

Prestudy

# The Inclusive Green Economy

Shaping society to serve sustainability –  
minor adjustments or a paradigm shift?

April 2014

**Authors:**

**Eva Alfredsson**

**Anders Wijkman**

The contents of this prestudy are  
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# Foreword

 'Green economy' was a central theme at the 2012 United Nations Conference on Sustainable Development ('Rio+20'). Before it, the Swedish think tank Global Challenge's working group on the Green Economy initiated a seminar series and a prestudy to examine the notion of a 'green economy' and, specifically, identify crucial research issues concerning the scope for turning society in a more sustainable direction. The prestudy was funded by Mistra.

This publication, reporting on the prestudy findings, was written by Eva Alfredsson (chair) and Anders Wijkman (vice chair) of the Global Challenge Green Economy working group. Other group members are Thomas Hahn, Karl Hallding, Catharina Nystedt-Ringborg, Staffan Laestadius, Måns Lönnroth, Kristina Persson, Sandro Scocco and Kristian Skånberg.

Kristian Skånberg and Thomas Hahn played an active part in writing the report. Ulf Dahlsten, Karl Hallding, Kristina Persson, Sandro Scocco and Magnus Lindmark contributed key opinions on an early draft of the prestudy report. Halvar Johansson, Mikael Malmaeus, Åsa Sohlman and Jonas Wannefors did the same.

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Special thanks are due to Per Lagerström, Director and communications manager at Global Challenge, and the other staff at the Secretariat of Global Challenge, for their proficient and creative work of arranging the seminar series.

Finally, we wish to thank the many attendees who made both written and oral contributions in the course of the seminars.

We would also like to extend our sincere gratitude and appreciation to all the speakers and discussants during the seminar series. They shared with us their time and expertise in a wonderful way. **Thank you!**

STOCKHOLM, MARCH 2014  
Eva Alfredsson and Anders Wijkman

# Summary

One central theme of the 2012 United Nations Conference on Sustainable Development ('Rio+20') was the 'green economy' issue. This was motivated, for the UN, by a growing realisation that sustainable development is highly contingent on whether the economy and its frameworks can be transformed (UNEP, 2011). The economy is a powerful engine for the development of society, and if this engine does not work towards sustainable development, efforts for sustainability will always involve an uphill struggle (Speth, 2008).

Various organisations, such as the OECD, have drawn similar conclusions and launched strategies for 'green growth' (OECD, 2011). For the OECD, the global economic crisis ensuing from the financial crisis of 2008 has resulted in a successive revision of policies. Pier Carlo Padoan, Chief Economist and Deputy Secretary-General, has described the predominant economic paradigm before the crisis as unsustainable in ecological, social and economic terms alike. Padoan asserts the unwise-ness of a return to 'business as usual': it represents major risks and costs, and would be untenable in the long run.

The United Nations Environment Programme (UNEP) has developed a working definition for the 'green economy' as 'one that results in **improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities**. In its simplest expression, a green economy can be thought of as one which is **low-carbon, resource-efficient and socially inclusive**' (UNEP). The OECD's definition is strikingly similar (OECD, 2011), and its report contrasts the green economy with the economy of the present day.

Increasingly, the OECD and the World Business Council for Sustainable Development are also discussing the role of entrepreneurship in society, in terms of serving the interests not only of company shareholders but of society as a whole. In other words, business operations must be a 'fair deal' for a broader group of stakeholders.

As part of the preparations for the UN Rio+20 conference, the Swedish think tank Global Challenge's working group on the Green Economy initiated a pre-study to analyse the notion of 'green economy' in detail. The purposes of this pre-study were to analyse the prospects of transforming our current economy into a sustainable green one and to identify knowledge gaps where further research might make important contributions to a successful transformation. Questions critical to the pre-study were:

- ▶ What characterises a green economy and how does it differ from the prevailing one?
- ▶ Can the economy be turned in a sustainable direction by adjusting the existing tools of economic policy or are changes on a larger scale — a paradigm shift — required?

One central premise was that many of the issues addressed in the pre-study have, for decades, been objects of extensive research and analysis among research economists with a natural science bent, such as environmental economists. However, this

research has neither gained much of a hearing in the public debate nor, unfortunately, led to any broad intradisciplinary dialogue among economists.

Switching to a green economy is presented by the UN, OECD and many leading scientists as a necessity. Given this objective, it is clearly both relevant and vital to benefit from the research carried out by the economists with an orientation towards the natural sciences, such as ecology. One explicit purpose of the pre-study was to analyse in detail the proposals and conclusions contributed by these ‘scientifically oriented’<sup>1</sup> economists’ research.

This study is in no way comprehensive. Many other issues would have been important to explore. No doubt the most crucial one is that of jobs and employment. A particularly pertinent question would have been how a much more efficient use of natural resources — a key component in a green economy — would affect the supply of job opportunities. Other interesting themes that we would have liked to study in greater depth are:

- ▶ international trade — what changes are required to align the trading system with the framework of an inclusive green economy
- ▶ ethics, morality and psychological aspects of a transition
- ▶ gender perspectives
- ▶ technology and, in particular, the digitisation of the economy
- ▶ the growing complexity of society and its implications for democracy and sustainable development
- ▶ issues related to food production, especially soil quality.

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## Discourse of an inclusive green economy

One key conclusion of the pre-study is that the present-day economy exhibits major shortcomings in terms of prospects for sustainable development. The pre-study also shows that the political discourse expressed in the term ‘green economy’, if implemented, would entail key changes in the framework. Table 1 seeks to summarise, in heading form, the foremost differences between our current economy and a green economy as described by UNEP and the OECD, in particular.

The major contrasts between the features of the current economy and the green economy (as clarified in Figure 1) mean that the former and its frameworks and incentive structure must be radically reformed to live up to the visions of a green economy — one that promotes sustainable development.

One central conclusion is that adopting the aims of the green economy would entail a shift of perspective in political discourse, from seeing sustainable development as an endeavour to achieve a harmonious balance between economic, social and ecological development — as expressed by the Brundtland Report — to a perspective in which **socially sustainable development is the aim, ecological sustainability is a fundamental requirement and the economy is seen as a tool.**

The social dimension is critical. Development that is socially sustainable — where the ‘social capital’ (trust) is well developed — is not just an overarching aim. It also appears essential for success in implementing the major changes in economic frameworks and society at large that are needed to attain sustainable development in all its dimensions.

Carrying out a traditional economic transaction, for example, requires only a relatively low degree of social capital (trust), while the degree necessary for devel-

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<sup>1</sup> In this publication, the description ‘scientifically oriented’ refers to the new breed of economists whose interests cross the boundary from social science into what is commonly known as ‘science’ (*naturvetenskap*) itself, and whose work includes the scientific, and especially environmental, implications of economic policy, trends and phenomena. The expression in no way negates the ‘scientific’ nature of the classical economists’ reasoning and methods, or economics as a (social) science.



**TABLE 1.** Examples of contrasting aims and features (as expressed by UNEP, the OECD etc.) of the current economy and a green economy

Current economy	Green economy
GDP growth: more economic activity the aim	‘Beyond GDP’: prosperity the aim
Focus on the near future (short-termism)	Long-termism
Maximisation of return	Safeguarding of long-term incomes
Shareholder value	Stakeholder value: benefit to society
Extraction of natural resources	Management of natural resources
Linear production systems	Circular production systems
Short-life products for sale	Long-life services: the ‘performance economy’
Efficiency measured in monetary terms (e.g. cost-benefit analysis, CBA)	Multidimensional efficiency (e.g. multi-criterion analysis, MCA)
Micro- and macrorationality highly divergent	Micro- and macrorationality highly congruent

oping close human relationships is higher. This higher level of social capital is also required for developing and maintaining a democratic form of government. Developing and maintaining sustainable management of nature and its life-support systems probably calls for an even higher degree of cooperation and trust. This conclusion, in turn, implies the need for a global social contract (global solidarity) and strengthened global institutions if attaining sustainable development is to be feasible. At times of crisis, such as the ongoing economic crisis of our day, there is a major risk of social capital being eroded, severely jeopardising the attainment of ecological, social and economic objectives alike. One conclusion is that social capital must not be neglected: on the contrary, in times of economic recession extra efforts must be made to protect it.

## Traditional versus scientifically oriented economic theory

One conclusion from the prestudy and the discussions that took place at the associated seminars is that important steps towards a more sustainable economy could already be achieved within the framework of traditional economic theory, dominated by neoclassical ideas. Reasons why this has not occurred to any great extent must be sought in the application of economic discourse, i.e. issues of ecological sustainability, in particular, have not been prioritised enough. Reasons must also be sought in the sluggishness and resistance inherent in the political process. Many of the proposals put forward over the years within the framework of the political process, often in response to initiatives from leading economists, have been either voted against or watered down. The EU Emissions Trading System (ETS) is one current example of many.

One clear conclusion from the prestudy is that **a substantial consensus exists, at the theoretical level, on a range of economic principles relevant to sustainable development.** Examples of principles on which there is a good consensus but where application is often inadequate are that:

- ▶ Sustainable development calls for long-termism, taking the prosperity of future generations into account as well.

- ▶ Anyone who pollutes the environment must pay for remediation (the ‘polluter pays principle’).
- ▶ Adverse impacts on the environment and human beings must be included in market prices, i.e. external impacts must be internalised.
- ▶ A functioning market means that neither sellers nor buyers should be so large and dominant that they can themselves exercise strong influence on market prices.
- ▶ The distribution of incomes and ownership in society must be relatively even.
- ▶ A well-functioning market requires symmetrical information, i.e. both sellers and buyers must be fully informed about the content of transactions.
- ▶ There is a need for an institutional framework (societal aims, rules and regulations) to reduce the difference between what is rational for the individual (microrationality) and what is most beneficial to society (macrorationality).<sup>2</sup>
- ▶ GDP was never intended as a measure of prosperity, and has distinct shortcomings as an objective of economic policy. An activity that raises GDP may be directly uneconomic (i.e. reduce efficiency) in cases where marginal costs exceed the benefits of the activity.

Despite substantial agreement between economists schooled in the neoclassical tradition and scientifically oriented economists, **there are also crucial differences**. On the basis of the prestudy and the seminars and literature studies carried out, these differences may be summarised as follows:

- ▶ Scientifically oriented economists see natural capital, especially the supply of high-quality energy, as having a far more crucial bearing on the economy and its development than it is seen to have in neoclassical economic theory.
- ▶ Scientifically oriented economists question whether it is reasonable to discount the future value of ecosystem services and other natural capital at all, given the fact that the supply of these will hardly increase in the future (TEEB 2010).
- ▶ Scientifically oriented economists base their reasoning on a ‘strong’ definition of ‘sustainability’. In this approach, natural capital is replaceable by other (manufactured, financial, knowledge or social) capital only to a limited extent. Economists rooted in the neoclassical tradition assume greater, if not total, substitutability among different forms of capital. However, a shift towards a ‘stronger’ definition of sustainability seems to be under way among mainstream economists.
- ▶ Scientifically oriented economists (for whose work the laws of thermodynamics are a fundamental premise) believe that continued material (GDP) growth, in the form of a further rise in the aggregate throughput of energy and material, is incompatible with sustainable development. Traditional economists are well aware of the shortcomings of the GDP measure, yet they do not seem to view further growth of energy and materials throughput as an obstacle to sustainable development, either in theory or in practice — rather, the contrary.
- ▶ In terms of the primacy of the price mechanism, especially for natural resources and ecosystem services, scientifically oriented economists in general are highly critical of conventional economic methods of valuing nature. In their view, these methods underestimate its ‘true’ value, including its value as insurance, which in

<sup>2</sup> The ‘prisoner’s dilemma’ otherwise has suboptimal results that can be remedied only through communication and joint decisions (policy) that include reform of ground rules and sanctions, and the institutional framework (taxes and regulations) should be shaped in such a way as to minimise the difference between microrationality (economic benefit to businesses) and macrorationality (economic benefit to society). Calculated risk-taking at micro level must not entail any costs being offloaded on the macro level: economic benefit to businesses should result in economic benefit to society.

many cases can be infinitely large.<sup>3</sup> Economists schooled in the neoclassical tradition generally have a stronger belief in the importance of well-defined ownership rights as a mechanism of securing long-term sustainable management.

- ▶ Scientifically oriented economists are critical of the inability of current economic theory to capture and deal with non-linear phenomena, such as tipping points, and point out that processes in nature, such as the impacts of climate change, are not always reversible.

Summing up, while — in theory — a relatively broad consensus exists among economists of different schools regarding issues relating to sustainable development, there may also be said to be substantial differences. Knowledge in the area is developing rapidly, with some indications of convergence in the direction of the scientifically oriented economists' premises (TEEB, 2010). Intradisciplinary debate on these matters is still, however, extremely limited. Economics textbooks (in Sweden and elsewhere) have incorporated scientific knowledge into economics only to a very small extent.<sup>4</sup> Consequently, the knowledge acquired by certain economists, after long careers spent analysing environmentally related issues using economic theory, is not being passed on to the next generation of economists.

Ecosystem services, for example, are multifunctional and some of these functions can be replaced only at a very high cost. The fact that natural capital is therefore only to a limited extent replaceable by other types of capital is, to most economists with long experience of working on these issues, irrespective of whether they started from (and have reassessed) neoclassical theory or from a more interdisciplinary springboard, a fact. But this fact is far from obvious for economists in general, both recent graduates and professionals, who lack experience of sustainable development.

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## Emphasis on importance of politics and social capital

One aspect that was frequently stressed at the seminars is the crucial role of politics. However sound economic theories may be, there is little chance of them being applied in practice unless they are supported in the political process. Problems like external effects, valuation of different types of capital, protection of biodiversity, scarcity of resources crucial to the economy (such as high-quality energy), the incentive structure relating to innovations and new technology — these must be tackled in a political and institutional framework. Without the emergence of a robust political discourse, based on the principles of sustainable development and founded in democratic decisions, there is an inherent danger in prevailing imbalances of power and influence, along with vested interests of various types. The danger is that, as a result, the scope offered by economic theory may not develop and the prospects of sustainable development may be further eroded.

At the seminars, the scientifically oriented economists who took part advocated a range of different proposals that were, in their view, key reforms en route to a sustainable, inclusive green economy. Examples are tax reforms (amounting to a green tax shift, with lower tax on labour and raised taxes on extraction of raw materials and/or emissions of various kinds); a reform of the financial sector, replacing the current short-termism by greater long-termism, not least in risk valuation; and devising new economic development measures and indicators ('Beyond GDP').<sup>5</sup>

<sup>3</sup> TEEB, *The Economics of Ecosystems and Biodiversity, Synthesis Report* (2010, p. 25).

<sup>4</sup> Green, Tom. 2012. 'Introductory economics textbooks: what do they teach about sustainability?' *Int. J. Pluralism and Economics Education*, Vol. 3 (2): 189–223; Green, Tom. 2013. 'Teaching (un)sustainability? University sustainability commitments and student experiences of introductory economics.' *Ecological Economics* 94: 135–142.

<sup>5</sup> The Commission on the Measurement of Economic Performance and Social Progress (Stiglitz-Sen-Fitoussi Commission), <http://www.stiglitz-sen-fitoussi.fr/>.

These various proposals are described below, but without specific judgements on the suitability of each. However, one lesson is that the key to sustainable development may be found less in specific sustainability issues, such as locally produced versus imported food, choice of transport mode and increased consumer power, than in the overall nature of frameworks, including the financial system, in the economy.

Our view is that foundations must be laid for radically broadened analysis and discussion of the conditions of sustainability. There is no lack of proposals. The problem is the inadequacy of both intradisciplinary dialogue and political will. There is an urgent need for a debate on the practicalities of the proposals and their application. In some areas, new knowledge is also acutely needed.

Current research on sustainability essentially concentrates on issues where there is relative unanimity among different kinds of economists. In our view, there remains a marked need to intensify knowledge development, notably by analysing the effectiveness of various control instruments, in these areas.

The true challenge to research, however, is to be found where knowledge gaps are at their widest and the differences in perspective and assumptions among the discourses of the various schools of economic theory are at a maximum. On the basis of several series of scientific research reports — from the Intergovernmental Panel on Climate Change (IPCC), Millennium Ecosystem Assessment, Planet under Pressure etc. — there are cogent reasons for taking the scientifically oriented economists' analyses with the utmost seriousness. Accordingly, one crucial task for the research must be to analyse the scope for economic development that ends our current addiction to constantly using more energy and materials, especially finite natural resources and, in particular, fossil fuels.

The economy of today is one that not only strives for economic growth but has come to be based, and made to depend, on exponential growth. In its present form, the system implies a throughput of energy and materials that constantly increases over time. This trend is unsustainable. A green economic transition, ending this increase, would thus mean reshaping many societal functions and mechanisms.

A key function of research should be to perform a special analysis of how countries that are already rich can achieve a transition from quantitative growth to qualitatively oriented development.

Summing up, research faces a need for a steep, focused learning curve that includes:

1. Calling into question parts of the existing economic discourse, on the basis of the new conditions entailed by the aim of sustainable development.
2. Using the economy as a tool for sustainable development, i.e. developing decision support for a transition towards a green economy, based not only on neo-classical economic theory but also on natural science-oriented economics.
3. Developing an interdisciplinary approach that comprises subjects like economics, ecology, biophysics, ethics and political science to develop theoretical frameworks, knowledge and solutions to address the more complex aspects of sustainable development.

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## The Green Economy Workshop, 10-11 February 2014

Additional insights were gained at a 'Green Economy Workshop', with international participation, held in Stockholm in February 2014 (see Chapter 7). The aims were to review this pre-study report and to elaborate on the proposed research agenda for a transition to an inclusive green economy. While the workshop participants represented a wide range of disciplines and academic backgrounds, a remarkably high degree of consensus was reached on a great number of issues.

In general terms, the most significant point of agreement was that a transition to an inclusive green economy would require a systems perspective and the closest possible cross-disciplinary cooperation. Moreover, the global nature of the challenges will require the research to be truly *international*.

Workshop participants also expressed profound concern about the problems of ecological and financial overshoot, as well as looming resource constraints. ‘Business as usual’ represents grave risks, and this constitutes a strong motive for ‘*action research*’. There is simply not enough time to slowly build new theories and models. Researchers must devote significant time and effort, as well, to testing new, sustainable solutions that can improve resilience and provide bridges to a new and inclusive green economy. In our current situation — in the Anthropocene, with growing evidence of discontinuities and tipping points in the Earth system — policies for growth and development and, indeed, macroeconomics must recognise the necessity of adopting models of ‘*growth within biophysical limits*’. Conventional macroeconomic models, such as DICE, include no such limits, thus implying that environmental degradation (such as GHG emissions and ecosystem decline) can continue unabated, reaching very high levels and pressures, for example CO<sub>2</sub> concentrations exceeding 1000 ppm, while anticipating only limited damage to the world economy.

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## Key research topics

In response to the outcomes both of the seminar series and of the international workshop, we have grouped the research questions under a number of key topics deemed particularly important for launching a research programme. It is suggested that a research effort of this kind should be underpinned by a robust definition of sustainability. In the view of this prestudy’s authors, as already mentioned, the definition should entail a shift in perspective from seeing sustainable development as a harmonious balance between economic, social and ecological sustainability to seeing social sustainability as the goal, ecological sustainability as a precondition and the economy as a tool.

### Formation of social capital and well-being

- ▶ **How do we rebuild social capital at all levels – individual, societal, political and at the level of global governance?** We need a better understanding of the interconnections between economic policy and social capital and well-being.
- ▶ **How can well-being be maximised while resource use is minimised?** Comparing different countries in terms of well-being per capita in relation to resource use, what conclusions can we draw?
- ▶ **How can social capital and well-being be maintained when GDP is failing to grow, or even declining?** If society does not find a way of decoupling aggregate resource use from growth at global level, the world is likely to face low or even negative GDP growth for an extended period of time. In a squeezed economy there are imminent risks of social instability, conflict and adverse effects on well-being.

### Crucial role of natural resources for growth and development

- ▶ **Rising prices of most commodities, including energy, are likely to damage prospects for growth and development. What alternative strategies could be pursued to avoid this?** What would be the short-term and long-term benefits to society— of a circular economy, i.e. one characterised by massively increased resource efficiency?

- ▶ **What are the preconditions for a long-term sustainable transition of the energy system** from fossil dependence, exceeding 80% at global level, to a dominance of renewable energy? How can we establish *and renew* a system based on biomass, wind and solar power? Examining the critical role of EROEI (energy return on energy invested) is particularly important.
- ▶ **Centralised versus decentralised electric power systems.** How should we evaluate higher unit costs but lower risks (disaster risk reduction) of decentralised systems in relation to lower unit costs but higher network costs and unknown disaster risks?

### Qualitative versus quantitative growth

- ▶ **How can a shift in policy priorities from GDP growth to a set of well-being goals become feasible?** What are the requirements for decoupling production and consumption from a rise in the throughput of energy and materials?
- ▶ **How would the functions of our society need to be designed to optimise welfare and development in a steady-state economy?** Specifically, in a steady-state economy:
  - How are employment issues managed?
  - How are resources and incomes distributed?
  - How are welfare services funded?
  - How can the ratio of earned to unearned income be raised again after decades of decline?
- ▶ **What indicators for welfare and well-being should be used to promote and facilitate a shift towards qualitative growth?**

### The business sector as a force for sustainability

- ▶ **What regulations and incentive structures would support sustainable businesses?** How can regulations and incentive structures be shaped in such a way as to encourage the evolution of companies that produce the greatest possible benefit to society (in all relevant forms of capital: real, human, social and natural)? What regulatory measures are needed to restrict marketing activities that excel in creating consumer habits of overconsumption and waste?
- ▶ **Examine the overall effects of economies of scale.** The quest for market dominance and economies of scale has led to many companies becoming very large and, in the process, reducing their share of equity. Companies have, in effect, become ‘too large to fail’, entailing greater risk-taking for society. How can such risks be limited?
- ▶ **Improve understanding about public sector levers,** like public procurement and public/private partnerships, with a huge potential for sustainable innovations.

### The financial system as a force for sustainability

- ▶ **How should the financial system be shaped to support sustainable development?** How, for example, will the challenges of financial overshoot combined with ecological overshoot be tackled to facilitate a transition to a sustainable economy?
- ▶ **How does the level of indebtedness in society impact on prospects for sustainable development?** To what extent does a rapid credit expansion ‘dope’ the economy, causing greater exploitation of natural resources and increased GHG emissions?



- ▶ **How can taxation loopholes in the global economy be addressed?** In the last few decades, international competition has resulted in a ‘race to the bottom’ regarding corporate taxes. Income inequalities have increased substantially, both between and within countries, and are now perceived by the World Economic Forum as one of the main global risks.

### Governance

- ▶ **Democratisation of the transition:** the crucial importance of politics for a transition to an inclusive green economy is clear, irrespective of which issue is at stake. The inadequacy of action in the political sphere to date is abundantly clear. How are we to pave the way for a democratically based transition that meets the indispensable requirements of sustainable development?
- ▶ **In an inclusive green economy, what institutions would foster sustainable development?** A transition to an inclusive green economy requires a transformation of the institutions that guide the economy today. The prevailing view of cost-effectiveness and the demand that all policies should aim at, and be benchmarked against, their contribution to GDP growth constitute serious barriers to change. What kinds of frameworks and methods — such as backcasting from a sustainable future, valuation of ecosystem services and economic incentive schemes — would be conducive to overcoming these barriers to change?
- ▶ **How can resources in society be allocated efficiently and resiliently?** Today, resource allocation is far from efficient and, above all, unsustainable in the long term. Massive and growing financial resources are, for example, being allocated to support exploitation of fossil fuels. Another example of inefficient resource allocation is for large groups of people to be unemployed while numerous important, value-creating tasks in society are neglected. How far is this an issue of governance?

# 1 Introduction

Internationally, the concept of a ‘green economy’ became established when it was selected as a major theme at the United Nations Conference on Sustainable Development in Rio in 2012 (‘Rio+20’). The United Nations Environment Programme (UNEP) defines a green economy as one that results in ‘improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities... in its simplest expression, a green economy is low-carbon, resource-efficient and socially inclusive’ (UNEP, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, 2011).

The OECD uses the term ‘green growth’ (OECD, *Towards Green Growth*, 2011). In the OECD’s view, achieving it entails boosting growth while, in parallel, reducing emissions of pollutants and greenhouse gases, minimising waste and inefficient use of natural resources, and preserving biodiversity. Green growth is also, according to the OECD, about improving conditions for human health, ensuring energy security and independence from fossil fuel imports, and making environmental investments a driver for economic growth.

The green economy (as outlined by the UN and others) is compared in this pre-study with our current, unsustainable economy. Today’s economy was born — to build on Pavan Sukhdev’s narrative — at the beginning of the 20<sup>th</sup> century. It has been shaped by contemporary challenges, such as widespread poverty, glaring deficiencies in health and education, and insecurity in unemployment and old age.

The Swedish economist Klas Eklund has described ours as a ‘cowboy economy’ (Eklund, 2011). This term was originally used by Kenneth Boulding (1966) to describe an open economy embedded in a world of apparently infinite resources where the heroes were those who constantly broke new ground.

As a reaction to perceived shortcomings in neoclassical theory, but above all in the application of theory to environmental problems, the International Society for Ecological Economics was formed in 1989. Its purpose was not to develop a whole new set of theories, but rather to pinpoint specific failings in both application and theorisation.

The 20<sup>th</sup>-century economy was tremendously efficient in many respects. Economic development during the century represents an exceptional phase in human history. Never before has economic growth been so rapid. Technological development and innovations; improved forms of organisation; private enterprise and entrepreneurship; institutions to protect ownership rights; free trade and globalisation — these, according to the traditional neoclassical economists, have been the dominant drivers of and explanations for the rapid expansion. Moreover, technological advances and fast-rising labour productivity made possible the exploitation of natural resources that were previously inaccessible. The focus among traditional economists, however, was not on productivity in the use of energy and natural resources, mainly owing to low and, throughout the 20<sup>th</sup> century, falling prices.

The utility of constantly exploiting new land and new resources was substantial. As long as total production (the ‘pie’) was growing, there were prospects of greater prosperity for all. ‘A rising tide lifts all boats,’ as Margaret Thatcher pointed out. The incentive structure was geared to generating the most rapid economic growth



possible. The incidental adverse impacts (negative external effects like pollution) of production were tackled, as they arose, with regulations, financial instruments and information campaigns. The conventional wisdom was that, with more growth and prosperity, more resources could be set aside to remedy the negative externalities.

Scientifically oriented economists, on the other hand, attribute the 20<sup>th</sup> century's exceptionally high economic growth rates largely to the abundance of fossil fuels, above all high-quality oil. The problem of reduced growth rates, which are faced by the great majority of countries today: growth in the OECD region has declined considerably over the past few decades, slackening even in growth nations like China, is seen by the scientifically oriented economists as directly connected with the fact that we can no longer boost our supply of high-quality energy at reasonable cost. This, in turn, has reduced scope for further rises in labour productivity (Stern, 1993). In these economists' opinion, too, the OECD region has partly solved its profitability problems since 1990 by means of labour arbitrage, i.e. companies in the increasingly globalised economy have been able to benefit from very cheap labour and low-cost raw materials in the developing countries (Korten, 2010; Giarini, 2010). This, in turn, has given an impetus to these countries' economies, greatly accelerating their growth; and this has boosted demand in the developed countries as well, driving further natural-resource exploitation. Thus, exploitation of natural resources has given way to overexploitation.

In many developed countries, falling employment in manufacturing industry has been offset by rising service production. The financial sector has been deregulated, similarly giving a temporary impetus to economic activity and investments. One marked effect has been a sharp rise in indebtedness in these economies. An increasingly marked gap between the financial economy and the real economy has arisen. Investments in the real economy have yielded a lower return than those in financial instruments and properties, and a growing proportion of investments have therefore been in various financial instruments. This has, in turn, resulted in asset inflation, i.e. rapidly rising prices of property and shares, in particular.

Despite globalisation, the rate of GDP growth has steadily declined since the 1970s, both in the OECD as a whole and in the EU. The first global analysis of the Genuine Progress Indicator (GPI) shows that GPI per capita peaked in 1978 and thereafter successively decreased. GPI includes housework and voluntary work, and deducts costs of degradation of natural, social and human capital. According to the study, growth may be said to have been 'uneconomic' since 1978, i.e. the value of its negative effects has exceeded that of positive ones (Kubiszewski, 2013).

On the other hand, there are also researchers who assert that the cause of the negative economic trends of the past few decades in the OECD region is that progress in the reshaping of the economy towards a more market-oriented system, with less government intervention, has been too slow, while competition from China and other developing countries has stiffened.

Regardless which explanatory model is chosen, there is broad agreement that the present-day economy needs reforming if it is to address the great challenges now facing the world.

In the debate of the past few years, more and more people have called for the current economy to be replaced by one that is green and inclusive. Organisations like UNEP and the OECD have, as mentioned above, presented a succession of reports with similar orientation and content (such as the OECD's *Putting Green Growth at the Heart of Development*, 2013, and *Towards Green Growth*, 2011).

At issue, then, is what characterises the green economy and how far it differs from the economy of today.

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## 1.1 Purpose

The purpose of the prestudy is, by identifying a number of crucial aspects (themes), to exemplify and explore how far, and how, the green economy diverges from the present-day economy and what is required to bring about a practicable and successful green economic transition.

Another major purpose is to identify knowledge gaps and issues for further studies and research.

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## 1.2 Method

The prestudy was implemented in the form of a seminar series. Speakers at the seminars were internationally leading experts in their respective fields. At these seminars, ‘opponents’ were invited to create a discussion. A number of articles on each subject were selected in consultation with the speakers, and these articles were examined by the opponents. The documentation for the present prestudy report was scrutinised by a wide-ranging group of experts.

The seminars covered issues to which a great deal of attention had been devoted in the background reports on the ‘green economy’ theme — especially those from UNEP and the OECD — drawn up ahead of the UN Conference on Sustainable Development (Rio+20) in June 2012. The list of intractable issues included in the prestudy is far from complete, and some important questions were excluded for reasons of time and resources. Some of these questions are listed in Chapter 7.

The subjects raised at the seminars may be regarded as cases in a case study. Based on the various cases, the critical questions of the study have been analysed. Details of the seminars are given in Appendix A.

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## 1.3 Layout

The report is laid out as follows.

Chapters 2–6 summarise and analyse key issues for a green economy, on the basis of the following layout and issues:

1. Discussion based on a traditional economic perspective.
2. The speakers’ theses and proposed measures are summarised using sources including various articles on which the respective speakers had based their lectures. In the context, references are also made to reports on the ‘green economy’ theme, mainly from the OECD and UNEP.
3. The areas of conflict and/or contrast between conceptions of a green economy and the ‘logic’ of the present-day economy are analysed and discussed, addressing the question of whether a paradigm shift is necessary.
4. Summary of conclusions and proposed research questions.

Chapter 7 summarises and describes knowledge gaps and proposals for future R&D initiatives.

## 2 Energy

(based on seminars 1, 6 and 7)

### **‘What is worse than running out of oil? Not running out of oil!’**

CHARLES A.S. HALL

The importance of the energy supply and the price of energy for economic development is undoubtedly one of the most crucial and controversial issues in economic contexts, especially with reference to the green economy. The dividing lines are clear but sometimes confusing. Energy, as a theme, has therefore taken a prominent place both in the seminar series and in this report.

There is broad agreement on the connection between energy use and growth in the economy. Research in this area has been intensive ever since the first oil crisis of the 1970s. Nevertheless, it appears that much of the knowledge generated is not applied. As relevant as this knowledge is in terms of GHG emissions and air pollution, it is of course equally relevant in terms of growth and prosperity.

For scientifically oriented economists, a central criticism and premise is that neoclassical economics has not paid enough attention to the fundamental importance of energy and natural capital for the economy and growth.

Scientifically oriented economists believe that access to abundant, high-quality (energy-dense, easily handled and storable) energy at a low cost had a decisive impact on economic and social development in the 20th century (Stern, 2011 and 1993; Dasgupta, 2002; Kander, 2002). True, they find that technological development and innovation have been similarly key factors, but nonetheless of a secondary nature. The reason is that technology, in the great majority of cases, is the tool for effective exploitation of the high-quality (fossil) energy. Without access to this energy, however, technology would not have taken off. Technology is said to have been developed in order to put energy to work.

In his book *The Origin of Wealth: Evolution, Complexity, and the Radical Remaking of Economics* (page 11), Eric Beinhocker summarises the economic history of humankind:

*To summarize 2.5 million years of economic history in brief: for a very, very, very long time not much happened; then all of a sudden, all hell broke loose. It took 99.4 percent of economic history to reach the wealth levels of the Yanomamö, 0.59 percent to double that level by 1750, and then just 0.01 percent for global wealth to leap to the levels of the modern world.*

In retrospect, the 20th century was a highly exceptional period. The conclusion should plausibly be that research on sustainable development needs to adopt a longer historical perspective, and that economic research should lay greater weight on being consistent in scientific terms — or at least not conflict with scientific laws.

The speakers at the seminars on energy (seminars 1, 6 and 7) were Astrid Kander, Professor of Economic History at Lund University; Charles A.S. Hall, Professor of Environmental and Forest Biology at the State University of New York, Syracuse, and founder of ‘Biophysical Economics’; and Kjell Aleklett, Professor of Physics and leader of Global Energy Systems research at Uppsala University.

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## 2.1 How economics research sees the link between energy and growth

In economic research on the association between energy and growth, the analysis is normally performed in two main stages. The first involves determining whether there is a causal connection between the variables of energy use and GDP. The second stage is analysis of the direction of this connection, i.e. whether it is a rise in GDP that brings about increased energy use or, on the contrary, an increased supply of energy that boosts GDP growth.

The prevailing causal interpretations are as follows. If the causality is from energy to GDP, this implies an 'energy-dependent economy' in which energy scarcity can adversely affect incomes. Similarly, increased energy use results in a rise in GDP. If the causality is in the opposite direction, from GDP to energy, this suggests that energy savings are not necessarily detrimental to incomes. The causal connection may also work both ways. Whether the economy is 'energy-dependent' (the causality is from energy to GDP) or not has major policy implications. In an energy-dependent economy, for example, it is difficult (or, rather, expensive) to cut carbon dioxide (CO<sub>2</sub>) emissions by reducing energy use, since this is deemed to impair growth.

Numerous studies have examined the association between energy and GDP. The results are not unequivocal, but most studies reach the conclusion that there is a strong connection and it works both ways (Stern, 1993; Stern, *The Role of Energy in Economic Growth*, 2011; Lee, 2007; Lee, 2006). Some studies conclude that the connection goes from GDP to energy (Abosedra and Baghestani, 1989). A study of the G7 countries shows that capital formation, energy use and GDP are correlated, and that a rise in capital formation or an increased supply of energy results in a higher GDP (Narayan, 2008). A 1% increase in energy use results in a rise in GDP of 0.12–0.39%, and a 1% rise in capital formation boosts GDP by 0.1–0.28%.

Many economists are strongly opposed to reducing energy use in absolute terms, which — given a strong focus on growth — may seem logical. According to some research reports, there is a danger that reducing energy use may damage growth.

From this viewpoint, the logical method for reducing CO<sub>2</sub> is, instead of reducing energy throughput, to focus on replacing carbon-intensive energy sources with less carbon-intensive ones, and on making energy use more efficient. It is, moreover, this method that has brought about most of the reductions in emissions to date in a country like Sweden.

In general, countries that are economically successful (in terms of GDP per capita) are relatively energy-efficient. This normally ensues from rising trends of human capital and productivity alike, as well as of growth in real earnings. One result is a trend towards activities with higher added value and various types of services, i.e. activities of lower energy intensity.

If the goal is a transition to a green economy, based on renewable energy sources, a limitation is encountered: energy use must be adjusted to the level a renewable energy system can deliver. Several studies have analysed the scope for a transition to a sustainable energy system — that is, one based in all essentials on renewable energy. The conclusion is that such a transition is feasible but difficult to reconcile with a continued increase in energy use, and thus calls for a vigorous parallel drive for greater energy efficiency (SEI 2012; The Corner House, 2013). Other studies express the view that a sustainable energy system presupposes a lower global level of energy consumption (Tverberg, 2013).

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## 2.2 How scientifically oriented economists see the importance of energy

The scientifically oriented economists regard factors like energy, natural resources and energy services as being of paramount importance for the economy and prosperity. They also stress that the quality of energy is crucial. All experience shows that humankind uses energy of the highest quality first, and that energy costs rise when sources of inferior quality are tapped. It also shows that the scope for rapidly replacing today's overwhelmingly predominant energy sources, in the form of fossil fuels, with alternative sources is limited. Moreover, any change in the prevailing energy system would entail long lead times. It would, for example, take several decades to find renewable substitutes for the fossil sources on which we depend for 80% of our energy supply (Hirsch et al., 2005; Marchetti, 1977).

To live and develop, a net energy supply is imperative for every organism. Different ecosystems and organisms are, moreover, adapted to making use of energy in certain specific forms (in the form of specific foods, living within certain temperature zones etc), and these can be replaced by other forms of energy only to a limited extent.

Communities and societies, like ecosystems and organisms, depend on surplus energy for survival. The more surplus energy there is, the greater the scope for developing production and consumption over and above sheer survival requirements. In her thesis Astrid Kander, one of the seminar speakers<sup>6</sup>, compiled data on energy use in Sweden since the 19<sup>th</sup> century. These figures show that in that century, generally speaking, there was in fact only one industrial sector in the economy: energy. Virtually all production in society was energy production of some kind: food, clothing to stay warm, housing and heating. Since then, the proportion of household income spent on basic consumption, in the form of food, clothing and heating, has steadily fallen. This has left room for other forms of consumption, including the establishment of our welfare state in the form of healthcare, education and social security.

As already mentioned, the scientifically oriented economists have attributed the rapid economic growth of the past 150 years mainly to the copious supply of fossil fuels at low cost, above all crude oil (Hall, 2011; Stern, 2011). Technology of various kinds has had the primary purpose of making it easier for society to utilise the high energy value of fossil fuels, and thereby boost productivity. The technology has thus been complementary.

This thesis is based on the fact that the fossil fuels, not least crude oil, have historically offered a very high degree of net energy. The energy content of a barrel of oil (approx. 159 litres), for example, corresponds to roughly as much work as 12 adults engaged in heavy physical labour would carry out over a whole year. Even a record high oil price of almost 150 dollars a barrel (in July 2008) must, in this context, be regarded as extremely low — at least, compared with the cost of labour. Reversing the substitution of energy for labour that has taken place over the past hundred years would thus require very large hikes in energy prices (while lower labour taxes, on the other hand, can encourage the kind of activity that is labour-intensive).

Oil has numerous properties that make it particularly valuable, compared with most other energy sources. Oil is a liquid fuel, which makes it easy to handle and transport. It also has a high energy density per volume unit. This makes it suitable as, for example, a fuel in the transport sector. It is a versatile fuel with many areas of use. The production process, from extraction to combustion, is also a relatively clean and environment-friendly process compared with coal, uranium, oil sand, shale gas and other energy sources. Last and perhaps most important of all,

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<sup>6</sup> Seminar 1 (see Appendix A).

oil has historically been extracted without major energy inputs. Oil has generated a high proportion of net energy, i.e. Energy Return on Energy Invested (EROEI, more commonly abbreviated to 'Energy Return on Investment', EROI). This situation has changed over time, and crude oil extraction at extreme ocean depths or in the Arctic is resulting in entirely different costs and declining EROEI.

Richard Heinberg (2009) has analysed whether any combination of energy sources now available can meet global energy needs between now and 2100.<sup>7</sup> The criteria used in his analysis are:

1. Direct monetary cost
2. Dependence on additional resources
3. Environmental impacts
4. Renewability
5. Potential size or scale of contribution
6. Location of the resource
7. Reliability
8. Energy density
  - a. Weight (or gravimetric) density
  - b. Volume (or volumetric) density
  - c. Area density
9. Transportability
10. Net energy (Energy Returned on Energy Invested, EROEI)

The last criterion, net energy or EROEI, is the most important and, indeed, absolutely crucial one, according to Heinberg and many other researchers.<sup>8</sup> EROEI is the ratio between the quantity of usable energy delivered by an energy source and the quantity that has been expended (invested) in order to gain access to the energy.

It might be argued that any energy source that generates a positive EROEI value is worth investing in and scaling up to a level that satisfies our energy needs. Discussion of ethanol from maize, for example, has focused to a high degree on whether ethanol production generates a positive or negative EROEI. However, many studies show that the energy conversion ratio is poor. The conclusion is that even if a low EROEI may make a particular activity worthwhile, this kind of reasoning would not apply for society as a whole.

A study by Hall et al. (2009) entailed analysis of the lowest value of EROEI required for a developed society like ours to function (Table 2). Hall et al. include in these calculations of EROEI all the energy used to produce energy, including the infrastructure required to transport the energy to the end users.

The conclusion is that the energy system must be based on an EROEI of approx. 14:1 in order to sustain present-day Western societies. Historically, fossil fuels have shown an EROEI far exceeding 14:1. Oil extraction in the USA, for example, had an EROEI of 100:1 in 1930 but has successively declined. Today, the figure is as low as just over 10:1. For the majority of renewable energy sources, wind turbines being the exception (18:1), the estimated EROEI falls below 14:1. Nuclear power, according to Hall's summary, has an EROEI of between 5:1 and 10:1.

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<sup>7</sup> A primary energy source exists in nature, and may be used to generate energy (examples are solar radiation, fossil fuels, uranium and falling water). An energy carrier stores or transports energy (examples: electricity, petrol, batteries, hydrogen gas, hot water).

<sup>8</sup> The key mathematical difference between the terms 'net energy' and 'EROEI' is that EROEI is a unit-free ratio.



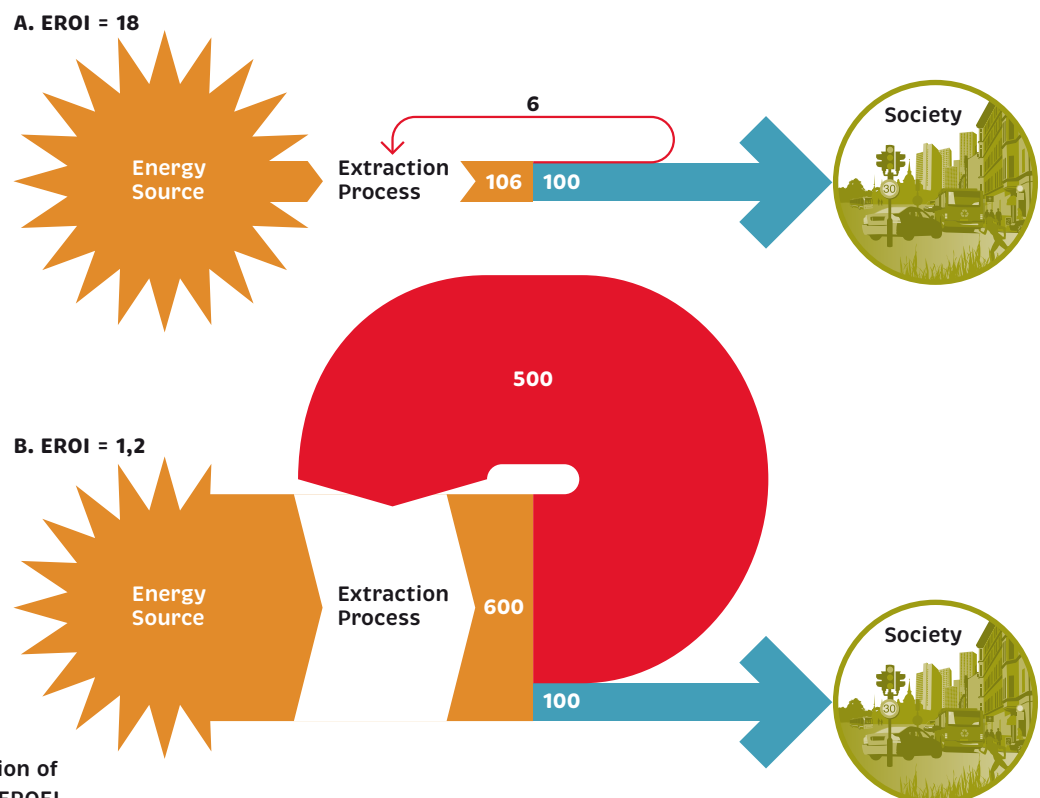
**TABLE 2.** Estimated minimum EROEI levels required to sustain functions of present-day Western society in terms of energy

Activity	Minimum EROEI required to sustain this function
Arts and miscellaneous	14:1
Health care	12:1
Education	9:1 or 10:1
Supporting workers' families	7:1 or 8:1
Growing food	5:1
Transport	3:1
Refining oil	1.2:1
Extracting oil	1.1:1

Hall et al. (2009) use a calculation to exemplify the implications of different EROEI levels for a society (Figure 1).

High EROEI values mean that a great deal of energy remains for other types of production and consumption. Low EROEI values, on the other hand, mean that a high proportion of the energy made usable must be allocated to new energy production. Discussion of EROEI to date has been confined to a small number of experts and commentators. Some analyses reach the assessment that an EROEI of at least 5:1 is required for an energy source to provide a sufficiently positive contribution to the development of society. But not only Hall et al. call this level into question. Gail Tverberg extends the analysis, adding the view that fossil fuels make a key contribution to the tax base today. Moreover, businesses' adaptation to higher energy costs, such as outsourcing and digitisation, has detrimental effects on the economy in a single country (Tverberg, 2013).

Entirely in line with Hall and Murphy, Tverberg finds that an EROEI of 5:1 is too low to sustain the existing structure of society. Constant development of technology that has been able to replace human muscle power with fossil energy has



**FIGURE 1.** Illustration of the importance of EROEI

brought about a very rapid rise in labour productivity. In fact, labour productivity has increased by a factor of 20, at a conservative estimate, over the past 150 years. This high productivity has simultaneously meant expending a great deal of raw materials and energy per hour worked. **At a time when fossil energy is an increasingly scarce and costly resource — and the EROEI is decreasing sharply — part of this productivity increase will, according to the scientifically oriented economists, be reversed.** Labour productivity decreases when the proportion of manual labour rises.

EROEI can be applied to sectors other than energy. Estimates of how much energy is used in food production, for example, give an indication of how efficiently and sustainably our food is produced.

## 2.3 Summary of conclusions

**TABLE 3.** Contrasts between the dominant present-day economic discourse and the scientifically oriented economists' perspective, in terms of energy

	<b>Current economy</b>	<b>Green economy, acc. to scientifically oriented economists</b>
<b>TYPE OF ENERGY</b>	The price of energy defines its importance. Renewable energy and improvements in energy efficiency will be phased in automatically once renewables have become competitive in relation to fossil energy. The market is expected to lead the way and, in general, to act rationally and for the long term, although most economists agree that market failures are substantial. Given that scarcity of fossil fuels and the climate threat are both realities and generally well understood, this ought to be reflected in higher prices. But this is not the case.	An energy system built primarily on renewable energy sources and a high degree of energy efficiency is a precondition for sustainable development. Non-renewable resources should be managed prudently, in line with these resources being regarded as humankind's joint asset and benefit that no individual or group has the right to exploit for personal gain.  Market pricing is not deemed to reflect the importance (and productivity) of energy correctly. The way externalities, both positive and negative, are managed is inadequate.
<b>VIEW OF IMPORTANCE OF ENERGY FOR THE ECONOMY</b>	A supply of reliable, low-cost energy is considered important but, since the cost of energy accounts only for a small proportion of GDP, not crucially so. The significance of energy is reflected in its share of overall costs.	Affordable access to high-quality energy is a fundamental and determining factor for the economy. To a high degree, the level of welfare and well-being in society is determined by its access to energy, the quality of the energy and how much energy is used to produce more energy (EROEI).
<b>ENERGY AS THE DRIVER OF GROWTH IN THE 20<sup>TH</sup> CENTURY</b>	Growth is ascribed to technological development in a broad sense — in the form of both machinery and more efficient production methods, assembly lines, international trade etc.	Growth in the 20 <sup>th</sup> century is considered to be essentially due to the abundant supply of high-quality, cheap energy (easy to extract, handle, transport and store, and of high energy density), i.e. from fossil sources. Technological development is viewed primarily as a means, for the purpose of exploiting and benefiting from this energy.



	<b>Current economy</b>	<b>Green economy, acc. to scientifically oriented economists</b>
<b>ENERGY QUALITY</b>	<p>The price of a form of energy indicates its quality.</p> <p>Monetary returns on investments are the decisive criterion for decisions to invest in energy extraction (production). It should be noted that this concept differs markedly from EROEI.</p>	<p>Energy return on energy invested (EROEI) is an important or crucial measure.</p> <p>A high EROEI means high net energy for society, which allows scope for meeting needs other than basic ones.</p> <p>The higher the EROEI and scalability (volume) a form of energy has, the higher its potential is.</p>
<b>VIEWS ON THE NEED FOR RAISED OR REDUCED ENERGY USE, IN ABSOLUTE TERMS</b>	<p>Energy use, in terms of absolute figures, should not be capped or reduced since this may have adverse repercussions on economic growth.</p> <p>However, energy use is thought to decline naturally as the economy evolves towards a service economy, which is considered to be a natural way of developing. Energy-intensive basic industry will, in time, become successively less energy-consuming owing to more efficient technology.</p>	<p>Since an energy system based on pure energy (dominated mainly by renewable energy) is a precondition for sustainability, energy use should be adapted to the supply of renewable energy. The extent of this supply is determined by the available energy sources and technology to extract the energy and make it usable.</p> <p>Most scientifically oriented economists think this means that the scope for continuously rising energy use over time is limited and that, globally, energy use per capita should converge. Developed economies with high per capita energy use should reduce it in absolute terms to broaden developing countries' opportunities for growth and development.</p> <p>High energy use is correlated with high exploitation of natural resources.</p>
<b>VIEWS ON RAISING ENERGY EFFICIENCY</b>	<p>Technological development and innovation continuously yield more energy-efficient technology.</p> <p>Given that energy is becoming a scarce resource, a raised price will result in greater energy efficiency. However, policy measures to raise energy prices impair productivity and growth, and should be avoided. Industry acts rationally, and will improve its energy efficiency to the extent that it is profitable to do so.</p> <p>Policy should help to bring about a reliable energy supply and low energy prices in order to optimise any given nation's competitiveness.</p> <p>Since technological development is expected to result in new energy sources being developed in line with demand, there are no absolute limits to energy use; nor are measures to enhance efficiency needed, beyond what is financially profitable.</p>	<p>Improving energy efficiency is crucial, to permit the highest possible production and consumption levels. Making energy use more efficient should therefore be a high-priority policy objective.</p> <p>Energy taxes help to accelerate the rise in energy efficiency; prevent development that is not energy-efficient; and bring about lower costs in the long term.</p>

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## 2.4 Proposed R&D topics

Central research questions are:

1. What does a transition to a sustainable energy system mean for a society as a whole?
  - What is the potential, in terms of the energy supply side, for sustainably using various forms of energy from a ‘source and sink’ perspective, i.e. how much is available to be extracted, and to what extent do environmental and health aspects restrict their use?
  - What is the potential for making energy use more efficient in various segments of society? The analysis can be based both on a user perspective (industry, transport, housing and buildings) and on the functional perspective (feeding people and animals, lighting, heating, refrigeration, moving objects and driving processes).
  - How are energy services allocated at a time when energy is a limited resource? What does existing research tell us about how energy services are organised when scarcity prevails?
2. How could measures of energy efficiency, such as EROEI, supplement measures of economic efficiency to create a measure of efficiency that is more consistent in interdisciplinary terms?
3. How can sustaining a supply of high-quality energy at affordable prices become part of the economic framework?
4. What are the preconditions for implementing a transformation of the energy system from fossil dependence, exceeding 80% today, to dominance of renewable energy? How can a system based on solar power, wind power and effective biomass be established and indeed renewed? What energy resources are required?

# 3 Development within planetary boundaries

(based on seminars 3, 4 and 8)

## **How can we safeguard the value of ecosystem functions and prevent overexploitation of natural resources?**

One central issue in the prestudy has been the issue of how today's economy relates to the rapidly increasing extraction of resources from the planet, with its consequences in the form of an ever more unstable climate; overexploited ecosystems; loss of biodiversity; growing volumes of waste, by-products and residuals; and the feared scarcity and, accordingly, rising costs of certain finite resources. Several seminars have focused on this issue, with the objectives of studying the scope for assigning a value to natural capital and ecosystem functions and of exploring the scope for a massive increase in the efficiency of energy and resource use. Speakers at the seminars concerned were Pavan Sukhdev, study leader for 'The Economics of Ecosystems and Biodiversity', TEEB (2010) and UNEP's Green Economy Programme; Professor Ernst von Weizsäcker, Co-President of the Club of Rome; and Dr Walter Stahel, Vice-Secretary General of the Geneva Association and Director of the Product-Life Institute.

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### 3.1 Tension between economic growth and nature

Assuming continued growth at the current rate, the global economy will double in size in less than 20 years. If this trend were to continue for the rest of the century, by 2100 the global economy would be between 15 and 20 times as large as it is today. The critical questions are whether such growth is possible at all, and what it would entail for the basis on which the whole economy ultimately rests: living ecosystems and natural resources (Wijkman and Rockström, 2012).

Today, natural capital is already subject to heavy exploitation. Continued growth policy of a conventional nature will, according to many expert analyses — such as those of the IPCC, Millennium Ecosystem Assessment (MEA, 2005), TEEB and the research behind the notion of 'planetary boundaries' (Rockström et al., 2009) — result in increasingly severe tension and antagonism between economic expansion on the one hand and, on the other, the objectives of a stable climate, ecosystems in equilibrium, protection for biodiversity, and supplies of certain critical raw materials, such as crude oil, phosphorus, rare metals and arable land.

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### 3.2 Invisibility of natural capital

Nature is given no specific value in the economic models that are applied at macro and micro level, other than as raw materials on a market. Energy and raw materials from nature are turned into goods and services, thereby boosting production value in the economy. Earnings from sales of record fish catches or timber from heavy forest exploitation are reported as plus items in GDP. As a rule, no correspond-

ing accounts are drawn up on the depletion of fish or tree stocks that very often takes place, reducing catches and scope for felling in the long term. Accordingly, financial accounts do not distinguish between stocks and flows of different natural resources.

A comparison with the treatment of various types of industrial capital, such as installations and machinery, clarifies the shortcomings. As assets of this kind wear out, deductions are made both in the national accounts (net domestic product, NDP) and in companies' bookkeeping. No corresponding depreciation is, as a rule, carried out when natural capital — such as fossil energy, minerals, fish stocks, arable land, forests or groundwater reserves — is overexploited and depleted. Consequently, there is no real balance sheet, either at national level or for the planet as a whole, for the economic development that takes place.

The failure to distinguish between flows and stocks is a grave weakness in traditional, neoclassically dominated economic theory. The problem is further complicated by the presence of a range of ecosystem functions, such as plant pollination, the breakdown of waste and by-products by various microorganisms, and the creation of new resources through photosynthesis, regulation of the climate and water cycle, and the capacity of a natural landscape to generate optimal water flows. These represent indispensable boons to human society. These functions (or services) are taken for granted and are not reported in the economy at either macro or micro level. It is only when one of these functions is destroyed or weakened that its value becomes obvious. These weaknesses are emphasised clearly by the scientifically oriented economists.

During the prestudy, two seminars were held in which the main issue addressed was how valuation of natural capital, including its ecosystem functions, could take place.

The starting point for TEEB was to clarify the importance of natural capital for production of goods and services — and, accordingly, for well-being. If an accurate valuation of ecosystems is excluded from the equation we risk, according to TEEB, being blinded by the potential for rapid growth in the short term — by overexploiting different ecosystems — and simultaneously obliged to admit that growth in the longer term is impaired when ecosystem production capacity is eroded. Although a strict monetary valuation of ecosystem functions and biodiversity is hard to achieve — some commentators think it cannot be done at all — it is clear that natural capital is at great risk of being depleted as long as its value is not taken into account when economic decisions are made. At the seminars that were held, Pavan Sukhdev commented:

*Economic invisibility is dangerous in this world. The purpose of TEEB has been to make visible what has so far been invisible. At the same time it must be recognised that a valuation of nature and its functions implies a risk that nature becomes commoditised.*

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### 3.3 Importance of natural resources underestimated today

Critical scrutiny of the fundamental view of energy and raw materials in the present-day economy has been central to the prestudy. Costs of using both energy and raw materials have been low: real prices of most raw materials fell by 50–100% in the 20<sup>th</sup> century. The economy has therefore focused on added value, while supplies of high-quality energy and various raw materials alike have been taken for granted. If problems of scarcity arise, it is assumed (in line with traditional neoclassical theory) that prices of the raw materials in question would rise, which in turn would encourage innovations and substitution, thereby solving the problem.

For the scientifically oriented economists, there are significant risks of certain resources — renewable and finite alike — becoming scarce. The most easily exploited raw materials are consumed first, and ultimately result in raw materials of increasingly low quality being exploited and thus costs rising. They also believe that the potential for substitution, both for high-quality energy and for certain raw materials, is limited. For the great majority of ecosystem functions there are no substitutes at all.

A notable example is that global production of crude oil seems to have peaked in 2004. Since then, the oil companies have doubled their investments in oil extraction, to some USD 600 billion a year. At the same time, the price on the world market has roughly quadrupled. But production, including ‘unconventional oil’, has risen only marginally.

Our society’s need for high-quality energy is immense. Now that the supply of crude oil is evidently no longer increasing, costs are rising fast in response to growing demand for oil products. The growing extraction of unconventional oil, but also gas, means that an actual shortage can be postponed, at least in the near future. But in the long run humankind must become much less dependent on fossil energy, not only for supply reasons but also for the sake of the climate.

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### 3.4 Decoupling

Historically, the connection between growth in the economy and the use of energy and raw materials has been broadly linear. A certain decline in demand for energy in relation to growth in the economy is distinguishable over time in the industrial nations, including Sweden.

More efficient energy use is one explanation. But most of the efficiency gains have been successively offset by a combination of higher economic growth and the ‘rebound effect’. A major factor explaining the relative decoupling between energy use and GDP growth is, however, fuel substitution: the fact that we have switched from less efficient (and relatively low-quality) forms of energy to energy of higher quality, electricity being the energy form of highest quality in economic terms (Stern, 2004). Primary energy use is thus generally lower. The need for high-quality energy in economic activities, however, remains large.

Ever since the Brundtland Report was presented in spring 1987, discussions of sustainable development (or ‘sustainable growth’, as many choose to call it) have been dominated by notions of ‘decoupling’, a term used to mean breaking the link between growth in the economy and the quantities of energy and materials extracted. Severing this connection would supposedly make growth ‘green’.

However, efforts to achieve decoupling to date have met only limited success. Examples of relative decoupling are many, but there are few examples of an absolute decoupling between economic expansion and resource use (UNEP, April 2011). The digitisation of the economy affords new opportunities for efficiency gains, but up to now this has had only a limited effect in the most resource-intensive areas.

One emerging pattern is clear and unequivocal: measures to make use of energy and resources more efficient have the same effect on the economy as productivity rises in general: they boost growth. Economic gains from greater efficiency in energy or resource use are, as a rule, used by businesses to expand their operations. Consequently, demand for energy and resources rises over time (UNEP, April 2011).

Ernst von Weizsäcker advocates a tax reform, with taxes on energy and raw materials being progressively raised while those on labour are lowered (Weizsäcker, 2011). This kind of reform would provide ever stronger incentives for more efficient resource use. To offset the rebound effect, von Weizsäcker recommends action on the price side — mainly through gradually rising taxes — so that the relative prices of energy and raw materials are not reduced over time. Unless this happens, the rebound effect will ensue.

Walter Stahel, for his part, argues for a shift to an economy where the focus is on using what has already been produced instead of focusing entirely, as now, on new production — i.e. a circular economy. Stahel would like to see the introduction of a ‘performance economy’, in which new business models are developed, and where sale of constantly new product models is partially replaced by leasing and high-quality services (Stahel, 2012). Products of various kinds would remain in the producers’ hands, designed for longer life cycles. When the product has finished serving a useful purpose, the materials it contains can be recycled, reused or reconditioned. Examples of this type of business model have been developed at business level (B2B) in certain sectors, but the scope for corresponding arrangements for various consumer products is, according to Stahel, huge. The effect would be far more efficient energy and materials management, and also rising job opportunities in the service organisation that would need to be established locally for maintenance and repairs. Another bonus effect is that CO<sub>2</sub> emissions would be radically reduced.

To encourage the transition to a circular economy, Stahel proposes a tax reform in which tax on labour is entirely abolished (society should not tax renewable resources), while tax is imposed on the use of finite resources (Stahel, 2012). Consequently it would become generally profitable to recycle and reuse various materials, compared with using virgin raw materials. Sales taxes like VAT, too, should be over-viewed with a view to abolishing such taxes on recycled materials.

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### 3.5 The growth dilemma

In *Prosperity without Growth: Economics for a Finite Planet* Tim Jackson, the British ecological economist, explores problems associated with growth and sustainability (Jackson, 2009). Written as a report for the UK Government’s Sustainability Commission, the book is a valuable contribution to the debate on preconditions for more sustainable development. Jackson finds that conventional growth, as it is measured today, is unsustainable in terms of the environment and climate. Simultaneously, he states that negative growth is not a solution either, for both economic and social reasons.

The whole of society is organised on the assumption that the pie will grow. Growth must increase to enable jobs to be created and welfare services funded. When growth declines, everything encounters problems. Sales of goods fall, and companies cut back their operations or close down. The number of jobs then decreases, and the same applies to salaries and taxes. For everyone who depends on major loans (whether we are referring to public authorities or individual consumers), low or negative growth is also a problem. Growth in the economy is necessary to repay the loans and, not least, pay interest. Another dimension of growth is, obviously, distribution policy. Propounding income equalisation has been relatively simple at a time when aggregate incomes are rising. When this is no longer so, we can expect far sharper antagonisms among different groups in society.

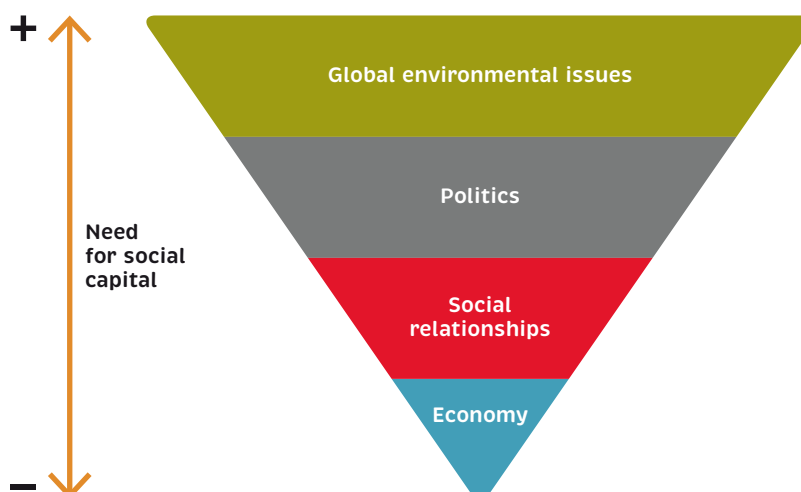
The challenges are many. Jackson has no readymade solutions to the dilemmas of growth. He wrote his book mainly to raise awareness about the problems we face and stimulate discussion of possible alternative solutions. In the recent past Jackson, in cooperation with Canadian economist Peter Victor, has presented a new report on the growth dilemma.

### 3.6 The need for trust and social capital

‘Social capital’ is the aggregate trust that individuals in a group of community have in one another.<sup>9</sup> Wide-ranging research shows the importance of social capital for the economy and growth. When social capital is not strong, the cost of financial transactions rises. A handshake is no longer enough: the parties demand valid contracts. When social capital has fallen below a certain level, society may fall into the ‘social trap’, which means that people who ordinarily stick to ‘fair play’ adopt unfair methods instead, because everyone else is doing it. Accordingly, social capital plays a paramount role in the workings of society.

The bearing of social capital on ecological sustainability has so far received limited attention. One conclusion of the prestudy is the existence of ample evidence that, to meet the great global challenges facing the world — like climate change and rapidly degrading ecosystems and biodiversity — we need a very high level of social capital (Figure 2). The tentative hypothesis is that the importance of social capital is lowest in the economic sphere (narrowly defined) and relatively highest in the sphere of ecological sustainability. To implement an ordinary economic transaction, for example, only a limited quantity of social capital (trust) is needed. Trusting human relationships, on the other hand, call for a higher degree of social capital. A democratic form of government requires even more social capital in order to work properly; and sustainable management of natural resources presupposes per-

**FIGURE 2.** Need for social capital



haps the very highest levels of collaboration, social capital and trust.

It follows that any change in the regulatory system in terms of management of our joint resources, not least the ‘global commons’, calls for social capital to be well developed and a broad dialogue involving various stakeholders and citizen groups to be possible to organise. Assuming that this hypothesis is valid, social capital should be given top priority as a means of attaining ecological sustainability.

Here, the law-governed state and its institutions are a key precondition. By international standards, a country like Sweden is characterised by a high degree of trust. Social capital is strong. In countries where politics has failed and corruption is widespread, social capital has been eroded. While it takes a long time to build up social capital, it can rapidly be lost. At times of crisis, virtually every society perceives that its social capital is fraying at the edges and trust is declining. There is a danger that this may seriously thwart ecological, social and economic objectives.

The stronger the social capital (trust), the better are the prerequisites for a more socially sustainable and resilient society.

<sup>9</sup> Bo Rothstein, the eminent Swedish political scientist, defines social capital as the number of contacts multiplied by the **degree of trust in these contacts**.



### 3.7 Recommended actions

In the course of the prestudy and seminars, there were discussions about various different proposed measures aimed at attaining a balance between the economy and nature. Sukhdev, von Weizsäcker and Stahel all represent a mindset at variance with the present-day economy. Proposals discussed were:

- ▶ Introducing binding targets for improving efficiency of energy use, and also for the exploitation of raw materials that are used unsustainably. This efficiency requirement should be set higher than expected growth in the economy, and the proposed levels are those that, according to the IPAT equation, mean that, despite increasing population (P) and affluence (A), thanks to much more efficient and thus improved technology (T), both emissions and resource extraction can be lowered, i.e. impact (I), to the levels that numerous scientific reports state are necessary. This reduction of impact is needed to safeguard sustainable development, as defined by science and with due attention paid to the precautionary principle. To obtain this is likely to be a matter of technical improvements to enhance efficiency at levels of 4–5% a year or more.
- ▶ Implementing a tax reform in which taxes on labour are successively reduced while taxes on energy, and specifically on finite energy involving heavy, environmentally harmful emissions, and also taxes on extraction of virgin raw materials, are raised.
- ▶ Managing the rebound effect (when technological improvements as such free up resources and bring about higher revenues and/or incomes, which in turn may drive an increase in emissions), which means that taxes must be progressively raised in line with measures to make energy and resource use more efficient, all for the purpose of keeping relative prices at the same level.
- ▶ Giving companies strong incentives to create more durable products that are easily upgraded and repaired, and in the process rethinking business models by replacing today's focus on selling more stuff in favour of product-life extension, leasing and renting.
- ▶ Reviewing the balance between investments and consumption, and also between private and public investments. The latter must focus on renewing the energy system and creating a far more sustainable infrastructure.
- ▶ Introducing valuation models for ecosystem functions at both macro and micro level.

### 3.8 Summary of conclusions

**TABLE 4.** Contrasts between the dominant present-day economic discourse and the scientifically oriented economists' perspective, in terms of natural capital and ecosystem services (planetary boundaries)

<b>Current economy</b>	<b>Green economy, acc. to scientifically oriented economists</b>
The focus is on adding value. Should problems of scarcity arise, the price of the raw material in question is expected to rise, which is considered a stimulus to innovations and substitution.	The focus is on setting up an ecological framework to ensure that natural assets are managed and energy services provided in sustainable ways. Within this framework, the economy must develop so that people's needs are met, and a democratic society must ensure that universal basic needs take precedence over vested interests.



<b>Current economy</b>	<b>Green economy, acc. to scientifically oriented economists</b>
Scarcity is managed through the price mechanism and the degree of substitution is generally regarded as high.	<p>Risks of resource scarcity are substantial. The raw materials that are of the highest quality and most easily exploited are consumed first. In time, the exploitation shifts to raw materials of lower quality that are harder to exploit. As a result, costs rise and there is an increasing risk of various kinds of pollution. When raw materials become scarce, technical solutions cannot fully compensate.</p> <p>For the great majority of ecosystem functions, no substitutes exist since the great majority of life-support systems are irreplaceable. Opportunities for substitution are limited, for high-quality energy and certain raw materials alike.</p>
Decoupling — i.e. removal of the link between growth and negative environmental impact — is thought to take place ‘automatically’ as a result of people’s preferences for a clean environment, as incomes rise. Growth also generates financial resources that make it possible to invest in clean technology and remedy the environmental damage caused in the process.	All production and consumption require a throughput of energy and materials. Relative decoupling is possible. Scientifically oriented economists, however, doubt whether growth can be dematerialised.
Linear production systems	Circular economy

### 3.9 Proposed R&D topics

Central research questions are:

1. How to create a resource-policy framework which ensures that vital natural resources are not continuously overexploited.
2. How to shape the incentive structure of the economy as optimally as possible for ecosystem functioning (and thereby productivity), i.e. so as not only to respect the scientific boundaries but also to optimise productivity.
3. How to effectively address the rebound effect while using resources more efficiently.
4. How employment would be affected by a transition to a more circular economy.
5. How to stimulate development of new business models, in which the service life of products is extended and it is a primary objective to recover, reuse and recondition component materials as far as possible.

## 4 The role of business in the green economy

(based on seminar 10)

### **From exploiter to creator<sup>10</sup>**

Ahead of RIO+20, some 30 Nobel laureates met at a symposium at the Swedish Royal Academy of Sciences (May 2011) to prepare a communiqué on the theme of human exploitation of, and impact on, Planet Earth. As a way of initiating the discussion, a hypothetical court case was organised, with Planet Earth prosecuting humankind for inflicting devastating damage on Earth's life-supporting systems. The result of the imaginary trial was that humanity was found guilty on most of the charges. Pavan Sukhdev was called as an expert witness, owing to his work on TEEB and UNEP's *Towards a Green Economy* report. Sukhdev's only formal objection was that humankind's invisible defence counsel, the business community, was not summoned to attend the trial.

After working on TEEB and the Green Economy report Sukhdev, who lectured at the tenth seminar, chose to undertake a study of how private enterprises could become a more positive force in the overall efforts for a green, inclusive economy. Business generates most of GDP — as a rule, some 70%. If the goal of societal development is sustainability, in its various aspects, this can be achieved only if companies are aligned with and work for objectives that support such development.

It is primarily through business activities that resources are exploited and over-exploited, and that negative external effects arise. To remedy these adverse effects, policies in various countries have introduced diverse regulations to reduce negative impact. Nevertheless, the trend in the wrong direction persists, aggravating most of the negative external effects — such as increasing GHG gases, resource depletion, chemical pollution and biodiversity loss — in absolute terms.

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### 4.1 Corporation 1920

The 'Corporation 2020' research project (Sukhdev, 2012) is under way in collaboration with researchers, mainly at Yale University. Here, the aim is not primarily to minimise businesses' negative impact — 'to do less bad'. Instead, the ambition is to find out how companies can promote sustainability — 'to do good'.

The project is based partly on a historical review of how the company as a legal entity, evolved during the 20<sup>th</sup> century — one in which the image of its role in society and its logic, research shows, underwent major changes.

One crucial milestone was the Dodge versus Ford court case of 1919. The Dodge brothers were early investors in Henry Ford's car production, but came to oppose Ford's aims for the business and its logic. Ford's wish was for as many households as possible to be able to afford the company's cars. Prices were set relatively low and profits were reinvested. Ford strove to expand the business and employ as many people as possible. Consequently, no dividend was paid to the shareholders.

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<sup>10</sup> This section is based mainly on Pavan Sukhdev's book *Corporation 2020*.

The Dodge brothers, however, wanted a return on their investment and took Ford to court.

The court ruled in favour of the Dodges. The judgment included the following words:

*A business corporation is organized and carried on primarily for the profit of the stockholders. The powers of the directors are to be employed for that end.*

Thus, the modern corporation had taken shape. Today, it is seen as virtually self-evident that the purpose of a business is to maximise its owners' return or, in other words, to generate shareholder value.

The view currently held by most economists is that this self-interest, by extension, is congruent with benefits to society. The theoretical foundation had already been laid early on by Adam Smith, who stated in his oft-cited axiom: 'It is not from the benevolence of the butcher, the brewer or the baker that we expect our dinner, but from their regard to their own interest.'<sup>11</sup> Adam Smith's opinion was that by means of four central forces — self-interest, competition, supply and demand — the 'invisible hand' of the market effectively steers the economy towards greater prosperity. Smith also believed that without companies' self-interest, diverse external effects would be taken into account and this would have an adverse impact on production and thereby reduce the benefit to society.

According to Sukhdev, companies — not least multinational corporations — have become increasingly efficient in relation to their objective of generating the largest possible return for their owners. This, in turn, has meant that they have been ever more efficient at minimising their costs, including externalising costs to society as far as possible. According to David Korten, globalisation has resulted in what he calls 'arbitrage gains' with respect to labour, raw materials and tax levels (Korten, 2010).

Sukhdev's view is that, in the future, sustainable development objectives will have to oblige all businesses, not least those of large corporations, to pursue goals in line with those of society throughout their operations. He calls this type of company 'Corporation 2020'.

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## 4.2 Corporation 2020

The appellation 'Corporation 2020' has a dual meaning. First, it denotes a modern enterprise that takes as its starting point the challenges and needs of the present day. Second, the term implies that this type of company must have superseded 'Corporation 1920' by 2020 at the latest.

According to Sukhdev, the sustainable enterprise needs a new 'DNA' that presupposes four traits:

- 1. Objectives in line with the overarching aims of society**, i.e. the company sees benefit to society as a central premise for its existence. A focus on shareholders' interests makes short-term profit the dominant aim, while a focus on benefiting society at large provides a more long-term perspective on activities and a purpose.
- 2. A vision of the company as a producer of various types of capital**, such as real, financial, human, social and natural capital. 'Capital' is defined as every requirement for generating incomes, such as mechanical equipment, credit, well-trained labour, a good work environment and energy services. Like real capital, the other forms need investments for income optimisation.

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<sup>11</sup> *An Inquiry into the Nature and Causes of the Wealth of Nations*, Book I, Chapter II (*Of the Principle which gives Occasion to the Division of Labour*), 1.2.2.

**3. An understanding of the role of business in society.** In many societies, local communities have declined in scale and strength over time. In many ways they have been marginalised by, for example, commuting, urbanisation and not least by the fact that many companies operate with no clear national, let alone local connections. The role and importance of urban blocks and districts, like those of tribal communities, have also diminished. Companies can potentially fulfil portions of ‘society’s’ role, such as conferring a sense of fellowship and value-creating contexts.

**4. A commitment to develop the company as a learning institution.** Most companies today offer their employees on-the-job training to make their work performance as good as possible. The vision for the sustainable enterprise in harmony with society’s goals is that learning, i.e. developing human capital, is one of the specific values the enterprise produces — for its own benefit but also that of society at large. Here, Infosys is an example of a company that has taken learning to a higher level, and whose contribution of human capital to society has an estimated value equivalent to half the profit that the company generates for its shareholders.

Already today there are companies that live up to the objectives set by Corporation 2020. That is, they promote sustainability, thrive financially and, at the same time, have proved more resilient than traditional companies at times of economic downturns and recessions, such as the one triggered by the 2008 financial crisis (Holmberg and Robèrt, 2000). How these positive examples can be scaled up and become the norm is addressed in a report, *Vision 2050: The new agenda for business*, by the World Business Council for Sustainable Development (WBCSD, 2010).

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## 4.3 The role of politics

In Sukhdev’s view, the emerging positive trend in sustainable enterprises — companies with clear objectives for sustainability, corporate social responsibility (CSR), more transparent profit and loss accounting and increased long-termism — is merely a start. But although research shows positive correlations between a focus on sustainability and a company’s financial results, today’s proactive businesses are operating in an arena where, as a rule, the incentives work against them and give unsustainable enterprises a competitive advantage, not least in the short-term.

Progress is far too slow, considering the gravity of the problems and the time left at our disposal. According to Sukhdev, ‘endogenous’ development, i.e. development within companies, must be supplemented and strengthened by an enabling political framework. The reasons for today’s unsustainable development are complex. Most of the solutions attempted to date underestimate this complexity, failing to reflect the nature of reality and existing power relationships and vested interests. Corporate decision-making is, in most cases, not governed by single individuals or families. Instead, to a growing extent, it has been institutionalised and anonymised. Today, large companies are 70% owned by institutions — often pension funds — that focus on short-term profits although they should be just as interested in long-term considerations, if not more so. Too often, non-sustainable objectives steer and push development in the wrong direction (Sukhdev, 2012).

Reform of the corporate institutional framework should, Sukhdev says, focus on four priorities:

**1. Internalising external effects:** revealing and measuring the external effects of companies’ activities on the environment and on human beings would be a crucial step. Present-day companies convert joint assets into private capital, and get away with it by calling it ‘profit’. Making external effects visible, first of all, and

then internalising them, will encourage the companies that are responsible and truly innovative, and genuinely add value.

- 2. Limited leverage:** the quest for economies of scale has meant that companies, including banks, have successively reduced their share of equity. In line with the proliferation of very large companies — with their ever rising share of global GDP — this has meant greater risk-taking for society. Companies have become ‘too big to fail’. Moreover, since many of the investments made are non-sustainable in nature — resulting in pollution, resource depletion etc. — the benefits to society must be seriously called into question.
- 3. Reform of the tax system:** the system must reward production of positive values, i.e. sustainability. Taxes on earned incomes and profits should be reduced and taxes on the use of natural resources and generation of negative external effects, such as pollution, loss of biodiversity, etc., should be introduced or increased.
- 4. Responsible advertising and marketing:** the Internet and social media have meant that consumers have strengthened their position in relation to producers. However, politics needs to provide regulations to support consumer power further. Without effective support in the legislation, we face the risk of changes being more a matter of ‘greenwashing’ than of genuine improvements. Requiring honest marketing and transparency would give the genuinely innovative and efficient companies an advantage.

The measures required for rapidly inducing businesses to promote sustainability will meet resistance, mainly from companies responsible for causing substantial external negative effects today. Since companies of this type currently dominate business activity in many sectors and, indeed, business organisations, the resistance to change will be massive. Concomitantly, such proposals will be welcomed by proactive companies that are prevented by unsound competition from going all out for sustainability at present. The proposals will also favour the emergence of new companies and forms of enterprise. In Sukhdev’s estimation, the transition will be turbulent; but this cannot be avoided.

#### 4.4 Summary of conclusions

**TABLE 5.** Contrasts between the economic discourse mainly governing present-day companies and characteristics and roles of companies in the green economy

<b>Traditional companies – ‘Corporation 1920’</b>	<b>Green companies – ‘Corporation 2020’</b>
Shareholder value	Societal and stakeholder value
Maximising profit	Maximising value creation
Minimising costs, with the result that a substantial share of costs is externalised, i.e. offloaded onto society	Producing positive external values and various types of capital — real, financial, natural, human and social
Competition	Cooperation
Monetary or pecuniary efficiency	Multidimensional efficiency
Linear production system: from extraction of raw materials to sales income	Cyclical thinking: controlling and taking responsibility for production, ‘cradle to cradle’ (McDonough & Braungart, 2002; Stahel, 2012; Ellen MacArthur Foundation, 2011, 2014)
→ Securing advantages for oneself (taking)	→ Working for the common good (giving)

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## 4.5 Proposed R&D topics

Provided that, in a democratic process, we decide how the role of businesses should be defined to bring them into line with Corporation 2020, the main questions would be:

1. What adjustments in the institutional framework (legislation, taxes etc) are required in order to redefine the role of companies to make them sustainable operators, in line with society's goals?
2. How can the institutional framework be made to support this change? One idea would be to design a system of rewards and penalties (a 'bonus-malus system') in which the companies that include all forms of capital in their balance sheets, and can show that they generate major benefits and only minor negative effects, receive tax reliefs, while those that generate major negative effects and only minor benefits pay higher taxes.
3. Which alternative forms of enterprise could be emphasised to facilitate this change? For the Swedish Companies Act – as an example - to support sustainable entrepreneurship, which amendments of the Act would be necessary?

## 5 A financial system that serves a green economy

(based on seminars 5 and 9)

To date, the role of the banking and financial sector in relation to ongoing efforts for sustainable development has hardly been a priority issue. Nonetheless, the decisions governing the financial markets obviously have a determining influence on our scope for attaining a more sustainable society. The many, repeated financial crises of the past few decades have regularly spread to the real economy, bringing with them serious repercussions in the form of high unemployment, social exclusion and extensive redistribution of assets and incomes. Furthermore, over the past couple of decades financial markets have come to be increasingly separated from their original role: mobilising capital for investments in business start-ups and entrepreneurship, and also extending infrastructure and social welfare services.

Most researchers agree that the financial system is not as stable as might be wished. A growing number concur that increased regulation is both necessary and defensible. The financial system creates money on the nation-states' behalf and, in principle, there is nothing to contradict the view that this right ought to be accompanied by a responsibility defined by these states. No less a body than the International Monetary Fund, under its new head Christine Lagarde, has affirmed very clearly that the function of the financial system is to support the real economy, and that steps must be taken to remedy those defects in the system that are counterproductive in these terms.

One considerable cause for concern is the generally meagre knowledge — in society and, indeed, among decision makers — of how the current, largely unregulated financial system works. This is due partly to its complexity and partly to the inadequacy of statistics. The deregulations of the financial markets in the 1980s were initiated by an economic paradigm shift, and with it came a strong belief in the market's capacity for self-regulation — with a consequent 'hands-off' approach to statistical data collection.

Bank volumes have increased sharply since the deregulations — in Europe, more than three times as much, on average, as the rise in GDP. What has happened is that the banks have created new money, not primarily for investments in the real economy (which have increased at roughly the same rate as GDP, or less, in most countries) but mainly for financial investments. This has contributed to a large rise in asset inflation, created 'bubbles' and made the system more procyclical, i.e. amplified upturns and downturns in the economy.

One fundamental problem and challenge, according to most financial experts, is that the financial system has become ever more global since the deregulations while, in all essentials, international legislation and regulations to balance this development are lacking. The global and especially the financial markets have outgrown the nation-states. After the crisis of the 1930s, the political system strove to resume control of the financial markets, which had ceased to support the real economy and, according to many observers, developed into a 'casino economy'. The task



is even more challenging now and will require much more than strengthening the international institutions in this field.

For this prestudy, it has been of particular interest to analyse the contributions of the financial sector — if any — to development that is environmentally sustainable. One central issue in this context has been to assess how the financial institutions deal with long-term risk with respect to the environment, such as climate change, resource depletion, ecosystem degradation and biodiversity loss. From the risk management ensue decisions on which types of investment to prioritise. Another paramount issue has been the repercussions of the rapid credit expansion in terms of sustainability.

Within the framework of this prestudy, several seminars were arranged for the purpose of further clarifying the financial sector's responsibility — or irresponsibility — in relation to the pursuit of sustainable development.

Speakers at the seminars on the role of the financial system for sustainable development (seminars 5 and 9) included Sandro Scocco, then chief economist at Global Challenge and now at Arena Idé, former economist at the Swedish Trade Union Confederation (*Landsorganisationen*, LO) and chief economist at the National Labour Market Board (AMS) and the Institute for Growth Policy Studies (ITPS). Other speakers were Sasja Beslik, Head of Responsible Investment and Governance at Nordea Investment Funds; Michael Kumhof, then economist and now Deputy Division Chief at the IMF; Bernard Lietaer, an international expert on monetary systems; and Ulf Dahlsten, a former State Secretary in the Swedish Government and who is now senior advisor to Global Challenge.

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## 5.1 Effects of credit expansion on ecological sustainability

One central issue in the sustainability context concerns the rapid credit expansion that has taken place in the past few decades. Two different hypotheses stand out:

► **The credit expansion has 'doped' the economy, causing greater exploitation of natural resources and increased CO<sub>2</sub> emissions.**

When consumption takes place earlier than it would otherwise, which has happened partly because of the rapid rise in indebtedness in society, the consequence is 'doping' of GDP. This accelerates the overexploitation of many important ecosystems and natural resources, and also boosts greenhouse gas emissions. Most present-day production and consumption systems are far from sustainable, and loans for consumption — and also for investments in unsustainable production facilities — exacerbate climate and environmental problems.

► **The credit expansion has damaged the real economy, resulting in a lower natural-resource exploitation rate and less CO<sub>2</sub> emissions than would otherwise have been the case.**

To a significant extent, the credit expansion has not favoured investments in the real economy. A large and growing share of assets has been channelled into investments in fixed property and one result has been rapid rises in property prices. However, prices of the great majority of goods have been relatively stable — an effect of globalisation — and real salaries in OECD countries have risen only marginally as a result. This has meant a relatively lower increase in GDP, relieving pressure on the environment and natural-resource base.

Which of these hypotheses match reality is difficult to establish on the basis of research to date. In the short term, GDP is probably boosted by the credit expansion. Nevertheless, the slightly longer-term trend is negative in terms of growth. Here, at least, is a major and vital research question.



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## 5.2 Short versus long term

Today, substantial parts of the financial markets are characterised by short-termism. Listed companies are valued according to such parameters as their quarterly accounts and expected cash flow over the next few years. Future risks and costs are discounted at present values, and this reinforces the short-term approach. Moreover, the reward systems applied in the sector very often reward short-term planning horizons. Representatives of the financial market state, in response to direct questioning, that they perceive the task their clients entrust to them ‘as delivering the highest possible return at the lowest possible risk and cost, in as short a time as possible’. They operationalise this task by externalising risks, i.e. the risks fall on society. Investments are placed where — at maximum speed, with no particular reference to ethics and morality — they earn as high and rapid a return as possible.

One general assessment is that, to date, banks and financial enterprises, as well as the broad majority of companies and consumers, have opted to exclude from consideration, as far as possible, the external effects to which their activities give rise. Prices are put on environmental factors only in contexts where society’s institutions have regulated activities using, for example, taxes or charges.

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## 5.3 Missed climate targets or myriad ‘stranded assets’?

Today, financial institutions grant large and increasing credits to, or make investments in, activities involving substantial exposure to risk in relation to energy and climate. For the past few years, for example, there has been a rapid rise in the volume of venture capital available for extraction of shale oil and shale gas in the US, and oil from oil sands in Canada, although the long-term risks — financial and in terms of the climate and environment — must be considered very high.

Valuation of oil, coal and gas companies on the world’s stock exchanges is directly proportional to reported fossil reserves. These reserves are, according to an analysis performed by Carbon Tracker and the Grantham Research Institute on Climate Change and the Environment at the London School of Economics (April 2013), many times larger than the maximum volume that can be exploited if we are to have a chance of meeting the 2°C target, i.e. of avoiding an increase of more than 2°C in the Earth’s mean temperature. Either the reserves will be used, entailing the risk of runaway climate change, or the world’s governments will succeed in reaching a climate agreement that brings about reductions in the use of fossil energy. In the latter case, major value losses will occur, in the form of ‘stranded assets’, for the owners and all those who have invested their assets in these fossil-based enterprises.

Financial markets would value fossil-dependent activities in a radically different way if the true cost of using fossil fuels were reflected in their prices. However, this is not the case. So far, attempts to introduce a global tax on CO<sub>2</sub> — or, alternatively, a ‘cap and trade’ system — have failed. In many countries, on the contrary, there are major subsidies or tax reliefs on the use of fossil fuels. Such measures create incentives in the economy that can only be described as perverse.

Although activities that are heavily fossil-dependent are subject to no — or only limited — costs or restrictions at present, this obviously does not mean that such activities are free from risk. The research is clear and unequivocal. The IPCC’s latest (fifth) *Assessment Report*, issued in September 2013, shows with the utmost clarity the great risks to which societies all over the world are subject. With a further rise in the concentration of greenhouse gases in the atmosphere, the danger is that an increasingly unstable climate will result. Encouraging investments in fossil-intensive activities therefore amounts to exacerbating climate risks.

In addition, governments worldwide have expressed a clear objective: to work jointly to avoid dangerous climate change. The target here is to prevent mean global temperature from rising by more than 2°C. To date, efforts to bring about an international, binding climate agreement have failed; but the negotiations are continuing, with the aim of reaching an agreement by 2015. In parallel, many countries have implemented, or are considering whether to implement, measures to reduce greenhouse gas emissions. To assume, as most players in financial markets obviously do, that governments will continue to fail in their efforts to reach a climate agreement is both irresponsible and immoral.

If and when an international climate agreement is a reality, the values of assets in activities that are heavily fossil-dependent will fall sharply. In their report cited above, Carbon Tracker and the Grantham Research Institute on Climate Change and the Environment predict that these values may be reduced by up to 60–80% (Carbon Tracker and Grantham Research Institute, 2013).

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## 5.4 Climate risks just one example

Heavy exposure in the form of assets invested in, or lending for, fossil-dependent activities is just one of many examples of large segments of the financial markets disregarding every effort to move society towards sustainable development. Thus, for example, a huge volume of capital from these markets is mobilised yearly to support activities — such as mining, agriculture, forestry and fishing — devoted to large-scale exploitation of natural resources. These activities often exert a very negative impact on vulnerable ecosystems and, in addition, increase the generation of greenhouse gases.

The simple fact is that financial markets bear a major responsibility in terms both of overexploitation of many of the planet's key ecosystems and natural resources and of the rapid increase in greenhouse gases. By imposing short-term return requirements on businesses and, in all essentials, disregarding climate, environment and resource risks in a long-term perspective, the banking and financial sector's contribution to efforts for more sustainable development is often negative. However, there are examples of initiatives in the sector that work in the opposite, positive direction, such as the Principles for Responsible Investments (PRI) initiative, the Global Reporting Initiative (GRI) and the Green Bonds (to promote sustainable investments) issued by several governments and/or major cities.

During the seminars, various proposals for reforms of the banking and finance sector were discussed. Relatively uncontroversial proposals — now on the table at the international negotiations — include:

- ▶ creating 'firewalls' between banks' investment and commercial operations
- ▶ reducing complexity and risks of spill-over effects by, for example, re-creating locally based banking systems
- ▶ raising the proportion of equity in relation to lending (increasing capital adequacy requirements); even after Basel III, the equity share is extremely low
- ▶ basing the calculation of bonuses in banking operations on all assets (not, as now, on equity alone)
- ▶ introducing a tax on financial transactions.

Among the more radical proposals, two were specifically emphasised within the framework of the seminar series: reviving the Chicago Plan and introducing complementary currencies.

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## 5.5 The Chicago Plan

One proposed reform to remedy the latest financial crisis included the Chicago Plan, with motives mainly derived from considerations of economic and social sustainability rather than of ecology. Originally developed in response to the Great Depression of the 1930s, the plan was supported by many prominent economists, the best-known proponent being Irving Fisher, at the time.<sup>12</sup>

In brief, the Plan involves the state resuming control of the national currency and the right to create money. Since the Bretton Woods system<sup>13</sup> was abolished in 1971, the capital adequacy ratio has fallen dramatically. Further steps have been taken since then, and the financial sector has been increasingly deregulated. One result is that to a high degree, today, it is the banks that control the quantity of money in the economy. Nowadays, some 97% of all money is created by commercial banks. They need only a cash reserve of money from the central bank, for a fraction of their credits (fractional reserve banking). Since the banks earn money primarily by charging interest, they gain from granting as much credit as possible. The result has been an exponential increase in the quantity of money since the 1970s. As credit has soared, indebtedness has followed suit, which is the logical effect of money being created by lending without reference to capital adequacy.<sup>14</sup>

The Chicago Plan entails the state taking over the banks' current right to issue (create) money, thereby regaining control of the national currency. The Plan also involves the banks being obliged to have a 100% capital adequacy ratio, which they can obtain by borrowing from the central bank. Private banks would thus revert to being loan providers and deposit managers, i.e. traditional banking activities. Separation of financial speculation from traditional banking operations is also proposed.

Two research economists at the International Monetary Fund (IMF), Jaromir Benes and Michael Kumhof, using modern data models, have analysed what the effects of implementing the Chicago Plan today would be (Benes & Kumhof, 2012). Their analysis substantiates Irving Fisher's conclusions of the 1930s: that the Plan would reduce business cycle fluctuations considerably, eliminate bank runs and bring about dramatic reduction of private and public debt. Benes and Kumhof also find that the Plan would generate output gains approaching 10%, owing to lower interest rates and taxes; enable the market to function better; and bring about very low steady-state inflation. The IMF researchers therefore state that:

*We take it as self-evident that if these [i.e. Irving Fisher's] claims can be verified, the Chicago Plan would indeed represent a highly desirable policy.*

It should be noted that the Chicago Plan was carefully considered at the time of the Great Depression by the US President, Franklin D. Roosevelt. But the opposition from major banks was too strong and the Plan was never implemented.

Paradoxically enough, given present-day production and consumption patterns, implementing the Plan might have an adverse effect in ecological terms because, according to the calculations, it would boost real growth, with increased investments and consumption as a result. However, at the same time, the Plan has a positive aspect in terms of ecological sustainability: vigorous steps to prevent crises through robustly positive effects on the real economy and social sustainability would give politicians and decision makers a breathing space. This would enable

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<sup>12</sup> Others included Frank Knight, Lloyd W. Mints, Henry Schultz, Henry C. Simons, Garfield V. Cox, Aaron Director, Paul H. Douglas and Albert G. Hart.

<sup>13</sup> Under the Bretton Woods Agreement, member countries joined a system of fixed exchange rates that pegged their currencies to the US dollar at adjustable rates. In return, the US pledged convertibility of the dollar into gold at a fixed price.

<sup>14</sup> In today's monetary system, money is debt. 'Positive Money' is a movement to reform the financial system. It resembles the Chicago Plan in design and based on the idea of regulating the quantity of money, with the state creating money free from debt — 'positive money'.

them, instead of just reacting to emergencies, to focus on implementing an institutional framework that is ecologically sustainable.

## 5.6 Complementary currencies

Another proposal is to supplement the present-day monetary system, based primarily on the notion of one currency per country or region, by a number of complementary currencies. These are often proposed for specific purposes, such as supporting various types of social activity (Club of Rome, 2012). Bernard Lietaer, an expert on monetary systems and author of several books on various projects in which complementary currencies were set up for different specific purposes, has given lectures within the framework of the prestudy.

Around the world, several thousand local complementary currencies exist and they are proliferating fast. They often originate either in relatively small enterprises' need for liquidity to do business among themselves or in local authorities' attempts to tackle social and environmental problems.

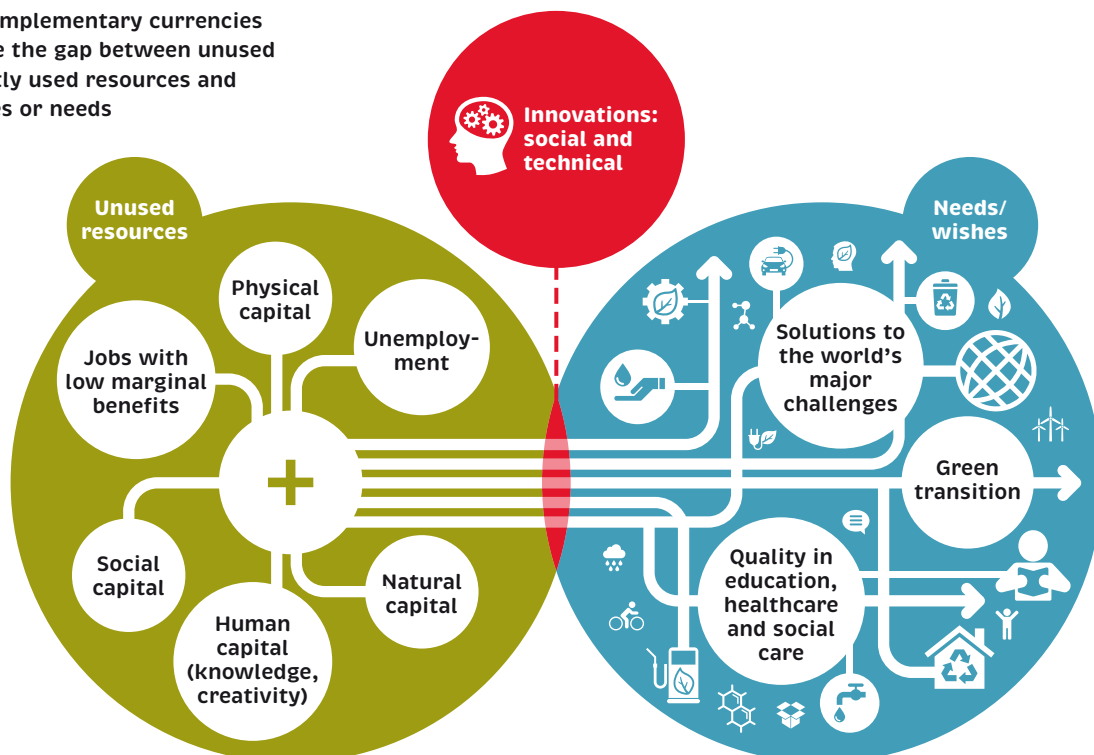
In Lietaer's view, these complementary currencies help to create a more resilient financial system. He compares monocultures with richly biodiverse ecosystems: the latter, unlike the former, are truly resilient. The same logic, according to Lietaer, would apply to currency systems.

It is worth recalling that numerous complementary currencies also exist within the framework of various business operations. Bonus systems for airline passengers, designed to establish a loyal customer base, are one example.

In essence, the idea is to use a complementary currency to 'match' unused resources (like the skills and time of the unemployed) with wishes and needs that would otherwise remain unmet (Figure 3).

According to Lietaer, many social needs can be met by means of complementary currencies, provided that the right 'rate of exchange' is found between the various purposes. The idea is not to replace existing national currencies. The local currency would be purely complementary, meeting a specific function that the regular currency neither can nor is even designed to meet.

**FIGURE 3.** Complementary currencies aim to bridge the gap between unused or inefficiently used resources and unmet wishes or needs



## 5.7 Summary of conclusions

**TABLE 6.** Contrasts between the economic discourse mainly governing present-day companies and the scientific economists' perspective, in terms of the financial sector

<b>Current economy</b>	<b>Green economy acc. to scientifically oriented economists</b>
Financial service companies and banks are regarded as profit-maximising enterprises like any others.	The function of the financial sector is to help bring about sustainable development.
Banks engage not only in traditional banking operations but also in speculative financial activities.	Traditional banking operations and speculative financial activities are split between separate companies.
Banks are entitled, according to their own business judgement, to regulate the quantity of money and create money through credit.	National governments have resumed control of money creation.  The quantity of money is governed by democratically appointed institutions and/or national governments.  However, banking operations remain private, albeit regulated.
Short-term financial speculation is a major activity	Long-term investments in the real economy.
A global financial market.	More locally supported funding of local projects.

## 5.8 Proposed R&D topics

- ▶ How the present financial system can be transformed into a positive instrument for a sustainable economy.
- ▶ The effects of complementary currencies on economic development at local and macro levels.
- ▶ The effects of complementary currencies on the efficiency and resilience of the financial system as a whole.
- ▶ Valuation of climate, environmental and resource depletion risks in the context of credit and/or in asset decisions, including the risk of stranded assets.
- ▶ The principles for discounting future risks and costs, and their implications for short-termism in the financial sector's decision-making.
- ▶ The importance of today's reward system in the financial sector, especially with respect to the tendency to favour short-term profits and results.
- ▶ The relationship between equity and lending in banking operations.
- ▶ Indebtedness, for society as a whole and for its various parts (households, businesses and the public sector) and how it relates to:
  - a) growth (how far it is genuine and how far merely apparent, i.e. the outcome of increased indebtedness)
  - b) bubbles and resulting crises (i.e. asset inflation that causes real problems when it is corrected, whether gradually or abruptly).

## 6 The goal of development

(based on seminars 2 and 7)

One of the most controversial ways in which scientifically oriented economists differ from traditional economists of the neoclassical school — and, indeed, most politicians and business leaders — is in their view of GDP growth.<sup>15</sup> The scientifically oriented economists, unlike most traditional, neoclassically schooled economists, are critical of the conventional growth concept primarily because it gives economic growth priority over ecological and social sustainability.

Although most economists agree that the objective of economic policy is not GDP growth per se, this particular notion is nevertheless an explicit priority in our current economy. The underlying assumption is that a growing GDP makes society richer, enhancing prosperity and well-being. According to this reasoning, GDP growth is itself a means to this end. Of paramount importance in this context is the fact that most politicians, business leaders and economists also regard economic growth as a precondition for ecological and social sustainability.

Herman Daly, one of the leading lights in — and the founder of — ‘ecological economics’, is of a different opinion. Daly regards our present growth policy as, in some respects, ‘uneconomic’. In his opinion, continued growth of the conventional kind is unsustainable and we must, instead, switch to a ‘steady-state economy’ — one of stable or only slightly fluctuating size. A steady-state economy can attain stability after a period of growth or recession and, to be sustainable, cannot exceed certain defined ecological limits.

The theoretical foundation for the notion of a steady-state economy consists, above all, in the fact that traditional, aggregate growth of GDP results in a constantly increasing use of resources (Malmaeus, 2013). This, according to Daly, is an impossibility on a finite planet.

Daly considers that the belief in ‘eternal’ growth is based on various misconceptions (Daly, 2012):

- ▶ **The existence of a need for growth in certain nations or regions** does not constitute a valid argument for aggregate exponential growth, i.e. a volume increase throughout the global economy. Instead, it represents a mixture of notions like *growth* and *redistribution*.
- ▶ **The assertion that GDP growth measures changes in values** — not volumes — and is therefore not restricted by limitations in physical resources (natural resources etc.) is, in Daly’s view, erroneous. Daly’s main argument is that GDP measures real changes, i.e. not price changes. Real GDP is a value-based index for aggregate quantitative change in production, and the best measure of overall resource use we have.
- ▶ **It is a fact that growth has generated high values and raised us out of poverty and hard labour.** In Daly’s view, some types of growth are undoubtedly positive in terms of raising standards and enhancing prosperity and well-being. But this postulate does not distinguish between different kinds of growth, i.e. those

<sup>15</sup> This is also perceived by some people as a dividing line between the OECD’s ‘green growth’ and UNEP’s ‘green economy’. However, the OECD and UNEP themselves seek to play down the difference and, within the scope of the ‘Green Growth Knowledge Platform’, have joined forces to develop knowledge and indicators.



that are *economic* and *uneconomic*. Growth becomes uneconomic at the point where marginal cost exceeds marginal benefit.

- ▶ **Empirical support for stating that growth has become uneconomic is said to be lacking**, but Daly believes there is ample empirical support for contending that growth in several rich countries has passed the point at which it has become uneconomic. He refers to the Index of Sustainable Economic Welfare (ISEW) and its successor, the General Progress Indicator (GPI), both of which show that growth in the US and various other rich countries was economic until about 1980.
- ▶ **It is contended that growth is generated on a market where transactions would not be implemented if the sellers and purchasers alike did not regard the deals as good.** This is taken to mean that growth enhances prosperity, since the transaction in question would not otherwise have taken place. The problem with this argument, according to Daly, is that there are many third parties who are affected but who do not get the opportunity to approve a specific transaction. These external effects, often negative but sometimes also positive, are not reported in the GDP statistics. Poor people and future generations are not given the chance to make their voices heard, nor can they influence the situation through their willingness to pay, since they lack money. The market is governed not by willingness to pay, but by ability to pay. Moreover, consumption of natural capital is counted as income. Negative external effects are not subtracted. Accordingly, stocks and flows are not distinguished when it comes to what is extracted from nature — in sharp contrast to practice regarding, for example, industrial capital, where depreciation is effected for wear. On the other hand, costs related to cleaning up after negative impacts are included as something positive, i.e. GDP rises in conjunction with negative events, such as environmental disasters.
- ▶ **Knowledge is said to be the paramount resource and, since its growth may be unlimited, knowledge-based growth is seen as sustainable.** Daly emphasises that he is in favour of knowledge replacing resource use as a production input, and thinks the tax system should support this by taxing raw materials more heavily and reforming patent legislation to bring down the cost of knowledge. However, he finds expectations of this bringing about immaterial growth ('angelised GDP') grossly exaggerated and based on ignorance of growth mechanisms.
- ▶ **The assertion that without growth unemployment will rise**, too, is based on a historical correlation that is no longer generally valid. Today, the relationship is often the reverse. The quest for growth is taking place at the cost of higher unemployment owing to such factors as increasing automation, digitisation and outsourcing.

*Social sustainability* plays a central role in criticism of growth. Here, growth critics point to the 'happiness paradox', i.e. the empirical fact that satisfaction with life is strongly correlated with economic growth up to a certain level, but that further economic growth does not then automatically result in an increase in life satisfaction. On the contrary, in many developed countries the trend seems to have been going in the opposite direction and mental ill-health has, instead, increased.

One explanation for the happiness paradox is, according to scholar Stefano Bartolini, that our consumption society impairs human social relationships and this, in turn, affects well-being since social relationships are among its key determinants (Bartolini, S. and Bilancini, E., forthcoming; Bartolini, S., Bilancini, E. and Pugno, M., 2011; Bartolini, S. and Bilancini, E., 2010; Bartolini, S. and Bonatti, L., 2008 [1]). According to Bartolini's theory, material consumption crowds out social connections, one reason being that material values are positively correlated with factors that are negatively correlated with good social relationships. These fac-



tors include objectification of other people and such relative traits as low degrees of empathy and genuineness in relationships, a poor capacity for cooperation and high degrees of cynicism and distrust.

This part of Bartolini's research also reverses the chain of causation. In his opinion, unhappy people boost economic growth: we consume in order to enhance our status and be happier.

There is also research showing that financial incentives contribute to a 'crowding-out' of motivation. According to this theory, such incentives may result in perverse effects since they do not supplement but, rather, supplant other motives, such as promoting social accountability.

The happiness paradox can be remedied by clarifying the fact that the objective of politics is well-being and that this objective should guide policy.

Speakers at the seminars (numbers 2 and 7) on new measures of economic development were Stewart Wallis, Executive Director of the New Economics Foundation (**nef**), and Professor Charles A.S. Hall, the founder of Biophysical Economics.

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## 6.1 New measures of economic development

After the financial crisis of 2008, it was clear that the great majority of economic forecasts had failed by not warning of the risks. Development had clearly proved unsustainable, not only in ecological and social terms but also financially and economically. In 2008 this prompted the French President, Nicholas Sarkozy, to appoint a high-level Commission on the Measurement of Economic Performance and Social Progress, with members including Professors Joseph E. Stiglitz, Amartya Sen and Jean-Paul Fitoussi. One of its purposes was to identify the limits of GDP as an indicator of economic development and social progress, and to put forward recommendations for better measures and indicators (Stiglitz et al., 2009).

The Stiglitz-Sen-Fitoussi Commission, as it came to be called, drew the conclusion that it is high time to develop indicators that can show, in a better way than present-day indicators, how the economy is developing. Indicators of this kind should focus on measuring human well-being, rather than economic output or production. In the Commission's view, in terms of well-being, income measures are more important than production measures. Another recommendation was to focus more on distribution effects with respect to income, consumption and wealth. Consumption of non-market goods and services, such as measures of leisure activities, should be included, and both objective and subjective dimensions of well-being are deemed important.

The New Economics Foundation (**nef**) has analysed measurement of economic development in the green economy for the UK Government (the Government Office for Science's Foresight Mental Capital and Wellbeing Project, 2008).

Based on contemporary psychological research, in which human well-being is seen as a dynamic process — in which people flourish when they function well in interaction with the surrounding world — **nef** has developed a range of new prosperity measures. The key determinants of well-being, according to **nef**'s model, are good relationships, autonomy, competence, a sense of purpose and feelings of happiness and satisfaction. The Chilean economist Manfred A. Max-Neef has previously drawn similar conclusions in his book *Human Scale Development: Conception, Application and Further Reflections*. According to Stewart Wallis, **nef**'s executive director, the current economy is characterised by the 'four U's': it is *unsustainable, unstable and unfair, and it is making us unhappy*.

Wallis thinks radical changes in the objectives and incentive structures of the economy — 'a Great Transition' — is necessary. Establishing a clear and measurable goal is a pivotal part of this transition. According to **nef**, the goal should be high levels of well-being and social justice within ecologically sustainable boundaries. Progress towards this goal can be measured in terms of three key 'spheres':

- ▶ **Goals:** universally high levels of well-being.
- ▶ **Resources:** sustainable use of environmental resources.
- ▶ **Human systems:** activities that achieve intermediate objectives such as a stable and productive economy, a cohesive society, good housing and so on.

How the different spheres relate to one another should be analysed in more detail. The key relationship is between resources and objectives. How efficient are we at achieving the goals we seek, given the resources we have? The constituent parts of the relationship should also be analysed separately. How efficient are our human systems at using resources sustainably and at delivering our goals?

In **nef's** view, the best way to measure prosperity and well-being is with subjective criteria, i.e. to ask people how they feel and how they interact with the world. To measure these variables effectively using subjective criteria, established techniques of proven robustness and reliability are recommended.

In its study, **nef** draws the conclusion that indicators of well-being should be used, and should govern decision-making. This is necessary since human well-being is very much affected by political decisions. Greater knowledge of the degree of well-being in society can contribute to better, and better-informed, political decisions.

The work carried out by **nef** culminated in recommendations to the UK Office for National Statistics to start developing a framework for understanding progress in terms of three spheres: *well-being and prosperity for all; sustainable use of environmental resources; and the human institutions and systems for achieving these goals*. The ONS was also recommended by **nef** to include, in the short term, five subjective questions to measure well-being within the Integrated Household Survey framework.

Further recommendations by **nef** to the ONS were to develop, first, a headline index of human well-being, based on these subjective measures; second, a range of indicators to provide an in-depth picture of target fulfilment; and third, a set of indicators to measure 'drivers of well-being'.

## 6.2 Summary of conclusions

**TABLE 7.** Contrasts between the economic discourse mainly governing present-day companies and the scientifically oriented economists' perspective, in terms of the overarching goal of economic policy

<b>Current economy</b>	<b>Green economy acc. to scientifically oriented economists</b>
The goal is growth (in GDP), i.e. in effect exponential growth.	The goal is well-being — 'Beyond GDP' — with the highest possible sustainable economic development, given planetary boundaries.
Not only can further growth be combined with achieving sustainability goals, but growth is a precondition for attaining them.	Further GDP growth at an aggregate global level is not feasible in the long term. Certain regions and sectors, however, need to expand in absolute terms while others need to contract (by using resources much more efficiently).
Absolute and physical limitations are seen as relatively irrelevant and uninteresting. Instead, the focus is on technological development and substitution.	Biophysical conditions are the basis for the economy and investing in natural capital and energy services is central for optimising GDP and net national income (NNI).

Current economy	Green economy acc. to scientifically oriented economists
The price mechanism will, it is assumed, lead to technological development and replacement of scarce resources by alternative ones.	There are absolute and physical limitations that it is important for us to stay within. These limitations are among the framework conditions of the green economy ('planetary boundaries'), which serve to develop correct prices and lead to sustainable technological development.
GDP growth is expected to enhance prospects for improving prosperity, including environmental investments. <sup>16</sup> Income disparities as such are not negative and may even help to improve conditions for more and more people in absolute terms. Poverty is most effectively alleviated by boosting growth.	Since GDP cannot grow continuously at the aggregate level, distribution issues are crucial in the green economy. Large and increasing income disparities are negative in terms of well-being. The green, inclusive economy is more important for poor demographic groups than for the rich portion of the world population (see e.g. TEEB and UNEP).
Labour productivity and total factor productivity (technological development) are in focus.	Multidimensionality: productivity should include several types of capital and focus on scarce resources.

Most people probably agree that growth must be economic, i.e. bring about an increase in real marginal utility. Growth that causes negative external effects, at the margin, to increase more than benefits is uneconomic. But how to assess and monitor quality vs quantity is a grossly neglected issue.<sup>16</sup>

One central conclusion from both the Sarkozy Commission and nef's work is that the focus must be shifted from GDP (a controversial and much criticised proxy) to measuring the target variable of well-being or happiness in a serious, robust way. Another conclusion is that the notion of productivity should be supplemented with more dimensions so that all relevant resource use, including the sustainable source and sink functions of ecosystems, is included.

However, the increasingly nuanced view, in economic research contexts, of what GDP measures — and does not measure — has so far had very little impact on the political debate. The reason for the political resistance (across the political spectrum) is that society's incentive structure and functions are wholly adapted to the historical situation in which GDP growth was generally assumed to be economic, i.e. positive, and to result in a greater supply of resources to distribute.

The adaptation required today for a transition to a sustainable economy is comprehensive. Since the adaptation to sustainability must take place at a time when most societies have accumulated major debts of various kinds, the task is twice as difficult.

The debts include several forms of capital. We have overexploited natural capital and energy services, with the result that our real assets have decreased and productivity in various ecosystems has been reduced. It will take a long time to restore these services to the optimal level.

The growth of financial capital has resulted in a greater concentration of wealth and great disparities in income and wealth, which in turn have led to substantial losses in social capital. This loss of social capital is particularly serious since the

<sup>16</sup> The notion of 'investments' includes not only measures that reduce emissions and boost production of natural capital or energy services but also, in particular, measures that reduce negative effects in relation to the current situation. In other words, the deterioration in environmental status takes place more slowly than otherwise (i.e. than the 'business as usual' scenario).

degree of trust in society is one of the most important factors when major changes need to be implemented.

There is a broad consensus on the overarching goals of social development, in the form of increased economic benefits and prosperity. However, there are extensive differences of opinion about growth and the scope for substitution among different resources and forms of capital. To bridge these differences, further development of knowledge and methods in the discipline of economics is required, as are institutional and practical adaptations in the economic life of society.

Given that the adaptations referred to above are being carried out, there are calculations showing that the potential for real economic growth is higher in the green economy (with growth and recovery in several capital categories) in relation to development based on the present-day economy (UNEP, November 2011).

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### 6.3 Proposed R&D topics

1. The interrelationship between the overarching goal (prosperity), the foundation (natural resources) and the means (economic production, such as investments in real and human capital) of societal development needs to be analysed and also measured, using suitable indicators.
2. Means of attaining the goal, prosperity, within the framework of sustainable use of available resources and setting up a workable framework to genuinely ensure that resource use does not occur unsustainably, i.e. beyond the scientifically defined limits, must be devised.
3. The various parts of a nation's wealth (natural, real, human and social capital) need to be measured both in monetary and in physical or qualitative terms. These parts should, in particular, include the least studied parts, which are also the most threatened: natural capital, especially its renewable constituents, and social capital. The latter is, unfortunately, being depleted most rapidly among the groups in our societies whose human capital is also weakest (lowest education, least labour participation and vocational skills, and worst health and work capacity).

## 7 Research agenda for an inclusive green economy

The purposes of the present prestudy have been to analyse the differences in characteristics and perspectives between the current economy and an inclusive green economy, to identify knowledge gaps and to propose further research.

The analysis is based on reports related to the green economy and green growth by UNEP, the OECD and other organisations, and on literature related to the seminar presentations.

Specific comments and conclusions regarding the differences identified between our current economy and the features of a desired inclusive green economy are dealt with in the previous chapters and, briefly, in the summary of the report. In this chapter, the focus is on knowledge gaps and proposed future R&D initiatives.

This study is in no way comprehensive. Many other issues would have been important to explore. No doubt the most crucial one is that of jobs and employment. A particularly pertinent question would have been how a much more efficient use of natural resources — a key component in a green economy — would affect the supply of job opportunities. Other interesting themes that we would have liked to study in greater depth are:

- ▶ international trade — what changes are required to align the trading system with the framework of an inclusive green economy
- ▶ ethics, morality and psychological aspects of a transition
- ▶ gender perspectives
- ▶ technology and, in particular, the digitisation of the economy
- ▶ the growing complexity of society and its implications for democracy and sustainable development
- ▶ issues related to food production, especially soil quality.

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### 7.1. The Green Economy Workshop, 10-11 February 2014

As a final step in the prestudy, an international workshop was held in Stockholm in early February 2014. Its main objective was to solicit comments and advice from the participants on the conclusions and the research topics identified in the draft report. The workshop was attended by some 70 people<sup>17</sup>: researchers, experts and policymakers, predominantly economists.

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<sup>17</sup> See the list of participants in the Appendix.

## Research agenda with international, transdisciplinary, systems-analysis perspective

While the workshop participants represented a wide range of disciplines and academic backgrounds, a remarkably high degree of consensus was reached on a great number of issues. On the general level, the most significant point of agreement was that a transition to an inclusive green economy would require a systems perspective and the closest possible cross-disciplinary cooperation. Applying a systems perspective is necessary to help avoid sub-optimisations, manage trade-offs, understand rebound effects, avoid unsustainable path-dependencies etc. Moreover, the international character of the challenges — not least the North/South dimension — will require the research to be truly international.

Karl-Henrik Robèrt<sup>18</sup> highlighted the fact that to achieve the goals of applying a systems perspective and cross-sector cooperation and research, a unifying framework is needed. A prominent example that has been tested and scientifically reviewed within the area of sustainable development is the Framework for Strategic Sustainable Development (FSSD). A key component in this approach is a robust, principled definition of the goal (in this case social and ecological sustainability). From this definition, strategic steps towards the goal are explored through back-casting from agreed sustainability principles.

### Key research areas

During both the seminar series and the concluding workshop, a broad consensus emerged that the following research topics are of particular importance for a transition to an inclusive green economy:

- ▶ the crucial role of social capital
- ▶ the importance of natural resources, not least high-quality energy, for economic growth and development
- ▶ the need to shift from a quantitative to a qualitative growth model
- ▶ participation of the business sector as a force for sustainability
- ▶ the eminent need to reform the financial system
- ▶ aligning governance and institutions with the sustainability challenge.

### Beyond economics

In our current situation — in the Anthropocene, with growing evidence of discontinuities and tipping points in the Earth system — policies for growth and development and, indeed, macroeconomics must recognise the necessity of adopting models of ‘growth within biophysical limits’. Conventional macroeconomic models, such as DICE, include no such limits, thus implying that environmental degradation (such as GHG emissions and ecosystem decline) can continue unabated, reaching very high levels and pressures, for example CO<sub>2</sub> concentrations exceeding 1000 ppm, while anticipating only limited damage to the world economy. The reason is that these models lack a ‘damage function’, to represent serious discontinuities with potentially catastrophic implications. One way of dealing with this would be to insert a planetary boundary component into macroeconomic analyses. This would provide a cut-off point between a situation where conventional economics applies (within a ‘safe operating space’) and one characterised as ‘beyond economics’, such as GHG emissions clearly leading to a future temperature rise exceeding 2 °C, where policy interventions become imperative.

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<sup>18</sup> Blekinge Institute of Technology and founder of the Natural Step.

### High-risk scenario prompts ‘action research’

Workshop participants expressed profound concern about the problems of ecological and financial overshoot, as well as looming resource constraints.

Financial investment overshoot goes hand in hand with ecological overshoot. It manifests itself in financial assets being valued by the market as if headlong conventional growth were just to continue despite ecological collapse. ‘Business as usual’ represents grave risks, and this constitutes a strong motive for ‘action research’. There is simply not enough time to slowly build new theories and models. Researchers must devote significant time and effort, as well, to testing new, sustainable solutions that can improve resilience and provide bridges to a new and inclusive green economy.

### Role of education: updating economics teaching to meet the sustainability challenge

Participants expressed serious concern about the organisation of science and education. One frequent comment was that the education system is not currently helping us to address problems of a systemic nature. Cross-disciplinary efforts are few and far between. Particular concern was expressed about the education and training of economists. As Cameron Hepburn<sup>19</sup> put it, *economics is taught today as if the last 30 years did not happen*.

One particular shortcoming, stressed by many, was the failure of the vast majority of economic schools to offer students any basic understanding of how the natural world works. *The economic system is a subsystem of the natural system — not the other way round*, as several participants emphasised.

### Need for a new narrative

How are we to communicate the challenges and risks, and achieve the much needed transition? Reference was repeatedly made during the workshop to a quotation from Thomas Berry: ‘We are in trouble now because we do not have a good story.’ As Hunter Lovins<sup>20</sup> commented:

*We need a strategy of change, a hopeful vision of where we want to get to and clarity on how to make this vision come about. And as part of that, we also need scenarios of how breakdown is likely to occur and what to do if and when it does.*

In this respect, it matters greatly what terminology is used to describe the desired future state of the economy. Which terms would most cogently convey the benefits of an inclusive green economy, as opposed to one giving priority to conventional growth? Simply a ‘green economy’? An ‘inclusive green economy’? ‘Green growth’? A ‘sustainable economy’? A ‘regenerative economy’? ‘Green stewardship’? A great variety of names have been given to an economy where key social and ecological objectives are set above economic objectives.

The point was made that **we need to understand better what makes people change priorities, and the role of new narratives in this context**. Such narratives will be crucial in justifying economic policy changes that promote a transformation of production and consumption patterns. This offers some obvious research opportunities, not least for studying how advertising and marketing work. Advertising is said by some to be the most powerful ‘educational’ force on the planet. What can we learn from it? How can it be used to inspire sustainable lifestyles and consumption patterns?

<sup>19</sup> The Smith School and the Institute for New Economic Thinking.

<sup>20</sup> President and Founder of Natural Capitalism Solutions.



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## 7.2 Need for research

Research is needed both on how to implement agreed economic principles and, in particular, in areas where there are major theoretical differences between economists of different schools. One clear conclusion of the prestudy is that a substantial consensus exists, on a range of economic principles, between economists schooled in the neoclassical tradition and scientifically oriented economists. Examples include the ‘polluter pays principle’ and the principles that sustainable development requires greater long-termism in the economy and that a fully functioning market requires symmetric information. Another belief they share is that GDP has obvious shortcomings as a measure of prosperity, and hence as an overarching goal of economic policy. Given that progress in terms of policy change on such principles is very limited to date, a central question to pose is:

- ▶ **How are we to implement those steps towards an inclusive green economy on which a fairly strong consensus** among differently schooled economists exists? How can the barriers to change in these areas be overcome?

At the same time, there are distinct differences among the economists of different schools, notably those schooled in the neoclassical tradition and the scientifically oriented economists. They diverge, for example, in their views on the importance of natural capital, especially high-quality energy, for economic development; on substitutability among various types of capital; on the potential for continued economic growth and increased throughput of energy and materials; and on the importance of the price mechanism. These differences, such as the divergent views on the benefits of continued conventional GDP growth, may explain some of the barriers to change.

In response to the outcomes both of the seminar series and of the international workshop, we have grouped the research questions under a number of key topics deemed particularly important for launching a research programme. It is suggested that a research effort of this kind should be underpinned by a robust definition of sustainability. In the view of this prestudy’s authors, the definition should entail a shift in perspective from seeing sustainable development as a harmonious balance between economic, social and ecological sustainability to seeing social sustainability is the goal, ecological sustainability as a precondition and the economy as a tool.

### A. Formation of social capital and well-being

The conclusion from the prestudy concerning the crucial role of social capital was confirmed at the international workshop. Social capital is of paramount importance, above all to make possible the overarching goal of well-being, i.e. socially sustainable development. However, social capital and trust are also indispensable in the process of mobilising democratic support for the transition to an inclusive green economy in all its dimensions.

- ▶ **How do we rebuild social capital at all levels – individual, societal, political and at the level of global governance?** We need a better understanding of the interconnections between economic policy and social capital and well-being. How does trust at one level of society affect trust at the next, and how can a negative feedback loop be reversed?
- ▶ **How can an inclusive green economy be achieved, given the current state of social capital at different levels?** The recent decline of social capital in many countries will have serious implications, not least for opportunities to advance the sustainability agenda. Given this situation, how can progress be made towards an inclusive green economy?

- ▶ **How can well-being be maximised while resource use is minimised?** Comparing different countries in terms of well-being per capita in relation to resource use, what conclusions can we draw? What do the results imply from a policy perspective?
- ▶ **How can social capital and well-being be maintained when GDP is failing to grow, or even declining?** If society does not find a way of decoupling aggregate resource use from growth at global level, the world is likely to face low or even negative GDP growth for an extended period of time. In a squeezed economy there are imminent risks of social instability, conflict and adverse effects on well-being. What measures should be taken — and when — to preserve wellbeing and social capital?

## B. Crucial role of natural resources for growth and development

A central theme during the seminar series was the crucial role of natural resources, not least high-quality energy, for growth and development. A clear difference exists between economists of different schools. It is manifested, for example, in the value they assign to natural capital and ecosystem services and the priority they give to a supply of high-quality energy services at affordable prices. According to scientifically oriented economists, the value of natural capital is neglected by mainstream economists, by and large, and this constitutes a major risk for economic and social development in the future.

- ▶ **Rising prices of most commodities, including energy, are likely to damage prospects for growth and development. What alternative strategies could be pursued to avoid this?** There is increasing evidence that rising prices of energy and materials impair growth and development. What would be the short-term and long-term benefits to society — in the form of reduced pressure on ecosystems, lower pollution levels, GHG emission reductions, creation of new jobs etc. — of a circular economy, i.e. one characterised by massively increased resource efficiency? What incentive structures, including business models, are needed to promote an economy focused less on production and more on utilisation of existing stock, where the service life of products is extended and the primary objective is to recover, reuse and recondition components as far as possible?
- ▶ **What are the preconditions for a long-term sustainable transition of the energy system** from fossil dependence, exceeding 80% at global level, to a dominance of renewable energy? How can we establish and renew a system based on solar power, wind power and sustainable biomass use? What energy sources are required and what are the repercussions on natural resources, such as land and water? Examining the critical role of EROEI (energy return on energy invested) is particularly important.
- ▶ **The transition to a sustainable energy system is largely an investment challenge.** The technologies exist, costs are falling and the benefits to society are obvious. Nevertheless, the necessary financial capital is not forthcoming. What are the main barriers? How can the flow of investment capital to clean energy and energy efficiency measures be significantly scaled up?
- ▶ **Centralised versus decentralised electric power systems.** How should we evaluate higher unit costs but lower risks (disaster risk reduction) of decentralised systems in relation to lower unit costs but higher network costs and unknown disaster risks?

## C. Qualitative versus quantitative growth

In the logic of the present-day economy, economic growth is the implicit normative goal. Every rise in GDP is assumed to increase the scope for improving welfare and well-being in society. The reasoning presented by scientifically oriented

economists, as well as by UNEP and the OECD in their recent reports on the green economy, strongly calls into question the assumption that GDP growth in developed countries, by definition, boosts genuine wealth and contributes to sustainable development. Their view is that growth takes various shapes and, in many instances, is closely associated with overexploitation of natural resources and pollution.

Most economists agree that GDP growth can have negative, as well as positive, effects on welfare and well-being. According to the vast majority of participants in the prestudy, GDP growth should therefore not be the primary goal for societal development. Instead, governments are advised to set goals that relate to distinct welfare goals. Furthermore, policies for sustainable development should not be judged not according to their effects on GDP growth but by their effects on well-being and nature.

Another (closely related) difference between mainstream economists and scientifically oriented economists concerns the question of substitutability between different types of capital. The natural-science approach implies that natural capital is replaceable by other types of capital — such as manufactured or financial — only to a limited extent. Maintaining life-supporting systems is seen as a system condition.

The tensions between different schools of economists on issues like these offer significant opportunities for research and analysis:

► **How can a shift in policy priorities from GDP growth to a set of welfare and well-being goals become feasible?** What are the requirements for decoupling production and consumption from a rise in the throughput of energy and materials? Is absolute decoupling of economic growth from energy and resource use possible?

How are the three spheres — *the goal* (social welfare/prosperity), *the base* or foundation (natural resources) and *the tools* (economic production in the form of investments in real and human capital) — interrelated? How can the overarching goal of welfare and well-being be attained within the framework of sustainable use of available resources? How can well-being be maximised while resource use is minimised? It is particularly important to study the transition from quantitative to qualitative growth in countries that have already attained a high level of material prosperity. Moreover, emerging economies with fundamentally different cost drivers and potentially large shifts in the real costs of factors of production may offer new approaches and options.

► **How would the functions of our society need to be designed to optimise welfare and development in a steady-state economy?** Specifically, in a steady-state economy:

- How are employment issues managed?
- How are resources and incomes distributed?
- How are welfare services funded?
- How is financing handled?
- How can the ratio of earned to unearned income be raised again after decades of decline?

► **What indicators for welfare and well-being should be used to promote and facilitate a shift towards qualitative growth?** It is especially relevant to capture the development of all types of capital, recognising the limits to substitution of natural capital as defined by planetary boundaries. It is equally important to identify activities that support the formation of social capital and community value.

## D. The business sector as a force for sustainability

A key theme during the seminar series was the role of the business community in the transition to an inclusive green economy. Business generates an estimated 70% of GDP. A sustainable economy can be achieved only if the business sector is closely aligned with the objectives that support such a development. It is particularly important to clarify what changes are needed in the incentive structure of the economy to inspire and support companies that are already making serious efforts to work for sustainability objectives. Too often, incentives work against them, giving unsustainable companies a competitive advantage.

- ▶ **From shareholder value to stakeholder value:** what measures are required to transform companies from generating maximum return for their owners to becoming producers of benefits for society at large and thus a broader circle of stakeholders? How are the relevant stakeholders identified, and which ones should a company take into consideration?
- ▶ **What regulations and incentive structures would support sustainable entrepreneurship?** How can regulations and incentive structures be shaped in such a way as to encourage the evolution of companies that produce the greatest possible benefit to society (in all relevant forms of capital: real, human, social and natural)?
- ▶ **How can horizontal collaboration along the supply chain be promoted?** Product Services Systems (PSS) are good examples of actors within a value chain helping to generate services to customers with a potential for promoting sustainability.
- ▶ **Improve understanding about public sector levers,** like public procurement and public/private partnerships with a huge potential for sustainable innovations.
- ▶ **Examine the overall effects of economies of scale.** The quest for market dominance and economies of scale has led to many companies becoming very large and, in the process, reducing their share of equity. Companies have, in effect, become 'too large to fail', entailing greater risk-taking for society. How can such risks be limited?
- ▶ **Examine the culturally distorting effects of advertising.** Honest marketing and transparency are key prerequisites for an inclusive green economy. What regulatory measures are needed to restrict marketing activities that excel in creating consumer habits of overconsumption and waste?

## E. The financial system as a force for sustainability

To date, the role of the financial sector in the promotion of sustainable development has been largely overlooked. Yet it is obvious that the principles that guide investments ultimately determine what kind of society we will have in the future. The problem we face is that significant parts of the financial markets are characterised by extreme short-termism. Few players in banking and finance pay much attention to the long-term risks associated with ecological overshoot or climate change. As long as this remains true, prospects of sustainability are non-existent.

- ▶ **How should the financial system be shaped to support sustainable development?** An analysis of this kind should cover issues brought to the fore in the previous chapters, such as the Chicago Plan, complementary currencies and how financial markets assess environmental and climate-related risks. It should also include the risk of 'stranded assets', given the extreme short-termism of financial markets and the compensation schemes prevailing in the sector.

- ▶ **The significance and role of the discount rate** in a green economy. Given phenomena like climate change and ecosystem degradation, discounting future values is difficult. Since we face problems that, if current trends continue, will be increasingly serious, a positive discount rate is highly questionable. The crucial question will be how to decide on the appropriate discount rate.
- ▶ **How will the challenges of financial overshoot, ecological overshoot and looming resource constraints affect prospects for future growth and development?** What measures are needed to avoid repeated crises and possible collapse? How would systematic efforts to address ecological overshoot affect financial asset values?
- ▶ **How does the level of indebtedness in society impact on prospects for sustainable development?** To what extent does a rapid credit expansion ‘dope’ the economy, causing greater exploitation of natural resources and increased GHG emissions?
- ▶ **How can taxation loopholes in the global economy be addressed?** In the last few decades, international competition has resulted in a ‘race to the bottom’ regarding corporate taxes. Income inequalities have increased substantially, both between and within countries, and are now perceived by the World Economic Forum as one of the main global risks. How would a unitary tax on corporations and/or an international tax on financial transactions be designed?

## F. Governance

Academic research has a crucial role to play in terms of facts and analysis, but ultimately the necessary transition is about values, politics and institutions. Analysing the interface between scientific knowledge and politics — the science–policy gap — is of paramount importance in the overall efforts to promote development towards an inclusive green economy.

- ▶ **Politics or science?** Which issues with a bearing on the green economic transition can be managed within the framework of science and academia, and which are markedly political in nature? Our analysis demonstrates the great importance of politics and the fact that sustainable development is far from attainable solely by means of an academic design.
- ▶ **Democratisation of the transition:** the crucial importance of politics for a transition to an inclusive green economy is clear, irrespective of which issue is at stake. The inadequacy of action in the political sphere to date is abundantly clear. How are we to pave the way for a democratically based transition that meets the indispensable requirements of sustainable development?
- ▶ **In an inclusive green economy, what institutions would foster sustainable development?** A transition to an inclusive green economy requires a transformation of the institutions that guide the economy today. This transformation, in turn, calls for a change in prevailing policy priorities. The prevailing view of cost-effectiveness and the demand that all policies should aim at, and be benchmarked against, their contribution to GDP growth constitute serious barriers to change. What kinds of frameworks and methods — such as backcasting from a sustainable future, valuation of ecosystem services and economic incentive schemes — would be conducive to overcoming these barriers to change?
- ▶ **How can a (market) system be established that prices goods and services correctly?** Is internalising external negative effects enough to turn prices in the right direction, or do we also need to introduce various supplementary regulations and/or find ways of incentivising production of economic benefits for society at large? Which further aspects need to be taken into consideration to approach ‘correct’ pricing that steers development towards greater sustainabil-

ity? How far is current pricing sustainable, and what are the limits of the price mechanism? Given that prices reflect relative values set by the market, it is crucial to understand when prices convey useful information and when they do not.

- ▶ **How can resources in society be allocated efficiently and resiliently?** Today, resource allocation is far from efficient and, above all, unsustainable in the long term. Massive and growing financial resources are, for example, being allocated to support exploitation of fossil fuels. A high proportion of these assets is in danger of being lost, in the form of 'stranded assets', if governments around the world live up to their pledge of stabilising the climate system. Another example of inefficient resource allocation is for large groups of people to be unemployed while numerous important, value-creating tasks in society are neglected. How far is this an issue of governance? Or can economic principles and mechanisms be designed to achieve a more efficient allocation of resources?
- ▶ **In which areas are long-termism especially important, and how can it be attained?** How, for example, can we ensure that long-term sustainable management of natural resources and energy services has higher priority than short-term exploitation? Which other areas call for long-termism?

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<sup>21</sup> Translator's note. In Swedish only. The title means 'Growth at Any Price'.

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# Appendix A.

## Facts about the 10 seminars in the series

### 1. The importance of energy for the green economy – stylised facts in new perspectives?

**Date:** 19 January 2012

**Venue:** Secretariat of Global Challenge, Stockholm

**Speaker:** Professor *Astrid Kander*, Lund University

**Discussants:** *Sandro Scocco*, chief economist of Global Challenge

**Attended by:** approx. 30

**Web:** <http://www.globalutmaning.se/?p=4611> (in Swedish)

**Interview with Astrid Kander (in Swedish):**

<http://www.youtube.com/watch?v=WDM86URvdDU>

### 2. New measures for progress – implications for policy and economics

**Date:** 22 February 2012, 5.00–7.00 pm

**Venue:** Mynthuset, Riksdagen (Swedish Parliament), Stockholm

**Speaker:** *Stewart Wallis*, Executive Director of New Economics Foundation (nef)

**Discussant:** Professor *Magnus Lindmark*, Umeå University

**Attended by:** approx. 50

**Web:** <http://en.globalutmaning.se/?p=2793>

**Interview with Stewart Wallis:** <http://www.youtube.com/watch?v=eROkWgg--Rc>

### 3. Towards a circular economy: Driving forces and obstacles – What are the policy challenges?

**Date:** 16 April 2012

**Venue:** Ekoteket, Kulturhuset (Stockholm Cultural Centre)

**Speakers:** *Walter Stahel*, *Ernst von Weizsäcker*

**Discussants:** Professor *John Hassler*, Stockholm University; *Christer Forsgren*, Head of Technology and Environmental Science, Stena Metall

**Attended by:** approx. 100

**Web:** <http://www.globalutmaning.se/?p=5178> (in Swedish)

**Interview with Walter Stahel:** <http://www.youtube.com/watch?v=yJzzPUUr5gg>

**Interview with Ernst von Weizsäcker:** [http://www.youtube.com/watch?v=1oq\\_41XBMcA](http://www.youtube.com/watch?v=1oq_41XBMcA)

**Webcast:** <http://bambuser.com/v/2559830>, <http://bambuser.com/v/2559786>, <http://bambuser.com/v/2559747>

**Other media:** Interview with Walter Stahel in Klotet, Radio Sweden channel P1:

<http://sverigesradio.se/sida/default.aspx?programid=3345>

#### 4. How do we value Nature?

**Date:** 9 May 2012

**Venue:** Ekoteket, Kulturhuset (Stockholm Cultural Centre)

**Speaker:** *Pavan Sukhdev*, founder and CEO of GIST (Green Initiatives for a Smart Tomorrow) Advisory

**Discussants:** *Carl Folke*, Stockholm Resilience Centre; *Martin Ådahl*, CEO of the green, liberal Swedish think tank FORES

**Attended by:** approx. 100

**Webcast (live):** [http://www.youtube.com/watch?v=pmy\\_ZpWOj5o](http://www.youtube.com/watch?v=pmy_ZpWOj5o), <http://www.globalutmaning.se/?p=5370>

#### 5. Vad ska vi ha finanssektorn till?<sup>22</sup>

**Date:** 22 October 2012

**Venue:** Vision, Kungsgatan 28A, Stockholm

**Speakers:** *Sasja Beslik*, Head of Responsible Investment and Governance at Nordea Investment Funds; *Sandro Scocco*, chief economist at Global Challenge

**Discussants:** public

**Attended by:** approx. 80

**Webcast (live):** [http://www.globalutmaning.se/?page\\_id=6513](http://www.globalutmaning.se/?page_id=6513), <http://www.globalutmaning.se/?p=6504>

#### 6. Peak Oil Postponed?

**Date:** 7 November 2012

**Venue:** Museum of Mediterranean and Near Eastern Antiquities, Fredsgatan 2, Stockholm

**Speakers:** Professor *Charles A.S. Hall* and Professor *Kjell Aleklett*, Uppsala University

**Discussants:** public

**Attended by:** approx. 100

**Webcast (live):** [http://www.globalutmaning.se/?page\\_id=6607](http://www.globalutmaning.se/?page_id=6607), <http://www.globalutmaning.se/?p=6617>

**Other media:** Debate article in *Svenska Dagbladet* (*Brännpunkt*): [http://www.svd.se/opinion/brannpunkt/dyrare-olja-orsaken-till-lagre-tillvaxt\\_7646542.svd](http://www.svd.se/opinion/brannpunkt/dyrare-olja-orsaken-till-lagre-tillvaxt_7646542.svd)

#### 7. The role of efficiency in the green economy: From labour productivity to a multidimensional measure of productivity

**Date:** 8 November 2012

**Venue:** Stockholm Environment Institute, Stockholm

**Speaker:** *Charles A.S. Hall*

**Discussant:** *Thomas Hahn*, Stockholm Resilience Centre

**Attended by:** approx. 50

#### 8. Biophysical economy: Understanding the boundary conditions for the green economy

**Date:** 8 November 2012

**Venue:** Secretariat of Global Challenge, Stockholm

**Speaker:** *Charles A.S. Hall*

**Discussant:** *Kristian Skånberg*, Swedish Confederation for Professional Employees (TCO)

**Attended by:** approx. 30

**Webcast (Charles Hall's lecture):** [http://www.globalutmaning.se/?page\\_id=6611](http://www.globalutmaning.se/?page_id=6611)

**Commentary by Charles Hall:** <http://www.globalutmaning.se/?p=6621>.

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<sup>22</sup> *Translator's note.* The title of this seminar, which was held in Swedish, means 'What do we need the financial sector for?'

## 9. Financial reform for a sustainable economy

**Date:** 28 January 2013, 3.00–5.00 pm

**Venue:** Museum of Mediterranean and Near Eastern Antiquities, Fredsgatan 2, Stockholm

**Speakers:** *Bernard Lietaer, Michael Kumhof (IMF), Ulf Dahlsten*

**Discussant:** *Pavan Sukhdev*

**Attended by:** approx. 100

**Webcast (live):** [http://www.globalutmaning.se/?page\\_id=7741](http://www.globalutmaning.se/?page_id=7741)

**Other media:** Studio 12 interview with Michael Kumhof, <http://tv.handelsbanken.se/2013/01/28/studio12-1545-28-nov-2013>; Andreas Cervenka's blog, <http://blog.svd.se/cervenkaspengar/2013/02/05/det-stora-mysteriet-pengar/>; Dagens Arena, <http://www.dagensarena.se/innehall/overhangande-risk-for-ny-finanskris>

## 10. Transforming business for tomorrow's world

**Date:** 29 January 2013, 8.00–9.30 am

**Venue:** Secretariat of Global Challenge, Stockholm

**Speaker:** *Pavan Sukhdev*

**Discussant:** Professor *Karl-Henrik Robert*

**Attended by:** approx. 30

**Web:** <http://www.globalutmaning.se/?p=7319>

### Green Economy Workshop

– A research agenda for a transition to a green, inclusive economy

**Date:** 10–11 February 2014

**Venue:** Royal Swedish Academy of Sciences, Stockholm

**Organizing Committee:** Dr *Eva Alfredsson* and Professor *Anders Wijkman*

**Moderator of the Workshop:** *Rebecca Oliver*, Future Earth


**Participants:** *Ann-Mari Svennerholm*, The Royal Swedish Academy of Sciences', Environmental Comittée; *Carolina Sachs*, The Antonia Ax:son Johnson Foundation for Sustainable Development; *Johan Edman*, The Swedish Foundation for Strategic Environmental Research, MISTRA; *Johan Kylenstierna*, Stockholm Environment Institute; *Per Krusell*, Institute for International Economic Studies; *Therese Lindahl*, The Beijer Institute of Ecological Economics; *Wendy Broadgate*, The Royal Swedish Academy of Sciences' Environmental Comittée; *Alexander Crawford*, Global Challenge; *Anders Wijkman*, Global Challenge; *Ann-Kristin Bergquist*, Umeå University; *Anna Borgeryd*, Polarbröd; *Anne-Cerise Nilsson*, Ministry of the Environment; *Annelie Örtqvist*, Naturakademin Learning Lab; *Åsa Svenfelt*, KTH Royal Institute of Technology; *Cameron Hepburn*, The Smith School and the Institute for New Economic Thinking; *Camilla Hållen*, Swedish Energy Agency; *Carl Folke*, Stockholm Resilience Centre; *Catherine Bonde*; *David Schelin*, Ragnsells; *Eeva Hellström Sitra*, The Finnish Innovation Fund; *Elin Mellqvist*, The Royal Swedish Academy of Sciences' Environmental Comittée; *Eva Alfredsson*, Global Challenge and KTH Royal Institute of Technology; *Gail Tverberg*, Our Finite World; *Gretchen Daily*, Stanford University; *Gustav Engström*, The Beijer Institute of Ecological Economics; *Hanna Wetterstrand*, Stockholm Resilience Centre; *Harald Sverdrup*, Lund University; *Helen Ågren*, Ministry of the Environment; *Hunter Lovins*, Natural Capitalism Solutions; *Ian Johnson*, Club of Rome; *Jessica Coria*, University of Gothenburg; *Joakim Sonnégård*, Swedish Fiscal Policy Council; *Jocelyn Blériot*, Ellen MacArthur foundation; *Johan Hall*, The Swedish Trade Union Confederation, LO; *Johan Rockström*, Stockholm Resilience Centre; *Johan Schuck*, DN, leading newspaper; *John Fullerton*, Capital Institute; *Karl Hallding*, Stockholm Environmental Institute; *Karl Henrik Robert*, The Natural Step; *Kate Raworth*, Oxford University; *Kjell Aleklett*, Uppsala University; *Kjell Vowles*, Effekt climate magazine; *Kristian Skånberg*, The Swedish Confederation for Professional Employees, TCO; *Kristín Vala Ragnarsdóttir*, University of Iceland; *Kristina*



*Persson*, Global Challenge; *Kristina Söderholm*, Luleå University; *Lars Magnusson*, Uppsala University; *Lars-Erik Liljelund*, The Swedish Foundation for Strategic Environmental Research, MISTRA; *Leif Anderson*, The Royal Swedish Academy of Sciences; *Environmental Comittée*; *Lene Anderssen*, Det Andersenske Forlag; *Magnus Lindmark*, Umeå University; *Marcus Zils*, McKinsey & Company; *Marie-Louise Kristola*, Klotet, Vetenskapsradion; *Mark Halle*, International Institute for Sustainable Development; *Mark Storey*, Ministry of Finance; *Markus Larsson*, Riksdagen, the Swedish Parliament; *Mats A. Andersson*, The Fourth Swedish National Pension Fund (AP4); *Mikael Malmaeus*, IVL Swedish Environmental Research Institute; *Oliver Greenfield*, Green Economy Coalition; *Olle Björk*, Miljödepartementet; *Paul Warde*, University of East Anglia; *Per Bolund*, Riksdagen, the Swedish Parliament; *Per Klevnäs*, Stockholm Environment Institute; *Peter Frykblom*, Ministry of Finance; *Rebecca Oliver*, Moderator; *Roger Tiefensee*, Riksdagen, the Swedish Parliament; *Sandro Scocco*, Arena Idé think tank; *Sanna Baltscheffsky*, Ny Teknik, newspaper; *Sofia Gustafsson*, The Antonia Ax:son Johnson Foundation for Sustainable Development; *Stefano Bartolini*, Università degli Studi di Siena; *Stewart Wallis*, New economics foundation; *Susanne Sweet*, Stockholm School of Economics; *Svante Axelsson*, Swedish Society for Natural Conservation; *Thomas Hahn*, Stockholm Resilience Centre; *Thomas Nilsson*, The Swedish Foundation for Strategic Environmental Research, MISTRA; *Thomas Sterner*, University of Gothenburg; *Tomas Björkman*, Stiftelsen Ekskåret; *Walter Stahel*, Geneva Association; *Birgitta Tullberg*, The Royal Swedish Academy of Sciences; *Environmental Comittée*; *Journalist SvD*; *Malin Olofsson*, SVT; *P.M. Nilsson*, DI.





 This report, from the Swedish think tank Global Challenge's Green Economy working group, describes the results of a series of seminars initiated ahead of the UN Rio+20 conference in 2012. It provides an analytical account of the 'green economy' concept. What changes are required to transform our current economy into one that is sustainable, inclusive and green – and that helps to engender sustainable development? The study identifies knowledge gaps and proposes research questions.

The report is based on the presentations and discussions on *Key Issues for a Green Economy* that took place within the framework of ten seminars in 2012 and 2013. Their themes were:

- 1.** The role of energy in development and the green economy
- 2.** New measures for progress – implications for policy and economics
- 3.** Towards a circular economy: driving forces, obstacles and policy challenges
- 4.** How do we value Nature?
- 5.** What do we need the financial sector for?
- 6.** Peak Oil Postponed?
- 7.** The role of efficiency in the green economy: from labour productivity to a multidimensional measure of productivity
- 8.** Biophysical economy: understanding the boundary conditions for the green economy
- 9.** Financial reform for a sustainable economy
- 10.** Transforming business for tomorrow's world