

A young girl with blonde hair, wearing a white top, is smiling and looking upwards towards a large, textured tree trunk. The scene is set in a sunlit forest with green foliage in the background. The text is overlaid on the right side of the image.

Integrated Scenarios in the scope of the national sustainability strategy

Possible context scenarios for
sustainability policy up to 2040
and sustainable design options
for spare time, habitation and
nutrition

Imprint

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Dear readers,

the challenges to design a successful environmental and sustainability policy are immense: climate change, scarce resources, loss of biodiversity or fertile soils. These are known developments. Societies and political systems are changing as well, though, e.g. by demographic change or new consumption or technology trends. Such developments considerably influence the design and possible success of our political situation; an ageing population at times requires other solutions than a young »Baby boomer« society. No matter the uncertainties, one thing is certain: the conditions and challenges regarding design of environment and sustainability politics in future will be different from what they are today. At best, we have an idea or wish for a specific development. But no one can know and foretell for sure what the future will look like. Future research does not even try to predict the future, but to help to recognize or think through different possible developments by its methods and points of view: which imaginable events and developments that we consider beneficial and worthwhile can we prepare for? What changes and escalations, e.g. increased crisis-like developments of the European economy, which we do not want to happen at all, do we have to expect anyway? What are our alternatives in responding to specific developments or preventing others?

The »Wissenschaftlicher Beirat der Bundesregierung für globale Umweltfragen« (WBGU) demands a »Great Transformation« towards a sustainable society. The Federal environmental agency is participating in this discussion, e.g. showing that it is already possible to become greenhouse-gas-neutral with today's technology in its current study on the »greenhouse-gas-neutral Germany«. The technological possibility alone is not enough, however. Social change is necessary. Society consists of different social actors with the respective individual and/or shared interests, and, of course, people with individual needs and requirements. Not all developments can be controlled by politics.

The first part of this brochure presents possible developments that are removed from direct political influence. Nevertheless, they are imaginable external situations in which sustainability policy must be designed. This leads to solutions for sustainable development that is more or less suitable or desirable.



This project is not special because of the forecasts or trend update, but because it promotes systemic and interconnected thinking and thus opens up new horizons and room for discussion. The project is to inspire and increase flexibility by describing possible and plausible developments of the future without prescribing finished solution templates.

The scenarios were developed in participative processes. Representatives from different areas, e.g. non-governmental organisations, industry, science, government, but also citizens, thought about possible sustainable developments and solutions in facilitated meetings. Of course, not every suggested solution is »ideal«. For example, one solution will protect more resources than others, while an alternative may consider social aspects more strongly. This diversity of discussion and approaches shows that there are many different sustainable solutions. In spite of all the differences, it becomes clear that the participants have one wish: Many want to place greater emphasis on the needs and requirements of people. At least in the scenario processes, the parties show- little fear of accepting a »good life«: simplification, deceleration and self-reliance as answers to increasing complication, technical dependency, time pressure and indifference.

This brochure shows how diverse and colourful the discussion about sustainable solution and design options are and thus contributes to the social discussion about the framework of our shared future. I wish you an inspiring and forward-looking read.

Dr. Thomas Holzmann

Vice-president of the Federal environmental agency

Sustainability in a future-proof way

Sustainability, by definition, is about maintaining future capability in one's own decisions. What happens, though, if the framework conditions change? What if the different political, economic and social actors have different ideas of sustainable solutions? Systematically developed future scenarios have been used to point out room for solution for sustainable action in spare time, living and building, as well as nutrition – and reviewed the necessity of resilience against changing framework conditions.



Sustainability as a long-term cross-sectional topic

Environmental and sustainability policies are facing complex challenges: Problems of climate change, increasingly scarce resources, the growing global population or increasing urbanisation are interacting more and more. Globally increasing material demands are reinforcing pressure on the natural basics of life, while ecological crises are leading to poverty, hunger and lack of essentials in many parts of the world. Since 2002, the Federal government has been emphasizing the fact that sustainable development is a central goal of the

government's actions with its national sustainability strategy »Perspectives for Germany«. In this sense, environmental policy is – more than ever – a cross-section that shows a high degree of interlinking and topic overlapping with many other areas of politics, such as economic, agricultural, energy and traffic policies. In the light of this, environmental policy issues are increasingly turning into economic and social issues, as evidenced by the energy turnaround or large infrastructure projects.

Since responsibilities for one and the same subject are often spread over several departments, different interests and points of view need to be balanced within the political framework. Many of the challenges named cannot be solved even remotely by policy alone, though. Instead an effective sustainability strategy requires a wider dialogue that includes companies as well as social and political actors.

Additionally, it is a characteristic of sustainability policy, comparable to the pension or infrastructure policy, that it is a long-term subject. This means that a decision once made – or omitted – will only show its effect in the long run and that planned effects may be impaired by unforeseeable developments. The environmental policy changes demand integrated solutions aligned with the long term - in spite of and specifically in the light of the crises of financial, currency and economic development, which currently cause much political focus. Additionally, solution approaches must be designed so that they cannot be counteracted by every little change to the framework conditions. Future research offers various tools for a strategic dialogue about comprehensive subjects and long-term forecasts, as well as robust strategy determination. Szenario-Management™ combines these requirements by permitting a systematic and open discussion to support strategic decisions.

Recording complex interrelations with scenarios and thinking ahead possible futures

When dealing with the future, it is often silently assumed that »the one future« can be predicted. This may actually be true in short-term matters – and in exceptional cases also beyond this. For complex cross-sectional subjects such as sustainability development, however, this procedure will often lead to wrong forecasts. Although the increase of complexity and uncertainty is clear, politicians, entrepreneurs and social stakeholders tend to rely on one forecast – or try to be able to react as flexibly as possible in the short run. Both approaches – planning thinking as well as »running on sight« – lead to missing structural changes while there is still time to react. Therefore, two ways of thinking need to be developed:

- **Future-open thinking:** Due to the uncertainty in many environments, it is no longer realistic to predict the future precisely. Instead, several imaginable future scenarios are developed and described.
- **System thinking:** Sustainable decisions in politics, economics and society are influenced by many interlinked factors the dynamics of which increase at the same time. Systems are that complex that they can not be controlled by simple linear approaches anymore. Therefore, we now need

to not only take notice of the interaction of these values, but also understand them and use them in making our own decisions.

The combination of thoughtful future-open thinking and system thinking leads to the definition of a scenario. This is an image of the future that is based on a logical combination of imaginable development assumptions. Together with other scenarios, it describes the future »window of possibilities«. Szenario-Management™ is a comprehensive framework concept in which development, assessment and strategic use of the scenarios are directly connected to each other. Since strategy must not be solely aligned with short-term and obvious targets, scenarios are an important tool for developing long-term strategy of sustainability. Of course, this must not lead to measures required in the short term being delayed for the future. On this basis, the Federal environmental agency and Federal Ministry of the environment charged ScMI AG with the development of »integrated sustainability scenarios to achieve the environmental goals of the national sustainability strategy«.

From context scenarios to solution spaces

In this project, the context for environmentally related sustainability policy was examined in the first section. This corresponds to an explorative approach preceded by a careful system analysis. This led to the development of five scenarios of imaginable framework conditions, that the decision-makers in politics, economy and society should deal with. These context scenarios were then assessed to make the superordinate expectations and desires for the environment transparent. Then, solution scenarios were developed for the design of sustainability in the areas of spare time, habitation as well

as nutrition. These three subject areas were chosen as core needs of society, since everyone structures their time between working and not working, lives somewhere and needs to eat. These solution scenarios are deliberately set up to be alternative views, life and economy models, with the solutions shown being aligned with the guiding principles for sustainability:

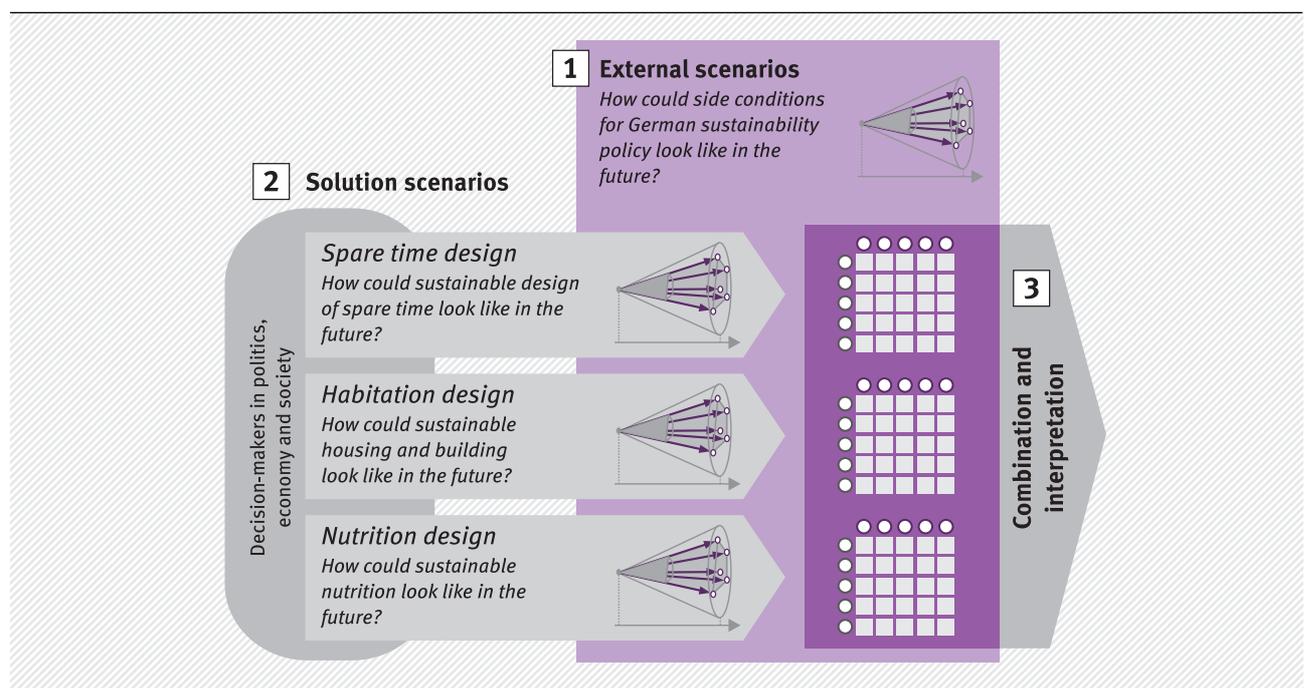
- *Maintenance of economic resilience* – including open discussion of the growth model;
- *Ecological compatibility* – meaning resource and climate protection;
- *Social justice* – including free development of people by unlimited access to public services such as education and infrastructure

When developing the solution scenarios, it was not specified in advance which solutions are more or less successful in terms of sustainability. This assessment was performed in the third section both directly and by combination with the context scenarios developed first, leading to a strategic interpretation that formed the conclusion of the project.

The development and assessment of the context and solution scenarios took place in four different scenario teams that were coordinated by a core team. For combination and interpretation, all four teams were brought together again.

Figure 1:

Project structure: Evaluation of solution scenarios based on previously developed context scenarios



Source: Federal environmental agency

How the context scenarios were developed

The question of how well the environmental goals related to the national sustainability strategy can be achieved does not solely depend on environmental politics as such. Both in Germany and in the global environment, there are many developments that affect them and that must not be ignored. In the first project section, these possible framework conditions are analysed and described in five alternative context scenarios. They are something like a »weather report« for specific sustainability politics.

Four steps of scenario development

At the beginning of the process, it was important to define the object of scenario development – the scenario field. This includes the national and global contexts of the environmental objectives of national sustainability strategy. The scenarios for this scope of sustainability policy were developed in three steps and then assessed in a fourth one:

System analysis and selection of key factors (step 1):

The starting point of scenario development was a »radar screen« – the system structure. In it, the considered context was structured in areas of influence, it was important to differentiate between national and global environment, for which different influences were collected and described. Not all of these influences equally drive future developments. Therefore, a networking analysis was performed to point out the interaction between the individual values. Under consideration of these results, the scenario team selected 22 key factors. They define the „open questions to the future“.

Development of alternative future projections (step 2):

Next possible future developments were pointed out for each key factor. To prevent an one-dimensional approach (good vs. bad), two insecurities for each key factor were identified with which a four-quadrant portfolio could be set up. The future projections contained in it describe strategically relevant characteristic and qualitative development alternatives of the individual key factors. They can be seen as »building blocs« of the scenarios.

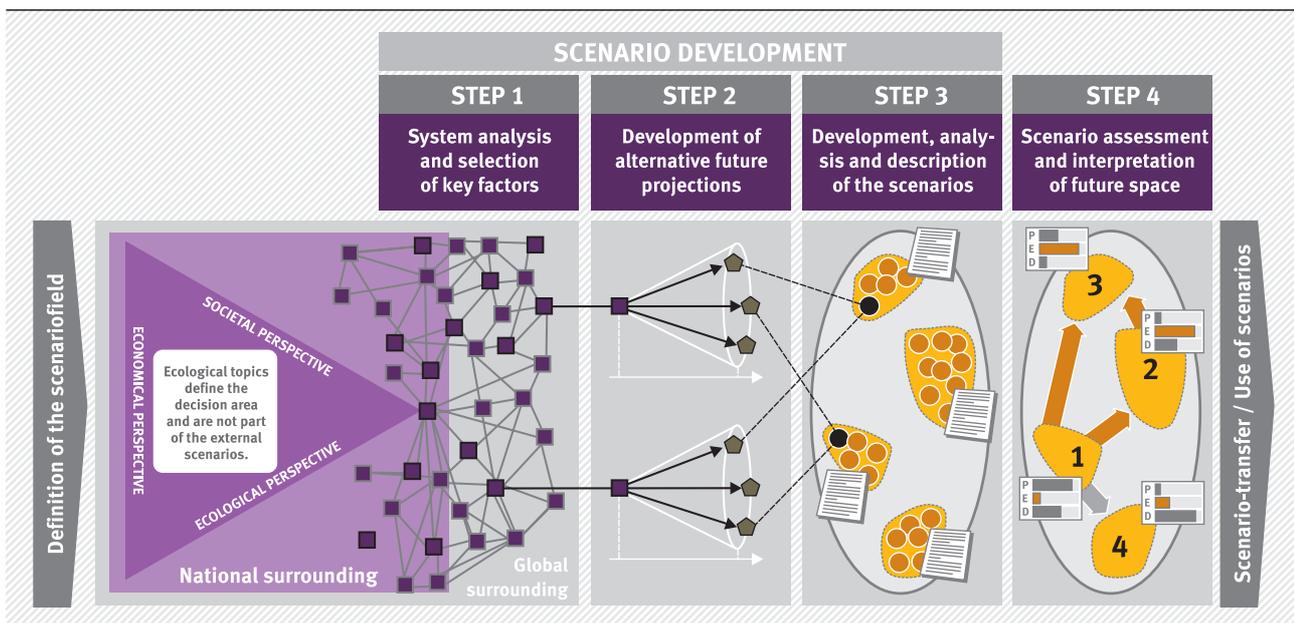
Development, analysis and description of the scenarios (step 3):

Scenarios are indicative illustrations of possible alternative futures. The scenario formation is based on an assessment of compatibility (consistency) of the individual future projections. These assessments made by the scenario team formed the basis for playing through all imaginable combinations with the help of software. Using a cluster analysis, eight sensible futures were then developed and condensed into five context scenarios in discussions within the scenario team. Additionally, a »map of the future« was created to visualize the relations between the scenarios.

The five scenarios are »thinking tools«. For users to think about the future free of prejudice at first, the scenarios were not assigned with any probabilities. In a later step 4 (see page 18), they were then assessed for the scenarios' proximity to the present and the expected and desired future.

Figure 2:

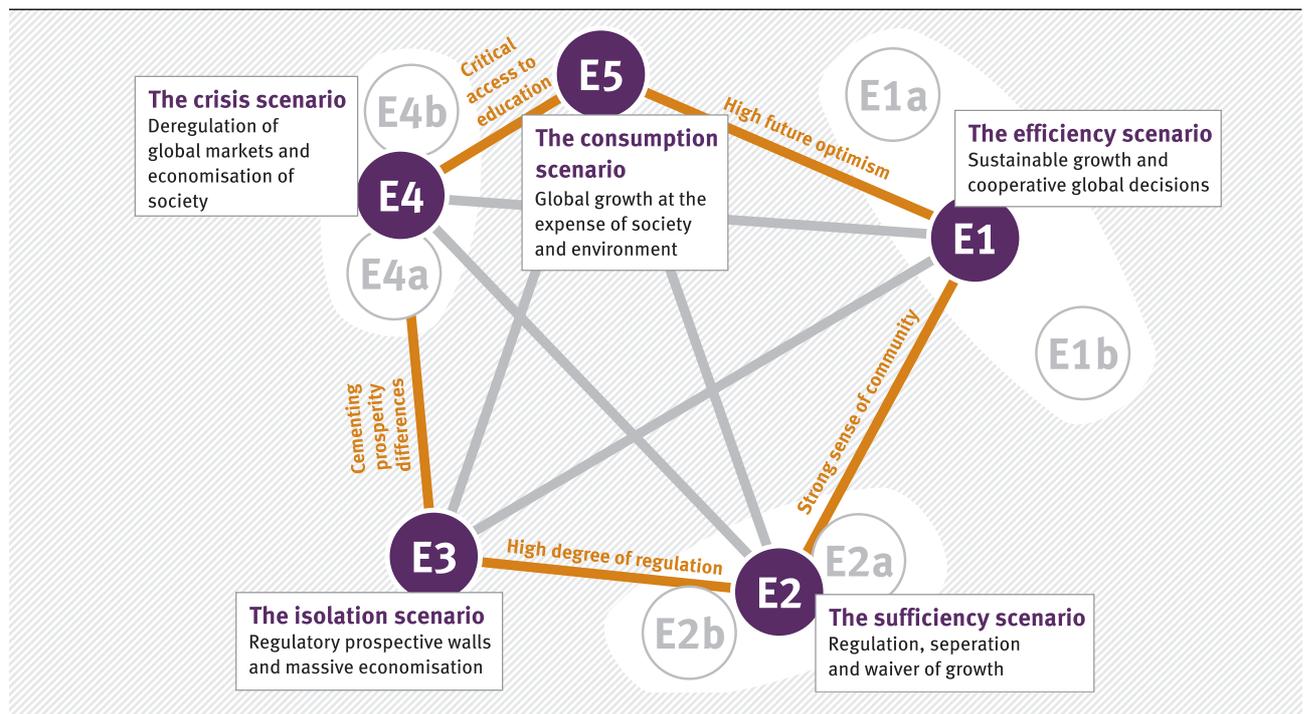
Four steps of scenario development and assessment



Quelle: Scenario Management International AG

Figure 3:

Five context scenarios in a „map of the future“



Source: Federal environmental agency

Five context scenarios - and how they differ

To differentiate the resulting five scenarios from each other, it is helpful to have a look at the five central differences more in detail:

- **Strong sense of community:** The context scenarios 1 and 2 are – in contrast to C3, C4 and C5 – marked by a strong sense of community, high importance of information in consumer decisions, self-determined design of life, entrepreneurial target systems exceeding profit maximisation and a high importance of global environment and sustainability consciousness.
- **High future optimism:** Context scenarios 1 and 5 contain – in contrast to C2, C3 and C4 – high future optimism, significant economic growth in quantity, low social risks and long-term alignment of entrepreneurial target systems.
- **High degree of regulation:** Context scenarios 2 and 3 contain a high degree of regulation of the global economy, balancing out large social risks by the state and higher global diversity. On the other hand, there are context scenarios 1, 4 and 5 with a low degree of regulation, private provisions for the future, a lower state involvement rate and strong globalisation of the value chain.
- **Critical access to education:** Context scenarios 1, 2 and 3 – in contrast to C4 and C5 – contain mostly free access to education and other state-warranted social security.
- **Cementing prosperity differences:** Context scenarios 1, 2 and 5 lead to balancing out of the global prosperity development, while context scenarios 3 and 4 include cementing of the differences. This would then be connected to a pessimistically oriented individualisation, externally determined design of life in accelerated social environments and a mostly unchanged industrial portrayal of the German economy.

By understanding the differences, the five context scenarios

can be better interpreted. In addition to the observation of the individual future structures, the possibilities covered by the scenarios were visualised (see figure 3). This future-space mapping (Zukunftsraum-Mapping™) based on multidimensional scaling shows similar futures close together, while strongly differing ideas are placed far apart.

Key factors of the context scenarios

National factors: (1) Value development/environment and sustainability awareness, (2) Consumer conduct, (3) Education, (4) Models of life / everyday organisation, (5) Living and settlement structures, (6) Prosperity development / economic growth, (7) Social security, (8) Economy structure / performance production and value generation structures, (9) Entrepreneurial target systems, (10) Public budgets, (11) Political development structures

Global factors: (12) Global value development and religion, (13) Global governance, (14) Globalisation and global trade / global growth regions, (15) Global financial and capital markets, (16) Global prosperity distribution/consumer development, (17) Resources / raw materials, (18) Technological change and innovations, (19) Organisational and social innovations, (20) International environment protection, (21) Effects of climate change and global adaptability, (22) Condition of the environment / global strain on the environment



Context scenario 1:

The efficiency scenario

Sustainable growth and cooperative global decisions

Future optimism and sense of community are the basis for an open knowledge-based society. High degrees of own responsibility and self-determination permit low regulation of economy and society. Responsible companies aligned with long-term thinking drive innovation dynamics in the area of sustainability due to massive increase of efficiency. In the global environment, cooperative, cross-national decision-making processes are predominant. Little regulated, internationally interlinked economy cycles permit global adjustment of the prosperity level. Global anchoring of sustainability principles in economic life as well as effective implementation of ambitious environmental objectives lead to noticeable improvements of the ecological situation.

Health and sustainability as central values

Society puts the community and individual development potential within the community as the focus in 2040. This is reflected politically by more participating decision models and new self-administration structures. On the other hand, the mostly open educational landscape leads to the development of informed consumers. All in all, people believe in a positive future and the possibility to actively contribute to it. Themed »good life – good conscience«, lifestyle is characterised by self-realisation, also reflected in an open educational landscape not solely aligned with economic demand. In addition to free access to education, health is a central value in this society. The new consumer climate results from deliberate decisions made by informed consumers and does not inhibit long-term positive economic development. It is not primarily based on consumption, but mostly the deliberate design of individual demand that significantly affects the goods available. The desire and potential to contribute are accordingly high in a socially balanced environment, with environment protection mostly taking place for the sake of a good conscience. Conscientious handling of resources and the environment are of primary concern.

Conscious consumption of demanding customers as a growth motor

This social structure is not only reflected in the quite comprehensive but very considerate consumption of demanding customers, which drives long-term growth and innovation dynamics at the same time. Products that do not comply with the demands of informed consumers are consistently boycot-

ted. The economic structure adjusts to this value development and profits from the change go towards service orientation with a focus on cyclic structures. Companies are aligned with multi-dimensional target systems and drive innovations in the area of sustainability – on technical, organisational and social levels. The investments in long-term and intangible values catch the reducing demand for nondurable consumer goods, so that the economy is still growing in a value-retaining way. Specifically ground-breaking technology innovations permit efficiency increases and resource-protecting growth.

Wide-spread participation as a foundation of a state capable of acting and performing

The state is highly able to act and perform in this context and balances out possible risks. They are rather low socially, economically and ecologically anyway. The strong political awareness and transparency within the enlightened and educated society lead to a great stability. The feeling of responsibility among the citizens clearly exceeds that of today and includes future developments in the community and development of the environment. The political system is characterised by strong democratisation and participation on all levels, with the high own responsibility of the actors keeping the required degree of regulation low. Thanks to careful planning and the long-term orientation deeply anchored in politics, financial tolerances of the public hand are high and permit consistent tracking of the subjects set.

International cooperation masters climate change

The lifestyle that dominates in Germany is embedded into a global development marked by a consistent consumer level at the correspondingly increased sustainability awareness and an internationally high importance of environmental protection. Prosperity is spread homogeneously around the world. National states are losing importance with increasing cooperation between states and the global solidarity and cooperation in managing climate change can noticeably reduce its consequences.

Thinking differently in global value generation

Effective global governance systems are aligned with the leading principle of conscious resource consumption and distribution of prosperity. The stabilising effects of the social transformation have been noticed positively, so that this path is undisputed around the world. The comprehensive technology innovations towards efficiency increase are also reflected on the raw materials markets, where availability clearly increases use of alternative energies. Since resource scarcity thus no longer is a general problem, many regulations and trade inhibitions become unnecessary, sustainability orientation in the global community also leads to reduced readiness to speculate, so that global financial markets lose importance and global trade is mostly based on direct exchange of goods. There are little-regulated, internationally linked economic cycles. This economic cooperation is facilitated by politics with cooperative, nation-comprehensive decision-making processes.



Dr. Inge Paulini

Secretary general of the scientific advisory council of the Federal government for global environment changes (WBGU; Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen)

The great transformation into a sustainable society

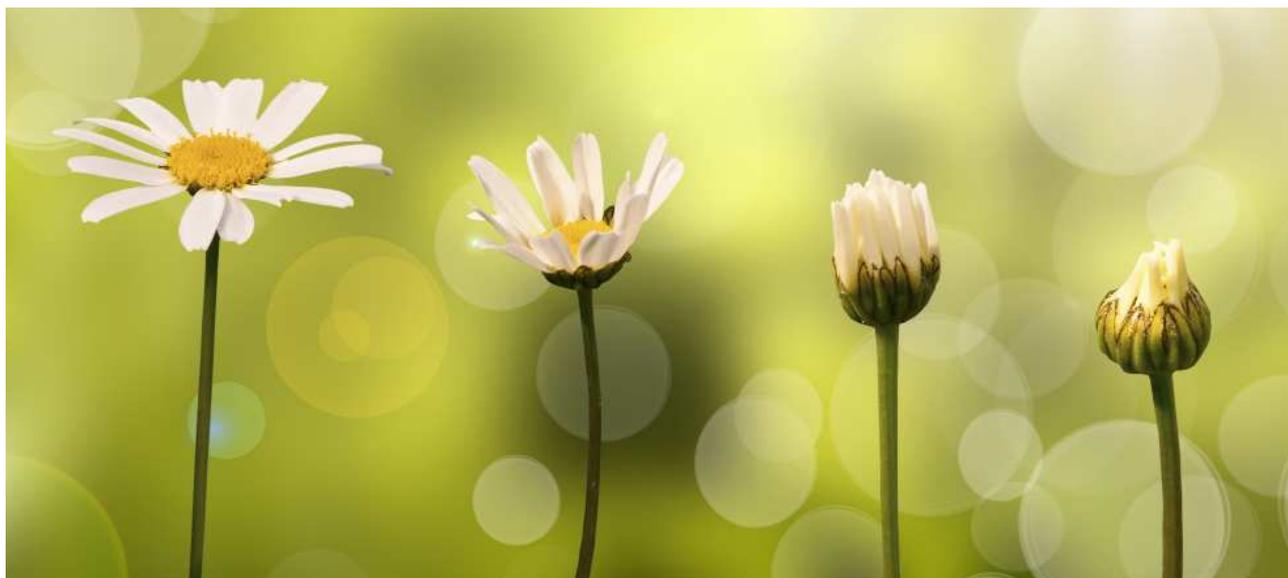
Mankind endangers its natural basics for life by its management and life styles. Here are a few examples: The increasing demand for fossil fuels, the clearing of forests and the unsustainable use of land lead to increased emission of greenhouse gases; avoiding dangerous climate changes becomes more and more difficult. Natural or near-natural ecosystems are destroyed more and more quickly. Biodiversity is lost irrevocably. Fertile landscapes are growing scarce because the demand for agricultural products is increasing while soil is lost due to erosion, over-grazing, salination or sealing.

A great transformation – which means the global change of the economy and society towards sustainability – is needed to retain the natural basics for living for the people living today and in future. To avoid global warming of more than 2 °C, especially the energy systems, land use and urban spaces must be converted in a climate-compatible manner by 2050 – i.e. under great time pressure. For this, politics should set clear objectives for sustainable development and create long-term planning and investment safety as well as incentives with the corresponding order framework and an effective legal set of instruments. The WBGU suggests ten measures bundles in its main expert report »Welt im Wandel – Gesellschaftsvertrag für eine Große Transformation«:

1. Developing the guiding state with expanded participation options
2. Globally advancing CO2-prices
3. Expanding and reinforcing Europeanization of energy policy
4. Accelerating development of renewable energies by compensation for electricity fed into the grid internationally
5. Promoting suitable energy services in developing and emerging countries
6. Sustainable design of rapid urbanisation
7. Advancing climate-compatible land use
8. Supporting and accelerating investments into a climate-compatible future
9. Strengthening international climate and energy politics
10. Striving for international cooperating revolution

For successful implementation of these measures, department, comprehensive integration and international cooperation at an unprecedented scope is just as necessary as the promotion of transformation by citizens, entrepreneurs and diverse pioneers of change. The more these actors trigger changes in the sense of transformation and link in different levels, the more likely will decision makers in turn be encouraged to tackle even allegedly unpopular, large changes of direction. In a dynamic social environment like this, measures that are considered unrealistic today can be quite possible tomorrow.

This text is based on the WBGU main expert report »Gesellschaftsvertrag für eine Große Transformation«, 2011 and the WBGU fact sheets 1/2011 and 4/2011.



Context scenario 2:

The sufficiency scenario

Regulation, separation and waiver of growth

A strong sense of community, high own responsibility and a self-determined, decelerated lifestyle characterise the German society. Deliberate limitations of private consumption promotes a service and solution oriented recycling management. Self-administration beyond the current structures and high-performance social security systems enable to close the prosperity gap in spite of reducing economic growth. In the global context, there will be political separation as an answer to the period of deregulated globalisation – national states strive for bilateral implementation of their individual points of view. The regional separation into highly regulated economic areas and a generally low technical progress cement global prosperity differences. In spite of the high global environmental awareness, the implementation of global environment protection is uncertain.

Social insecurity leads to a higher sense of community and own responsibility

The society of 2040 is knit closer together by the shared experience of social insecurity and deals with the political decision-making processes. This sense of community is promoted by an open educational system in which holistic development of personalities is more important than economically relevant contents. This does not only lead to a self-determined lifestyle, but also to deliberately reduced consumption and to condensed settlement structures characterised by multiple use. The comprehensive knowledge and strong sense of responsibility of the community, however, not only lead to strong political and social commitment, but also to a generally low future optimism in society. Deliberate renunciation is a wide-spread social consensus.

Value generation for the good of the community

The deliberate limitation of private consumption promotes service and solution oriented approaches. Service offers and products from sustainable recycling management are subject to increasing demand. The German economy is subject to the corresponding structural change. The sense of community is expressed in that companies maximise profits in the short term but partially reinvest this for the good of the community. Common well-being is at the focus of public distortion of funds as well, which promotes this doubly – by private-economic and public funding. Although there are only limited funds available here as well, society profits, since the present financial resources are used sensibly and efficiently and mobilised via different

»pots«. From a political point of view, these developments are enabled by a high degree of self-administration and performance-capable social security systems. This is particularly important for the individual because great social risks cannot be denied. People are secured by the state in an insecure environment and the prosperity gap is closing to the benefit of a wide-spread social participation in spite of reducing economic growth.

Global Sustainability fails due to structural obstacles

There is a global agreement about the importance of the environment and environment protection. However, states do not reach any consensus otherwise, so that very different value systems continue. Cultural stations as well as individual power interest of the individual national states prevent a global political approximation. Social innovation is widely spread, but the technology development towards sustainability is stagnating and renders the world incapable of making a consolidated effort to protect itself from the consequences of climate change. The efforts of individual states or state groups remain mostly ineffectual. Since these stagnating political structures prevent effective international environmental protection, the global environment situation is desolate. Only the destruction of the environment due to exploitation of natural resources is stagnating, since the demand is dropping in times of global recession.

Re-regionalisation and conscious waiver of growth

The differentiation in political and economic aspects is a consequence of the period of reducing globalisation. These global-political structures are mostly characterised by separation of regional economic areas in times of global poverty. The globally slow consumption is mostly due to economic needs and is increased by the awareness of destruction of the environment. In times of reducing global trade, the global financial and capital markets are losing importance and because of this, resources are not globally available. Accordingly, individual states use their nationally available raw materials and resources with care, partially securing themselves by identifying and providing alternative concepts. The uncompromising growth orientation is continued to be seen as the trigger of uneven distribution and disappearing prosperity. It is deemed the top-most political objective to avoid social unrest. This is to be warranted by state security against the great social risks in spite of scarce public funds.



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Production and Environment

Why the efficiency revolution must be followed by a sufficiency one

Ecological efficiency is targeted at maintenance or even increase of the current prosperity at reduced environment consumption. Can this promise be kept, however? Even efficient products, technologies or services won't pop up out of thin air, but have to be produced. If added to the goods stock, e.g. in the form of additional passive buildings or three-litre cars, the overall strain is growing. If they replace the previously used versions, however, the goods stock will not be increased, but the usage duration of the objects to be replaced will be reduced. The disposal mass also increases. Removing material artefacts (»negative production«) is hardly more ecologically compatible than producing new ones.

For many categories of goods, there are either no or only such efficiency solutions in sight that permit only very small consumption savings at high production effort. Often, efficiency increases come along with other disadvantages, e.g. in energy savings lamps. Efficient procedures or product designs that are based on anything but a spatial, systematic, temporal or material relocation of environment damage hardly exist (material rebound effects). At the same time, investments in efficient solutions, as well as consumption savings, increase the available income. The increased demand can counteract any resource savings, which are relative anyway (financial rebound effects).

Efficiency can only be referred to objects. Objects, however, cannot be sustainable as such. Only the overall balance sheet of a lifestyle can. Why is a passive building sustainable if its residents spend their holiday in the Caribbean? How many lives would be necessary to balance out the CO₂ emissions of a flight to New Zealand (approx. 14.5 tons) by efficient everyday solutions? Just like every other consumption action, efficient products or services always convey a message that states something about its users, creating a façade decorated with any number of sustainability symbols with which the less sustainable construction sites in the life of the same person can be morally compensated, i.e. justified (psychological rebound effects).

Efficiency does not replace sufficiency and can even prevent it. In contrast to this, sufficiency confronts the increased logic of consumer self-implementation excess with a counter-question. Which energy slaves and comfort crutches could be removed from the excessive lifestyles and society as a whole? What prosperity scrap that has long clogged our lives, while also claiming time, money, space and ecological resources, could be removed instead of replacing it by more efficient alternatives in a complicated manner that hardly promises any success? In a world of overstimulation that we can hardly handle anymore, sufficiency has long become self-protection. In the last decade, the antidepressant prescriptions in Germany have doubled. Efficiency will not cure psychological growth limits. Only self-limitation does.



Context scenario 3:

The isolation scenario

Regulatory protective walls & massive economisation:
industrial nations fight against the downward spiral

Acceleration and external control characterise the everyday lives of the increasingly separated society in Germany. The purchasing power is dropping and a pessimistic view of the future is spreading with dominating short-term economic interest. The focus is on maintenance of the social security systems and leaves little room for governmental action. The global economy is characterised by an acute, short-term site competition by which sustainable innovations are strongly inhibited. The industrial nations defend their »islands of prosperity« by regulatory protective walls, cementing the global power situation. Environment and sustainability subjects are of low global importance.

Fear of social degradation

The social situation in the Germany of 2040 is characterised by differences. The reducing purchasing power increasingly affects the consumption level due to the ever-present threat of social loss. People are looking at the future with an accordingly pessimistic outlook and refuse all social responsibility. Everyone is fighting for his own good and always remembers that it is better to put something aside for emergencies than to »go shopping«. Lifestyle is subject to short-term economic interests and is generally determined by acceleration. This means that the selection of schools and further training options takes place in the light of the degree achieved offering the safest workplace possible even in the publicly accessible education sector.

Material motives widely spread in economy

The target of short-term profit maximization is dominant in the economic and political environment as well. Multi-dimensional sustainable perspectives play hardly any role in an industrially characterised economy accordingly. The halting growth contributes to expansion of the uneven prosperity distribution. Many jobs are lost due to rationalisation. The threatening unemployment leads many people to working to their limits and partially even taking on several low-paying jobs. As a consequence, many employees are battling psychological and physical damage. The state, hardly acting in the business environment, uses its low financial resources for action solely in social security. Security offered by the social state becomes vital for part of society.

Educational landscape subordinate to the economic interest

The economic situation and perspective is reflected in the educational landscape as well. Education is no longer considered a means for personal realisation and loses its former meaning of preparing individuals for their social participation in cultural, social, political and public areas as well. It is reduced solely to its selection and allocation functions for the economy and serves solely providing qualified specialists for the labour market.

Environment protection moves to the background due to global conflicts

Sustainability values are playing a subordinated role at the global level. The economy is weakened in general and profits are only made by a very few. Neither the individual companies, countries nor the population are widely interested in working to protect the environment. The companies fear to reduce their already-low income even more in times of economic stagnation and to thus reduce their option towards competition. Efficiency increases and technical innovation towards sustainability is only of interest if it brings a direct economic benefit. Individuals are also more interested in maintaining their situation in life and hardly have any reason to act sustainably or to work towards sustainability due to the lack of future optimism. Additionally, they are – not least due to the economically aligned education – lacking the required sense of community to set impulses for an ecological turnaround. States are aligned with the interest of economy and its individuals (=consumers) and do not have the financial resources to deal comprehensively with the subject of sustainability anyway due to the generally rather bad economic situation. Specifically the neglect of global environment protection therefore finally leads to a global degradation of the environment, which is reinforced by the noticeable consequences of climate change.

Increasingly authoritarian states protect their economic interest

The desolate environment situation is reflected by the raw materials markets, where prices are rising due to a lack of alternatives. The short-term alignment of strategies is expressed by missing investments in innovation, which further reinforces this situation. Supranational cooperation thus becomes a competition on strongly regulated (financial, capital and raw materials) markets. In the scope of striving for short-term profits, the share of stock-listed companies is high, since quick profit is offered here in spite of the critical development of the economy. Even Western democracies slide more and more into authoritarian or lobby-group-dominated structures. These try to prevail in the economic competition, but also to hem in the consequences of global economic crises by creating and defending regulatory protective walls. They consider themselves „prosperity islands“ that must be defended.



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Future can only work with Europe

The unification of Europe since 1945 was initially targeted at securing the peace. Today, the protection of the natural basis for life and the climate are moving to the focus, also to prevent conflicts that may be caused or increased by destruction of the environment. According to Eurobarometer surveys, environment, climate and resource politics are some of Europe's strengths. Citizens believe that the Brussels government is better able to maintain the future opportunities of their children than their own governments. Why is that?

- Within the EU-internal market, scope for environmental-political action is strongly limited due to supposed competitive disadvantages or impairment of trade: protection of the environment and nature, health and consumers, must be organised at EU level or else it will be lost.
- Individual states cannot protect the environment or climate. International river or nature preserves, mostly enclosed seas, migrating animal species and the protection of the ozone layers are some examples of this: international cooperation with the matching geographic situation is needed.
- In Germany, some believe that Europe is opposing good, innovation-promoting environment policy. In contrast, the citizens of other member states know that only the EU will secure the protection of the environment, particularly in light of weak administrations susceptible to corruption. The EU can prevent worse if a national government with an environmentally harmful programme is elected.
- The matters of environment protection must be included in the design and implementation of all policies according to the EU, from agricultural to economic policy. The constitutions of the member states do not contain any provision. Legally, the value of environment protection is higher in the EU.
- EU-law is capable of learning and „error-friendly“. The consequences of laws are analysed in smartly organised, specified cycles and directives are adjusted based on the insights. Thus, EU-environment law is more flexible, more effective, more innovation-promoting and less expensive to implement than that of the member states.
- The EU is a strong voice and important provider of ideas at an international level. EU law must be implementable under different environmental conditions, cultures, legal and administrative traditions, directives must be understandable in many languages. What is right for the diversity of Europe often is also good for other countries and international organisations. Europe can characterise global politics.

European environment policy and its implementation in the member states should receive more attention. The example of Greece showed that a lack of environment protection, particularly if EU-directives are ignored, is a good early indicator for state failure. A healthy environment is a great asset for everyone. Those who cannot protect it will fail in other tasks as well. The member states will perish on their own, but together, Europe can design the future.



Context scenario 4:

The crisis scenario

Deregulation of global markets and economisation of society

Existential fear and social conflicts characterise an individualised and materially aligned society in Germany. Prestige-driven consumption pressure in an economically critical environment; Limited public funds limit the scope for decision-making and the state is forced to withdraw from many areas of tasks. In the global environment, multinational and short-term-oriented companies and capital markets hold a strong position as compared to highly heterogeneous national and global political structures. Scarce resources and increasing differences between the geological regions lead to a strained global political situation. Environment and climate protection discussions are globally and nationally unimportant, leading to desolate environmental conditions.

Individualism as a consequence of social conflict

Social life in the Germany of 2040 is overshadowed by existential fears. People are left alone with their social risks. The divide of society can no longer be bridged - and not only economically. The community is also characterised by a lack of solidarity. Social responsibility, sustainability and future optimism are unknown in a time in which everyone is focusing only on their own advantage and trying to (at least) better themselves by prestige-driven consumption. This development is reinforced by the fact that social risks are not secured by the state. The accelerated rhythm of life is determined by economic interest. Society reacts to the economic needs with massive individualism: everyone tries to make the best out of the situation for him or herself. There is no room for personal development or sense of community. The fact that many may be lost along the way is willingly accepted. This becomes apparent in education as well: individual preferences or needs are only considered if compensated by a corresponding value. Due to this, educational disadvantage expands more and more, but at the same time is less and less served in the general interest and public. Not only in the educational area there is no room for compassion. Disadvantaged groups are generally pushed out of society if they are not strong enough to swim along in the currents of time. They remain there without any hope of social advancement.

Companies are looking for short-term profit

The economic context is industrially characterised and aligned with short-term profit animation. Companies in this socially shattered context use low-cost workers to increase their profits

in the short term without participating in social security. Only few profit from the halting growth and the widening prosperity gap.

The state is also refusing responsibility for social justice, maintaining its position of power by increasingly authoritarian political decision-making structures. The citizens are included in rather secondary decision-making processes, but this alleged participation rather serves as a distraction. In fact, interest-driven decision-making structures dominate – and the limited financial means of the state considerably reduce the remaining room for decision-making.

Unstopped climate change with devastating effects

At a global level, there is a similarly divided social structure. This kind of uneven prosperity distribution leaves no room for sustainability. The »elbow society« draws its circles globally as well and sustainable values cannot prevail in an economically and socially divided world. Environment and climate protection discussion play just a little role in global politics as they do on the national level. Since these subjects are not observed at all in the public discussion and the politics are subordinated to short-term economic objectives, environment protection will not be able to affect on the geopolitical agenda anytime soon. The global environment situation is accordingly desolate: the consequences of climate change cannot be controlled and many eco systems are facing collapse.

Scarcity of resources prevents prosperity

Politically, this development drives the world further and further apart and global competition for the scarce remaining resources endangers the global political stability. Increased cooperation in international political decision-making processes cannot prevent this development either.

The global demand for the scarce raw materials drives up the price. Accordingly, scarcity of resources leads to a strained global political situation and the bad economic situation hardens. As a consequence, there is little room for innovations – technologically, organisationally and socially – so that the world continually loses in innovation potential. On the little-regulated raw material, financial and capital markets, a price war is started that causes sustainable innovation to be entirely displaced from the scope of considerations. Short-term alignment determines the global economic and political calculations as well; economic and social problems are ignored.



Sabine Werth
Berliner Tafel e.V.
founder and chairwoman

Social divide – Man does not live by bread alone!

98 cent for a pizza. Who would still buy the ingredients from the discounter separately? It would be much more expensive, the argument goes, which once again shows that the market strategy is successful. Fries come from the cooling system and not from potatoes. Preparing meals on one's own and from fresh ingredients seems to be relegated to cooking shows and a relaxing hobby for overworked people with high incomes.

However, if you are buying pizza for six – and also, because the flavour enhancers made you feel like more again, coke and jelly babies – you will quickly hit the red figures financially. Another strategy of trade has succeeded, though.

Not only money is lost. Children often no longer learn the simplest things because the only thing they ever see their parents do is operate the oven and the microwave. When there are cooking classes for children and teens at the Berliner Tafel, they start out with the very basics. What are fries made of, what is cut off from a zucchini, how is it cooked or roasted? Many children have never held a vegetable knife before.

Not only the art of cooking is lost, but so is communication. Many families eat in front of the TV, if they do eat together at all. In modern households, there is hardly anything to do and therefore hardly anything that requires coordination. Speech and discussion skills deteriorate.

Now it would be easy to assume that this is a phenomenon specific to Hartz IV households. Surely, the danger of being caught by the market and advertising strategies is high in precarious and strained situations. In the children and youth sector of the Berliner Tafel, there are also those from prosperous situations whose parents have no time for them. These are children who do not know how to handle knife and fork, who are not given a breakfast sandwich and who will put a deep-freeze pizza in the oven at home. They are children yearning for everyday interaction.

It therefore would not be sufficient to speak of social division between those with and those without money. Instead, we are threatened by a society in which some children are overburdened with diverse offers from piano lessons to alpine hikes with explanations about herbs and wild animals to Chinese lessons, while some others, like the narrator in Wolfgang Herrndorf's book »Tschick«, waste away socially.

Therefore, the Berliner Tafel now has two different offers. One is support of financially disadvantaged people with donated foods and the other is the child and teen area that is open to everyone in which they learn together for life and across all social borders to resist market interest and to fight social poverty in our society.



Context scenario 5:

The consumption scenario

Global growth at the expense of society and environment:
The divided consumption-society

High future optimism and individualism characterise the fast-living society in Germany in spite of increasing division. Elites skim off most of the prosperity; comprehensive consumption possibilities compensate for low participation and educational options for large groups of the population. Traditionally representative political decision-making structures leave social risk protection increasingly to private provisions. Innovations towards sustainability do not pay off and traditional industrial approaches continue to dominate. In the global environment, there are weak supranational institutions. Geopolitical decisions are primarily made based on the cooperation of sovereign national states. Global growth in industrial and developing nations takes place based on networked action and more strongly regulated capital and financial markets. International environment protection is the global loser, neglected for the benefit of fast consumption.

Egoistic motives for action lead to the division of society

Social life in Germany 2040 is characterised by a consumption-controlled egocentric approach in which people put public welfare on the back burner and are striving for their »piece of the cake« instead. Individual prosperity is often displayed by status symbols, which increases the demand for luxury goods. Working life is also characterised by this attitude: private profit maximisation must warrant the standard of living; for this, a good job is important. Education is aligned accordingly profit-orientedly: Both school and professional training as well as later qualifications are targeted at increasing opportunities on the labour market starting early on. The motto of this society is »everyone is his own best friend« – and as a consequence, the sense of community is suffering. In spite of optimistic future views and a decelerated everyday rhythm, subjects aligned with public welfare find little interest within society, since they contradict the opportunist lifestyle. The prosperity achieved is far from everybody's profit. The economic growth is characterised by strongly limited participation. The division of society is a logical consequence that also affects settlement structures and land use.

Economic growth is the primary political goal

The representative political decision-making structures reflect this lifestyle and leave social risk protection to private prevention. The state stays mostly out of social subjects. The high degree of own responsibility that is understood and lived like this in society, is consistently implemented at a political level. The economy is growing thanks to long-term profit orientation of the mostly industrially companies. Particularly consumer and luxury goods producers around the world profit from the strong consumption tendency of people. The globally strongly linked trade permits a generous goods offer. Nevertheless, growth does not reach all the social sections and leaves behind not only winners but also many losers.

Climate change not a subject of international politics

The ecosystem loses as well: At a global level, a value system aligned with sustainability cannot prevail. The consumer societies do not wish to limit themselves for the benefit of the environment or climate, but prefer to continue to consume as before. The consequences of this lifestyle are either consciously ignored or simply accepted – »let others deal with this«. The few critical opponents are not heard in the globally optimistic purchasing mood. Efforts such as the world climate conference serve only as alibis and do not lead to any considerable resolutions. Even the measures agreed on without great enthusiasm are hardly and particularly not comprehensively implemented. The permanent neglect of international environment protection is finally reflected in degradation of the environment and global warming. Due to the continued ignorance and late reaction, handling of the consequences will be difficult.

Global networking and increasing demand ensure economic growth

Only the economic dimension of sustainability is put into practice. The long-term profit orientation leads to globally interlinked action due to reduced raw materials availability and to a regulation of capital and financial transactions that support the real economy. The companies align their innovation processes with short-term consumer behaviour, so that research and development are hardly directed towards sustainability. One still uncertain effect only results from the raw material demand and, as a result, resource prices, are increasing along with global growth. This leads to innovation pressure, but in the light of consumption dominance, and not necessarily to innovations in sustainability.

The framework conditions for trade are well set and promote international exchange of goods. Geopolitics take up the national political alignment and are characterised by cooperative decision-making processes, with sovereign decision-making relevance being retained. In this environment, the economy is booming in spite of a lack of innovation dynamics, profiting from a globally high consumption level.



Prof. Dr. Hans Diefenbacher

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A different understanding of prosperity: The national welfare index

In the last years, the destruction of natural basis of life, driven by traditional processes of economic growth, has been endangering the future-capacity of society. Changes to climate, increasing scarcity of important resources, problems with land use and maintenance of diversity of species make clear that decoupling of the economic growth from consumption of resources is far from being successful. Traditional economic growth therefore cannot be taken as a measure for welfare and quality of life of a society.

The Forschungsstätte der Evangelischen Studiengemeinschaft and the Forschungszentrum für Umweltpolitik of the Free University of Berlin have designed and developed a new National Welfare Index (NWI) starting in 2008; the NWI is now available for the Federal Republic of Germany and – in its regional version – for several of its states (Schleswig-Holstein, Bavaria, Thuringia, Saxony, Rhineland-Palatinate). The index considers private consumption and weighs it according to income distribution; value indications for house work and volunteer work are added positively, while costs for traffic accidents, alcohol, tobacco and drug abuse, costs for environment damage, replacement costs for the consumption of non-renewable fuels and damage from greenhouse gases are deducted. Therefore, development of the national welfare index is much different from development of the gross domestic product (GDP) in the last twenty years: while the GDP continues to rise, the NWI drops considerably at times in the years of 2000 and 2007. Further divergences become apparent during the economic crisis afterwards: The NWI clearly increases in 2009, contrasting the reduced GDP. The main reason are reduced environmental expenses. Particularly air pollutant costs, replacement costs for use of non-renewable resources and damage from CO₂ emissions have dropped. Together, these three components make up 44 percent of the positive changes. Added to this are increase of the values for house work and charitable work. The renewed increase of economic growth in the year after again leads to a considerable increase of the damage and replacement costs in the environment area. Nevertheless, the NWI developed positively in 2010 as well, though less so than the GDP, since there was a clear increase of the weighted consumption expenses at the same time, and further increases in the value of house and charitable work.

The comparison between the two indices shows that the NWI represents a different welfare model: it is not important whether the value generation is conveyed through the market as in the GDP. House work and charitable work contribute to people's welfare in a society as well. It is, however, important that the stock in natural capital, as well as social capital, is retained, that environment damage is avoided and non-renewable resources are used as little as possible – and that as many of the members of a society as possible can participate in prosperity, which would correspond to a less imbalanced income distribution. Politics that promote an improved NWI instead of GDP would have to focus mostly on these items.

How the Context Scenarios were interpreted

Scenarios are initially »thinking tools« that are not assigned any probabilities. Because of this, they stimulate us to use even previously little-used thinking paths. If scenarios are, however, used in the scope of specific strategy and planning processes, there will be further questions: How many changes are connected to a scenario? What development do we expect for the future? And are there scenarios that we want to occur more than others? These questions were dealt with in the scope of a scenario assessment.



Scenarios can be assessed directly – for example, one can ask about which scenario someone believes in. This kind of procedure always comes with the risk of the assessment being aligned with some few contents of the scenario while the complexity of future structures is not considered. Therefore, another procedure was chosen here. The members of the scenario team assessed all the key factors and future projections regarding their closeness to the present and their proximity to the expected and desired future. This makes it possible both to recognise individual downward trends and to assess the complex scenarios. This scenario assessment brought the following results:

- The current situation has a clear proximity to context scenarios 3, 4 and 5. This is the area marked by low social participation, low public welfare and demand-caused scarcity of resources.
- The expected future cannot be placed clearly. The scenario assessment instead leads to a divided result: Context scenario 1 shows a number of expected elements, but such trend assumptions are also found in context scenarios 3 and 4.
- Finally, the desired future mostly corresponds to context

scenario 1 – and within limitations also context scenario 2. When analysing context scenario 1 more in detail, it also becomes clear that version 1B is much more closely to the desired result, since it contains restrained consumption, low social risk, a slim state with high financial tolerance, the market-economy development of regional economy cycles, voluntary simplicity and a large innovation dynamic in the area of sustainability.

Two external expectations

Because of this, two deviating external expectations result. The context scenarios 3 and 4 can be interpreted as critical external expectation. They essentially describe the continuation of already-evident external trends, which is also reflected in the more detailed analysis of the key factors and future projections:

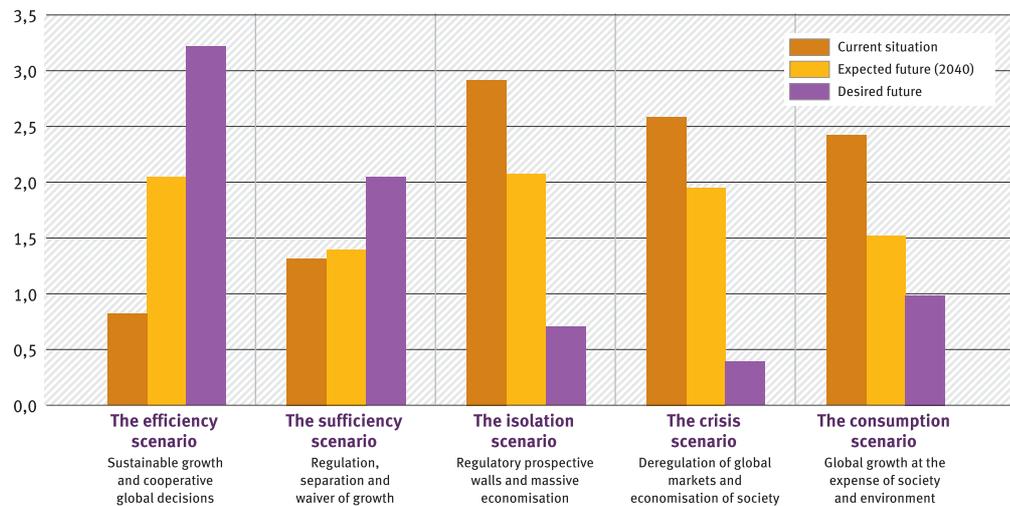
- The current situation in life is characterised by clear *acceleration* of everyday life and high *third-party determination*, which is not expected to change in future either.
- The already noticeably strong *uneven distribution of prosperity* will become even more pronounced in future. In addition to low social participation, economic growth is expected to be rather low in quantity as well.
- Today, *short-term alignment* and *profit orientation* determine entrepreneurial target systems. This trend will also dominate in future – even though more weakly.
- Today as in future, it is assumed that the *financial means of the state will be limited*. While the state rate is currently still relatively high, it will grow less and less in future – according to expectations.
- The meaning of *global capital markets* will be unbroken in future.
- The current *scarcity of resources* in light of high demand and a lack of alternatives will not change in future either – according to expectations. Specifically, developments towards a high availability of non-regenerative raw material sources are assessed as being almost impossible to imagine.

On the other hand, there is the desired external expectation indicated in context scenario 1. It differs from the current situation on a number of items, but strongly corresponds to the desired development. Such expected elements of a positive change are:

- Comprehensive consumption is primarily based on emotional decisions today, while a change to the consumption culture – driven by informed consumers – is expected for the future.
- At the moment, the German educational landscape is perceived as being economically aligned. In future, these contents will – according to expectations – be more personally aligned and expanded in this area.
- Today, residential and settlement structures are characterised by urban sprawl and clearly defined usage concepts. In future, this will develop towards mixed functions.
- The position of power-political negotiations between individual states is increasingly replaced by cooperative decision-making structures on a global level.
- Global values are only rarely characterised by sustainability

Figure 4:

Assessment of the Five Context Scenarios Regarding Proximity to the Present and Proximity to the Expected and Desired Future



Source: Federal environmental agency

today. In future, sustainability will increase in importance around the world. It is not clear how far this will lead to a shared and globally anchored value system.

- The current environment is considered technology-affine but little dynamic regarding sustainable innovations. A clear change to the innovation subjects (social plus technical innovation) is expected here.

Context scenario 5 does not play a decisive role in the scope of

expectations and desires alike. It can be inferred that continuation of the current consumption patterns without any consequences is apparently not given any high priority by the scenario team. Nevertheless, context scenario 5 must not be ignored, since it is a highly critical environment in terms of sustainability that can be observed in the scope of early recognition activities.

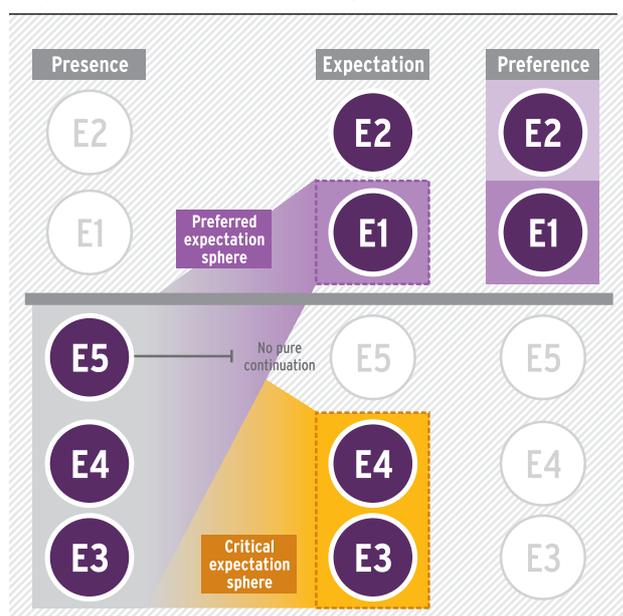
Change demands – impulses for strategic and political determination of targets

Even though context scenario 1 is called the desired environment expectation, this does not mean that all elements of this future are expected (after all, there is also a critical environment expectation). By reverse conclusion, this means that there are a number of change demands: What would have to happen additionally for the desired context scenario 1 to occur?

- The high degree of information among the consumers would need to influence not only consumer decisions as such but also lead to consumption restraint, which at the same time would contribute to a globally more homogeneous distribution of prosperity.
- A stronger self-determined lifestyle and a deceleration of the everyday rhythm would be necessary.
- Entrepreneurial targets must not be primarily aligned with short-term profit maximisation but with a long-term and multi-dimensional target system.
- The change to global trade should not take place via additional protectionism but via the market-economically driven development of regional economic circuits.
- The consumption of fossil resources would have to be limited both by demand limitation and by the development of alternatives.

Figure 5:

Derivation of the Desired Environment Expectation (Top), Critical Environment Expectation (Bottom)



Source: Federal environmental agency



Solution Scenarios - Module 1:

Future Spare Time Design

The time budget of people in the Western cultural area is strongly characterised by the separation of »working time« and »recovery time« – spare time. In the scope of this first subject area, it was to be examined how much this deeply anchored understanding of work and spare time will become reinforced or dissolved in society – and how sustainable development of the spare time area, during which people do not pursue any classic job, looks like.

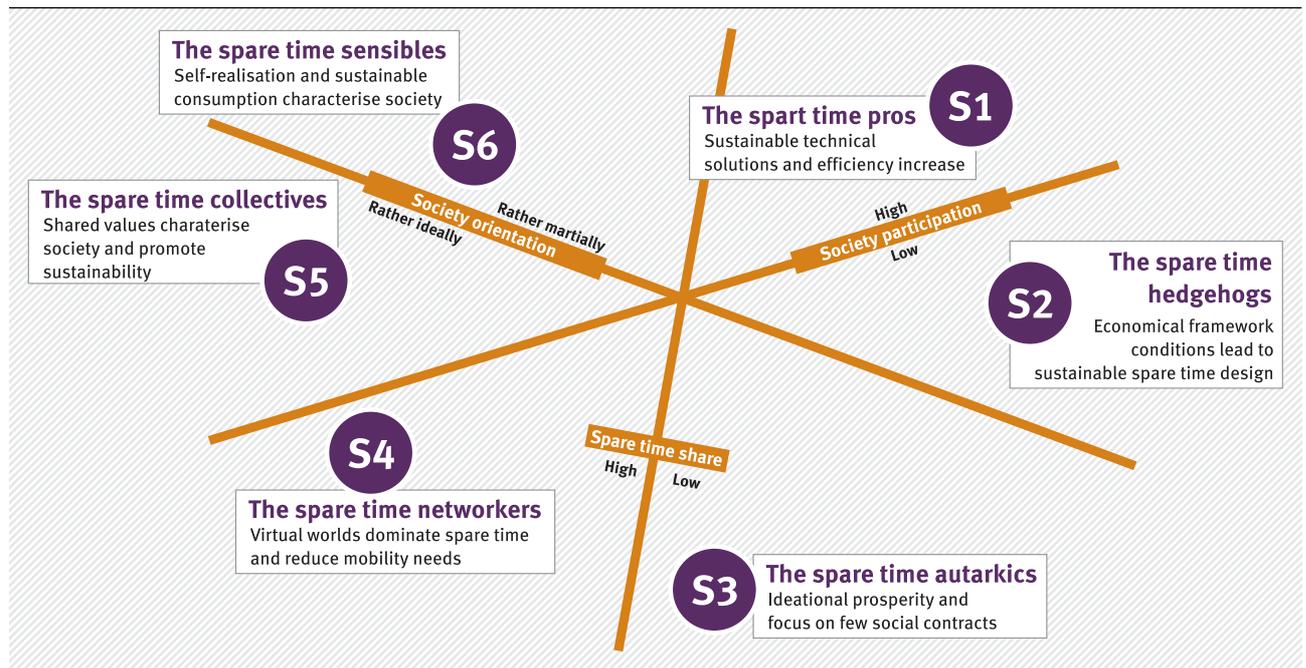
The term “spare time” as observed here includes classic leisure time and sports activities, including regeneration and social contacts, and volunteer work, cultural, neighbourhood and cooperative commitment. Sustainable tourism as a branch of the economy is deliberately left out, since this is to be more strongly focused on people’s everyday lives. This spare time design is surrounded by economic subjects (mobility, consumer offers, working relationships) and political questions (culture and spare time promotion, consumer protection, environmental policy). Based on a network of the 59 most important influence factors, 19 key factors are identified (see box), for which three to five alternative future options each were described. These future options were developed to permit a wide scope of possibilities for sustainable overall solutions. The combination of the total of 79 future options finally led to six solution scenarios whose essential differences can be made clear using three dimensions:

- *Society orientation:* Scenarios F1, F2 and F6 are rather money-oriented.
- *Society participation:* Scenarios F1, F5 and F6 are characterised by high social participation.
- *Spare time share:* Scenarios F4, F5 and F6 contain a lower weekly working time and high spare time share in everyday life.

The solution scenarios developed like this describe alternative solution spaces for spare time design. They are not as such more or less sustainable, but they form a solution space that can be deemed sustainable, at least subject to specific framework conditions or for relevant social, political or economic demand groups.

Figure 6:

Six Solution Scenarios for Spare Time Design



Source: Federal environmental agency

Solution scenario S1:

The spare time pros – sustainable technical solutions and efficiency increase

Economic framework conditions lead to a high workload in a more flexible working day. Everyone use their spare time to pursue their preferences. Active sport reduces in importance, while the commercial spare time industry is booming and profiting from the high budget citizens have for their spare time design. A significant part of the remaining spare time is used for professional further education. Participation does not play any role in political decision-making. The missing integration efforts of politics continue in society, leading to the development of parallel worlds.

Solution scenario S2:

The spare time hedgehogs – economic framework conditions lead to sustainable spare time design

The small spare time is mostly spent at home. After people have come home from work late, they still have plenty of informal work to handle. There usually is no time for shared spare time activities – sports play a subordinate role, just like education and culture. There is neither time, nor the right framework conditions, for citizen commitment. Spare time design is hardly considered in the political area and the infrastructure for this is more and more outsourced to (profit-oriented) companies. As a consequence, many spare time offers become more expensive and are no longer accessible to everyone. At the same time, spare time mobility reduces massively and cost-efficient micro mobility solutions become established in the near-distance areas.

Solution scenario S3:

Spare time autarkics – ideational prosperity and focus on few social contacts

In a profit-oriented knowledge and service economy, prosperity is not measured by material value only. In reality, the separation of working and spare time grows more acute. While the stress in working life remains high, spare time can be designed freely and is not strained by the job or informal work. In this limited but truly spare time, people focus on selected social contacts. Educational offers are highly popular. The reason for this is not only professional further training, but also the wish to develop individual skills. Society remains excluded as well – participation options and citizen commitment are low.

Key factors for spare time design

(1) Spare time share in everyday life, (2) Informal work and citizen commitment, (3) Spare time design, (4) Spare time mobility, (5) Holiday and regeneration, (6) Participation in and budget for spare time activities, (7) Importance of active activity and health, (8) Social life / residential environments, (9) Education, (10) Culture, (11) Relationship citizens-state / citizen participation and social discussion culture, (12) Working world, (13) Society structure, (14) Values and norms, (15) Spare time infrastructure and spare time offer, private and public, (16) Financial tolerance of the government, (17) Economy and prosperity development, (18) Consumer conduct, sustainability and consumption, (19) Virtual use of media.

The spare time networkers – virtual worlds dominate spare time and reduce mobility needs

The high spare time share is filled well: a large amount will be held by informal work and citizen commitment. The time that remains is designed interactively at home with others. The most important things for people are social contacts and the development of their personal abilities in society. Accordingly, education plays a large role – individual further development is of high importance in society. People also feel responsible for the integration of social groups. Economy distances itself from dominant growth targets and develops towards a post-growth economy. Consumption is limited and sustainability aspects are highly valued.

The spare time collectives – shared values characterise society and promote sustainability

People use the available spare time intensively: in addition to their high citizens' commitment, they are subject to a lot of informal work. They also do a lot together. Since spare time offers are freely accessible, people can choose from diverse options. They are mostly mobile by collective solutions based on individual transport. They use their individual mobility comprehensively for many short near-distance trips. People consider themselves fully responsible and set their own political agenda. Politics leaves many things to the active citizens' society. It also withdraws from the area of spare time infrastructure and offers due to shortage of funds.

The spare time sensibles – self-realisation and sustainable consumption characterise society

The high spare time share is strongly utilised: with working life and stress by informal work and high citizens' commitment having great influence on personal freedom. Spare time activities mostly take place away from home and in groups. The most important social contacts often take place in the neighbourhood. Cultural offers are used diversely and interest in further education during spare time is high in this society. People feel responsible and participate intensely in political decisions in the scope of the participative structures that are present. In the post-growth economy, the economic actors have prepared for consumption changing towards increased sustainability and contraction in general.

Working environment as a critical framework – »light and shadow« in design

After the scenarios were available as equal „thinking tools“, the scenarios were evaluated. Initially, it was found that the current situation is closest to solution scenarios S1, S2 and S3, i.e. a high importance of working life and low spare time share. At the same time, these three scenarios also characterise the expected future. According to this, a rather small change to spare time design is assumed. This also results if looking more closely at selected key factors:

- The future will be characterised by a profit-oriented knowledge and service economy. This working world will be perceived as a high strain by people – with insecure development of flexible design of working place and time.
- »Consumption as spare time design with low importance of sustainable consumption« is assumed – even though other possibilities in the future are considered realistic alternatives.
- Use of motorised individual traffic will continue in the scope of high spare time mobility.
- Media continues to be an essential part of spare time design. As compared to this, the direct proximity (neighbourhoods) will play a small role – instead of recovering their historic importance.
- The state will determine the framework conditions in spare time design in future as well. This is in alignment with increases for scenarios S2, S3 and S4, so that a trend towards participation in society reducing in future is expected.
- At the same time, spare time design continues to receive little attention from regional politics (because of a short budget).

In addition to this rather stiff framework of spare time design, a number of clear changes are expected for individual key factors:

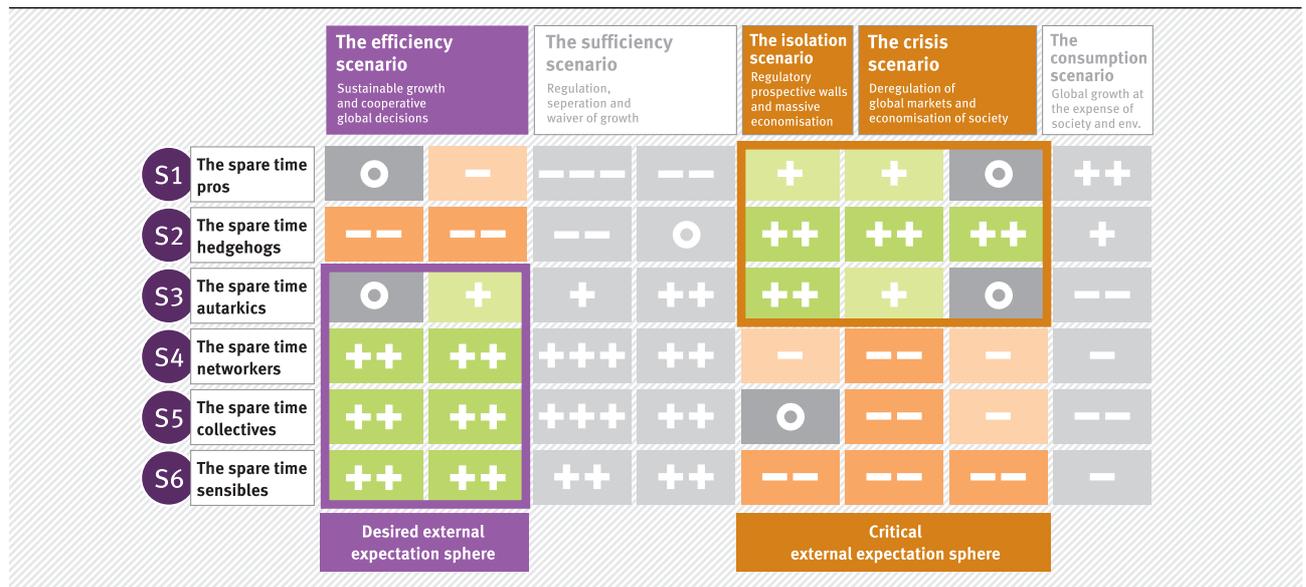
- Informal work will play a large role in future in contrast to the present. This includes particularly work in the family area, since citizen participation is reducing in parallel.
- Spare time will become more and more interactive in future – from home and from elsewhere.
- The degree of commercialisation of spare time activities will be high in future – the development of access options remains open.
- Comprehensive sports activities will become more and more important particularly to improve health – and not solely for fun and social interaction.
- Spare time infrastructure will be provided increasingly together with community initiatives in future – and thus less exclusively by public organisers.

The Scenario team assessed solution scenarios S4, S5 and S6 – i.e. those with reduced importance of the gainful employment – as desirable in contrast to this. Even though the occurrence of these cases is generally not expected, there are individual developments that are expected and also considered to be very positive:

- There will clearly be a high degree of social interaction in spare time.
- Education will become a central element of spare time design – both intrinsically and extrinsically motivated.
- Cooperative provision of spare time infrastructure by the

Figure 7:

Suitability of Solution Scenarios for Spare Time Design within the Environment Expectation Spaces



Source: Federal environmental agency

state and social initiatives is assessed rather positively.

Robust solutions are possible if spare time is viewed as a scarce asset

In addition to the direct evaluation of the solution spaces by the scenario team (e.g. »What spare time do we expect?«), it was examined how well the individual solution scenarios can be implemented under different framework conditions (see Figure 7).

The most expected context scenarios were of special interest. These are mainly the efficiency-scenario (=desired environment expectation space) and the separation and crisis scenario (=critical environment-expectation space).

The limited spare time possibilities (S1, S2 and S3) expected for the future are consistent with the critical environment expectations. At the same time, the desired solution scenarios (S4, S5 and S6) cannot be implemented in this environment. This means that there cannot be any corresponding change process without any substantial changes. Instead, the focus here would have to be on sustainability concepts as shown in scenarios S1, S2 and S3 – e.g. use of technical solutions to increase efficiency, profiling overall economic framework conditions or establishing new property terms.

Special focus should be on the solution scenario S3, which is consistent with the desired expectation space at the same time – and thus a robust solution concept.

This is mostly about giving people the opportunity to freely design their low spare time share – including targeted control of their social contacts. For politics, this makes social integration highly important. Education plays a large role in this future

and ideational prosperity replaces material growth.

With the implementation of the desired environment expectation space (i.e. a global transformation process), it would also become possible to establish many generally desired concepts for sustainable spare time design. This would include the reduction of mobility by use of virtual worlds (S4), emphasis of

Core statements on spare time design

- The future of spare time design depends on three core values: the spare time share, social participation and material alignment.
- The high importance of the job, connected with a low spare time share, will characterise the future, if the critical expectation space prevails.
- In case of transformation in the general environment, the less probable solution scenarios from today's point of view with reduced mobility, community values and sustainable consumption concepts may prevail as well.
- Ideational prosperity can become a characteristic concept of sustainable spare time design in all expected environment situations.
- Spare time design is relatively little based on sustainability concepts as an area so far.



Solution Scenarios - Module 2:

Future Habitation Design

An essential part of life happens »in one's own four walls«. Many developments relevant for culture meet here – living concepts, consumer conduct, energy supply, handling of technology. At the same time, all actor groups – politics (on all levels), economy and civic society will contribute to the design of habitation and residential environments. For these reasons, a look at this second subject area is very important.

Sustainable habitation design is mostly characterised in the manner in which the residential areas is built and how people live in it afterwards. To illuminate this subject area, 41 influence factors from the areas of society, politics and economy were identified and combined in 18 key factors in a network analysis (see box). Later, the 71 future options of the key factors led to a total of seven solution scenarios differentiated based on four central dimensions:

- **Object preservation:** The solution scenarios H1, H2 and H3 are characterised by high importance of object retention – i.e. mostly in the areas of renovation, restoration and use adjustment.
- **Object construction:** In solution scenarios H3 and H4, object construction is very important.
- **Durability and understanding of nature:** The shared aspects of solution scenarios H1, H1b and H2 are a long operating life of objects, a high understanding of nature and rather local structures and a high degree of self-supply.
- **Innovation in building:** Solution scenarios H2, H3 and H4 are characterised by high innovations in the construction

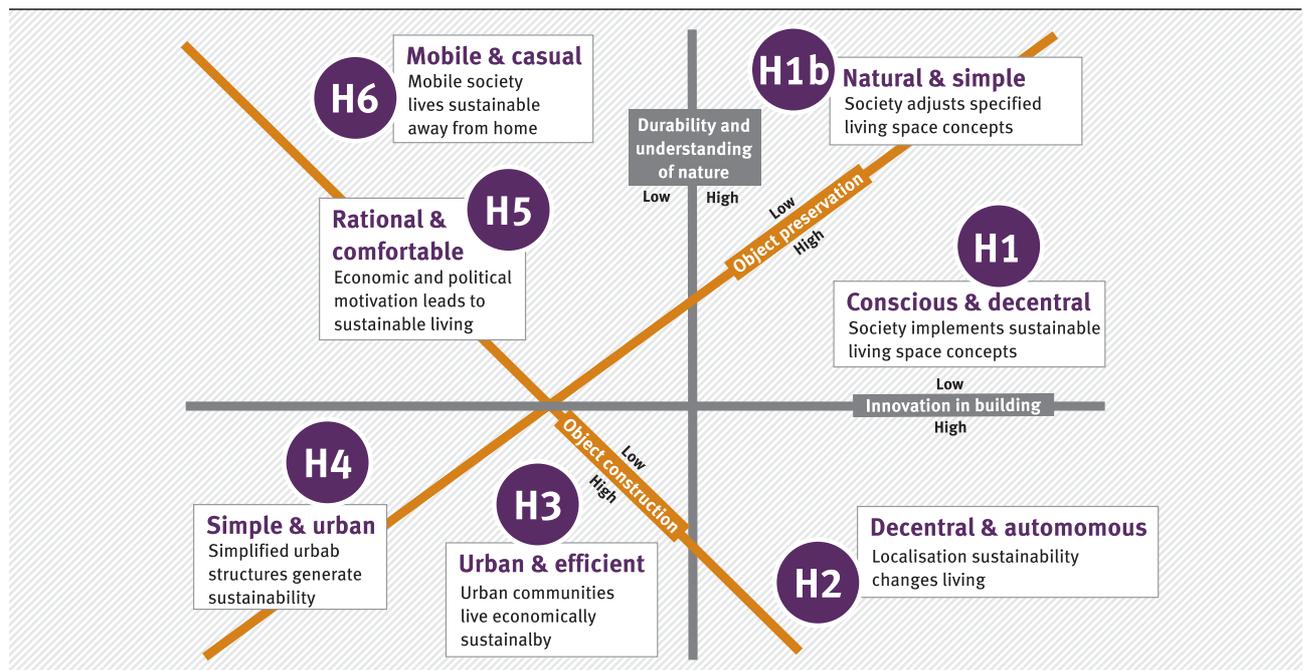
process. This comprises the strong effect of building materials and building products on health and wellbeing, adjustment to change of the city climate and, in connection with this, also consulting by the construction industry.

You can find these four essential differentiation lines in figure 8. They permit two points of view illustrated in different colours:

- **What is being built?** First, the two lines in dark orange create four quadrants: While solution scenario H4 focuses on object construction (in the urban area), scenarios H1 and H2 focus on object preservation. Solution scenario H3 combines the two areas, while scenarios H1b, H5 and H6 focus on the use of present buildings – including the removal of those not used.
- **How is building performed?** A second portfolio results when looking at the grey lines. In the right area, durability and understanding of nature in society drive the building process, while the construction industry actively drives innovations towards sustainability in the lower area. In the upper left quadrant, only the state remains as a driving force for sustainable buildings and apartments.

Figure 8:

Seven Solution Scenarios for Habitation and Living Environment Design



Source: Federal environmental agency

Solution scenario H1a

Conscious and decentral living – society implements sustainable living space concepts

Away from the metropolises, towards geographically distributed living spaces: a change is going through society from conurbations towards decentral, ecologically sustainable settlement structures. The private world takes place at home, with people spending their spare time together. The natural living environment creates a common wellbeing. The high degree of self-supply changes the structure of products and services. The construction industry focuses mostly on object preservation, since the main work is in the restoration and renovation of buildings. Utilitarian objects' use is in the focus of the real estate sector, which gives buildings a high usage duration in the long run. Supply and disposal takes place individually optimised by a mixture of line-bound and non-bound offers. The implementation of all efforts for optimisation usually takes place in a very focused manner. Overall ecological efficiency cannot be achieved comprehensively yet.

Solution scenario H1b

Natural and simple living – society adjusts specified living space concepts

Society puts high value on nature thus creating local settlement structures. Areas that are made available by the dismantling of unused buildings are planted consistently. They contribute to the food supply and support the social wish for nature. Man is part of his social environment – spare time activities often take place outside of the own living area. The demand for new construction is restrained, so that the construction industry is focusing on long-term and resource-efficient use of buildings. The present structures are used and tenants and landlords achieve a balance of interest even though the residential area is used rather inflexibly. The technical efficiency is low and the material flow management takes place mostly selectively.

Key factors for habitation design

(1) Type of object use, (2) Living space use, (3) Social needs, (4) Nutrition and self-supply, (5) Demand of mobility and working world, (6) Living concepts (7) Life cycle financing, (8) Substance flow management, (9) Supply and disposal, (10) Ecological effectiveness and efficiency, (11) Environmental performance in habitation, (12) Plants in the living environment, (13) Building technology, (14) Apartments and household management, (15) Object construction and preservation, (16) Environment alignment in the construction industry, (17) Construction materials and products, (18) Spatial development/settlement structure

Decentral and autonomous living – localisation sustainably changes living

Society develops back into small settlement units close to nature. Many towns and villages act independently and organise their own supply and disposal. In the settlement communities, strong social networks develop in which people spend most of their spare time. Many challenges resulting from centralisation can thus be met more successfully. People have high demands for their own apartment and have the construction industry advise them also regarding sustainability and value retention. The materials used for conversions comply with the high standards of the construction industry while also being „healthy“ for man and nature. Political requirements increase resource-efficient conduct and man considers himself part of the local ecosystem. Regional independence is widely achieved.

Urban & efficient living – urban communities live economically sustainable

Infrastructure concepts, green areas and high technical standards counter pollution in densely settled conurbations. The needs of people take first priority in apartment design. The construction industry is aligned with this and tries to increase the residential value. Buildings are constructed in a resource-protecting manner, but are not designed for long-term use – and only partially renovated. The apartments are small and intended to adjust flexibly to the tenant. While many people work from home, they leave their home in their spare time to maintain their diverse social contacts. All products and services needed are purchased, with supply often being organised by the community. People consider themselves as an essential part of the economic system and behave sustainably where it is economically sensible.

Simple & urban living – simplified urban structures generate sustainability

Supply in the predominant conurbations is simplified by warranting area-comprehensive basic supply. This simplification protects the environment, even if the main objective is economic efficiency rather than focusing on ecological aspects. The construction industry focuses on resource-saving new construction complying with the contemporary needs of people. Strong competition has arisen in construction management, which, among others, becomes noticed in active information and consulting on environmental issues. During construction, resource protection is important as well. At the same time, the building materials used must comply with the requirements of people for health and wellbeing. People focus on personal luck to optimise their habitation context – environmentally friendly conduct is only attainable by external incentives.

Rational & comfortable living – economic and political motivation leads to sustainable living

The settlement structures become increasingly urban – large, condensed conurbations with strongly networked infrastructures are most dominant. At the same time, mobility demands reduce in importance, since more and more people are working from home and like to maintain their social contacts virtually. Object construction stagnates, since the present building substance is used and removed if vacant. The construction industry reacts with offers focused on economic resource efficiency, showing alignment with the environment only upon request. Since money generation from real estate is very important, the economic efficiency of investments is a good argument. Implementation of resource-protection and optimised substance cycles also originates from economic reasons and political incentives. Ecologically compliant living conduct is politically promoted and made possible by the high degree of technologisation.

Mobile & casual living – mobile society lives sustainably away from home

In strongly linked conurbations, securing working mobility is essential. Areas that are not needed for the development of infrastructure after the dismantling of old buildings are often available as additional green areas. Here, people can spend their spare time after a strenuous day at work and enjoy the loosened-up appearance of their town. The construction industry is »up to date« and knows about environmental aspects, but will only show this on request. Instead, they will try to offer savings potentials through economic resource efficiency. Politics applies guiding control and sets standards by passing the corresponding reference values. The resulting living spaces are characterised by small sizes and specific uses. People are okay with this, since they are hardly home except for sleeping. Economically thinking people act sustainably as long as it remains affordable or even permits savings.

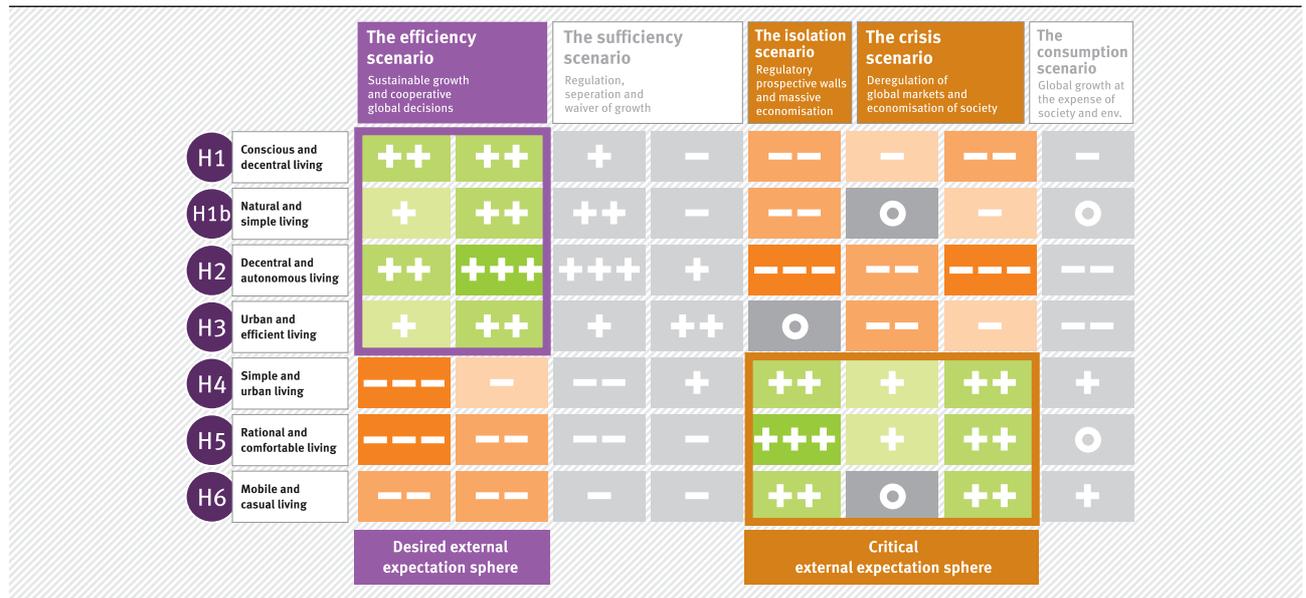
Development of the habitation and living environment design still open

The solution scenarios for habitation and living environment design were also evaluated and interpreted based on the individual key factors and on the scenario level. Looking at the results, it becomes clear that this area is considered little sustainable. Scenarios H4, H5 and H6 are closest to our time. The expected future is very unclear in this subject area: While H5 and H6 have the highest degree of expectancy, scenarios H1 and H1b and H3 are placed in the expanded expectation space. There is still great insecurity about the developments expected in future. Some constants appear when looking at the evaluation on key factor level:

- The own apartment remains a meeting site for selected social contacts.

Figure 9:

Suitability of the Scenarios for Habitation within the Environment Expectation Spaces



Source: Federal environmental agency

- For living and building, costs play a dominant role: the living concept »man as part of economy« (nature only as long as affordable) will continue in future as well. The ecologically aligned demand of customers will entice the corresponding reactions from the construction industry.
- Centralised infrastructure continues to prevail. A collective supply and disposal will dominate in future as well. The option of »big city life« will be characterised by strong infrastructure concepts in the conurbations in future as well.

There are not only constants, but also clear changes in the living and building of the future. Important expected changes on the level of individual key factors include:

- Flexibility of use of objects will increase.
- A sustainable environmental behavior will be supported by an increasing degree of technologisation in future.
- Energy management will be more important at home – also because of rising energy costs.

Living can be made sustainable even when savings are mandatory

Again, it was examined how well the individual solution scenarios can be implemented in the different framework conditions (see Figure 9). The developments expected for the future towards reduction and »simplification« of the living space fit the critical environment expectations very well. The restrained living environment design is not always caused by conviction, but partially by economic forces, but the sustainability effect will occur no matter the motivation.

All scenarios that correspond to the critical expected environment are also based on centralised solutions. This trend towards further urbanisation is currently noticeable around the world and is expected to continue to be valid. Thus, the corres-

ponding solution scenarios H4, H5 and H6 are well suitable as templates for derivation of sustainable concepts. Looking at the desired external expectation space, – in contrast to the critical expectation space – the decentralized solution scenarios appear compatible to external conditions. If clearly recognisable change processes take place in society and approaches such as self-supply and climate-neutral living gain in importance, many indications suggest a return to rather local settlement structures. Specifically scenario H2, with autonomous supply approaches, would offer suitable solution approaches for this. Since a complete reversal of today's urbanisation trends is not expected, scenario H3 comes to the focus, which corresponds to the desired expectation space as well as the further localisation of settlement structures with the implementation of efficiency increases in the newly structured urban space.

Core statements on habitation design

- The future of habitation design will be essentially influenced by the demand-side importance of environmental aspects as well as the development of the corresponding solutions by the apartment and construction industry.
- The development of sustainable solutions and concepts has an even clearer potential. This could be because changes here are usually being connected to a high financial effort.
- Expectations regarding future developments in this area are still open – i.e. a sign of a need for discussion and action to make the future sustainable.



Solution Scenarios - Module 3:

Future Design of Nutrition

Nutrition is a central decision field regarding sustainability: many global changes are driven by providing enough food for the growing global population. At the same time, nutrition design is strongly influenced by changes in consumption patterns – in industrial states as well as in developing regions.

Nutrition is an important subject area in the area of sustainability, since the procurement and preparation of food are elementary parts of human life and nutrition also directly influences the health of people and the strain on the environment. In the scope of scenario development, the entire food chain from agriculture, to processing/preparation and trade, to the nutritional habits of people was analysed. All stations have potentials for increased sustainability. As a result of the consistent link between alternative development options of 18 key factors, seven solution scenarios were developed. Central differences between the scenarios are:

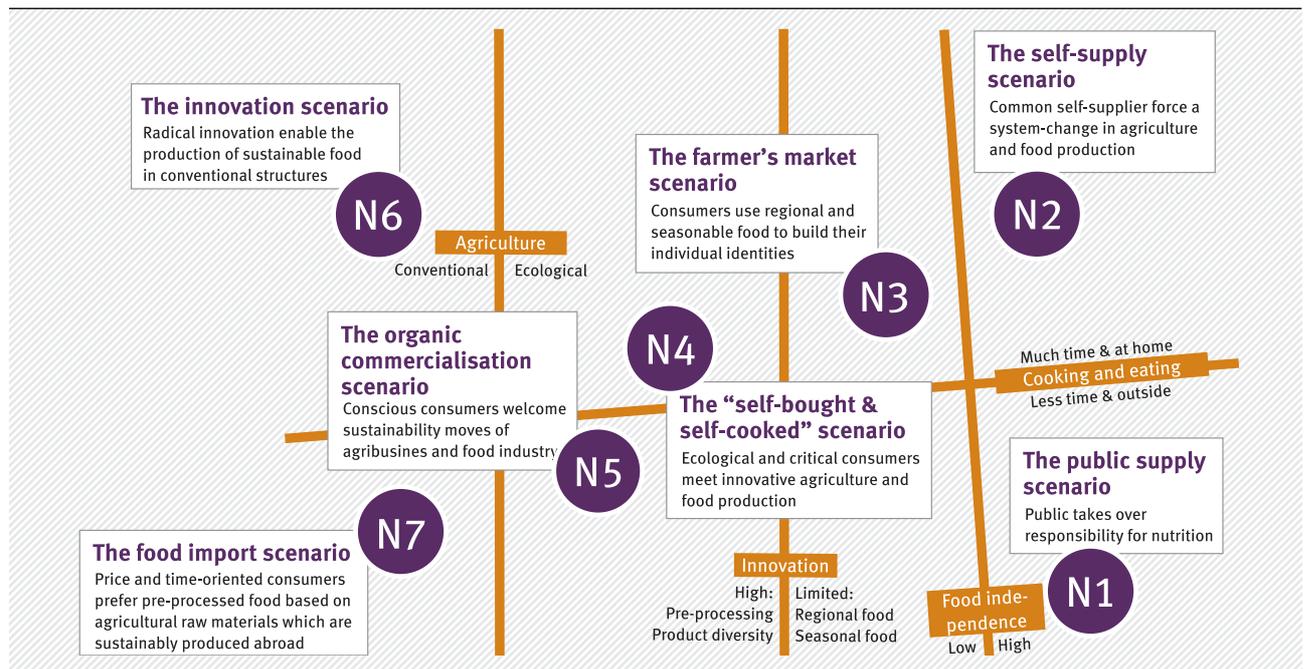
- **Agriculture and sustainability drivers:** In solution scenarios N6 and N7, the industry drives sustainability based on conventional agriculture, while the other scenarios are driven by informed customers who prefer ecological agriculture.
- **Innovation:** In solution scenarios N4 to N7, innovation and pre-processing lead to high product diversity, while scenarios N1 to N3 have regional agriculture and a focus on seasonal foods decelerate innovation.

- **Food independence:** Solution scenarios N1 and N2 are characterised by high importance of food sovereignty and conscious nutrition based on limiting philosophies („conscious waiver“).
- **Cooking and eating:** Solution scenarios N2, N3, N4 and N6 contain that lots of time is spent on food preparation and primary eating at home, while the lower range of the map describes futures where people take little time for preparing food and often eat out.

The noticeably different scenarios on the future of sustainable nutrition design show that very different paths can lead to an overall sustainable future.

Figure 10:

Seven Solution Scenarios on Nutrition Design



Source: Federal environmental agency

Solution scenario N1

The public-supply scenario

The state considers itself responsible for the supply of citizens beyond today's standards. Communities and regions promote the creation of new out-of-house providers in the scope of their active role in nutrition design to ensure sustainable supply. More and more people accept this offer – not least because conventionally produced foods become increasingly expensive because of excise taxes and community kitchens are a low-cost and sustainable alternative. Smaller regional units organise their food independence. The demands of consumers and control by the state lead to a sustainable production of food. Product diversity in trade is rather low, since production is seasonal and regional. Generally, self-producer communities as well as small, ecologically operated agricultural operations are dominant.

Solution scenario N2

The self-supply scenario

Sustainable nutrition, food preparation and self-supply are very important for society. The awareness of healthy nutrition and cooking competence are strong throughout society. The conscious self-suppliers prepare extensive meals from self-produced and additional carefully selected foods. To supplement the foods produced by themselves, they actively participate in purchasing communities. The food industry is controlled by the consumer: it meets the consumer's wish and mostly puts sustainable products on the market. Customers also have many regional producer communities to choose from. According to the trend towards self-supply, product diversity is low, but the foods are fresh, little processed, regional and seasonal – as the consumer wishes.

Solution scenario N3

The farmer's market scenario

Sustainable nutrition and preparation of meals are highly important in society and people act accordingly: consumers are interested, gather information and spend a large amount of their time on the subject of nutrition. The consumer needs a lot of time for comprehensive preparation, since the foods used are little pre-processed. Cooking is „cult“ and friends and families will often cook together. In spite of higher prices, ecologically and fairly produced foods are preferred. The influence of consumers is also mirrored in production: Agriculture and the food industry produce their products fully according to the consumers' convictions. Weekly markets are very popular and consumption is deliberately seasonal. Naturalness is most important for consumers. The legislator recognises the wishes of the citizens and ensures the best transparency.

Key factors of nutrition design

- (1) Willingness to pay for foods, (2) Cooking habits in households, (3) Purchasing conduct of households, (4) Importance / cultural valuation of meals, (5) Self-supply, (6) Disposal/recycling, (7) Everyday organisation of food, (8) Nutrition philosophy and awareness, (9) Supply out of house, (10) Knowledge and competences of consumers, (11) Production of the food industry, (12) Rationality / origin of food, (13) Innovation in industrial food production, (14) Innovation in agriculture, (15) Importance and structure of agriculture, (16) Food trade, (17) Consumer protection politics, (18) Raw material supply and supply

The »self-bought & self-cooked« scenario

People want to eat consciously well and sustainably and are willing to invest money and a lot of time in this. They prefer to eat at home. The preparation of a good meal may take a while, even though pre-processed foods are often used. The procurement of foods complying with the quality and sustainability demands of consumers takes place via a well-stocked food store. Both discounters and specialist stores consider the conscious demand and offer a wide range. Innovations in food production area are questioned by critical consumers, so that particularly large organic farmers will cover the demand for ecologically produced food. The food industry is obliged by the legislator to implement consumer protection and cannot avoid the claims of politics and demand.

The organic commercialisation scenario

Conscious consumers do not want to lower their sights. They want to eat healthily and sustainably at once and save time in preparation. For this, they either spontaneously eat out, or quickly prepare their meals with pre-processed products. Both when shopping and when eating out, people value regional and organic food. Consumers are willing to pay an accordingly higher price for such values as well. The conscious alignment of consumers leads to a focus on organic agriculture. The producers are highly innovative to increase efficiency while meeting the highest environmental and sustainability criteria. The attitude of consumers and the responsibility politics assigned to producers for quality and transparency lead to a high sustainability alignment of the food industry.

The innovation scenario

For society, cooking and shared meals hold an important role in life. Meals and their preparation take lots of time. Purchasing decisions are dominated by trust in the food trade, with consumers buying in a very price-oriented manner and therefore often preferring conventional foods. Generally, consumers rely on the food industry. Food production is characterised by radical innovations. Many developments, such as the production of »artificial meat«, permit diverse nutrition without the extensive factory farming of the past. Such innovations are driven by agriculture and industry. The state supports this development by creating the corresponding innovation-promoting framework conditions and a producer-oriented consumer protection.

The food import scenario

Eating mostly needs to be quick. Both the time for preparation, which is optimised by strongly pre-processed products, and the meal as such must not take long. Often, people eat on the road. Eating is a fringe activity because other things are more important to people. The low interest in foods is mirrored in the consumers' price orientation. People rely fully on industry and trade in their purchasing decisions. The high transparency in retail, with its wide range as demanded by the legislator, reinforces consumer trust. The strongly pre-processed foods come from the innovative food industry, which considers sustainability aspects as well as legal requirements. In addition to this, products supplied from the agricultural sector often are not from Germany, since local agriculture has clearly reduced its food production.

High degree of pre-processing expected for the future to continue

The scenario evaluation initially showed that the current situation is most similar to scenarios N7 and N6 – also the future structures characterised by global, conventional agriculture and low trust in the food industry. Scenarios N5 and – less strongly – N4 also had high similarities to the present. Looking at the expectations, it is noticeable that scenarios N4 to N7 once again show the highest values. A high degree of pre-processing and an innovative food industry is expected for the future. This results from observation of the respective key factors:

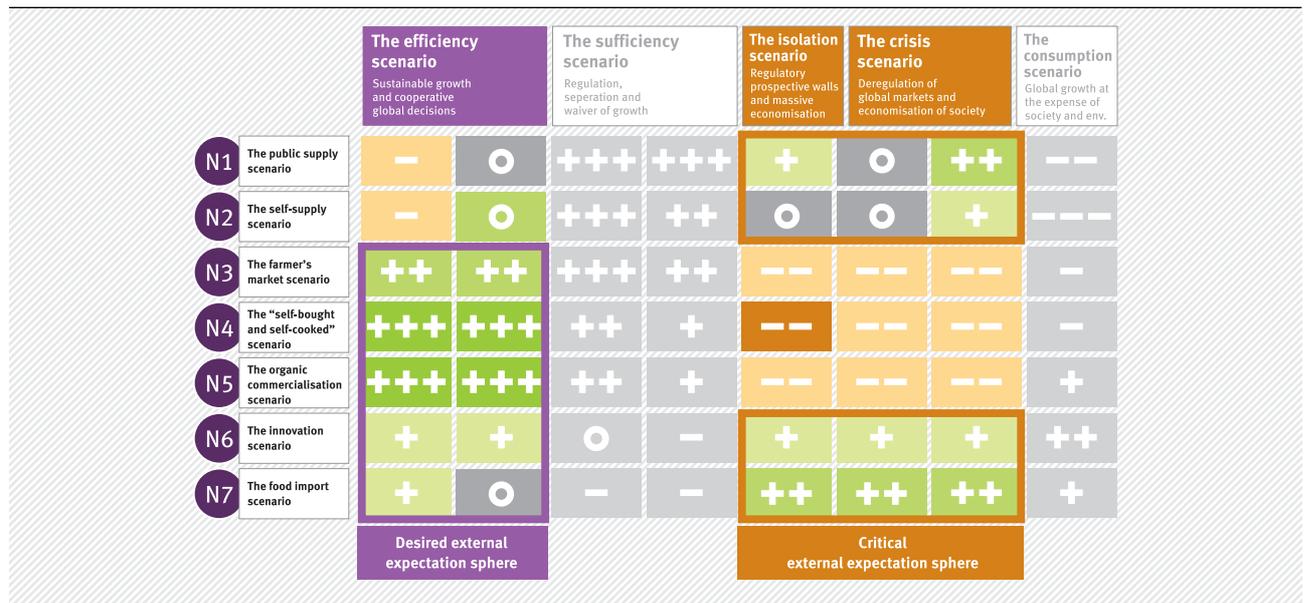
- Self-supply plays a rather low role in future as well. The procurement of foods mostly takes place through retail, which will offer a season-comprehensive range in future as well.
- Price-sensitive purchasing buying continues: consumers furthermore prefer conventional foods due to their lower prices.
- Food is processed according to comfort considerations. Strongly pre-prepared foods characterise the cooking habits in households. The nutrition rhythms are clearly individualised.

For the evaluation of the individual key factors, expected changes have become obvious as well:

- The importance of eating changes from eating as a necessity to heterogeneous enjoyment patterns with a high contribution to community identity formation.
- In future, there will be a higher focus on avoiding waste.
- Consumers make more conscious decisions, which leads to the offer becoming accordingly more wide-spread.
- The attitudes to sustainable nutrition and food preparation will develop from a low to a high importance with weak personal implementation.
- In addition to the end product, food production will increasingly have to meet sustainability criteria.

Figure 11:

Suitability of the Solution Scenarios for Nutrition within the External Expectation Spaces



Source: Federal environmental agency

The expectation space comprises four scenarios, N4 to N7, that do not all appear equally desirable in their design of sustainability in nutrition. While N6 and N7 are not given priority as strongly commercialised worlds, the two scenarios N4 and N5 are at the same time in the scope of the desired futures for nutrition design. Specifically scenario N5 («The organic commercialisation scenario») is a scenario in the future space that shows a great proximity to the present in addition to the high expectation and desire value. The closest proximity to the desired future, however, is found in scenarios N2 and N3. They contain a number of changes that are not part of the expectation space: more time for using foods with little pre-processing, increase of own work in the scope of self-supply concepts, return to traditional nutrition rhythms, sustainable food production based on the corresponding demand, as well as ecological agriculture with a low size of operations. This reversal of current development does, however, show very low expectation values.

The implementation of sustainability in nutrition can be diverse

The reconciliation of the solution with the context scenarios (see Figure 11) shows challenges mostly for the critical environment expected. Only scenarios N1 and N2 as well as N6 and N7 are compatible here. This evaluation is particularly interesting, since the suitable approaches can be found in solution scenarios that are very different: while N1 and N2 de-commercialise supply and ensure nutrition by self-supply or public supply, N6 and N7 have very different solution approaches. Scenario N6 is characterised by sustainable technology product and process innovations, while N7 relocates the production where it can be most ecologically and economically efficient. A suitable answer to the framework conditions of the critical expectation space can be found either on a path beyond today's form of supply by industrial food production and commercialisation – or by changing today's approach innovatively.

The two scenarios N4 and N5 are both desired and expected. They therefore are suitable for the desired external expectation space as well. If the transformation processes intended for in the environment are actually effective, solution approaches as they are described in the scenarios «Self-bought & self-cooked» and «Organic commercialisation» are very suitable.

Core statements on nutrition design

- Core values for the development of future nutrition design are the degree of influence of the consumer, further development of pre-processing and innovation, degree of networking of value chains and the degree of knowledge and cooking competence of the people.
- Scarce time due to working life and reducing importance of eating and cooking for social commitment suggest that the food industry will continue to remain very important.
- A development exceeding supplementation towards self-supply is not expected. Concepts of autonomous supply for larger communities may gain in importance.

Summary and Interpretation

In the described project, scenarios were used as »thinking tools« to deliberately combine different points of view in the scope of the sustainability discussion and to permit expansion of perspectives for sustainable development. Additionally, the complexity – from specialist subject to global environment – was to be made clear and connecting formats were to be offered. All of these were reasons for bringing together all participants in the last phase of the project and to stimulate discussion among them.



The starting situation – context scenarios and solution scenarios

The development and evaluation of the context and solution scenarios took place in four separate teams, coordinated by a core team. As a matter of fact, four separate interpretations evolved that can be summarised as follows:

- The evaluation of context scenarios showed that the national environmental and sustainability policy must take place within uncertain national and global framework conditions. Generally, two external paths were pointed out that must be expected to occur. The critical path often represents the continuation of the present, while the desired path describes a comprehensive global transformation process.
- Evaluation of the solution scenarios initially took place from the point of view of the individual specialist teams. Against the present, expectation and desired images were determined; by linking them to the context scenarios, it became clear which options may be sensible under the desired or critical framework conditions.

Subsequent to the analysis of the comparison of the context scenarios with the three subject areas of the solution scenarios, the different scenario teams met again to discuss the previous results and possible consequences. Three questions were at the focus:

- 1) Where are we regarding the subject of sustainability?
- 2) Are there any comprehensive subjects in the solution areas that should be observed?
- 3) What are the method conclusions from the process – and how could or should the results be used as a basis?

Where are we standing regarding the subject of sustainability? – a comparison of the three subject areas

The solution spaces for the three subject areas of spare time, habitation and nutrition were methodically developed so that only sustainable scenarios were represented. This means that a future pattern always is to sketch a recognisable sustainable solution at least for one stakeholder (politics, economy, society) or under one specific external framework. The original expectation was confirmed according to which the individual solution scenarios showed considerable differences regarding their compliance with different sustainability criteria – as well as their desirability or suitability as standardising targets. In this respect, it is logical to compare the three example decision fields that are selected.

Nutrition as a classic sustainability subject

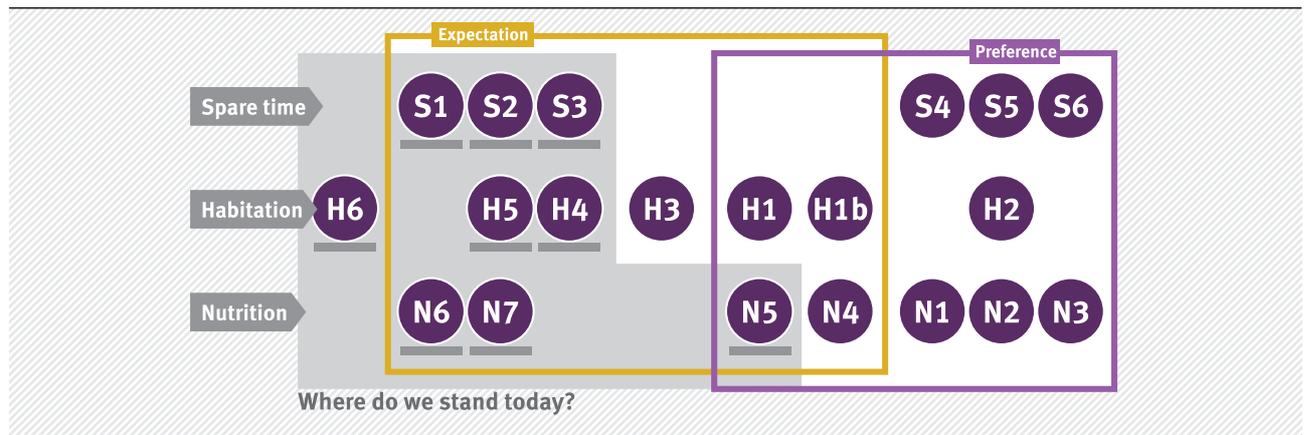
The term of sustainability is most established in the area of nutrition. There are three scenarios here that are close to the present and with high expectations. One of these three futures is the »organic commercialisation scenario« (N5). This is not only a future that is close to the present, but also one that is desired (see intersection in Figure 12). In this solution scenario, industrial food production is designed sustainably, so that nutrition can meet the needs of time-sensitive people in today's working world. This solution does not seem like a »bad compromise« – if implemented well – but as a high-value and sustainable answer to the challenges of modern society on the one hand and the environment on the other hand. Nevertheless, many experts emphasise that there is considerable need for reformation in the industrial production of foods and work structure for its production.

More information and transparency, as well as internalisation of environmental costs and more sustainable design of production processes, are the most frequent demands to the food industry.

It also must be noted that there are four more desired patterns, of which three are outside of the expected area. In this respect, there is still considerable potential for improvement here, e.g. in the areas of agriculture/gardening, transport, food supple-

Figure 12:

Comparison of the Solution Scenarios from the Three Subject Fields



Source: Federal environmental agency

ments and additives, as well as surplus and waste of food.

Habitation environments with hopeful development trends

In the area of habitation environment design, the degree of sustainability is different: Scenarios H4 and H5, which are close to the present, are in the expected, but not the desired area. This means that continuation of the currently little sustainable living area design with accordingly low improvements is considered plausible. Scenario H6 »mobile & casual living«, which is close to the present, is not expected or desired. W1 and H1b, however, two other scenarios with high expectation values, are desired. Consequently, the less sustainable expectations are also supplemented by a development trend that is positive in the sense of sustainability. These are scenarios where a good understanding of nature in society leads to a rather passive construction industry. The also-desired scenario H2, where the construction industry proactively implements the good understanding of nature, is considered less realistic (=expected). In the discussion, scenario H5 »rational and comfortable living« was considered a possible bridge to the desired future images with a clearly more active role of society. However, it was noted that this development would hardly be possible without the active contribution of politics in close coordination with the economy, which does more than just provide innovations.

Spare time design in the »choke hold« of the primate of gainful employment

Spare time design showed less development regarding sustainability than nutrition and habitation design, which may be because this subject is not at the focus of public discussions. The three scenarios S1, S2 and S3, which are close to the present, are reflected accordingly in the expectation space. No essential changes are expected for the future. However, the three scenarios S4, S5 and S6 are desired. Hence there is no overlap with the expectation space. Central differentiation criteria between stability space and desired space are the spare time share in everyday life and the strain of working life, the scope of citizen commitment, and the degree of social interaction and intensity of social bonds. This shows that considerable deficits

are seen mostly in the social dimension of sustainability. In this respect, the development of working life and value systems are essential drivers for sustainability of spare time design. The development of this decision field extremely depends on social transformation.

Are there comprehensive subjects?

Another perspective results if the assessed solution scenarios are linked to the expected framework conditions. Figure 13 shows that nearly all the scenarios considered to be close to the present correspond to the critical external path (only the organic commercialisation scenario N5 is in the lower area).

How to deal with unusual solution approaches?

A view to the solution scenarios that are an option in the critical and desired environment path is interesting as well (Figure 13, upper right quadrant). These are

- **Scenario S3:** Spare time autarky – ideational prosperity replaces material growth.
- **Scenario N6:** The innovation scenario – radical innovations permit production of sustainable foods in conventional structures.
- **Scenario N7:** The agricultural import scenario – price-conscious consumers prefer a „quick“ kitchen based on strongly pre-processed foods produced from agricultural raw materials sustainably grown abroad and sold here.

These three future structures share that they are outside of the classic transformation logic by offering different solution patterns – by changing values in the spare time area or by technical or business innovation in the nutrition area. This »alternative movement« may be the reason for none of these contextly robust solution approaches being considered desirab-

le by the specialist groups.

Two core questions

In the discussion between the different reasons, two core questions become clear:

- Can there be a redefinition of the term of work, as a consequence of which sustainable solutions can result in the global context as well as in all three decision fields?
- What options are there for social transformation, as it is shown particularly in contrast between the desired and critical environment expectations?

Sustainable tension field

All in all, the discussion of the solution spaces showed that the sustainability debate is moving in a tension field of efficiency, consistency and sufficiency: this is about achieving sustainability by maximising the (technical) efficiency. On the other hand, material cycles are to be mostly closed. This means that only raw materials can be recycled, but no waste arises anymore in a system. There is a high technology alignment that permits this recyclability (consistency).

Finally, it is about no longer focusing on the »how« and rather on the »how much« (sufficiency). While »sufficiency« was often criticised as a »waiver and redistribution strategy«, the approach is now more strongly interpreted in the sense of a non-material prosperity model, connected to solutions for civilisation problems such as stress-related illness or increasing social isolation as a negative consequence of unilateral orientation with material prosperity.

Methodical Conclusions

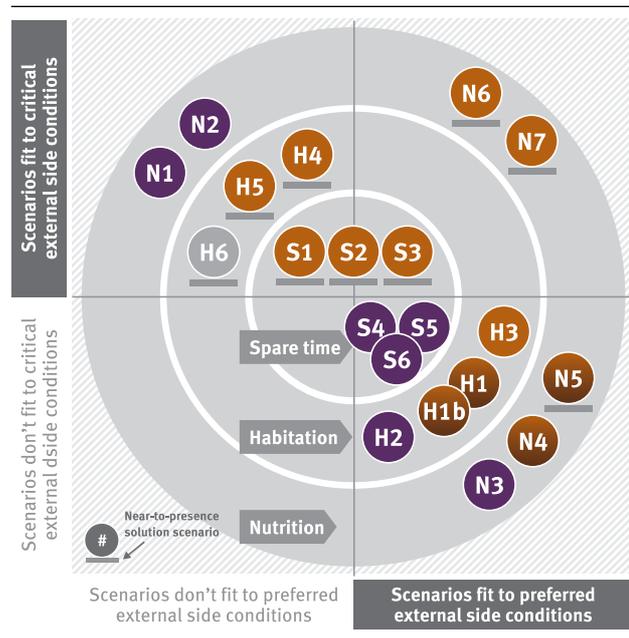
One of the control problems of the principle of sustainable development is the extraordinary complexity – not only of the subject but also politically and regarding the measures. Therefore, it was a first, central project target to point out connections between the environment targets of the national sustainability strategy and the national and global framework conditions. This led to the systematic development of the area under observation – i.e. specifically the separation of context and solution scenarios. This approach has proven its worth in general, even though the differentiation between national and global developments within the context scenarios is not simple – and many future developments also strongly depend on the European level.

Context scenarios as comprehensive think tools

The developed context scenarios did not only provide a tool for evaluation of environment-related objectives of the national sustainability strategy. According to the estimation of the different scenario teams, the alternative future images can also be used for a dialogue in the political, entrepreneurial and social areas – particularly because they differ from one-dimensional forecasts. Additionally, there is a differentiation of scenario development and evaluation: only evaluation of the context

Figure 13:

Comparison of the Solution Scenarios from the Three Decision Fields



Source: Federal environmental agency

scenarios points out the necessity of a global transformation process as well as the possible consequences connected to not pursuing it.

Solution scenarios lead the sustainability discussion out of its one-way street

The transfer of the tool of decision or strategy scenarios - which are often used in companies - in the sustainability area, can be considered an important innovation of the project described. These alternative options for action, the so called »solution scenarios« here, could be used to show that there are many paths that are possible and also desirable from the point of view of individual actors to increase sustainability. This effect of expanding perspectives and learning from each has always been particularly distinctive when very different stakeholders could be reconciled in the scenario process.

Combining solutions and environments

A special challenge was the linking of solution and context scenarios. Even though it is clear that possible solutions must be reviewed for robustness, the resulting complexity was difficult to handle – particularly the results are difficult to communicate. Still, it became clear that the trioka of (1) separation of context and decision area, (2) separate views of the future and (3) the systematic combination of results is a good tool for handling complexity. At the same time, this led to avoiding all desired options being combined in a future image that was easy to illustrate but hard to put into practice.

In this respect, the project results provide not only a content stimulation but also a tool that can be sensibly used for many questions in the area of environmental and sustainability policy.



Excursion: Greenhouse Gases in Germany

Can an industrialised country like Germany almost completely avoid its man-made greenhouse gas emission? The Federal Environmental Agency (UBA) confirms this in its new study. According to the study, the greenhouse gas emission can be reduced by 95% as compared to 1990 – even with technologies available today.

The study »Greenhouse gases in Germany 2050« includes all relevant emission sources in an examination that are described in the annually drawn-up national inventory report (NIR) on the greenhouse gas inventory. In addition to the complete energy supply – i.e. power, heat and traffic sectors – the greenhouse gas emissions from industry, waste management, agriculture and forestry, as well as from land-use changes are considered. A target scenario was developed for this.

One important prerequisite for a greenhouse gas neutral Germany is reduction of final energy consumption. We show that it can be cut in half in households, traffic, industry, as well as in commerce, trade and services, by 2050 as compared to 2010.

A central component of a completely regenerative – i.e. greenhouse gas neutral – energy supply is the production of hydrogen by water electrolysis with the help of electricity from renewable energies. Hydrogen can then be used to produce methane and other hydrocarbons. This way, fuels can be produced regeneratively for long-distance road traffic, flight and maritime traffic. They can be used to replace diesel or gasoline. They can also be used to replace natural gas for heating apartments and as raw materials in the chemical industry. The first successful pilot projects for this technology have already been started in Germany. However, this process comes with high conversion losses and is still expensive at this time. Further research – also on other options in mobility and heat supply – is needed. However, it is particularly important to avoid unnecessary traffic altogether. Unavoidable mobility should be relocated to bike, bus and train. For cars and trucks, technical vehicle efficiency must be clearly improved.

All room and process heat for industry will be produced from renewable sources and regenerative fuels (hydrogen or methane) by 2050 according to the UBA-scenario. This drops the energy-related greenhouse gas emissions almost to zero. The process or raw material related greenhouse gas emissions drop by 75 percent to about 14 M tons. The currently very strongly crude-oil-based raw materials supply of the chemical industry would have to be switched to regeneratively produced hydrocarbons; this would almost completely avoid greenhouse gas emission in future, as they occur in ammonia production and other chemical syntheses.

The emissions from the waste and sewage sectors have already dropped strongly and are only at three M tons CO₂ equivalent by 2050 according to the UBA. For this, even more depot gases would have to be collected and used in cogeneration units. Better ventilation of compost systems for organic waste can also help to prevent methane, which is harmful for the climate, from forming in the plants in future.

The greatest emitter in 2050 could be agriculture with 35 M tons of CO₂-equivalent. Since technical measures alone are not enough to achieve this reduction, it is necessary to reduce the animal stock – and particularly ruminants.

The Federal Environmental Agency assumes in this study that Germany will continue to be an industrialised country in 2050. The calculations were also based on the assumption that the population will drop slightly (version of the 11th population forecast of the Federal Statistical office from 2006).

This study is not a forecast of what will be, but points out the technical feasibility. Possible transformation paths from today to 2050 are not considered, and neither are economic questions on costs and benefits. It also was assumed that the consumer conduct of the population will not change considerably. It can be expected, however, that more climate- and ecologically-friendly lifestyles will make it easier and often also more cost-efficient to achieve climate protection goals.

For more information and to download the study: <http://www.umweltbundesamt.de/publikationen/treibhausgasneutrales-deutschland-im-jahr-2050>

Scenario teams and selected sources

Scenarios are created, assessed and interpreted by teams. Within this project, there was a collaboration of four different scenario teams – coordination by a core team. The Federal environmental agency (UBA) as well as ScMI thank all participants for their contribution. We are looking forward to a continuation of this dialogue.

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Selected sources

Kurt Beck / Jan Ziekow (Hrsg.): Mehr Bürgerbeteiligung wagen. Wege zur Vitalisierung der Demokratie, VS Verlag für Sozialwissenschaften, 2011, S. 97 ff.

Wolfgang Blau / Alysa Selene: German Dream. Träumen für Deutschland, Deutscher Taschenbuch Verlag, München, 2007

Stefan Brunnhuber / Harald Klimenta: Wie wir wirtschaften werden. Szenarien und Gestaltungsmöglichkeiten für zukunftsfähige Finanzmärkte, Redline Wirtschaftsverlag, Frankfurt, 2003

Gerhard Both: Szenario 2100. Die Welt ohne Rohstoffe, Kolb, Mannheim, 2007

Bundesregierung: Perspektiven für Deutschland. Unsere Strategie für eine nachhaltige Entwicklung.

Bundesregierung: Für ein nachhaltiges Deutschland. Fortschrittsbericht 2008 zur nationalen Nachhaltigkeitsstrategie, 2008

Deutscher Bundestag: Schlussbericht der Enquete-Kommission »Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft«, 2013

Hans Diefenbacher / Roland Zieschank: Woran sich Wohlstand wirklich messen lässt. Alternativen zum Bruttoinlandsprodukt. Oekom, München, 2011

Ulrich Eberl: Zukunft 2050. Wie wir schon heute die Zukunft erfinden. Beltz & Gelberg, Weinheim, 2011

European Commission: Global Europe 2050. October 2011

Friedrich-Ebert-Stiftung: The Geneva Scenarios on Global Economic Governance 2020, 2009

Stephen Emmott: Zehn Milliarden. Suhrkamp, Berlin, 2013

Richard Florida: Reset. Wie wir anders leben, arbeiten und eine neue Ära des Wohlstands begründen werden. Campus, Frankfurt am Main, 2010

Holm Friebe / Thomas Range: Marke Eigenbau. Der Aufstand der Massen gegen die Massenproduktion. Campus, Frankfurt am Main, 2008

Birgit Gebhardt: 2037. Unser Alltag der Zukunft. edition Körber-Stiftung, Hamburg, 2011

Armin Grunwald: Ende einer Illusion. Warum ökologischer Konsum die Umwelt nicht retten kann. Oekom, München, 2012

Eberhard Haunhorst / Christoph Willers: Nachhaltiges Management: Sustainability, Supply Chain, Stakeholder. 2. Auflage. Books on Demand, 2011

Uwe Jean Heuser: Humanomics. Die Entdeckung des Menschen in der Wirtschaft, Campus, Frankfurt am Main, 2008

Karl Otto Hondrich: Weniger sind mehr. Warum der Geburtenrückgang ein Glücksfall für unsere Gesellschaft ist, Campus, Frankfurt am Main, 2007

Tim Jackson: Wohlstand ohne Wachstum: Leben und Wirtschaften in einer endlichen Welt. Oekom, München, 2013

Michio Kaku: Die Physik der Zukunft. Unser Leben in 100 Jahren, Rowohlt, Reinbek bei Hamburg, 2012

Koelnmesse / Bundesverband des Deutschen Lebensmittelhandels / ScMI AG: Die Zukunft unserer Lebensmittel. Szenario-Studie. Köln, 2011

Geseko von Lüpke (Hrsg.): Zukunft entsteht aus Krise, Riemann, München, 2009

Meinhard Miegel: Exit. Wohlstand ohne Wachstum, Propyläen, Berlin, 2010

Henrik Müller: Die sieben Knappheiten. Wie sie unsere



Zukunft bedrohen und was wir ihnen entgegensetzen können, Campus, Frankfurt am Main, 2008

Horst W. Opaschowski: Deutschland 2030. Wie wir in Zukunft leben, Gütersloher Verlagshaus, Gütersloh, 2008

Niko Paech: Befreiung vom Überfluss. Auf dem Weg in die Postwachstumsökonomie. Oekom, München, 2012

Price Waterhouse Coopers: The World in 2050. Can rapid global growth be reconciled with moving to a low carbon economy?, July 2008

Franz Josef Radermacher / Bert Beyers: Welt mit Zukunft. Überleben im 21. Jahrhundert, Murmann, Hamburg, 2007

Jorgen Randers: 2052. Der neue Bericht an den Club of Rome: Eine globale Prognose für die nächsten 40 Jahre. Oekom, München, 2012

Robert Reich: Super-Kapitalismus. Wie die Wirtschaft unsere Demokratie untergräbt, Campus, Frankfurt am Main, 2008

Gill Ringland: In Safe Hands? The Future of Financial Services. April 2011

Andreas Rinke / Christian Schwägerl: 11 drohende Kriege. Künftige Konflikte um Technologien, Rohstoffe, Territorien und Nahrung, C. Bertelsmann, München, 2012

Nouriel Roubini / Stephen Mihm: Der Ende der Weltwirtschaft und Ihre Zukunft. Crisis Economy, Campus, Frankfurt an Main, 2010

Eric Schmidt / J. Cohen: Die Vernetzung der Welt. Ein Blick in unsere Zukunft. Rowohlt, Reinbek bei Hamburg, 2013

Laurence C. Smith: Die Welt im Jahr 2050. Die Zukunft unserer Zivilisation, DVA, München, 2010

Umweltbundesamt: Deutschlands Wege in die Zukunft. Dokumentation einer UBA-Vortragsreihe zu mehr Nachhaltigkeit, Dessau-Roßlau, 2012

Umweltbundesamt: Treibhausgasneutrales Deutschland im Jahre 2050, Dessau-Roßlau, 2013; www.uba.de/publikationen/treibhaus-gasneutrales-deutschland-im-jahr-2050

United Nations: Retooling Global Development, World Economic and Social Survey, 2010

US Government: Global Trends 2025. A Transformed World, www.dni.gov/nic/NIC_2025_project.html

Beatrice Weder di Mauro (Hrsg.): Chancen des Wachstums. Globale Perspektiven für den Wohlstand von morgen. Campus, Frankfurt am Main, 2008

Harald Welzer / Klaus Wiegandt (Hrsg.): Perspektiven einer nachhaltigen Entwicklung. Wie sieht die Welt im Jahr 2050 aus? Fischer Taschenbuch, Frankfurt am Main, 2011

World Economic Forum: Redesigning Business Value. A Roadmap for Sustainable Consumption. January 2010

World Economic Forum: The Future Role of Civil Society. January 2013



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