

UniNEtZ-

Options- Report

UniNEtZ –
Universities and Sustainable
Development Goals

From Options to
Transformation



UniNEtZ
Verantwortung für nachhaltige Entwicklung

Greetings from the Federal President

If you look around in Austria, the consequences of the climate crisis are now clearly visible and tangible – from floods to droughts and storms. Also, when looking beyond our national borders, the in part already catastrophic effects of global warming cannot be overlooked.

Hence, we face a global challenge. And thus, also a common task. In the UniNEtZ project, scientists from numerous partnering institutions have joined forces to really tackle this task together. The key word is “together”, because interdisciplinary networking creates new opportunities, new ideas, new synergies that help to implement the UN Sustainable Development Goals. It makes me hopeful that many smart people from social sciences, natural sciences, technology, the arts and music are putting their heads together to talk about sustainability goals and to come up with options how they can actually be achieved.

Each and every person involved in this project has made a significant contribution to sustainable development in Austria. And it is exactly this kind of development that we urgently need in order to steer towards a *livable future*. The Options Report that you are holding in your hands right now gives us a real chance of such a future.

I wish all participants and partner institutions every success in the next phase of the project – the joint implementation of the options in cooperation with stakeholders and finding further ways to implement the sustainability goals. I know that the road from the idea to the actual measure can sometimes be a long one – my sincere thanks go to all those who continue to follow it undeterred.



A handwritten signature in black ink, reading "A. Van der Bellen". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Federal President
Alexander Van der Bellen

Foreword by the UniNEtZ Council Chairman

We are living in a time of great changes and challenges. Our natural resources are increasingly under threat, climate change and its consequences are already keenly felt in many areas, inequalities between different social groups are growing and the associated insecurity is a source of discontent, tension, and conflict. All these challenges, which are interrelated in a complex way, require solutions that integrate ecological as well as social and economic aspects. The *UN Agenda 2030* with its 17 Sustainable Development Goals (SDGs) represents such a holistic approach. It sees all the countries of the world as developing countries, with different development priorities, but with the common goal of promoting sustainability on all levels.

In the UniNEtZ project, numerous academics, artists and students have taken on the task of bringing this concept to life and developing concrete options for implementing the 17 UN Sustainable Development Goals (SDGs) in Austria. Together, they have overcome both disciplinary and university borders.

In a cooperation between social sciences, economics, humanities, and natural sciences, as well as art and technology, a total of 17 partner institutions and the student initiative *forum n* have made significant contributions to shape a *UniNEtZ Options Report: Austria's options for action to implement the UN Agenda 2030 for a livable future*. This extraordinary means of cooperation not only provides impulses for a socio-ecological transformation but has also set in motion a transformation process of the universities themselves. In this sense, “universities of the future” should, in addition to exemplifying sustainability at the overall institutional level, also increasingly open up to other parts of society, and “rethink” science, research, and teaching – as more inclusive, more participatory and more transformative.

A tangible result of the three-year work is now available in the form of the *UniNEtZ Options Report: Austria's options for action to implement the UN Agenda 2030 for a livable future*. The report shows concrete policy options to achieve the SDGs and highlights six fields of transformation through which these options are systemically linked.

I wish you an exciting and inspiring read that will give us all valuable impulses for shaping a sustainable future – because getting to such a future needs us all!



A handwritten signature in black ink that reads "Franz Fehr". The signature is stylized with long, sweeping strokes.

UniNEtZ Council Chairman
Franz Fehr

Foreword by the UniNEtZ Steering Committee

At the beginning of the third decade of the 21 century, it is clear that the timeframe in which it is still possible to tackle and implement the socio-ecological transformation necessary for a sustainable and livable future is becoming ever shorter and that therefore immediate action is required. In fact, this was already known in 2015 at the latest when the UN Agenda 2030 and the Paris Agreement were concluded and the international community of states committed to meeting the sustainability and climate goals formulated therein. However, very little has been done so far, neither at the global nor at the national level.

In view of these failures, 16 universities, the Geological Survey of Austria (GBA) and the student association forum n have joined forces in the UniNEtZ project (Universities and Sustainable Development Goals) to contribute to sustainable development in Austria from an academic perspective. To this end, over 300 scientists, artists and students, have developed around 150 options including comprehensive measures for achieving the Sustainable Development Goals, which were presented to the Austrian federal government in December 2021. The options are available online at www.uninetz.at/optionenbericht.

This first volume shows how these options interact in six transformation fields that are particularly important for Austria. In a second volume, summaries of the options with all individual measures are presented.

When we started preparing the project more than four years ago, it was clear to us that we were breaking new ground in many ways – especially with regard to:

- assuming real and active societal responsibility, as increasingly demanded by universities through different terminologies (e.g. Responsible Science, Third Mission);
- engaging in the purely quantitative, inter-university dimension of a project involving 17 institutions and forum n;
- the qualitative interdisciplinary dimension with contributors across 30 disciplines and different scientific cultures;
- the self-realisation that aspiring to make a real contribution to transformation only becomes credible if (have) we also gone through (self-)transformation.


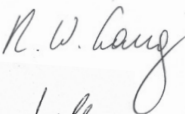
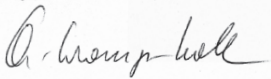
However, many details that have emerged during the course of this challenging project and the high overall workload were not clear to us at the beginning. But after the successful completion of this first phase of UniNEtZ, we can conclude: It was worth all the effort because:

- a multitude of new impulses and insights could be gained from many interdisciplinary discourses;
- with the preparation and submission of the options report to the federal government, a concrete example of universities taking on societal responsibility has been created;
- with the options, a foundation has been laid for the initiation of trans-disciplinary dialogues with society in the sense of transformative science in the next phase of UniNEtZ;
- this demonstrated a form of science that corresponds to the challenges of the 21st century.

At this point, we would also like to express our gratitude to many people without whom UniNEtZ would not have been possible or would not have been possible in this form. Our heartfelt thanks go to:

- the rectorates of the participating universities for the vote of confidence in supporting such an undertaking in this way;
- the over 300 contributors to the UniNEtZ project for their commitment and willingness to engage with something new;
- the UniNEtZ coordination team (Annemarie Schneeberger, Franziska Allerberger, Ingomar Glatz) for their tireless efforts, without which the project would not have been possible;
- to the BMBWF for its manifold support and ideas.
- the UniNEtZ Council (Chairman Franz Fehr) for the excellent and constructive accompaniment of the project.



November 2021

(from left to right)

Johann Stötter, Reinhold

Lang, Helga Kromp-Kolb

UniNEtZ Steering

Committee

Executive Summary

In 2019 16 universities, the *Geological Survey of Austria*, the *Climate Change Centre Austria* and the student association *forum n* joined forces to form the project consortium UniNEtZ (Universities and Sustainable Development Goals) to submit an Options Report to the Austrian Federal Government on how Austria can achieve the sustainability goals of the *UN Agenda 2030* from a scientific point of view. In this report, an option is understood in the sense of the IPCC (*Intergovernmental Panel on Climate Change*), as a proposal of measures relevant for political and economic decision-makers, which is based on a comprehensive analysis and evaluation of the current state of scientific knowledge carried out by interdisciplinary teams. These contributions to the achievement of goals apply to both internal impact within national borders as well as external impact through which Austria can influence the achievement of the global sustainability goals in other countries, especially in countries of the Global South.

After three years, some 150 options with more than 1000 concrete measures have been developed, which are summarised in the Options Report *Austria's options for action to implement the UN Agenda 2030 for a livable future*. The extended version of these options can be found on the homepage of the UniNEtZ project (<https://www.uninetz.at>). Each option is framed by a detailed presentation of objectives and background, before individual measures or bundles of measures are proposed. The measures are explained in terms of their general impact, their time horizon and their interactions with other options or measures. In this *From Options to Transformation* part of the Options Report, a systemic synthesis is presented giving an overview of the interaction of different options for action to implement the Sustainable Development Goals. This is done in six Transformation Fields oriented towards the UN report *The Future is Now* and adapted to the conditions in Austria:

- 1) Welfare of People and Society
- 2) Global Environmental Commons
- 3) Sustainable and Equitable Economy
- 4) Energy Systems and Circular Carbon Management
- 5) Nutrition and Food Production
- 6) Urban and Rural Spatial Development

In the individual Transformation Fields, an introduction to the topic is followed by the first main part, in which essential transformation potential is shown with reference to the interaction of options and their measures. The textual explanations of the section *From Options to Transformation* are complemented by summarised brief descriptions (*Overview of Measures*) of the individual options, which allow a quick overview of the respective goals and concrete measures. After a brief description of the responsibility beyond Austria's borders, the second main part shows which actors are responsible for which tasks in the implementation of the transformation potentials:

- 1) Politics and administration
- 2) Economy and finance
- 3) (Society) individuals and groups
- 4) Education, science, art and media

In summary, at the end of the report, and thus also at the end of the three-year project phase, it can be concluded that the overarching goal of UniNEtZ, the desired socio-ecological transformation, will only be achieved if there is a multifaceted interaction of political and economic frameworks (*top-down*) and broad social acceptance and willingness to implement (*bottom-up*). The questions discussed in conclusion are based on this fundamental idea: How does transformation happen? Who has the power to implement the options and measures and thus also the responsibility for their implementation? How can Austria help to ensure that the Sustainable Development Goals are also implemented at the global level?

With the preparation of the Options Report, the participating universities have left the classic fields of action and, in the sense of assuming societal responsibility, have taken a first step in the direction of the Third Mission called for by the BMBWF.

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1. Introduction

Johann Stötter and Helga Kromp-Kolb

1.1 Point of departure and reason for UniNEtZ

Building on the *Millennium Development Goals* (MDGs), at the United Nations (UN) Summit in September 2015 in New York, all member states committed to work towards the implementation of the 17 Sustainable Development Goals (SDGs; Fig. 1) at the international, national and regional levels, by 2030 (*UN Agenda 2030*).

The *UN Agenda 2030* can be seen as the global goal of the third decade of the 21st century to overcome the major challenges of the present. Its overarching importance is also made clear by the fact that the implementation of the necessary climate protection measures agreed by the Paris Treaty is one of the 17 Sustainable Development Goals.

Accordingly, the European Union (EU), which sees itself as a driving force in the development of the *UN Agenda 2030* and has placed sustainable development at the centre of European values, has committed to implementing the 17 Goals in both its internal and external policies.

SUSTAINABLE DEVELOPMENT GOALS



// **Fig. 1:** The 17 Sustainable Development Goals of the *UN Agenda 2030*. Source: United Nations Department of Global Communications (2019).

In Austria, too, all federal ministries were committed to the coherent implementation of the *UN Agenda 2030* and the 17 Sustainable Development Goals (SDGs) by a decision of the Council of Ministers on January 12th 2016. However, activities to fulfil this commitment only became apparent in the preparation of the *Voluntary National Implementation Report* for the UN *High-level Political Forum* (HLPF) in New York in 2020.

In view of this situation 16 Universities, the *Geological Survey of Austria* (GBA), the *Climate Change Centre Austria* (CCCA) and the student-organised association *forum n* joined forces under the auspices of the *Alliance of Sustainable Universities in Austria* (Allianz) to form the UniNEtZ (Universities and Sustainable Development Goals) project. The UniNEtZ project aims to identify, develop and evaluate options on how Austria can meet its obligation of the coherent implementation of the *UN Agenda 2030* and the Sustainable Development Goals (SDGs). In doing so, the *UN Agenda 2030* is understood as a global, and thus also valid for Austria, roadmap for transformation in the sense of the Sustainable Development Goals within the limits of the Earth System.

With the overarching goal of making an active contribution to sustainable development in Austria, the partners involved are thus fulfilling the societal responsibility of universities called for by the *Federal Ministry of Education, Science and Research* (BMBWF). However, since an active contribution to sustainable development in society is only credible if the universities themselves take this step, the anchoring of the sustainability Goals in the university's core fields of activity (research, teaching, operations, governance and societal dialogue) is a further focus of the project.

1.2 What is an option or the *UniNEtZ Options Report*?

The *options* in this report show future-proof ways how to achieve individual sustainability Goals or their sub-Goals (*targets* in the *UN Agenda 2030*). In this sense, options can be understood as proposals for a bundle of concrete measures based on current, interdisciplinary scientific findings. These recommendations for action, which are relevant for political decision-making but not prescriptive, relate on the one hand to individual sustainability Goals or their targets. On the other hand, they also show interactions with other options that can either promote or hinder goals and targets. In summary, the options and their measures are intended to support decision-makers in Austria in achieving the sustainability Goals by society as a whole and in realising the *UN Agenda 2030*, both nationally and in an international context.

In March 2022 the *UniNEtZ Options Report* as delivered to the Austrian Federal Government. The complete volume ***Austria's options for action to implement the UN Agenda 2030 for a livable future*** consists of five parts:

The UniNEtZ Project:

Universities and the 17 Sustainable Development Goals

This part explains the origins, the basic idea and goals of UniNEtZ.

From Options to Transformation

Here, the interaction of different options in six Transformation Fields is presented.

Overview of Measures

This part contains summaries of the options and their measures.

Options and Measures

With the roughly 150 options and 1,000 concrete measures proposed, this section is the main part of the *UniNEtZ Options Report*. The structure follows the order of the *UN Agenda 2030's* Sustainable Development Goals (SDGs), although, the SDG 14 “*Life below Water*” was not dealt with.

Appendix: Supplementary Documentation to the UniNEtZ Options Report

Activities, publications, teaching events and public relations work that have been realised around the UniNEtZ project are presented here.

1.3 Options as building blocks of a comprehensive socio-ecological transformation

The finite nature of the Earth system has been the subject of scientific discourse since the early days of the Industrial Revolution (from the Malthusian Law of Population to the *Limits to Growth* 50 years ago). This is also the focus of the *Doughnut Economy* model, in which the *planetary boundaries* are compared with human (social and economic) needs and, imbalances resulting from overexploitation are highlighted, in particular. This holistic linking of social, economic and ecological aspects, which is in line with the principle of sustainability, makes the concept groundbreaking with regard to the transformational ideas associated with sustainable development.

In this sense, the *Doughnut Model* (Fig. 2) also provides a framework for thinking about how to move from options to a socio-ecological transformation¹ in Austria. The *Welfare of People and Society* is to be realised within social and ecological limits.

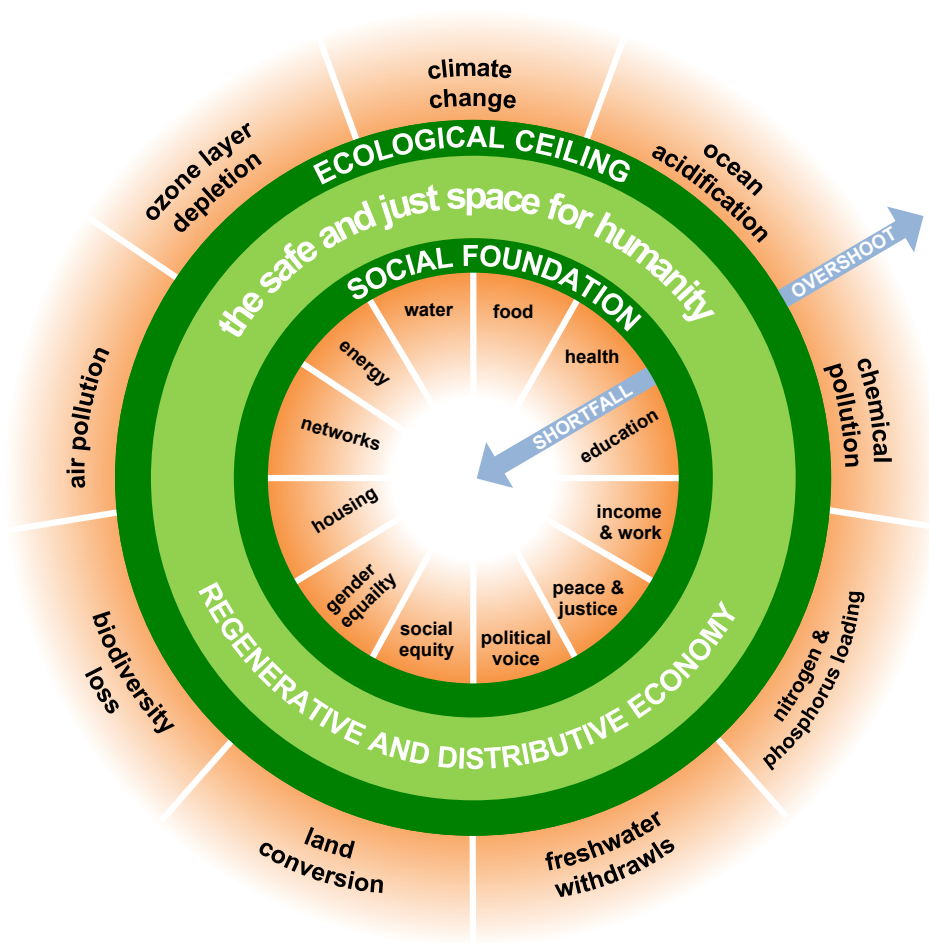
Since the *UN Agenda 2030* itself, in the sense of a meta-concept, does not provide any concrete details with regard to implementation, programmatic, framing concepts are needed that lead to real political and economic decisions and trigger action by society as a whole. With regard to the overarching objective of UniNEtZ, the challenge is to identify Transformation Fields of which decision-makers and society are aware and that are accepted on the one hand, and which can be filled with concrete and scientifically justifiable content through the options developed in the UniNEtZ project on the other.

In this sense, this part of the *UniNEtZ Options Report* focuses on Transformation Fields that connect the options and should therefore be understood as a meta-level. In an extensive discussion process involving the main proponents of three approaches (Peter Messerli: ***Global Sustainable Development Report 2019: The Future is Now***; Nebojsa Nakicenovic: ***The World in 2050***; Martin Stuchtey: ***The System Change Compass***) and based on consultation with the UniNEtZ *Scientific Advisory Board* (SAB), it was decided to follow the principles of the *Global Sustainable Development Report 2019: The Future is Now* and to use its basic structure as a starting point for this part of the *UniNEtZ Options Report*.

This UN-commissioned ***Global Sustainable Development Report 2019*** defines concrete actions in six ***Transformation Fields*** (*Entry Points for Transformation*; Fig. 3) to achieve the 17 Sustainable Development Goals (Fig. 2). The Transformation Fields are to be understood as areas on a systemic level for which it is expected that the desired goals can be achieved to a large extent and within a manageable timeframe.

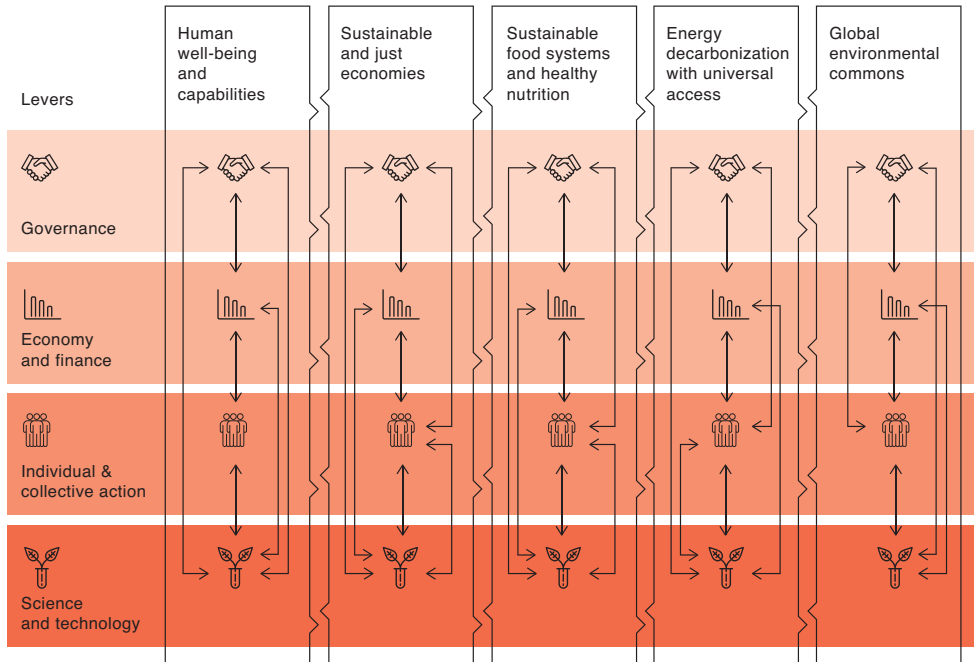
With regard to implementation, governments and economic decision-makers are addressed first and foremost, without disregarding other societal groups. The groups of addressees referred to as *levers* are intersected with the Transformation Fields in a matrix (Fig. 3).

¹ The concept of socio-ecological transformation is discussed in section The UniNEtZ Project: Universities and the 17 Sustainable Development Goals of the UniNEtZ Options Report in more detail.



// Fig. 2: The Doughnut of social and planetary boundaries after Raworth. Source: Raworth (2017).

Entry Points for Transformation



// **Fig. 3:** Pathways to Transformation.
Source: UN (2019).

In this sense, *The Future is Now* is also to be understood as a kind of appeal calling for increased cooperation between science and politics as well as business and societal groups in order to achieve the global sustainability Goals, a basic principle to which the UniNEtZ consortium is committed:

“The Report is not only a product but also a process for advancing collaboration among actors in science, Government, the private sector and civil society in all regions of the world towards identifying and realizing concrete pathways for transformation driven by evidence. ... It also seeks to strengthen the science-policy interface as an evidence-based instrument to support policymakers and other stakeholders in the implementation of the 2030 Agenda across the social, economic and environmental dimensions of sustainable development” (UN, 2019, xix).

1.4 Other guiding principles

In addition to the general framework provided by the ideas of the *Doughnut Model* and the pragmatic pursuit of a systematic approach aligned with the concept of the *Global Sustainable Development Report 2019: The Future is Now*, the following additional principles are incorporated into the *UniNEtZ Options Report* in general, and in the *From Options to Transformation* section in particular.

Leave No One Behind (LNOB)

The demand to leave no one behind (*Leave No One Behind*), is a universal basic principle of the *UN Agenda 2030*. At the global level, this demand may be understood above all in the context of the imbalance between the countries of the Global North and the Global South, which Austria is committed to overcoming by signing the *UN Agenda 2030*. But in Austria, too, there are growing groups of people who are excluded from many positive developments and live in extremely precarious conditions. If the implementation of a socio-ecological transformation in Austria, which goes hand in hand with the achievement of the global sustainability Goals, is to be successful, these parts of the population must be actively involved in this process. In this sense, the basic principle of *Leave No One Behind* also guides the *UniNEtZ Options Report*.

Efficiency and sufficiency, substitution and compensation

For individual processes, the SDGs can be used to assess the extent to which they remain within the ecological limits or the societal scope for action. Processes that have negative ecological and social impacts are to be classified as *unsustainable*. To nevertheless enable sustainable development, sufficiency, substitution, efficiency and compensation measures must be taken (Tab. 1).

The primary objective must always be to minimise negative environmental and social impacts. This results in a hierarchy of measures: Only when it is clear that sufficiency measures are not effective should substitution measures be taken and then, if necessary, efficiency measures — whereby efficiency measures are most effective when applied to the most sustainable alternatives (e.g. rail freight transport).

If these substitution and efficiency measures are not sufficient to make the processes sustainable, compensation measures are also necessary to offset the remaining negative environmental and social impacts.

Resilience

The current COVID-19 pandemic has shown, in a way that could not have been foreseen in advance, how vulnerable global society is today. It is therefore not surprising that in this context the demand for increased resilience has become the focus of various discourses at both national and international (global) levels.

In combination with considerations on achieving the 17 Sustainable Development Goals, resilience takes on a broader meaning that goes beyond a purely potentially negative counteracting system property. If the socio-ecological transformation sought through sustainable development is to lead to a new, stable state of the Earth system from an ecological, social and economic perspective, then this can only go hand in hand with a high level of resilience. In this sense, resilience is to be understood as a system property that, in addition to preventing potentially negative developments, also focuses on the conscious and active absorption of positive impulses.

Nr.	Category	Description	Instruments	Example
1	Sufficiency	Omit unsustainable processes	E.g. prohibitions, restrictions	No more import of apples
2	Substitution	Replace less sustainable processes with more sustainable ones	E.g. incentives through taxes/ subsidies	Importing oranges with climate-neutral instead of fossil-fuelled means of transport; or also: Substitution of oranges by apples
3	Efficiency	Make less sustainable processes more sustainable	E.g. development of standards for sustainable offsetting	Import of oranges with climate-neutral instead of fossil-fuelled trucks
4	Compensation	Balance less sustainable processes with sustainable processes	Development of standards for sustainable compensation	Import of apples with fossil-fuelled trucks, with reforestation of forests to compensate

// **Tab. 1:** Categories of measures for sustainable development.
Source: Own illustration

1.5 Structure of the present part of the *UniNEtZ Options Report*

Based on the matrix-like structure of *The Future is Now* (Fig. 3), the outline for the present part of the *UniNEtZ Options Report* was slightly modified, expanded and ordered differently. The six Transformation Fields thus show how the options can contribute to a socio-ecological transformation in a systemically interconnected way. The Transformation Fields are:

- 1) Welfare of People and Society
- 2) Global Environmental Commons
- 3) Sustainable and Equitable Economy
- 4) Energy Systems and Circular Carbon Management
- 5) Nutrition and Food Production
- 6) Urban and Rural Spatial Development

A regular structure is followed in the individual Transformation Fields. After an introduction to the topic, the first main part shows essential transformation potentials with reference to the options and their measures. After a brief description of the respective international responsibility, the second main section shows which tasks fall to the individual groups of actors in the implementation of the transformation potentials:

- 1) Politics and administration
- 2) Economy and finance
- 3) Society (individuals and groups)
- 4) Education, science, art and media

In order for UniNEtZ to fulfil its objective of contributing to the sustainable development of, with and by Austria, a broad acceptance of the options and measures proposed in the Options Report is required. Successful socio-ecological transformation requires a multifaceted interaction of political and economic frameworks (*top-down*) and broad social acceptance and willingness to implement (*bottom-up*).

2. Welfare of People and Society

Meike Bukowski, Ulrike Payerhofer, Katharina Kreissl,
Maciej Palucki and Fritz Hinterberger

In times of multiple crises such as environmental degradation, biodiversity loss, climate change, economic crises and pandemics, the factor of human well-being is increasingly in the public focus. The possibilities and capacities to cushion the effects of these crises vary greatly in society. The increasing inequalities threaten social cohesion, peace, prosperity and, last but not least, human well-being. Human well-being and the human ability to satisfy needs are fundamental prerequisites for a *good life*.

The basic prerequisite for this is an intact natural and social environment that is accessible to all people regardless of gender, social stratification, education, ethnicity, and citizenship. The underlying factors and structures for this can be actively shaped on many levels. They are also decisive for how a society can react to crises, i.e. how resilient it is. In order to cultivate the process for this understanding of the good life and to build up a high degree of resilience, comprehensive social transformation processes towards sustainable development are necessary and feasible.

Human history shows that fundamental social transformation is possible. Examples range from the abolition of slavery, the introduction of women's suffrage, the Equal Treatment Act, the development of social security systems to more recent environmental (e.g. animal protection, CFC ban) and climate protection measures.

All these examples are based not least on social movements, civil society engagement and the will of political and societal decision-makers. They have contributed to improving the quality of life of individuals and social groups – and thus increase overall social cohesion – substantially. They also show that transformation processes can be initiated in a targeted manner.

2.1 Human well-being and empowerment

Human well-being and human empowerment are fundamental prerequisites for sustainable social cohesion. A good life, and thus also human well-being, is based on the fulfilment of needs – today and in the future. Two dimensions are central to this: the subjective well-being of people and those framework conditions that contribute to well-being, i.e. services of public interest – and how these are distributed in society. The characteristics of human well-being serve as an important yardstick for assessing the social cohesion of a society. Closely related to this is human empowerment, which is about *“the life that people can lead”*, and not about *“their resources, such as their possessions – or the use – of necessities they have at their disposal”* (translated from Sen, 2010, p. 281). In the sense of the comprehensive sustainability paradigm, it is also crucial that human well-being cannot be achieved without taking into account comprehensive ecological requirements.

These include aspects such as health, safety, participation, education, housing, work, an ecologically intact environment, consumable resources, income and wealth, and the opportunity to participate in society. This multidimensional empowerment approach goes beyond the conventionally narrow, microeconomic or monetary resource approach. It expands the assessment of poverty and inequality to include a holistic understanding of circumstances, which are structured by inequality categories. This refers primarily to a person's freedom to choose alternative courses of action and to be able to make meaningful use of available resources.

However, it is crucial that the possibility of living a good life does not restrict other people or groups from also doing so. This obligation arises from a central guiding principle of

the *UN Agenda 2030 Leave No One Behind*, with which all states have committed themselves to a transformative promise: “to eradicate poverty in all its forms, end discrimination and exclusion, and reduce the inequalities and vulnerabilities that leave people behind and undermine the potential of individuals and of humanity as a whole” (Principle 2, UNSDG, 2021).

A comprehensive treatment of the multifaceted and diverse Transformation Field of *Welfare of People and Society* would go beyond the scope of this chapter. Therefore, reference is made exclusively via the options in question.

2.2 Transformation potentials

Large inequalities in distribution, especially the concentration of wealth, endanger social cohesion, peace and, not least, trust in state institutions (see Transformation Field *Sustainable and Equitable Economy*). To overcome them, a critical intervention in unequal power relations and relations of domination and a focus on social justice is needed both at the national and global levels (**Options 01_02, 10_01, 10_09**). This includes a fair distribution of social recognition, social representation, opportunities for participation (**Options 15_09, 16_09, 16_10**), economic resources and assets. This enables economic and social prosperity and ultimately also promotes the stability of democratic systems.

Due to the increasing inequalities and the persistence of absolute and relative poverty, a comprehensive socio-ecological transformation towards a sustainable society is necessary. In this context, the *UN Agenda 2030* with its 17 Sustainable Development Goals serves as a framework to identify levers and fields of action and to bring them into a systemic context.

The following is an example of how people can be empowered to increase their well-being by satisfying basic needs.

2.2.1 Participation, inclusion and rights

Although societal participation is an essential human need, not all people have the same opportunities to do so. This is due to economic reasons on the one hand, but also to administrative, political and social reasons on the other. Categories such as social origin, ethnicity, citizenship, non-disability, gender/gender identity, religious affiliation, age, access to education, etc. are social place markers and closely linked to power relations. A structural perspective on power and inequality relations requires that the intertwined effects of inequality categories on vulnerable groups are analysed and

put in relation to the privileges of those who benefit from them. This is a basic prerequisite for assuming social responsibility to combat unjustified inequalities and to eliminate them in the long term. Vulnerable and marginalised groups should, on the one hand, be made more visible and given the rights and opportunities to participate to which they are entitled. On the other hand, the constant reproduction of social inequalities must be actively disrupted. For this, processes of social and symbolic recognition and social representation as well as economic redistribution are central.

In the longer term, easier access to Austrian citizenship is essential for political participation, without having to renounce the original citizenship (dual citizenship). In the medium term, analogous to the situation of EU citizens, the right to vote should first be decoupled from (third) citizenship and instead be linked to a registered residence in the municipality (**Option 10_7**). Otherwise, people who have lived and worked in the country for a long time will be excluded from participating in shaping the basic legal system. The extension of the right to vote to the federal level would then be a well conceivable next step, as some countries already practice. Enabling political participation contributes to achieving a greater degree of quality of democracy in Austria. The introduction of the birthplace principle (*jus soli*) is another sensible way of facilitating access to Austrian citizenship by conferring Austrian citizenship on all children born here (**Options 10_7, 16_16**).

In order to strengthen political participation and to elaborate and implement widely accepted solutions, the establishment of cooperative governance forms such as citizens' councils, neighbourhood and children's parliaments is important (**Option 06_11**). This also requires the expansion and strengthening of children's rights through a structural package that includes a national action plan, evaluation and monitoring (**Options 16_03, 16_05, 16_06, 16_07, 16_08**).

Access to information (**Options 16_09, 16_10**) and balanced reporting is an essential prerequisite for political participation. In addition to this important function, the media also play a central role in conveying affiliation and identification with society and/or certain interest groups, i.e. in the representation of groups and different voices. In order for diverse life realities and demographic realities to be represented in the media, the representation and participation of women and marginalised groups (people with disabilities, people with a history of migration, LGBTIQ+ persons) in media organisations as well as an inclusive (visual) language are indispensable (**Option 05_03**).

Another essential component of social participation is equal access to justice for all. This requires the development of comprehensive, collective legal protection with a broad scope of application and the guarantee of fair, transparent and speedy proceedings (**Option 16_09**).

2.2.2 Peace, protection against violence and security

One of the most important prerequisites for human well-being is that all people can live free of violence and in peace and security — regardless of gender, sexual orientation, non-/disability, social origin, ethnicity, religious affiliation, lifestyle and abilities.

Statistics show that anti-women, anti-LGBTIQ+, racist, anti-homeless and anti-disabled violence are still part of everyday life in Austria. The transformation of society into a peaceful and inclusive society can only succeed if relations of domination and role models that promote violence are questioned and broken down.

Violence against women, which primarily originates from men and is an expression of hegemonic or toxic masculinity², is one of the most important problem areas of gender inequality. During the COVID-19 pandemic, this type of violence has increased further. Violence manifests itself in psychological violence, physical violence, sexual harassment and sexual violence. Murders of women by men, predominantly (ex-)partners or family members, have steadily increased in recent years. Homosexual, transgender and intersex people, people of colour, children and people with disabilities are also affected by increasing levels of violence and assaults.

If this is to be countered, on the one hand it is of great importance to expand existing support services for all affected and vulnerable groups of people. On the other hand, prevention work in schools and outside of schools is also indispensable in order to learn and acquire sensitisation and empathy in the sense of positive masculinity. In the field of education, a comprehensive and systematic gender-sensitive pedagogy from kindergarten onwards is essential to combat problematic manifestations of masculinity and to create positive and non-violent masculinities. In schools, awareness can be raised about violence in the internet

² The terms Hegemonic Masculinity (Connell, 1987) and Toxic Masculinity (Kupers, 2005) describe problematic manifestations of masculinity that maintain and (re-)produce the patriarchal system.

and peace education can be systematically anchored (**Options 05_04, 16_02, 16_03**). The serious lack of resources and resulting offers in violence prevention work should be counteracted (**Option 16_01**). In order to counteract the deficit of knowledge about types of violence that can be clearly observed in the population, public campaigns with broad impact are needed (**Option 16_01**) as is sensitive reporting by the media. State-supported media, whether directly through subsidies or indirectly through advertisements, play a central role in the context of education, awareness-raising and primary prevention against violence (Istanbul Convention). They are responsible for fact-based and informative reporting on mechanisms of violence and on violence as a societal and structural issue and not to trivialise individual cases. To this end, binding compliance with the Code of Ethics is essential (**Option 05_03**).

Peace, security and non-violence are also a central task globally and multilaterally. At the United Nations level, Austria is engaged in the *United Nations Development Programme* (UNDP), the *United Nations Children's Fund* (UNICEF), the *United Nations High Commissioner for Refugees* (UNHCR) and the *United Nations Industrial Development Organisation* (UNIDO). In order to strengthen Austria's role and its ability to shape the international context and assume global responsibility, it is necessary to increase funding for multilateral development cooperation programmes (**Options 10_05, 17_01**). The broad social awareness for non-violence and peace that is a necessary prerequisite can be given a foundation by systematically anchoring peace education in schools (**Option 16_02**).

In order to promote and strengthen peace, protection against violence and security beyond Austria's borders, Austria must insist on fundamental human rights, women's and LGBTIQ+ rights as well as children's rights in other countries and counteract regressive steps, such as in the Visegrad countries.

2.2.3 Work and income

Alongside natural resources, gainful employment is the most essential factor for producing goods and services. In order to ensure well-being, work must therefore be primarily geared to the needs of society, i.e. of all people, and not to the requirements of abstract markets. Gainful employment contributes to individual well-being not only materially, but also in the sense of personal satisfaction and the associated participation in the societal production process.

The proportion of precarious and low-wage workers in Austria and the EU is on the rise and has meanwhile taken on societal and economy-wide dimensions. These developments are favoured by factors such as creeping deregulation processes or reduced collective income commitments. Especially sectors based on international migration, especially intra-European East-West mobility, such as 24-hour care or seasonal work in tourism and agriculture, are characterised by inhumane working conditions, ranging from legally grey areas to illegal. In order to stop or slow down this process, reforms for more socially just working and employment conditions are needed.

These include, in particular, more equitable wages, i.e. through increasing the minimum wage (at a minimum to the poverty line), fairer working hours and times and access to affordable health care for the precariously employed (**Option 01_02**). The inclusion of people with chronic illnesses and disabilities through supportive rehabilitation measures and the creation of inclusive jobs that enable people to secure their livelihoods is an essential contribution to achieving true full employment in the sense of gainful employment, for all those wishing to do so (**Options 03_04, 08_05, 16_08**).

Gainful employment, however, is only *one* possibility of social participation and for many is strongly linked to earning an income. In addition, unpaid work for oneself (personal work), for others (care work) and for society (community work) contributes to the well-being of all and makes up a large part of the work done in society as a whole.

However, the ratio of paid to unpaid work in Austria is highly unevenly distributed, in particular by gender, but also due to age (**Option 08_06**). Women still perform the largest share of unpaid care work – also for child-related care. The introduction of non-transferable parental leave for both parents (**Option 05_02**) provides a basis for the equitable distribution of unpaid work and has an effect on reducing the gender pay gap. Substantive and economic improvement of systemically relevant activities is also necessary to combat inequalities related to ethnicity, social origin and gender, as life-sustaining occupations (care, harvesting, etc.), which are often performed by women, people with a history of migration and mobile workers from Eastern Europe, are poorly paid. The introduction of non-discriminatory job evaluation systems also serves to close the wage gap – and relatedly the pension gap – between women and men (**Options 05_01, 08_06**).

In an early industrialised country like Austria, in addition to the general economic situation, the distribution of income, assets, but also life chances and ultimately quality of life within

the population (according to qualification, origin, gender), and thus the social security system, is decisive. Although gainful employment is the main source of income and wealth accumulation for most people, it is in many cases not enough to secure people's existence.

Concrete measures can contribute to a fairer distribution of income and assets as well as to securing material existence. Examples of this are combined citizens' insurance, basic income support (possibly also in the sense of an unconditional basic income by extending the existing negative income tax), a tax reform for more distributive justice (**Options 10_01, 10_02, 10_03**) and the expansion of public infrastructure (**Option 10_05**). Establishing a development centre for sustainable social security systems could contribute to the development of new instruments (**Option 01_01**).

A redistribution of the labour force as well as of care work can lead to greater justice – also between the sexes. Shortening the full-time working life from 65.000 hours to 50.000, while at the same time extending the working age, can contribute to socially upgrading care work and improving the life balance. It also reduces resource consumption, waste and emissions (**Option 08_05**).

An improvement in the area of care work requires, on the one hand, an upgrading and support of voluntary work. On the other hand, it requires the expansion of inpatient and mobile care and nursing for the elderly as well as socially acceptable pre-school and school-accompanying childcare, improvement of care ratios and the reduction in the size of care groups while at the same time reducing the density of work in the sense of reducing stress and creating further education and training time (**Options 05_02, 08_07**).

2.2.4 Social security and social infrastructure

Socially just, anti-discriminatory access to functioning social infrastructures, social security systems and basic cultural services is central to human well-being. This mitigates the effects of poverty, exclusion and unequal distribution through immaterial and material safeguards and opportunities for care and support, and shapes the resilience of society. The value of social protection becomes particularly evident in times of societal crises (e.g. climate change, pandemics, economic crises) (**Option 01_01**).

The provision of and access to social infrastructure as well as to adequate social security systems are interdependent and include health and education systems, public transport and urban infrastructures (affordable housing; **Option 01_03**), care and support services (**Option 08_06**), as well as ser-

vices sector, arts and culture. As a part of the social infrastructure, social services in particular make a valuable contribution to inclusion, participation and redistribution, for example by ensuring that people on low incomes or those who are affected by other mechanisms of exclusion (people with disabilities, single parents the old etc.) are also taken care of. The range of social services is, however, increasingly being reduced by savings on the part of the state and subject to intensified tendencies of privatisation and commodification. At the same time, a large part of care services is based on the unpaid work of women (**Option 05_02**). The indexation of family allowances also discriminates against migrants from Eastern Europe who provide paid care for the elderly in Austria. To this end, this legal situation, which violates existing European and international treaties and laws, must be repealed (**Option 10_08**).

In contrast to private assets, so-called public assets, i.e. publicly financed infrastructures such as educational and cultural institutions, health care facilities, housing, public transport and transport routes, publicly administered land, forests and lakes, etc., are available to the population and are particularly essential for non-owners. A well-developed welfare state means that fewer private assets have to be saved to secure one's livelihood. Public investments in system-relevant infrastructure such as health, childcare, public transport, housing, care and education increase employment and well-being both in the short and long term. Therefore, a general expansion of the social infrastructure is needed (**Options 01_01, 08_02, 10_05**). Functioning social infrastructures and social security systems therefore also include an appropriate form of basic security and financing (**Options 01_02, 10_06**).

In addition to labour market policy decisions (**Options 01_03, 08_05, 08_06**) such as appropriate remuneration (**Options 01_02, 10_06**), an expansion of the basic social security elements, i.e. an increase in the minimum basic income/social assistance, an increase in the net replacement rate of unemployment benefits or unemployment assistance, as well as improved recognition, of care and nursing services in pension insurance (**Option 10_06**) are central. Contribution-financed social security through a general, uniform and solidary citizens' insurance in combination with the expansion and maintenance of the social infrastructure also serves as a needs-oriented basic security (**Option 01_02**).

³ In this context, e.g. structural retrofit measures, environmentally friendly heating systems, etc.

Besides fiscal policy measures such as the taxation of transnational corporations and financial market activities (**Option 10_09**) or inheritance and wealth taxes (**Options 10_01, 10_02**) measures relevant to social security (**Option 01_01**) are also suitable for financing the social security system. By means of fiscal policy measures, a reduction in the share of taxes and contributions on employee compensation (**Option 10_06**) can be used to finance contributions to an improved social security system (**Option 01_01**).

In this context, it is essential to consider socio-ecological justice aspects, such as environmental and climate justice, as these enable the necessary participation in social security systems. This applies in particular to the growing challenges with regard to social issues and climate adaptation and CO₂ mitigation needs. The affordability of decarbonised³ housing (**Option 01_06**), for example, is a key issue. Without adequate provision and equitable access to these systems, social peace and social security can hardly be guaranteed in Austria. Social unrest, dissatisfaction with established institutions and systems are the result and rebound on social and political decision-makers.

In the following, three central areas of social infrastructure will be specifically addressed: Education, health and housing. More detailed explanations of other areas such as mobility or food supply can be found in the Transformation Fields *Energy Systems and Circular Carbon Management, Nutrition and Food Production*, and *Urban and Rural Spatial Development*.

2.2.5 Education

Education is a key success factor for human well-being and empowerment. Adequate provision and free access to education are intergenerationally crucial in order for people to become capable of acting in the sense of sustainable development. A move away from early differentiation in the school system and joint teaching with the provision of all-day care for all children and young people up to the age of 14, irrespective of social origin, gender, ethnicity, non-disability/disability, religion and different abilities and prerequisites, would promote social mobility and inclusion (**Options 08_07**).

Framework conditions, teaching concepts and ideas help to support young people and their teachers in shaping the future in terms of sustainable development (**Options 04_01, 04_05**). In this context, holistic support and approaches of pedagogical reform, which form physical and mental work, aesthetic and creative competences as well as social skills, taking into account language and

movement, play an important role (**Options 04_02, 04_19, 08_07**). A democratic school and university structure (**Options 04_07, 04_18**) as well as the strengthening of civil society engagement, critical thinking and solidarity (**Option 04_13**) in combination with the promotion of media literacy (**Options 04_02, 12_07, 16_18**) are also conducive to sustainable development. It is also central to embed sustainability in all dimensions both in teacher training and in the curricula (**Options 04_03, 04_04, 04_05, 04_06, 04_09, 04_10, 04_14, 04_15**). This also applies to the higher education sector, where the structural embedding of sustainability is equally important (**Option 09_03**). As this is currently not the case in many curricula, there is an urgent need for action.

Finally, comprehensively anchoring gender-sensitive elementary education would help to reduce gender stereotypes (**Option 05_04**). Education is still understood as a process that is completed before the start of working life. In reality, however, education goes far beyond classical schooling. The challenges of globalisation and digitalisation make continuous education indispensable, as practised in lifelong learning, in further and continuing education concepts parallel to work; they require appropriate further education and dialogue settings as well as educational spaces free of disruptive influences. For example, the effort required for continuous education can be equated with work (**Options 04_12, 08_07, 16_05**).

2.2.6 Health

The area of health is an essential aspect of well-being and is addressed in SDG 3: The goal, which must also be reflected in legal structures, is to ensure a healthy life for all people and promote their well-being (**Options 16_09, 16_10**).

Central to health care is the focus on health-promoting conditions, not on the behaviour of individuals. A health system that focuses primarily on repairing diseases is not sustainable. If public health is to be strengthened in the sense of prevention and health promotion (**Option 03_14**), health effects must be systematically and systemically considered in all decisions (**Option 03_04**).

Options in this area range from a diet according to the recommendations of the *German Nutrition Society* (DGE)/*Austrian Nutrition Society* (ÖGE) (**Option 03_02**), reduction of meat consumption (**Option 02_01**) and prevention of excessive alcohol consumption (**Option 03_05**); from the protection and promotion of mental health (**Option 03_03**) to the digitalisation of medical services (**Options 03_11, 03_12**). Substances of concern,

such as those that are carcinogenic, mutagenic and/or toxic to reproduction, must also be removed from materials and products at the time of product creation (**Option 12_02**). In addition, ensuring sexual and reproductive health care for all and sexual education (**Option 03_10**) are important areas of health promotion.

The COVID-19 pandemic in particular highlights the impact of categories of inequality such as social origin, socio-economic status, but also housing conditions on health and medical care. In order to achieve the goals formulated in SDG 3, joint or state financing of medical care and barrier-free access for all would be central. This includes an extension of health insurance for atypical employees in the low-wage sector (also for non-Austrian citizens) as well as the expansion of barrier-free, health infrastructure such as (multilingual) health centres and drop-in centres as well as health assistance funds (**Option 01_02**), which also entail complementary financing models for health services.

2.2.7 Living

Shelter and housing are a central part of basic human needs and essential for human well-being. Real estate is increasingly used as a profitable investment opportunity and is no longer primarily available for the social provision of housing. Due to price increases, more and more people are denied access to adequate and affordable housing. The resulting problems of adequate housing availability and even homelessness are a fundamental barrier to social participation and lead to exclusion from the labour market, health problems and reduced life expectancy.

Increased decommodification, i.e. removing housing provision from market logic (**Option 01_03**), would contribute to overcoming the housing crisis: By committing to affordable housing that is accessible to all people, housing is understood not as a commodity and profit object that conforms to the market, but rather as a central part of the social infrastructure. An effective decommodification policy also includes land as a finite resource and should lead to more sparing and responsible use. As a consequence, this would also require a forward-looking local land policy that is not oriented towards self-serving interests and that also takes into account necessary climate and environmental protection measures in spatial planning and neighbourhood and housing offers (decar-bonisation) (**Options 01_03, 13_10, 15_02, 15_07**).

Decarbonisation measures⁴ (see Transformation Field *Energy Systems and Circular Carbon Management*) can only be successfully implemented to the extent necessary if they are supported by society at large, and all people are given the opportunity to participate in the sense of LNOB (**Options 01_03, 11_01**). Strategies for re-municipalisation serve the ability to act in the sense of the socio-ecological common good and to promote climate-friendly, affordable housing (**Option 01_03**).

Complementary to strengthening the local level and promoting holistic and diverse housing concepts, the effect of de-commodification of building land and housing also lies in binding coordination and cooperation of urban and rural regional planning (**Options 01_03, 11_01**). The merging of responsibilities at the federal level in the form of a coordination office for Austria for the topic of housing would enable the development of an adequate basis for legislation in this field (see Transformation Field *Urban and Rural Spatial Development*).

2.3 Responsibility beyond the borders of Austria

Most of the issues addressed here are to be regulated at national level. Some of them transcend national borders, such as citizenship law or the indexation of social benefits. Finally, the impact of Austrian activities via global supply chains on working and social conditions in the countries of origin is also important and can be recorded in terms of progress monitoring with regard to the social dimension of sustainability (**Option 08_01**). Many of the options addressed here can also be regulated at European level.

2.4 Allocation of roles in the implementation of the transformation potentials

The options and measures listed here require, on the one hand, clear state framework conditions (including the global and EU level), especially in the area of social security systems, but also collective and individual action; in some cases there is still a need for research. For example, in Austria there is no sufficient database on time use that would give a better picture of the division between gainful employment and unpaid work.

Achieving the goal of a good life for all will only be successful if all (stakeholder) levels work together to set systemic levers in motion.

⁴ e.g. building renovations (energy-related), other heating systems (without gas and oil), etc.

2.4.1 Politics and administration

The policy framework includes:

- inclusive and non-discriminatory state laws and regulations;
- creating framework conditions for social, ecological and economic sustainability, especially for
 - paid and unpaid work (minimum wages, working time, precarious workers);
 - the fair distribution of working time and capital (salaries, wages, pensions);
 - affordable and barrier-free housing;
 - access to health and education for all;
 - including participation (**Options 16_09, 16_10**) and citizenship rights;
 - fair taxation of income and wealth.

2.4.2 Economy and finance

In addition to politics, economic actors (real and financial economy) can also influence sustainability:

- expanding the importance of social responsibility along all dimensions of sustainability in companies. These include, for example:
 - companies taking responsibility for materials used in products and product design throughout the supply chain (**Options 12_01, 12_02, 12_03, 12_04, 12_07**);
 - the increased use of sustainable practices (e.g. implementation of environmental and sustainability management systems, life cycle assessments or energy efficiency (**Option 07_02**)) and sustainability reporting (**Option 12_05**);
 - the consideration of sustainable procurement in public tendering procedures (**Option 12_06**);
- establishing general collective agreements with employers' and employees' representatives;
- developing good models of representation of poorly organised, atypical and precarious workers.

2.4.3 Society (individuals and groups)

The COVID-19 pandemic has made the life realities, working conditions and pay inequalities more visible and has highlighted the consequences. The development of non-discriminatory

job evaluation systems and collective agreements lead to a reduction of social inequality (especially gender inequality) and precarious/atypical employment. Corresponding possibilities for action therefore present themselves:

- development of non-discriminatory job evaluation systems (social partners);
- involving NGOs and associations: Turning affected groups into stakeholders;
- increasing civil society engagement (including corresponding financial support);
- unbundling of work and social participation (working time regulations, material recognition of reproductive activities, basic security, time as another currency (time banks), cooperative housing projects, commons, sharing economy, etc.).

2.4.4 Education, science, art and media

The fields of education and work will be subject to particularly intensive transformation processes in the coming years. In order to prevent the accompanying economisation and deepening of paths already taken, it is expedient to interlink work and education to the point of equating them, and thus to realign the classic concepts of work and education in the sense of socially embedded personality development. Among other things, this is served by:

- reorientation of the classical concept of gainful employment and education: equating work and education and continuous (lifelong) education;
- expansion and promotion of the community-based self-conception of educational, art and cultural institutions;
- multiplication of the benefits of institutional facilities in terms of better participation of vulnerable groups;
- increased use of public space to promote cultural participation (open places of identification);

- development and establishment of inter- and transdisciplinary educational offers in the formal and informal sector as well as fair access to education for all;
- increased involvement of arts and culture practitioners in research and discourse and dialogue processes;
- implementation of *Education for Sustainable Development* (ESD) in all school levels and tertiary education;
- common school for all 10 to 14 year olds;
- recognition and strengthening of research in the social sciences and humanities over research in the natural sciences.

3. Global Environmental Commons

Verena Germann, Georg Gratzner, Franz Fehr and Johann Stötter

3.1 Global Environmental Commons

Human well-being is fundamentally dependent on the *Global Environmental Commons*. *Global Environmental Commons* refers to systems and properties of system, whose existence across regional and national borders or jurisdictions contributes directly or indirectly to the maintenance of the functions of the Earth system or to the preservation of life. This includes all natural spheres (atmosphere, biosphere, hydrosphere, lithosphere and pedosphere), their process dynamics and all their ecosystem services. The so-called support and basic services (soil formation, water and biogeochemical cycles) form the basis for the supply (food, drinking water, wood, energy and mineral raw materials) and regulation services (soil and biodiversity, water retention, constant climatic conditions, pest and disease control) as well as for cultural services (aesthetic values, recreational and educational function).

The spatial limitation of the Earth system means that in a stable and sustainable condition, the maximum number of ecosystem services that can be used in a given timeframe, can-

not exceed those that will be provided over the same period of time. Until the middle of the 20th century, the global society-environment relationship existed within this safe scope of action. Since about 1970, however, these *planetary boundaries* of ecosystem services have been increasingly exceeded, so that the well-being of humankind, which depends on them, is increasingly threatened.

The transgression of ecological boundaries is exemplified in the concept of **planetary boundaries** using the example of processes through which elementary **ecosystem services** are already restricted and will be lost in the future, in some cases irretrievably.

Global **climate change** (a regulating ecosystem service and one of nine *planetary boundaries*) is an illustrative example of how local and regional greenhouse gas emissions add up to a global driver, which in turn has regionally specific effects. In Austria, the warming signal of approx. 2.3°C compared to the 19th century is about twice as high as the global average of approx. 1.1°C. In the last three decades alone, the temperature increase in Austria was about 1.4°C. This accelerated dynamic and an expected comparable further warming until the middle of the 21st century will have according, multiple effects on the society-environment system.

A similar, if not even more difficult problem constellation results from the increasingly perceived phenomenon of global **biodiversity loss** (another regulating ecosystem service and *planetary boundaries*), which is now seen as the *sixth mass extinction* in the Earth's history spanning over four billion years. Even though Austria is one of the most species-rich countries in Europe, figures such as a 40% decline in vertebrates in the past 30 years and the immediate endangerment of approx. 50% of mammals and breeding birds, almost 100% of crawling animals and a large part of the insect population speak for themselves. Using the example of pollination of crops (approx. € 300 million) and pest control by insects (approx. € 330 million), the potential monetary damage caused by the loss of system services can also be estimated for Austria.

Essential human uses of supply- (e.g. agricultural production) and regulatory services (e.g. water storage) are dependent on **soil functionality**. Globally and also in Austria, this elementary basic service is subject to processes of continuous impairment. In Austria, about 12 ha of soil (about 44 km² per year) are irreversibly lost every day due to sealing and erosion – in many cases these are soils that took thousands of years to form. In addition, there is loss of function due to improper management and the introduction of pollutants (**Options 15_03, 15_10**).

These examples show the extent to which human valorisation and (over)use have disrupted the *Global Environmental Commons system*. Another measure of the extent to which the ecological capacity of the Earth system has been exceeded at both the global and national level is the concept of the **Ecological Footprint**, which converts resource use into area and compares it to the available bioproductive area. By comparing the observed resource consumption with the available area, it can be clearly shown how long the ecosystem services provided in a year will last. Globally, environmental output is currently exceeded on the 1st of August, in Austria on the 9th of April (as of 2019).

In considering the *Global Environmental Commons* from the perspective of ecosystem services, which focuses on human needs, it must not be forgotten that nature, in the sense of all natural system elements and -processes, per se has an intrinsic inherent value. The recognition of the inseparable coexistence and the associated equivalence of humans and nature results in the environmental-ethical consequences of rethinking human responsibility and granting nature inherent rights (cf. e.g. New Zealand, USA, Bolivia, Ecuador, El Salvador, Colombia, Bangladesh or India; **Options 15_09, 16_10**). Consequently, this means that when considering the *Global Environmental Commons*, it is not only about the problem of carrying capacity (how many resources can the Earth system provide?), but equally about the responsibility for the preservation of all ecosystems (how can the ecological function of the Earth system be reconciled with human interests of use?).

3.2 Transformation potentials

With regard to the need for transformation, important ecosystem services for Austria (climate, biodiversity, soil, water) are addressed and the corresponding need for action to maintain their functions is highlighted.

3.2.1 Climate

When considering climate as an ecosystem service, the focus is primarily on regulatory services. The climate elements temperature and radiation as well as precipitation and evaporation play a central role. They control and regulate the energy and heat supply for all living organisms and essential processes of the water cycle.

Under a stable climate state, as was the case for much of the Holocene (for 11,700 years), the relationship between regulating climate conditions and other ecosystem services regulated by them was in a dynamic state of equilibrium.

Since the beginning of industrialisation around 1800 and with increasing intensity from the second half of the 20th century, the increased use of fossil fuels has increasingly intervened in the control of the climate — land use change and the emission of greenhouse gases are representative examples. The fact that more than half of the temperature increase has taken place in the last three decades shows how much the limits that existed over a long period of time have already been exceeded and indicates the dynamics with which this process will continue. All climate scenarios show that the further warming trend up to the middle of the 21st century will roughly correspond to the temperature increase of the last three decades. This will result in new climatic conditions that were previously unknown (in the Holocene), which can be illustrated using the example of temperature-dependent altitudinal boundaries. Thus, the tree and forest line or the snow line and equilibrium line on glaciers will change in comparison to the 19th century by more than 500 m. By adapting to these changed conditions, a completely new spatial distribution pattern of landscape elements and their species composition will emerge, and with it new structures in the regulation and supply services.

With the 2015 Paris Agreement, the international community agreed on the clear target of limiting average global warming by well below 2°C, and if possible not to exceed 1.5°C. To achieve this goal, comprehensive climate protection measures are required at the national level and in international cooperation (**Options 13_01, 13_04 – 13_11**), the paths of which are now known. The necessary action in Austria has been developed in cooperation between the UniNEtZ consortium and the *Climate Change Centre Austria* (CCCA) in the so-called *Reference National Energy and Climate Plan* (Ref-NEKP). Of central importance in the context of the environmental commons are:

Conversion to a circular economy

Through an overarching economic policy focus on a reduction of resource use, which can be achieved, among other things, through the transformation to a circular economy, a significant contribution is made to the profound and lasting reduction of primary material and energetic services of the *Global Environmental Commons*. In this way, stabilisation within the ecological performance is once again within the realm of possibility (**Options 06_01, 08_03, 12_01, 12_02, 12_03, 12_04, 12_07, 13_09, 13_10, 13_11**; Transformation Fields *Sustainable and Equitable Economy* and *Urban and Rural Spatial Development*).

Adequate expansion of renewable energy

Of critical importance in order for the circular economy to be successful is also the rapid – whole-system- and energy services-needs-orientated – expansion of production capacities for electricity and district heating and cooling from renewable energy sources (solar, wind, hydro, geothermal and biomass – with priority consideration and avoidance of biodiversity loss), whereby principles of sufficiency and efficiency must be taken into account (**Options 07_01, 07_03, 08_02, 13_06**; Transformation Field *Energy Systems and Circular Carbon Management*).

Development and implementation of nature-friendly carbon storage

Increasingly biologically regenerative agriculture and forestry can make a significant contribution to carbon storage in Austria's soils, wood biomass and permanent grassland.

Measures to limit soil sealing, to increase humus build-up, and in the direction of energy forestry or carbon stock build-up through out-of-use and non-energy wood use contribute to climate neutrality (**Options 13_06, 13_09, 13_10, 13_11, 15_03, 15_04**).

Profound reduction of resource requirements through climate protection-oriented digitalisation

Through the targeted use and promotion of digitalisation (*Industry 4.0*), the demand for resources can be profoundly reduced in the sense of a climate and environmentally friendly way of life and production (*Environmental Protection 4.0*) and thus an important contribution can be made to economic activity within natural performance limits (**Options 12_01, 13_08**).

3.2.2 Biodiversity

Global, but also European biodiversity loss is closely linked to economic growth through higher resource consumption and emissions.

In Austria, for example, soil sealing continues to increase in line with gross domestic product (GDP). In order to do justice to their responsibility for the biodiversity crisis, both the general conception of the economy and its concrete manifestations must be aligned in such a way that they remain within the *planetary boundaries* (**Options 08_01, 08_02, 08_04, 12_01, 13_09, 15_09**; Transformation Field *Sustainable and Equitable Economy*).

Biodiversity losses are gradual and difficult to detect even for land users, as important elements of biodiversity such

as insects and especially soil organisms are difficult to observe. Moreover, species loss often does not occur immediately after habitat loss, but with a time lag, which makes causal attribution even more difficult. This highlights the need for comprehensive, Austria wide longterm monitoring of biodiversity to enable future generations to determine the development of the status of biodiversity beyond doubt (**Option 15_13**).

The direct causes of biodiversity loss in Austria are manifold, but can be summarised in the two main groups of land use and climate change as the main culprits. In the area of land use, the following aspects are responsible for the drastic declines:

(1) Intensification of land use and loss of fallow land, (2) abandonment of agricultural use, (3) nitrogen inputs, (4) construction and soil sealing, (5) invasive alien species and (6) land use for tourism.

The biodiversity crisis can only be tackled with measures that are taken simultaneously at different levels of action. On the normative-political level, the development of a new model of agricultural policy and practice can provide an essential basis (**Options 15_01, 15_09, 15_10**).

The development of biodiversity and its ecosystem services is significantly influenced by political framework conditions such as taxes and subsidies. These can contradict the polluter pays principle, prevent or delay necessary structural changes or even counteract measures to protect biodiversity. Therefore, the avoidance of subsidies and tax regulations in different areas, e.g. agriculture, energy production or the environment, that have direct or indirect negative impacts on biodiversity and its ecosystem services are of great importance (**Options 11_07, 15_05, 15_08, 15_15, 15_16**). This also avoids a double burden on the public budget, which on the one hand bears expenditures through the provision of subsidies and on the other hand through additional expenditures when damage has to be repaired that has been caused by these subsidies (**Option 15_11**).

In terms of concrete measures, combinations of extensification/de-intensification and preservation as well as creation of structural diversity and small scale should be aimed for (**Options 15_01, 15_04**). Converting at least 10% of the area previously used intensively for agriculture and forestry into well-connected, near-natural habitats (**Options 15_02, 15_04**), would create a lifeline for biodiversity.

The introduction of alien species by humans alters the species composition of ecosystems. Invasive species threaten or displace native species and therefore pose a threat to the biodiversity of these ecosystems. Normative options at the EU level for minimising biodiversity loss and managing the introduction of such

species include the establishment of a comprehensive list of invasive alien species of relevance to Austria (**Options 15_04, 15_08**).

Of the more than 30,000 km of flowing stretches of rivers and streams in Austria, 40.4% are in an ecologically *very good* or *good* condition. Almost one third of **watercourses** (30.3%) are assessed as *moderate*, 15% as *unsatisfactory* or *poor*. The rest are considered to be significantly altered. Around 60% of the native fish species are considered endangered. These impairments are caused by settlement in areas close to rivers, industrial activities, use of hydropower and intensive agricultural use. Especially with regard to the necessary energy transition, there is high pressure for the expansion of hydropower even in the last rivers with very good conservation status. From the point of view of biodiversity conservation, there is a need to completely refrain from any interventions (**Options 15_06, 06_04**).

3.2.3 Soil

The multiple functions of soil are of high value and existential importance for society, ranging from the provision of clean drinking water or healthy food to the absorption of water during heavy rainfall and the provision of water in times of drought. But also, the use as a source of raw materials (**Option 12_01**) or building land for housing, infrastructure and commercial purposes (**Options 15_10, 15_16**) are existential. Therefore, some forms of land use are often in competition with each other, because sealed or built-over soil can neither absorb water nor are plants able to grow (**Options 15_03, 15_15**).

According to the government programme 2020-2024, soil consumption should be kept as low as possible and the annual increase should be reduced from today's 44 km² to 9 km² per year by 2030. However, since the earth's surface is a limited, non-renewable resource and the soil therein takes centuries to form and is not easily increased, this limitation will not be sufficient in the long term. As the complete loss of soil functions is progressing due to increased soil sealing (**Option 15_10**), it is important to use appropriate planning and management tools in order to at least prevent the loss of the most productive soils and the interconnection of species-rich habitats (**Options 15_03, 15_15, 15_16**).

But it is not only the ever-increasing area of lost soil that is causing concern. The health and thus the functionality of the soil is also in great danger. Because due to a variety of factors, such as improper cultivation, the introduction of pollutants (**Option 15_10**) and the advance of climate change, loss of humus and soil fertility and even the total erosion of soils are a real threat.

Only healthy soil can fully fulfil its productive function on agricultural and forestry land. Special attention should therefore be paid to maintaining and expanding the fertility of soils. To this end, it is necessary not only to supply the **plants** themselves with the most important **nutrients**, but also to pay attention to the soil structure and, in particular, to **soil life**. Numerous measures in the *Austrian Agri-environmental Programme for Environmentally Compatible Agriculture* (ÖPUL) are aimed at this. Special importance is attached to organic farming and sustainable forestry (**Options 02_03, 02_04, 06_05, 15_01, 15_03, 15_04**).

On the one hand, from an agricultural point of view, it is important to pay attention to a balanced nutrient balance and a favourable humus content of the soil, as well as other aspects of sustainable management. On the other hand, the functions and impairment of soils as a result of **climate change** and the resulting imminent changes in the load and production capacity must be considered (**Options 12_03, 15_03, 15_10**).

3.2.4 Water

When considering water resources as a global environmental common, the primary focus is on the functions they play in **maintaining ecosystems (and their services)**. These include the regulation of the water cycle through infiltration, storage and retention, evaporation and runoff (as a regulatory service as well as a basic and supporting service), but also the creation of living and recreational space for people, animals and plants (as a cultural service) and the provision of drinking water (as a supply service).

Water resources are mostly **managed at the local or regional level**. However, these resources and the associated ecosystem services are often influenced on a supra-regional level by **planetary boundaries** and **global trends**. Particularly relevant are climate change, changes in land use, the spread of water-intensive consumption and globalised trade patterns, shifts in biochemical material flows (especially of phosphorus and nitrogen), and the input of novel substances.

Conversely, global crises such as climate change and biodiversity loss are driven by changes in the water balance of ecosystems as well as by nutrient and problem substance inputs. However, these complex interactions also mean that synergies can emerge from addressing each of these problem areas, and these synergies need to be harnessed. One concept for understanding the complexity of water management and making it sustainable is **Integrated Water Resources Management** (IWRM). Through inter- and transdisciplinary approaches (**Option 06_11**)

as well as international agreements, this aims to achieve integrated water management at river basin level and thus an optimal balance of interests (**Option 06_09**).

The protection and conservation of ecosystems and their **biodiversity** (**Options 06_04, 15_04, 15_06**) is also urgently needed to ensure recreational and educational functions. In addition, further measures are needed to improve recovery and reduce inputs of nutrients and pollutants into the environment (**Options 06_01, 06_05, 06_06, 11_09, 12_01, 12_02**) and to preserve **water and material cycles** (**Options 06_01, 06_02, 15_03, 15_04**) as naturally as possible, as well as appropriate **soil protection** and management (see chapter 3.2.3).

According to the current draft of the *National Water Management Plan* (NGP) from 2021, without taking into account ubiquitous pollutants, it is certain (*certain risk*) for 28.6% of the assessed watercourses and for 27% of the lakes (>50 ha) that the **target of good status for 2027** will not be achieved. Taking into account ubiquitous pollutants, this is the case for 100% of the assessed watercourses. The NGP does not cover peatlands, wetlands and headwater streams, although these are particularly at risk (**Option 06_04**).

Nevertheless, Austria is in the fortunate position of currently being able to cover its entire drinking water needs with groundwater and spring water. But here, too, the effects of climate change are already noticeable today. Seasonal water shortages can already be observed locally/regionally. Careful, forward-looking management in all sectors (**Option 06_03**) as well as the protection of water resources (**Option 06_08**) and thus of (water) ecosystems (**Options 06_04, 15_04, 15_06**) are therefore indispensable in order to maintain this water supply and prevent conflicts of objectives, e.g. between drinking water supply and irrigation needs in agriculture.

3.3 Responsibility beyond the borders of Austria

The fact that Austria currently has a global ecological footprint that is about 3.7 times as large as its share of the Earth's global ecosystem services in relation to the size of its population, drastically demonstrates the unsustainable use of the *Global Environmental Commons*. The unsustainable use of resources in Austria is made possible, among other things, by increasing imports of supply services, e.g. energy and mineral resources or food. Given the limited ecological capacity of the Earth system, it is clear that such a course

of action contradicts the very basic principles of sustainability and will lead to system collapse in the medium term.

Since this action contradicts general ethical principles and endangers the livelihood of future generations, it results in responsibility that must be thought of in at least three directions:

- Bearing in mind that all living beings are interconnected in a single (global) community of life, the conservation of biodiversity has the highest priority in the sense of a holistic ecocentric ethical principle;
- From an anthropocentric point of view, it is about sustainably safeguarding the natural foundations of life and thus the habitability of the planet;
- From the point of view of equality and equity, Austria cannot maintain an unsustainable lifestyle at the expense of other countries and people.

A concrete example is the substantial share of biodiversity losses for which Austria is partly responsible. These do not occur in Austria itself, but in the countries from which goods are imported. In 2011, Western Europe and North America were responsible for 48% of biodiversity losses through international trade. Livestock farming is the largest driver of biodiversity loss globally, while the cultivation of oilseeds showed the largest increases in negative impact on biodiversity. For example, through imports of soy feed (500,000-700,000 t/year; mainly from Brazil and Argentina) Austria contributes indirectly to the destruction of tropical forests and ecologically equally important and very species-rich savannahs. In Brazil, one of the most biodiverse countries in the world, at least 51,000 hectares of soybean cultivation area are needed to supply Austria's livestock. A considerable proportion of the soya feed imported into Austria also comes from sensitive eco-regions in Brazil, which originally had a fourfold higher species richness, but hardly exist as such anymore, as 80% of the vegetation typical of the eco-region no longer exists. It is necessary to refrain from importing soy from such regions and instead create sustainable alternatives (**Option 08_04**).

Globally, two thirds of people are currently affected by water scarcity at least one month a year. Austria also contributes to water scarcity in other regions, especially through **global trade and consumption of** water-intensive products. Around two thirds of the water *virtually*⁶ consumed in Austria is extracted abroad and then indirectly imported via products. To reduce this external **water foot-**

print, measures to promote the consumption of less water-intensive products (**Option 02_01**), the reduction of waste (**Options 02_03, 06_03, 12_01, 12_05, 12_07**) and strengthening sustainable, regional *Nutrition and Food Production* (e.g. **Options 02_03, 02_08, 12_03**) and awareness raising is necessary, e.g. through alignment with relevant indicators (**Options 06_03, 08_01**).

3.4 Allocation of roles in the implementation of the transformation potentials

The realisation of a sustainable approach to the *Global Environmental Commons* is only possible if the decisions and actions of all groups of actors work together synergistically. chapter 3.2 outlines the transformation steps that can be taken to meet the major challenges in this area and the entirety of the *UN Agenda 2030*. This chapter mainly deals with possible ways in which this transformation can be implemented and what roles different actors can play in this process.

3.4.1 Politics and administration

The elementary importance of the *Global Environmental Commons* for the whole of humanity, the awareness of their finiteness and the recognition of their current overexploitation result in the obligation to include in the constitution the protection of the *Global Environmental Commons* and the obligation to deal with them in a sustainable manner in the sense of the inherent rights of nature (**Options 15_09, 16_10**). This should include:

- special focus on aspects of climate and soil protection, biodiversity and vital resources;
- legally binding nature of integrated strategies such as sustainability, climate adaptation and biodiversity strategies;
- special laws and associated regulations at federal and provincial levels to maintain the performance of the global environment commons;
- adaptation of the responsible administrative structures;
- harmonisation of hitherto contradictory agricultural, health, spatial planning, social and environmental policies;

⁵ In this case virtual means that this water is not consumed directly as water, but indirectly through the production of consumer goods that are consumed in Austria.

- create support structures for sustainable consumption patterns while ending harmful or counterproductive subsidies, e.g. environmentally harmful subsidies such as the diesel privilege;
- create structures for citizen participation (e.g. citizens' councils) in important and cross-sectoral policy areas such as tackling the climate and biodiversity crisis.

3.4.2 Economy and finance

Different sectors of the economy, which are largely responsible for the exploitation of the *Global Environmental Commons* and the crossing of **planetary boundaries**, have a central role in the implementation of the necessary transformation measures:

- new business-ethical orientation with regional, but also global responsibility at the management level, such as **Corporate Social Responsibility** (CSR Network), respACT (**Austrian Business Council for Sustainable Development**);
- a far-reaching change in production patterns, currently characterised by increased efficiency and intensification, towards diversification of farms and sustainable, resource-conserving farming methods (organic agriculture);
- significant reduction of livestock farming and meat consumption as a contribution to the reduction of greenhouse gas emissions (especially CH₄, CO₂, N₂O);
- stronger promotion of a circular economy that conserves primary resources, thus reducing the burden on the environment and promoting regional value creation;
- restructuring of forest management in order to maintain the ecosystem services of forests (increasing the protective function, sustainable production of wood or securing the CO₂ storage function);
- increased care for the preservation and shaping of the (cultural) landscape and participation in the further development of social structures in rural areas.

3.4.3 Society (individuals and groups)

Societal engagement is an essential force for advancing sustainable development. Collectively demanding policy goals and action can set in motion an upward spiral of self-empowerment and effectiveness:

- strengthening the *Fridays for Future* movement and other civil society movements as a contribution to political and social change;
- develop and refine credible and powerful narratives (an example of a powerful narrative is that of the *Fridays for Future* movement: Adults destroy the future of children) that focus on the major challenges of the 21st century, e.g. climate crisis or biodiversity loss;
- pressure on political decisions through targeted referendums, e.g. the Bavarian referendum “*Save the bees!*”
- advance the nutrition transition leading to a reduction in meat consumption.

3.4.4 Education, science, art and media

The education and science system, as well as the arts and culture sector, have a central role to play in creating perception and awareness of the intrinsic value of the *Global Environmental Commons* and their existential significance, as well as the existential threat posed by current overexploitation (**Option 15_14**):

- anchoring *Education for Sustainable Development* (ESD) and climate change education with a focus on the development of competences (future competences as an integrative component from primary to tertiary education; **Options 04_03, 04_05**);
- introduction of a new teaching and learning format in terms of a Studium Generale, which is based on the challenges of the 21st century and corresponding solutions (according to the motto: every university graduate must have basic knowledge about the challenges of the 21st century and adapted solutions and especially about the existential importance and limitations of the *Global Environmental Commons*) (**Options 04_10, 17_02**);
- intensification of transdisciplinary dialogue and design processes with societal groups in the sense of the universities’ societal responsibility, on the one hand for the purpose of joint knowledge produc-

tion and solution finding, and on the other hand in an advisory and monitoring function with decision-makers (**Option 09_03**);

- transformation of higher education institutions in all fields of action of research, teaching, governance, operations and societal dialogue (**Option 04_09**);
- development of new, inter- and transdisciplinary research programmes with adequate funding (**Option 09_03**);
- expansion and development of innovative and inclusive education and outreach formats in art and cultural institutions on global environmental issues and the intrinsic rights of nature, as well as on the communication of complex content and the need for action;
- intensification of dialogues between art and culture professionals and societal target audiences on new perspectives for the future.

4. Sustainable and Equitable Economy

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4.1 Purpose and tasks of the economy and finance

In Austria, the activities of more than 500,000 companies with 4.3 million employees influence whether and how well the 17 SDGs can be achieved. However, the *economy* also includes governmental and non-profit actors that offer and demand goods and services, employ people, and use natural resources in the process. Due to an increasing financialisation of economic structures, finance also plays a crucial role – an aspect that has hardly been addressed in the framework of the SDGs so far.

Instead of a social subsystem that contributes to the satisfaction of human needs by providing goods and services, the economy has become the dominant subsystem of society – and quantitative economic growth the dominant goal, which can only be achieved through constantly growing markets and increasing consumption. Other subsystems of society (education, science, culture, politics or health) are increasingly **subjected to market logic**. People are seen as consumers and human resources, and research should primarily produce economically useful results. Today,

the **economy** is sometimes explicitly or implicitly **understood as the central system** whose thriving ensures all other requirements of human well-being.

Although material shortages could be significantly reduced in this system in the industrialised countries, they could not be fundamentally eliminated. Instead, problems arise at other levels that cannot be solved with increased consumption. On the contrary: the prevailing growth-oriented, (financial) capitalist-driven economic system is now endangering human well-being (see Transformation Field *Welfare of People and Society*) and, due to its high resource intensity, leading to the overexploitation of nature (see Transformation Field *Global Environmental Commons*).

Money, or financial capital in the broader sense, plays an important role: from being **a generally recognised means of payment** issued by the state and limited by the goods and services available, it has become **a commodity**. Today, financial capital exceeds the value of the real economy by far. This **drifting apart of the real and financial economy** periodically triggers financial and/or economic crises. Therefore, measures have to be taken at the level of the national economy, business and finance, which could not be covered by all the options developed in UniNEtZ I.

A *Sustainable and Equitable Economy* in the sense of Raworth's *Doughnut Economy* (see introduction) must be able to **make its contribution to human well-being without exceeding ecological limits**. At the same time, the shocks caused by the Corona pandemic also offer the opportunity to take fundamental steps at the economic, business and financial levels to transform towards such more sustainable systems.

4.2 Transformation potentials

4.2.1 Basic principles and instruments of sustainable management

The goal of a good life for all within ecological limits (see *Doughnut Economy*; chapter 1) requires corresponding microeconomic (entrepreneurial and financial) activities and a macroeconomic framework that makes them economically viable.

One of the basic prerequisites for fair and sustainable economic activity is the consideration of higher-level, public, state interests. In order to be able to assess whether development is moving in this direction, micro- and macroeconomic measures of success are needed.

While gross domestic product (GDP) only measures output traded by markets, such a measure should also include public goods and services, commons, cooperative, solidarity networks free from the logic of exchange as well as subsistence structures (households, farms, farm communities, ecovillages) as well as the transgression of ecological and social boundaries (**Option 08_01**).

In a market economy system that gives companies a great deal of freedom, the **legal framework** must be designed in such a way that it prevents negative environmental and social impacts (**Options 16_09, 16_10**). In addition to self-commitments by companies, bans and requirements or penalties as well as financial incentives in the form of taxes or subsidies therefore make sense. A functioning market economy requires **transparency and needs to be true-cost**.

In order to comply with the *planetary boundaries*, it is necessary to produce and consume more efficiently (i.e. to use fewer resources to produce certain products and services), but also to think about how a good life can also be achieved with less production and consumption (*sufficiency*). If the aim is to reduce CO₂ emissions to net zero, the potential of both strategies must be fully exploited.

Efficiency measures to optimise existing processes (**Options 06_03, 07_02, 08_03, 12_01, 12_04**) can and must contribute to making the existing economic system more sustainable. However, their **potentials are physically limited**, as for example the development of fossil fuel-powered engines and the limited potential for efficiency improvements shows. In addition, **rebound effects** reduce efficiency.

However, the physical limits of efficiency measures cannot be changed by pricing. Therefore, **substitution measures** (in the sense of switching to other technologies or raw materials) are necessary, which can, however, also have a negative impact if, for example, the demand for the new products increases significantly (Jevons paradox; see Transformation Field *Energy Systems and Circular Carbon Management*).

Sufficiency measures are therefore also needed, which reduce consumption but can also make certain business areas superfluous as a result (e.g. lawn-mowing robots, if a switch is made to a natural garden). In this context, it is important to **restrict advertising and marketing** for non-sustainable products (**Option 12_07**). In return, it is important to **promote the shift to new, sustainable business models** (**Options 08_03, 12_05**) and to provide targeted retraining and support to those employees cur-

rently working in non-sustainable economic sectors to enable a just transition. New business models will be oriented towards a circular economy, which is about developing nature-compatible and technically closed cycles (**Options 12_02, 12_03, 12_04, 12_07**).

In this context the **resilience of the economy** must be taken into account: The economy must be able to fulfil its socially important functions even in the event of disruptions and be adaptable to changing ecological, social and political conditions. To achieve this, the high dependency on global supply chains must be reduced through regional economic practices, such as those pursued in the circular economy through repair, reuse and recycling (**Options 12_01, 12_07**).

4.2.2 The economic level

The Austrian economy – the totality of all economic entities belonging to the Austrian economic area – is subject to national as well as supra- and international legal framework conditions that promote, permit or prohibit certain economic activities. The currently prevailing economic order places great importance on the optimisation of individual *utility*, whereby this is measured almost exclusively in financial terms. The current economic order based on neoclassical theories therefore leads to undesirable outcomes and collateral damage (e.g. destruction of livelihoods, inequality in income and wealth distribution) and to an overemphasis on efficiency, resulting in, among other things, the loss of essential features of health and education and a lack of preparedness for unusual events such as pandemics.

In this context, it is important to emphasise **services of general interest**, so central for the state and society, which, in a general understanding, includes the provision of all those goods and services that are particularly important for daily life: Water and energy supply, waste disposal, public transport, hospitals, schools, etc., as well as the maintenance of societal order internally and externally, including hazard and risk prevention (see Transformation Fields *Welfare of People and Society* and *Urban and Rural Spatial Development*). In Austria, some services of general interest have been completely or partially privatised in recent years, e.g. postal services and energy suppliers, so that the state has become dependent on commercially managed companies for the fulfilment of some of its very own tasks and access is no longer guaranteed for all. The problem areas also include care work, which, systemically undervalued, reinforces gender inequality.

The economic system distributes goods and services and thus also resources, money and labour. Unequal distribution leads to **market and thus power concentrations** and even monopolies, which hinder the functioning of the market economy and social peace as a whole. The richest one per cent of Austrians now owns about 40% of net wealth; this puts Austria – together with Germany – at the **top of the list of inequality** within the Eurozone.

The resulting negative consequences can be mitigated by reforms for more socially just working conditions (**Option 01_02**). Proven instruments to effectively curb escalating feedbacks include **taxation of very large assets (Option 10_01)**, **inheritance taxes** with allowances for smaller inheritances (**Option 10_02**) and **upper and lower limits for wages and salaries (Option 10_04)**. Potential tax evasion can be prevented by a global **financial asset register**, which becomes a prerequisite for the free movement of capital, and which makes cross-border money flows transparent (**Option 10_03**). In this context, existing **legal loopholes** should be **closed** – in cooperation with other countries (**Option 10_09**).

In order to actively reduce inequality, the funds from wealth and inheritance taxes can, for example, be invested in the continuous **expansion of the socio-ecological infrastructure (Options 08_02, 09_01, 09_02, 10_05)** as well as the improvement of **basic security or to reduce income tax (Option 08_05)**. A **value creation levy** can replace social security contributions and finance social security in the long term despite increasing automation and digitalisation (**Option 10_06**; Transformation Field *Welfare of People and Society*).

The principle of **true costs** can – if appropriate – be served at the macroeconomic level by an eco-social tax reform, which includes CO₂ prices in addition to the existing energy taxes and levies (**Options 07_01, 13_01**), with a redistribution of CO₂ tax revenues that, in addition to households, supports particularly sustainable companies (**Option 13_01**). The exemption of railways from the electricity levy promotes true costs and contributes to increased economic efficiency of rail freight transport (**Option 09_01**). The principle of transparency and true costs must cover the entire supply chain. The more responsibility an individual link in the chain has for all the links before it, the more successful this will be. Relevant legislative proposals containing obligations beyond the national sphere are being drafted at the EU level and also in Austria.

At the same time as efforts are being made to make the economy more sustainable, digitalisation is being systematically promoted by the state and the EU. The increase in automated, electronically controlled processes has a profound impact on

the economy and the world of work. If digitalisation is not to counter-act sustainable development, **targets and criteria for digitalisation** need to be set quickly (**Option 13_08**; Transformation Fields *Energy Systems and Circular Carbon Management* and *Global Environmental Commons*).

The undesirable developments point to the need for action on several levels, first and foremost **removing services of general interest from the market** as well as the **implementation of alternative economic and financial concepts** which consider e.g. also ecological aspects and unpaid services and include a financial theory that is appropriate to practice. This would be the basis for the “*fundamental transformation of the production and consumption of goods and services ... that have a smaller environmental footprint and greater distributive justice*” (UN, 2019, p. 22) called for by the international community in the *UN Agenda 2030*.

The undesired consequences of the current economic order have led to the emergence of alternative approaches, such as new **cooperatives, community supported agriculture, repair cafés, clothes swaps, give-away shops** and **food coops** (**Options 12_02, 12_07**), but also knowledge platforms such as **Wikipedia**, which defy the strict logic of the market. Alternative insurance and banking models are emerging. The **valorisation of care work** and **unpaid work** can also make an important contribution (**Option 08_06**).

Behind these developments, there are now also a variety of **integrative economic concepts** that take into account social and ecological framework conditions and are oriented towards principles such as resilience and sufficiency. Some focus mainly on ecological limits (e.g. steady state economy, recycling economy) or on the reduction of growth (degrowth, post-growth). Modern understandings of the bioeconomy and circular economy also integrate, based on the ecological dimension, social issues (e.g. regional economies, sufficiency through measures to extend product life cycles such as repairs, elimination of pollutants). Comprehensive approaches such as the eco-social market economy and economy of the common good integrate many of these social and ecological aspects. Growth per se is not considered good or bad; some areas of the economy may or must grow (e.g. organic farming), but overall resource consumption must not exceed ecological limits (**Options 08_02, 12_01, 13_09**).

Some concepts are already being implemented – for example, the *Green Deal* at the EU level is based on a **circular economy** with the goal of decoupling economic growth from resource consumption (= ecological modernisation narrative). The transition to a circular economy, which is also politically desired in

Austria, means e.g. the transition to long-lasting quality products without planned obsolescence, which are easy and inexpensive to repair in any specialised company (**Options 09_02, 12_02, 12_07**). At the end of the service life, these products can be degraded without any environmental consequences in the long term if they are made from renewable raw materials of the third generation (residues), no substances/additives of concern are added in the product design and their return to biological cycles is thus ensured (**Options 08_03, 09_02, 12_02**). The transition to a circular economy can also be accelerated if, for example, companies are legally required to take back products (e.g. electrical appliances) and packaging material and the mail order sector is also included. Financial incentives to increase separate waste collection in trade and industry (**Option 09_02**) enable recycling (**Options 12_02, 12_04, 12_07**; Transformation Field *Energy Systems and Circular Carbon Management*).

The creation and implementation of a circular economy road map (**Option 09_04**) would help to leverage the transformative environmental and social potentials. In the modern interpretation of a circular economy, aspects of sufficiency are supported by *small* technical cycles such as product maintenance, repair and reprocessing (i.e. life extension measures). This is essential, as complete and durable material cycles can never be achieved in practice. In addition, every transformation also requires energy.

The **bioeconomy** – if based on sustainable agriculture and underpinned by strict sustainability criteria (especially 3rd generation residues) – counteracts climate change and resource bottlenecks by replacing fossil fuels with renewable raw materials, whereby utilisation rates must not exceed regeneration rates and the environmental impacts of bioresource production and extraction (biodiversity loss, emissions, etc.) need to be addressed. In the broadest sense, it is also about a transformation of the economic system itself (**Options 13_09, 15_17**).

Both the bioeconomy and the circular economy can transform the economic system in a sustainable direction if social measures are taken in parallel to the ecological ones, such as a labour evaluation system free of discrimination or the elimination of the gender pay gap (**Options 05_01, 05_02, 05_03**).

A new sustainable economic order means first and foremost **redefining the goals of the economic system** (see introduction). There are already numerous suggestions on how to measure the economy and economic progress that go beyond GDP or GDP growth (**Option 08_01**). In this respect, it would only be consistent to assess progress primarily as an improvement in the sense

of the SDGs. This could also be used to counter criticism of the formulation of SDG 8.

4.2.3 The business management level

Once the purpose of economic activity and the corresponding framework conditions have been clarified, the entrepreneurial goals can be derived from them. The suitability of financial figures is very limited: Higher profits do not automatically mean greater added value for society – on the contrary, the negative effects on people and nature may even outweigh them.

There are already legal regulations for companies that set minimum ecological and social standards and/or define incentives for improvement. On the one hand, however, these are still far too limited (e.g. concerning questionable ingredients in products; **Option 12_02**), and on the other hand, the appropriate **indicators** to specify these standards and incentives are often **lacking**: For example, if companies do not collect data on the greenhouse gas emissions they produce, then an essential basis for legal regulations is missing. However, data collection can be very time-consuming, resulting in high bureaucratic and sometimes also financial costs. At the same time, a growing number of companies are producing sustainability reports. Apart from the generally still deficient data situation, however, often the basic awareness within the companies of why sustainability is significant and in which areas they can take the most effective measures, is still lacking.

Therefore, in Austria there are regulations for individual sub-areas (e.g. working hours, waste quantities), but no laws that oblige companies to collect all sustainability-relevant indicators. The **Sustainability and Diversity Improvement Act** (NaDiVeG) is a first step, **but does not go far enough**, as it only requires general concepts and information about environmental, social and labour issues, respect for human rights and the fight against corruption and bribery. Arbitrary content, no obligation to conduct external audits and the restriction to large companies with over 500 employees make it impossible to derive the extent to which Austrian companies are making their contribution to achieving the SDGs (**Option 12_05**). However, certification systems or sustainability management systems that can be validated for larger corporations, certain basic indicators in the context of a sustainability balance sheet for smaller corporations and public companies with comparable results and external audits (**Option 12_05**) would be an improvement. In this way, companies receive feedback on their activities and can better assume their responsibility. The public sector can provide targeted support to companies with good sustainability records (e.g.

through lower taxes, higher subsidies or benefits, or requirements in public procurement; **Option 12_06**). This would enable sustainable companies to offer products at relatively lower prices – and demand would shift towards more sustainable products.

Improvements can also be achieved if ingredients are regulated via positive rather than negative lists and substances of concern are restricted even more strictly. The legal framework should also be shaped by the state in such a way that companies have more incentives, e.g. for safe and circular economy compatible substitutes or secondary raw materials (**Option 12_02**) or through higher taxation of conventional extraction of primary raw materials (**Option 12_01**).

All these options would support companies in taking responsibility for their products and services throughout the value chain, with a clear advantage for companies offering sustainable products and services and being transparent about them.

4.2.4 Finance

The liberalisation of financial markets has led to a **highly inflated financial sector** that has found some of its most lucrative investment opportunities in unsustainable economic activities, especially in the fossil energy sector. Economic theories and policies, which are based on real-capitalist game arrangement are only of limited relevance for the analysis of a financial-capitalist economic system.

A general reform of the financial sector could consist in the reversion of trading markets into financial markets. This would maintain the link to real economic activities in all transactions and products. The attractiveness of speculative money transactions can be significantly reduced by an international **transaction tax** on share purchases and sales, derivatives, intraday trading and high-frequency trading, and at the same time bring in necessary funds for the socio-ecological transformation. Further developments that stand in the way of a sustainable economy can be mitigated, for example, through extended capital and reporting requirements for banks and large companies, as well as more transparency through better access to information on economic ownership or corrections in the tax system (**Option 10_02**). The risk assessments of financial institutions and the international divestment movement have led many investors to withdraw from fossil fuels, while ethical and sustainability funds have become popular. The EU taxonomy being developed should help to exclude *greenwashing* and the promotion of unsustainable investments.

Complementary currencies and monetary systems can be used specifically to promote regional economic cycles. Enabling government guidelines and regulations based on independent scientific analysis are still pending.

Structural changes in the financial system are also being discussed. The full money movement (*Monetative*) wants to for example, restrict the right to create money to a public central bank that is independent of politics, because that would among other things, make it much easier to cope with the enormous public debt resulting from the Corona support and bailout measures in 2020 and 2021. *Modern Monetary Theory* assumes that government debt is a necessity, not an evil. A change in the principles of the European Central Bank's monetary policy is even being called for internally in the bank so that it is allowed to support the EU's climate policy instead of counteracting it. The Central Bank could link the refinancing of commercial banks to the condition that only real economic transactions are carried out that promote sustainable development in the sense of the SDGs.

Many of these reforms would bring fundamental changes to the economic and financial system. It would be important that progressive thinkers in the economic and financial spheres of the financial sciences and civil society **jointly develop these reform ideas** – taking into account the limits of the ecosystem and social requirements.

4.3 Responsibility beyond the borders of Austria

The globalised economic system does not benefit all participants in the same way. On the one hand, Austria can strive for fairer rules of the game, on the other hand, it can make sure that it deals fairly with its economic partners and their population. From an ethical point of view, Austria – together with all other industrialised countries – even has a duty to set a good example here (**Option 17_01**).

A **supply chain law** that imposes responsibility on business for equal social and environmental standards along the entire chain in a verifiable and sanctionable manner would be a step in this direction. Such laws at the international level would be a contribution to achieving the level playing field demanded by business.

In practice, **international economic agreements** tend to increase environmental damage and to undermine the social standards of individual sectors in some of the trading partners

through price pressure. Austria would both fulfil its international responsibility and promote the interests of its own agricultural sector, for example by systematically reducing imports of soya (**Option 08_04**).

Austria can also promote fair dealings with countries of the Global South in the financial sector, e.g. by advocating for the **establishment of an intergovernmental tax organisation at the UN level** in which all countries are represented on an equal footing and the countries of the Global South are guaranteed a say in this policy area, or by supporting them in establishing and strengthening fair, progressive and transparent tax systems (**Option 10_02**).

4.4 Allocation of roles in the implementation of the transformation potentials

4.4.1 Politics and administration

Changes in the economic and financial systems, but especially measures affecting the national economy, are a matter of politics. Many policies can be developed and implemented by the Austrian Federal Government, some require cooperation with-in the EU or at the global level. Politics and administration can:

- create framework conditions for a sustainable and just economic system; i.e.
 - prevent negative environmental and social impacts through appropriate orders, prohibitions and incentives;
 - stop harmful excesses in the financial sector, also by taking action at the European or international level;
 - proactively take steps to promote transparency, true costs, resilience and sufficiency.
- give educational institutions a mandate to facilitate comprehensive understanding of economics and finance, including the necessary resources (e.g. dedicated professorships);
- link research and development (R & D) funding to research institutions and companies more closely to sustainable development (**Option 09_03**);
- make provisions in the curricula, textbooks and staffing of educational institutions to enable diversified economic and financial education for all.

4.4.2 Economy and finance

Companies and their interest groups usually attach importance to low levels of state intervention and control. This can best be ensured if they themselves actively implement the SDGs as comprehensively as possible in their sector.

- All companies can
 - take measures to make internal processes more sustainable, further develop the business model (withdraw from non-sustainable business areas, develop sustainable business areas);
 - test and co-develop instruments for the preparation of sustainability balances and reports;
 - actively participate in shaping improved framework conditions that enable sustainability.
- Interest groups can assume their social responsibility and proactively advocate for the necessary changes at EU or the global level.

4.4.3 Society (individuals and groups)

The victims of the unsustainable economic and financial systems are civil society and the environment, both nationally and in countries along the global value chains. Individuals and groups can

- change habits in a sustainability-conscious way;
- draw attention to problems, resist them and actively campaign politically for systemic change;
- use the spectrum of possibilities from writing letters to the media or ministers, boycotting non-sustainable companies and products and participating in alternative economic projects to becoming active in civil society, within political parties or as a politician;
- all those in privileged positions – be it through education, social or professional position or financial opportunities – take their special responsibility, also for the *Leave No One Behind* principle.

4.4.4 Education, science, art and media

In view of the identified lack of workable theories and a general lack of understanding of economic and financial issues, education, science, art and the media have a special role to play. They can

- create the scientific basis and accompany the necessary profound transformation of the economy (**Option 09_03**);
- do justice to the universities' pioneering and leadership role in the field of economics and finance, i.e. diversify teaching and research in economics and finance (**Option 09_03**);
- replace the extremely one-sided focus on a neo-classical understanding of economics in Austria with plural and heterodox approaches that depict social and ecological responsibility as integral components of economic theory;
- address links to other systems (social and environmental) and promote systemic thinking (**Option 04_01**);
- prepare students as (future) actors for the challenges of the present and the future (as required in the documents of the BMBWF);
- make financial and economic education accessible to all – as a prerequisite for the necessary participation of society in the discussion on economic and financial policy measures (not only in higher education);
- as media, provide balanced and comprehensive information, but also raise the public discussion of economic and financial issues to a higher level through well-researched analyses;
- to show the excesses and contradictions of the current system and the chances of sustainably designed systems in art and to make them emotionally understandable and tangible.

5. Energy Systems and Circular Carbon Management

Helga Kromp-Kolb, Reinhold Lang and Nathalie Spittler

5.1 Purpose and tasks of the energy system

A reliable, cost-effective energy supply that is accessible to all and environmentally sustainable is an important prerequisite for the sustainable development of modern societies. There are several reasons why it is necessary to redesign existing energy systems (energy technologies and energy industry structures): (1) Changing framework conditions such as the liberalisation and globalisation of energy markets, (2) the ecological necessities including related social rethinking processes (e.g. climate crisis, pollutant emissions), (3) the ecological-economic (CO_2 pricing), innovation-oriented incentives and (4) the desire for more resilience.

The necessary transformation of the energy system into a sustainable energy system (**Options 07_01, 13_06**) is challenging, but at the same time offers great opportunities. Through the expansion of an optimised mix of renewable energy sources and associated technologies, the energy supply can be made more sustainable. In this context, the interconnections and coupling of the energy

system with material systems (e.g. water, CO₂) must be taken into account. At the same time, orientation towards societal needs compatible with sustainable development with regard to the (energy) end-function⁶ can reduce demand. The possible evolutionary paths towards an innovative, future-proof and thus sustainable energy and circular economy can be understood as a process on several levels:

- Decarbonisation: Substitution of fossil resources with renewable resources;
- Increasing efficiency: Life cycle analyses and optimisation along the value chain;
-
- Inversion: Put primary focus first on end-functions/services to be fulfilled and find synergy potentials in the system (What is needed? Instead of: What can be offered?);
- Innovation: New technological and societal solutions to meet real needs more efficiently;
- Integration: Sustainable industrial development through coupling and integration of energy and materials management (radical transformations of processes and products; comprehensive overall approach using multi-layered interconnection potentials).

5.2 Transformation potentials

5.2.1 Principles

A reliable, cost-effective and environmentally sustainable supply of energy services (**Option 13_04**) that is accessible to all is an important prerequisite for the development of modern societies within *planetary boundaries*, which at the same time achieves social sustainability Goals. This results in efficiency, resilience, sufficiency and participation as principles for the design of the energy system, which must be considered in all solutions and, as far as possible, realised.

As described in the introduction, the principle of sufficiency is decisive in order to use as little energy and resources as possible. In Austria, however, average per capita primary energy consumption is clearly above the sufficiency level.

⁶ Energy services, (energy) end-functions and end-services do not refer to the type of energy we use (e.g.: electricity, gas), but what we use this energy for, i.e. what functions it fulfils (e.g.: heated rooms, light).

Nevertheless, many people affected by poverty in Austria cannot afford even the basic supply of energy (especially heating). Factors such as social origin, ethnicity and gender play an important role. A sustainable energy system must compensate for such social inequalities in the sense of LNOB (see Transformation Field *Welfare of People and Society*).

Furthermore, the energy system must be designed as **efficiently** as possible in order to avoid losses, which can have negative environmental consequences, in conversion processes and energy use, and to conserve resources that are needed for the provision of energy. The entire life cycle of the product or process that has led to the increase in efficiency must be considered, because only then can it be determined how much energy is actually saved.

The real savings are often much lower than expected due to so-called rebound effects (see Transformation Field *Sustainable and Equitable Economy*). More efficient engines lead, for example, to the purchase of larger vehicles (the share of SUVs is steadily increasing in Austria) and to more kilometres driven. Energy consumption is also linked to cultural (the gender aspect in energy behaviour is often underestimated) and psychological dimensions. In the current economic system, energy-saving, more efficient technologies also tempt people to use them more or to spend the money saved on other consumption.

A focus on efficiency in the search for solutions may also prevent lower-energy solutions from being considered: No matter how efficient electric laundry drying cannot compete with the clothesline in terms of being environmentally friendly.

It should also be noted that efficiency and **resilience** are often opposites. An optimised, centralised and highly efficient energy system is not as resilient as a diverse, decentralised system. As in ecosystems, diversity in the energy system increases resilience and enhances security of supply in the short and long term, but at the expense of efficiency. Resilience is also relevant with regard to renewable technologies and their variable availability over time. This can be countered by the expansion of storage capacities and digital optimisation of producers and consumers via the grids can be countered, but this in turn creates resilience problems, for example in the event of hacker attacks. Thus, in addition to efficiency, resilience must also be taken into account when planning a sustainable energy system. The expansion of renewables in the two energy sources with the greatest potential (wind and PV) inherently leads to a decentralised energy supply.

Since cheap fossil energy has been and still is an essential driver of the economic system, the envisaged energy transition does not only affect individuals but also the economy. Furthermore, renewable energies also have an impact on their surroundings and can therefore trigger opposition. Achieving the goal with the support of everyone therefore requires **participation** (see Transformation Field *Urban and Rural Spatial Development*).

5.2.2 Coupling with the substance system

The sun is the primary source of energy on earth, and it is used directly (light, heat, PV and thermal solar energy) or indirectly (wind, hydropower, biomass). Ultimately, fossil energy is also biomass and thus solar energy, albeit under different climatic conditions millions of years ago and cannot be renewed in human time (see also chapter 5.2.5.2, *Limits of renewables (flow-based vs. stock-based renewables)*). Only when solar energy is used directly, for example as light or for drying, are no conversion processes into mechanical work or electricity necessary. Since these conversion processes cannot take place without material resources such as water, metals, rare earths or carbon, the energy issue is inevitably closely linked to material resources. Many of these resources are non-renewable and are already close to the energy and financial economic limit in terms of their extraction (see Transformation Fields *Global Environmental Commons* and *Welfare of People and Society*). Sharply rising costs of uranium extraction, for example, are one reason why nuclear energy is not economically sustainable. The infrastructure needed for grid stabilisation and storage in connection with renewables is also dependent on limited material resources, such as lithium and copper. These resources should be used as sparingly as possible and their consumption should be minimised through innovation and a well thought-out strategy and circular economy from the outset (**Options 12_01, 12_02**). The bioeconomy offers potential for a comprehensive resource transition (**Options 13_09, 13_11, 15_10**).

Water is used in the extraction of raw materials for energy production plants, as well as in their operation for cooling or for cleaning. In thermal power plants (biomass, solar power plants), water is used as a conversion medium and is lost for other purposes, e.g. irrigation. This can lead to conflicts of use, e.g. between energy and food production. Cooling and cleaning water is usually returned to the aquifer, but in a different quality (temperature, composition). This can have consequences for the biodiversity and usability of the water. The conflict of interests between hydropower and nature conserva-

tion in Austria primarily concerns the disturbance of river biotopes by storage and run-of-river power plants. In the case of agro-energy, the intensification of production achieved with nitrogen fertilisers leads to biodiversity losses through water pollution. A well thought-out, efficient use and management of water resources is therefore unavoidable (**Options 06_03, 06_05, 06_09, 15_06**).

Both the *European Union* and the Austrian government are committed to climate protection and the circular economy, which, in the industrial sector, can become a decisive impulse for circular carbon management through integrative sector coupling. On the one hand, this is explicitly expressed in the government programme as the *Green Deal for Austria's economy (industry and commerce)*, and on the other hand also in the *National Reform Programme 2021* in the section on *sustainable industrialisation*. On the positive side, it should be noted that Austria is already pursuing very advanced concepts in comparison to the rest of Europe, but also to the rest of the world, and that some of these concepts have already been implemented. One example of a cluster lead project that is already in a pilot phase is the *Carbon-to-Products Austria (C2PAT)* project, in which the companies *Lafarge, OMV, Borealis* and *Verbund* are involved. The medium- and longer-term goal of this project is to reduce CO₂ emissions in the production of cement as part of a cross-sectoral value chain using renewable energy technologies on a large industrial scale as a renewable raw material for the chemical industry, for example in the form of *Green Methanol* or for the production of plastics based on renewable raw materials.

5.2.3 Functions and services

People and the economy do not need energy per se, but energy services (such as heating, entertainment, mobility). These should be highly efficient (**Options 13_04, 13_06**) and their demand should determine the energy system. The less transformation (and associated losses) between energy carrier and energy service, the more sustainable the system: lighting by sunlight, for example, is more sustainable than using a light bulb powered by solar electricity. It therefore makes sense to assume no greenhouse gas emissions (net zero) in Austria in 2040 and to derive the necessary functions of the energy system from this basis. This applies in particular to the currently energy-intensive services in the areas of industry, buildings and mobility. Agriculture and forestry are also energy-intensive if the associated sectors such as fertiliser production are included. The corresponding transformation potential in **agriculture** is dealt with in more detail in

the Transformation Field of *Nutrition and Food Production*. **Across the sectors**, technology networking offers opportunities, so that the primary energy demand of each sector is reduced (**Option 13_08**).

In the **building sector**, the energy demand is largely determined by the living space per household or per person. In addition, a distinction must be made between existing and new buildings; in the case of new buildings, a further distinction must be made between embodied energy⁷ and energy in operation. In the case of existing buildings, the aim is to accelerate adaptation to the requirements of climate change (**Options 06_02, 08_02, 13_06**). In order to make the entire building stock climate-compatible, corresponding subsidies, stricter standards in building codes, denser construction methods and the goal of covering the remaining energy demand with renewable energy must be anchored in policies (see Transformation Field *Urban and Rural Spatial Development*). Lower-energy and more efficient **mobility** solutions of the future will be shaped by spatial and urban planning: This sets the framework for active mobility (walking, cycling, public transport), and can be complemented by rental and hire vehicles for specific needs. The possible measures are manifold (**Options 08_02, 11_02, 11_03, 11_04, 12_07, 13_10**). Both public and individual transport should be primarily electric for efficiency reasons. Appropriate (infrastructural) measures must also be taken to make freight transport more ecological (*from road to rail*; **Option 09_01**). Where high energy density is required, hydrogen can be used, e.g. for heavy trucks and machines and possibly on individual non-electrified railway lines. The hydrogen value chain results in requirements for spatial and urban planning (see Transformation Field *Urban and Rural Spatial Development*), but also consequences for the vehicle and supplier industry. In general, interregional transport must also be transformed and air traffic in particular must be made more sustainable. In order to make the mobility system sustainable from an environmental point of view, the primary energy source for both electricity and hydrogen must be renewable.

Special attention should be paid to the energy-intensive **industry** (steel, cement, chemicals). On the one hand, the options and measures for the still large potential with regard to energy efficiency must be implemented (**Options 07_02, 12_01**), and on the other hand, cross-sectoral activities for carbon recycling must be significantly expanded, e.g. C2PAT – *Carbon to Products Austria*.

⁷ Embodied energy refers to the total energy required for a product from production to disposal.

Digitalisation is seen as making a significant contribution to saving resources through so-called smart solutions, including a reduction in energy demand. Automated processes are considered more efficient and productive than manually controlled ones; one example is precision agriculture (see Transformation Field *Nutrition and Food Production*). Meaningful applications of digitalisation arise in energy-intensive industry (**Options 07_02, 12_01**), among others, but also in transport (**Option 09_01**) and recycling (**Option 09_02**). However, the dependency on the availability of electrical energy also means a need for balancing services, which must be taken into account especially when considering the use of digitalisation. *Rebound effects* and the high energy requirements of digital solutions must also be taken into account. It is therefore important that digitisation takes place in a way that promotes climate goals and sustainability (**Options 12_01, 13_08**). Therefore, digitalisation should (1) contribute to reducing resource consumption, (2) promote equity and equality, (3) contribute to simplifying and adapting economic and financial systems, and (4) ensure the necessary resilience, even at the expense of efficiency. With the *Bioeconomy* and *Horizon Europe* programmes, the EU has enormous financial resources available for investments in this area, the acquisition of which should be strategically supported.

5.2.4 Investments and financial matters

A central as well as quickly implementable step towards restructuring the energy system is to remove or at least significantly reduce subsidies for fossil fuels in order to increase the competitiveness of renewable energy sources. In addition, the integration of external social and environmental costs, which is necessary anyway, e.g. through progressive CO₂ pricing, can also increase the competitiveness of renewable and more efficient technologies and speed up the transition (**Options 07_01, 13_01**). In order to increase the use of renewable energies and to increase their energy efficiency, considerable investments in the expansion of renewable production capacities and the necessary infrastructure, such as transmission grids and storage facilities, are necessary (**Option 07_03**). Efficiency increases require investments in new technologies, process optimisation and cross-sectoral, cascading energy use (**Options 07_02, 12_01**). 2020 estimates of the level of investment required in the energy sector is estimated to be around Euro 50 billion by 2030 (**Option 08_02**); however, these figures are highly dependent on the estimated energy demand.

5.2.5 Renewable energy

Taking into account the framework conditions for renewables described below, adequate expansion is needed (**Options 07_01, 13_06**). Expansion must be oriented towards the system as a whole and specifically geared towards energy service demand. Furthermore, it must provide production capacities for electricity and district heating and cooling from renewable energy sources (solar, wind, hydro, biomass and geothermal energy) as well as necessary information networks and storage facilities, coordinated with the optimisation of efficiency and the requirements in terms of resilience and environmental and nature protection (**Options 07_01, 07_03, 13_06**).

5.2.5.1 Structural changes

The phase-out of fossil energy and the transition to renewables is a far-reaching transformation, that goes beyond the purely technological: In the electricity sector, for example, the transition from a centralised to a decentralised system, from a mono-directional to a multi-directional one, from an oil-dominated to a diversified system, from a producer/consumer relationship to one of a prosumer relationship is necessary, in which the production methods also fundamentally shift.

Up to now, Austria has mainly sourced its fossil energy from Norway, Saudi Arabia, Russia, Eastern Europe and countries in the Middle East, thus promoting, albeit indirectly, the destruction of nature, human rights violations, undemocratic regimes and ultimately wars. The transition to renewable energies, on the other hand, offers the possibility of greatly reducing dependence on foreign countries. However, new technologies and associated material resources can create new dependencies and other direct and indirect influences. Therefore, it is important to pay attention to SDG-compliant imports in the future (**Options 07_01, 07_02, 12_01**).

The expansion of renewables also makes it possible to bring jobs to structurally weak regions and sectors via national, decentralised energy production. Unlike the large, centralised, fossil-fuel power plants, private individuals, cooperatives, and municipalities can also own the smaller decentralised units so that revenues flow into local value creation.

Technical, logistical and legal infrastructure projects to optimise the electricity infrastructure and temporal use, e.g. in connection with the transition to smart meters, will be all the more successful the better those affected are involved, as aspects of personal rights and ethical issues are also relevant. However, this

presupposes that individual interests are set aside against the common good within the framework of a balance of interests.

Since renewable energies are only available in Austria to a limited extent and intermittently, the importance of material-chemical energy sources such as green hydrogen, which are easier to store, in importance in addition to their direct use, will increase.

Embedded in a sustainable, international energy network, they have the advantage that the existing energy infrastructure such as pipelines and storage facilities can continue to be used. Nevertheless, there is a considerable need for adaptation, conversion and new construction of energy infrastructure.

5.2.5.2 Limits of renewables

(flow-based vs. stock-based renewables)

The current political objectives to achieve 100% renewable electricity generation for Austria by 2030 and climate neutrality by 2040, de facto mean the transformation of the energy system to a completely renewable energy system within the next two decades. At the same time, there will be very drastic changes in energy demand and in the energy services required, at least in some areas (e.g. increased use of electromobility) and in value chains (e.g. conversion of steel production to electric or H-based₂ processes).

In contrast to the inventory-based fossil fuels, renewables are often seen as flow-based energies. This implies that the resource per se is not limited. However, this is only partly true. Biomass, for example, grows back, but is only available to the extent that it grew in the first place. For a sustainable use of these resources, the regeneration rate must not be exceeded or should ideally be undercut in order to have a buffer for unforeseeable events. Biomass, geothermal energy, hydrogen and water (storage power plants) are storable forms of energy: If the resource is not used, the energy is still available at a later date. In a narrower sense, flow-based renewables are those that can only be used when they occur (solar, wind and water/run-of-river power plants) without their availability being affected by use. They are therefore theoretically available in unlimited quantities. However, a high density of wind or hydro power plants may very well reduce the yield of the individual plants. A limitation in use also arises because the technologies are tied to the material cycles described above (e.g. rare earths).

In a sustainable energy system, hydrogen can only be considered if it is produced from renewable energy sources, so availability is limited. It should be used as a niche technology

where there are no suitable alternatives, such as for heavy machinery or locomotives on remote railway lines.

On the basis of a referendum, Austria fundamentally ruled out the construction of nuclear power plants in the country. Numerous scientific studies also confirm that nuclear energy is unsuitable as a solution component for climate protection because it is too slow, too expensive, too inflexible, too risky and too resistant to transformation.

5.2.5.3 Conflicts of interest

No energy production is possible without interfering with nature. Moreover, it is always profoundly linked to social and economic structures. Accordingly, conflicts of interest can arise. The involvement of stakeholders in decision-making and the concrete design of facilities, from authorities committed to nature conservation and environmental protection to civil society actors in this field, is therefore necessary (**Options 12_06, 13_06, 15_09, 16_09, 16_10**).

Biomass, solar and wind energy in particular are land-intensive, which can lead to conflicts of interest in land use. Conflicts with biodiversity objectives occur in particular with hydropower, large-scale production of energy crops and wind energy (see Transformation Fields *Global Environmental Commons* and *Urban and Rural Spatial Development*). The locations and thus the quantities of renewable energy that can be generated within Austria are therefore limited. These limits are already noticeable for hydropower, as only 15% of Austria's river stretches are still in very good condition. As such, inland watercourses should be preserved as far as possible and restored accordingly (**Options 06_04, 15_06**). The contribution of wood biomass to energy production is also often overestimated. The use of wood for energy, for example, is much less efficient as a climate change mitigation measure than its material use (**Option 07_02**), which plays an important role in a bioeconomy (**Options 13_09, 15_17**) and for carbon storage (**Option 13_11**). However, biomass plays a special role among the renewable energies because it can be stored and is therefore well suited for use as an alternative energy source when weather- or time-of-day-dependent sources fail.

5.3 Responsibility beyond the borders of Austria

As one of the richest industrialised countries in the world with a high potential for renewable energy, Austria has a particular responsibility to play a pioneering role in climate protection. Apart from the electricity sector, Austria has not yet fulfilled this

responsibility – within the EU, Austria is one of the laggards, as the Austrian Court of Audit has already noted. Austria neither leads by necessary example that emission reductions are feasible in harmony with the population, nor does it pay an adequate contribution into the international *Green Climate Fund*.

Austrian companies export know-how and products to other countries, e.g. for the expansion of renewable energy: some of these are exemplary sustainable technologies, others are technologies or projects that do not receive approval in Austria or endanger local structures (e.g. hydropower plants that destroy ecology and culture). At present, we can only appeal to the proponents to refrain from such projects.

However, the planning and construction of renewable energy plants such as PV plants, wind turbines etc. in Austria must also consider the damage caused during the extraction of the raw materials necessary in other countries, especially those with low environmental and human rights standards. The principles of sufficiency and efficiency, along with appropriate liability provisions along the international supply chain, can help to minimise this damage.

Since the 1980s, Austria has been trying to reduce nuclear energy in Europe and, where this is not possible, to at least contribute to reducing the risk of accidents. In this sense, Austria has already brought several cases before the *Court of Justice of the European Union* (ECJ). These efforts, which are opposed by a powerful international lobby, are very much welcomed by numerous civil society groups in countries with nuclear energy. An important building block in the European discussion is the taxonomy, which currently excludes nuclear energy as unsustainable due to the lack of final storage facilities.

Due to the changed resource requirements and the land intensity of renewable energy, additional land is needed for energy production, which means that land grabbing⁸ may also be a problem in the energy sector in future. The transformation of the Austrian energy system must not contribute to land grabbing, either indirectly or directly.

⁸ *Land grabbing* is the term used when foreign private investors buy or lease large areas of land in countries of the Global South in order to use them for their own large-scale production of food or energy.

5.4 Allocation of roles in the implementation of the transformation potentials

5.4.1 Politics and administration

Politics and administration have an important role to play in setting the framework that promotes the conversion into and expansion of a sustainable energy system. Specifically, this includes:

- the abolition of direct and indirect subsidies for fossil energy and sufficiently high pricing of CO₂ emissions, combined with accompanying measures to avoid economic hardship for the particularly affected and sustainability-oriented economic subsidies (**Option 13_01**);
- legal framework conditions that facilitate and regulate joint financing (e.g. *crowd funding*), joint ownership, access to electricity grids, etc. in a forward-looking manner;
- correct and committed implementation of the European legal framework in the field of renewable energy (**Options 13_05, 13_06**);
- clear and long-term rules that create a secure investment climate;
- investments in the expansion of renewable energy and in efficiency measures;
- investment in infrastructure to optimise networks while increasing resilience in the event of network disruptions;
- supporting measures for the expansion of renewables, e.g. to facilitate reallocations and investments, but also steering measures to avoid undesirable developments and to resolve conflicts of interest in a forward-looking manner;
- commitment at the international and EU level against high-risk technologies, especially nuclear energy and geo-engineering. Maintenance or creation of the necessary competences nationally and commitment to a forward-looking distribution of EU research funds (EU research funds flow disproportionately into nuclear energy research);
- creation of suitable, also financial, incentive instruments for the rapid, scaled and broad implementation of carbon management technologies (e.g. establishment of an *Austrian Innovation and*

Transition Fund; participation of Austrian industry in the major EU funding programmes such as the Austrian Recovery and Resilience Plan, *EU Innovation Fund*, *Important Projects of Common European Interest* (IPCEI) Hydrogen, IPCEI Decarbonisation of Industry).

5.4.2 Economy and finance

In order to be able to realise a sustainable energy system, both the energy industry and the energy-intensive sectors must make their contribution. This includes:

- investments in the conversion, expansion and new construction of the energy system;
- implementation of alternative and innovative solutions, especially in the energy-intensive and fossil-dependent sectors;
- process optimisation and efficiency enhancement in energy-intensive industry;
- development of lower-energy solutions for the demanded energy end-functions, i.e. not only to make energy services more efficient, but also to identify innovative new ways of providing services (**Option 13_04**). Society and individuals should be involved in order to identify not only optimal solutions, but also solutions that can be implemented;
- divestment from fossil energy and investment in forward-looking technologies. Banks and investment advisors can significantly accelerate this process by providing sustainability-oriented products and client advice;
- recognition of the key role of circular carbon management for climate and circular economy strategies with *Carbon Capture & Utilisation* (CCU) technologies and products based on them as central components;
- advance carbon management by promoting and establishing cross-sectoral cluster lead projects through targeted integration and cooperation, especially in the materials (steel, cement, plastics, pulp) as well as energy and waste management sectors.

5.4.3. Society (individuals and groups)

As energy is an important part of everyday life, there is also a need for action in this group. Among other things through:

- active participation in shaping the energy system of the future by observing the principles of sufficiency (e.g. lowering room temperature) and efficiency (e.g. paying attention to efficiency standards when buying electrical appliances);
- switch to renewable energy and also generate them themselves where possible;
- political engagement in citizens' initiatives or participation processes (**Options 15_09, 16_09, 16_10**) for locally accepted solutions;
- do not sacrifice the goals of society as a whole to particular interests.

5.4.4 Education, science, art and media

Energy is an essential part of everyday life and an important driver of the current economic system and climate change. In addition, the societal discourse on energy can be dogmatic. Accordingly, the following measures in the field of education, science, art and media are necessary to promote a transformation (see **Options for SDG 4**):

- actively promote independent science. This means open approaches, diversity of viewpoints and constructive handling of differences of opinion;
- pay more attention to social and environmental aspects of the energy system in education, training and research in the energy sector, including alternative energy sources;
- drive innovation at all levels, without losing sight of the goal of sustainable development, and include social innovation;
- address digitisation in all its consequences, to ensure that undesirable side effects do not render the intended effect obsolete;

- actively maintain the necessary independent scientific nuclear expertise in Austria in order to be able to support politics with expert knowledge;
- educational, art and cultural institutions should accompany societal transformation processes through dialogue formats.

6. Nutrition and Food Production

Thomas Lindenthal, Franz Fehr, Georg Gratzner and Maciej Palucki

6.1 Introduction

Nutrition and food systems form one of the central foundations of human life. Therefore, they have a key function in ensuring a sustainable society. **Food systems** include agriculture (including horticulture, urban agriculture and self-sufficiency systems) and the links in the food value chain upstream and downstream of agriculture. The latter includes also focussing on processing and supply structures, including supply chains for out-of-home consumption as well as the sectors upstream of agriculture. This includes fertiliser, fodder and pesticide production (**Option 15_10**) as well as seeds and young animals.

Dietary patterns are key determinants of people's health (**Option 03_02**) and have a significant influence on the food value chain and thus on major ecological and socio-economic systems. They are culturally determined and are influenced by many social and economic factors. Transforming diets and dietary patterns (as an important part of our consumption patterns) towards sustainability has great synergistic effects on many other economic

sectors and SDGs. This, in combination with all the thematic areas in this chapter, can lead to great improvements in human well-being and the ecological situation.

6.2 Transformation potentials

A sustainable **diet for Austrian society** means that health and quality of life (e.g. reduction of meat consumption), sufficiency and efficiency (e.g. reduction of food waste) as well as transformation processes (e.g. conversion to organic farming) are central principles. This will strengthen regional and fair economic structures such as small-scale farms. At the same time, the food transition⁹ as an important component of the climate strategy would contribute to the reduction of **greenhouse gas** emissions and significantly reduce the current consumption of **water and soil**: significantly lower and as such healthy (see health guidelines of the *Austrian Society for Nutrition* (ÖGE), below) level of meat consumption in Austria, can reduce the amount of land required for *Nutrition and Food Production* by the Austrian population by around 30% and have spillover effects¹⁰ (e.g. through significantly reduced soy imports). In close connection with sustainable (if possible organic) management in arable farming (for plant protein) and by pushing for ecological agricultural landscape design, this could contribute to largely overcoming the **biodiversity crisis**.

Transforming the food system in line with the SDGs, would contribute significantly toward sustainability in Austria as well as reducing the negative consequences of *Nutrition and Food Production* in the Global South intended for export to Austria.

Such a fundamental transformation of food production, diets and consumption patterns (including out-of-home consumption) can be achieved primarily through (1) a significant reduction of meat consumption, (2) the significant reduction of avoidable food waste in all areas of the value chains (in particular households, gastronomy and trade) and (3) increased consumption of organic, seasonal, regional and fair trade products. Organic products have broad sustainability effects, seasonal, regional and fair-trade products fulfil selected important sustainability criteria.

⁹ Transition is the technical term for transformation in the field of food systems.

¹⁰ spillover effects in this context means negative ecological, social and economic effects in other countries, especially in the Global South.

6.2.1 Meat consumption

By reducing meat consumption from the current level of 63.4 kg per person per year to 22 kg (see recommendations of the ÖGE and DGE), cardiovascular diseases can be reduced by up to 45% (especially in conjunction with a general reduction in caloric consumption). Being overweight, which currently affects 41% of the adult population, and obesity, which affects 15% of the population, as well as diabetes, can also be greatly reduced by a significant reduction in meat consumption. This significant improvement in the health of the population goes hand in hand with substantial cost savings in the health sector. The funds saved can be used for ongoing awareness raising in the health sector (**Option 02_01**).

The dietary style in Austria is also gender-specific. Men in particular consume three times the recommended amount of meat and thus consume twice as much meat as women. In relation to women, they are also less willing to adjust or change their behaviour (at least among vegetarians, the gender balance seems to be more balanced in recent times). This is a problematic manifestation of masculinity and an expression of toxic masculinity¹¹ (see Transformation Field *Welfare of People and Society*). A larger willingness to take risks, risks sometimes associated with health hazards, – also with regard to eating patterns – is associated with masculinity in certain social circles. Gender-sensitive pedagogy at kindergarten age is a basis for breaking down these traditional role models and behaviour patterns and thus also dietary patterns (**Option 05_04**).

Strategies and measures to **significantly reduce meat consumption** (in combination with a reduction of caloric consumption) are manifold and need to address several levels at the same time. High **meat consumption** as a **cultural** practice can lose its importance through a strong focus on advertising and **education** (professional training and broad awareness raising) (**Options 02_01, 12_07, 15_14**). Meat should be consumed in significantly lower quantities and higher quality (with significantly higher incomes for the farmers). This requires a **social and economic re-evaluation of food systems** and dietary patterns. For example, the prices of food have fallen in the last decades, whereby the ecological and social consequential costs have not/hardly

¹¹ Toxic masculinity (Kupers, 2005, p. 714) as “the constellation of socially regressive male traits that serve to foster domination, the devaluation of women, homophobia, and wanton violence”. This term explains (among other things, alongside hegemonic masculinity (Connell, 1987, 1995) problematic expressions of masculinity that maintain and (re-) produce the patriarchal system. [Eating meat] “makes them feel like real men” (Rothgerber, 2013, p. 1).

been taken into account, while other prices have risen sharply, especially for housing. This can also be achieved by building up a separate **policy field** for **sustainable, climate-friendly and healthy diets (Option 02_01)**. In the area of production, unsustainable objectives in the **support and subsidy system** have further exacerbated the environmental, social and economic problems in agriculture and food processing. To counteract this, agri-food policies can be reshaped through fiscal policy measures and a reform of subsidies and agricultural support (**Options 02_01, 15_01, 15_11**).

From the point of view of sustainability in Austria, meat consumption must be reduced in particular with regard to **pork and chicken**. In contrast, the majority of **beef production and cattle farming** in Austria, is moderately intensive and grassland-farmed and as such are **of great importance in Austria, also from a sustainability perspective**. This concerns food sovereignty, the preservation/promotion of biodiversity (moderately intensive and extensive grassland; keeping land open), water protection and animal welfare. Therefore, beef and dairy products are not primarily in the focus of the food/protein transition, despite the fact that ruminants generate higher greenhouse gas emissions (**Options 02_01, 02_04, 02_05**).

The expansion of Austria's sustainable **aquaculture** and thus of domestic **fish consumption** can have a very positive effect on health and the environment as a complementary measure.

Another measure is the substantial **reduction of feed imports**. This increases both the equity and the ecological compatibility of the food system globally and also in Austria.

These different measures develop strong mutual synergies when they flow simultaneously and in a coordinated manner into a package of measures that is implemented at different levels including politics, administration, subsidies, tax policy, education, trade, tourism, gastronomy and communal catering (**Option 02_01**). For example, mandatory origin information and labelling of eco-standards of key ingredients (and e.g. animal husbandry standards for meat) are important levers in combination with measures in the field of education/awareness raising.

6.2.2 Food waste

Pressure on agricultural production and thus also the demand for land is intensified by the currently high amounts of avoidable food waste (along the entire chain from agriculture to consumption) in Austria (over 1 million tonnes/year). This contributes significantly to a resource-inefficient

food value chain and thus also to increased environmental pollution of ground water and watercourses as well as lakes. Avoidable food waste is generated in particular in households, in food retailing, in food processing and in the catering industry (including community catering and canteens). Significantly reducing avoidable food waste (**Option 12_03**), which can at least in part be achieved in the short term with ambitious measures¹², not only offers a great opportunity to increase the resilience to crisis of the food system (security of supply despite the climate crisis), but also to make agriculture more ecological (extensification of agriculture). Such a development also contributes significantly to a resource-efficient food value chain and thus also to a reduced environmental impact on agro-ecosystems, ground and watercourses and lakes. The emergence of new initiatives and networks and improving production, processing, harvesting and storage methods to minimise damage or loss are other positive effects. Conversely, a higher appreciation of food leads to less food waste.

Avoidable food waste in Austria should be reduced by 50% along the entire value chain by 2030. Analogous to the reduction of meat consumption, this goal is to be achieved through a mix of tried and tested measures. They should be applied simultaneously in different areas in order to take advantage of potentially strong synergies. In this way, significant reductions in food waste can already be achieved in the short term.

Essential elements of these measures are also:

- the development of new marketing channels or new products for the processing/preservation of unsaleable goods, or surpluses;
- training farmers in the processing sector to improve production, processing, harvesting and storage methods;
- innovations for the use of leftover food from gastronomy and agriculture;
- the promotion and expansion of existing initiatives such as food-sharing, donation of food to charitable initiatives (**Options 02_03, 12_07**).

¹² Measures to reduce avoidable food waste that can be achieved in the short term:

- in households: e.g. knowledge about processing, storage, best before dates, awareness raising, food sharing, cooking with leftover food;
- in gastronomy, hotels, catering: e.g. reduction of portion sizes, improving buffets, incentives to take away remaining food in restaurants and catering.

6.2.3 Trade

Establishing or improving ecological and social minimum standards in international trade with animal feed (especially soy) and food (including palm oil, coffee, cocoa, meat, cane sugar, bananas, coconut) is an important lever for sustainable development in the food sector. In addition, within the EU, economic and agricultural policy framework conditions for sustainability (such as those in the *New Green Deal*, *Farm-to-fork* strategy) and realigning subsidies in trade are important levers. Austria has an international responsibility, especially towards the countries of the Global South, and can be an important initiator, also with bilateral flagship initiatives.

Trade structures in the food system, especially in the **food retail sector**, have a great influence on the food transition and a necessary crisis-robustness of the food system. **Forms and structure of supply and awareness-raising** are a major lever in retail. Necessary measures include not only increased greening, regionalisation and health orientation of agriculture, food processing and nutrition, but also social goals. The latter concern among other things, the reduction of current inequality, lack of fairness (including problems such as contract breaches, agreements that undermine competition, effects of private labels, etc., which remain unpunished due to the significant market power of food retail companies) and the high workload along the entire food value chain in Austria. Central to this are also all measures **to reduce large negative spillover effects**, especially in the least developed countries and emerging economies in the context of key import products such as soy, palm oil, coffee, cocoa and bananas. Fairtrade products are very important in this context.

6.2.4 Agriculture

Guiding **agricultural production** towards consistent ecological, economic and social sustainability is an elementary part of the food transition. Measures to achieve this must be taken at many levels and range from the development of new guiding principles for agriculture (**Option 15_01**) and a new framing of food (which is much more than a commodity, but culinary heritage and our closest relationship to nature), education and research, and structural and fiscal policies that provide the right financial incentives for the orientation of farms, e.g. the further greening of agricultural subsidies (alignment with the environmental pact, EU *Farm-to-fork* strategy, redistribution in favour of small farms), and investments to enable further crop production for human consumption.

Rigorous **taxation of fossil fuels** (**Option 13_01**) and the transformation of agricultural markets towards regional production could reverse the scaling effects that have led to a continuous increase in the size of farms and farmed areas (plots) over decades. **Small-scale** agricultural production is more resilient, has improved pollination and increased natural pest control and can thus lead to higher yields, at least in the medium term. Smart technology and **digitalisation** can become important elements in agricultural production, as they allow the use of machinery and processes specifically adapted to small-scale organic farming.

Organic farming and agro-ecological approaches are of great importance for the sustainable transformation of the food system and agriculture in particular. Organic farming has a major role to play in water, soil and climate protection, but also in important areas of biodiversity and resource efficiency (**Options 02_03, 02_04, 02_05, 02_06, 06_05, 06_08, 15_03, 15_10**). Socio-economic advantages of organic farming contribute to the preservation of small-scale farming in Austria, to increased fairness, transparency, participation and co-determination in the food value chain as well as to increased effects in the regional economy (**Options 02_03, 02_05, 02_06, 02_08, 12_03**). In addition, organic products have significantly lower spillover effects and greater variety and product diversity.

Due to its pioneering role in the establishment of organic farming, Austria is in a very good position to further anchor this form of farming in the food system or to expand it significantly, e.g. in agriculture, processing, gastronomy, trade, tourism and canteens. A further expansion of organic farming in Austria has very strong synergies with regard to a sustainable food culture, which includes the areas fairness, transparency and co-determination (including the in Global South) as well as health care, for example healthy nutrition – reduction of meat consumption, increase in the share of plant-based nutrition (**Option 02_01**) – as well as the significant reduction of avoidable food waste (**Options 02_03, 12_03**).

Increased consumption of organic, seasonal, regional and fair food has multiple positive environmental and socio-economic **benefits** in agriculture and food processing (**Options 02_03, 02_04**), strengthens the sustainable orientation of rural regional development (**Option 02_05**) and the crisis security of the agricultural economy (**Option 02_06**).

6.2.5 Tourism

Food and tourism are strongly interlinked through agriculture and food consumption in gastronomy and the hotel industry. This interconnection can be used for an important contribution to the **change towards sustainable, regionally and locally adapted tourism concepts** (including wellness and health tourism) in connection with sustainable regional development. The promotion of sustainable and climate-friendly nutrition in the catering and hotel industry includes, among other things, the reduction of meat consumption and food waste, the increase of organic food and the increased use of regional and seasonal food. Synergies also arise in the context of health, landscape and nature conservation, sustainable spatial planning and regional development, but also in assuming global responsibility.

Specific fields of action and measures in connection with **tourism and sustainable food and agriculture** are manifold. They are to be promoted through targeted strategies, subsidies, tax incentives, investments, educational measures and the development of cooperation structures, among other things.

6.2.6 Spatial planning and the problem of soil sealing

The protection of fertile agricultural soils from sealing is becoming increasingly urgent, especially on the outskirts of cities, where soil sealing is often increasing the most. A study by the *Austrian Agency for Health and Food Safety AGES* (**Option 15_03**) shows how the most valuable soils in Austria can be identified for agriculture in order to secure our food supply even under further changing climatic conditions. The reduction of soil sealing (**Option 15_10**) is a cross-cutting and key task of sustainability. Therefore, it is important to implement effective measures such as redesignating land for agriculture, taxation of profits from land designation or stronger restrictions on changing the designation of agricultural land.

6.2.7 Bioeconomy and agriculture

Many actual and potential applications, opportunities and risks of the bioeconomy are closely linked to agriculture and the processing of agricultural products. **Closely interlocking the bioeconomy with sustainability** and therefore with the SDGs is indispensable in order to avoid, among other things, serious conflicts of use (e.g. fuel vs. food, biodiversity), technological risks and so-

cio-economic dangers as well as further spillover effects in countries of the Global South (land grabbing, social exploitation, soil degradation and -erosion, biodiversity, etc.).

Goals and measures of ecologically, economically and socially resilient agriculture and processing are central to enable a sustainable, climate- and environmentally friendly as well as to use the opportunities of the bioeconomy to strengthen the circular economy and cascading economies to rapidly phase out the use of fossil raw materials. Also of great importance for a future-oriented bioeconomy is an embedding in fair economic and trade structures as well as a broad interdisciplinary and systemically oriented support of bioeconomy strategies and their implementation. A **comprehensive, integrative technology assessment** (including the social dimension and the impact on biodiversity) is also indispensable for new technological applications (e.g. **Options 13_09, 15_17**).

Those new technologies that also offer many **opportunities for sustainable development** in the food sector (e.g. implementation of fair delivery, food sharing, online direct marketing, community machine use, energy transition, etc.) therefore make an important contribution to a socio-ecological transformation. However, in some areas (e.g. energy technologies, digital technologies) they also require an accompanying integrative technology assessment.

6.3 Responsibility beyond the borders of Austria

Agriculture and dietary styles in Austria cause serious ecological, social and economic problems in other countries of the world (**spillover effects**). These include the destruction of large areas of tropical forest and savannah and negative social consequences for many people in the Global South (**Options 02_01, 02_02, 02_03, 02_06, 02_07, 06_03, 08_04**). The agricultural and trade policies of Austria and the EU (e.g. large imports of soy feed, palm oil, coffee, cocoa, bananas, beef and other foods from emerging countries and countries of the Global South at very low prices), contribute significantly to these spillover effects. Thus, agriculture and the entire food system in Austria (as well as in the EU), with their economic and (agricultural) policy framework conditions have a responsibility and opportunity to contribute to a significant reduction of the aforementioned problems in the Global South. Land concentration and land grabbing are global undesirable developments with negative consequences for the agricultural economy, which also affect farmers in the EU (especially in Romania) (**Option 08_04**). The causes of

migration in the context of (international) trade, finance, agricultural and food policy and Austria's share of responsibility should also be included in the considerations.

6.4 Allocation of roles in the implementation of the transformation potentials

6.4.1 Politics and administration

For a successful transformation in the food sector, the following measures can be taken at different levels of politics and administration:

- develop or expand a healthy and sustainable food policy in coordination with a sustainable agricultural, economic and tourism policy;
- establish a separate **policy field** on sustainable, climate-friendly and healthy nutrition (**Option 02_01**);
- the further establishment and implementation of a **reform of agricultural subsidies and agricultural support** in the direction of consistently sustainable agriculture and nutrition;
- expansion of **support programmes** for **organic farming** (**Option 02_03**), for the preservation of small-scale farms, the promotion of biodiversity (**Option 15_11**) and thus of agriculture in many, especially structurally weak, regions with a high proportion of unfavourable locations;
- **consistent implementation of fiscal policy measures** that provide increased incentives for sustainable regional agriculture and a healthy climate-friendly diet;
- creating stronger innovation incentives for **sustainable tourism** in connection with regional organic agriculture and sustainable food;
- increased anchoring and implementation of the protection of fertile agricultural soils from soil sealing in **spatial planning** (**Option 15_10**);
- expand **sustainable nutrition** programmes in **communal catering** (hospitals, retirement homes, schools) and in **procurement**;

- increased assumption of responsibility by Austria for **sustainable agriculture and nutrition in EU agricultural policy**. This also includes support for the initiative to link agricultural subsidies to fair labour rights and conditions and improved social standards for all employees – regardless of gender and origin (**Options 01_02, 02_03, 02_06**).

6.4.2 Economy and finance

Food trade and tourism are important economic sectors to be addressed with regard to the promotion of sustainable nutrition. In this context, the following measures, among others, are to be envisaged:

- expand the **supply and promotion** of food with the **highest** sustainability standards and stop advertising promoting cheap meat and cheap imports (**Option 08_04**);
- expanding support and marketing for **healthy and sustainable diets** (**Option 02_02**) are also important levers for food retailers;
- expand measures to reduce spillover effects in the Global South by significantly increasing the supply of organic and fairtrade products as well as seasonal and regional food with fair prices (**Option 08_04**);
- develop a comprehensive package of measures to reduce and prevent food waste (**Option 12_03**);
- expand cooperation between tourism and regional, organic, sustainable agriculture, e.g. by promoting local/regional organic farms in procurement, continued establishment of organic hotels (including educational measures and certification) and development of organic regions;
- establishment/expansion of educational measures on the topic of sustainable nutrition (see **Options in SDG 4**) in the training of chefs and hotel staff as well as (joint) purchasing concepts for gastronomy and the hotel industry to maintain small-scale farming structures in the region and thereby strengthen local/regional value creation;

- strengthening the role of women in tourism and agriculture. This includes, among other things, increased integration of women in important decision-making processes, significant expansion of women's empowerment programmes, integration of gender issues in agricultural policy, agricultural education and consulting, promotion of appreciation, visibility and fair compensation for the work of women in agriculture.

6.4.3 Society (individuals and groups)

This includes the large group of citizens or consumers, but also associations: among others, organic associations, associations in the field of nutrition education and environmental education, food coops and environmental NGOs, all of which are, on the one hand, affected and, on the other hand, can leverage the food transition. Measures in this regard are:

- develop permanent and cooperative networks among these groups, awareness raising and joint activities;
- strengthen the development of informal cooperation between consumers and agriculture, e.g. *community-supported agriculture* (CSA), internet platforms against food waste, etc.

6.4.4 Education, science, art and media

Education plays a central role in developing awareness for sustainable nutrition. Measures range from kindergarten to university. In addition, adult education measures play an important role in the sense of *life-long learning*.

- expanding **education and awareness for sustainable nutrition (Options in SDG 4)** and related sustainable production methods and consumption styles in the **curriculum** as well as in the **everyday life of** kindergartens, compulsory schools, secondary schools and universities;
- **expanding and diversifying nutritional education and training** of farmers, restaurateurs, hotel staff and medical professionals **toward sustainable nutrition**. Both human health and ecological sustainability from agriculture to the plate are central topics;
- establish **sustainable nutrition awareness programmes for adults**;

- expansion of **discourse spaces and establishment of new educational and dialogue formats on sustainable nutrition** with the involvement of cultural institutions, freelance artists and regional actors in communities, tourism, gastronomy and communal catering.

7. Urban and Rural Spatial Development

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7.1 Resilient Urban and Rural Spatial Development

A large part of the transformation processes in the five Transformation Fields presented have a **spatial reference** or direct **spatial impact**. Therefore, they must also be considered from the perspective of planning (spatial planning, as well as spatial-, urban- and rural development) and design disciplines (urban planning, landscape architecture), which – even though almost two thirds of the population in Austria live in cities – takes equal account of urban, suburban and rural areas.

In the context of sustainable development, the principle of **resilience** plays a central role (see chapter 1.4). Resilience is understood to mean all characteristics and developments that contribute to minimising negative influences and strengthening positive impulses with regard to the achievement of defined sustainability Goals. Thus, the envisaged spatially effective transformation processes must – in effect as a superordinate goal – support an increase in resilience. This should help to ensure that the implementation of spatial planning and design measures ensure or even improve the fulfilment of the population's basic need.

With regard to spatial planning, **infrastructure** can be seen as the manifestation of the fulfilment of the basic needs in space. A large part of the needs (living, working, mobility, supply, communication) is mainly reflected by **technical infrastructures**. In addition to this, **social and cultural infrastructures** also serve as a means of fulfilling needs such as education, health or recreation, which are mainly addressed in the **Transformation Field of Welfare of People and Society**. In addition, the **blue-green infrastructures (soil, water, plants)** are of particular importance, as they are elementary for the satisfaction of human needs and also provide the space for leisure and recreational purposes. This structural classification should not obscure the fact that there are numerous interactions between the different infrastructures.

With regard to the achievement of socially focused sustainability Goals it is of high relevance to take into account normative concepts of **equal opportunities, equality and gender justice** – each of which is also closely related to the achievement of **distributive justice** and social cohesion – in spatial planning and the implementation of spatial planning measures.

7.2 Transformation potentials

7.2.1 Technical infrastructures

In spatial development, buildings and their architecture, transport, supply and disposal of water, food, waste, energy and communication as well as the necessary (technical) infrastructure play a decisive role. Due to **urbanisation, climate change** and **resource scarcity**, this infrastructure is faced with increasing challenges. In order to meet these challenges, the various parts of the infrastructure must be completely rethought and considered in interaction with each other. Current infrastructures are often not designed for this (e.g. peak consumption, extreme weather events, end-of-pipe solutions). Historically grown, rigid structures and high, installed material stocks, their longevity and large, long-term investments make a quick, comprehensive conversion difficult. Accordingly, current decisions and developments also shape the infrastructure for the future. If **change to resilient, resource efficient infrastructure** to maintain and improve **basic services** (relevant for SDGs 2, 6, 7, 11 and 12 in particular) is to be realised, it must be designed in such a way that its resilience and adaptability to disruptions (e.g. heavy rainfall and drought periods; **Options 11_06, 11_07, 11_08**) is improved and the **regional material, energy and water cycles with the lowest possible resource requirements** optimised. In this context the neces-

sity of some infrastructures should also be questioned and mixed uses and efficient multiple uses should be increasingly considered. From a spatial development perspective, the increasing **use of land (Option 15_10)** and the associated impairment of **soil resources and their functions** must be taken into account in particular (see Transformation Field *Global Environmental Commons*). The following chapters summarise options in this regard. For their implementation, appropriate framework conditions are necessary that enable **trans-disciplinary processes** in particular and are intended to prevent potential conflicts of objectives where space is limited.

7.2.1.1 Buildings and public spaces

The construction and operation of buildings is very **energy-intensive** (see Transformation Field *Energy Systems and Circular Carbon Management*). In Austria, providing heating and hot water alone cause around 10% of greenhouse gas emissions. Due to the continued thermal energy retrofitting of existing buildings, the expansion of district heating and renewable energy sources, as well as the implementation of energy efficiency requirements in new buildings, it has been possible to **reduce** these **emissions** by more than one third since 1990. Further measures in this regard can be found, for example, in **Option 13_06**.

In order to halve greenhouse gas emissions by 2030, 45 billion euros must be invested in **retrofitting** buildings (**Options 08_02, 13_06, 15_16**). In order to be able to act in a targeted manner, a comprehensive **greenhouse gas emission bonus/malus system** should be introduced, which takes into account not only energy for heating and hot water, but all climate-relevant emissions of the building (**Option 11_10**). In parallel, the mandatory preparation of **life cycle assessments** should be integrated into building tender procedures (**Option 12_06**). In the case of already existing, accumulated anthropogenic material stocks, approaches of **urban mining** for the recovery of secondary raw materials should increasingly be integrated (**Options 12_01, 12_02, 12_04**; chapter 7.2.1.5). Furthermore, the water demand of buildings can be reduced by **reusing** treated wastewater streams (e.g. grey water) (**Options 06_01, 06_03**).

In view of ever-increasing **land consumption**, the construction of new buildings far away from existing public transport, walking and cycling infrastructure should be massively impeded and the redesignation of land for building should be completely stopped before existing building land reserves are used up (**Options 15_09, 15_10, 15_16**). In principle, from a sustainability

perspective, retrofitting existing buildings to meet newer requirements for use and energy savings should be given priority over construction of new buildings.

Together with ecological aspects, **social and aesthetic** considerations are important in the construction of buildings – especially in housing: housing and living have to do with **well-being**, with the emotional and physical stability of the individual within a group within society. To promote **holistic and multifaceted-housing concepts**, an institutionalisation of housing at the federal level is necessary (**Option 11_01**). In particular, the reduction and revitalisation of vacant residential and commercial space is important (**Options 01_03, 12_07, 15_16**).

Overall, buildings should be **adaptable to changing uses over a long period of time** and thus be resilient (e.g. possibilities for adding storeys or ground floor zones with high ceilings). This curbs the need for new construction, is resource-efficient, but must be considered from the very conception of the building.

Between the buildings, **public spaces** and their **social, cultural and ecological functions** play an important role – not only for mobility, but also as educational resources and other uses (e.g. for children to play, for passive and active recreation, urban food production, and for aesthetic appreciation and health). They enable diverse social activities, are spaces of participation and collective experience, a forum for socialisation, an integral part of a democratic society, a counterweight to exclusionary and centrifugal forces and thus necessary for an open society. They are particularly available when cities and municipalities put a strong focus on walking, cycling and public transport.

Therefore, special importance is attached to the provision of **climate-neutral** and **climate-appropriate** living spaces/neighbourhoods (**Option 01_03**), **community-inclusive** neighbourhood design and research on interstitial spaces (**Option 11_05**), as well as **barrier-free, equitable access** to basic services without compulsory consumption, also in public spaces (**Option 06_02, 06_07**).

Understanding the interaction of gender, space, planning and design is also essential, allowing space to be analysed from a **gender-sensitive perspective**. In this respect, open spaces have to be considered in the context of all daily actions, taking into account **different needs** and providing **different types of open spaces**. This is particularly successful when buildings and open spaces are interlinked (e.g. through parks on roofs). Mixed or multiple use (e.g. temporally staggered and efficient use of open school

spaces, car parks, etc.) would also create many possibilities with minimal space consumption.

7.2.1.2 Transport infrastructure

Buildings not only have a direct ecological, economic and social impact, but also an indirect one in that they cause more or less local or regional **traffic** due to their arrangement in relation to one another. This traffic always arises when certain needs cannot be met locally. In these cases, goods or data are transported from A to B – or people themselves move about.

In Austria, transport has steadily increased over the last decades. Meanwhile, it causes around 30% of total **greenhouse gas emissions** – 75% more than 1990. Investments of approx. four billion euros would be necessary, in order to halve these emissions by 2030.

In **passenger transport**, one constant is particularly important: the **time** that people take for their mobility. Within this time, people look for those destinations where they can satisfy their needs – within their means (see SDGs 1 and 10) – as optimally as possible. How far they travel in doing so depends strongly on the speed with which one gets from A to B. The higher the speed, the longer the routes – and the more traffic they generate. At the same time, however, long journeys encourage the use of transport services that pollute the air and climate, create noise, can cause serious accidents and take up a lot of space. This concerns especially motorised private transport that – irrespective of the type of engine.

Sustainable mobility behaviour therefore requires a transport system in which people can satisfy their needs **without being dependent on cars**. In order to establish such a system, it is important to take into account that in passenger transport, the individual perception of journey time, comfort, safety and flexibility are the main factors that determine the **choice of mode of transport**. Therefore the **transport infrastructure** is crucial and a **redistribution of transport space** from motor vehicle traffic to walking, cycling and public transport is the key to transforming the transport system. At the same time, it is necessary to stop all **investments** in the expansion of the road network (**Option 15_16**) and to invest the money in the **expansion of infrastructure for walking, cycling and public transport (Options 08_02, 11_02, 11_03)**. In cities and municipalities, **pedestrian zones**, high-quality cycle paths and modern cycle parking facilities should be built, which also improve health (**Option 03_01**). In larger cities, the **tram and suburban railway networks** should also be expand-

ed, while in rural areas, **public transport axes** are to be created, which can be served by suburban railway and buses with a high frequency. This means that individual vehicles are only needed for short journeys or for the journey to the next public transport station with **Park & Ride or Bike & Ride spaces**. Car journeys into cities, on the other hand, become extremely unattractive due to long journey times and a lack of parking facilities.

Furthermore, a consistent implementation of **spatial planning objectives** would lead to denser settlement structures and a better **functional mix** – and thus to shorter everyday journeys and significantly less passenger traffic (**Option 11_04**). This includes, above all, the prevention of urban sprawl. If, in addition, vehicles are available on a shared basis through **sharing services** (cars, cargo bikes, etc.), the need for individual car ownership is practically zero (**Option 11_03**).

In addition to measures in passenger transport, it is also necessary to (1) **reduce freight transport**, (2) shift it from trucks to **rail or cargo bikes** and (3) transport the remaining part with **non-fossil fuel vehicles**. First of all, the external costs must be internalised: This would result in a massive increase in the cost of truck transport, which would strongly support the aforementioned goals. In order to keep the remaining distances as short as possible, rail freight terminals and connecting railways to manufacturing companies should be expanded (**Option 09_01**). Overall, a massive shortening of transport distances should be made possible by a predominantly **small-scale, regional economy** in which production and consumption are close together (see Transformation Field *Sustainable and Equitable Economy*).

7.2.1.3 Water and sanitation

With **challenges** such as increasing urbanisation and climate change, the careful use of **valuable water resources** (see Transformation Field *Global Environmental Commons*) is becoming ever more important. In (drinking) water supply, continuous monitoring of water losses and consumption and corresponding promotion of water pipeline retrofitting, measures to reduce peak water consumption as well as relevant research and awareness-raising in all relevant sectors are important (**Option 06_03**).

In **water and sanitation**, a shift in thinking is needed to take into account **multiple, potential benefits of infrastructure** (**Option 06_01**). In addition to ensuring hygienic waste disposal, this can include, for example the reuse of (treated) wastewater and greywater or the recovery of nutrients through (en-

ergy)-optimised, decentralised and regional recycling. This should be seen in interaction with blue-green infrastructure (soil, water, plants) (**Option 06_02**; chapter 7.2.3).

According to the latest figures from the United Nations in 2017, 2.2 billion people **worldwide** (29% of the global population) do not have access to clean drinking water and 42 billion people (55%) do not have access to safe sanitation. Here, too, Austria has a **global responsibility** to support other countries in achieving the goals (**Option 06_10**).

7.2.1.4 Food supply

Regionally oriented, sustainable food production, processing and supply is strongly determined by appropriate regional development. This requires, among other things, **strengthening regional cycles** (**Options 02_05, 06_01, 06_02**) and urban-rural relations in food production, supply and processing, promoting and **preserving small-scale farming structures**, and **regional cooperation and networking** (**Option 02_05**) as well as the greening of grassland management (**Option 02_04**). These measures, but also the cultivation of food in urban areas (urban farming) as a **neighbourhood-based food supply**, can contribute to increasing food sovereignty, resilience and the cohesion between people (**Option 11_11**). Further details and options on this topic can be found in the Transformation Field of *Nutrition and Food Production*.

7.2.1.5 Waste management structures and processes

In addition to the pure supply and disposal of waste from a household perspective, waste management must also **focus on waste prevention, reuse, recycling and recovery**, and **safe disposal**. Cities and municipalities are responsible for waste collection and initial processing (pre-sorting), from which **secondary raw materials** of all kinds are obtained for a **circular economy** (see Transformation Field *Sustainable and Equitable Economy*). Among other things, this is important in order to reduce the consumption of primary raw materials and to enable the greatest possible independence from the import of the latter. Measures to this end include, for example, the creation of a trading platform for secondary raw materials, the promotion of digitalisation investments in raw material producing companies, the creation of resource registers to identify anthropogenic deposits and the promotion of industrial symbioses (industrial sites as clusters) (**Options 12_01, 12_04**).

Functioning closed-loop cycles already begin with the appropriate design of products (**design for recycling**) (**Option 12_02**), in which, among other things, the avoidance of toxic substances for human health and the environment and, in particular, also for functioning material cycles and the recovery of secondary raw materials is relevant. **Consumption patterns** also need to be designed sustainably. Measures to increase the **useful life and intensity of use** (caring & sharing) of consumer goods and their components are essential for this (**Options 01_03, 11_05, 12_07**).

In terms of **sufficiency**, the topic of waste plays a decisive role ecologically, socially, but also economically. This is particularly evident in the example of **food**, which is examined in more detail in the Transformation Field of *Nutrition and Food Production* or in **Option 12_03**.

The improved design of waste management processes should also aim at **reducing** the resulting **greenhouse gas emissions**. Improving the quality of landfilled waste and creating the safest possible final sinks (**landfills**) play a decisive role here (**Option 11_09**).

The **legal framework** necessary for the implementation of the various measures includes clarifications on the **concept of waste** (**Option 12_04**) as well as the same **quality requirements** for all **materials** (regardless of whether primary or secondary) (**Option 12_02**). Furthermore, sustainability- and cycle-oriented research and development should be promoted (**Option 09_03**).

For the corresponding **infrastructural framework**, sustainability-oriented **reuse and recycling infrastructure** must be established or modernised. This includes, for example, the establishment and promotion of professional second-hand shops, the harmonisation of separate collection systems for waste and old materials as well as high-tech sorting facilities (**Options 09_02, 09_04**). Through joint target definition and coordinated implementation of all these aspects, the **economic potentials** can also be tapped through higher **regional added value**, increased employment in service-intensive circular sectors (e.g. repair, reprocessing, recycling), and supply chain resilience (**Options 09_04, 12_01, 12_02, 12_05**; Transformation Field *Sustainable and Equitable Economy*).

7.2.1.6 Energy infrastructure

For the sustainable development of communities and regions, **energy supply**, mobility and settlement development must be thought of together, as compact, functionally well-mixed set-

lements reduce the effort required for the provision of heat, but also for everyday travelling (**Option 13_06**; Transformation Field *Energy Systems and Circular Carbon Management*; chapter 7.2.1.2). The key to this is **integrated energy space planning** (**Option 13_11**), which is closely linked to the expansion of **regional decentralised** energy production and supply based on **renewable** energy (**Option 02_05, 07_01**) as well as the establishment of an infrastructure for **balancing** energy production and consumption in terms of **time and space**.

7.2.1.7 Communication infrastructure

Communication infrastructure requires the least space. Especially in rural areas, the expansion of **digital infrastructure** would bring various advantages (**Option 02_05**). In part, this can also replace real traffic. At the same time, however, there is a significant amount of data traffic that requires more and more **energy**: Already in 2013, the entire sector of information and communication technology (ICT; office equipment, telecommunication and a large part of entertainment electronics) was responsible for almost 10% of electricity consumption. In addition, the associated lack of exercise leads to health problems (**Option 03_01**). The impact of digitalisation on the human brain and the **health and environmental effects** of the increasing radiation from communication infrastructure should also be monitored.

Strengthening **media education and media competence** as well as the competence necessary for critical reflection and use of **digitalisation** and its effects is necessary (**Option 16_08, 16_18**). This is particularly important for the comprehensive, sustainability-oriented equipping of pupils and teachers with a digital infrastructure for the development of digital competences (**Option 04_08**).

7.2.2 Social infrastructures

Human well-being and the ability for self-realisation and action depend not least on **existing and functioning social and cultural infrastructures and anti-discriminatory access to them**. As mentioned in the Transformation Field of *Welfare of People and Society*, they make an essential contribution to social participation, security and social protection systems. Social infrastructure includes health, cultural and educational systems, public spaces, mobility and building use (including environmentally and climate-friendly housing that is affordable). There are various options in the report (**Option 01_03**), which include care and supply possibilities (**Options 05_02, 08_06**) as well as the service and cultural sector. In order

for the creation, maintenance and access to these infrastructures to contribute to **societal well-being**, it is important to focus urban and spatial planning less on private and particular individual interests, which are mostly exclusive and resource-intensive. This also means taking into account a **socially (including gender), environmentally and climate equitable distribution** – especially to meet community needs that take into account increasing environmental and climate pressures (e.g. increasing heat stress and biodiversity loss) (**Options 15_02, 15_07**).

To this end, it is indispensable to expand the **scope of action of the municipalities (Option 01_03)**. Appropriate and effective control mechanisms that ensure quality assurance (of developments, land designation, tenders, etc.), for example at the provincial level, help in this. Regaining room for manoeuvre also goes hand in hand with participatory design of urban and peripheral spaces, in which citizen participation plays a central role instead of the legal representative bodies (e.g. mayors, municipal councillors).

The involvement of the population, e.g. through co-design and co-creation, is essential for this (**Option 06_11**). **Re-municipalisation efforts** open up scope for action for the common good: from housing to the sharing economy to the preservation and creation of natural and public recreational spaces (lakes and parks) as well as the adaptation of urban and rural spaces to the changing needs and realities of societal functions (e.g. in the field of modern care and welfare work; **Option 08_06**). Measures to this end include, for example, special land designation regulations, pre-emption rights for land and residential buildings, a levy on secondary residences, stronger networking and cooperation between urban and rural authorities, the joint use of industrial estates (**Options 01_03, 11_01**). In this context, improved mobility concepts between urban and non-urban areas play an important role (**Options 11_02, 11_03, 11_04**; chapter 7.2.1.2). Another important factor for human well-being is **anti-discriminatory and gender-equitable access to affordable housing**, living environments and land resources that meet climate adaptation measures (decarbonisation of housing, mobility and land use) (**Options 01_03, 11_02, 11_03, 11_04, 15_07**). Further commoditisation and rent-seeking¹³ in urban development and the housing sector risks playing off economic interests against social needs, climate protection and other environmental concerns.

¹³ Here: Use for purely profit-making purposes (individual economic interests).

7.2.3 Blue-green infrastructure: Soil, water and plants in settlement areas

Blue-green infrastructure as a **nature-based solution** plays a key role in the future-oriented and resilient **design** of settlement areas. Blue infrastructure refers to water surfaces and bodies as well as urban water infrastructure for rainwater management and treatment of wastewater or wastewater sub-streams (e.g. greywater) in the **regional cycle**. Plants are crucial as green infrastructure, for example in their cooling and recreational function (e.g. reduction of heat islands through shading and evaporation). Soil is also an essential element, for water purification and as a water reservoir (e.g. for protection against natural hazards; **Options 11_04, 11_05, 11_06**), but also as a habitat for plants and animals and for the local absorption of nutrients. In contrast to grey infrastructure, blue-green infrastructure can thus fulfil **several functions at the same time**. As it also functions in a decentralised manner, it is far **more flexible and adaptable** to future changes and allows for local material, water and energy cycling. Spatial planning is particularly relevant in the protection of **soil resources**. These are non-renewable, but fulfil essential functions (e.g. provision of food, drinking water, habitat, carbon and water storage). Land for settlement development competes with other important land uses such as agriculture, nature conservation and retention. These should be optimised through appropriate **land management** (**Options 01_03, 13_09, 13_10, 13_11, 15_02, 15_03, 15_09, 15_10, 15_15, 15_16**) and coordinated well with each other (chapter 7.4; Transformation Field *Global Environmental Commons*).

Urban **green spaces** have numerous **positive influences** on the **urban climate** (air quality, temperature, water balance, noise pollution) and thus on people's health and (mental) **well-being**. They promote stress reduction, motivate physical activity and active mobility (cycling, walking), improve social cohesion and interaction with nature. They have been shown to reduce the risk of cardiovascular disease, obesity and diabetes, and lead to improved pregnancy outcomes. In order to be able to unfold these positive influences and to **compensate for inequalities**, particular attention should be paid to the **accessibility** and **usability** for all population groups as well as the quality of the green spaces (**Options 10_01 – 10_05**).

For the **increased use of blue-green infrastructure**, incentives for the local management of rainwater, corresponding assessment bases, availability of education and training as well as securing the necessary water supply are important (**Options 06_02, 13_03**). As these **measures** require appropriate space, planning & design, maintenance and financing, all relevant **stakeholders must be involved** in their development and implementation (**Options 06_11, 11_05, 11_11**) and appropriate legal, spatial planning **framework conditions** and distribution of competences must be created (**Options 11_06, 11_07, 15_16**; chapter 7.4).

Near-natural or natural areas can also contribute to the **protection of species and habitats** in urban areas and thus to the promotion of **biodiversity**. In addition to publicly accessible areas, this also applies to company premises and private gardens. Measures to achieve this include sustainable management of street and building lighting, securing and linking traffic routes for wildlife, care of native plants, alternative pest control and responsible handling of domestic animals. With regard to urban green spaces and water areas, the creation of biotope networks and near-natural design and maintenance as diverse habitats are particularly important (**Option 15_07**).

7.3 Responsibility beyond the borders of Austria

Just as global challenges do not stop at national borders, resilient spatial development that contributes to the achievement of the Sustainable Development Goals cannot stop at state or national borders. In the sense of the *European Spatial Development Perspective* (ESDP), cross-border cooperation is needed to preserve the natural foundations of life and the cultural heritage, and to secure and further develop economic and social cohesion.

In order to counteract spatial disparities and ensure equal access to infrastructure and knowledge, targeted promotion of cross-border spatial planning is required. In cross-border exchange, learning from each other offers a high potential for innovation, from which both sides can ultimately benefit.

7.4 Allocation of roles in the implementation of the transformation potentials

The realisation of sustainable spatial development based on enhancing resilience is only possible if the decisions and actions of all groups of actors work together synergistically. In concrete terms, this means that (1) political frameworks and the provision of instruments on all levels, (2) the development and implementation of spatially effective economic and financial-technical instruments, (3) willingness to act and consistent action on the part of citizens, both at the individual level and on the part of groups, and (4) goal-oriented education and transdisciplinary research to create awareness, which leads to a responsible willingness to act. Only when they complement each other do they make the desired transformation possible.

7.4.1 Politics and administration

It is the responsibility of politics and administration to anchor the principles of sustainable development, climate protection and equal opportunities at all levels (federal, provincial and municipal) of spatial planning. The following basic principles apply:

- adaptation of the legal basis at all planning levels (**Options 15_09, 15_10, 16_09, 16_10**);
- target and create funding instruments for the conversion of existing infrastructures according to the general requirements of the Sustainable Development Goals and the specific requirements of climate neutrality (**Option 09_01**);
- prioritise the protection of natural resources and the restoration of near-natural spaces, as well as the preservation of cultural elements;
- halting urban sprawl through densification and functional mixing;
- anchor and introduce comprehensive participatory processes (**Options 16_09, 16_10**).

7.4.2 Economy and finance

With regard to spatial planning, economics and finance play important roles. Since about one third of the annual soil sealing takes place for commercial areas, the consideration of sufficiency as a central basic principle for sustainable land use is necessary. In this context, the contribution of the financial sector to the responsible use of space as a limited resource must also be questioned and rethought (which spatially effective plans are financed and how, and what are their financial consequences?)

- strengthening small, regional businesses that produce and sell their products and services in close proximity to residential areas;
- increasing use of existing technical and social infrastructure so that regional value creation is strengthened;
- optimisation of entrepreneurial potential, value chains and material cycles through regional cooperation and networking between enterprises and with public institutions (**Options 02_05, 06_01, 06_03, 09_03, 09_04, 12_01, 12_02, 12_07**).

7.4.3 Society (individuals and groups)

Spatial planning is a political process whose success is strongly dependent on individuals and groups. Active citizen participation increases the chance that space will be designed according to local needs, which also leads to a high level of acceptance. This valorisation of the *intelligence of the many* is all the more important the more small-scale spatial structures are, e.g. in villages or in individual neighbourhoods within cities.

- strengthening political commitment through involvement in participation processes (e.g. citizens' councils) and active co-design of spatial structures and thus of the future;
- individual assumption of (co-)responsibility for sustainable spatial development through conscious choice of places for living, working, shopping, education and leisure activities as well as the optimal use of existing infrastructures. The same responsibility applies to political actors such as mayors.

7.4.4 Education, science, art and media

The scientific community is called upon to conduct more inter- and transdisciplinary research in the field of spatial development. Representatives from civil society, politics and administration as well as from architecture, design and art should be included in dialogues so that, by taking into account different perspectives, jointly applicable and accepted instruments for sustainable spatial development can be created.

- anchoring the spatial effectiveness of sustainability and climate neutrality measures in education programmes from primary to tertiary education (**Options for SDG 4**) in order to create perception, awareness and willingness to act (**Option 09_03**);
- intensification of the identity-creating contribution of art and culture in urban and regional development;
- strengthening cultural activities in rural areas (**Option 02_05**).

8. Summary

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8.1 Introduction

What conclusions can be drawn at the end of the first phase of the UniNEtZ project? How does transformation happen? Who has the power to implement the options and measures and thus also the responsibility for their implementation? How can Austria contribute to ensuring that the Sustainable Development Goals are also implemented at the global level? This chapter attempts to provide answers to these questions – answers that can be derived from the multitude and diversity of the options and measures developed and from the numerous interdisciplinary discussions that took place within the framework of UniNEtZ in general, but especially in the course of the preparation of the options and the *UniNEtZ Options Report*.

8.2 How does transformation happen?

It is worth considering whether the stated sustainability Goals within the prevailing economic, financial and societal systems are achievable at all. If one answers this question

in the *negative*, one has to ask whether a replacement of these *systems* is so imminent, that the solution to the major challenges, such as climate change or biodiversity loss, can be postponed until after the system change. Since the time to act is very short in both cases, this is highly questionable. Regardless of whether one considers disruptive or gradual changes desirable, there are no convincing signs that a wilful, socio-ecological transformation of even one of the affected systems is imminent on a global or supra-regional scale. Moreover, sweeping system debates are often too polarising and insufficiently differentiated to open up meaningful and practicable solutions.

This means that the transformation must begin now, under the given framework conditions. Assuming a serious will to achieve the sustainability goals, changes in the systems will inevitably result. The measures outlined in the *UniNetZ Options Report* give an indication of what such changes and the resulting new system states might look like. Even these changes may not go far enough for some. There is also the fear that the *systems* are so persistent that they pervert or a priori nullify all reform efforts. In this case, the task arises to promote developments that cushion the crash into chaos or the *Fortress World* (according to the *Stockholm Global Scenario Group*) for as many people as possible and thus make it more bearable for as long as possible. In the climate discussion, there are many considerations and proposals for measures that have universally valid under the heading of *deep adaptation*.

UniNetZ has dedicated itself to that path into the future that leads via smaller and larger transformation measures, the result of which, however, is not clearly predictable. This open future results from the fact that both the overall system and the essential subsystems are complex systems that fundamentally do not permit targeted control of current and, above all, future developments/processes in the sense of comprehensive control of development. Learning and a critically-reflective approach to failures must in any case also be part of shaping the future.

8.3 Who has the power of implementation and thus also the responsibility?

As the previous chapters have shown, the power to implement the options for achieving the Sustainable Development Goals is distributed across all actors. The discussions in the climate debate about an eco-dictatorship of the state on the

one hand and individualisation of responsibility on the other hand are futile, because the Sustainable Development Goals of the *UN Agenda 2030*, including the climate goals of the Paris Agreement, will only be achieved in a concerted action of all actors, i.e. if everyone does what lies within their power and responsibility, and if as many of those affected as possible are involved in the definition of goals and the choice of means to achieve them. This means that in every decision at every level, all actors must ask the question whether the chosen solution promotes or hinders the achievement of the Sustainable Development Goals and that the answer must be included in the basis for the decision. It also means the legal circumvention of laws, regulations, directives, etc. to the detriment of sustainable development must be socially ostracised and prevented by the administration apparatus.

One of the great challenges of the coming years will be to steer the unavoidable changes in social consensus along more sustainable paths, but at the same time to ensure the flexibility that is necessary in dealing with complex systems. Enabling broad participation and actively striving for it at all political, social and economic levels, in the spirit of *Leave No One Behind*, appears to be an indispensable prerequisite in a democracy.

The need for dual approaches in different directions runs through all groups of actors:

- take positive and refrain from negative actions. For example, it is not enough to invest in renewable energies; the promotion of fossil energies must also be stopped (innovative and *exnovative*¹⁴);
- act as sustainably as possible within the given system boundaries and at the same time participate in the expansion of the system boundaries. This means, for example, producing as sustainably as economically possible, but at the same time demanding regulations that enable more sustainability (systemic and cross-systemic);
- exploit the possibilities at the local, regional and national level, but at the same time work towards the creation of improved framework conditions at the respective higher, also international, levels. In this way, the individual can save greenhouse gas emissions by switching to an electric car, but at the same time he/she can advocate for

¹⁴ The term coined by Paech expresses the fact that already existing technologies are displacing others, e.g. through the energy transition, in which nuclear fossil fuels are being displaced by renewable forms of energy. The old new (the renewable forms of energy) is thus being exnovated.

the expansion of public transport and car rental systems that make owning a car unnecessary (regionally and globally).

8.3.1 Policy at international and EU level

When framework conditions for social, ecological and economic sustainability are implemented at the international and EU levels in the areas of labour, trade, environment, agriculture and food, health and international politics, scope is created for more sustainable national policies. Moreover, this is an essential step towards peace. Peace and sustainability, especially climate protection, are interdependent: without sustainability, lasting peace is inconceivable; on the other hand, sustainability cannot develop under conditions of war.

The basic concept of international trade as a peace project can only succeed if the framework conditions are fair to all participants. Austria can promote this by actively participating in international and EU treaties to strengthen sustainable development. These include the major EU funding programmes for the economy, agriculture and forestry, research and education, as well as the culture, in which sustainability is mostly still underdeveloped at present.

Austria can continue to campaign at the international and EU level against high-risk technologies, especially nuclear energy, geo-engineering and genetic engineering, and call for a well-considered and forward-looking approach to the socially and ecologically potentially problematic field of digitalisation. The maintenance or creation of the necessary competence in the country and the commitment to a future-oriented distribution of EU research funds (EU energy research funds currently flow disproportionately into nuclear energy research, for example) are prerequisites for success.

8.3.2 Policy (and administration) at the national level

Making a good life possible for all within ecological limits will only succeed if systemic levers are set in motion and work is done together at all levels and across party lines. National policy has a central role to play in this. Every political and administrative decision, including public procurement, must be measured against the question of whether it serves or hinders sustainable development. This would be an important step towards the protection of natural resources as well as the preservation of cultural elements and the restoration of near-natural spaces.

An important step towards sustainability could be to declare integrated strategies such as sustainability, climate adaptation and biodiversity strategies legally binding and to check state laws and regulations to ensure that they are inclusive and non-discriminatory. Of similar importance would be the harmonisation of hitherto contradictory policies, such as agricultural, health, spatial planning, social and environmental policies, with clear and long-term guidelines that create a secure investment climate. Important measures would be, on the one hand, an end to harmful or counterproductive subsidies, especially in the energy sector, and, on the other hand, a shift from urban sprawl to densification and functional development.

All this could probably be implemented more easily by introducing and anchoring comprehensive participatory processes for citizens in the face of strong interests that counteract these changes. This would be especially true if educational institutions were given a broad educational mandate encompassing the entire population, including a comprehensive understanding of nature, economics and finance, which corresponds to the requirements of the present (see below). At the same time, it is the responsibility of the state to ensure the independence of science and the media.

At the systemic level, the transition to a circular economy can initiate the socio-ecological transformation to a sustainable and equitable economic system, which takes proactive steps to promote transparency, cost-truth, resilience and sufficiency, prevents negative environmental and social impacts through appropriate prohibitions and incentives, and prevents harmful excesses in the financial sector.

8.3.3 Policy at the municipal level

It is the responsibility of local politics to make the best possible use of the scope for sustainable development offered by the international and national levels, and at the same time, as described above, to expand it by providing feedback on obstacles and opportunities for expansion. Spatial planning, settlement development, transport routes, mobility services, construction, parks and trees, kindergartens and primary schools, old people's homes, tourist activities, farmers' markets and much more are all within the decision-making sphere of regional and local politics and offer many opportunities to promote sustainable development. Often, encouragement can already achieve a lot, for example in strengthening the role of women in politics and agriculture or in cross-sectoral measures such as combining tourism and local agriculture.

Last but not least, the local level plays a decisive role in democratic education. The manageability of the issues and the people concerned allows for a transparent involvement of the citizens in the decisions – an important factor in the empowerment as citizens of the state.

8.4 Economy and finance

All actors in the economic and financial sector can act more sustainably in their own area, as far as the framework conditions allow, and actively participate in shaping improved framework conditions that enable sustainability. Interest groups also have many opportunities to increasingly assume their societal responsibility and to proactively advocate for the necessary changes at national, EU or global levels. It is important to develop an understanding that *business-as-usual* is not an option; not because people with an affinity for sustainability do not want it, but because the inevitable changes associated with it (climate change, loss of biodiversity, digitalisation, social unrest and populist regimes) make it impossible to *carry on as before*. It is important not to simply let these changes happen, but to shape them in an informed way in cooperation between politics, science, art and other parts of society.

Even under the current framework conditions, the exploitation of the *Global Environmental Commons* and the overstepping of *planetary boundaries* can be curbed by business. This would be facilitated by the transition to a sustainable, regionally oriented circular economy, to the achievement of which business can contribute significantly, as pioneering companies have long since shown. Even now, the annual soil sealing for industrial estates could be reduced in favour of a more sustainable use of space by applying the sufficiency principle. Cross-sectoral cooperation can turn residual products into raw materials (e.g. through carbon management), waste heat into useful energy and allow infrastructure to be shared.

The social partnership that has been successful in Austria for many years could be revived with a new orientation of the chambers, confederations, trade unions, etc. involved and the expansion of the social partnership goals in accordance with the changed framework conditions. For example, good representation models for poorly organised, atypical and precarious workers could be developed and implemented in the sense of *Leave No One Behind*. Going further still, an overarching sustainability partnership could be considered, in which not only the social partners, but also civil society, future genera-

tions and nature would be represented with a strong voice.

It is also necessary to consider the contribution of finance, which has become much more than a specialised area of the economy, to a responsible and sustainable approach to nature and people. It is obvious that investments in the conversion, expansion and new construction of the energy system are necessary, but at the same time *divestment* from fossil energy, risky, biodiversity-destroying and peace-threatening technologies is also necessary. Banks and investment advisors can significantly accelerate this process by providing sustainability-oriented products and advice to their clients.

In addition, it would be helpful to analyse the respective contribution to sustainable development of the entire range of financial instruments (shares, bonds, participation certificates, investment certificates, money market instruments, foreign exchange, units of account, derivatives, emission certificates, cryptocurrencies, etc.) in order to introduce appropriate reforms. Some things are obvious, such as the elimination of tax havens, others require closer examination.

8.5 Society (individuals and groups)

Everyone belongs to society, as individuals, as voters and citizens, as consumers, but also organised in families, communities, associations, NGOs and many other formal and informal groups. Due to their demands and habits, their consumption and voting behaviour, their acceptance of undesirable developments, their persistence in the traditional and many other things, they are all part of the problem, but at the same time victims of the multiple crises and the core of any solution. In democracies, they potentially have the greatest leverage, but a minimum of people has to pull in the same direction. That is why education, information and transparency are fundamental prerequisites for transformation and why the media also have a key role to play.

Credible and effective narratives can create awareness that things could be different and thus increase willingness to leave the beaten track. They can increase civil society engagement, valorise the *intelligence of the many*, make particular interests take a back seat to the goals of society as a whole, and contribute to the collective demand for political objectives and measures through petitions, popular petitions, demonstrations, strikes, etc., thus exerting pressure on political decision-makers to create suitable framework conditions. Such processes can set in motion an upward spiral of self-empower-

ment and effectiveness, and increase active citizen participation in political decision-making at all levels.

In addition, important steps can be taken and habits consciously changed toward sustainable development even without changing the framework conditions. A change of diet with significantly reduced meat consumption and food waste as well as more ecologically, regionally and seasonally produced food, is a personal choice and means of change and contributes to improving health. These autonomous individual decisions away from culturally strongly anchored dietary habits will manifest themselves broadly, when a wide range of additional measures are taken by politics, the education system, retail, the media, food companies, doctors, health representatives and others. Attention to sufficiency and efficiency, not only in the energy sector, quality goods instead of throw-aways, borrowing instead of buying, to name just a few examples, not only serve the environment but also help to save money. Renewable energy instead of fossil energy, active mobility instead of individual transport improve air quality, health and are more sustainable. Fortunately, most of the measures that contribute to sustainable development also have direct positive effects on people's lives and contribute to an increased quality of life.

8.6 Education, science, art and media

Education, science, art and media have a special responsibility to create awareness and competences for existing and future challenges. The goal is a responsible willingness to act, based on the development of a deep-rooted understanding of the intrinsic value of the global commons and on the identity-forming roles of art and culture that are essential for the social community. This can only be ensured if these sectors actively work to maintain their independence from the state and the economy and cultivate and teach open approaches, diversity of viewpoints and a constructive approach to disagreement.

Education, science, art and media are not only important for the transformation of politics, the economy and society, they will also have to transform themselves if they want to fulfil their task. This applies both to their core activities and to their everyday life, in which, for example, attention is paid to sustainable energy supply, mobility and nutrition, equal access infrastructure, biodiversity-rich design of school gardens and school environments, and a thoughtful approach to digitalisation.

The education system will be able to make a greater contribution if it opens up in terms of content and becomes more socially inclusive. The change of consumer and dietary habits or mobility behaviour, for example, is easier if there is an awareness of the consequences of previous habits and of the connections, e.g. with the understanding of roles in society and the family, across the population.

To this end, access to the education system must be facilitated, from kindergarten to general and vocational schools and universities to extracurricular institutions. This applies in particular to social groups with little affinity to education, which must be actively addressed. This is particularly important in times of upheaval, as the profound changes in the economic system and the world of work can only be countered through continuous education and training. In the sense of the findings of modern brain research, which emphasise interest-led learning in a joyful environment, fundamental changes in the systems currently geared towards performance and competition would also be expedient. At universities, particular attention should be paid to preparing students as (future) decision-makers for the challenges of the present and the future.

Science is challenged to adapt its content in research and teaching to the requirements of the present and the future and to react more quickly and with foresight to changes. This applies, for example, to opening up economic and financial sciences, agricultural and nutritional sciences, and energy and labour sciences to more diverse and new ideas, as it is crucial to accompany these particularly important and far-reaching transformations with research. The establishment of experimental and creative spaces and structures can promote this, but penetrating institutions also requires conceptual and structural changes within the science system. The current all-pervasive market and efficiency logic stands in the way of the free development of creativity and systemic penetration of subject matter. Opening up the system in the sense of a transdisciplinary approach for representatives of civil society, business, politics and administration can promote the necessary holistic and systemic approach.

Observation and reflection on the relationship between society and nature has long been a central motif in art. It is therefore in a good position to point out the excesses and contradictions of the current system and the great opportunities of sustainably designed systems and to make them emotionally understandable and tangible. In so doing, it is important to focus not only on the urban, but also the rural environment.

Through balanced and comprehensive information, but above all through well-researched analyses from different perspectives, the media can improve the public discussion in political, economic and financial issues, sustainability and ethics. This requires, however, a large degree of independence from owners, from the state and from advertising revenue, which is currently lacking in most media. It is also highly questionable that the owners of social media, not academia, determine what are real facts and what are *fake news*. More transparency in the financing of the media as well as the second jobs of journalists could be a first step in this direction.

8.7 How can Austria also contribute to achieving the Sustainable Development Goals at the global level?

The analysis of the fulfilment of the criteria of the *Doughnut Economics* or the *Ecological Footprint* vs. the *Human Development Index* (Fig. 4) both lead to the same conclusion: states fulfil either the social or the ecological criteria, no state fulfils both. This means that the two groups of states must follow fundamentally different paths to achieve the Sustainable Development Goals. The industrialised countries must reduce their ecological footprint without losing their social achievements, i.e. in the sense of “*liberation from abundance*” (Paech, 2011, translation from German). The proposals for sustainable and climate-neutral living, developed within the framework of UniNEtZ and the Ref-NEKP, show that more quality of life can be achieved. The options presented are steps in this direction. The countries of the Global South, on the other hand, must achieve an increase in quality of life through measures in social and economic areas without (significantly) increasing their resource consumption. Both groups assigning the other the responsibility – by the one group because of unsustainable lifestyles, by the other because of population growth that counteracts sustainability – is not helpful.

UniNEtZ has dealt with this problem in as much as analysing which Austrian institutions (in the sense of living habits, rules of the economy and the financial sector, etc.) make it difficult or impossible for emerging and developing countries to implement the Sustainable Development Goals.

This includes, for example, Austria’s share in the loss of biodiversity or regional water shortages in these countries through the import of goods from developing countries.



// **Fig. 4:** Comparison of the ecological footprint.
Source: Kromp-Kolb & Formayer (2018).

Here, too, Austria can act on several levels: At the **international level** (global, multilateral and EU), Austria can advocate for regulations and agreements that promote sustainability, point out misguided developments and actively fight against them with diplomatic and political means. One example at the European level is the attempt to include both gas and nuclear energy as sustainable energy forms in the so-called taxonomy – a step, which would allow the supporting of these forms of energy with EU funds. In multilateral trade agreements and financial regulations, Austria can advocate designs that also give developing countries fair opportunities and, in addition, sanction unsustainable practices wherever they take place. This is of particular importance in European agricultural policy, which leads to the destruction of large areas of tropical forest and savannah and to negative social consequences for many people in the Global South.

At the European level, Austria can advocate for the EU to terminate counterproductive treaties such as the *Energy Charter Treaty* (ECT). On the positive side, a good spatial development concept (ESDP) drawn up in cross-border cooperation can contribute to preserving the natural basis of life and the cultural heritage as well as to securing and further developing economic and social cohesion. Austria has already proven many times that despite its small size it can also act successfully on the EU and global political stage – the most recent example being the ostracism of nuclear weapons.

Independently of this, Austria can join relevant treaties and agreements, such as the *High Ambition Coalition for Nature and People*, or generously endow international funds, such as the UN *Green Climate Fund* or the *Legacy Landscapes Fund*.

As long as the international level does not act to a sufficient extent, Austria can, for example, impose responsibility on the economy for equal social and environmental standards along the entire value chain at the **national level** in a way that can be verified and sanctioned.

A collaboration between **politics and the economy** is necessary when it comes to achieving the energy transition in such a way that it is not to the disadvantage of other countries, especially developing countries. This concerns, on the one hand, non-renewable resources, which should be used as sparingly as possible and extracted in the most environmentally friendly way possible, on the other hand, land consumption, especially *land grabbing* for the extraction of raw materials or energy, and thirdly, social aspects, from child and slave labour to labour security and fair wages.

The situation is similar in the case of digitalisation, except that here the requirements for a less ecologically and socially damaging disposal of electronic waste that is more strongly oriented towards the reuse of materials is as an additional, important factor. Given the importance and growth of this sector, it is probably one of the first in which the circular economy can be systematically and rigorously demanded in a beneficial way.

In the field of **education, science, art and media** it is important to be tactful in offering services without dominating and destroying each other's culture. It is increasingly recognised how misguided the sometimes brutal, sometimes subtle efforts were and are to teach all children worldwide (e.g. also children of indigenous peoples) the same thinking and the same Western-influenced values. The fact that it is essentially the Western economic and financial system and the associated belief in technology and progress that have led the world onto its current unsustainable path and into crisis should make us receptive to the potential of solutions that have been developed in other, non-Western cultures and are still partly lived.

By providing information about and documenting grievances, many **media** already make a significant contribution to raising awareness of the sometimes catastrophic international effects of national actions. Unfortunately, this awareness remains siloed within the media – i.e. what the environmental editors know, for example, is not included in the reports and analyses of the business editors or in the interviews of the political editors. This is particularly evident with regard to advertising: in an issue with an article about child labour on cocoa plantations, there may be advertisements for chocolates that are based on this very child labour. The media have a great deal of leverage in accelerating the international implementation of the Sustainable Development Goals. One of the ways in which they can fulfil this responsibility is by making suggestions to the state for legally binding regulations to integrate ethical principles for media. The current ethics charter for the media does not seem to be sufficient, in particular some important media in Austria have not signed it.

Society can also play a major role here, since in a market economy the market is dependent on the consumer buying. Deciding what to eat, for example, is political and cumulatively determines political and business decisions. The same is true for clothes or electronics. Furthermore, voting also influences which policy is made by Austria. Anyone who does not believe in this possibility doubts the functioning of democracy and should work to improve it.

8.8 Consequences for the further work of UniNEtZ

The options created within the framework of UniNEtZ cover a wide range of topics, but without claiming to be exhaustive – completeness was never an objective. In the course of compiling this report, however, it has become clear that some very essential fields of action should still be addressed with additional options. In some cases, this could be done within the framework of UniNEtZ, e.g. for the SDG 13, where preliminary work had already been done by the Ref-NEKP. Some further options can be developed in the next phase, within UniNEtZ II. However, the main focus of UniNEtZ II is on new tasks.

The *UniNEtZ Options Report* was created by scientists, artists and students for Austria, in exchange with a limited number of stakeholders. In order to become effective, it must be subjected to practical tests. Within the framework of UniNEtZ II, the options and measures are to be examined, supplemented and improved in numerous discussions, interactive processes, surveys, etc. To this end, university staff, citizens, business people, administrative officials, politicians at all levels, students, pupils, religious communities, journalists, etc. will enter into dialogue together. In doing so, we deliberately seek cooperation with colleagues from universities of applied sciences and NGOs, e.g. those brought together by *SDG Watch*, as well as local initiatives and various *For Future* groups.

Transformation presupposes the ability to imagine that things could be different than they are. The goal of the Austria-wide social dialogue in the years 2022-2024 is to impart this understanding to as many people in Austria as possible.

In addition, change must also be perceived. In a second project line of UniNEtZ II, the implementation of options and measures at all levels will be accompanied and documented scientifically. Nothing inspires as much as success. It is therefore important to make successes visible. This also enables the exchange of ideas, experiences and solutions across all kinds of borders.

The work of UniNEtZ so far has shown that many scientific questions are still open. UniNEtZ II aims to provide a platform for questions that are to be addressed across disciplines and universities and can also be incorporated into joint research proposals. UniNEtZ II also provides space for the development and implementation of inter-university study programmes.

After all, every change begins with self-reflection and one's own change. The *Alliance of Sustainable Universities in Austria*, the sponsor of the UniNEtZ project, has set itself the same goal of self-reflection for the performance agreement period 2022-2024. UniNEtZ II will guide this self-reflection.

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