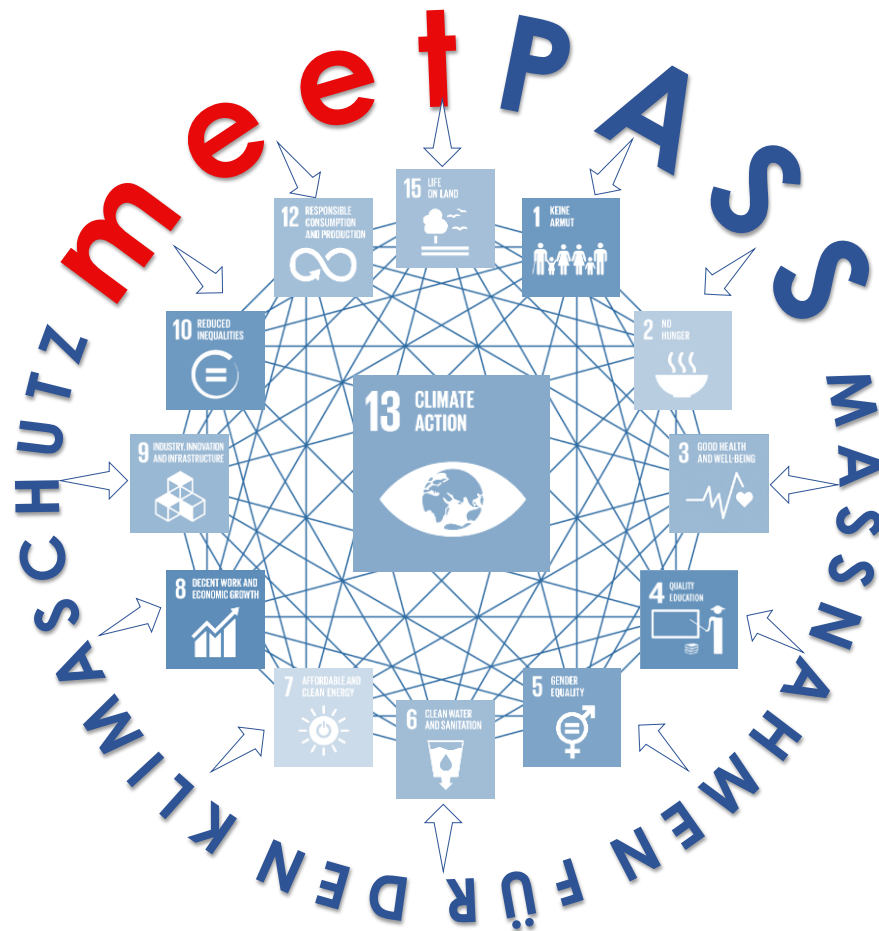


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# Selection of suitable SDG indicators for the evaluation of climate mitigation scenarios

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## meetPASS: meeting the Paris Agreement and Supporting Sustainability

### Working Paper No. 1

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# 1 Introduction and background

The project "meetPASS", funded by the Austrian Climate and Energy Fund as part of the "Austrian Climate Research Programme – ACRP 9<sup>th</sup> Call", deals with the question how the climate goals as foreseen in the Paris Agreement can be achieved and which consequences regarding the UN sustainable development goals (SDGs) can be expected.

By conducting an integrated, model-based scenario analysis – involving stakeholders and experts – we analyse the economic, environmental and social impacts of a transition to a low-carbon-society from a global, European and Austrian perspective. For this purpose, we developed a meetPASS Scenario comprising climate change mitigation policies and actions. We initially quantified the scenario with the global model GINFORS to ensure that the 1.5°C climate target can be achieved at the global level. After that, the Austrian model e3.at provides a detailed analysis of the impacts of the scenario on the sustainability dimensions for the Austrian society. Thus, it is possible to examine whether the measures supporting climate protection can encourage progress within other important areas of sustainable development, or to show potential trade-offs.

An important part of the project is a **meaningful selection of indicators which represents the broad range of sustainable development issues** in an adequate manner and can also be quantified with the model e3.at. The intention of this working paper is to explain the process of indicator selection and to present the selected indicators.

Starting point of the indicator derivation was the "Revised list of global Sustainable Development Goal indicators" from the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs, 2017). In addition, regional and national indicators are chosen that are important from an Austrian perspective. In this respect, we screened the national indicator set developed by Statistik Austria<sup>1</sup>, which can provide national data for almost half of the UN indicator list. During the process of indicator selection, we proofed if the proposed indicators can be integrated in the e3.at model and if additional indicators of other data sources should be integrated.

The selected indicators help to show the effects of the climate protection scenario on the different SDGs within the model e3.at. To select suitable indicators and to support the model-based evaluation, it is helpful to assess the interactions between climate mitigation and the SDG targets. In this respect, we used and adapted the scoring mechanism of the ISCU (2017) to show where strong relationships exist, in both positive and negative direction (see meetPASS Working Paper No. 2).

This working paper is structured as follows: In section 2 we introduce the meetPASS mitigation scenario that is designed to achieve the goals formulated in the Paris Agreement. In section 3 we describe the process of indicator selection, starting with the selection of relevant SDG targets and derivation of potential indicators for that targets in section 4. In section 5 we present the final selection of the indicators that we use to evaluate the impacts of the climate mitigation measures on relevant SDGs for Austria.

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<sup>1</sup> See [http://www.statistik.at/web\\_de/statistiken/internationales/agenda2030\\_sustainable\\_development\\_goals/un-agenda2030\\_monitoring/index.html](http://www.statistik.at/web_de/statistiken/internationales/agenda2030_sustainable_development_goals/un-agenda2030_monitoring/index.html)

## 2 Starting point: the meetPASS Mitigation Scenario

The Paris Agreement (UNFCCC, 2015) which was adopted on 12 December 2015, provides the framework for the meetPASS scenario. It is a global milestone for increasing collective action and accelerating the global transformation to a low-carbon and climate-resilient society. It includes both mitigation and adaptation actions. In meetPASS however, only the effects of mitigation policies and actions will be considered. The scenario has the primary intention to **limit the rise of global average temperature to no more than 1.5°C above pre-industrial levels**.

While recognising the need for the global community and EU Member States to act together in deciding on binding legislation to fight climate change, resource depletion as well as inequality and poverty, Austria must also prepare its own robust and independent strategies towards a sustainable and low-carbon-society. To achieve this, policy makers need to look at the **manifold effects that a transition towards the implementation of the two agreements would have**. We therefore present and analyse the feasibility of a COP21-compatible future scenario and its global impacts and then project the impacts on selected SDGs for Austria.

The development and analysis of this scenario facilitates a first assessment of the mutual relationships between deep decarbonisation pathways and (selected areas of) SDGs. meetPASS investigates the feasibility as well as the impacts of potential measures implemented in Austria. It also examines how these measures may affect selected SDGs, to demonstrate whether they can encourage progress within other important areas of sustainable development, or to show potential trade-offs.

The development of the meetPASS mitigation scenario is described in Working Paper 3 of the meetPASS working paper series. We summarise the most important elements of the scenario in the following box. This description helps to assess the impacts of the scenario on the SDG targets and indicators.

### Box 1: The elements of the meetPASS mitigation scenario

Climate policy is assumed to include a substantial increase of the carbon price in the emission trading system, which would be extended to a world-wide system by 2020 in all industries. In addition, a regulation of the share of renewables in electricity production would ensure that, by 2050, in most countries 100% of electricity would be produced by means of renewable resources. This policy would be supported by feed-in tariffs and green certificates. Additionally, we assume a stepwise phase-out of nuclear energy in the EU up to 2050 and worldwide up to 2060.

In transport, set of regulations and economic instruments would also be introduced favouring e-mobility. We foresee an introduction of binding emission standards for new cars and taxation of fossil fuel burning engines, which would be used to subsidise the use of hybrid and electric cars, so that industries and households overall are not adversely impacted. Furthermore, the use of electric cars in cities would be promoted via better parking conditions, exemptions from city taxes, etc. All subsidies on air and water transport would be reduced linearly, and phased out completely by 2030, while taxes on air transport services would increase linearly by 50% in the period to 2050.

With regard to housing and living, subsidies for investment in the energy efficiency of buildings should ensure that higher renovation rates are reached. All new buildings would be at least nearly zero-energy, and many would produce energy (energy-plus houses) and would be highly material efficient. 100% of non-hazardous construction and demolition waste would be recycled.

For the required deep decarbonisation pathway, it is necessary to add measures from other areas, like resource policy (e.g. regulation for recycling of ores and non-metallic minerals, upstream tax on ores and non-metallic minerals and a public innovation fund for material efficiency) and agricultural policy (e.g. information programmes to avoid food waste and reduce meat consumption). These additional policy measures result from the aim to stay within the planetary boundaries (see Steffen et al. 2015) and within the carbon budget derived by IPCC (2018).

Thus, it is crucial to link resource policy more closely with climate protection and the implementation of the Paris Climate Agreement. IPCC (2014) emphasises that an ambitious resource policy is an important climate change mitigation strategy and a report by the International Resource Panel (IRP, 2017) shows that without an ambitious resource policy the 2.0 or 1.5 degree climate target cannot be achieved (cost-effectively) (UNEP 2016).

Since the 1.5°C aim is very ambitious, we have to assume that the intrinsic motivation of individuals and households would lead to a structural change in the economy to such a degree that the ambitious environmental targets are achieved. Behavioural changes would alter the structure and volume of consumption, reducing environmentally harmful commodities like consumer durables; high-carbon, material-intensive transport; and meat consumption. Furthermore, employees would seek to reduce the number of hours worked in the formal economy, inducing an increased share of part-time employment.

Thus, the scenario also assumes that NGOs and businesses would drive decarbonisation through voluntary changes in preferences and behaviour. A comprehensive policy programme would facilitate such lifestyle changes using the aforementioned economic instruments, information campaigns and regulations.

We initially quantify the meetPASS Scenario with the global model GINFORS to map the feasibility of a COP21-compatible future scenario and to project implied international impacts. As Austria is also explicitly modelled within GINFORS, this parametrization also involves a concrete set of climate policy measures which exemplarily picture Austria's contributions to global decarbonisation efforts. Focusing on social issues, we then evaluate the related impacts on the Austrian society and economy in more detail with the Austrian model e3.at.

Consequently, we must ensure that (apart from climate policy issues) also social and equality aspects will be modelled with ample detail. Therefore, we have extended the Austrian model e3.at by **suitable SDG indicators** to enable a detailed analysis of economic, environmental and social effects of climate mitigation policies. We describe the selection of these indicators in this meetPASS Working Paper.

### 3 The process of indicator selection

The Paris Agreement makes an important attempt at reaching target 13.2 “Integrate climate change measures into national policies, strategies and planning” of SDG 13 - Take urgent action to combat climate change and its impacts. In this respect, meetPASS analyses the impacts of target 13.2 on other SDG targets and related indicators.

meetPASS addresses the question how selected climate protection measures affect specific areas of the Sustainable Development Goals (SDGs), to demonstrate whether the measures of a strategy to stabilize the climate can encourage other important areas of sustainable development, or to show potential conflicts. The overall objectives of meetPASS are thus intended to provide beyond state-of-the-art insights by an intensified analysis of the

interconnectivity between extensive climate mitigation efforts and aspired SDGs developments. Consequently, the selected indicators must allow a systemic monitoring.

Since the SDGs cover 17 goals with 169 targets (besides combating climate change: ending poverty and hunger, improving health and education, good jobs and economic growth, etc.), it is important to make a meaningful selection of indicators, which represents the broad range of sustainable development issues in an adequate manner.

The United Nations Statistical Commission provides a global indicator framework for monitoring progress towards achieving the SDGs. The most recent list of proposed indicators (IAEG-SDGs, 2017) comprises 232 different indicators (statistical observations). This framework serves as basis for the indicator selection. We chose only indicators that are important from an Austrian perspective. Statistics Austria has been commissioned to compile the national indicator set for Austria, which was published in December 2017. This indicator set is based on the UN Indicator Proposal in close coordination with the European Statistical System. The work of Statistics Austria has revealed that almost half of the UN indicator proposals currently have national data available. Another 34% of the UN Indicator Proposals are not considered relevant to Austria or statistical data in the narrower sense cannot be used (Statistik Austria, 2017). The list of meetPASS indicators was coordinated with the work of the Austrian statistical office.

Overall, for the selection of indicators the following steps are conducted:

First, we decided which SDGs to address, and which not. For the purpose of this project, i.e. with a focus on Austria and with regard to what can be integrated in the model e3.at, the goals 11 - Sustainable Cities and Communities, 14 - Life Below Water and 16 - Peace, Justice and Strong Institutions are not considered for further investigation, because qualitative aspects (as in goal 16) cannot be measured in quantitative terms, while local communities (14) and oceans (13) are either below or beyond the granularity of the models applied. Since we focus on thematic areas underlined by the SDGs, SDG 17 (Strengthen the means of implementation and revitalize the global partnership for sustainable development) is neglected as it refers to the means of implementation which are addressed to the whole set of the SDGs.

Second, for the remaining 13 SDGs, the list of targets was monitored and decided which are relevant. In this respect, the availability of data and the explanatory power (is it possible to show the potential interactions with the climate protection measures of the meetPASS scenario) must be considered as well.

Third, for the remaining targets we decided, which indicators to select for the analysis in meetPASS. In this respect the following steps were carried out:

- Identification of those indicators that are already covered by the modelling system (e.g. material footprint per capita or manufacturing employment as a proportion of total employment in GINFORS),
- Identification of those indicators from the UN indicator list<sup>2</sup> as well as from the Statistics Austria indicator set that are relevant for Austria and can be incorporated in e3.at,

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<sup>2</sup> Since the indicator set of Statistic Austria was only published in December 2017, we have already started to work with the UN indicator set and identified those indicators that are relevant for Austria. After the publication of the national indicator set we checked the meetPASS selection and adapted it.

- Identification of additional and/or alternative indicators (statistical observations) that allow for a monitoring of targets and are not directly addressed in the indicator set of Statistics Austria.

In the process of indicator selection we included stakeholders and external experts.

#### 4 Selection of relevant targets and derivation of potential indicators for that targets

Not all SDGs and all targets are relevant for the analysis in meetPASS with its focus on Austria and with the possibility of indicator mapping in the model e3.at. Based on these restrictions we addressed 13 SDGs within the project, as already explained in chapter 3.

The following figure, which also serves as logo for the meetPASS project gives an overview of these SDGs. Although we have reduced the number of relevant SDGs for meetPASS it has to be mentioned, that reaching all 17 goals together is essential for a world that is characterised by equality, prosperity, and sustainability.

Figure 1. SDGs relevant for the analysis in meetPASS



Source: own representation

For the remaining 13 SDGs, we monitored the list of targets and decided which are relevant. Beside the potential to analyse the impacts on the targets within the model e3.at, the availability of data and hence the possibility to show the potential interactions with the climate



protection measures of the meetPASS scenario were important aspects making the choice for the assessment of appropriate indicators.

At the end, we identified a list of 29 targets. For this list, we derived relevant indicators that have the potential to be incorporated in the model e3.at, based on the already mentioned IAEG-SDG list and the national indicator set of Statistik Austria<sup>3</sup>. However, both sources do not include the carbon footprint as relevant indicator and do thus neglect emissions embodied in traded goods<sup>4</sup>. Because footprint indicators (carbon footprint, material footprint, cropland footprint) can at least be integrated in GINFORS (but not in e3.at), they were also added to the list of potential indicators. We found Around 50 indicators that could be integrated in e3.at or that are already part of the modelling system.

Since a set of 50 indicators goes beyond the scope of the investigation and reduces the ability to adequately communicate the results, we had to decide which indicators and how many should be analysed.

Thus, after the identification of relevant targets and possible indicators the next step was the assessment of the impacts of climate mitigation measures on the selected SDG targets. This helps to show where particularly notable effects can be expected and whether the relationship is positive or negative. This evaluation is important to make a meaningful selection of SDG indicators that should be integrated in the model e3.at to analyse the most important linkages between mitigation policies and SDG aspects (see meetPASS Working Paper No. 2).

The assessment is based on the evaluation of the project team, on the judgement of the external experts as well as on a broader public online consultation. Since this process is still ongoing the final selection of indicators is not finished. Results can be expected by end of June.

Table 1 provides an overview of the identified targets and potential indicators. This pre-selection provides the basis for the final selection of indicators (see chapter 5).

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<sup>3</sup> See [http://www.statistik.at/web\\_de/statistiken/internationales/agenda2030\\_sustainable\\_development\\_goals/un-agenda2030\\_monitoring/index.html](http://www.statistik.at/web_de/statistiken/internationales/agenda2030_sustainable_development_goals/un-agenda2030_monitoring/index.html)

<sup>4</sup> While the carbon footprint is not part of the UN indicator list, the material footprint is included in the set of 232 indicators.

SDGs Target		Related Indicators
<b>Goal 1. End poverty in all its forms everywhere</b>		
1,2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Proportion of population under national poverty threshold Proportion of population under mean income (by gender, age, household type)
<b>Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture</b>		
2,1	By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	Cropland footprint (GINFORS)
2,3	By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	Agricultural productivity: Agriculture value added per worker (UNEP data) CO <sub>2</sub> emissions from agriculture
2,4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	Organic versus conventional agriculture (share of organic agricultural area on overall agricultural area) Meat consumption per capita Development of food prices
<b>Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</b>		
4,1	By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes	Increase of employment in education sector
<b>Goal 5. Achieve gender equality and empower all women and girls</b>		
5,5	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	Income by gender, age groups in different sectors Gender Pay Gap Jobs in different sectors
<b>Goal 6. Ensure availability and sustainable management of water and sanitation for all</b>		
6,4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	Water exploitation index (GINFORS)
<b>Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all</b>		
7,1	By 2030, ensure universal access to affordable, reliable and modern energy services	Energy consumption ratio Indicator for energy poverty
7,2	By 2030, increase substantially the share of renewable energy in the global energy mix	Renewable energy share on total final consumption Share of nuclear energy on electricity production

7,3	By 2030, double the global rate of improvement in energy efficiency	Energy efficiency Investment into energy efficiency as a proportion of GDP
<b>Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</b>		
8,1	Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	Annual GDP growth per capita / per employed person / per hour worked Disposable income per capita Structural change (employment, growth)
8,2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	Material footprint per capita (GINFORS) Material footprint per GDP / Value added (GINFORS) Domestic material input per capita and per GDP (e3.at) Annual GDP growth per capita / per employed person Employment
8,3	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	Material footprint per value added / GDP (GINFORS)
8,4	Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead	Material footprint per GDP (GINFORS)
8,5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Employment (by gender, age), income
8,9	By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	Share of direct tourism value added of total GDP Growth rate of direct tourism value added Share of jobs in tourism industries of total jobs by gender Growth rate of number of jobs in tourism industries by gender
<b>Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</b>		
9,1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	Passenger and freight volumes by mode of transport CO <sub>2</sub> emissions of transport per unit of value added Share of infrastructure expenditures on GDP
9,2	Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	Resource efficiency Manufacturing employment as share of total employment

9,4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	Share of infrastructure expenditures on GDP CO <sub>2</sub> emissions of industry per unit of value added
9,5	Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	Share of R&D expenditures on GDP (in GINFORS)
<b>Goal 10. Reduce inequality within and among countries</b>		
10,1	By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	Growth rates of household expenditure/income per capita among the bottom 40% Proportion of population under 50% of median income
10,4	Adopt policies, esp. fiscal, wage and social protection policies, and progressively achieve greater equality	Proportion of household expenditure on heating and fuels Labour share of GDP, comprising wages and social protection transfers (wage rate)
<b>Goal 12. Ensure sustainable consumption and production patterns</b>		
12,2	By 2030, achieve the sustainable management and efficient use of natural resources	Material footprint per GDP (GINFORS) DMI per GDP (e3.at)
12,3	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	Global food loss index (possible to implement in GINFORS via FAO data)
12,5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	National recycling rate (e.g. municipal waste / electronic waste, available from Eurostat)
12.c	Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	Environmental harmful subsidies Fossil fuels subsidies
<b>Goal 13. Take urgent action to combat climate change and its impacts</b>		
13,2	Integrate climate change measures into national policies, strategies and planning	Carbon footprint (GINFORS) total and per capita CO <sub>2</sub> emissions (e3.at) total and per capita
<b>Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</b>		
15,1	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	Area used for agriculture and forestry (GINFORS)
15,2	By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Area used for agriculture (GINFORS)

## 5 Final selection of indicators

In addition to the selection of suitable indicators for Austria, we have derived indicators for the global analysis with GINFORS (see chapter 5.1). In this respect the primary aim was to map the feasibility of a COP21-compatible scenario and to analyse the impacts on economy and environment. The analysis for Austria has a stronger focus on social aspects, thus additional indicators have to be selected (see chapter 5.2).

### 5.1 Derivation of environmental indicators for the analysis of the global meetPASS Scenario

Achieving the 1.5°C target must go beyond current energy efficiency and renewable energy policies by applying a more comprehensive approach considering the resource input perspective (as well as lifestyles changes). Thus, along with CO<sub>2</sub> emissions “input” indicators for reaching important environmental targets are considered, such as

- decreasing the overall material consumption,
- reducing the average land use (of people living in high developed countries),
- decreasing the water use.

These environmental indicators that refer to SDGs 6, 12, 13, 14 and 15 are derived from the "Planetary Boundaries" (Rockstrom et al. 2009 and Steffen et al. 2015). In this respect, the footprint concept is important, that follows a consumption-based accounting approach considering the entire value chain. Footprints comprise all emissions or material inputs/land use caused by a country's consumption, no matter where they were emitted/extracted. While consumption-based indicators include not only direct but also indirect inputs and outputs, production-based indicators can generally be identified by simply summing direct impacts or consumption of inputs. Consumption-based accounting comprises all emissions caused by a country's consumption, no matter where they were actually emitted. Because production and consumption often occur in different geographical regions, the two methods result in different estimations of CO<sub>2</sub> emissions (Kammerlander et al., 2019).

While footprint indicators are implemented in GINFORS and allow the representation of consumption-based and production-based emissions, e3.at as a national model cannot include footprint indicators but includes direct material inputs which are used in production and consumption activities.

We propose three indicators, all based on a consumption-based "footprint" or "backpack" concept, that is, allocating the consumption or impact across the entire value chain to consumption or production in the region.

In the model GINFORS such footprint indicators are integrated. Thus, we can use the footprint perspective to evaluate the impacts of climate mitigation policies:

- CO<sub>2</sub> footprint in order to achieve a comprehensive decarbonization and remain within the available carbon budget,

- TMC<sup>5</sup> in order to substantially reduce material consumption,
- Cropland footprint in order to decrease land use change.

For all mentioned indicators the following targets have been formulated:

- In order to reach the 1.5 degree target with a probability of 50%, CO<sub>2</sub> footprints per capita would have to decrease significantly - to about 1 tonnes per capita in 2050.<sup>6</sup>
- Concerning the TMC, no more than 45 Gt materials (abiotic and biotic) should be consumed. This means a material footprint of less than 5 t/capita/year calculated on the basis of a world population of 9.7 billion people in 2050.
- As regards land use change, no more than 15% of the global ice-free land surface should be converted to cropland. This means a cropland footprint of 0.15 ha per capita with a world population of 9.7 billion people in 2050.

The proposed targets are based on the results of the IntRESS project<sup>7</sup> for the German Federal Environment Agency and the POLFREE project<sup>8</sup>. We chose these indicators to emphasise the fact that besides an energy transition, reductions in material use and land use are also important components of a comprehensive decarbonisation strategy (see discussion in meetPASS Working Paper 4).

## 5.2 Derivation of SDG indicators for the analysis with e3.at

The final decision on which indicators are mapped in e3.at is based on the assessment of the impact of climate action on the SDGs and its associated targets (see meetPASS Working Paper 2). The assessment helped to reduce the number of SDG targets that are strongly influenced by climate mitigation actions in Austria. Subsequently, the number of relevant indicators decreased from 50 to 25. The selection is based on a balanced share of social, economic and environmental aspects.

In the following table the remaining SDG targets and the selected indicators are presented.

SDGs Target		Selected indicators
<b>Goal 1. End poverty in all its forms everywhere</b>		
1,2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Proportion of population under national poverty threshold
<b>Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture</b>		

<sup>5</sup> **Total material consumption (TMC)** measures the global total amount of materials required for domestic consumption including indirect material requirements. TMC is a measure for all direct and indirect primary material extractions, both at home and abroad, which are associated to the consumption of an economy.

<sup>6</sup> The remaining **global carbon budget** can be broken down for individual countries like Austria. Thus, we can also derive a concrete CO<sub>2</sub> emission target for Austria. In meetPASS the budget is **distributed to an equal contingent per capita**, regardless the country he/she lives in, in order to divide the remaining emission budget evenly across the world's population.

<sup>7</sup> See [www.intress.info](http://www.intress.info)

<sup>8</sup> See <http://polfree.seri.at/>

2,4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems	Development of food prices
<b>Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</b>		
4,1	By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes	Increase of employment in education sector
<b>Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all</b>		
7,1	By 2030, ensure universal access to affordable, reliable and modern energy services	Energy consumption ratio Indicator for energy poverty
7,2	By 2030, increase substantially the share of renewable energy in the global energy mix	Renewable energy share on total final consumption
7,3	By 2030, double the global rate of improvement in energy efficiency	Energy efficiency Investment into energy efficiency
<b>Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</b>		
8,1	Sustain per capita economic growth in accordance with national circumstances	Annual GDP growth per capita / per hour worked Disposable income per capita Structural change (employment, growth)
8,2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	DMI per capita and per GDP GDP growth per capita Employment
8,5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities	Disposable income per capita
<b>Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</b>		
9,1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being	Energy consumption of transport sector CO <sub>2</sub> emissions of transport per unit of value
9,2	Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances	Resource efficiency Manufacturing employment as share of total employment
9,4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes	Infrastructure expenditures CO <sub>2</sub> emissions of industry per unit of value added
<b>Goal 10. Reduce inequality within and among countries</b>		
10,1	By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	Growth rates of household expenditure / income per capita among the bottom 40% Proportion of population under 50% of median income
10,4	Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	Proportion of household expenditure on heating and fuels Labour share of GDP, compromising wages and social protection transfers (wage rate)
<b>Goal 12. Ensure sustainable consumption and production patterns</b>		
12,2	By 2030, achieve the sustainable management and efficient use of natural resources	Resource efficiency
12,5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	National recycling rate on metal ores and non-metallic minerals
<b>Goal 13. Take urgent action to combat climate change and its impacts</b>		
13,2	Integrate climate change measures into national policies, strategies and planning	CO <sub>2</sub> emissions total and per capita

Some of these indicators are input variables for the model e3.at, e.g. investment into energy efficiency, the share of infrastructure expenditures on GDP or the national recycling rate. Their extent depends on the measures chosen in the meetPASS Scenario. All the others are indicators that can be calculated with the model e3.at. The analyses of the Austrian meetPASS Scenario shows the impacts of the scenario measures on these indicators.

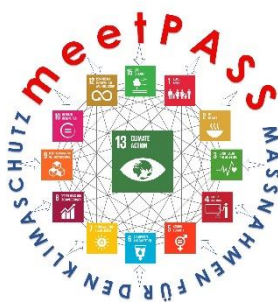


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## meetPASS

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**Leader:** SERI Nachhaltigkeitsforschungs und -kommunikations GmbH

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