METADATA

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Measuring performance in achieving SDG targets

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This is a supplementary document to the Report on the Green Growth Index – Measuring performance in achieving SDG targets (Acosta et al., 2021). It provides description on the indicators that were included in the indicator framework of the Green Growth Index*.

* Note: The SDG Indicators are regularly updated. The SDG indicators identified here are based on the list as of December 2021.

Contents

01 Sustainable and efficient resource use

1.1 Ratio of total primary energy supply to GDP, or energy intensity level of primary energy

Unit:	Megajoules per constant 2017 purchasing power parity GDP	**Indicator category/code:**	Efficient and sustainable energy / EE1
Related SDG:	Target 7.3, indicator 7.3.1		
Impact on green growth:	Negative	**Data availability:**	Time series, 2000-2018
Data source:	Energy Balances, UNSTATS		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	Energy intensity is the energy provided to the economy to create a unit of economic output. A low level of energy intensity means less energy is used for a unit of economic output (UNSTATS metadata).		
Relevance:	Energy is one of the most significant inputs for economic growth. Economic growth depends on the available cost-effective energy sources. Energy intensity and other energy consumption characteristics are relevant because the energy sector affects economic development. It is a very relevant indicator for green growth because it shows how energy is efficiently used in the economy (Reddy & Mehra, 2017).		
Limitation(s):	The structure of the economy, geography, and other structural factors influence the share of total primary energy supply to the gross domestic product (GDP) in the country. Thus, the indicator is not suited for measuring energy efficiency (UNSTATS metadata).		

1.2 Share renewable to total final energy consumption

Unit:	Percentage	**Indicator category/code:**	Efficient and sustainable energy / EE2
Related SDG:	Target 7.2, indicator 7.2.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2018
Data source:	Energy Balances, UNSTATS		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	Renewable energy is the energy from the natural processes that can be replenished in a fast rate. It includes heat and electricity from wind, hydropower, solar, ocean, geothermal, biofuels, and biomass. It supports the shift from a less carbon-intensive to a more sustainable energy system (IEA, n.d.).		
Relevance:	Increasing the share of renewable energy can help improve economic growth by helping address energy shortage in developing countries (Marinaş et al., 2018). It is also identified as an important tool to address climate change (Nia & Niavand, 2017). It enables countries to protect the environment as renewable energy generates nearly zero emission of greenhouse gases (GHG) and air pollutants (Uğurlu & Gokcol, 2017).		

1.2 Share renewable to total final energy consumption *(continued)*

Limitation(s):	The measurement of renewable energy takes into account the energy generated from biomass and charcoal, which are not necessarily produced in a sustainable way. It also does not take into account off-grid renewables. Moreover, the indicator tends to underestimate the transport costs of renewable energy because heat and electricity are not differentiated in its calculations (IEA & WB, 2013; UNSTATS metadata).

1.3 Efficiency in sustainable transport

Unit:	Score	**Indicator category/code:**	Efficient and sustainable energy / EE3
Related SDG:	Not in the list of Sustainable Development Goals (SDGs) but contributes to Target 7.3; Target 9.1, 9.4; Target 12.c, 12.3; Target 17.14 (Sum4All, n.d.-a)		
Impact on green growth:	Positive	**Data availability:**	Time series, 2005-2018
Data source:	World Bank		
Online source:	https://lpi.worldbank.org/		
Definition:	The indicator refers to Logistics Performance Index (LPI), which the Sustainable Mobility for All (Sum4All) use to represent indicator for efficiency in the sustainability mobility index (Sum4All, 2019a). LPI is computed using principal component analysis (PCA). It has six dimensions: customs, infrastructure, ease of arranging shipments, quality of logistics services, timeliness, and tracking and tracing. The data used came from a worldwide survey of logistics professionals. Higher LPI scores were interpreted as having good logistics performance (Arvis et al., 2018).		
Relevance:	Tracking logistics performance has been an important indicator of country progress in the fields of services, climate resilience, trade, and sustainability. LPI has been recognized by policymakers, companies, academe, and international organizations (such as the EU, ASEAN, APEC, etc.) as a logistics performance indicator on a country level (Arvis et al., 2018; World Bank, n.d.-a). According to Sum4All, an efficient sustainable transport system provides people a more consistent, reliable, convenient, and cost-effective way of transport without experiencing any problems in the system (Sum4All, n.d.-a). In addition, a recent study showed that there is a positive and significant relationship between LPI and reduction in CO_2 emissions (Karaduman et al., 2020).		
Limitation(s):	Due to lack of data for better indicator, LPI will be used as a "proxy variable" for efficient transport. In addition, LPI scores, due to the nature of the data collected through surveys, could introduce potential biases/ subjectivity (Raimbekov et al., 2017). Thus, other important economic factors (e.g., transportation investments, economic growth rate, GDP) would not have a direct effect on the LPI scores (Guner & Coskun, 2012).		

1.4 Water use efficiency

Unit:	U.S. dollar per cubic meter	**Indicator category/code:**	Efficient and sustainable water use / EW1
Related SDG:	Target 6.4, indicator 6.4.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2018
Data source:	Food and Agriculture Organization of United Nations (FAO)		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	Water use efficiency is the total efficiency in the main sectors of the economy weighted according to the proportion of water withdrawn in every sector over the total amount of withdrawals. The indicator provides an indication on the extent that water resources could support the world's ecosystems of the current and future generations (FAO, 2018b).		
Relevance:	There are different levels of water use and scarcity between countries because water resources and human population are unevenly distributed around the world (Mekonnen & Hoekstra, 2014). Water scarcity is getting worse, causing intense drought due to increasing intensity of climate change impacts. As such, water competition is increasing in different sectors of the economy, affecting economic growth. Consequently, the demand to increase water use efficiency is growing because the availability of water supply in many countries is limited and increasing the supply is costly (Mancosu et al., 2015).		
Limitation(s):	The indicator considers water for agriculture, mining and quarrying, manufacturing, electricity, gas, steam and air conditioning supply, construction, and all the service sectors. It does not consider; however, water use for energy or the quality of water distribution networks (UNSTATS metadata).		

1.5 Share of freshwater withdrawal to available freshwater resources (Level of water stress)

Unit:	Percentage	**Indicator category/code:**	Efficient and sustainable water use / EW2
Related SDG:	Target 6.4, indicator 6.4.2		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2019
Data source:	FAO		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	It is the ratio between the total amount of freshwater withdrawn by the main sectors and the total resources of renewable freshwater. The indicator measures how sustainable withdrawal and supply of freshwater can reduce water scarcity and its impacts on society (FAO, n.d.-d).		
Relevance:	Water stress affects more than 2 billion people across the world because water use is shifting from agriculture to industrial uses due to growing urban populations (Önder & Akay, 2016). Also, climate change and current natural conditions affect pressure over water resources. As such, the metrics of water stress has changed over the last three decades. They shifted from simple indicators to holistic threshold indicators, which characterize water sustainability and human environments (Damkjaer & Taylor, 2017).		
Limitation(s):	The indicator does not fully reflect sustainable water management because it does not consider the quality of water distribution, behavioral patterns, or geographic and climatic particularities. It also does not consider the quality of water. Freshwater resources are particularly difficult to measure due to complexity of water resource cycle. Data availability and estimation remain a challenge (UNSTATS metadata).		

1.6 Sustainable fisheries as a proportion of GDP

Unit:	Percentage	**Indicator category/code:**	Efficient and sustainable water use / EW3
Related SDG:	Target 14.7, indicator 14.7.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 2011, 2013, 2015, 2017
Data source:	Official country reported data (UNSD and OECD national accounts), FAO Yearbook of Fishery Statistics and Review of the State of World Marine Fishery Resources		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	The indicator is computed as the value added of sustainable marine capture fisheries as a proportion of GDP. It is used to represent the sustainable utilization of marine resources through fisheries, where the sustainably captured fish stock can support the industries and communities that depend on them, without affecting its reproduction and long-term sustainability (UNSTATS metadata).		
Relevance:	Sustainable fishing is important since it contributes towards the conservation and sustainable use of water resources including oceans, seas, and marine (UNSTATS metadata). The fisheries sector's contribution to GDP is one method frequently used to measure economic performance. However, there is difficulty in measuring it due to general absence of comprehension or consensus leading to underutilization or misuse of fisheries GDP measures (Cai et al., 2019).		
Limitation(s):	The data for marine capture/ fish stock is only available for few countries which implies that there might be discrepancies to the actual level of exploitation of a fish stock (UNSTATS metadata).		

1.7 Soil nutrient budget

Unit:	Nitrogen kilogram per hectare	**Indicator category/code:**	Sustainable land use / SL1
Related SDG:	Not in the list of SDG indicators but contributes to Target 12 and 15		
Impact on green growth:	Positive	**Data availability:**	Time series, 1961-2018
Data source:	FAO		
Online source:	http://fenix.fao.org/faostat/internal/en/#data/ESB		
Definition:	The soil nutrient budget per unit area is an indicator of nutrient flows in the soil of a country for a given year (FAO, 2021). It is computed as the sum of inputs: synthetic fertilizers (SF), manure applied to soils (MAS), nitrogen deposition (ND), and biological fixation (BF) minus outputs: crop removal (CR) (FAOSTAT, 2021).		

1.7 Soil nutrient budget *(continued)*

Relevance:	Nutrient Balance is often used as a way to assess nutrient use efficiency across countries i.e., how efficient is the use of agricultural inputs with respect to crop output (FAO, 2021). Farm inputs are needed to ensure crop productivity; however, excessive use of these inputs incur additional cost to farmers as well as pose additional threats to the environment in the form of ammonia and GHG emissions (OECD, 2021). On the other hand, under-utilizing farm inputs would lower the potential yield from crops (FAO, 2021).
Limitation(s):	Based on the methods, the soil nutrient budget does not account for the differences of baseline soil nutrient properties, nutrient retention/mining across countries over time. In addition, the losses from emissions and leaching into water resources were not considered (FAO, 2021).

1.8 Share of agriculture organic to total agriculture land area

Unit:	Percentage	**Indicator category/code:**	Sustainable land use / SL2
Related SDG:	Not in the list of SDG indicators but relevant to SDG 2 and 12 (Rahmann et al., 2017)		
Impact on green growth:	Positive	**Data availability:**	Time series, 2004-2019
Data source:	FAO		
Online source:	https://www.fao.org/faostat/en/#data/EL		
Definition:	Organic agriculture is a production system that improves biodiversity, biological activity in soil, and biological cycles. Agricultural area includes permanent pastures, permanent crops, and arable land (FAO, 2003).		
Relevance:	Agricultural land is crucial and there is also a limited resource for agricultural goods production. Thus, there is a need to use agricultural land efficiently to provide food security to a growing population (Pilvere et al., 2014). A shift from conventional to organic farming is one of the ways to address the issue. Organic farming integrates and effectively uses the landscape and ecosystem services. It contributes to long-term food security by conserving natural resources and promoting overall sustainability (Kukreja & Meredith, 2011).		
Limitation(s):	This indicator does not consider the debate around organic farming and transgenic crops, in particular with respect to consistency in defining and measuring sustainability (UNSTATS metadata).		

1.9 Share of ruminant livestock population to agricultural area

Unit:	Percentage	**Indicator category/code:**	Sustainable land use / SL3
Related SDG:	Not in the list of SDGs but contributes to Target 13.2, indicator 13.2.2		
Impact on green growth:	Positive	**Data availability:**	Time Series, 1961-2019
Data source:	FAO		
Online source:	http://www.fao.org/faostat/en/#data/EK		
Definition:	It is calculated on the population of ruminant livestock as a share of agricultural land area.		
Relevance:	The livestock sector emits considerable amounts of human-induced GHG emissions, especially from ruminants like cattle which represents 62% of the sector's emissions (FAO, n.d.-a). Adoption of better practices and technologies for cattle raising and manure management could reduce the GHG emissions of the livestock sector by as much as 30% (FAO, 2016). Livestock per agricultural area measures livestock production intensity, which indicates higher emission per unit area.		
Limitation(s):	Ideally, ratio should be based on livestock area, but this data is not available.		

1.10 Total domestic material consumption (DMC) per unit of GDP

Unit:	Kilograms per GDP	**Indicator category/code:**	Material use efficiency / ME1
Related SDG:	Target 8.4, indicator 8.4.2; Target 12.2, indicator 12.2.2		
Impact on green growth:	Negative	**Data availability:**	Time series, 1970-2019
Data source:	Organisation for Economic Co-operation and Development (OECD) for DMC and World Bank for GDP		

1.10 Total domestic material consumption (DMC) per unit of GDP *(continued)*

Online source:	https://www.oecd-ilibrary.org/environment/material-consumption/indicator/english_84971620-en; https://data.worldbank.org/
Definition:	Domestic material consumption is the total amount of materials used in the economy at the national level. It is also the total amount of domestic materials handled within the economy, either added to the transport infrastructure or building materials. Moreover, it covers the physical aspect of the economic process. The indicator can be used to measure long-term waste equivalent (UNEP, 2016).
Relevance:	At the national level, material efficiency is one of the crucial indicators for the success of sustainable resource management. As an economy grows, economic material efficiency increases (Fishman et al., 2014). The increase in material efficiency is crucial to separating resource depletion and its accompanied environmental stresses from the economic development (Zhang et al., 2018).
Limitation(s):	Domestic material consumption is based on material flows from Japan and the European Union but estimated for the rest of the world using various non-standardized datasets comprising agriculture, forestry, fisheries, mining, and energy statistics. It does not consider the whole of material consumption (UNSTATS metadata).

1.11 Total material footprint (MF) per capita population

Unit:	Tons per capita	**Indicator category/code:**	Material use efficiency / ME2
Related SDG:	Target 8.4, indicator 8.4.1; Target 12.2, indicator 12.2.1		
Impact on green growth:	Negative	**Data availability:**	Time series, 1990-2015
Data source:	U.N. Environment: Secretariat of the International Resource Panel (resourcepanel@unep.org)		
Online source:	https://www.resourcepanel.org/global-material-flows-database		
Definition:	Material footprint attributes the universal material extraction to the final domestic demand. The total material footprint is the total amount of footprint for metal ores, nonmetal ores, fossil fuels, and biomass. It shows the needed amount of main materials for the final domestic demand. MF also includes traded goods. DMC and MF measure production and consumption, respectively. Hence, they can be combined to cover both aspects of material flows in the economy. (UNSTATS metadata).		
Relevance:	The demand for urban material resources is expected to increase due to future growth in urban population. As a country economically grows, it tends to reduce domestic materials through international trade. With that, the general mass of material consumption increases (Wiedmann et al., 2015).		
Limitation(s):	Similar to DMC, MF is based on material flows from Japan and the European Union, with estimates extrapolated for the rest of the countries in the world. MF is not based on apparent physical consumption and actual physical movement of materials within and among countries. It is based on the estimates from where raw materials are extracted and where a product or service is consumed (UNSTATS metadata; Wiedmann et al., 2015).		

1.12 Share of food loss to production and food waste to food consumption

Unit:	Percentage	**Indicator category/code:**	Material use efficiency / ME3
Related SDG:	Target 12.3, indicator 12.3.1(a) and 12.3.1(b)		
Impact on green growth:	Negative	**Data availability:**	Time series, 2014-2018
Data source:	FAO		
Online source:	http://www.fao.org/faostat/en/#data/SCL		
Definition:	Food loss measures the crop and livestock human-edible commodities that are lost during storage, transportation, and processing, including imported food commodities (UNSTATS metadata). Food waste measures food discarded and not used for its intended purpose such as consumption and end up as municipal solid waste (EPA, n.d.).		
Relevance:	Reducing food waste and loss is crucial in reducing production costs, increasing food system efficiencies, and improving food security, nutrition, and environmental sustainability (FAO, 2019). Additionally, it reduces GHG emission, alleviates the pressure on the use of water and land resources, and improves productivity and economic growth (FAO, n.d.-e).		
Limitation(s):	For food loss, it only measures quantitative losses but not qualitative and economic losses that are not measurable but is important. Data availability remains a challenge. For food waste, due to its methodology, comparing at a regional level is possible if each country's random error is relatively high. However, comparing countries against one another is only possible if the difference in their estimates is greater than the combined amount of error (UNSTATS metadata).		

02 Natural capital protection

2.1 PM2.5 air pollution, mean annual population-weighted exposure

Unit:	Micrograms per m^3	**Indicator category/code:**	Environmental quality / EQ1
Related SDG:	Target 11.6, indicator 11.6.2		
Impact on green growth:	Negative	**Data availability:**	1990, 1995, 2000, 2005, 2010-2017
Data source:	Brauer, M. et al. 2017, for the Global Burden of Disease Study 2017.		
Online source:	https://data.worldbank.org/indicator/EN.ATM.PM25.MC.M3		
Definition:	The mean annual population-weighted exposure to PM2.5 measures the average exposure level of a population to the concentration of PM2.5, which penetrates deep into the human respiratory system and, therefore, severely damages human health. The exposure level is computed by weighting the mean annual PM2.5 concentration by urban and rural population (World Bank, n.d.-b).		
Relevance:	According to the World Health Organization (WHO), particulate matter has harmful effects on human health. PM2.5 is the most commonly used indicator for estimating the effects on mortality. In fact, it ranked as the fifth mortality risk factor in 2015 (Denier van der Gon et al., 2015). Moreover, exposure to chronic PM2.5 over a period of one year or more causes around 95 percent of the 3 million deaths globally per year. Thus, prediction of exposure to it is a good indicator for the overall impacts of air pollution on health (Tessum et al., 2017).		
Limitation(s):	The indicator calculates air pollution using satellite data but using urban populations as denominator factor, which can be defined differently according to the country. Furthermore, consultations with countries can lead to adjustments and bias on the data. Data quality also varies between high-, low-, and middle-income countries (UNSTATS metadata).		

2.2 DALY rate due to unsafe water sources (DALY lost per 100,000 persons)

Unit:	DALY lost per 100,000 persons	**Indicator category/code:**	Environmental quality / EQ2
Related SDG:	Target 3.9, indicator 3.9.2		
Impact on green growth:	Negative	**Data availability:**	Time series, 1990-2019
Data source:	Institute for Health Metrics and Evaluation		
Online source:	http://ghdx.healthdata.org/gbd-results-tool		
Definition:	The disability-adjusted life years (DALY) is the only indicator in health that measures diseases consisting of the total number of years of life lost and the number of years lived with disability (Kim et al., 2018).		

2.2 DALY rate due to unsafe water sources (DALY lost per 100,000 persons) *(continued)*

Relevance:	Clean water access is important for the environment, human development, and economic growth. However, sbout 785 million people across the globe do not have access to basic safe water resources (UNICEF & WHO, 2019). Urban construction and economic development increase sewage discharges and harshly damage the reservoir environment. The need for safe water has increased because living standards have also improved (Gu et al., 2014). In developing countries, diarrheal disease caused by poor drinking water quality is one of the most common contributors to the disease burden as measured by disability-adjusted life years. Thus, safe water resources play an important role in maintaining human welfare and health (Hunter et al., 2010).
Limitation(s):	The data on deaths are not up-to-date in all countries as there are not always reliable registration systems, leading to discrepancies between countries and the need to complete the data using other sources (UNSTATS metadata).

2.3 Municipal solid waste (MSW) generation per capita

Unit:	Tons per year per capita	**Indicator category/code:**	Environmental quality / EQ3
Related SDG:	Not in the list of SDG indicators, but contributes to knowledge on Target 11.6, Indicator 11.6.1.		
Impact on green growth:	Negative	**Data availability:**	2018
Data source:	World Bank What a Waste database		
Online source:	https://datacatalog.worldbank.org/dataset/what-waste-global-database		
Definition:	Municipal solid waste is defined as the household waste and other waste generated in the same nature by industrial and agricultural areas, business or commercial establishments, and public spaces (UNSTATS metadata). The per capita municipal solid waste is an environmental indicator that measures the intensity of generating waste over time (Kawai & Tasaki, 2016).		
Relevance:	The overload amount of solid wastes from domestic activities of humans disposed in the municipality has caused numerous negative impacts to humans and ecosystem (Azodo & Ismaila, 2016). Also, economic growth, consumption patterns, and the degree of industrialization are related to the amount of solid wastes generated. Solid wastes are byproducts of urban growth. The growth of population in urban areas results in more municipal solid wastes. Additionally, if there is a lack of technology and efficient methods to dispose wastes, air quality will deteriorate, thus adversely affecting human health (Tahir et al., 2015).		
Limitation(s):	In many developing countries, municipal solid waste collection and treatment are done through the informal sector. Data on adequate treatment of municipal waste is limited. Furthermore, even if data collection is done correctly, the interpretation of what makes municipal waste treatment such as recycling, composting and the adequacy of collected data vary greatly from country to country. This leads to limitations in data unification (UNSTATS metadata).		

2.4 Ratio of CO_2 emissions to population, including AFOLU

Unit:	Tons per capita	**Indicator category/code:**	GHG emissions reduction / GE1
Related SDG:	Not in the list of SDG indicators but relevant to Goal 13 on Climate action		
Impact on green growth:	Negative	**Data availability:**	Time series, 1990-2020
Data source:	Climate Analysis Indicators Tool (CAIT) and Potsdam Institute for Climate Impact Research for emissions (PIK), World Bank for population		
Online source:	https://www.climatewatchdata.org/ghg-emissions?end_year=2018&start_year=1990 https://data.worldbank.org/		
Definition:	CO_2 is a greenhouse gas that is odorless, colorless, and nonpoisonous. It is formed through carbon combustion and respiration of living things (UNFCCC, n.d.). The indicator is based on emissions from burning fossil fuels and manufacturing cement, including those produced during the consumption of solid, liquid, and gas fuels and gas flaring (World Bank, n.d.-d).		
Relevance:	In recent years, global CO_2 concentrations exceeded over 400 ppm (Ritchie & Roser, 2020). In China, the total carbon emissions in the cities relate closely to the country's GDP. But per unit area carbon emissions are strongly related with population density in cities (Wang et al., 2012). It is suggested that a more useful indicator for measuring impacts on climate is carbon emissions per capita (The Guardian, 2016).		

2.4 Ratio of CO_2 emissions to population, including AFOLU *(continued)*

Limitation(s):	Different calculation methods and energy sector disaggregation methodologies have caused some discrepancies on estimates of CO_2 emissions among countries (UNSTATS metadata, n.d.).

2.5 Ratio of non-CO_2 emissions (CH_4, N_2O and F-gas) excluding AFOLU to population

Unit:	CO_2eq tons per capita	**Indicator category/code:**	GHG emissions reduction / GE2
Related SDG:	Not in the list of SDG indicators but relevant to Goal 13 on Climate action		
Impact on green growth:	Negative	**Data availability:**	Time series, 1990-2020
Data source:	CAIT for emissions, World Bank for population		
Online source:	https://www.climatewatchdata.org/ghg-emissions?end_year=2018&start_year=1990 https://data.worldbank.org/		
Definition:	Methane and nitrous oxide are also sources of GHG emissions, accounting for around 17.3 percent and 6.2 percent of emissions, respectively. In terms of sectors, agriculture and fugitive emissions (e.g. unintentional gas leaks from fracking, traditional oil and gas extraction and transportation) contribute about 70 percent of global methane emissions, while agriculture accounts for more than 75 percent of nitrous oxide emissions. Due to the importance of the latter type of emissions, nitrous oxide emissions were included as separate indicator (see GE3 below) (Ritchie & Roser, 2020).		
Relevance:	Non-CO_2 greenhouse gases also contribute to climate change. It is, however, not related to cumulative emissions but determined through annual emissions. Thus, it is important to account independently the additional warming from the non-CO_2 agents when CO_2 emissions compatible with temperature limit is estimated (Friedlingstein et al., 2014).		
Limitation(s):	Uncertainty for global emissions of CH_4, N_2O and the F-gases has been estimated as 20%, 60%, and 20%, respectively (Climate Watch, n.d.).		

2.6 Ratio of non-CO_2 emissions (CH_4, N_2O and F-gas) in Agriculture and LUCF to population

Unit:	CO_2eq tons per capita	**Indicator category/code:**	GHG emissions reduction / GE3
Related SDG:	Not in the list of SDG indicators but relevant to Goal 13 on Climate action		
Impact on green growth:	Negative	**Data availability:**	Time series, 1990-2020
Data source:	CAIT for emissions, World Bank for population		
Online source:	https://www.climatewatchdata.org/ghg-emissions?end_year=2018&start_year=1990 https://data.worldbank.org/		
Definition:	Greenhouse gas emitted from the agricultural sector include non-CO_2 gases, such as methane (CH4) and nitrous oxide (N_2O). Livestock and crop production and management generate these gases (FAO, 2018a).		
Relevance:	Activities related to agriculture, forestry, and other land uses (AFOLU) generate greenhouse gases through removals by sinks. They comprise CO_2 and non-CO_2 emissions from forestry and other land uses and non-CO_2 from agriculture. AFOLU represents almost 25 percent of GHG emissions globally. Next to the energy sector, AFOLU is the second largest emitting sector. Action in AFOLU is important to many countries where the sector represents a huge part of their economy, at risk of climate change, and can greatly benefit from climate funding for GHG reduction, food security, and rural development (Tubiello et al., 2014).		
Limitation(s):	Uncertainty for global emissions of CH_4, N_2O and the F-gases has been estimated as 20%, 60%, and 20% respectively (Climate Watch, n.d.).		

2.7 Average proportion of Key Biodiversity Areas covered by protected areas

Unit:	Percentage	**Indicator category/code:**	Biodiversity and ecosystem protection / BE1
Related SDG:	Target 14.5, indicator 14.5.1; Target 15.1, indicator 15.1.2; Target 15.4, indicator 15.4.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2020
Data source:	BirdLife International, International Union for Conservation of Nature (IUCN) and UNEP-WCMC (2020)		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	The indicator is the proportion of main biodiversity areas, whether terrestrial, freshwater, marine, and mountain, covered by protected areas. These areas significantly affect biodiversity preservation globally. Protecting these key ecosystems improves biodiversity and sustains the use of natural resources (UNSTATS metadata).		
Relevance:	As humans encroach on the natural systems, adverse impacts on the terrestrial, freshwater, and marine ecosystems also increase. Establishing protected areas has become a major strategy to conserve biodiversity. Well-managed protected areas provide healthy ecosystems and benefits even to humans. These benefits include ecosystem services such as food security, disaster risk reduction, and clean water (Bertzky et al., 2012). Moreover, integrating establishment of protected areas in land use plans can address issues relating to species loss and climate change adaptation (Lopoukhine et al., 2012).		
Limitation(s):	The indicator does not include the effectiveness of establishing protected areas in protecting biodiversity and ecosystems, which depends on enforcement and appropriate management. Regarding key biodiversity areas, the list is not complete in all regions and there are also some omissions (UNSTATS metadata).		

2.8 Share of forest area to total land area

Unit:	Percentage	**Indicator category/code:**	Biodiversity and ecosystem protection / BE2
Related SDG:	Target 15.1, indicator 15.1.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 1990-2018
Data source:	FAO, electronic files and website https://www.fao.org/faostat/en/#data/EL		
Online source:	https://data.worldbank.org/indicator/AG.LND.FRST.ZS		
Definition:	Forest area is a land with trees with a minimum of five meters in situ. It does not include trees in agricultural areas such as fruit plantations and agroforestry and in gardens and parks (World Bank, n.d.-d). Forest area is important for human as it provides goods such as non-wood and wood forest products and services such as carbon sequestration, coastal protection, soil preservation, water conservation, and biodiversity habitat (UNSTATS metadata).		
Relevance:	Forestry can help conserve natural resources and contribute to their sustainable growth through protecting water resources and enhancing biodiversity. The forestry sector can contribute to green growth through instituting policies on climate change. It can help expand renewable energy and reduce GHG emissions. Generally, forests contribute to green building and infrastructure and act as carbon sinks (UNECE & FAO Timber Section, 2010).		
Limitation(s):	Forest surveys are conducted at irregular intervals from country to country. Remote sensing can be used but cannot detect long-term tree growth or low canopy cover density forests. The indicator is used to measure the extent of forest preserved and restored but only partially measures the extent of forests that are managed sustainably (UNSTATS metadata).		

2.9 Above-ground biomass stock in forest

Unit:	Tons per hectare	**Indicator category/code:**	Biodiversity and ecosystem protection / BE3
Related SDG:	Target 15.2, indicator 15.2.1		
Impact on green growth:	Positive	**Data availability:**	2000, 2010, 2015-2020
Data source:	FAO, Global Forest Resources Assessment (FRA)		
Online source:	https://unstats.un.org/sdgs/unsdg		

2.9 Above-ground biomass stock in forest *(continued)*

Definition:	Above-ground biomass is defined as "all biomass of living vegetation, both woody and herbaceous, above the soil including stems, stumps, branches, bark, seeds, and foliage" (IPCC, 2006). It measures the gains in forest growth through biomass stock and reduction through wood removals, fire, wind, pest, diseases, and natural losses. Reduced biomass stock per hectare over a long period of time may either suggest unsustainable forest management and degradation or unforeseen losses due to due to fire, wind, pest, or diseases (UNSTATS metadata). This indicator is also used as a sub-indicator for Target 15.2, indicator 15.2.1 on progress towards sustainable forest management.
Relevance:	This indicator is important since forests serve as a major carbon pool. Additionally, it is given the greatest importance in carbon inventory and many mitigation projects related to forest lands, agroforestry, and shelterbelts. Lastly, it is a crucial carbon pool for afforestation and reforestation CDM projects of the Kyoto Protocol (Woldemariam, 2015).
Limitation(s):	The indicator does not fully reflect sustainable forest management since it does not fully cover all aspects such as economic and social. Additionally, due to limited data availability, only countries with complete time series data can have trends over time (UNSTATS metadata).

2.10 Red List Index

Unit:	Score	**Indicator category/code:**	Cultural and social value / CV1
Related SDG:	Target 15.5, indicator 15.5.1.		
Impact on green growth:	Positive; an upward trend means that the expected rate of species extinctions decreases.	**Data availability:**	Time series, 1993-2020
Data source:	BirdLife International and IUCN (2021)		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	The Red List Index, which ranges from 0 to 1, measures the variation in the total extinction across species groups. It is based on the variation in the total number of species in every type of extinction risk based on the IUCN Red List of Threatened Species. A value of 1 means the species is of least concern for extinction and a value of 0 means the species is extinct. The index shows how far the species groups have moved toward extinction. Therefore, it can be used to compare species groups in terms of extinction risk level and the rate that such a risk would change (UNSTATS metadata).		
Relevance:	There is still a significant number of species threatened by extinction despite different conservation efforts. Contributing factors include habitat destruction, pollution, overexploitation, and introduction of exotic species. To boost conservation efforts, many countries have been using the IUCN Red List. The list is a commonly used system to assess the risk of and quantify threats to a species to go extinct (Kideghesho, 2009). Highly valued species are considered cultural indicators and critical when planning restoration and rehabilitation projects with local communities (Harmsworth et al., 2011).		
Limitation(s):	The Red List Index includes several sources of uncertainty. Species can be inadequately qualified as to their endangered status and there can be inconsistency in assessing species. Some species are also too poorly known to be included in the Red List's data (UNSTATS metadata).		

2.11 Tourism and recreation in coastal and marine areas

Unit:	Score, 1-100	**Indicator category/code:**	Cultural and social value / CV2
Related SDG:	Not in the list of SDG indicators but contributes to SDG target 12.B, which is to develop and implement tools to monitor sustainable tourism.		
Impact on green growth:	Positive	**Data availability:**	Time series, 2012-2020
Data source:	Ocean Health Index (OHI)		
Online source:	https://oceanhealthindex.org/		

2.11 Tourism and recreation in coastal and marine areas *(continued)*

Definition:	Tourism in coastal and marine areas contributes to economic growth. The indicator on tourism and recreation represents the cultural experiences of visitors in coastal and marine attractions. This indicator only represents participation in coastal tourism. The OHI measures the economic aspects of coastal and marine attractions in Coastal Livelihoods and Economies goal (OHI, n.d.).
Relevance:	Ecotourism promotes responsible tourism in natural areas, improves the well-being of local communities, and contributes to conserving the environment (Zambrano et al., 2010). Determining the symbolic species depends on the existence of that species and that its value for a particular cultural area increases when it is rare and its habitat is inaccessible (Schirpke et al., 2018).
Limitation(s):	The model used for this index is the study of participation rates in 19 marine-related activities per capita. Thus, a wide range of marine activities are not included (Halpern et al., 2014).

2.12 Share of terrestrial and marine protected areas to total territorial areas

Unit:	Percentage	**Indicator category/code:**	Cultural and social value / CV3
Related SDG:	Target 14.5, indicator 14.5.1, and contributes to Target 15.1		
Impact on green growth:	Positive	**Data availability:**	2016, 2017, 2018
Data source:	World Database on Protected Areas (WDPA) where the compilation and management is carried out by United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC) in collaboration with governments, non-governmental organizations, academia, and industry.		
Online source:	https://data.worldbank.org/indicator/ER.PTD.TOTL.ZS https://www.protectedplanet.net		
Definition:	Terrestrial protected areas are at least 1,000 hectares of completely or partially protected areas designated by the national government as nature reserves, national parks, wildlife sanctuaries, natural monuments, and protected landscapes. Protected areas also include scientific areas that cannot be publicly accessed and areas that are managed sustainably. Marine protected areas are subtidal or intertidal land, overlying water, and associated fauna and flora preserved by law. It also includes the cultural and historical characteristics of the area (World Bank, n.d.-d).		
Relevance:	Planning for tourism areas considers the environment and people in protected areas. A tourism planning and development strategy normally takes into account aspects such as adequate zoning, safeguarding guidelines, regulations, and proper management (Yamauchi & Donald, 1999).		
Limitation(s):	The indicator excludes sites protected under local or provincial law (World Bank, n.d.-d).		

03 Green economic opportunities

3.1 Ratio of adjusted net savings to GNI, including particulate emissions damage

Unit:	5 years moving average	**Indicator category/code:**	Green investment / GV1
Related SDG:	Not in the list of SDG indicators but contributes to Goal 12.		
Impact on green growth:	Positive	**Data availability:**	Time series, 1990-2020
Data source:	World Bank staff estimates based on sources and methods described in "The Changing Wealth of Nations 2018: Building a Sustainable Future" (Lange et al., 2018).		
Online source:	https://data.worldbank.org/indicator/NY.ADJ.SVNG.GN.ZS?view=chart		
Definition:	Adjusted net savings are computed by adding net national savings and expenses in education and subtracting mineral depletion, energy depletion, net forest depletion, damages from particulate emissions, and carbon dioxide (World Bank, n.d.-c). It measures the sustainability of the economy based on the extended national accounts. Saving creates a surplus for investment, which helps countries escape a state of low-level subsistence (EU, 2012). A 5- year rolling average was introduced to address the variability in the dataset, which was based on the assumption that unspent national savings can accumulate over time.		
Relevance:	Natural capital is the most abundant asset that is accessible in all countries. Environmental degradation for increasing economic growth is rational because the growth of economy depends on the natural resources available. In fact, natural capital is the largest part of wealth in low-income countries. In the adjusted net saving (ANS), the gross national saving minus capital depreciation and depletion of natural resources is used as a measure. ANS guides policymakers on the direction of the economy and actions for long-term growth. It indicates if the country is using more wealth than what it is adding (Lange et al., 2018).		
Limitation(s):	The methodology is different from that of national accounts. The unit prices used to calculate the value of natural resource depletion are regional and international, and not local. Concerning energy and mineral depletion, average cost is used instead of marginal cost to calculate unit resource rent. Finally, net forest depletion does not include all forest benefits but only timber benefits (Lange et al., 2018).		

3.2 Share of export of environmental goods (OECD and APEC classifications) to total export

Unit:	Percentage	**Indicator category/code:**	Green trade / GT1
Related SDG:	Not in the list of SDG indicators but contributes to Goal 12, for example, Target 12.6 to encourage companies to adopt sustainable practices.		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2019
Data source:	Computed using UNCOMTRADE data and OECD and APEC classifications of environmental goods; based on the methods applied by U.N. Environment (PAGE, 2017)		

3.2 Share of export of environmental goods (OECD and APEC classifications) to total export *(continued)*

Online source:	https://comtrade.un.org/data/
Definition:	Green trade is the share of exports of environmental goods in total exports. These goods are environment-friendly in production, usage, and disposal. Thus, they reduce environmental pollution and hazards. This indicator measures how a country competes in creating and selling environmental goods. Also, it measures the result of policies and investments related to green trade (PAGE, 2017).
Relevance:	In Asia-Pacific, environmental goods present an essential trade opportunity for exports and imports. The region has a large share of exports and their shares have been increasing. The main contributor to such growth was renewable energy. Environmental good exports from developing countries account for more than 75 percent of the region's total export. These countries have also increased their environmental goods export share (Jacob & Møller, 2017).
Limitation(s):	Environmental goods under harmonized customs codes can comprise products that have both environmental and nonenvironmental end uses (de Alba & Todorov, 2018).

3.3 Share of green employment in total manufacturing employment

Unit:	Percentage	**Indicator category/code:**	Green employment / GJ1
Related SDG:	Not in the list of SDG indicators but contributes to Goal 9, for example, Target 9.2.		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2018
Data source:	Moll de Alba and Todorov 2018, 2019.		
Online source:	Not available online, data computed and shared by the author		
Definition:	This indicator measures the impact of manufacturing on employment through its capability to absorb excess labor force from the traditional and agricultural sectors (UNSTATS metadata).		
Relevance:	The labor market will be restructured as there is transition toward green growth. It will create new green employment opportunities. There is, however, an issue as employment is relocated between industries due to structural changes caused by greener growth. Research shows that carbon-intensive industries emit almost 90 percent of CO2 but only generate a little more than 10 percent of employment. Thus, these industries with large environmental footprint should adapt. There should be adjustments in labor market employment for greener growth. Also, good policies on innovation and environment can create new markets (OECD, 2014).		
Limitation(s):	Analysis covered only limited data and a number of countries were excluded (de Alba & Todorov, 2018).		

3.4 Share of patent publications in environmental technology to total patents

Unit:	7 years moving average	**Indicator category/code:**	Green Innovation / GN1
Related SDG:	Not in the list of SDG indicators but contributes to Goal 12, for example, Target 12.A to support developing countries' scientific and technological capacity for sustainable consumption and production.		
Impact on green growth:	Positive	**Data availability:**	1980–2017
Data source:	World Intellectual Property Organization (WIPO) statistics database. Last updated: November 2021.		
Online source:	https://www3.wipo.int/ipstats/index.htm?tab=patent		
Definition:	Patents in environmental technology measure the innovative capability to produce goods and services that are environment-friendly. Green innovations ensue from policies on research and development and other private initiatives. Environment- friendly inventions contribute to the production of environmental goods and thus making new markets and employment (PAGE, 2017).		
Relevance:	The dynamics in green technologies are increasing since 2007. This resulted in an increased share of patents in environmental technology (Walz et al., 2017). The patent grants are indicators used to determine the innovative level in the field of environment. Ecoinventions patents are used in measuring invention and research activities and in studying the research direction in a given technological field. Ecoinnovations patents, meanwhile, are used in measuring innovations that reduce environmental risk and negative impacts (OECD, 2014).		
Limitation(s):	The criteria for a patent to be environmental technology are not extensive and they include climate change mitigation; capture, storage, sequestration or disposal of greenhouse gases; and environmental and water-related adaptation technologies (OECD 2014).		

04 Social inclusion

4.1 Population with access to basic services, i.e., water, sanitation, electricity, and clean fuels

Unit:	Percentage	**Indicator category/code:**	Access to basic services and resources / AB1
Related SDG:	Target 6.1, indicator 6.1.1; Target 6.2, indicator SDG 6.2.1.; Target 7.1, indicator SDG 7.1.1, indicator 7.1.2		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2020
Data source:	WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene (washdata.org); Global Health Observatory (GHO); WHO		
Online source:	https://unstats.un.org/sdgs/indicators/database/		
Definition:	The indicator shows the population that uses drinking water from safe sources that are accessible and available. Safe water sources include delivered water, protected springs, protected wells, piped water, and tubewells. Also, it indicates the population that has sanitation facilities not shared with others. Sanitation facilities include septic tanks, flush-to-piped sewer systems, and improved toilets with slabs (World Bank, n.d.-d). Electricity access is the percentage of the population with access to electricity. The data are from national surveys, industries, and other international organizations. Clean fuel access is the percentage of the population that uses clean fuels for cooking, excluding kerosene (World Bank, n.d.-d). The use of solid fuels and kerosene in households contributes to mortality rates from respiratory-related diseases (WHO, 2018). Fuels are categorized as clean based on their emission rate and specific recommendations. The population proportion is computed by dividing the number of people who use clean fuels for heating, cooking, and lighting by the total number of people who use any method for heating, cooking, and lighting (UNSTATS metadata).		
Relevance:	Access to safely managed water and sanitation is the foundation of socio-economic development, human dignity, well-being, and health (Anthonj et al., 2018). However, a number of people do not have this. In the past century, the use of water was more than twice the population rate. Even though there is no water shortage yet, 40 percent of the global population living around a river basin are experiencing water scarcity. Environmental degradation and water competition are some of the effects of water scarcity (Ako Ako et al., 2010). Moreover, clean water and sanitation inaccessibility causes children's death. Those who do not have access to clean water and sanitation also experience less opportunities in reaching their potential (Armah et al., 2018). Efforts to ensure access to affordable and clean energy have progressed due to recent initiatives in electrification and improvements in energy efficiency. However, there is still a need to establish national policies on affordable energy. Some of the causes of global energy problems today are high fuel prices, poverty, and lack of access to clean fuels. Countries with severe climate and heating demand are greatly affected by these problems (Kerimray et al., 2017).		
Limitation(s):	Data on access to safely managed water and sanitation is not yet uniform and national discrepancies exist. Fecal and chemical contamination is not considered in all cases (UNSTATS metadata). The indicators that were usually used in monitoring progress in response to water and sanitation issues are at the international level only. There have been many new and useful initiatives at the local level that contribute to the availability of clean water and sanitation (Osumanu et al., 2010), but these are not considered yet in measuring the indicator. Data on household cooking, heating, and lighting are not yet unified and universally measured. Concerning electricity, the availability of an electric outlet does not always imply that the electric supply is reliable and constant (UNSTATS metadata). It also does not include information about affordability, reliability, and the quality of service which are also indicators of accessibility (Bhatia & Angelou, 2015).		

4.2 Prevalence of undernourishment

Unit:	Percentage	**Indicator category/code:**	Access to basic services and resources / AB2
Related SDG:	Target 2.1, indicator 2.1.1		
Impact on green growth:	Negative	**Data availability:**	Time series 2000-2019
Data source:	FAO		
Online source:	https://unstats.un.org/sdgs/indicators/database/		
Definition:	The prevalence of undernourishment (PoU) measures the percentage of the population that can't have enough food to provide the needed dietary energy requirements to support a normal, active, and healthy life. Additionally, undernourishment is defined as the condition of lack of food intake (UNSTATS metadata).		
Relevance:	In 2020, 768 million people are undernourished globally, with 418 million people living in Asia and more than one-third of 282 million living in Africa (FAO, n.d.-c). Prevalence of undernourishment and undernutrition to children can lead to stunting, wasting (being dangerously thin for one's height), and being underweight (Roser & Ritchie, 2019).		
Limitation(s):	Precision of the PoU estimates is low due to its probabilistic nature of inference and the model parameter's margins of uncertainty. The PoU's theoretical Margin of Error cannot be calculated but, in many cases, it would likely exceed plus or minus 2.5%. Thus, FAO only publishes country-level estimates larger than 2.5% and is the lowest score that can be obtained in the indicator (UNSTATS metadata). It cannot be disaggregated by age, sex, etc. in order to identify populations that are most vulnerable to undernourishment within countries (FAO, n.d.-b). Lastly, it only tells how many are undernourished but not the severity of how undernourished they are (Roser & Ritchie, 2019).		

4.3 Universal access to sustainable transport

Unit:	Score	**Indicator category/code:**	Access to basic services and resources / AB3
Related SDG:	Not in the list of SDGs but contributes to Target 5.1, 5.2, 5.3; Target 9.1; Target 11.2 (Sum4All, n.d.-b).		
Impact on green growth:	Positive	**Data availability:**	2020
Data source:	Sum4All		
Online source:	https://www.sum4all.org/gra-tool/country-performance/global		
Definition:	The indicator consists of three sub-indicators: Rural access index (RAI), rapid transit to resident ratio (RTR), and percentage of female employment in transport. RAI or also known as SDG indicator 9.1.1 is an important measure of people's accessibility in rural transport through looking at the share of a country's rural population that lives within 2 km of an all-season road (Iimi et al., 2016; UNSTATS metadata). RTR is a metric that uses the country's urban population and the length of its rapid transit lines. It can be used to compare transit growth over time since due to the increasing population which transit investments must keep up with that growth in order to improve the transport system (ITDP, 2016). Lastly, percentage of female employment in transport is important since working in the transport sector is still highly gendered and unequal resulting to women working in low status jobs or salaries which hinders development of their job opportunities (Turnbull et al., 2013).		
Relevance:	Improving access to rural transport is crucial in order to end poverty and promote sustainable development, especially for Africa, where 70 percent (450 million people) lack transport infrastructure and systems (Sum4All, n.d.-c). Improving access to urban transport provides more opportunities socially and economically, as well as reduce traffic congestion, noise, and air pollution (Sum4All, 2019b).		
Limitation(s):	For the RAI, there is limited time series data since the initial RAI methodology in 2006 used household survey which is costly and does not provide adequate and equal spatial representativeness. Thus, it was revised in 2016 using advanced technologies and datasets to provide more reliable and informative than the previous RAI (Iimi et al., 2016; Sum4All, n.d.-c). RTR has been used as proxy for public transport accessibility since the latter has unavailable data for many cities. Percentage of female employment in transport has been used as proxy for women and girls as transport users due to its lack of data availability (Sum4All, n.d.-c).		

4.4 Proportion of seats held by women in national parliaments

Unit:	Percentage	**Indicator category/code:**	Gender balance / GB1
Related SDG:	Target 5.5, indicator 5.5.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2020
Data source:	Inter-Parliamentary Union (IPU)		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	Participation of women in parliament is a major opportunity for them politically. It is linked to their empowerment. The indicator measures the extent of women's equal access to parliament (UNSTATS metadata).		
Relevance:	Involvement of women in politics has good social and economic impacts. It is crucial in advancing gender equality and democracy in a country. Also, involvement of women in decision-making balances the dominance of men in politics. In a political sense, their involvement improves policies and inclusion of minority groups. In the economic sense, it promotes the role of women in development and their inclusion in the labor market (Asiedu et al., 2018).		
Limitation(s):	The indicator does not consider results in by-elections and upper chambers of parliament. It is also not a complete measure of women's political power (UNSTATS metadata).		

4.5 Gender ratio of account at a financial institution or mobile-money-service provider

Unit:	Ratio	**Indicator category/code:**	Gender balance / GB2
Related SDG:	Target 8.10, indicator 8.10.2 and contribute to target 5.1.		
Impact on green growth:	Negative	**Data availability:**	2011, 2014, 2017
Data source:	World Bank Global Findex database		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	Account in financial institution refers to the proportion of people age 15 and older who have access to financial or mobile money services such as payments, insurance, savings, remittances, and credit irrespective of their age, education, address, and income (World Bank, 2021). The indicator was computed by taking the higher value between male-female or female-male ratio of the indicator. Given that the target is equality, countries are penalized if there are imbalances (i.e., higher ratio values) to access in financial institution between male and female.		
Relevance:	Financial inclusion provides people with insurance and access to credit. Poor low-income individuals rely on their own savings and earnings if they are excluded from financial systems. There is a wide gender gap when it comes to measuring financial inclusion through usage. Aside from income, gender has an impact on financial inclusion (Fanta & Mutsonziwa, 2016). People who have access to financial services can manage their lives and participate in businesses (UNSTATS metadata).		
Limitation(s):	The indicator is built using representative surveys of 140 countries, which are conducted every three years. This method implies uncertainties on the values (UNSTATS metadata; World Bank, 2021).		

4.6 Getting paid, laws and regulations for equal gender pay

Unit:	Score	**Indicator category/code:**	Gender balance / GB3
Related SDG:	Not in the list of SDG indicators but contributes to target 5.c and 10.2		
Impact on green growth:	Positive	**Data availability:**	Time series, 1971-2020
Data source:	World Bank Women, Business and the Law		
Online source:	https://wbl.worldbank.org/en/reports		

4.6 Getting paid, laws and regulations for equal gender pay *(continued)*

Definition:	The indicator refers to the legal gender discrimination that influences employment and economic choices of women. It also covers the laws that require equal pay for labor of equal value (World Bank, n.d.-c).
Relevance:	Similar to men, women have become better workforce members. There are also many social policies that support the employment of women. Gender pay gap, however, persists partly due to the lack of political will to redistribute wage share. Gender quality will require more sharing of work and social support. Also, there is a need to change the behavior of employers and perspectives of countries that give opportunities for women (Rubery & Koukiadaki, 2016).
Limitation(s):	This indicator does not consider the whole of the labor force (World Bank, n.d.-c).

4.7 Inequality in income based Palma ratio

Unit:	Ratio	**Indicator category/code:**	Social equity / SE1
Related SDG:	Not in the list of SDG indicators but contributes to Target 1.1, indicator 1.1.1; Target 1.2, indicator 1.2.1; Target 10.1, indicator 10.1.1.		
Impact on green growth:	Negative	**Data availability:**	Time series, 1967-2020
Data source:	World Bank		
Online source:	https://data.worldbank.org/indicator		
Definition:	The Palma ratio is a measure of income concentration. It is computed as the share of national income received by the 10% people with highest disposable income divided by the share of all income received by the 40% people with the lowest disposable income (OECD, n.d.; Palma, 2011). Higher scores would indicate higher levels of inequality. For example, a value of 3.0 in the Palma ratio suggests that the richest 10% earn three times more than the poorest 40%.		
Relevance:	Studies show that measuring income inequality is a factor in determining the poverty level, economic growth rate, human rights, and the level of crime, violent conflict, and social unrest (Birdsall, 2007; McKay, 2002). It was also observed that growth rates are generally better for countries that have lower initial income inequality (Dollar et al., 2013). The Palma ratio is also used in policy debates since it is easier to interpret and explain to both policy makers and stakeholders compared to other measures of inequality (Cobham & Sumner, 2013).		
Limitation(s):	As with all measures of inequality, the indicator measures income differences but cannot indicate the standard of living (Rahe et al., 2015). In addition, the Palma ratio only utilizes the top 10% and 40% of the income distribution data as a measure of concentration (Cobham & Sumner, 2013).		

4.8 Population with access to basic services by urban/rural, i.e. electricity

Unit:	Ratio	**Indicator category/code:**	Social equity / SE2
Related SDG:	Target 7.1, indicator 7.1.1		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2019
Data source:	Computation of the indicator used data on access to electricity.		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	It is calculated based on the portion of population who has access to electricity.		
Relevance:	There is a big difference between the population in rural and urban areas when it comes to access to basic services. Services like electricity are essential for improved living. However, poor people particularly in rural areas have low access to these basic services (United Nations, 2011).		
Limitation(s):	The indicator has the same issues concerning electricity as AB1. There is a lack of data for water and sanitation, thus it was not added.		

4.9 Share of youth (aged 15-24 years) not in education, employment or training

Unit:	Percentage	**Indicator category/code:**	Social equity / SE3
Related SDG:	Target 8.6, indicator 8.6.1.		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2019
Data source:	LFS - EU Labour Force Survey		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	The number of youths aged 15-24 who are not in education, employment, or training is an indicator that measures the involvement of youth in the labor market and does not cover youth who are unemployed. It also includes youth workers who are outside the labor market because of their disability or involvement in household chores or other tasks (UNSTATS metadata).		
Relevance:	Increasing human capital through employment, education, and training is one of the contributing factors for economic growth. The level of educational attainment is an important factor for employability. The youths who finished secondary education will less likely experience difficulty in searching for work (OECD, 2014). The youths who did not finish education nor attended training are the vulnerable ones in the labor market (Eurostat, 2019).		
Limitation(s):	The age coverage defining youth is different from country to country — some use 15 to 24; others 15 to 29 — so the data are not uniform (World Bank, n.d.-d).		

4.10 Proportion of population above statutory pensionable age receiving a pension

Unit:	Percentage	**Indicator category/code:**	Social protection / SP1
Related SDG:	Target 1.3, indicator 1.3.1.		
Impact on green growth:	Positive	**Data availability:**	Time series, 2000-2020
Data source:	International Labour Organization (ILO)		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	The proportion of population above statutory pensionable age receiving a pension is an indicator that measures the number of people who are covered by a social protection system. Access to social protection is a human right. This indicator also reflects the degree of security of the living condition of people. Social protection system benefits people covering disability, unemployed persons, child and maternity benefits, injured workers, and older persons (UNSTATS metadata).		
Relevance:	According to ILO, old-age income security pension schemes are still relevant. Many countries are giving pensions in periodic cash forms under one scheme. Usually, it is through a combination of noncontributory and contributory schemes. Globally, those who receive pension comprise the 68 percent of people with above retirement age, either covered by noncontributory or contributory schemes (ILO, 2017).		
Limitation(s):	Countries provide statistics, which do not imply that pension is sufficient for the persons above pensionable age to live well. Furthermore, pensionable age varies from country to country (UNSTATS metadata).		

4.11 Universal health coverage (UHC) service coverage index

Unit:	Score	**Indicator category/code:**	Social protection / SP2
Related SDG:	Target 3.8, indicator 3.8.1		
Impact on green growth:	Positive	**Data availability:**	2000, 2005, 2010, 2015, 2017
Data source:	WHO		
Online source:	https://unstats.un.org/sdgs/indicators/database/		

4.11 Universal health coverage (UHC) service coverage index *(continued)*

Definition:	The indicator covers and measures different essential services based on tracer interventions which include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases, and service capacity and access. It is scaled from 0 to 100 using 14 tracer indicators from the four tracer interventions (UNSTATS metadata).
Relevance:	The indicator ensures that all receive health care such as health promotion, prevention, rehabilitation, palliative care, and treatment while protecting them from financial consequences. Additionally, good health allows people to earn income and escape poverty and has a positive impact on long-term economic development (WHO, 2021).
Limitation(s):	It only covers health services and interventions that are needed for universal health coverage that have currently existing database and available data for every country (UNSTATS metadata).

4.12 Proportion of urban population living in slums

Unit:	Percentage	**Indicator category/code:**	Social protection / SP3
Related SDG:	Target 11.1, indicator 11.1.1.		
Impact on green growth:	Negative	**Data availability:**	1990, 1995, 2000, 2005, 2010, 2014, 2016, 2018
Data source:	United Nations Human Settlements Programme (UN-HABITAT)		
Online source:	https://unstats.un.org/sdgs/unsdg		
Definition:	The proportion of urban population living in slums is an indicator that measures the number of people in urban areas who do not have good housing condition. It also measures the capability of people to meet the basic need for a shelter. It reflects people living in homes that lack basic services such as resilient housing, tenure security, safe water, improved sanitation, and electricity. These are indices for poverty (UN-Habitat, 2003).		
Relevance:	As urban population grows, so are the informal settlers in the urban areas. The urban population living in slums has been increasing since the 20th century. Urban people living without basic services is a serious issue. Countries have been addressing this issue because it can cause further concerns such as epidemics, political instability, mass migration, and national insecurity (Hermanson, 2016).		
Limitation(s):	Potential limitations include the lack of universally agreed definitions and characteristics for deteriorated housing conditions, underestimation of deteriorated housing units due to a lack of appropriate measurement tools, complex links between security land and property tenure, and the lack of data consistency globally due to limited capacity for collecting, managing, updating, and monitoring data in some countries (UNSTATS metadata).		

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