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THE USE OF SEEA FLOW ACCOUNTS FOR DERIVING CIRCULAR ECONOMY INDICATORS

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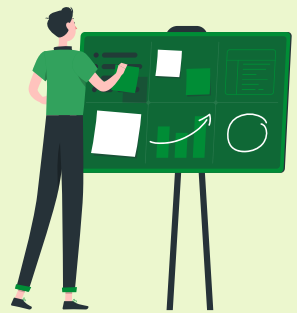
BACKGROUND

Environmental Issues

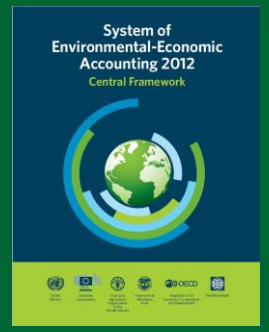
- **Increasing trend of material use**
- **Environmental degradation**
- **Risk of material scarcity**

> Circular economy is an economic model which aims to generate economic growth and reduce environmental impact by preserving and enhancing natural capital, optimizing resource yields, and fostering system effectiveness.
> *(Ellen MacArthur Foundation, 2015)*



OBJECTIVE

1. *The needs of circular economy indicators*
2. *Current available circular economy indicators*
   - *Waste*
   - *Recycling*
   - *Material flows*
   - *R-strategies*
   - *Policy and process*
   - *Environmental impact*
   - *Economic and social impact*
3. *Harmonization and standardization for circular economy indicators*



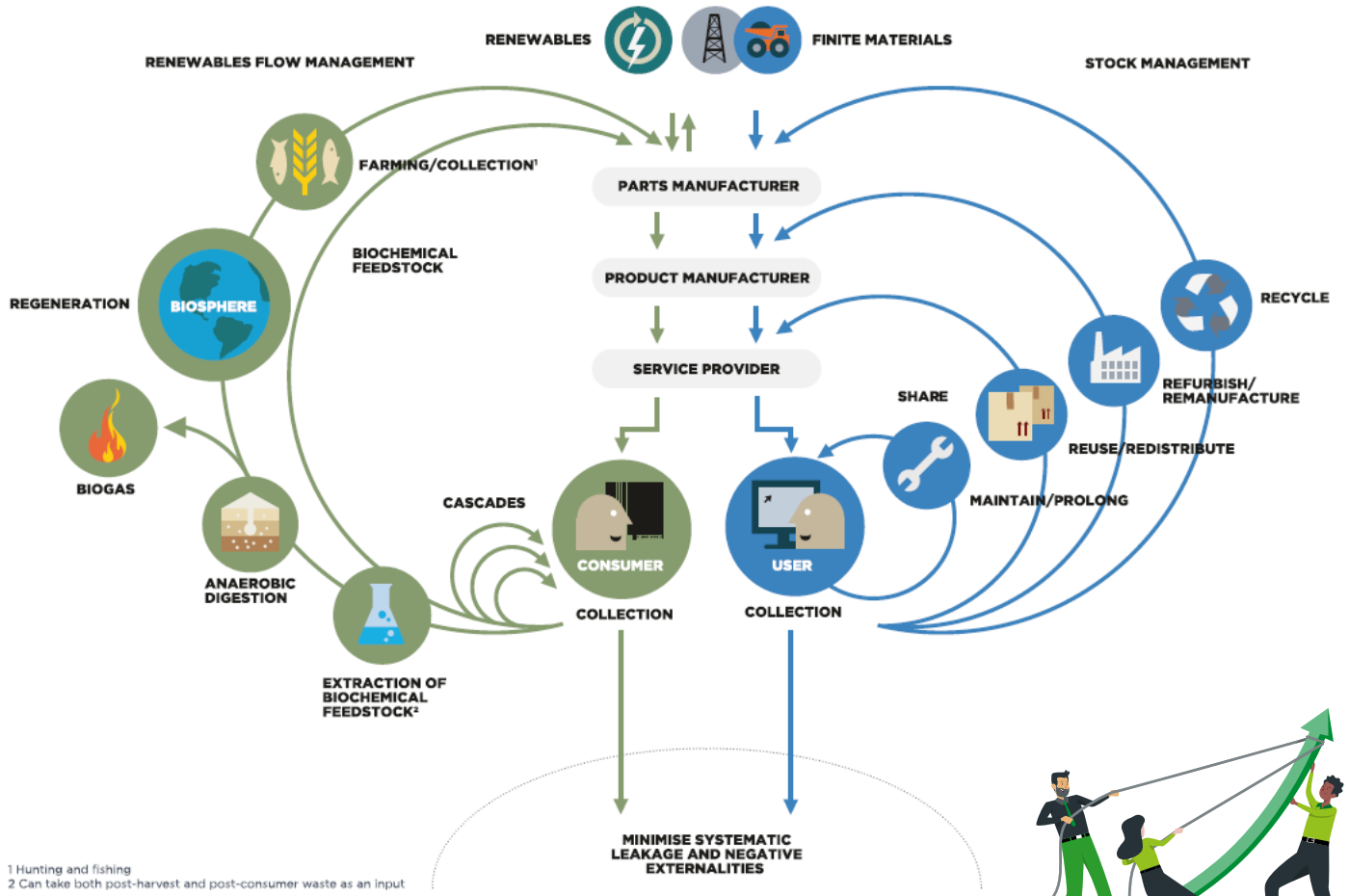
SEEA provides standard statistical framework to understand the relationship between the economy and the environment.

The objective of this paper is to highlight the use of SEEA flow accounts as a standard framework to derive some related circular economy indicators.

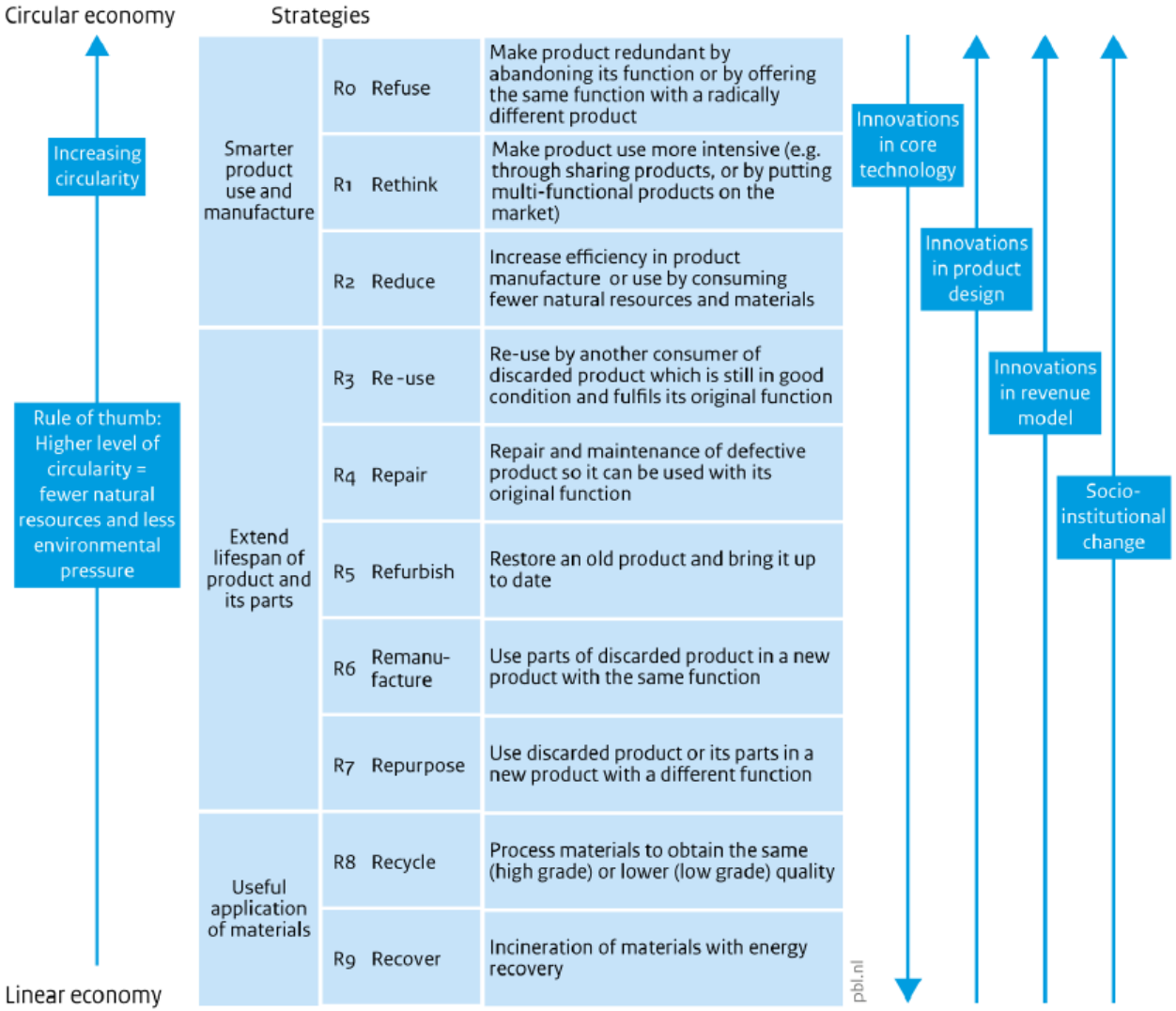
CIRCULAR ECONOMY

DEFINITION

Circular economic activities aim to consume products and materials effectively in the production process cycle. This concept is different from a linear economy that applies a “take, make, waste” process, in which after raw materials are processed into products and used or consumed, those products will then be discarded into non-renewable waste (Lacy et al., 2020).



CIRCULARITY STRATEGIES: 9R FRAMEWORK



Source: RLI 2015; edited by PBL

- There are several strategies in implementing circular economy concepts. An approach has been developed to reduce the use of natural resources and material consumption in production process, called R-strategies. (Potting et al., 2017)
- R-strategies consist of 10 strategies which ordered by the level of circularity.
- Lower R-number represents the higher level of circularity.

METHODOLOGY

Material Flow Accounts

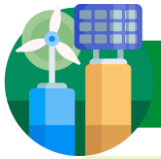
- Domestic Material Consumption per unit of GDP
- Material footprint per unit of GDP

Solid Waste Accounts

- Solid waste generation per capita
- Recycling rate
- Reuse of solid waste products

Air Emission Accounts

- Greenhouse gas (GHG) emissions per unit of GDP



Energy Flow Accounts

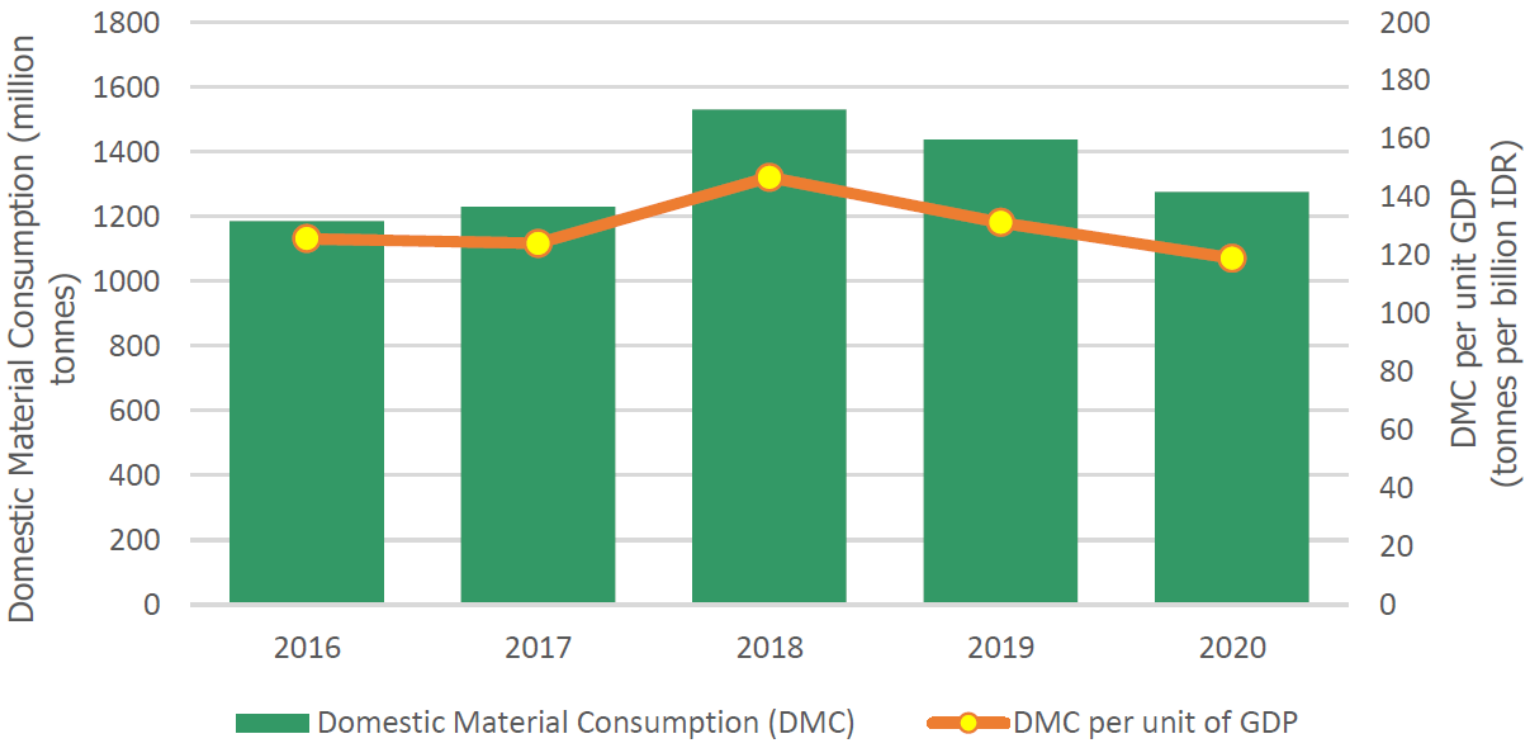
- Renewable energy mix
- Energy recovered from waste

Water Flow Accounts

- Water use productivity

RESULTS AND DISCUSSION[1]

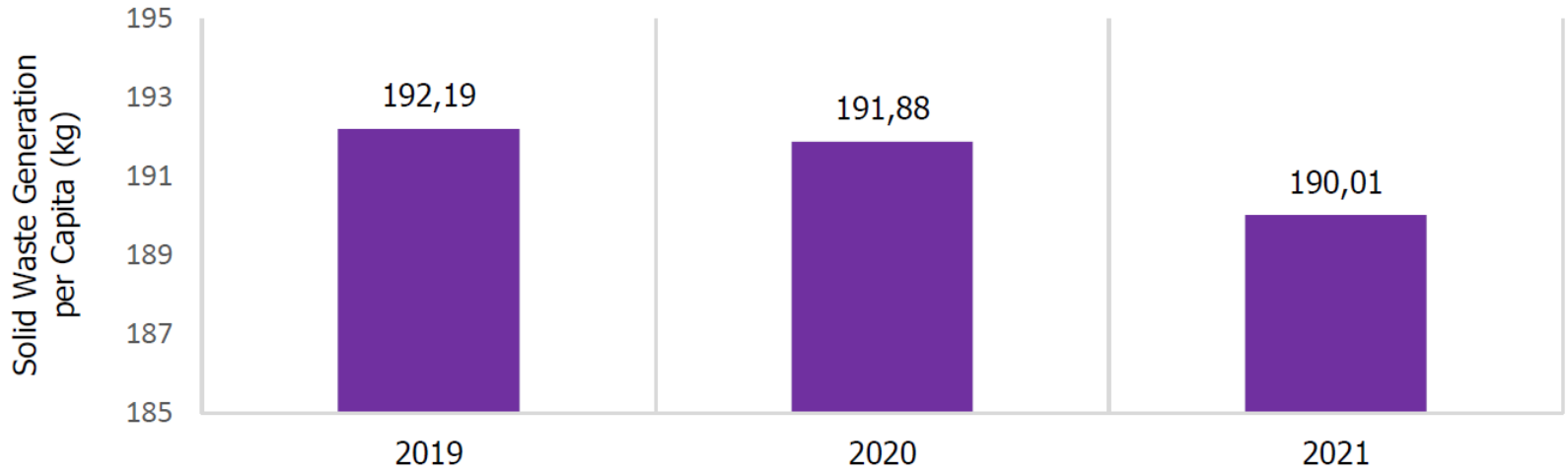
Domestic Material Consumption per unit of GDP



The trend of DMC per unit of GDP was not always in line with the trend of DMC. During 2016-2017, for instance, the DMC had increased from 1186 million tonnes to 1231 million tonnes, but the DMC per unit of GDP had declined from 125.75 tonnes per billion IDR to 124.15 tonnes per billion IDR.

RESULTS AND DISCUSSION[2]

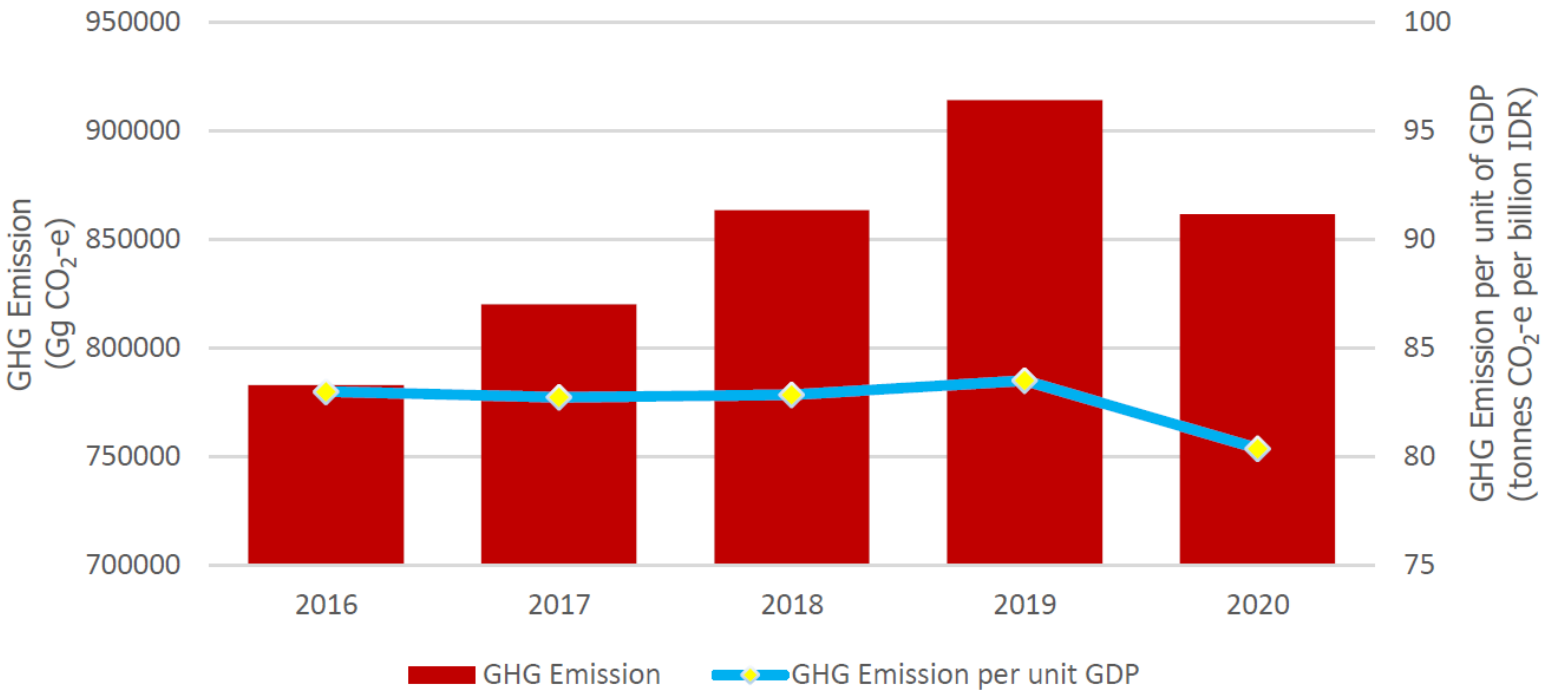
Solid Waste Generation per Capita



During 2019-2021, the solid waste generation per capita in Indonesia had declined over time. In 2019, the solid waste disposed to the environment per person in 242 municipalities/regencies was 192.19 kg in average. In 2021, the data from 228 municipalities/regencies showed that every person generated 190.01 kg of solid waste in average.

RESULTS AND DISCUSSION[3]

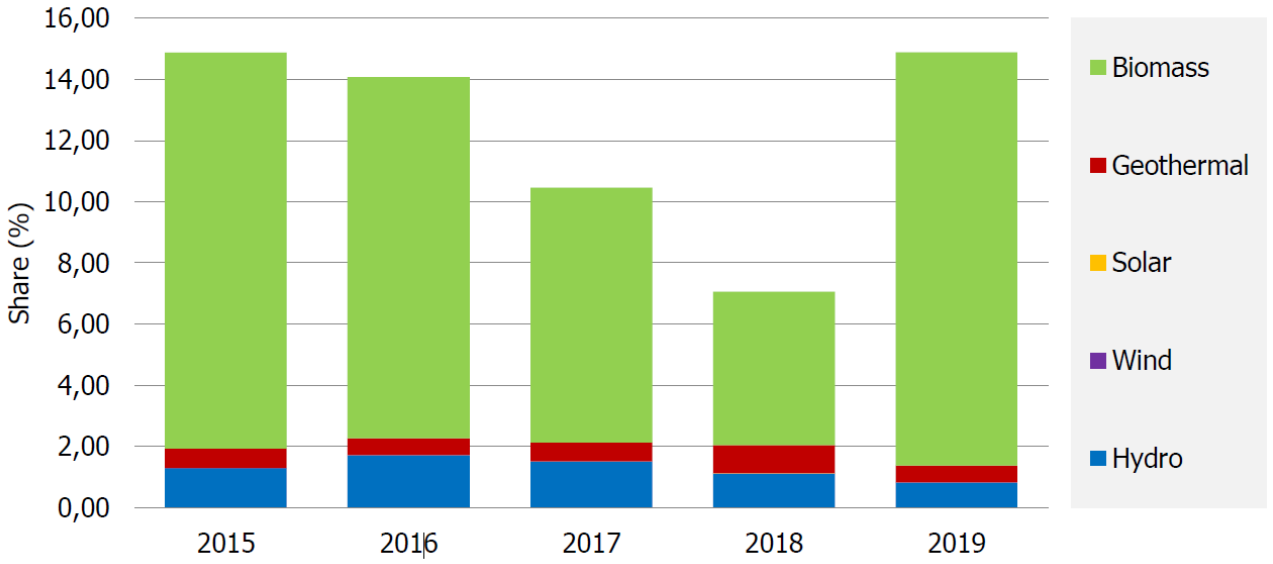
GHG Emission per unit of GDP



- *There was 16.77 percent growth of GHG emission in 3 years.*
- *The GHG emission per unit of GDP only increased from 82.98 tonnes CO2-e per billion IDR in 2016 to 83.50 tonnes CO2-e per billion IDR in 2019. The growth was only 0.62 percent during 2016-2019.*

RESULTS AND DISCUSSION[4]

Renewable Energy Share in the Total Final Energy Consumption



There was declining trend of renewable energy share in the total final energy consumption during 2015-2018 before it increased to 14.89 percent in 2019. That significant change was mainly caused by the increase of biomass-based energy consumption, even though the renewable energy captured from geothermal and hydro power decreased.

SUMMARY

SEEA Flow Accounts	Derived CE Indicators	CE Indicators Topics
Material Flow Accounts	DMC per GDP	Waste
	Material Footprint per GDP	Recycling
Solid Waste Accounts	Waste generation per capita	Material flows
	Recycling rate	R-strategies
	Reuse of solid waste products	Policy and process
Air Emission Accounts	GHG emissions per unit of GDP	Environmental impact
Energy Flow Accounts	Renewable energy mix	Economic and social impact
	Energy recovered from waste	
Water Flow Accounts	Water use productivity	

CONCLUSION

SEEA as a statistical framework to derive circular economy indicators

SEEA flow accounts provides standard framework to produce consistent and comparable statistics and indicators related to circular economy.

Scope of circular economy indicators derived from SEEA

The scope of circular economy indicators derived from SEEA flow accounts comprise indicators on waste, recycling, material flows, environmental impact, and R-strategies.

Further issues

The agreed methodology on material footprint modelling and the classification of solid waste for deriving comparable indicators for specific type of solid waste

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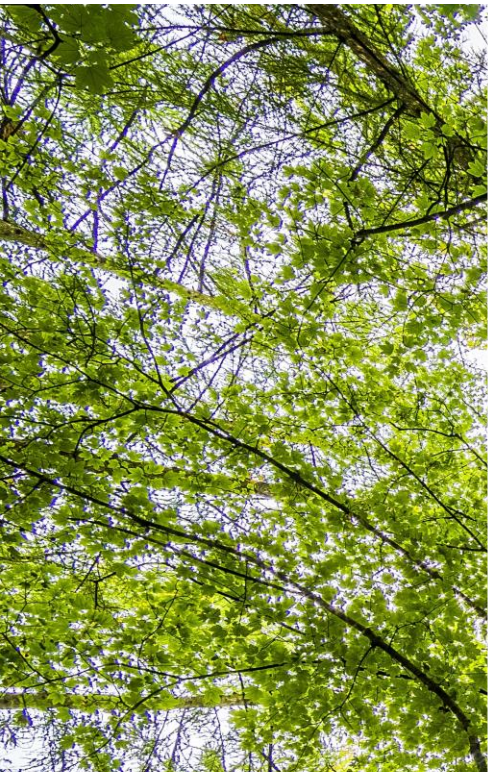

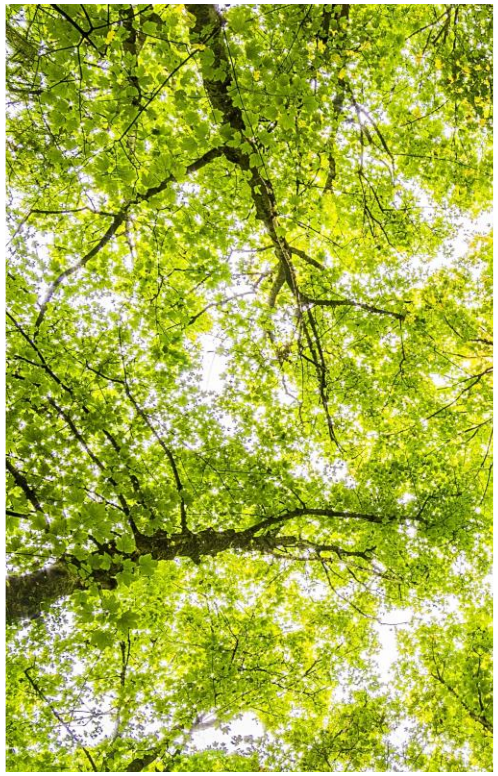

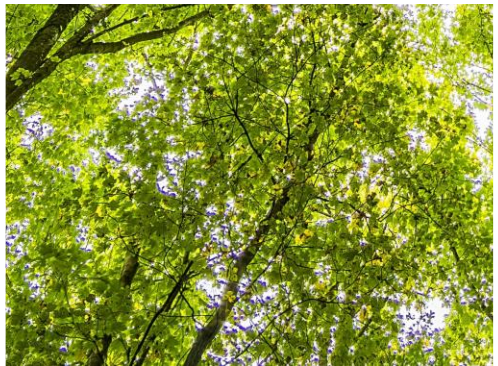

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Thank You!