



THE USE OF SEEA - MATERIAL FLOW ACCOUNTS FOR DERIVING CIRCULAR ECONOMY INDICATORS

Presentation of Republic of North Macedonia

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Suzana Stojanovska



Circular economy

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. In a circular economy, products that have been consumed will be reused in various stages of production until they are completely non-recyclable.



SEEA and Circular Economy

Environmental-Economic Accounting (SEEA) provides a statistical framework which guides the compilation of environmental-economic accounts. SEEA provides standard statistical framework to understand the relationship between the economy and the environment. Environmental flow accounts, in particular, record the flows of energy, water, and other materials between the environment and the economy as well as the flows within the economy. The use of SEEA flow accounts is a standard framework to derive some related circular economy indicators.



SEEA and Circular Economy

Flow account is a type of environmental-economic accounts within SEEA framework which measures the flows of natural inputs into the economy and releases of residuals to the environment (United Nations et al., 2014). The use of SEEA flow accounts allows the derivation of indicators for the consumption of resources relative to economic indicators derived from national accounts, such as output or value added, since the residence principle of SEEA framework is in line with the System of National Accounts.

SEEA flow accounts comprise three subsystems: material flow accounts, energy accounts, and water accounts. Within the framework of material flow accounts, there is also other types of flow accounts, such as air emission accounts and solid waste accounts, which are focused on specific type of residuals. The measurement of SEEA flow accounts is generally carried out in physical units and presented using the structure of supply and use table.



Circular Economy Indicators from Material Flow Accounts

Economy-wide material flow accounts (EW-MFA) provides aggregate overview in physical terms of the material inputs and outputs of an economy, including inputs from the environment, outputs to the environment, and the physical amounts of imports and exports. As one of the objective of circular economy is to keep the utility of materials as long as possible while maintaining the economic growth, the EW-MFA framework could be used to derive the material productivity indicators.



Circular Economy Indicators from Material Flow Accounts

The basic indicator derived from EW-MFA is **Domestic Material Consumption (DMC)**. Domestic Material Consumption (DMC) is a standard material flow accounting (MFA) indicator and reports the apparent consumption of materials in a national economy.

DMC measures the total amount of materials (biomass, fossil fuels, metal ores and non-metallic minerals) needed for domestic consumption activities. Therefore, DMC equals to the mass of materials extracted from the domestic environment plus materials imported from other countries less materials exported to other countries. To be classified as circular economy indicator, DMC should be divided by Gross Domestic Product (GDP) to form DMC per unit of GDP indicator (SDG indicator 12.2.2(a)) because the circular economy aims to reach more economic growth with less material consumption.



Indicator 12.2.2 (a)

Domestic material consumption per unit of GDP (all materials)

in kilogrammes per constant 2020 United States dollar

Domestic Material Consumption (DMC) is a standard material flow accounting (MFA) indicator and reports the apparent consumption of materials in a national economy.

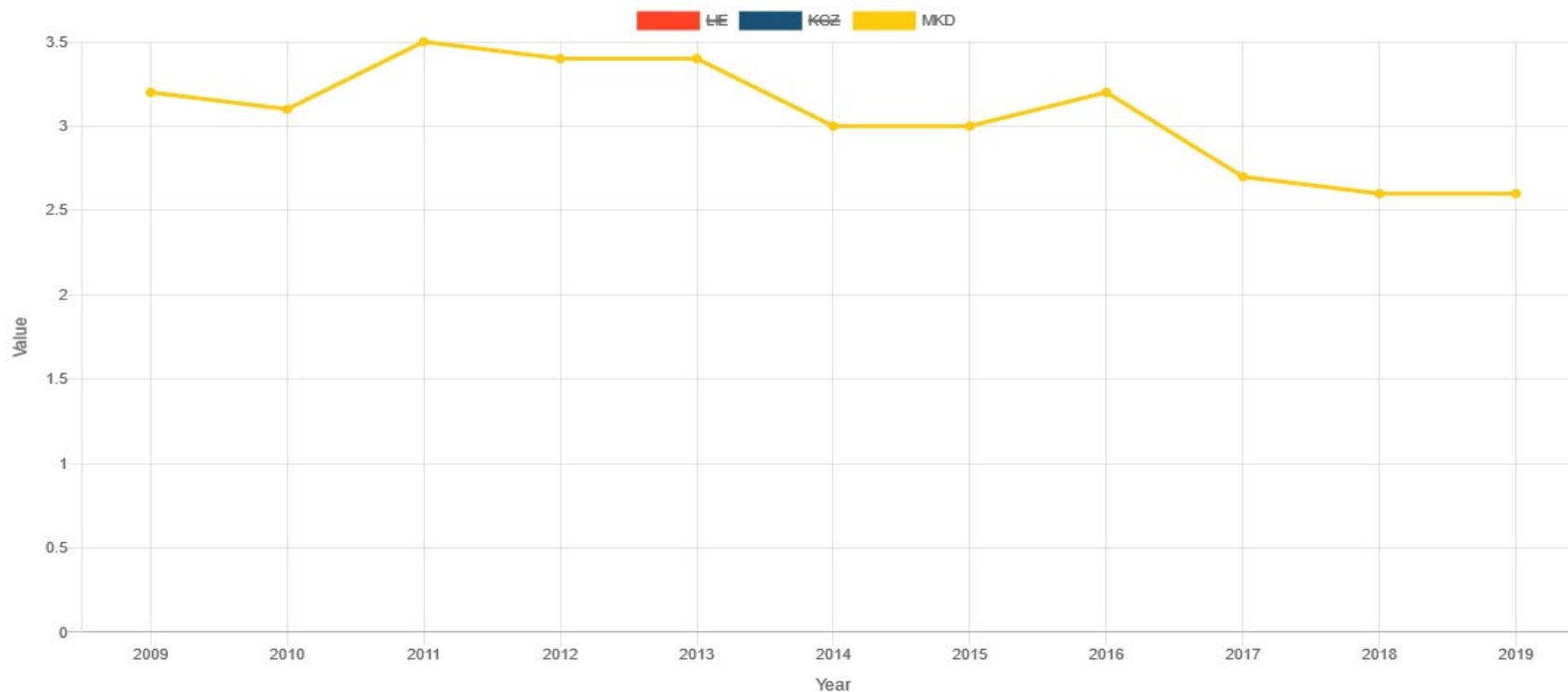
North Macedonia	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	3.2	3.1	3.5	3.4	3.4	3.0	3.0	3.2	2.7	2.6	2.6

Data source: UNECE United Nations Global SDG Database



Indicator 12.2.2 (a)

Domestic material consumption per unit of GDP (all materials)





Measuring Physical Flow of Plastic

The SSO produces statistics on plastics.

Data sources for measuring flow of plastic:

- Production – Industry statistics – Industrial production
- Import and export – Foreign trade statistics
- Plastic waste collected, generated and treated – Environmental Statistics (Survey on municipal waste and Survey on waste by sectors of economic activity)



Measuring Physical Flow of Plastic

- **Production of plastics**

Section 22 (class 22.2) Manufacture of rubber and plastic products according to NACE Rev 2

2022 - **72025** tones

- **Import and export of plastics**

Tariff 3923

Import		Import	
kg	EUR	kg	EUR
18,265,489	53,874,600	10,378,594	21,738,468

Measuring Physical Flow of Plastic

- Plastic waste

LoW		EWC-Stat	
15 01 02	Plastic packaging	07.41	Plastic packaging wastes
12 01 05	Plastic shavings and	07.42	Other plastic wastes
17 02 03	turnings		
19 12 04	Plastic		
20 01 39	Plastic and rubber		
	Plastics from households		

Generated plastic waste		
7.41	Plastic packaging waste	8874.4668
7.42	Other plastic waste	39329.59



Plastic in the circular economy

Is there a place for plastic in the circular economy?

By adopting sustainable practices that minimize waste and promote resource conservation, companies can actively contribute to solving the plastic waste crisis.

Embracing the circular economy not only benefits the environment, but also presents economic opportunities, promotes innovation, and enhances a company's reputation. Thanks to these collective efforts, we can pave the way to a more sustainable and prosperous future.

Fostering the use of recycled plastics, and increasing their use in various applications, is essential to accelerate the progress towards a circular and climate neutral economy of plastics.



Plastic in the circular economy

In Republic of North Macedonia, the selection of waste is minimal. The analyzes so far show that recycling does not work completely, and that part of the waste from Macedonia is exported directly without further treatment, and part goes through a longer treatment process and is sold as such, for example glass, paper and plastic.

Every day in Macedonia, plastic is created on a huge scale, both from households and from business entities, which in turn have an obligation to give their own amounts of plastic for recycling. Of the plastic used, less than 25% is recycled. This leads to the creation of uncontrolled landfills throughout the country, in municipal landfills, riverbeds and on the outskirts. Instead of polluting our environment, this plastic can be recycled. An additional factor in the reduced recycling coverage is that plastic recycling is an expensive process, as well as the fact that the more plastic is reused, the more toxic it becomes.



Plastic in the circular economy

The problem in Macedonia with plastic waste is not only in the absence of recycling facilities, but also in the poorly controlled import of waste that is used as fuel in factory facilities. Not only are landfills more and more full of plastic waste, along with green areas across the country, but air pollution has also increased due to the burning of waste. This waste is imported from the EU and neighboring countries and to make the tragedy even greater, much more waste is imported than is exported.

Only about 1.4 percent of the total collected waste in the country is selected plastic waste, and the individual collectors of plastic bottles throughout the cities (informal sector) and collective operators have the largest share in the selection of plastic waste, instead of the Public Communal Enterprises.



Plastic in the circular economy

The activities undertaken by the competent institutions for the establishment of an integrated system for plastic waste management are not effective and do not allow avoiding and reducing the amount of plastic waste generated, efficient use of usable waste ingredients and respect for the principles of waste management.

Two companies in the country are dealing with plastic recycling. The first one has two lines of recycling: one is for the processing of the plastic "Pet" bottles of juices and mineral water. The goal of that processing is to eliminate all the dirt, in order to finally get completely washed and dried pieces of plastic, so-called 'Five Flex' or 'Five Flakes'." The "five flakes" as a new raw material are exported to the factory in Romania where they produce polyester fiber and polyester tape.



Plastic in the circular economy

The second line of recycling refers to the processing of polyethylene and polypropylene, it involves the introduction of input raw materials such as bales of plastic and foil, which first goes to primary selection after various types of hard and other plastic, its grinding, weighing and drying. And the last stage in that technological line is granulation, ie extraction and obtaining a new granulate. So a new granulate is obtained here, which it is further marketed on the market and is used for the production of several new articles, namely plastic pipes, such as sewers, water supply pipes, pressure pipes, irrigation pipes, then for new foils, new nylons and bags.

Another company that deals with the recycling of plastic waste, using an innovative and environmentally acceptable method. With their modern technology, the plastic is selected, compressed and baled into bales, and then exported.



Plastic in the circular economy

The issues associated with society's use of plastics are complex. They need to be addressed through coordinated actions at multiple levels and require changes not only in technologies, but also in business models and behavior.

Government policies have a key role to play in making such changes happen. The stakeholders must work together to address these challenges through exchange of policy experiences, technical advice and capacity.



Thank you for your attention!

suzana.Stojanovska@stat.gov.mk