EU-REI

Creating a Resource Efficient India

EU-REI
Creating a Resource Efficient India

Resource Efficiency and Circular Economy in the Indian Context

Module 4

Tools, standards and indicators for RE and CE: Indicators

adelphi
Confederation of Indian Industry
CII-ITC Centre of Excellence for Sustainable Development
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
teri

Course overview

Basic modules

1	Introductory session
2	Foundations of RE and CE in the international context
3	Towards RE and CE through sectoral strategies in India

Applied and advanced modules

4	Tools, standards and indicators for RE and CE	
	4a	Material Flow Analysis
	4b	Life Cycle Assessment
	4c	RE and CE Standards
	4d	RE and CE Indicators
	4e	Public Procurement
	4f	Circular Business Models
	4g	RE and CE Funding

Recap and evaluation

5	Summary, outlook and evaluation

Learning objectives: module 4d

After completion of module 4d, participants will be able to

- relate to the purpose of indicators and explain SMART-principle;
- outline difference between quantitative and qualitative indicators as well as macro-, meso- and micro-level application; and
- recall the terminology of resource use indicators and possible data sources to determine material flows.

Indicators

"What Gets Measured Gets Done."

- Regular measurement and reporting helps focusing on critical aspects, assists decision-making process and improves results.
- **Key Performance Indicators** (KPIs) - small number of agreed-upon metrics that reflect an organization's critical goals for success

[1]

[2]

[3]

Picture sources: [1] https://www.vectorstock.com/royalty-free-vector/tachometer-speedometer-and-indicator-icon-vector-20763599 [2] https://matthewatkin.actioncoach.co.uk/2018/07/09/the-importance-of-kpis/ [3] https://de.dreamstime.com/rotes-wei%C3%9Fes-ziel-mit-pfeil-im-bullauge-schwerem-schatten-auf-ihm-welches-die-symbolikonenzeichen-vektorillustration-lokalisiert-image145638345

Indicators

Indicators should be formulated according to the SMART principle.

S	*Specific*	Clearly articulated, well defined and focused; clear to people with basic knowledge about the issue, programme or initiative.
M	*Measurable*	Capacity to be counted, observed, analysed, tested or challenged; determine the degree of completion; findings should be repeatable and comparable.
A	*Attainable*	Achievable within the scope of the project/programme.
R	*Relevant*	Able to detect change and be related to the specific situation they seek to describe; appropriate scale should be used.
T	*Time-bound*	Attached to a time frame, including term dates/deadlines.

Indicators

Quantitative versus qualitative indicators

Quantitative

Can be expressed in whole numbers, decimals, ratios, fractions, percentages and monetary values.

Examples:

- Number of workshops organised
- Amount of resources required per GDP
- Recycled content per product

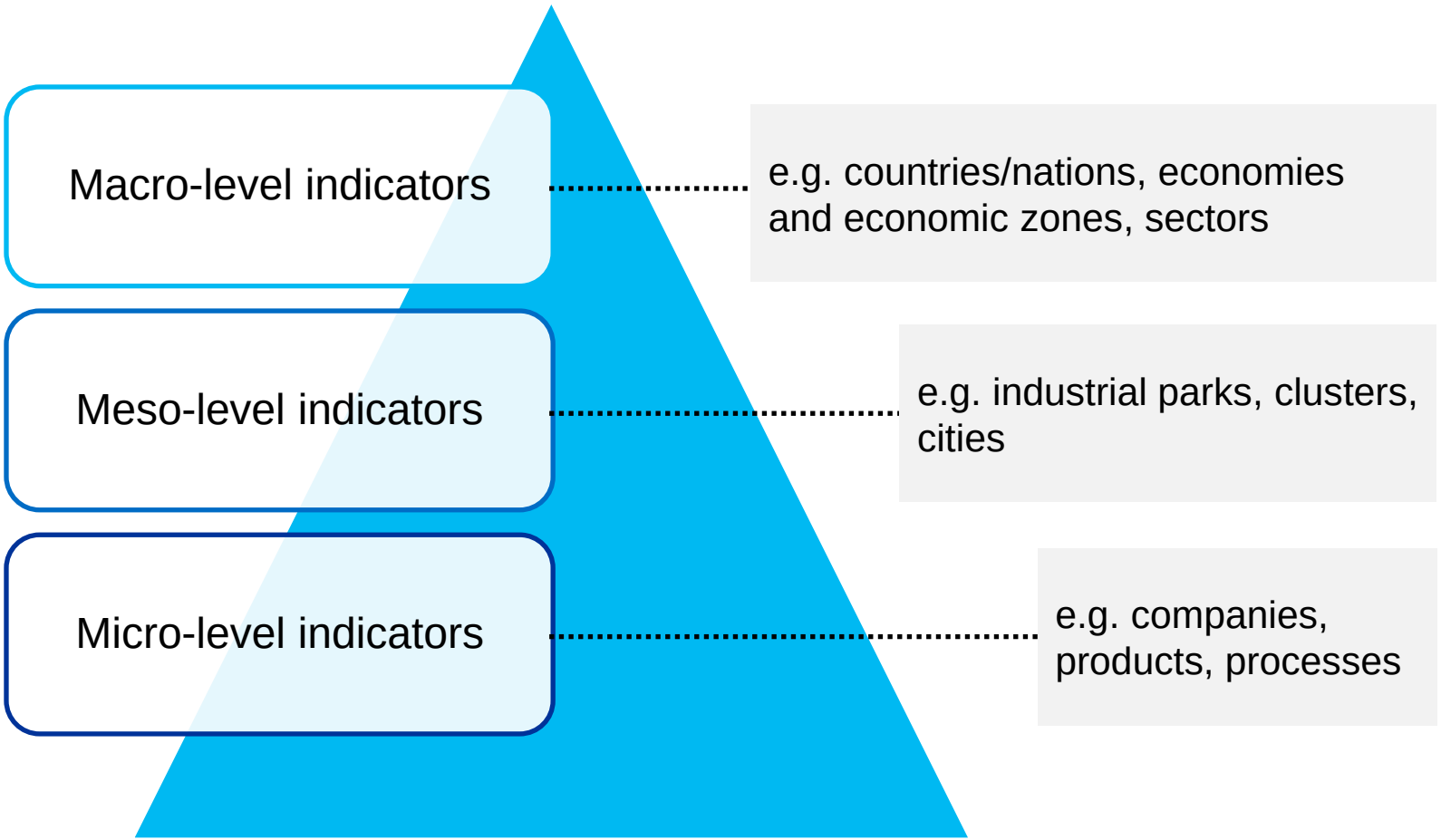
Qualitative

Expressed as either independent statements or as relative terms such as "good," "better," and "best."

Examples:

- Visible decrease in dependence on Critical Raw Materials
- Increased collaboration to close materials loops

Indicators


Macro-level indicators
e.g. countries/nations, economies and economic zones, sectors
Meso-level indicators
e.g. industrial parks, clusters, cities
Micro-level indicators
e.g. companies, products, processes

Indicators

Macro-indicators for RE at country level are measured in metric tonnes of materials.

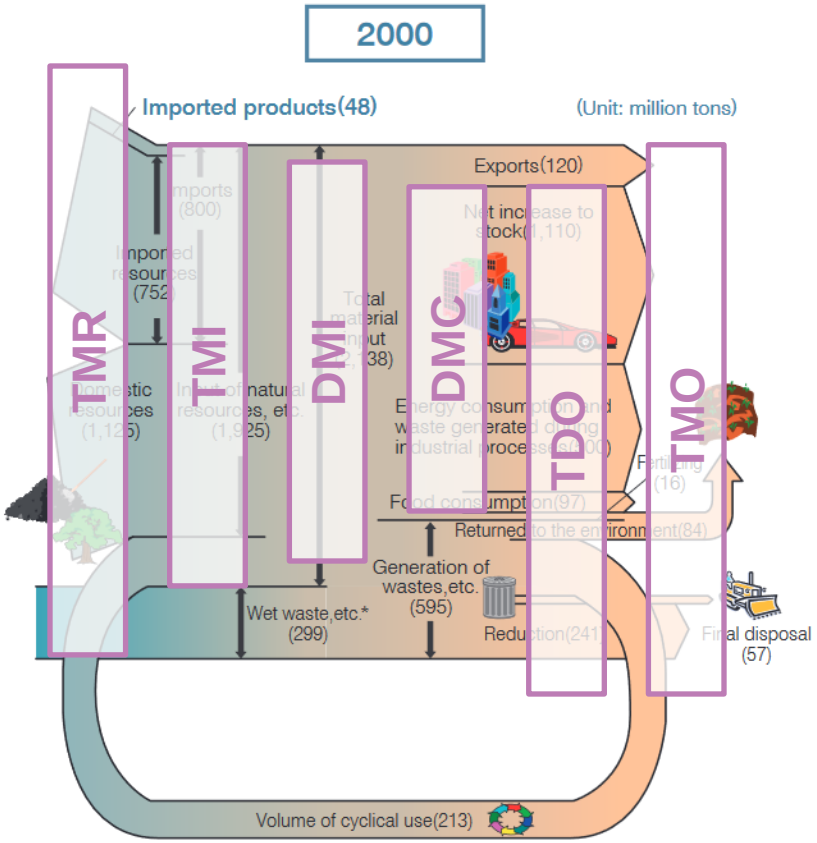
Indicator	Definition
Total material requirement (TMR)	= Indirect flows of imports + imports + used domestic extraction + unused domestic extraction
Total material input (TMI)	= Total material requirement - indirect flows of imports
Direct material input (DMI)	= Total material input - unused domestic extraction
Domestic material consumption (DMC)	= Direct material input - exports
Total domestic output (TDO)	= Domestic material consumption + unused domestic extraction
Total material output (TMO)	= Total domestic output + exports

A country's **resource productivity index** can provide insights into the degree of **economic decoupling**:

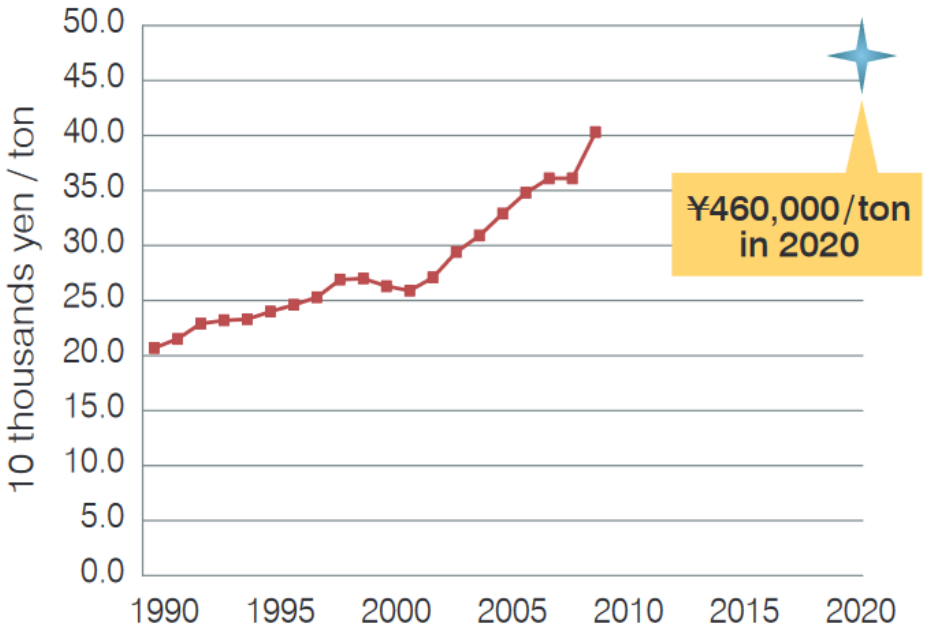
- **Consumption-based** resource productivity index = GDP/DMC
- **Production-based** resource productivity index = GDP/DMI

Indicators

Example: material flows of Japan



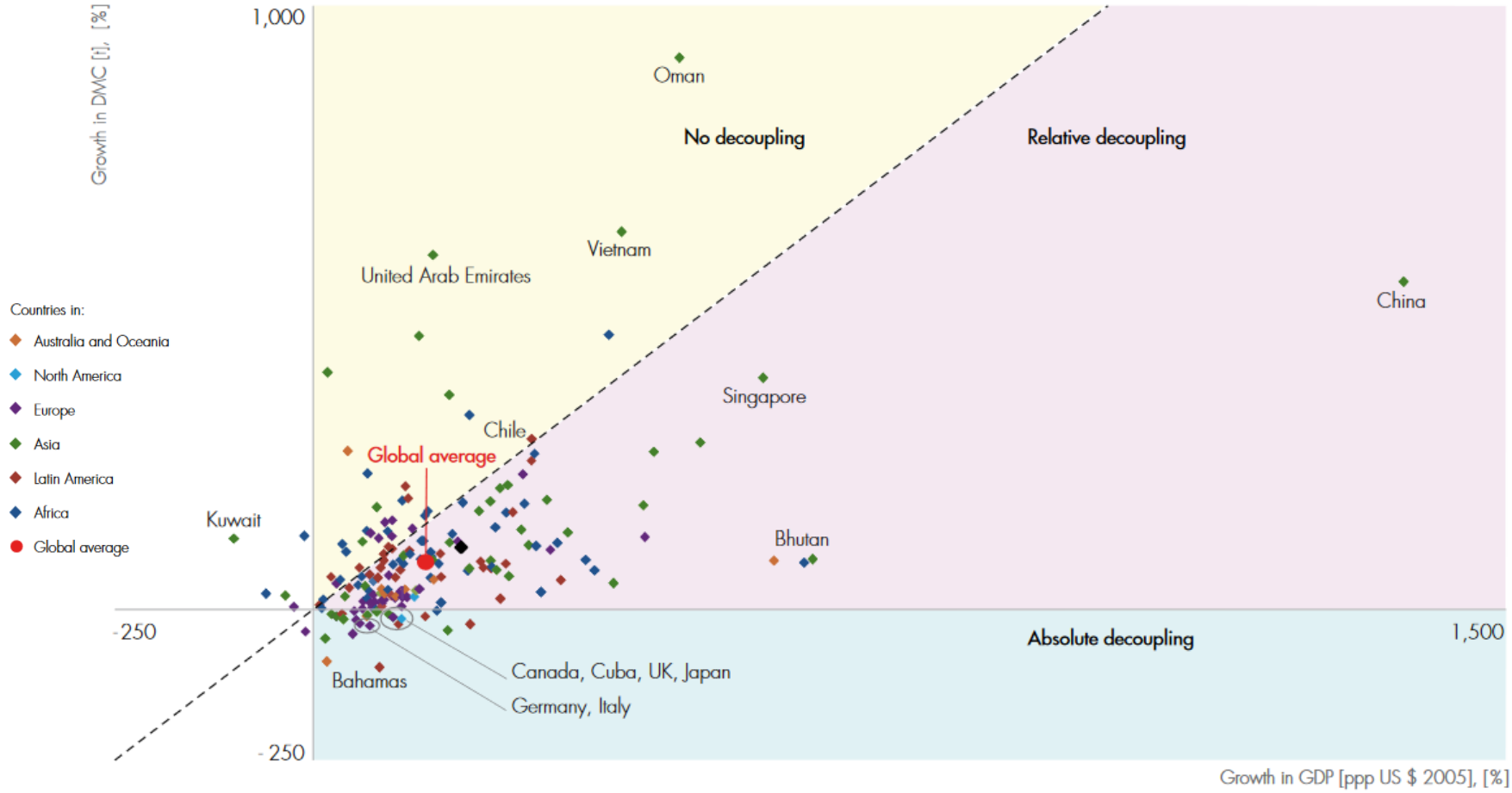
Resource productivity in Japan: GDP/DMI (1990-2008)



Picture source: https://iges.or.jp/en/publication_documents/pub/issue/en/3891/3RFS_010_web.pdf

Indicators

Worldwide trends in decoupling (1980-2008)



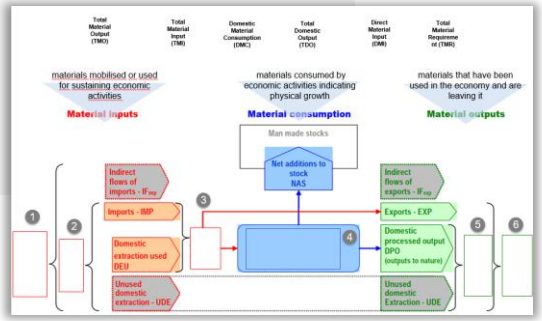
Picture source: https://www.boell.de/sites/default/files/201207_green_economies_around_the_world.pdf

Exercise: Indicators

Exercise 4d.1: Allocating macro-level resource use indicators

- Form groups of 2-3 people
- Review the definitions and examples of macro-level indicators on RE
- Assign each indicator to the corresponding slots (1-6) on the flowchart.
- Match provided options for data sources to the categories ‘material input’/ ‘material output’ and name two additional options for data sources

Estimated time requirement: 20 min



Exercise: Indicators

Solutions

Total Material Output (TMO)	Total Material Input (TMI)	Domestic Material Consumption (DMC)	Total Domestic Output (TDO)	Direct Material Input (DMI)	Total Material Requirement (TMR)

materials mobilised or used for sustaining economic activities

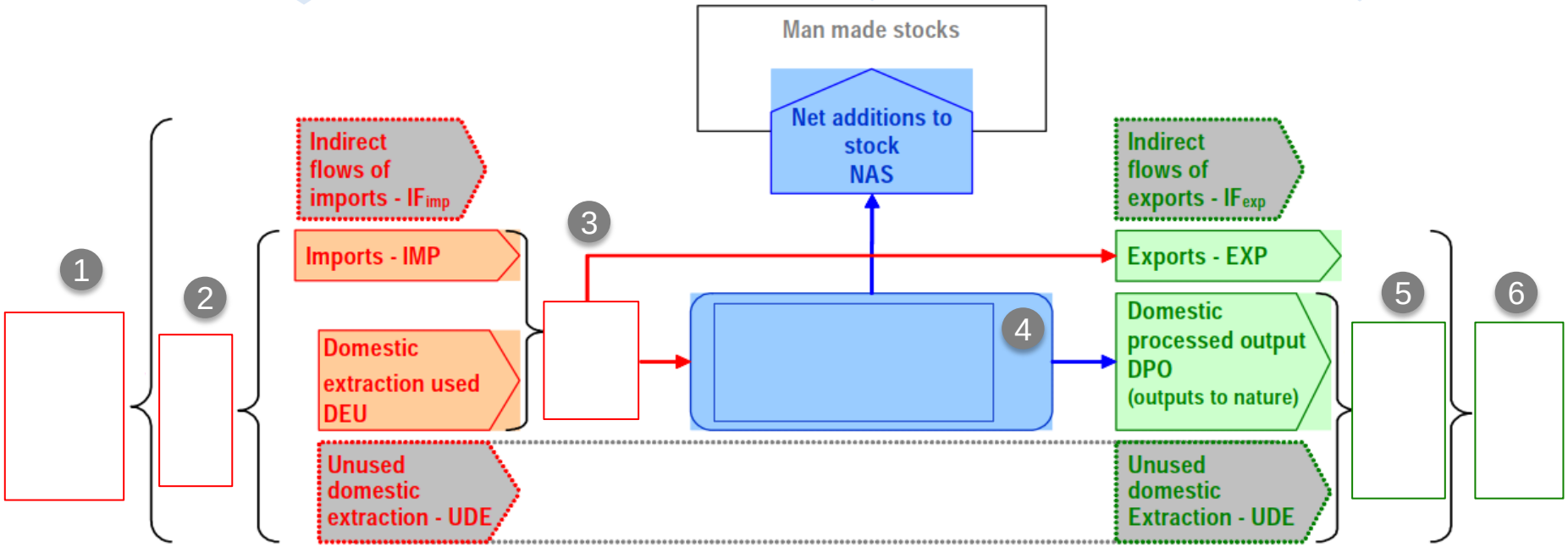
Material inputs

materials consumed by economic activities indicating physical growth

Material consumption

materials that have been used in the economy and are leaving it

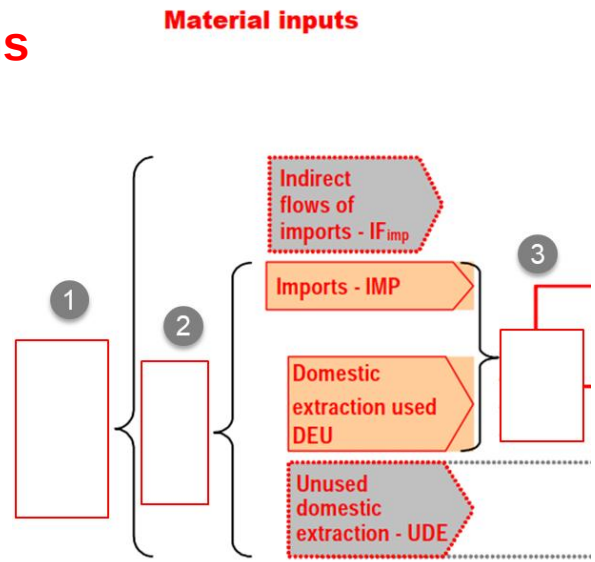
Material outputs

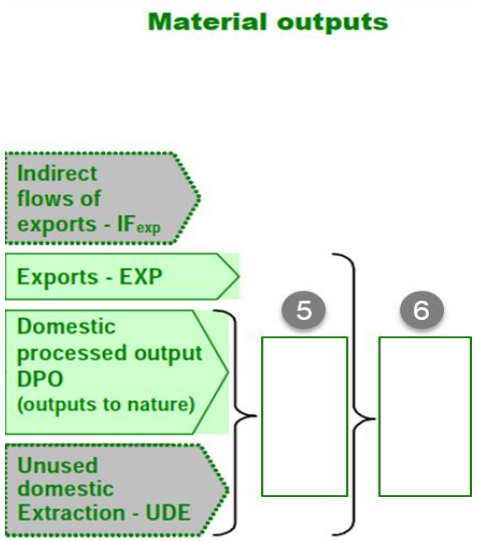


Picture source: https://www.oecd.org/environment/indicators-modelling-outlooks/MFA-Guide.pdf (adapted)

Exercise: Indicators

Solutions





1. Forestry statistics (timber harvested)
2. Energy statistics and balances (extraction of fuels)
3. Agricultural statistics (cereals, vegetables etc. produced)
4. Statistics for foreign trade (imports)
5. Statistics for foreign trade (imports)

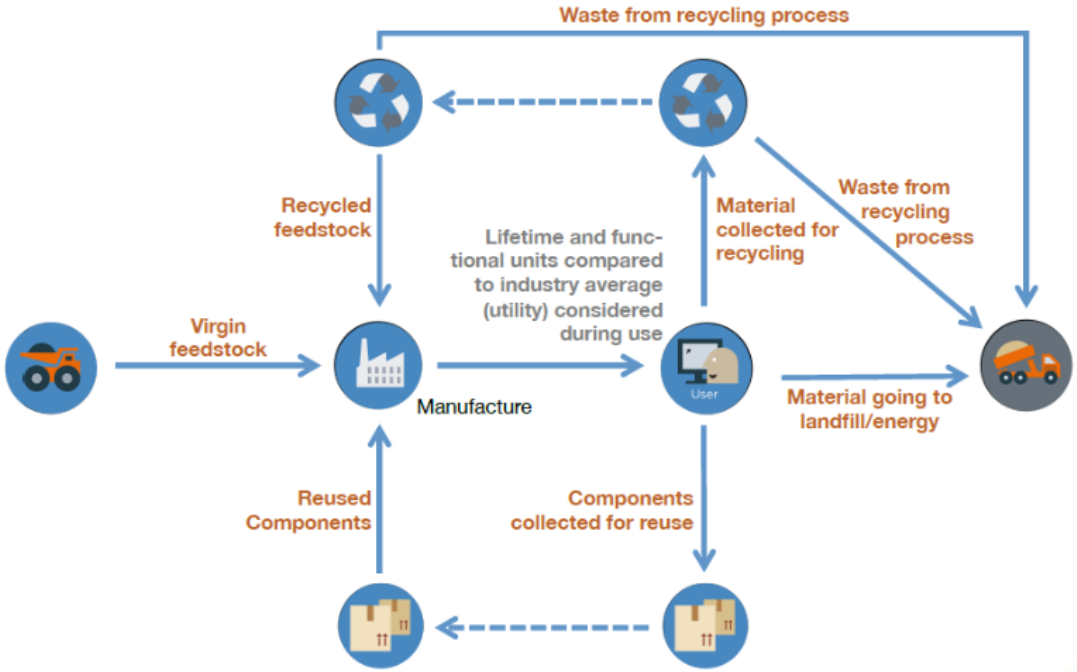
1. Environmental accounts for air emissions
2. Agricultural statistics for fertilizer use
3. Energy statistics (emission inventories)
4. Statistics for foreign trade (exports)
5. Environmental statistics for waste water and solid waste disposal

Picture source: https://www.oecd.org/environment/indicators-modelling-outlooks/MFA-Guide.pdf (adapted)

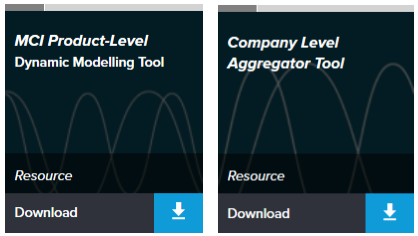
Indicators

- The **Material Circularity Indicator** (MCI) was developed by the Ellen MacArthur Foundations and measures circularity of materials flows on the business and product level
- The MCI consists of three variables:
  - the mass of virgin raw material inputs (V);
  - the mass of waste going to landfill or energy recovery (W); and
  - the product's longevity and use intensity, reflected by a utility factor (X).

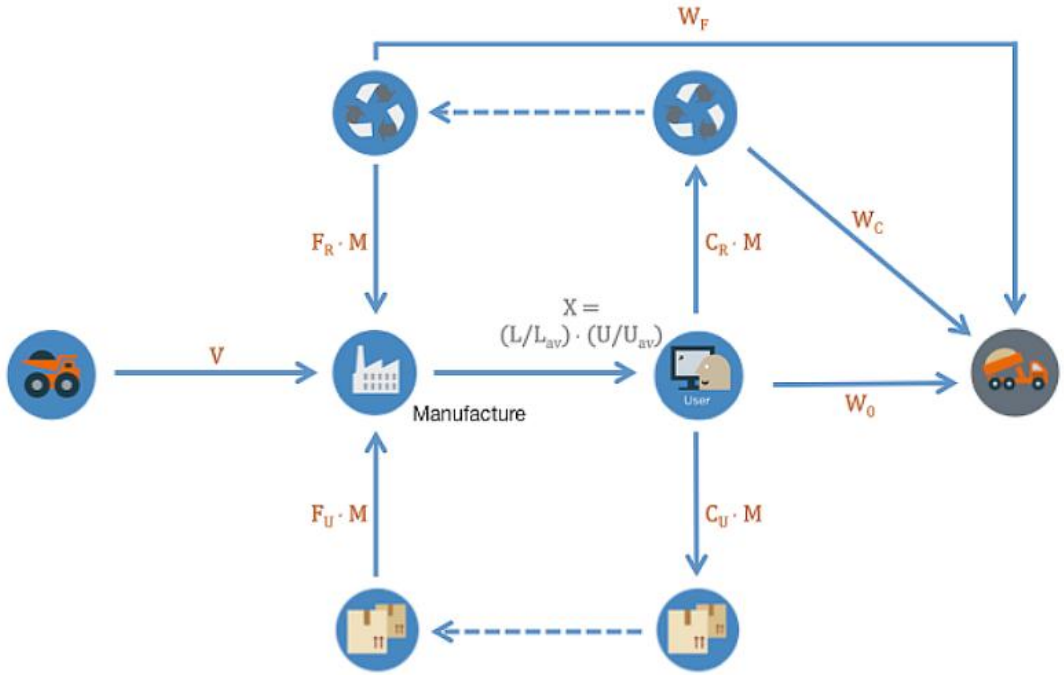
Indicators



- MCI value range: 1 (fully circular) to 0 (fully linear)
- Heavy products can provide a distorted picture
- Normalization by revenue is recommended



Tools and practical guidance on the MCI:
https://www.ellenmacarthurfoundation.org/resources/apply/circularity-indicators



Picture source: https://www.ellenmacarthurfoundation.org/resources/apply/measuring-circularity

Indicators

The **Circularity Calculator** is based on a weighted scale and guiding questions informed by experts‘ inputs.

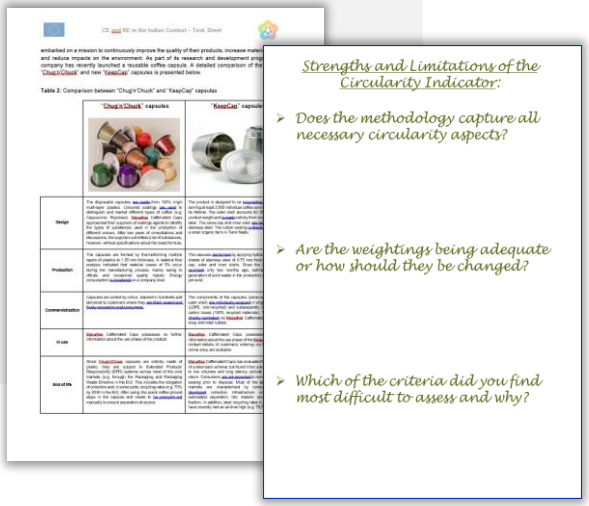
Lifecycle stage	#	Guiding question	Max. Score
Design	1	Is the product made from recycled/reused material?	20
	2	Is the product lighter than its previous version?	2
	3	Is there a complete bill of materials and substances for the product?	5
Production	4	Is there a complete bill of energy for the manufacturing process?	10
	5	Is there a complete bill of solid waste for the manufacturing process?	15
Commercialization	6	What packaging is being used?	5
	7	What is the product’s warranty?	10
	8	Is there a rental option for the product?	15
In use	9	Can the usage status and identification of the product be established?	15
	10	Can the product be repaired?	5
	11	Can the product be reused?	10
	12	Does the product help to reduce waste through its use?	5
End-of-life	13	What take-back scheme is available for this product?	15
	14	Is the product separated out from other products at the end of its life?	10
	15	Are the product’s materials passed back into the supply chain?	10

Exercise: Indicators

Exercise 4d.2: Applying a circularity calculator

- Form groups of 2-3 people
- Apply the circularity calculator methodology to the fictional case study of Marudhar Caffeinated Caps
- Discuss strengths and limitations of the circularity calculator

Estimated time requirement: 30 min



Exercise: Indicators

Solutions

Lifecycle stage	#	Max score	Score of "Chug'n'Chuck" capsules	Score of "KeepCap" capsules
Design	1	20	0	15
	2	2	2	0
	3	5	3	5
Production	4	10	5	0
	5	15	7	0
Commercialization	6	5	0	3
	7	10	0	7
	8	10	0	0
In use	9	15	0	5
	10	5	0	5
	11	10	0	10
	12	5	0	5
End of life	13	15	15	0
	14	10	5	10
	15	10	5	7
SUM			42/152	72/152

Exercise: Indicators

Strengths and Limitations of the Circularity Indicator:

- *Does the methodology capture all necessary circularity aspects?*
- *Are the weightings being adequate or how should they be changed?*
- *Which of the criteria did you find most difficult to assess and why?*

Summary

Take-home messages:

- Indicators can help benchmarking different products, processes or systems to assess RE and CE on a systematic basis
- Indicators should be formulated according to the SMART principle
- Qualitative indicators can help in the decision making process, but usually rely on expert opinion and are less suitable for objective benchmarking

EU-REI

Creating a Resource Efficient India