



ENV 370 (GR A332 – GRB001)

Environmental system analysis and assessment – Evaluation et analyse environnementale systémique

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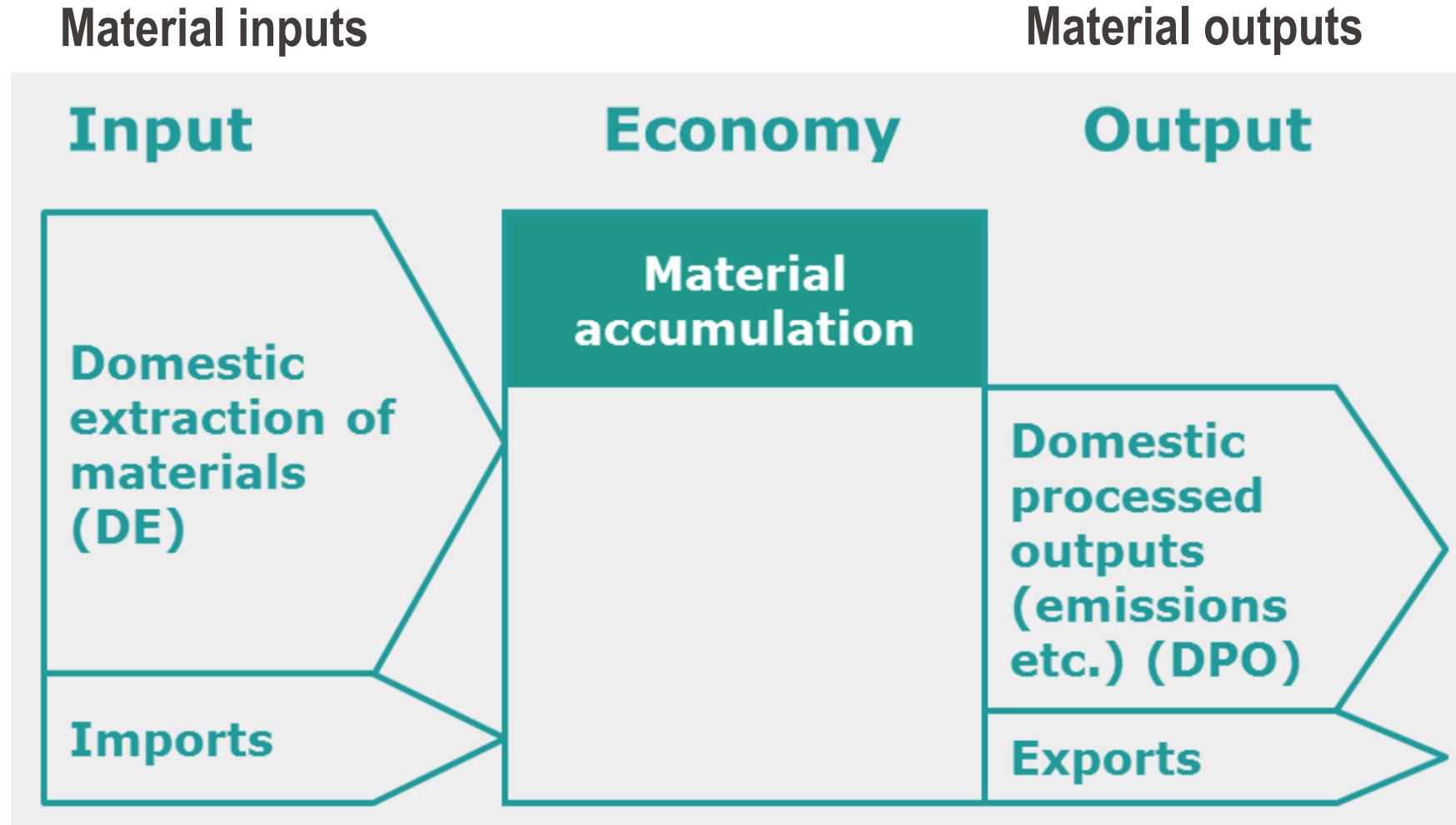
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EPFL - Spring 2025

Exercise

MFA (Eurostat): method



Eurostat, 2018

Material flows within the economy, Water flows and electricity flows are not represented in EW-MFA

Perform an EW-MFA for the 36 countries reporting

Basic flow types

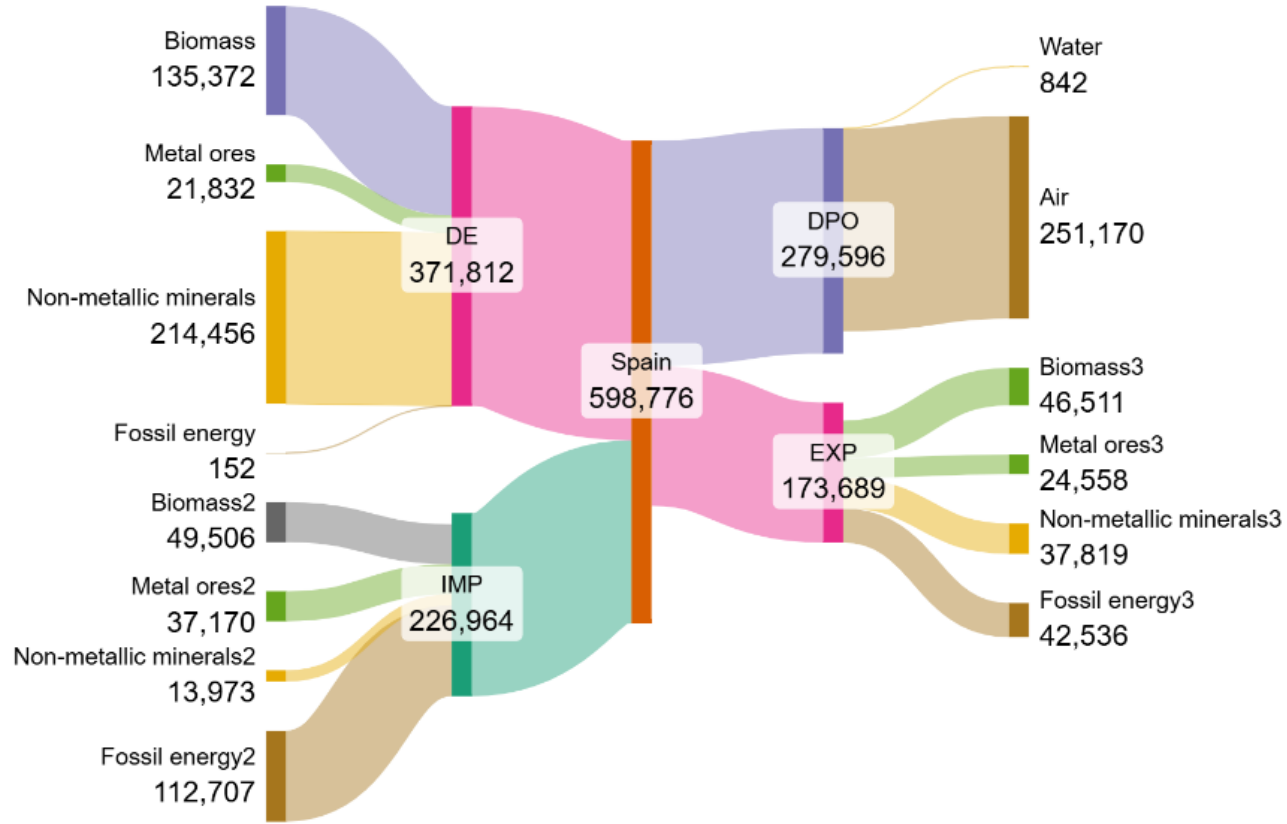
- Domestic extraction (DE)
- Domestic processed output (DPO)
- Imports (IMP)
- Exports (EXP)
- NAS

<https://ec.europa.eu/eurostat/web/environment/database>

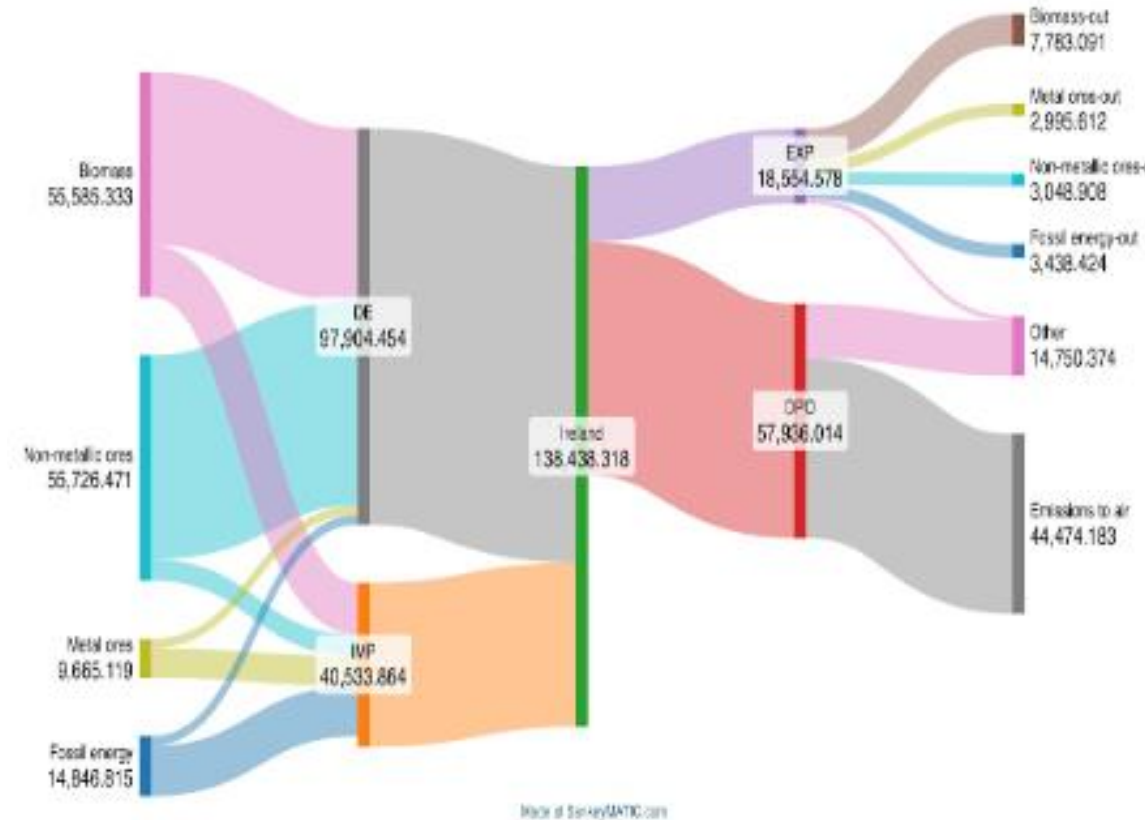
The screenshot displays the Eurostat Environment Database interface. On the left, a navigation menu includes 'Overview', 'Database' (selected), 'Publications', 'Information on data', 'Methodology', and 'Legislation'. The main content area is titled 'Database' and is divided into two sections: 'Selected datasets' and 'Detailed datasets'. The 'Selected datasets' section lists several categories with expandable icons: Environment (t_env), Emissions of greenhouse gases and air pollutants (source: EEA) (t_env_air), Material flows and resource productivity (t_env_mrp), Environmental taxes (t_env_eta), Environmental protection expenditure (t_env_epe), Waste (t_env_was), Water (t_env_wat), Chemicals (t_env_chm), and Biodiversity (t_env_biodiv). The 'Detailed datasets' section shows a hierarchical view of the 'Material flow accounts' (env_ac_mfa) dataset, which is expanded to show sub-datasets: Material flow accounts - domestic processed output (env_ac_mfadpo), Material flow accounts - balancing items (env_ac_mfabl), Material flow accounts - main indicators (env_ac_mfain), Resource productivity (env_ac_rp), Material import dependency (env_ac_mid), Circular material use rate (env_ac_cur), Circular material use rate by material type (env_ac_curm), and Material flows for circular economy - Sankey diagram data (env_ac_sd).

<https://docs.google.com/spreadsheets/d/1LI9EFF7eoxyxcJV9LnIX0fNYFPVti2r1fvfIN3Juv0c/edit?usp=sharing>

Compare the EW-MFA – What solutions to change their metabolism



Made at SankeyMATIC.com



Made at SankeyMATIC.com

Exercise 2

Veillez lire cet extrait de journal. Dans un contexte de transition socio-écologique et dans une approche AFM, comment évaluer l'ouverture d'une mine de lithium en France (ou dans n'importe quel pays), sachant que la France compte au total 39 millions de voitures ? Quelles sont les précautions qu'il est important de garder à l'esprit ? Quelles solutions complémentaires ou alternatives proposeriez-vous en termes de sobriété et d'efficacité ?

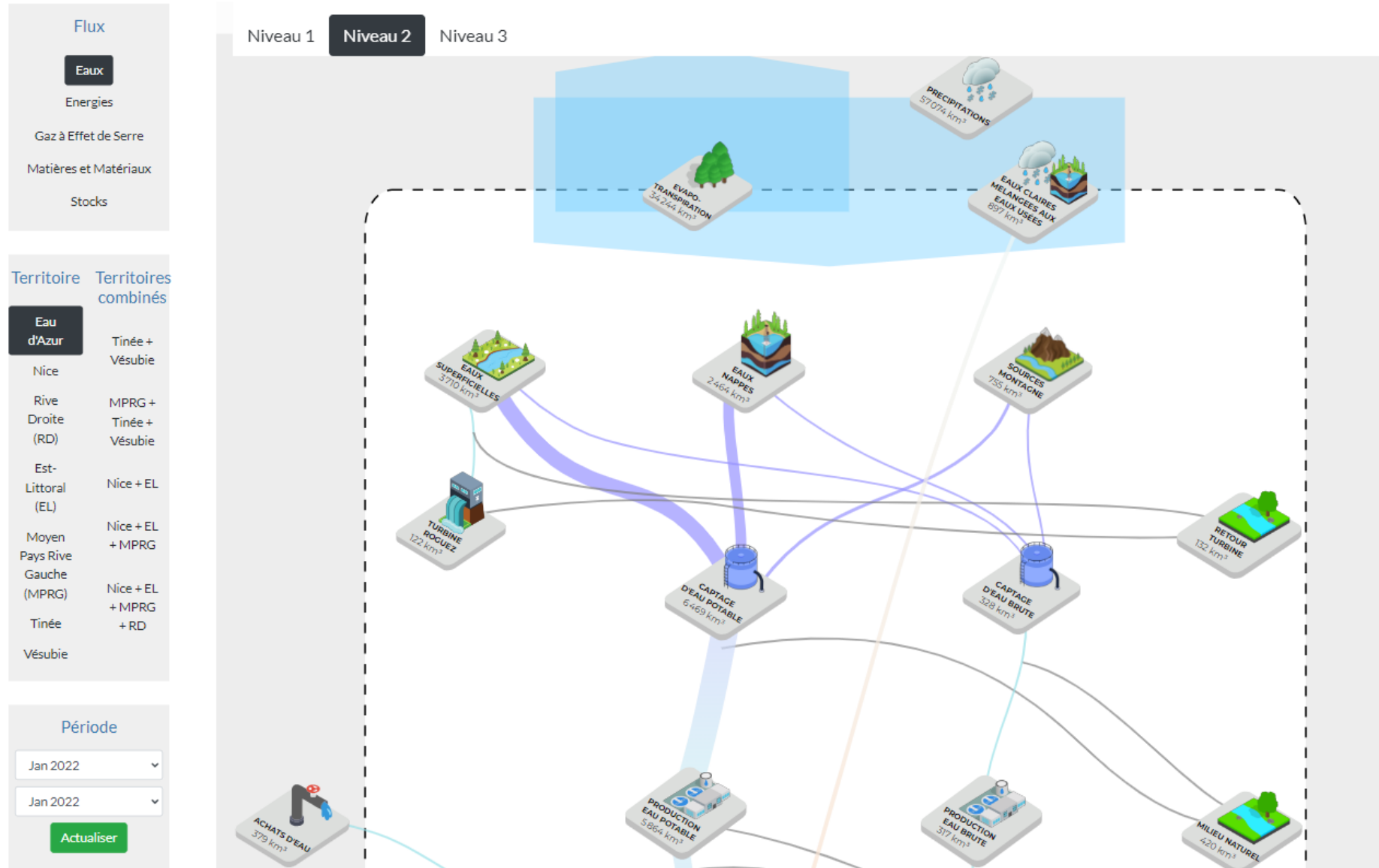
World leader in minerals for industry, the Imerys group announced on Monday October 24, 2022, the launch of a major lithium mining project in Echassières (Allier). [...] Studies predict the presence of high concentrations of lithium hydroxide, in total one million tonnes with a content of between 0.9% and 1% oxide, confirming the estimates of the Bureau of Geological and Mining Research (BRGM). This deposit will allow the extraction of **34,000 tonnes over twenty-five years**. Imerys will thus become a leading supplier to the European market, with a capacity to equip **700,000 vehicles with lithium-ion batteries per year**.

Leader mondial des spécialités minérales pour l'industrie, le groupe Imerys a annoncé, lundi 24 octobre 2022, le lancement d'un important projet d'exploitation de lithium à Echassières (Allier). [...] Les études et carottages prévoient la présence en profondeur de fortes concentrations d'hydroxyde de lithium, au total un million de tonnes d'une teneur entre 0,9 % et 1 % d'oxyde, confirmant les estimations du Bureau de recherches géologiques et minières (BRGM). Ce gisement permettra l'extraction de **34 000 tonnes pendant vingt-cinq ans**. Imerys deviendra ainsi un fournisseur de premier plan du marché européen, avec une capacité d'équipement de **700 000 véhicules en batteries lithium-ion par an**.

Source : https://www.lemonde.fr/economie/article/2022/10/24/imerys-annonce-l-ouverture-de-la-premiere-production-de-lithium-en-france-qui-fera-de-l-entreprise-un-acteur-de-poids-du-marche-europeen_6147060_3234.html

Exercise 3

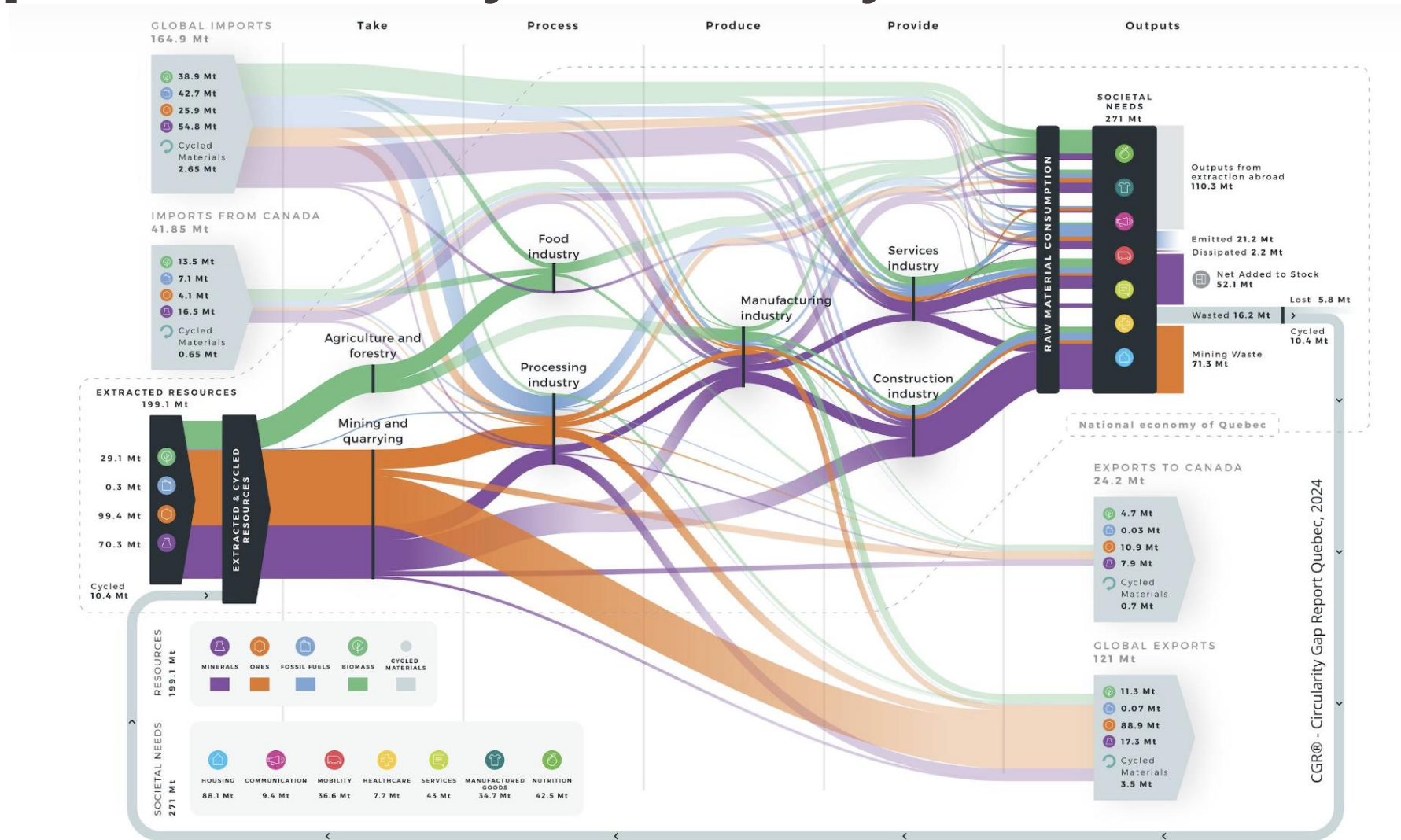
Study this System Diagram / Sankey diagram – What can we learn ?



https://eau-azur.metabolismofcities.org/water/?sankey®ion=1&date_start=2022-01&date_end=2022-01&level=2

Study this System Diagram / Sankey diagram – What can we learn ?

Propose some efficiency and sufficiency measures



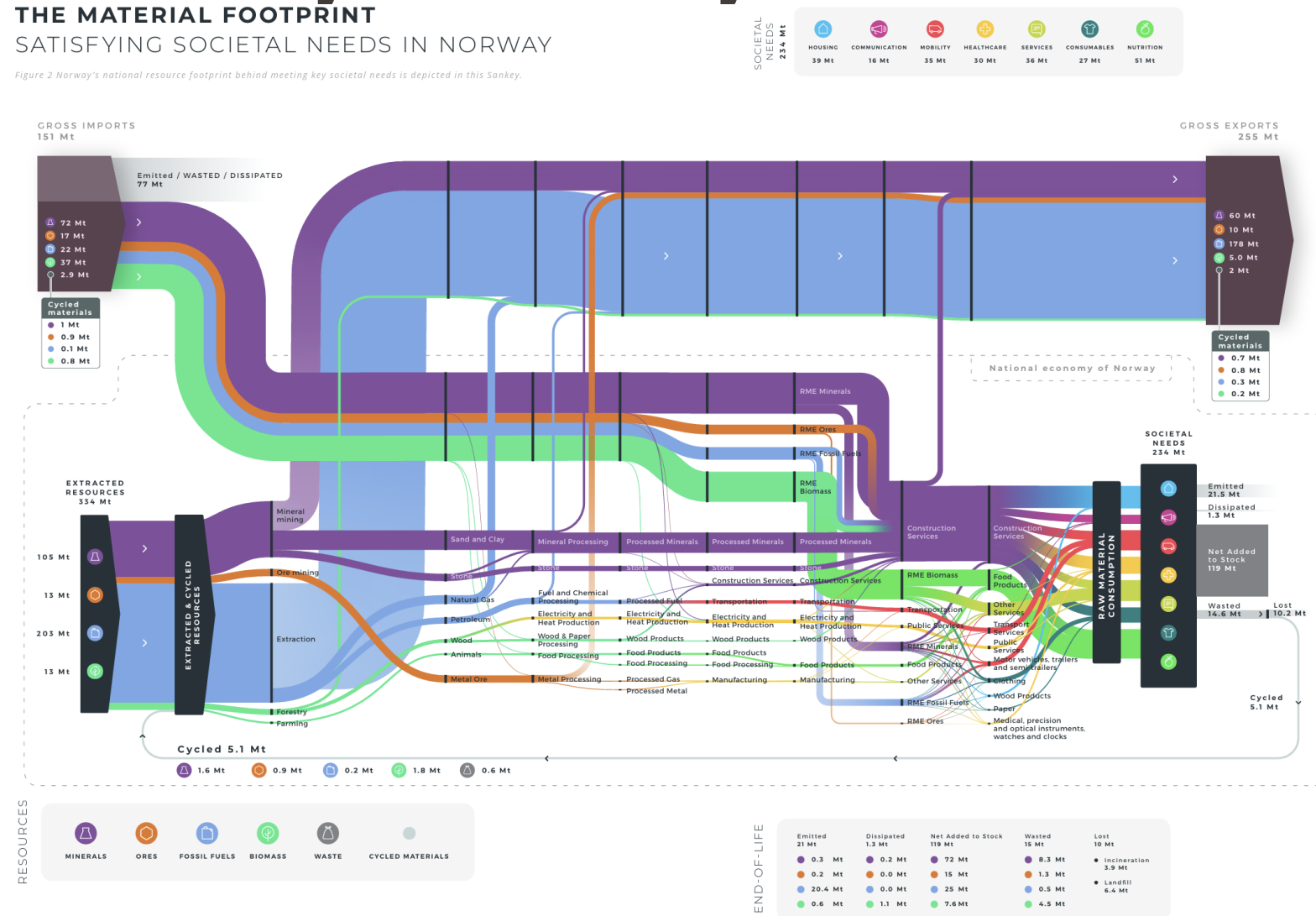
<https://www.circularity-gap.world/quebec>

**Study this System Diagram / Sankey diagram – What can we learn ?
Propose some efficiency and sufficiency measures**

THE MATERIAL FOOTPRINT

SATISFYING SOCIETAL NEEDS IN NORWAY

Figure 2 Norway's national resource footprint behind meeting key societal needs is depicted in this Sankey.



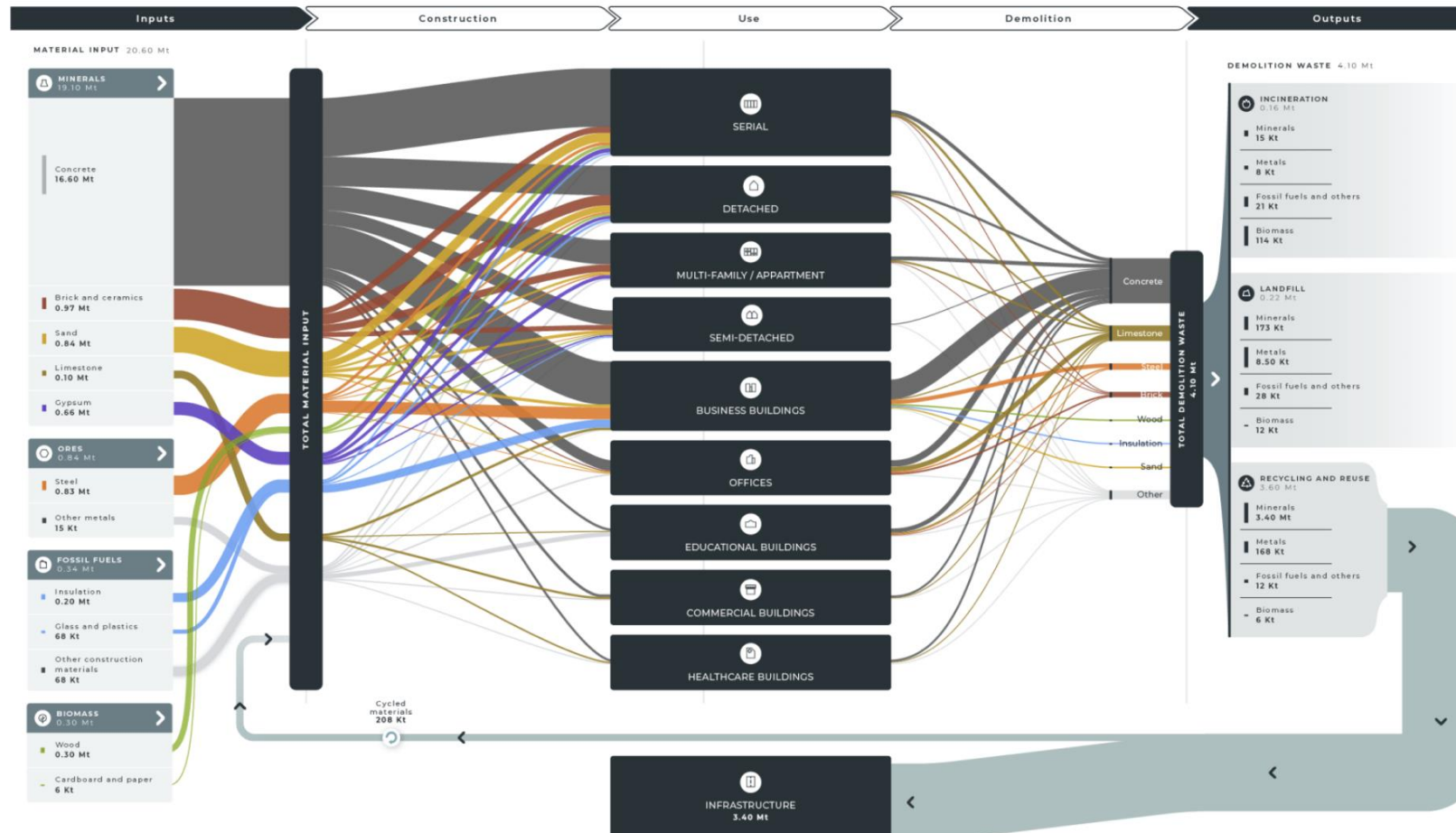
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<https://www.circularity-gap.world/norway>

Study this System Diagram / Sankey diagram – What can we learn ?

Propose some efficiency and sufficiency measures

THE METABOLISM OF
THE BUILT ENVIRONMENT IN
THE NETHERLANDS



<https://www.circularity-gap.world/sectors#download>

Study this System Diagram / Sankey diagram – What can we learn ?

Propose some efficiency and sufficiency measures

