NATIONAL CIRCULARITY GAP REPORT

This document explains the measurement framework used to assess the circularity for a nation state. Please note that we are continuously developing our approaches through integrating state-of-the-art literature and collaboration with reputable academics. Please reach out to us for a more updated version of our methodologies. In the first edition of the global *Circularity Gap Report* (CGR), we launched the Global Circularity Metric (GCM). Having identified a need for a national measurement framework for circularity after launching the report, we adapted the metric to be applicable to Nation States. This document represents original research, as there are no established and widely accepted measurement frameworks yet in existence within this scope. Our effort supports the desire of businesses and governments to be able to track their circular performance over time and put trends into context, plus engage in uniform goal-setting and guide future action in the most impactful way.

Circle Economy's ambition is to build a consistent measurement framework that can be applied to a macro-level (global, all sectors), meso (nation-state, sector) to micro-level (city, company) environment. It has been a deliberate choice to develop one head-indicator for circularity, applicable to all levels, while being aware of its limitations.

A CIRCULARITY METRIC FOR NATION STATES.
The main objective of a circular economy is to minimize resource extraction and reduce (non-recyclable) waste generation. The high-level strategies to do so, is to narrow, slow and close material loops. In a circular economy, the cycling of materials, is a key factor, since focusing only on resource efficiency (narrow and slow material loops) misses the point of the cyclical use of materials and products.[1] In the first circularity gap report for nation states, the following metric has been developed.[2]

To capture the dynamic between reduced resource consumption and cycling of materials for a nation state, we suggest that the circularity metric should represent the share of cycled materials as part of the total national material consumption every year (Equation 1) This is the total upstream primary AND secondary materials and resources used to satisfy the local demand, referred to as *Consumption Footprint* in the box below. However, we need to know what share of the cycled materials flowing into the national economy will be used to create and support exports, or otherwise will be used to satisfy societal needs. Since we take a consumption-based approach, we need to estimate how much of the secondary material is used to satisfy domestic needs or instead used for (supporting) exports. In our experience so far, we have only been able to collect data on the types of cycled material (e.g., wood, metals, etc.), but lacking the details on which sectors use these reported secondary material flows as inputs for the local industries. In this case, the metric applies the division of consumption footprint versus export footprint to the cycled materials, in order to calculate the estimated cycled materials used for consumption, expressed in equation 2 as '*Consumption footprint/Total footprint'* (Total footprint being the Consumption footprint and Export footprint. The next challenge is determining what the total amount of cycled material is. From national recycling statistics, one should derive the figures for the '*Domestically Cycled Material'* (see equation 3), but we cannot ignore the fact that there must be secondary materials embedded into the imports (footprint). A simple and readily replicable way to include the secondary material is to take the global average of material cycling (GCM) — 9.1 %[3] — for the entire import footprint. If data is available on the secondary use of materials in the footprint, it should be used instead.

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[1] Parchomenko, Alexej & Nelen, Dirk & Gillabel, Jeroen & Rechberger, Helmut. (2018). Measuring the circular economy - A Multiple Correspondence Analysis of 63 metrics. Journal of Cleaner Production. 210. 10.1016/j.jclepro.2018.10.357.
[2] Circle Economy & BOKU (2019). The Circularity Gap Report Austria
[3] Circle Economy, 2018. The Circularity Gap Report: An analysis of the circular state of the global economy. www.circularity-gap.world/2018

$$\text{(1) Cycled Materials for Consumption / }$$
$$\text{Consumption FP (= all upstream Primary \& Cycled Materials for Consumption)}$$
$$=$$
$$\text{(2) ((Consumption FP / Total FP) * Total Cycled Material) / }$$
$$\text{Consumption FP}$$
$$=$$
$$\text{(3) ((Consumption FP / Total FP) * Domestically Cycled Material + (9.1 \% * Import FP))/ }$$
$$\text{Consumption FP}$$

$$\text{(FP = Footprint)}$$

METHODOLOGICAL CHOICES THAT AFFECT THE METRIC

Sizing the footprints. Imports also play an essential role as an input for the many economies. In the CGR Austria, we found that the import footprint (import RME) is roughly triple that of the direct import (i.e. biophysical mass of imported goods)— meaning that two-thirds of resource use and waste production happen beyond Austrian borders. However, using the biophysical material flows alone is not sufficient to provide a genuine material footprint for a country's societal needs. Instead of taking the direct import weight of the goods, the Raw Material Equivalents (RME) of goods considers the total resource-use needed to produce it. When using the RME of imported goods instead of their direct weight, material consumption footprint of a net-importing country can therefore be seen to increase considerably.[4]

Secondary material in the import footprint. To measure circularity, the share of secondary materials included in the footprint of imports is therefore needed. Due to a lack of specific information, the metric calculation resorts to the global average circularity of 9.1% for 2015 or 8.6% for 2017. Given the sheer size of the total import footprint, this is an influential factor for the circularity rate. The global circularity average has been proven difficult to produce on a yearly basis and therefore the global average circularity can cause inconsistencies with the years for other variables.

Cycling of exported product. Whilst a country can actively improve recycling of domestic material flows and set 'circular importing standards', the circular use of exports or recycling of waste flows from exports in other countries is beyond the country's direct influence and therefore excluded from the metric/analysis.

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[4] Wiedmann, T, Schandl, H., Lenzen, M., Moran, D., Suh, S., West, J., Kanemoto, K. (2013). The material footprint of nations. Proceedings of the National Academy of Sciences of the United States of America. 112. 10.1073/pnas.1220362110.