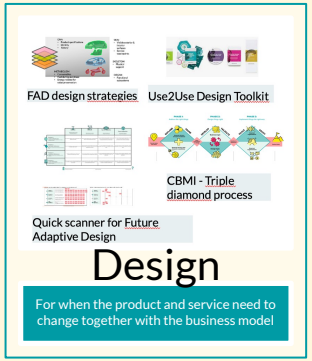
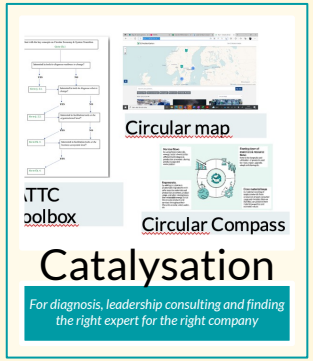
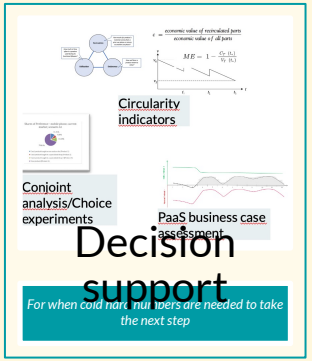
Conceptualisation of Sustainable Circular Business Models

Marcus.linder@ri.se
+46 708745185
Director of Sustainable Business





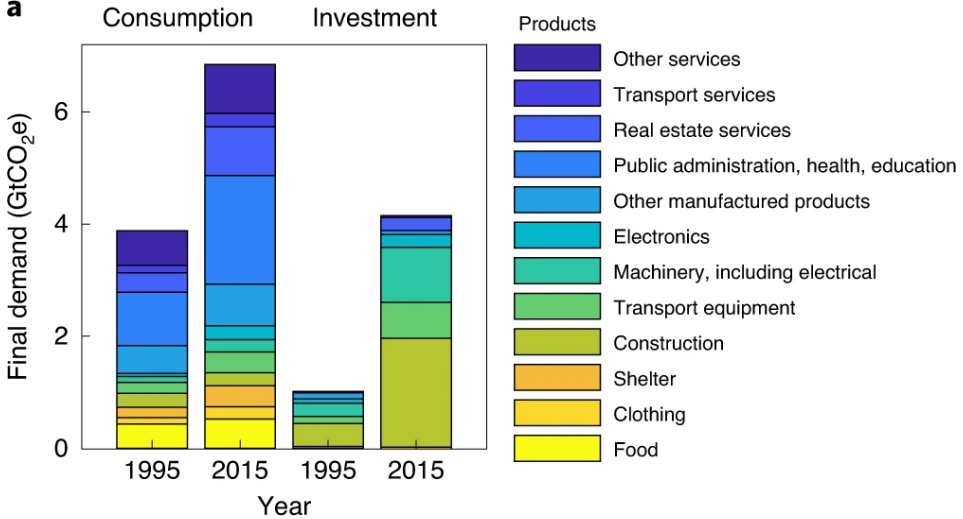


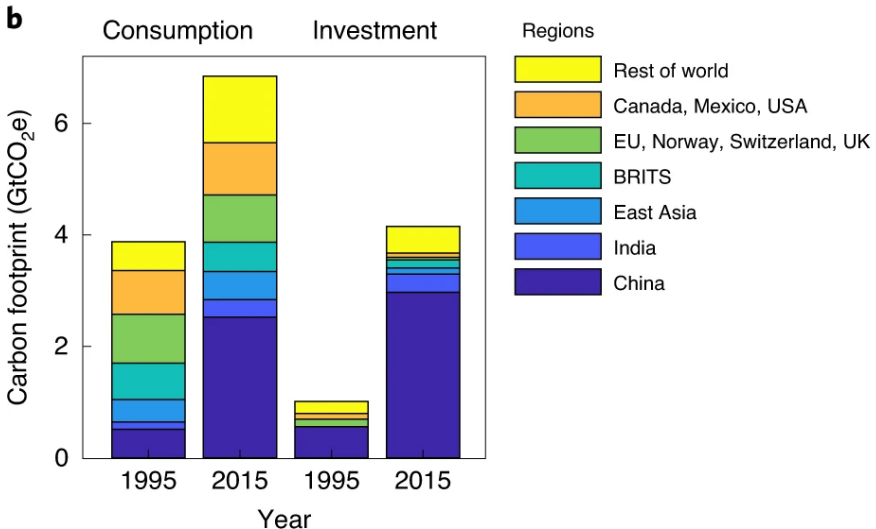

Swedese

Umesläp

Bumper Sculptur

Why care about CBM?





Hertwich, E.G. Increased carbon footprint of materials production driven by rise in investments. *Nat. Geosci.* **14**, 151–155 (2021). https://doi.org/10.1038/s41561-021-00690-8

RI.
SE

Because it’s the easiest way to solve some important problems.

How should we conceptualise CBM?

CREATE CAPTURE DELIVER

We should conceptualise it around value.

Especially creation of customer value.

How should we conceptualise Circular BM?

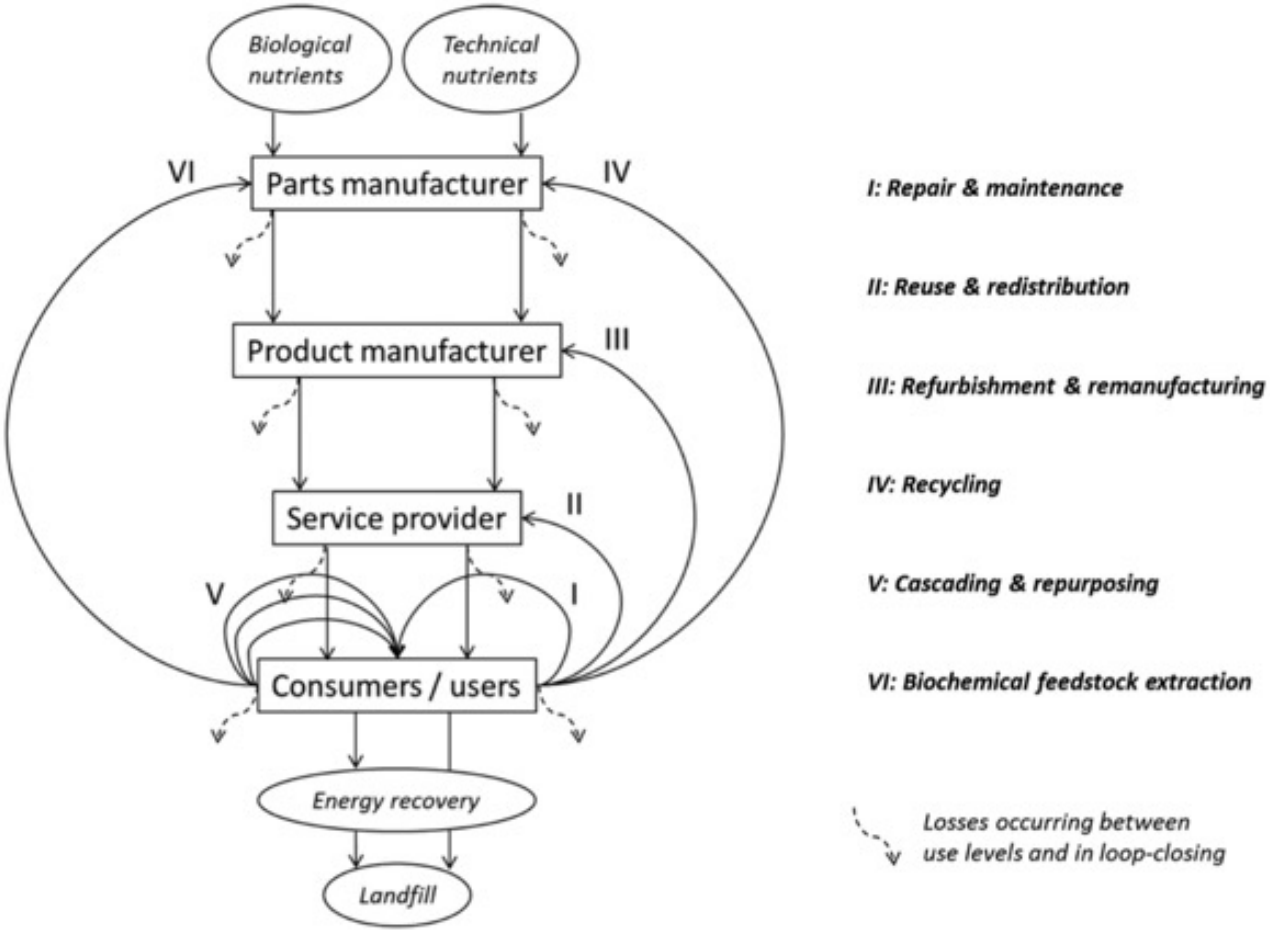
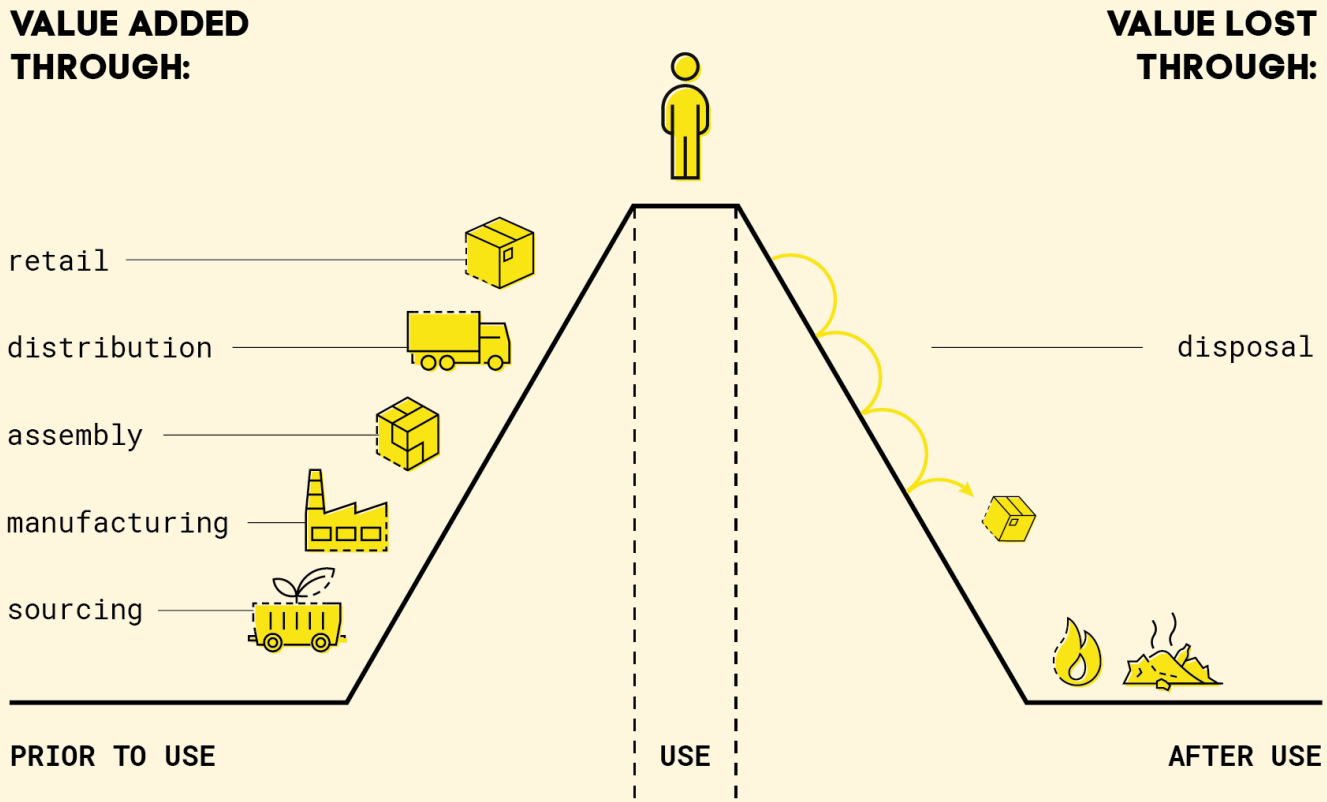
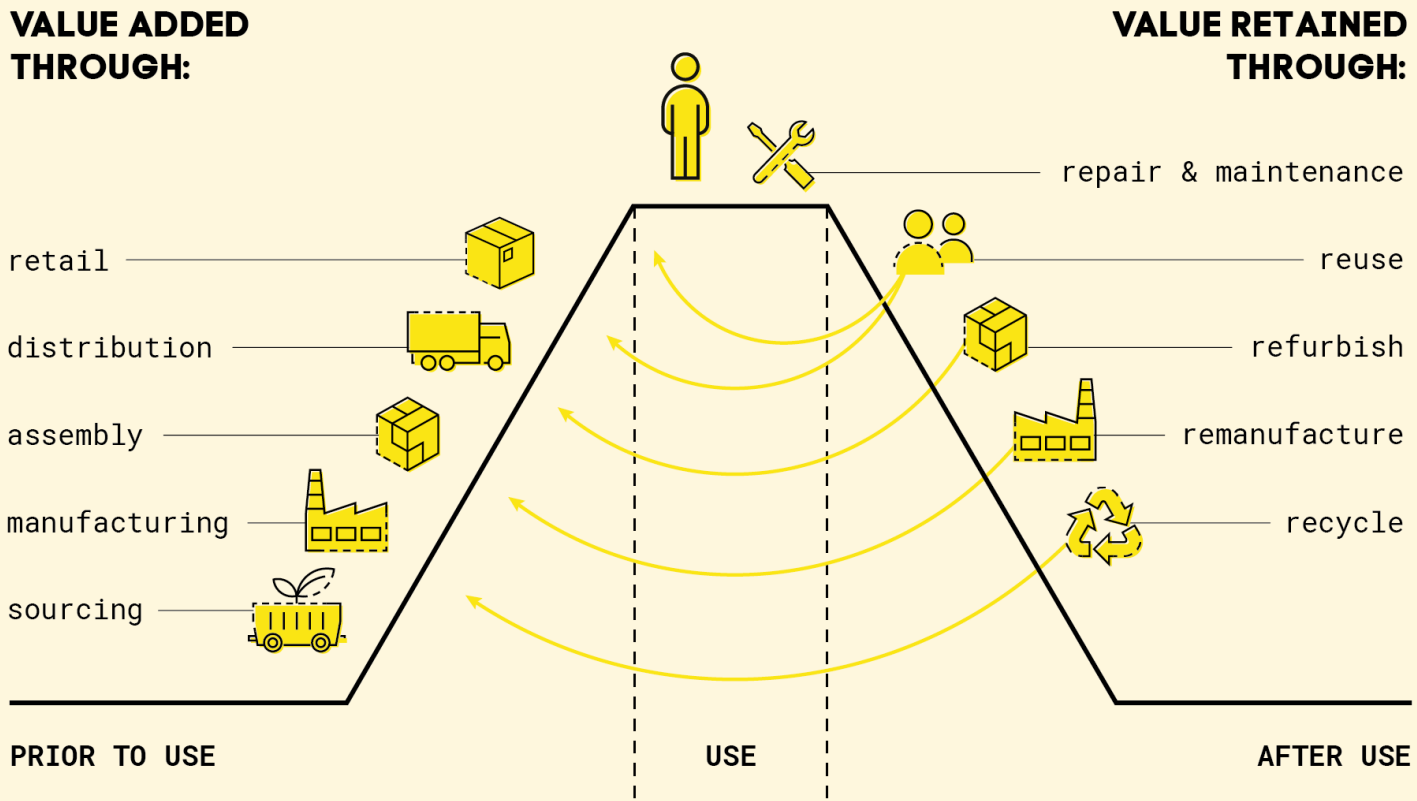


Figure 2 Major reverse cycles for the circular economy (adapted from EMF 2012).

Src: From suggested reading Lüdeke-Freund et al 2018



Picture by Anneli Selvefors 2022, Adapted from Achterberg, Hinfelaar, Bocken (2016)



Picture by Anneli Selvefors 2022, Adapted from Achterberg, Hinfelaar, Bocken (2016)

”The second principle of the circular economy is to circulate products and materials at their highest value. ”

(EMF, https://ellenmacarthurfoundation.org/circulate-products-and-materials 2022-10-10)

”Business models that support a CE would retain either product or material value ” Lüdeke-Freund, Stefan Gold, Nancy Bocken (2018, p 55)

”We define a circular business model (CBM) as a business model in which the conceptual logic for value creation is based on utilizing economic value retained in products after use in the production of new offerings.” (Linder & Williander, 2015, p2)

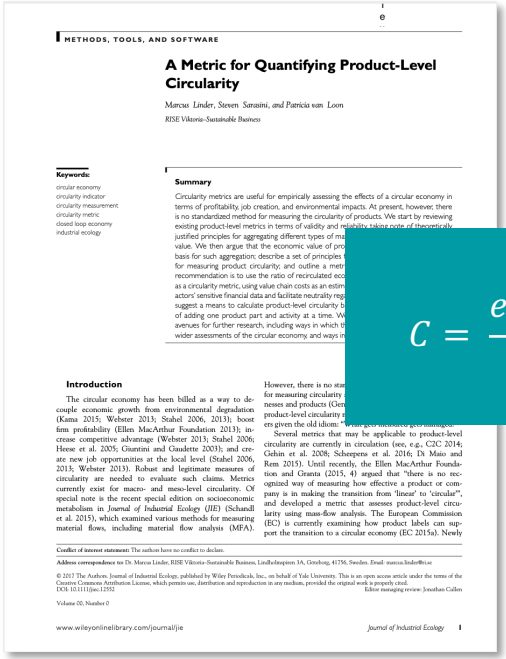
We should conceptualise it around economic value.

Value creation from, and capture of, value retained in products.

What are some implications?

Implications for Measurement

C-Metric (Value retention per cycle)



METHODS, TOOLS, AND SOFTWARE

A Metric for Quantifying Product-Level Circularity

Marcus Linder, Steven Sarasini, and Patricia van Loon
RISE Viktoria–Sustainable Business

Keywords:
circular economy
circularity indicator
circularity measurement
circularity metric
closed loop economy
industrial ecology

Summary

Circularity metrics are useful for empirically assessing the effects of a circular economy in terms of profitability, job creation, and environmental impacts. At present, however, there is no standardized method for measuring the circularity of products. We start by reviewing existing product-level metrics in terms of validity and reliability, taking note of theoretically justified principles for aggregating different types of ma… value. We then argue that the economic value of pro… basis for such aggregation; describe a set of principles … for measuring product circularity; and outline a metr… recommendation is to use the ratio of recirculated eco… as a circularity metric, using value chain costs as an estim… actors' sensitive financial data and facilitate neutrality reg… suggest a means to calculate product-level circularity b… of adding one product part and activity at a time. W… avenues for further research, including ways in which t… wider assessments of the circular economy, and ways in…

Introduction

The circular economy has been billed as a way to de-couple economic growth from environmental degradation (Kama 2015; Webster 2013; Stahel 2006, 2013), boost firm profitability (Ellen MacArthur Foundation 2013); increase competitive advantage (Webster 2013; Stahel 2006; Heese et al. 2005; Giuntini and Gaudette 2003); and create new job opportunities at the local level (Stahel 2006, 2013; Webster 2013). Robust and legitimate measures of circularity are needed to evaluate such claims. Metrics currently exist for macro- and meso-level circularity. Of special note is the recent special edition on socioeconomic metabolism in *Journal of Industrial Ecology (JIE)* (Schandl et al. 2015), which examined various methods for measuring material flows, including material flow analysis (MFA).

However, there is no sta… for measuring circularity … nesses and products (Cer… product-level circularity … ers given the old idiom: "…

Several metrics that may be applicable to product-level circularity are currently in circulation (see, e.g., C2C 2014; Gehin et al. 2008; Scheepens et al. 2016; Di Maio and Rem 2015). Until recently, the Ellen MacArthur Foundation and Granta (2015, 4) argued that "there is no recognized way of measuring how effective a product or company is in making the transition from 'linear' to 'circular'", and developed a metric that assesses product-level circularity using mass-flow analysis. The European Commission (EC) is currently examining how product labels can support the transition to a circular economy (EC 2015a). Newly

Conflict of interest statement: The authors have no conflict to declare.

Address correspondence to: Dr. Marcus Linder, RISE Viktoria–Sustainable Business, Lindholmspiren 3A, Göteborg, 41756, Sweden. Email: marcus.linder@ri.se

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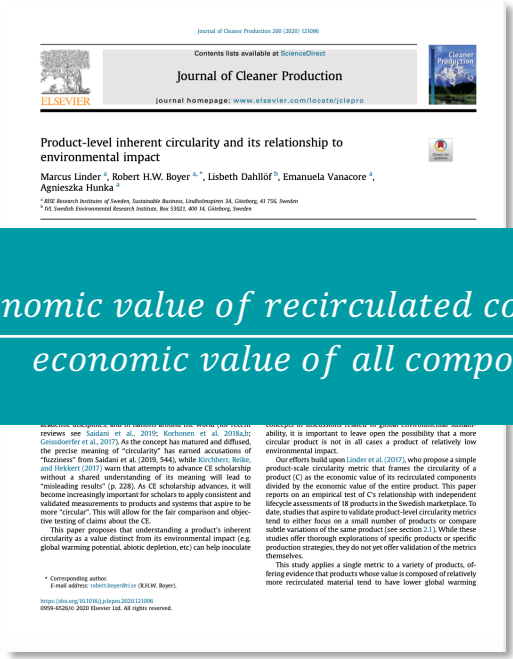

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Product-level inherent circularity and its relationship to environmental impact

Marcus Linder [a], Robert H.W. Boyer [a, *], Lisbeth Dahllöf [b], Emanuela Vanacore [a], Agnieszka Hunka [a]

[a] RISE Research Institutes of Sweden, Sustainable Business, Lindholmspiren 3A, Göteborg, 41 756, Sweden
[b] IVL Swedish Environmental Research Institute, Box 53021, 400 14, Göteborg, Sweden

… reviews see Saidani et al., 2019; Korhonen et al. 2018a,b; Geissdoerfer et al., 2017). As the concept has matured and diffused, the precise meaning of "circularity" has earned accusations of "fuzziness" from Saidani et al. (2019, 544), while Kirchherr, Reike, and Hekkert (2017) warn that attempts to advance CE scholarship without a shared understanding of its meaning will lead to "misleading results" (p. 228). As CE scholarship advances, it will become increasingly important for scholars to apply consistent and validated measurements to products and systems that aspire to be more "circular". This will allow for the fair comparison and objective testing of claims about the CE.

This paper proposes that understanding a product's inherent circularity as a value distinct from its environmental impact (e.g. global warming potential, abiotic depletion, etc) can help inoculate … concepts in discussions related to global environmental … ability, it is important to leave open the possibility that a more circular product is not in all cases a product of relatively low environmental impact.

Our efforts build upon Linder et al. (2017), who propose a simple product-scale circularity metric that frames the circularity of a product (C) as the economic value of its recirculated components divided by the economic value of the entire product. This paper reports on an empirical test of C's relationship with independent lifecycle assessments of 18 products in the Swedish marketplace. To date, studies that aspire to validate product-level circularity metrics tend to either focus on a small number of products or compare subtle variations of the same product (see section 2.1). While these studies offer thorough explorations of specific products or specific production strategies, they do not yet offer validation of the metrics themselves.

This study applies a single metric to a variety of products, offering evidence that products whose value is composed of relatively more recirculated material tend to have lower global warming

* Corresponding author.
E-mail address: robert.boyer@ri.se (R.H.W. Boyer).

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Product Labels for the Circular Economy: Are Customers Willing to Pay for Circular?

Robert H.W. Boyer [a,*], Agnieszka D. Hunka [a], Marcus Linder [a], Katherine A. Whalen [a], Shiva Habibi [b]

[a] RISE Research Institutes of Sweden AB, Sustainable Business Unit, Lindholmspiren 3A, 417 56 Gothenburg, Sweden
[b] RISE Research Institutes of Sweden AB, Mobility Transformation Unit, Lindholmspiren 3A, 417 56 Gothenburg, Sweden

R A C T

…iting research has probed consumer responses to products of different recirculation pathways … reuse, refurbishment, etc), little work has examined consumer responses to an explicit "circular … product label or how willingness to pay is influenced by a continuum of circularity levels. This …orts on the results of an online survey experiment that tests whether customers are willing to … for products with a theoretical multi-level Circular Economy score. Conjoint analysis was used …spondents in the United Kingdom to test their willingness to pay for mobile phones and robot …eaners at different levels of circularity alongside other product attribute combinations. Results …ad the average customer almost always prefers a more "circular" product when compared to …with otherwise identical attributes, and that customers are consistently willing to pay more for …with low or moderate levels of circular content. However, analysis suggests that willingness to … for products disappears, and in some cases declines, as the proportion of recirculated content … Results offer evidence that applying a numerical circular economy label at low levels of recircu… ent could be a profitable strategy for producers of mobile phones and robot vacuum cleaners. …tegy is less certain for heavily refurbished products, fully reused products, or other product

In the past decade, the Circular Economy (CE) has grown into a global knowledge community focused on decoupling environmental and economic wellbeing (Ghisellini, Cialani, and Ulgiati 2016). CE principles have also been embraced by industry and a small but growing number of individual firms employing business models that actively mitigate the consumption of virgin materials and the generation of wastes (Ellen MacArthur Foundation 2019; Business Europe 2019).

For original equipment manufacturers (OEMs), transitioning to a circular business model can involve major reorientations in product design, supply chains, value propositions, revenue streams, and customer segments, all of which have been optimized over years to align with the traditional "linear" business model. Shifting production toward more circular products can involve substantial uncertainties, including risks to a firm's profits, especially if firms cannot reliably gauge whether the costs of reorienting production toward the CE will yield returns on their investment (Linder and Williander 2017). Moreover, Elzinga et al. (2020) stress the importance of understanding the demand-side of the circular economy, arguing that there is currently limited research dedicated to understanding customers and acceptance of circular business models. This is especially relevant to circular business models because customers often resist buying re-used products (Hazen, Mollenkopf, and Wang 2017), perceiving them as inferior (van Weelden, Mugge, and Bakker 2016).

One potential strategy for mitigating this risk to OEMs could be to indicate levels of circularity on the product packaging. Labelling could, for example, increase customer confidence of circular products, but a comprehensive labelling system could increase total costs to the producer (Gävertsson, Milos, and Dalhammar 2018). Thus, it is important to know if these costs are justified. Customers' responses to a CE product label is of particular interest because, on one hand, prior research suggests that certain customers are willing to pay more for products with labels that signal social and environmental benefits

* Corresponding author.
E-mail address: robert.boyer@ri.se (R.H.W. Boyer).

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2352-5509/

$$C = \frac{\textit{economic value of recirculated components}}{\textit{economic value of all components}}$$

Marianne and Marcus Wallenberg Foundation

https://www.ri.se/sv/vad-vi-gor/projekt/mata-cirkulara-affarsmodeller

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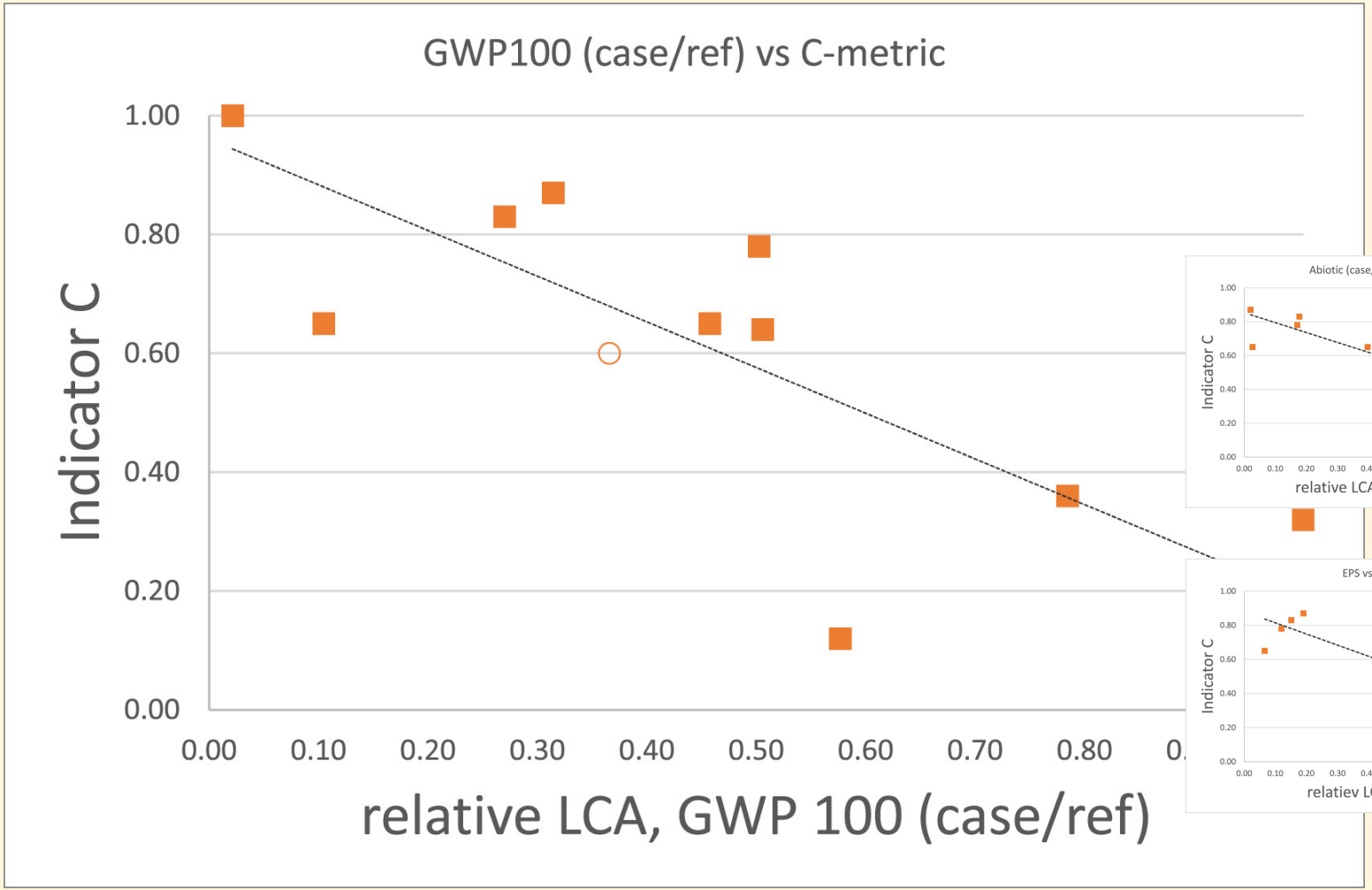
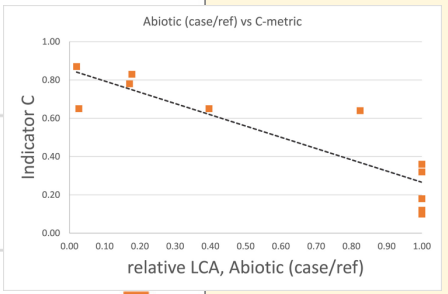
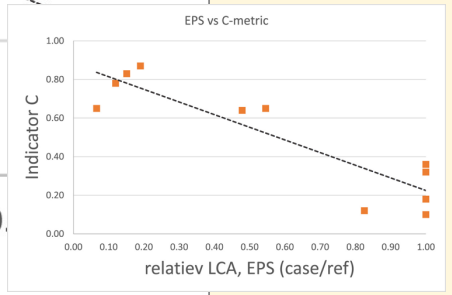
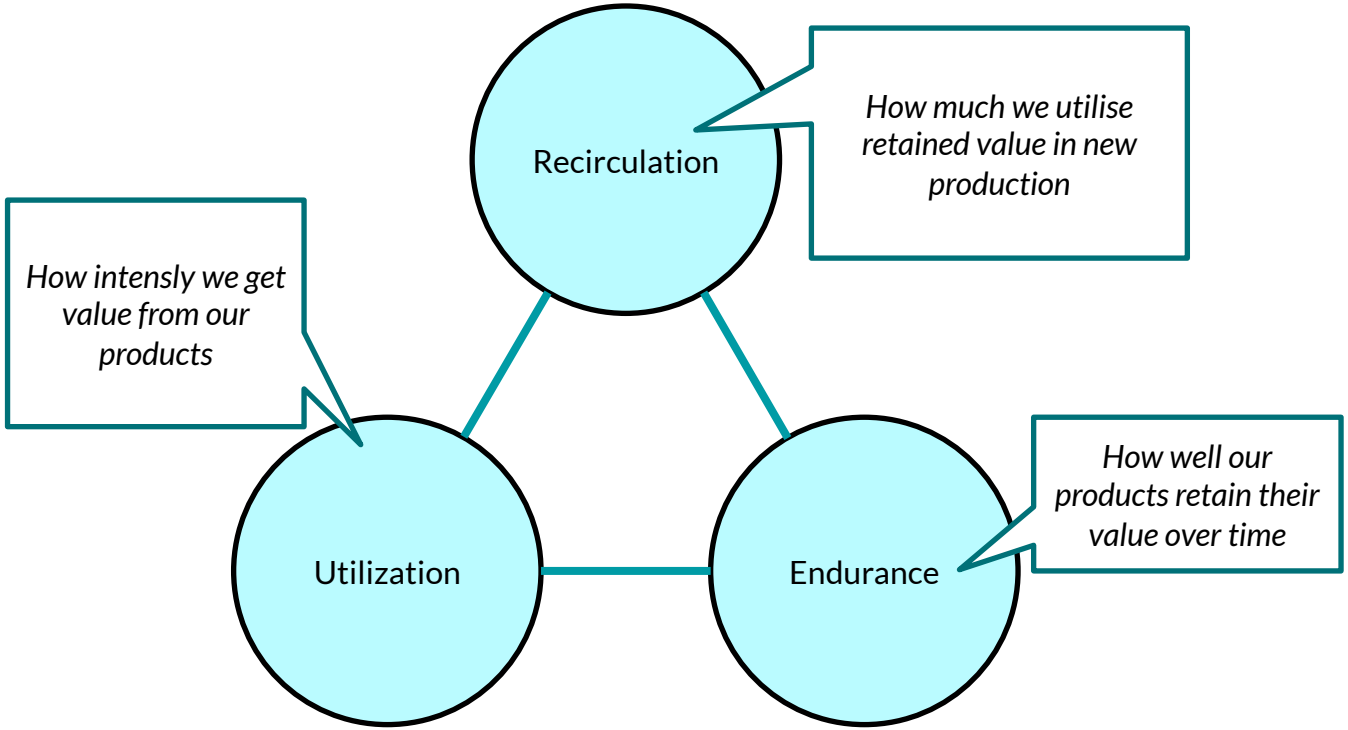
https://www.sciencedirect.com/science/article/pii/S0959652620311434







3 dimensions of creating value from that which is already produced



Adaptation of Boyer et al 2021. https://onlinelibrary.wiley.com/doi/full/10.1111/jiec.13109

Why care about CBM?

- Because it's one of the easiest ways to solve some important problems.

How should we conceptualise CBM?

- We should conceptualise it around economic value. Value creation from, and capture of, value retained in products.

What are some implications?

- Implies use of economic data in circularity measurement.
- Steers towards consistency with waste hierarchy and R-models of sustainability
- Guides towards economic explanations e.g. design inertia

Other topics I would love to have a chat about during the day

Regulations:

- CSRD, ESRS, Taxonomy

Cooperatives for sharing things

- Especially housing.
- Utilisation focus.

Right to repair

- Opinion: It's at odds with CBM!

Compensation practice

- Royalties at odds with CBM
- Sales kick-backs and KPIs at odds with CBM

Circular public procurement

- We've helped make a handful happen, it can a great catalyst!

Property rights

- Elevators->Design->BM->Financing->Jordabalken

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