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Not all Circular Futures are green!

On Ecological Transitions, Militarism and Autarky

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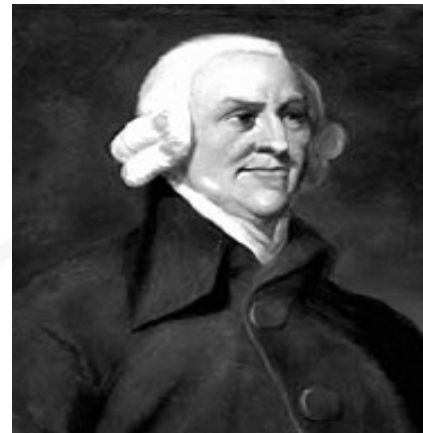
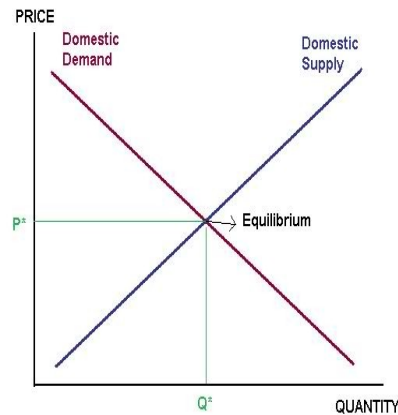
Politics Ontologies Ecologies, Florence, 30th October 2025

Agenda

- Circular Economy Generalities
- Circular Futures as Value Articulating Institutions
- From Ecomodernism to Autarky?
 - The CRM act
 - The Steel Industry crisis
 - Control vs Planning
- Conclusions

The Linear Economy

- According to classical economics, production and consumption patterns represent a natural or desirable outcome
 - They drive the creation of wealth, being a result of specialisation and economic activity

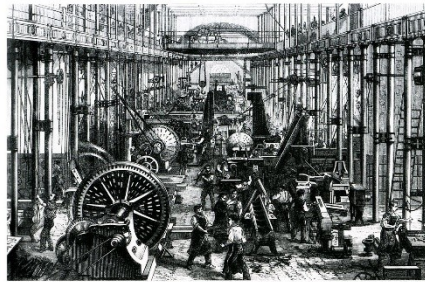


The Linear Economy



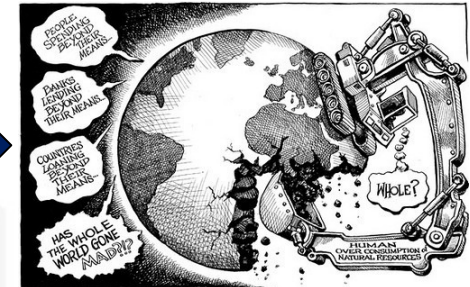
The agrarian society

- Solar-based energy system
- Biomass is the most important source of energy
- Recycling as a core process
- Provision of energy is related to land use
- Limited technological development
- Energetic constraints for development and growth
- Surplus and transport limit



The industrial revolution

- Fossil fuel-based energy system
- Exploitation of non-renewable natural resources (coal)
- High surplus rates
- Economic growth
- Population growth
- Decoupling of point of production and point of consumption
- Urbanisation



Over-consumerism

- Mass production and consumption
- High level of energy and material use
- Transition from production-based to consumption-based economies
- Global supply chains
- Financial crisis

What about Efficiency?



MOBILITY

- Cars remain parked **95%** of the time
- When moving, they usually carry **1.6** people at a time
- **1.2m** lives are lost in accidents yearly worldwide according to WHO



BUILT ENVIRONMENT

- **32%** of waste sent to landfill in the UK originates from construction
- Offices are occupied only **60%** of the day on a working day (post-Covid)
- **11 million** empty homes in Europe



FOOD

- **>100M tonnes** of food lost annually in Europe
- **Up to 40%** lost along the production chain
- **> 80%** of global food residue is sent to landfill

Circular Economy

- A theoretical concept which aims at creating an industrial system that is restorative by intention
- Material value is maximized
- Product life-cycle extension
- Waste generation is minimized
- Lower dependence on imports
- Job creation

=

Economic, environmental
and social resilience

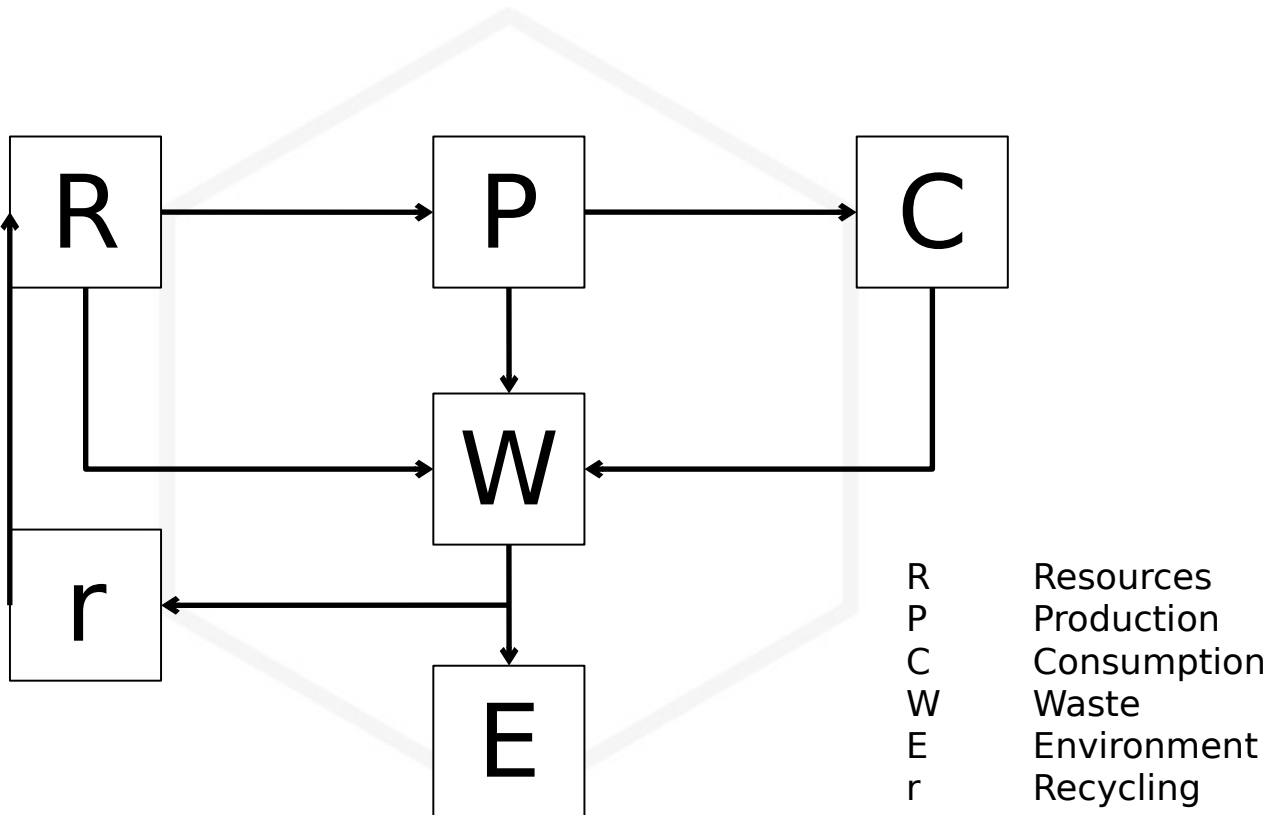


Circular Economy



- Circular Economy:
 - Emphasises the idea of workable relationships between resource flows involving industrial systems.
 - Aims at creating methods of production in which materials are used over and over again.
 - Aims at overcoming the concept of “waste”

Circular Economy



Hegemonic CE?

- Prominence in the political and corporate discourse
 - NGOs advocacy
 - EU CE Action Plans
- Problematic for many reasons:
 - Vehicle for *green growth* and capital recirculation
 - Lack of acknowledgment of social dimensions
 - Tokenistic actions from big corporations

Ideology and Politics

The Circular Economy at a Crossroads: Technocratic Eco-Modernism or Convivial Technology for Social Revolution?


Andrea Genovese  & Mario Pansera 

Pages 95-113 | Received 24 Sep 2019, Accepted 28 Mar 2020, Published online: 18 May 2020

 Cite this article  <https://doi.org/10.1080/10455752.2020.1763414>

 Check for updates

RESEARCH ARTICLE | JULY 23 2024

Unlocking circularity: the interplay between institutional pressures and supply chain integration 

Tommaso Calzolari; Andrea Genovese  ; Andrew Brint; Stefan Seuring 

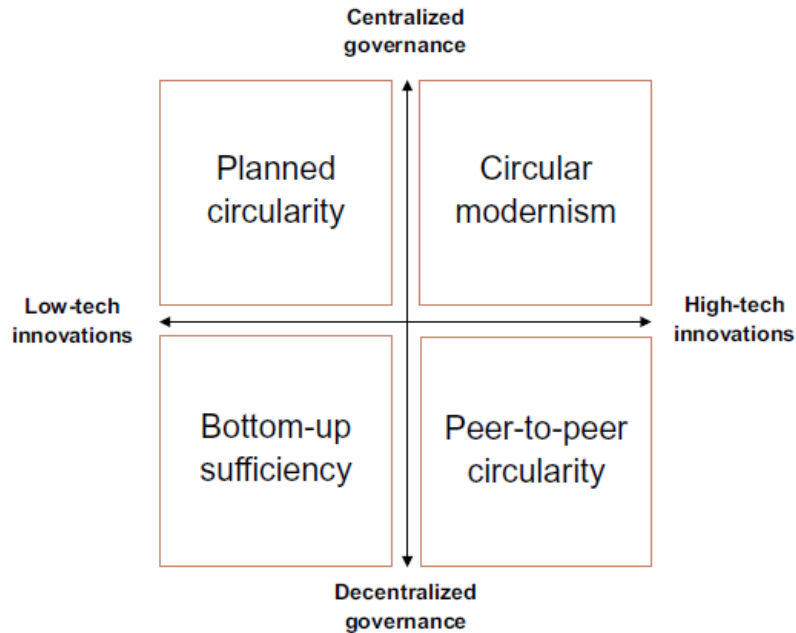
[+ Author & Article Information](#)

International Journal of Operations & Production Management (2025) 45 (2): 517–541.

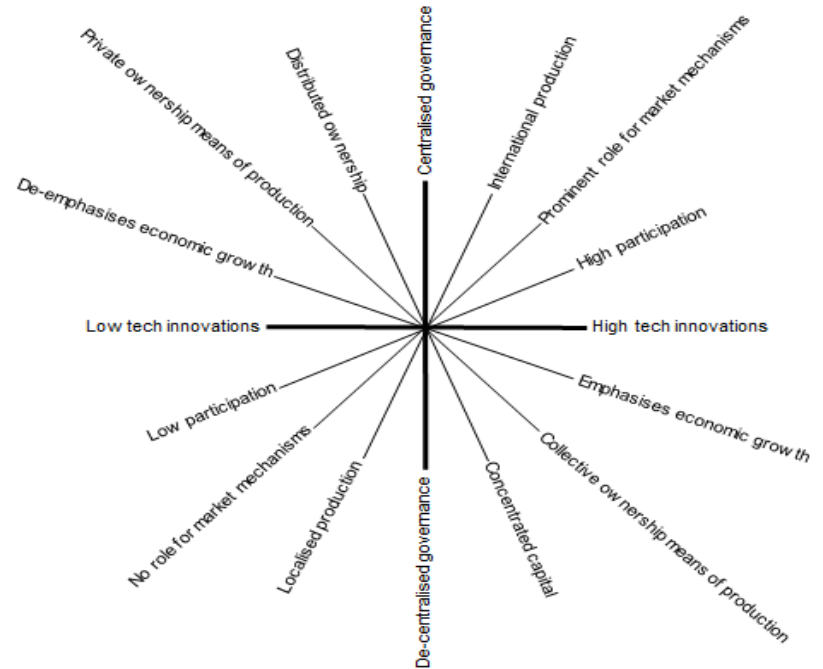
<https://doi.org/10.1108/IJOPM-10-2023-0860> [Article history](#) 



Alternative futures?



Source: Bauwens et al. 2020



Source: Lowe and Genovese (2022)

Circular Futures and Value

- Circular futures are *value articulating institutions* that implicitly adhere to a conception of *value* even if this is not explicitly acknowledged
- CE research has so far ignored *theories of value*, given that this goes to the heart of how societies evaluate trade-offs between environmental, social and economic goals



What theories of value (could) underpin our circular futures?

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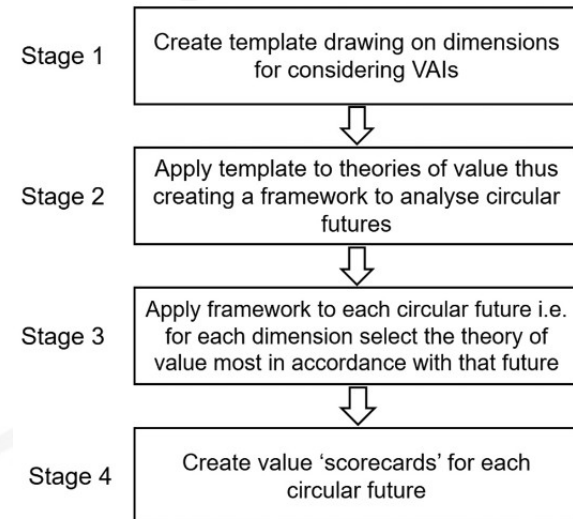


Fig. 3. Stages in mapping values theories to circular future.

Circular Futures



	Conceptual axes					Precedent Scenarios
	1	2	3	4	5	
	Nature of innovations	Political/ productive governance	Scale of production	Access to final goods and services	Ownership of the means of production	
MNE-led Modernist Circularity (MMC)	High-tech	Centralised	Large	Market-based	Private	Circular modernism (Bauwens et al. 2020); Techno-centric circular economy (Calisto Friant et al. 2020)
Welfare State Modernist Circularity (WSMC)	High-tech	Centralised	Large	Universal/inclusive	Private	Circular economy in the welfare state (Svenfelt et al. 2019); Reformist circular society (Calisto Friant et al. 2020)
State-led Modernist Circularity (SMC)	High-tech	Centralised	Large	Universal/inclusive	Collective	
Open-access P2P Circularity (OP2C)	High-tech	Decentralised	Large	Universal/inclusive	Collective	Peer-to-peer circularity (Bauwens et al. 2020)
Platform P2P Circularity (PP2PC)	High-tech	Decentralised	Large	Market based	Private	Peer-to-peer circularity (Bauwens et al. 2020)
Autarkic Fortress Circularity (AFC)	Low-tech	Centralised	Large	Universal/inclusive	Collective	Planned circularity (Bauwens et al. 2020)
Landlord Fortress Circularity (LFC)	Low-tech	Centralised	Large	Market based	Private	Fortress circular economy (Calisto Friant et al. 2020)
Convivial Eco- socialism Circularity (CEC)	Low-tech	Decentralised	Small	Universal/inclusive	Collective	Transformational circular society (Calisto Friant et al. 2020); Bottom-up sufficiency (Bauwens et al. 2020); Local self-sufficiency (Svenfelt et al. 2019)
Free-market Insufficiency Circularity (FI)	Low-tech	Decentralised	Small	Market based	Private	

The political deployment of CE



- Once we recognise CE as a *value regime*, we can ask: *how is this regime deployed politically?*
- In the 2020s, CE has become a **strategic discourse**:
 - For governments → tool for **industrial resilience**
 - For corporations → framework for **new markets and legitimacy**
 - For militaries → narrative of **operational self-sufficiency**
- Thus, CE is not only about “closing loops” but also about **closing sovereignty gaps**

Autarkic Fortress Circularity



- A CE scenario not driven by real concern about reversing environmental damage, but responding to the notion of prevailing in a context of fierce global competition for scarce key resources
- Income distribution and social justice may be addressed by centralised governance, although only within national borders
- Tariffs might be imposed in order to favour domestic production resulting from the large-scale implementation of CE measures, in order to make this competitive with imported goods characterised by superior technical performance

(Llorente-Gonzalez et al., 2025)

Autarky or Sustainability?

- German wartime innovation in material substitution (synthetic rubber, fuels, textiles)
- A proto-circular system built under blockade and scarcity, to sustain war efforts and genocidal projects
- The goal: **self-sufficiency (Autarky)**, not sustainability
- Over time, the gradual expansion of the Nazi waste recovery policies and campaigns – here referred to as the ‘Nazi waste exploitation regime’ – brought forth a determined vision of a circular economy in which no waste whatsoever should escape its reclamation for the national community or *Volksgemeinschaft*



Special Issue Paper in Waste Economies under Wartime Conditions: a Transnational Perspective on Recycling and World War II

Nazi German waste recovery and the vision of a circular economy: The case of waste paper and rags

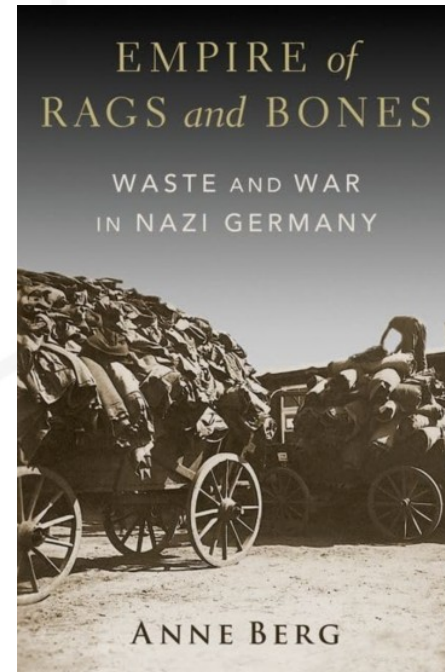
Heike Weber

Pages 882-903 | Published online: 18 May 2021

Cite this article

<https://doi.org/10.1080/00076791.2021.1918105>

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Circular Sovereignty?

- The 2023 **EU Critical Raw Materials Act (CRMA)** frames CE as a pillar of **Strategic Autonomy**
- The **CRMA** positions recycling, substitution, and circularity not primarily as environmental tools, but as *instruments of geopolitical resilience*



CHAPTER 5
SUSTAINABILITY
SECTION 1
Circularity

Article 26

National measures on circularity

1. Each Member State shall, by two years from the date of entry into force of the implementing act referred to in paragraph 7, adopt and implement, or include in, national programmes containing measures designed to:
 - (a) incentivise technological progress and resource efficiency in order to moderate the expected increase in Union consumption of critical raw materials;
 - (b) promote waste prevention and increase re-use and repair of products and components with relevant critical raw materials recovery potential;
 - (c) increase the collection, sorting and processing of waste with relevant critical raw materials recovery potential, including metal scraps, and ensure their introduction into the appropriate recycling system, with a view to maximising the availability and quality of recyclable material as an input to critical raw material recycling facilities;
 - (d) increase the use of secondary critical raw materials, including through measures such as taking recycled content into account in award criteria related to public procurement or financial incentives for the use of secondary critical raw materials;
 - (e) increase the technological maturity of recycling technologies for critical raw materials and promote circular design, materials efficiency and substitution of critical raw materials in products and applications, at least by including support actions to that effect under national research and innovation programmes;

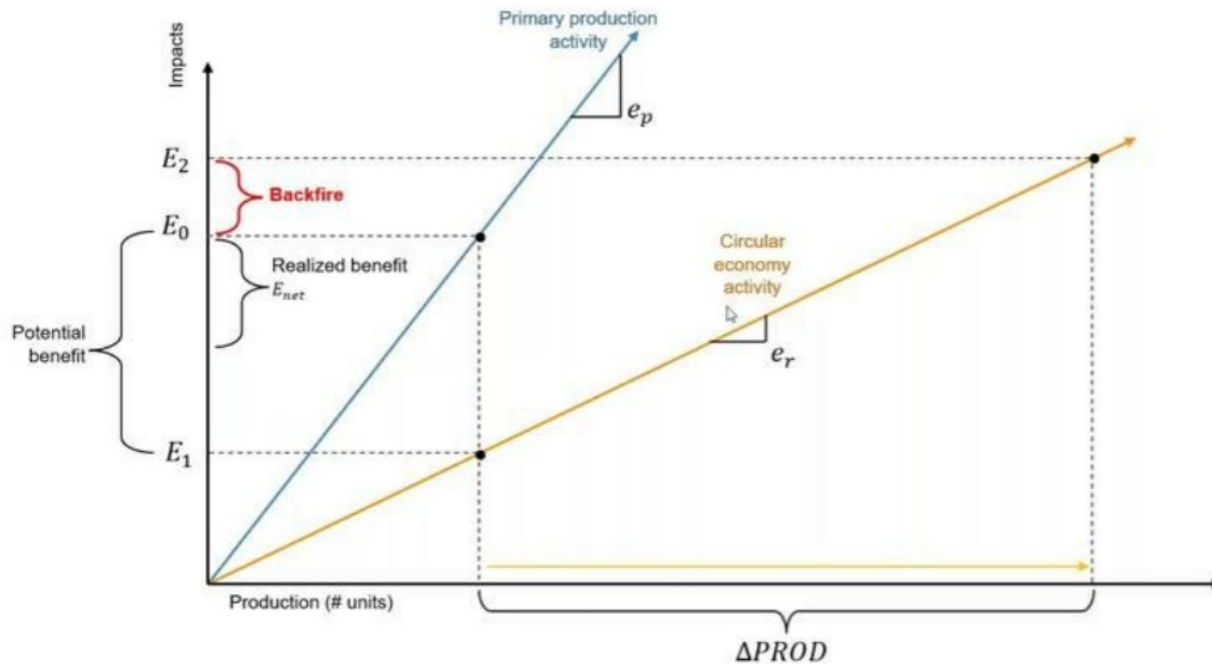
Circular Sovereignty?

“This Act will bring us closer to our climate ambitions. It will significantly improve the refining, processing and recycling of critical raw materials here in Europe. Raw materials are vital for manufacturing key technologies for our twin transition – like wind power generation, hydrogen storage or batteries. And we're strengthening our cooperation with **reliable trading partners** globally to reduce the EU's current dependencies on just one or a few countries. It's in our mutual interest to **ramp up production** in a **sustainable manner** and at the same time ensure the highest level of



A very sovereign rebound!

- UvdL speech institutionalised the pursuit of rebound effects!



Zink and Geyer (2017)

Circular Sovereignty?



REGULATION (EU) 2024/1252 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 11 April 2024

establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations

(EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020

(51) Most critical raw materials are metals, which can be in principle endlessly recycled, albeit sometimes subject to deteriorating quality. This offers the potential to move to a truly circular economy in the context of the green transition while increasing the availability of critical raw materials and thereby contributing to ensure security of supply. After an initial phase of rapid growth of demand for critical raw materials for new technologies, where primary extraction and processing will still constitute the predominant source, recycling should increasingly **reduce** the need for primary extraction and its associated impacts. This should be done while maintaining a high level of Union recycling capacity via a strong market for secondary critical raw materials. Today, however, recycling rates of most critical raw materials are low, with waste streams such as batteries, electrical and electronic equipment and vehicles being shipped to third countries for recycling. Recycling systems and technologies are often not adapted to the specificities of those raw materials. Innovation plays an important role in **reduc**ing the need for critical raw materials, **reduc**ing the risks of shortage of supply and for the development of recycling technologies to properly and safely extract critical raw materials from waste. Prompt action addressing the different factors holding back the circularity potential is thus required.

Circular Sovereignty?



- Official EU language speaks of “reducing dependencies on third countries,” “strengthening European sovereignty,” and “ensuring security of supply”
- The act creates a pathway for faster approval of mining projects deemed “strategic,” with targets for how long these processes should take
 - Decisions to be made without fully assessing all risks, including risks to nature and human rights.
- Circularity here becomes a *security mechanism*: keeping materials “in the loop” within EU borders to avoid vulnerability to external shocks, especially from



Circular Sovereignty?

- Benchmarks for domestic capacities along the CRM supply chain by 2030: **10%** of the EU's annual needs for extraction; **40%** for processing and **25%** for recycling
- No more than **65%** of EU's annual needs of each strategic raw material at any relevant stage of processing should come from a single third country

Strategic Projects for the EU

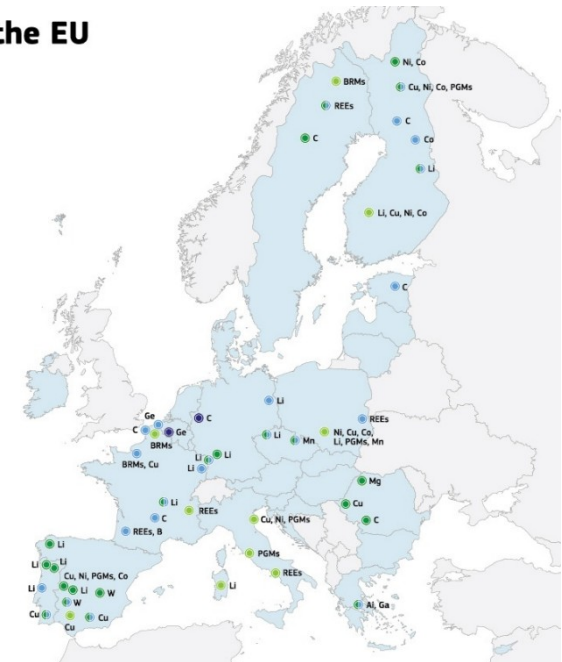
MAP LEGEND



Al	Aluminium
B	Boron
BRMs	Battery Raw Materials ¹
Co	Cobalt
Cu	Copper
Ga	Gallium
Ge	Germanium
C	Graphite
Li	Lithium
Mg	Magnesium
Mn	Manganese
Ni	Nickel
PGMs	Platinum Group Metals
REEs	Rare Earth Elements
W	Tungsten

¹ Battery Raw Materials refer to lithium, cobalt, nickel, manganese and graphite

Disclaimer: The location of projects is based on a regional scale and doesn't reflect their exact geographical locations



Savannah Resources gets temporary land access for Portuguese lithium project

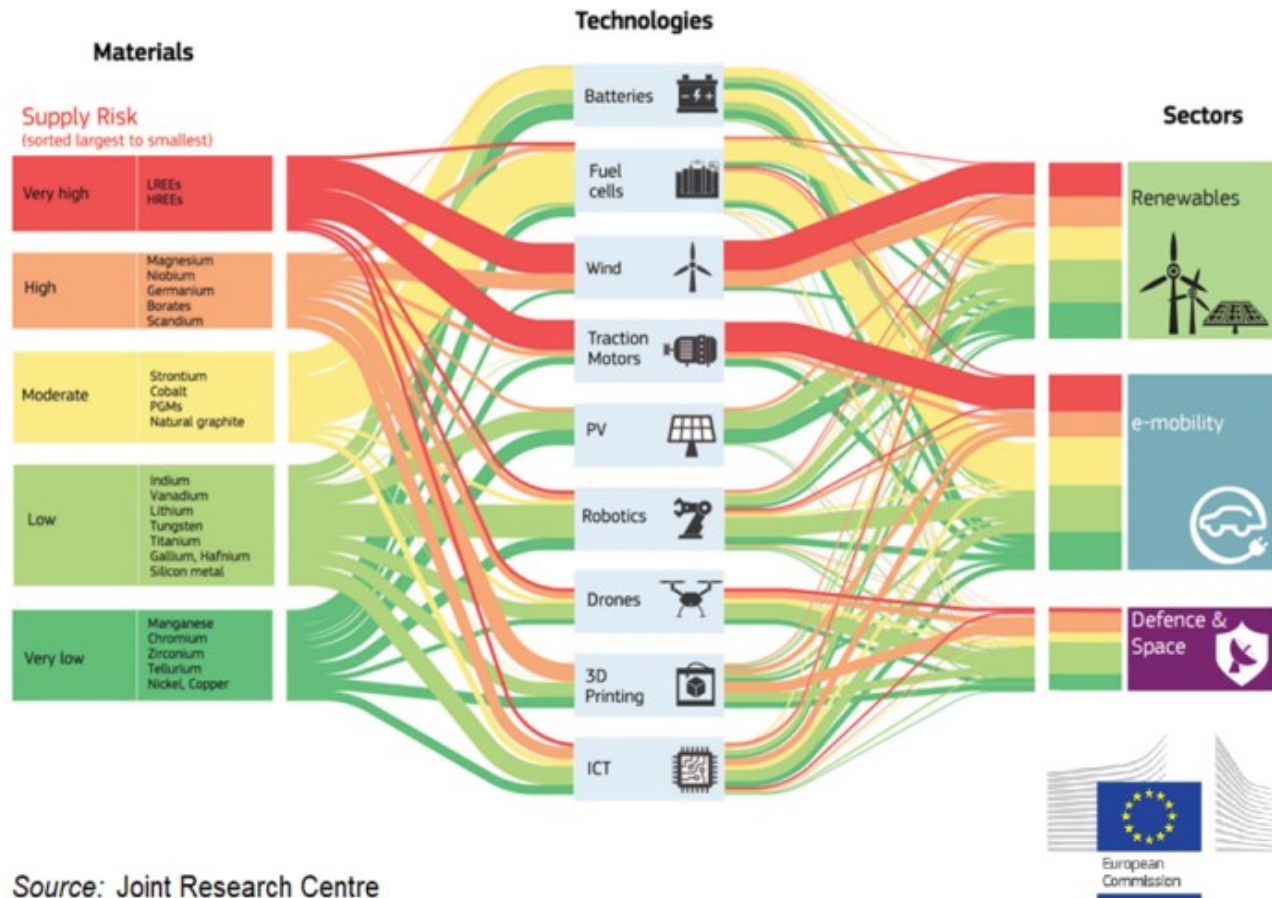
By Catarina Demony

December 12, 2024 8:57 AM GMT · Updated December 12, 2024



Circular Sovereignty?

Critical raw materials and their supply risk



https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_trade_in_critical_raw_materials

Technocratic planning



- Member States must adopt **national circularity programmes** within two years (Article 26).
- Programmes must:
 - Promote technological progress and resource efficiency
 - Boost repair, reuse, and collection of CRM-rich waste
 - Incentivise secondary materials and recycled content
 - Integrate circularity into R&D, skills, and public procurement

Technocratic planning



- CE here is institutionalised as *national planning*
 - Technocratic, rather than democratic planning
- Every EU state must embed circularity in industrial and innovation systems, treating critical materials as *strategic assets*
- A form of resource mobilisation echoing wartime coordination - language of “mobilisation,” “efficiency,” and “security”, replacing the one of “sufficiency” or “ecological limits”

Circular neo-extractivism?



- Member States must identify and map **extractive waste sites** with recoverable critical materials (Article 27).
- Operators required to conduct **economic recovery assessments**. By 2027:
 - National **databases of mining waste** must be public and digital.
 - States must promote **secondary extraction** from legacy mines.
- A European system of “**urban and post-industrial mining**”

Circular neo-extractivism?



- The EU is effectively reviving extractive logic under the banner of circularity
- Old waste dumps, slag heaps, and tailings become new “resource frontiers”
- The CE here acts as *neo-extractivism within Europe* - a shift from ecological restoration to strategic re-mining
- Circularity as reindustrialisation, not as dematerialisation

Tracing the flows



- Articles 28 and 29 prescribe mandatory **labelling and data carriers** for all products containing permanent magnets (EVs, wind turbines, electronics)
 - Data must disclose composition, location, removal steps, and recyclability
 - By 2031, **minimum recycled content thresholds** for rare earths and metals (Nd, Dy, Sm, Co, Ni, etc.)
- Exemptions for **defence and space sectors**
- Circularity becomes a **data infrastructure**: every magnet, every material becomes traceable
- This digital layer of CE is about *surveillance and control of material flows*. It embodies a political economy of transparency, but in service of industrial efficiency and sovereignty

The Nexperia Affair

- Semiconductor supply chains as a site of geopolitical tensions
- Nationalisation and control of production framed as “resilience”
 - 80% of production offshore
- Autarkic logic meets global interdependence
 - pseudo-circular sovereignty

BBC

Dutch government takes control of China-owned chip firm

14 October 2025

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Osmond Chia
Business reporter

Automotive alarm: “Without Nexperia chips imminent stop in production.” EU mediates between China and Netherlands

ACEA denounces the “unresolved political dispute” that puts European production at risk: the interruption of assembly lines “could be a matter of days.” The European Commission assures: “We are looking for a solution as a matter of urgency”



by [Simone De La Feld](#)

[X @SimoneDeLaFeld1](#)

— 29 October 2025 in Business

The Nexperia Affair



- Taking managerial control of a company does not equate to controlling its supply chain
- Nexperia's production base remains in China, effectively splitting operational control
- Europe still relies on offshore extraction and manufacturing for even basic semiconductors, so national interventions at the corporate level can only deliver limited resilience

FINANCIAL TIMES

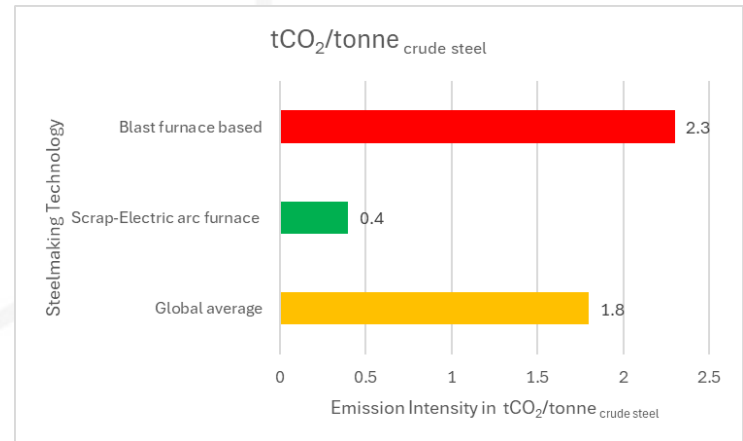
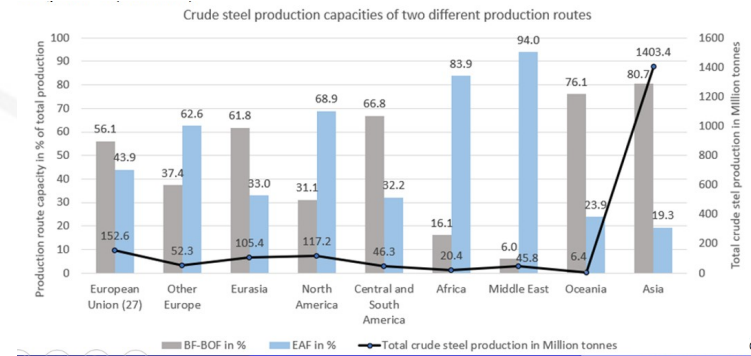
Nexperia faces 'existential threat' after Dutch seizure, Chinese owner warns

Hundreds of jobs at chipmaker at risk in the Netherlands, Germany and UK, says parent company Wingtech



A look at the Steel Industry

- Two main production routes, Blast Oxygen Furnace (BOF), Electric Arc Furnace (EAF)
- EAF technology uses scrap as main input, being almost **fully circular!**
- European countries are decisively shifting towards EAF production
- This increases the demand for scrap



Source: elaboration from Venkataraman Guru, Else and Genovese (2025)

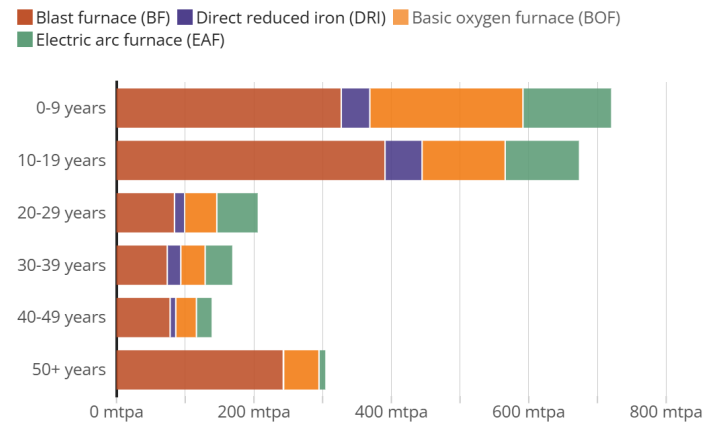
A look at the Steel Industry

- High quality scrap needed for EAFs is imported within the EU from Global South, where steel is produced mainly using BOFs
 - EU's scrap pool just grows 1.2% a year! (EUROFER, 2025)
- More than 40% of the new steelmaking capacity entering the market during 2025-27 is expected to be based on the relatively emission-intensive blast furnace/basic oxygen furnace (BF/BOF) process (OECD, 2025)

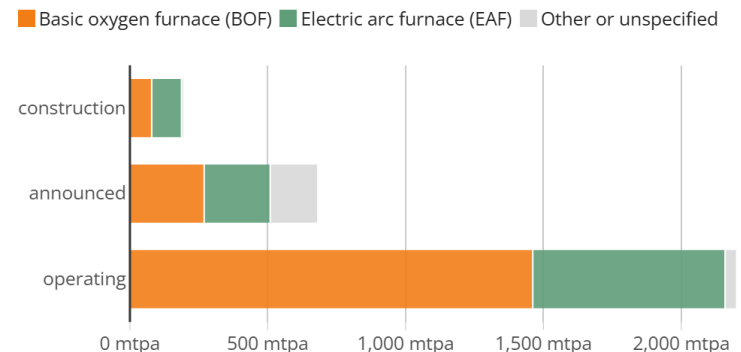
Source: elaboration from Venkataraman Guru, Else and Genovese (2025)

- Is this a pathway towards a

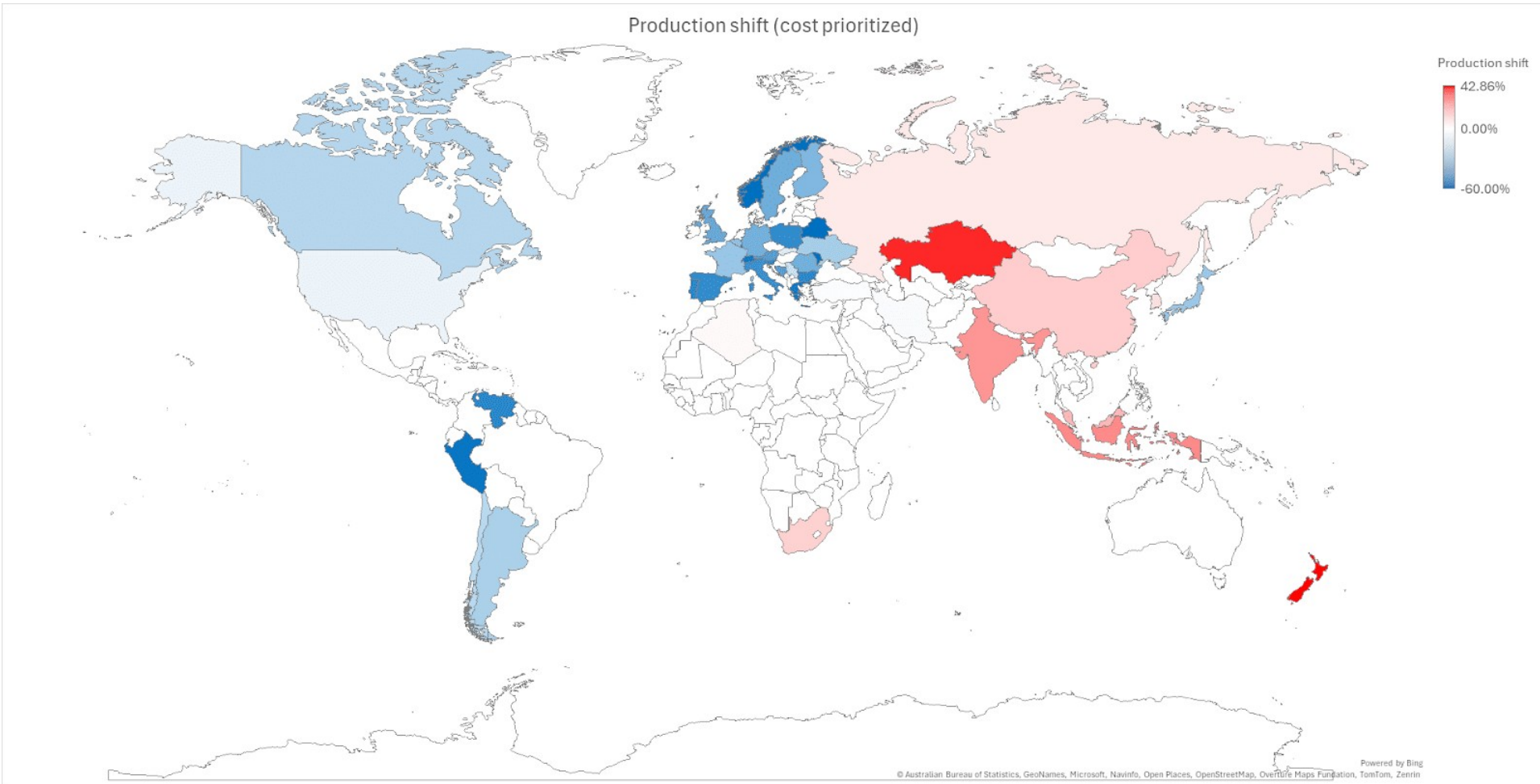
Operating iron and steelmaking capacity, by unit age group and technology type



Steelmaking capacity by status and technology type



A look at the Steel Industry



Source: elaboration from Venkataraman Guru, Else and Genovese (2025)

A look at the Steel Industry



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My News

Commentary Climate & Energy

Why relying on recycled steel would derail Europe's drive to decarbonise



Annie Heaton

August 11, 2025 11:14 AM GMT+1 · Updated August 11, 2025



EXPLAINER

Why did British Steel need saving - and why is shutting the furnaces down such a big deal?

Turning off the furnaces would be a "complex, costly nightmare the government wants to avoid", Sky News science correspondent Thomas Moore says.



Explainer

Scunthorpe steelworks: why can't you just turn a blast furnace off and what is a salamander tap?



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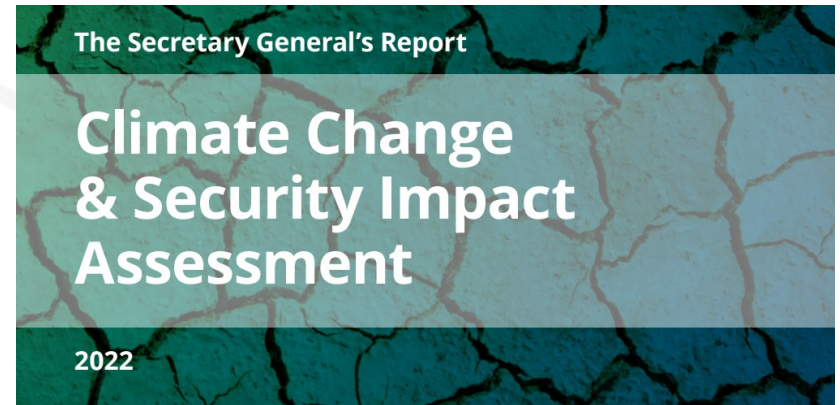
ENERGY TRANSITION

What is steel scrap and how can it help us reach net zero?

Jan 17, 2023

Circular Defence?

- NATO's **Climate Change and Security Action Plan (2022)** specifically talks about **Circularity for Operational Resilience**
- NATO explicitly integrates CE principles into its logistics and infrastructure planning
- The plan commits to increasing resource efficiency, reuse, and recycling within defense operations



NATO announces Leopard-1 tank recycling results

NEWS | ARMY | By Dylan Molysov | Nov 23, 2020
Modified date: Nov 23, 2020



Photo by NATO Support and Procurement Agency

Circular Defence?

- Circularity is justified not as an environmental need but as a **readiness tool**:
 - Reduced fuel dependency for bases = operational autonomy
 - Modular, repairable components for vehicles and equipment = sustained deployment capability
 - Energy recovery and waste minimisation = lighter supply convoys, fewer vulnerabilities



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Preparing NATO for climate-related security challenges

By putting in place climate change adaptation measures, NATO has an opportunity to both strengthen operational resilience and adapt to the impacts of climate change.

RESEARCH PAPER

PUBLISHED 4 JULY 2023

UPDATED 29 SEPTEMBER 2023

ISBN: 978 1 78413 579 9

< Latest Market News

Nato targets stronger supply chains for critical metals

Spanish Market: Metals | 17/12/24

Circular Defence?



- In this context, the CE becomes a **military logistics doctrine**, designed to extend endurance under resource constraints and conflict conditions
- The language of *resilience* mirrors CE discourse but with entirely different ends: sustainability of operations, not sustainability of ecosystems

Circular Defence?



Circular economy projects start in EU defence

Land October 9, 2025

The European defence technology landscape is expanding its commitment to resource resilience with the launch of two new Circular Economy projects under the European Defence Agency's (EDA) Incubation Forum for Circular Economy in European Defence (IF CEED).

The weaponisation of CE



- Across these examples, circularity is being **weaponised**—not metaphorically, but materially
- The same vocabulary (resilience, autonomy, efficiency) appears in sustainability and defense policy alike
- **Circularity becomes a dual-use paradigm:**
 - *Ecological circularity* aims to limit throughput and reduce harm
 - *Strategic circularity* seeks to sustain throughput and extend control
- The CE thus reveals its political plasticity: it can underpin both a **green transition** and a **security-industrial turn**

Conclusions



- CE as **Gramscian “passive revolution”** - reforms that incorporate ecological critique without transforming capitalism
- Despite the hype, the hegemonic CE interpretation, based on ecomodernist paradigms, has so far failed to deliver any improvement (the world is just 7.2% circular!)

Conclusions

- A shift from ecomodernist CE interpretations to autarkic versions has become visible!
- CE can also become **a militarised revolution from above**, securing extractive continuity under new justifications (security, autonomy)
- The circular state as the *security state of scarcity*

Thank You!

- Questions
- Comments


Planned Obsessions



Andrea Genovese

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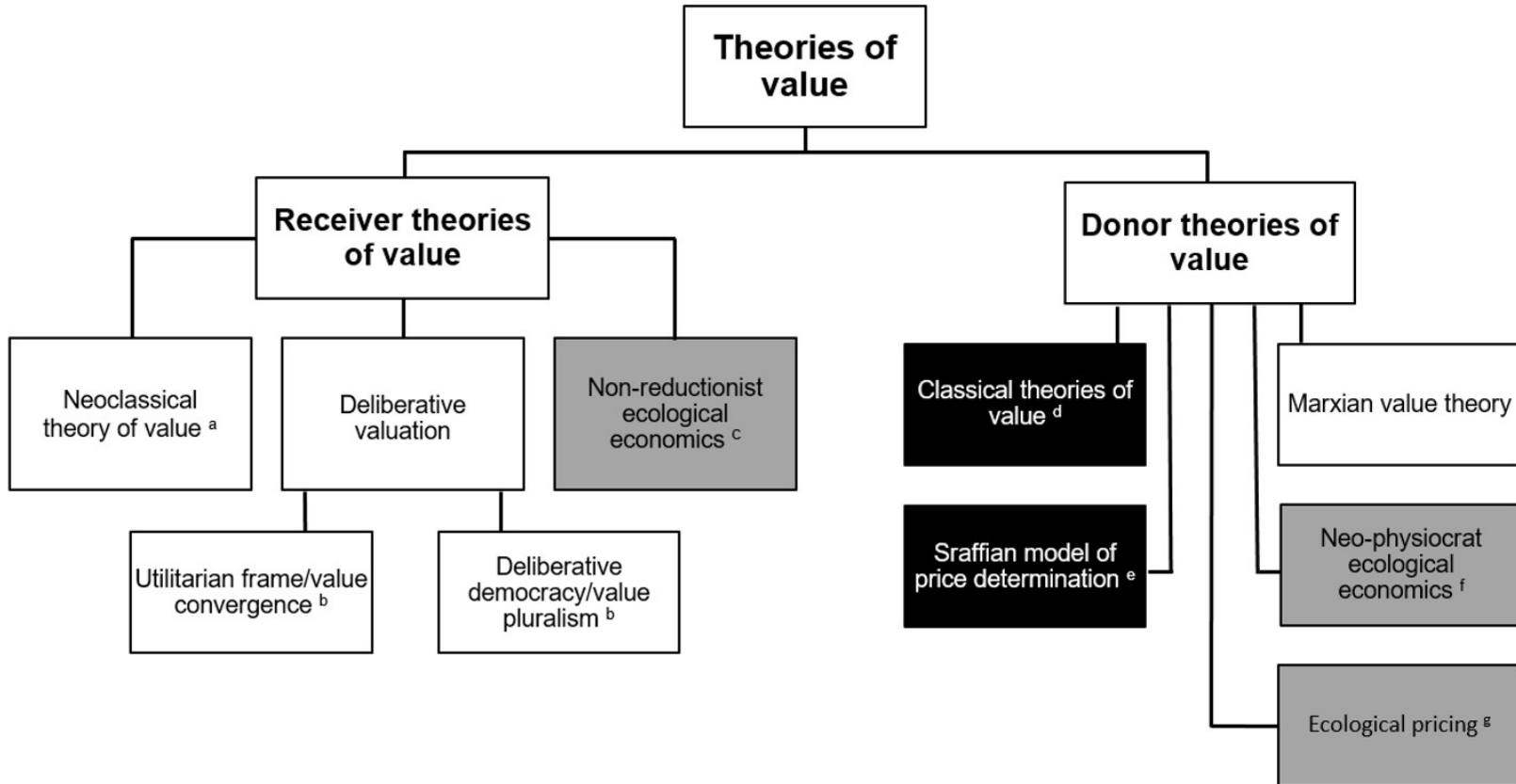
Andrea Genovese is a critical supply chain management scholar. His work explores the intersections of circular economy, ecological planning, post-growth transitions, and the political economy of supply chains.

 Planned Obsessions

 Facebook

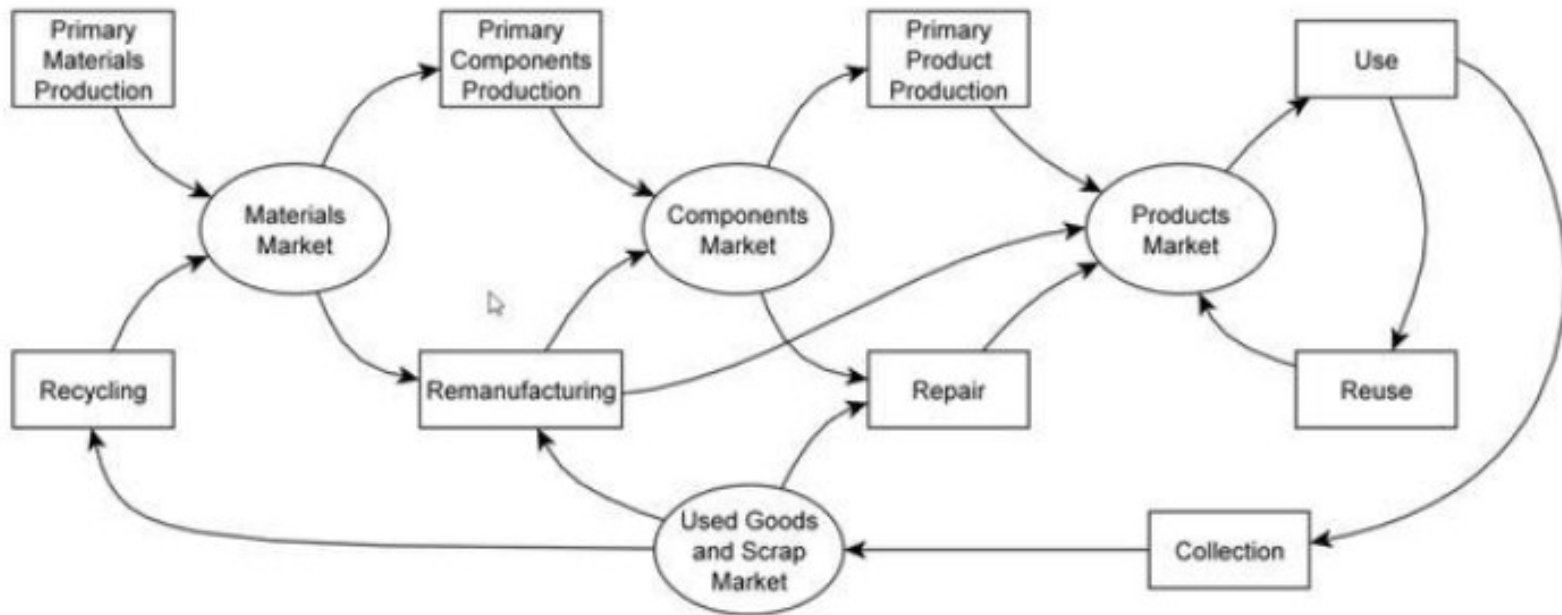
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Heterodox and Mainstream ToVs



Source: Lowe and Genovese (2022)

An Economist's View



Zink and Geyer (2017)