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(BANDA SONORA DE STAR WARS)

# PINE CHEMICALS SUSTENTÁVEIS

## EPISODE III

## THE FUTURE BEGINS

MARIANA JORGE FERREIRA

2023, Encontro Brasileiro de Pine Chemicals

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## EPISODE III

## THE FUTURE BEGINS

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FALAR SOBRE ASPECTOS MAIS FILOSÓFICOS DO ASSUNTO (SUSTENTABILIDADE)

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# OI ?

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QUÍMICA VERDE

SUSTENTABILIDADE AMBIENTAL

BIOECONOMIA

SUSTENTABILIDADE FRACA

QUÍMICA SUSTENTÁVEL

SUSTENTABILIDADE FORTE

ECONOMIA CIRCULAR

SUSTENTABILIDADE ECONÓMICA

DESENVOLVIMENTO SUSTENTÁVEL

ECONOMIA VERDE

SUSTENTABILIDADE SOCIAL

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FONTE: INTERNET

**PORQUE É IMPORTANTE CLARIFICAR CONCEITOS?**

**O QUE É QUE ISSO INTERESSA AO SECTOR RESINEIRO E AOS "PINE CHEMICALS"?**

**VAMOS FALAR DE "PINE CHEMICALS" SUSTENTÁVEIS!**

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D'Amato, Dalia et al. "Green, circular, bio economy: A comparative analysis of sustainability avenues." *Journal of Cleaner Production* 168 (2017): 716-734.

Mossa, Giorgio et al. "Bioeconomy and Circular Economy Approaches Need to Enhance the Focus on Biodiversity to Achieve Sustainability." *Sustainability* (2022): n. pag.

Pelenc, Jérôme "Weak versus Strong Sustainability" (2015)

Franceschini, Simone and , Pansera, Mario "Beyond unsustainable eco-innovation: The role of narratives in the evolution of the lighting sector" *Technol. Forecast. Soc.* (2015) Chang. 92, 69–83.

Krasnodębski, Marcin "An unlikely bifurcation: history of sustainable (but not Green) chemistry" Foundations of Chemistry (2023)

About green economy | UNEP - UN Environment Programme

What is circular economy and why does it matter? | Climate Promise (undp.org)

Basics of Green Chemistry | US EPA

ISC3 – International Sustainable Chemistry Collaborative Centre

Bioeconomy Strategy | Knowledge for policy (europa.eu)

Secretaria Nacional de Bioeconomia — Ministério do Meio Ambiente e Mudança do Clima (www.gov.br)

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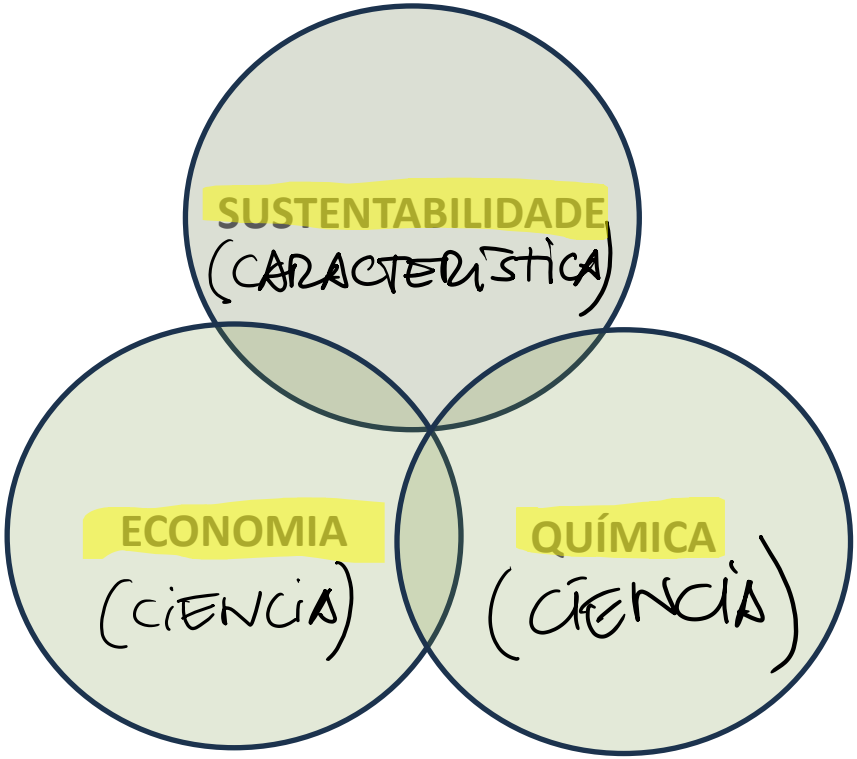
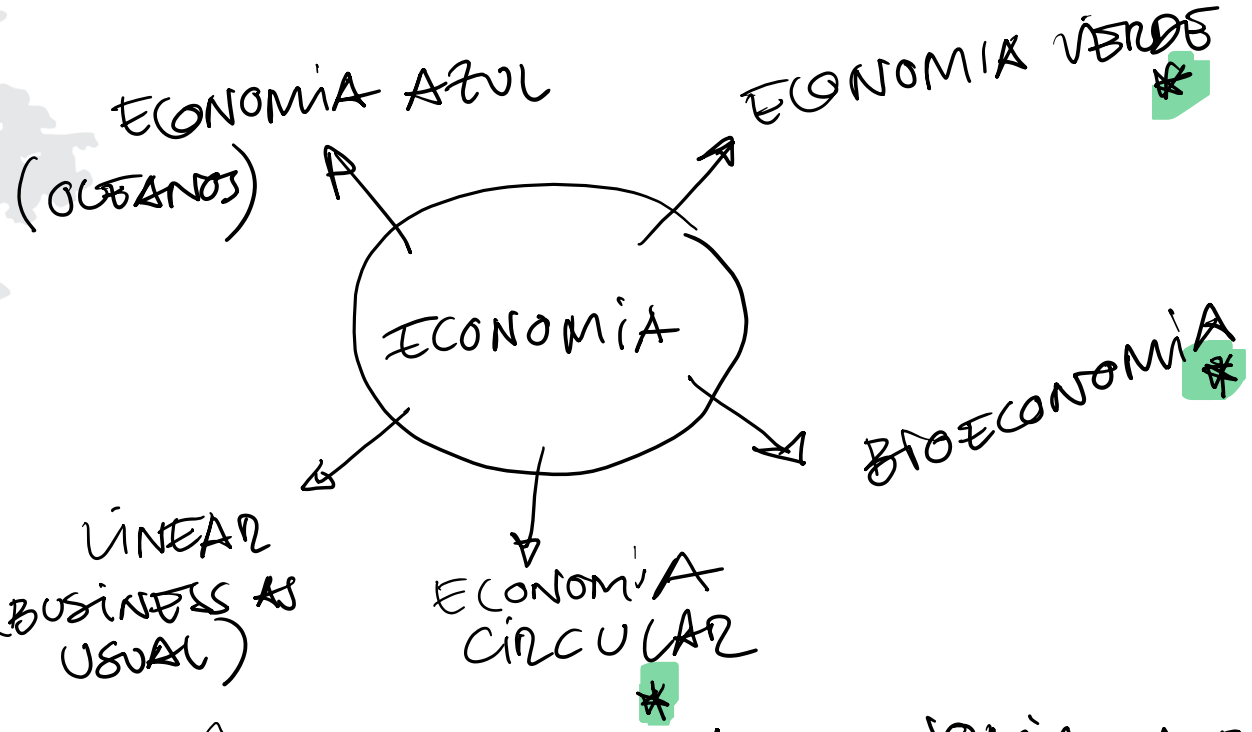

SUSTENTABILIDADE
(CARACTERÍSTICA)
ECONOMIA
(CIÊNCIA)
QUÍMICA
(CIÊNCIA)




TODOS PROPÕEM TRANSFORMAR A ECONOMIA ACTUAL NUMA ECONOMIA MAIS SUSTENTÁVEL

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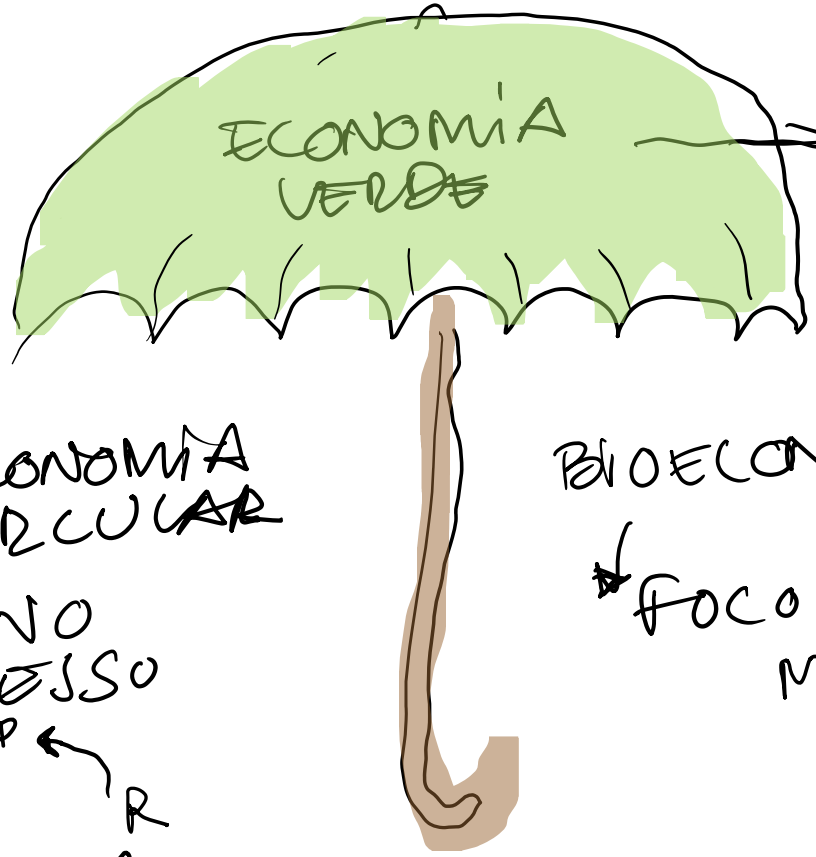


VISÃO HOLÍSTICA QUE INTEGRA SUSTENTABILIDADE SOCIAL E AMBIENTAL

ECONOMIA CIRCULAR

FOCO NO PROCESSO

MP

R

P

BIOECONOMIA

FOCO NA MATÉRIA PRIMA

MP ORIGEM NATURAL E RENOVÁVEL

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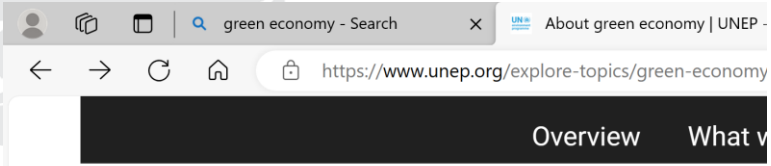
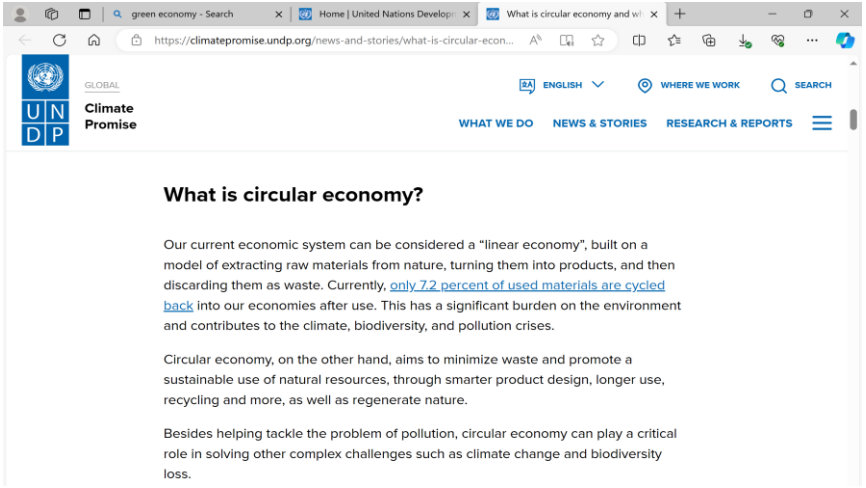



## An inclusive green economy is one that improves human well-being and builds social equity while reducing environmental risks and scarcities.

An inclusive green economy is an alternative to today's dominant economic model, which exacerbates inequalities, encourages waste, triggers resource scarcities, and generates widespread threats to the environment and human health. Over the past decade, the concept of the green economy has emerged as a strategic priority for many governments.



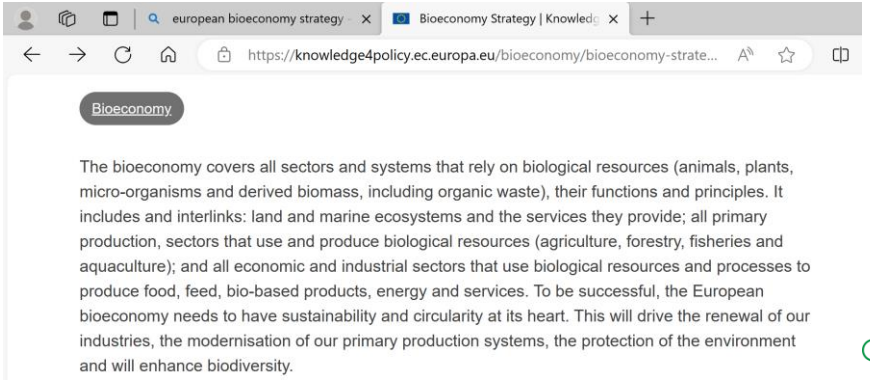




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**Table 4**
Six main topics emerging in CE, GE and BE concepts.

| Topic | CE | GE | BE |
|---|---|---|---|
| 1 | Sustainable development in industrialization and urbanization | Sustainable development | Biomass and renewables in energy production |
| 2 | Recycling in products life cycle for waste reduction | Green investments, especially in urban context | Rural policies esp. in Europe |
| 3 | Industrial symbiosis, especially in EU | Tourism, business, education, employment | Biotechnology applications in health science |
| 4 | Efficiency evaluation techniques in logistic/supply chain management systems | Biomass and renewables in energy production | Biotechnology applications in materials science |
| 5 | Carbon emission and energy in production plants | Recycling, re-use, reduction in products life cycle | Biomass supply/demand, especially wood |
| 6 | Greening the supply chain | Conservation and land use | Biosecurity |

**Table 5**
Main aspects included in CE, GE and BE concepts in regard to the social and environmental dimensions of sustainability.

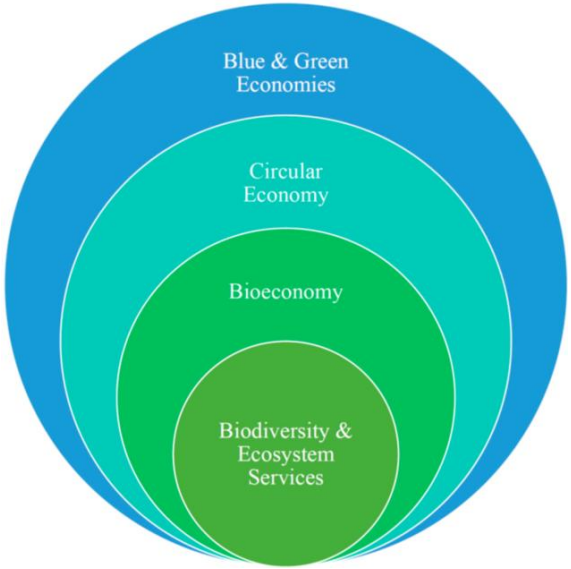
| Concepts | Sustainability dimensions | |
|---|---|---|
| | Environmental | Social |
| CE | Recycling/re-use, efficiency, industrial symbiosis, greener supply chain. | Economy, development, utilization. |
| GE | Conservation, water, land, biodiversity, food, security. | Sustainable development; Green investments, tourism, business, employment, education. |
| BE | Biosecurity, crops, species, risk, yield, invasive. | Rural policies; Research and applications in health science. |

Table 2. Summary of the main challenges and opportunities in implementing bioeconomy and circular economy approaches.

| Challenges | Opportunities |
|---|---|
| Definitions are confused and unharmonized. | Work, thinking and experience exist that can be built on |
| Biodiversity is neglected in both models and proof of concept is lacking on how biodiversity will benefit. | Sustainability is a topical, relevant and timely issue |
| Many elements of society are excluded. | Diverse and influential stakeholders are involved and engaged |
| Monitoring is weak with no use of biodiversity indicators | Some indicators have been identified |
| Inflated expectations of what each approach can achieve. Implementation is unharmonized and causes competition. Legal and organizational complexity across multiple sectors | The COVID-19 pandemic may create the stimulus for improving economic models |
| Limited organizational and operational capacity for implementation. | |

Mossa, Giorgio et al. “Bioeconomy and Circular Economy Approaches Need to Enhance the Focus on Biodiversity to Achieve Sustainability.” *Sustainability* (2022): n. pag.

Figure 1. Bioeconomy can be seen as a subset of the broader circular economy and the blue and green economies.

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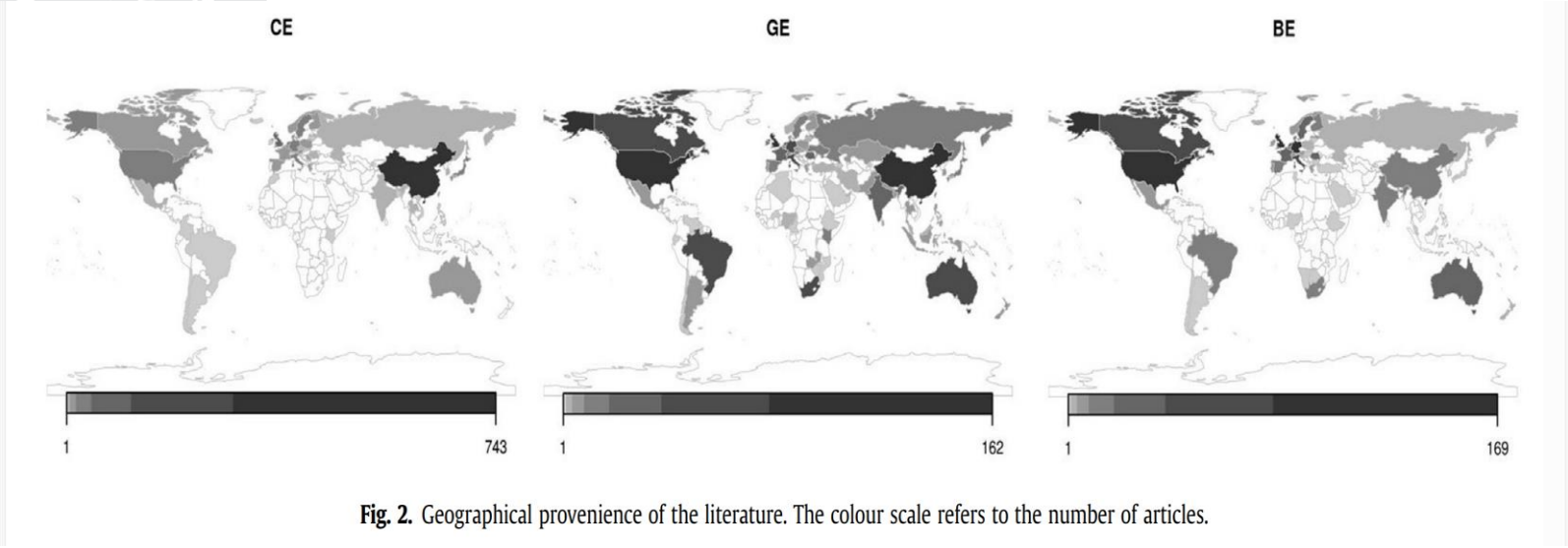


**Fig. 2.** Geographical provenience of the literature. The colour scale refers to the number of articles.

D'Amato, Dalia et al. "Green, circular, bio economy: A comparative analysis of sustainability avenues." *Journal of Cleaner Production* 168 (2017): 716-734.

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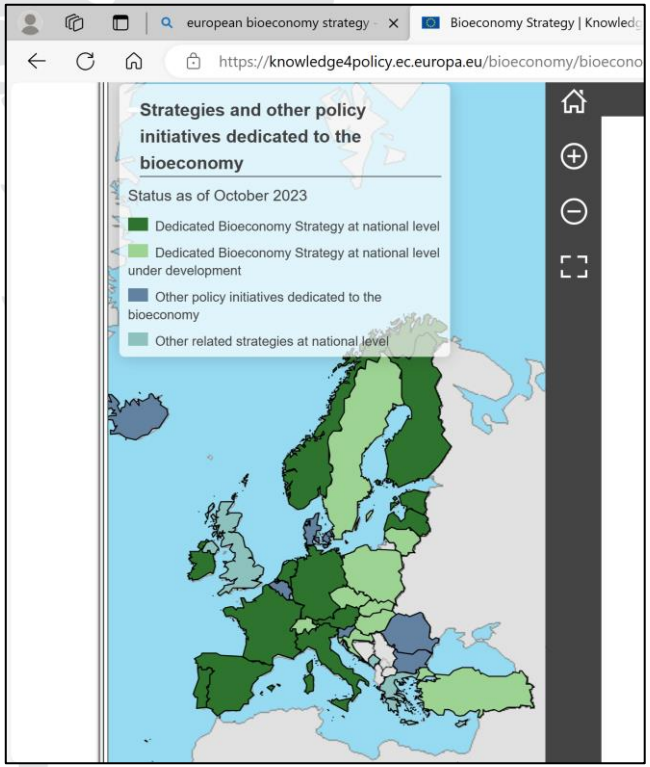


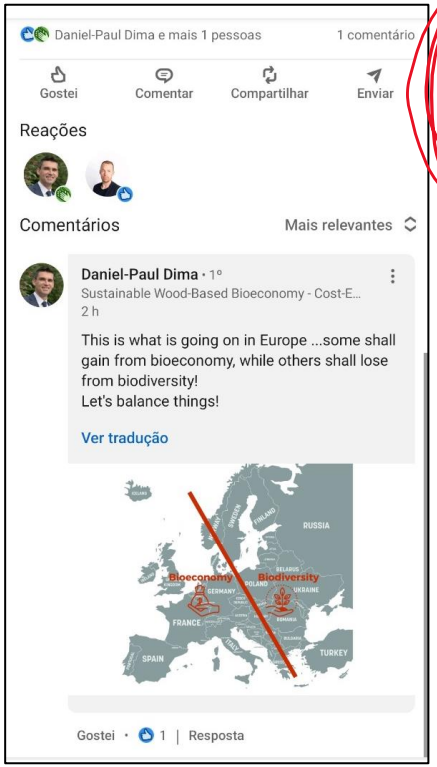


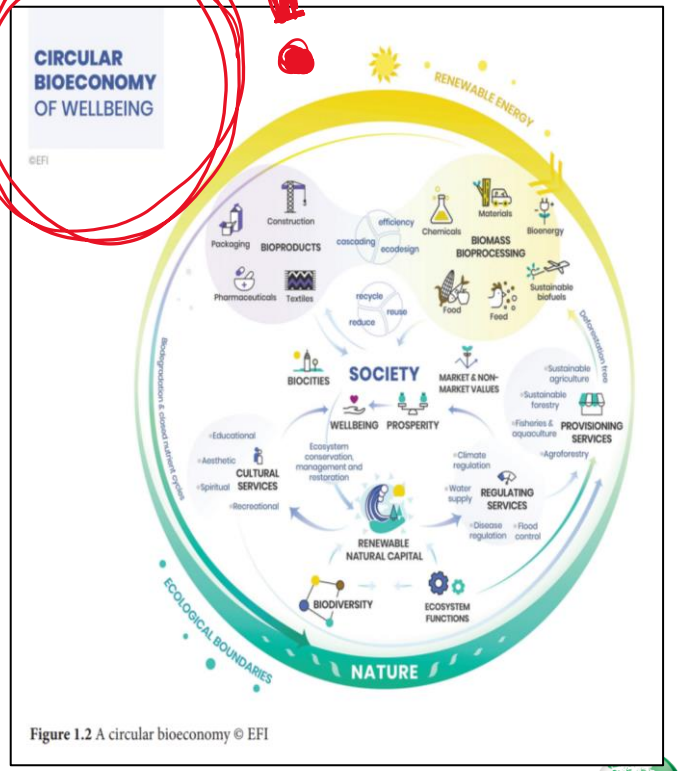


**Figure 1.2** A circular bioeconomy © EFI

**SUSTENTABILIDADE**

“Sustainability is the ability to exist constantly.” (Wikipedia, 2019)

“The quality of being able to continue over a period of time.” (Cambridge Dictionary, 2019)

“The concept of sustainability was originally coined in forestry, where it means never harvesting more than what the forest yields in new growth.” (Tom Kuhlman and John Farrington, *What is Sustainability?,* 2010)


UN ODSs

**DESENVOLVIMENTO SUSTENTÁVEL**

“Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.” (Brundtland Report, UN, 1987)


Wikipedia, Sustainable Development

**3 PILARES DO DESENVOLVIMENTO SUSTENTÁVEL**

“For sustainable development to be achieved, it is crucial to harmonize three core elements: economic growth, social inclusion and environmental protection. These elements are interconnected and all are crucial for the well–being of individuals and societies.” (FAQ, Sustainable Development Summit , UN, 2015)

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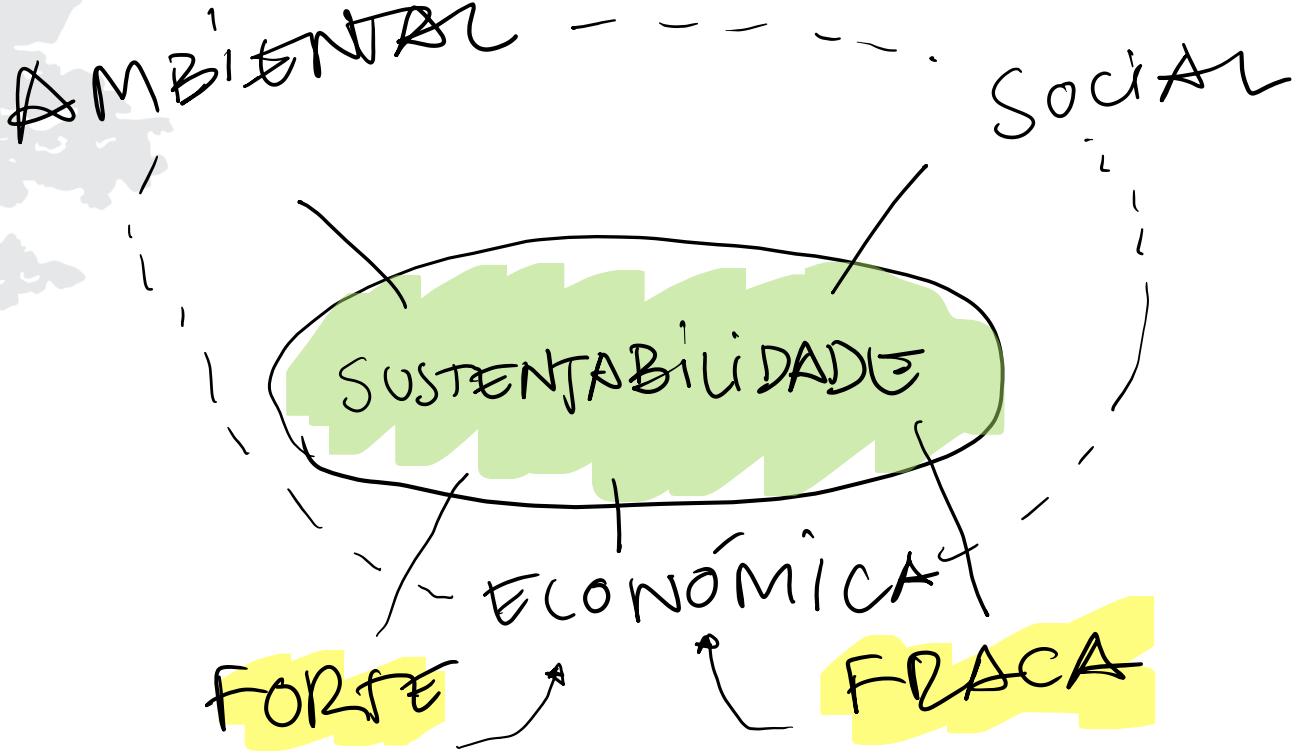


DESENVOLVIMENTO SUSTENTÁVEL

The fundamental debate regarding sustainable development is whether we choose to adopt a strong or a weak conception of sustainability. Weak sustainability postulates the full substitutability of natural capital whereas the strong conception demonstrates that this substitutability should be severely seriously limited due to the existence of critical elements that natural capital provides for human existence and well-being.

Pelenc, Jérôme "Weak versus Strong Sustainability" (2015)

SUSTENTABILIDADE FRACA

CAPITAL NATURAL
+
CAPITAL PRODUZIDO / MANUFACTURADO

SUSTENTABILIDADE FORTE

CAPITAL NATURAL COMO ELEMENTO CRÍTICO E INSUBSTITUÍVEL

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# QUÍMICA - CIÊNCIA

|

## QUÍMICA ORGÂNICA - DISCIPLINA DENTRO DA QUÍMICA

## QUÍMICA VERDE | QUÍMICA SUSTENTÁVEL

MOVIMENTOS / CORRENTES DA QUÍMICA (CIÊNCIA) TRANSVERSAIS ÀS DIVERSAS DISCIPLINAS

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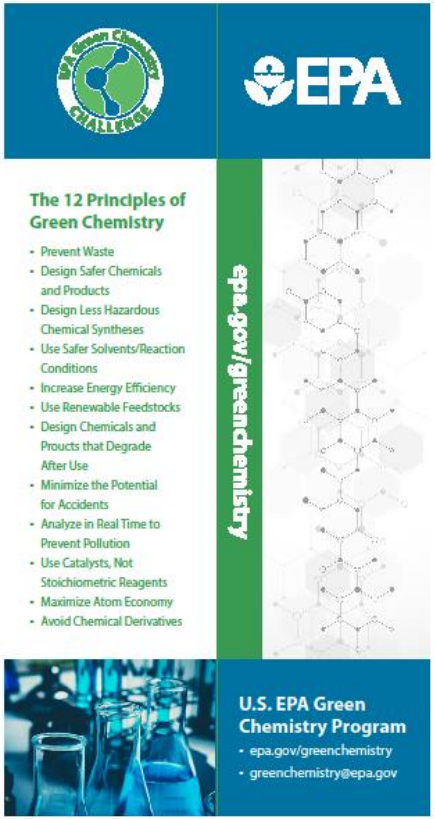
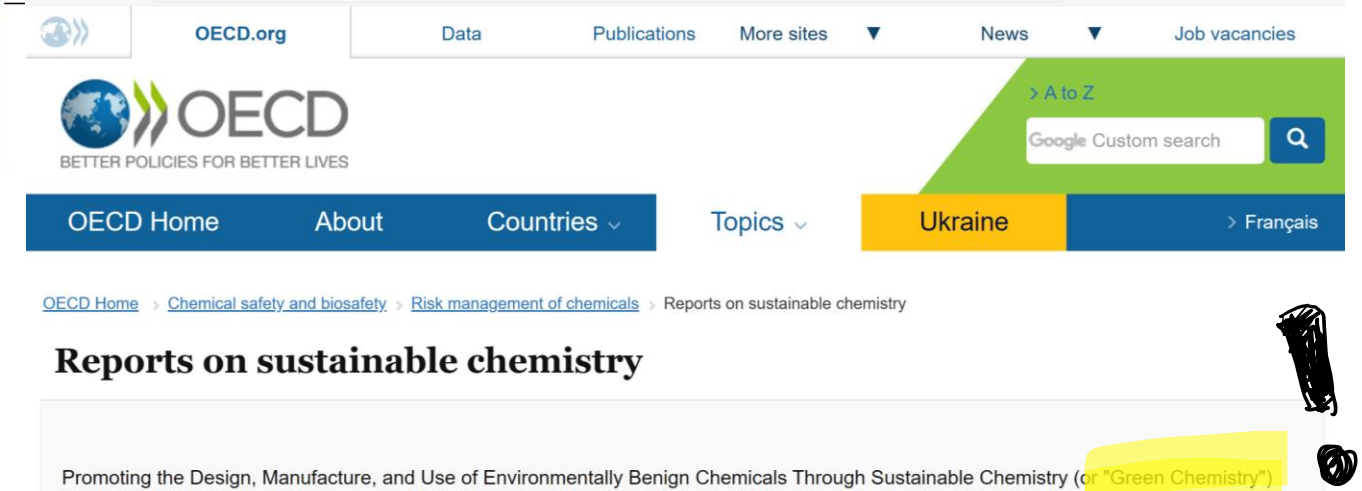

EPA
The 12 Principles of Green Chemistry
• Prevent Waste
• Design Safer Chemicals and Products
• Design Less Hazardous Chemical Syntheses
• Use Safer Solvents/Reaction Conditions
• Increase Energy Efficiency
• Use Renewable Feedstocks
• Design Chemicals and Proucts that Degrade After Use
• Minimize the Potential for Accidents
• Analyze in Real Time to Prevent Pollution
• Use Catalysts, Not Stoichiometric Reagents
• Maximize Atom Economy
• Avoid Chemical Derivatives
epa.gov/greenchemistry
U.S. EPA Green Chemistry Program
• epa.gov/greenchemistry
• greenchemistry@epa.gov


OECD.org
Data
Publications
More sites
News
Job vacancies
OECD
BETTER POLICIES FOR BETTER LIVES
A to Z
Google Custom search
OECD Home
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Countries
Topics
Ukraine
Français
OECD Home › Chemical safety and biosafety › Risk management of chemicals › Reports on sustainable chemistry
Reports on sustainable chemistry
Promoting the Design, Manufacture, and Use of Environmentally Benign Chemicals Through Sustainable Chemistry (or "Green Chemistry")
OECD Member countries have initiated work on a new project aimed at facilitating the development of environmentally benign chemicals. As a first step, a workshop was held in Venice, Italy (15-17 October, 1998) [ ENV/JM/MONO(99)19] to identify effective techniques and approaches in the field of sustainable chemistry and to identify activities that can further the development and use of sustainable chemistry programmes. This includes such things as recognising and rewarding sustainable chemistry accomplishments; disseminating technical information; promoting the incorporation of sustainable chemistry principles into various levels of chemical education; and promoting the research, discovery and development of innovative sustainable chemistry technologies. Work is underway on each of these approaches.
• The Role of Government Policy in Supporting the Adoption of Green/Sustainable Chemistry Innovations ENV/JM/MONO(2012)3

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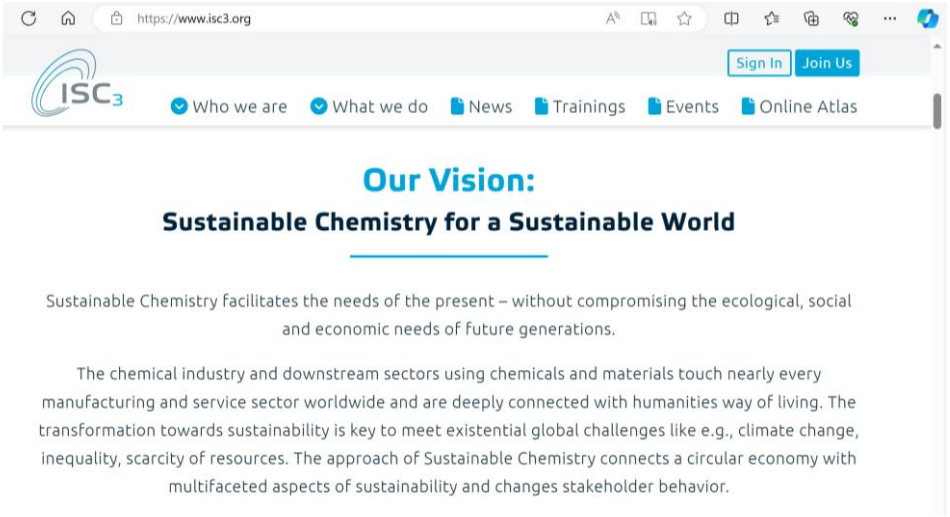
**Table 4** ISC3's key characteristics of sustainable chemistry

| | |
|---|---|
| Holistic | Guiding the chemical science and the chemical sector towards contributing to Sustainability in agreement with sustainability principles and general understanding and appreciating potential interdependencies including long-distance interactions and temporal gaps between the chemical and other sectors. |
| Precautionary | Avoiding transfer of problems and costs into other domains, spheres and regions at the outset, preventing future legacies and taking care of the legacies of the past including linked responsibilities. |
| Systems thinking | Securing its interdisciplinary, multidisciplinary and transdisciplinary character including a strong disciplinary basis but taking into account other fields to meet Sustainability to its full extent. Application as for industrial practice including strategic and business planning, education, risk assessment and others including the social and economical spheres by all stakeholders. |
| Ethical and Social Responsibility | Adhering to value to all inhabitants of plant earth, the human rights, and welfare of all live, justice, the interest of vulnerable groups and promoting fair, inclusive, critical, and emancipatory approaches in all its fields including education, science, and technology. |
| Collaboration and Transparency | Fostering exchange, collaboration, and right to know of all stakeholders for improving the sustainability of business models, services, processes and products and linked decisions including ecological, social, and economic development on all levels. Avoiding all "green washing" and "sustainability washing" by full transparency in all scientific and business activities towards all stakeholders, and civil society. |
| Sustainable and Responsible Innovation | Transforming fully the chemical and allied industries from the molecular to the macroscopic levels of products, processes, functions and services in a proactive perspective towards sustainability including continuous trustworthy, transparent and traceable monitoring. |
| Sound Chemicals Management | Supporting the sound management of chemicals and waste throughout their whole life cycle avoiding toxicity, persistency and bio-accumulation and other harm of chemical substances, materials, processes, products and services to humans and the environment. |
| Circularity | Accounting for the opportunities and limitations of a circular economy including reducing total substance flows, material flows, product flows, and connected energy flows at all spatial and temporal scales and dimensions especially with respect to volume and complexity. |
| Green Chemistry | Meeting under sustainable chemistry application as many as possible of the 12 principles of green chemistry with hazard reduction at its core when chemicals are needed to deliver a service or function whenever and wherever this complies with sustainability |
| Life Cycle | Application of the above-mentioned key characteristics for the whole lifecycle of products, processes, functions and services on all levels, e.g. from molecular to the macroscopic levels and all sectors in a pro-active perspective towards sustainability |




Wait, but aren't green and sustainable chemistry the same thing'? (…) If the two terms were interchangeable, this article would end here. Green chemistry would merely be a more fashionable name for sustainable chemistry; in fact, much more fashionable. (…) However, things are not that simple.

Krasnodębski, Marcin "An unlikely bifurcation: history of sustainable (but not Green) chemistry" Foundations of Chemistry (2023)

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FONTE: INTERNET

TUDO CLARO AGORA?

ONDE SE INTEGRAM OS "PINE CHEMICALS" SUSTENTÁVEIS AFINAL?

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