

Resource plants replacing waste plants, needs a detoxification perspective.

Efforts to minimize our impact on the planet have been ongoing, but we're still on the brink of surpassing several planetary boundaries. The resource challenge gained widespread attention outside scientific circles with the publication of "Limits to Growth" in 1972. That same year, OECD adopted the polluter pays principle, yet neither has had a significant impact thus far. Over the last 12 years, resource demands in Europe have not diminished.

The EU's Eighth Environment Action Program aims to address this by decreasing the EU's material footprint—the raw materials extracted to produce consumed goods and services. However, despite these intentions, the per capita material footprint has remained stable from 2010 to 2022. Projections suggest that the EU won't significantly reduce its material footprint in the coming decade, given the lack of progress and the anticipated rise in material demand.

To counter this trend, substantial efforts are required to reduce material extraction and consumption. Shifting towards goods and services that require fewer resources is essential for sustainability.

The Waste Hierarchy

In the Dutch parliament the year 1979, Dr. Ad Lansink introduced the “Ladder of Lansink” to reduce and minimize the problems with the growing littering and to make sure that we avoided expansion on landfilling with the ambition to reduce our resource need. With the Ladder of Lansink, the waste hierarchy was introduced, which has been a very important tool for reducing the negative impact of our linear production model.

The waste hierarchy has been a tool to decide on how mixed types of resources, sometimes including toxic substances, should be treated due to that it is WASTE. When a product has been labelled as waste, there are in the waste hierarchy uniform ways to treat it, regardless of it is a critical or strategic resources the waste contains and without considering the quality potential in the output. From 1979, the hierarchy started to set a standard on how to treat this mix of resources.

Municipalities often resort to a convenient mantra when making decisions: "we must adhere to the waste hierarchy." However, this simplistic approach has not only resulted in resource depletion but has also fostered the creation of new contaminated areas, exaggerating environmental pollution. Moreover, it has shifted the burden of dealing with these issues onto future generations, thereby generating long-term costs and sustainability challenges.

Today, the scarcity of resources has reached critical levels, and the adverse effects of adhering strictly to the waste hierarchy have become increasingly apparent. This approach fails to account for the diverse composition of resources, lacks provisions for detoxification processes, overlooks quality standards, and neglects the possibility of resource storage for future use. Despite our aspirations towards achieving a circular economy, we persist in employing the same mindset developed in 1979 to minimize waste.

The Pitfalls of the Waste Hierarchy

Examples of how the waste hierarchy leads society in the wrong direction with its "least preferred" options:

"Is Landfilling Good or Bad?"

1. Temporary storage may be necessary if we anticipate a future need for a resource. If technologies for resource recirculation aren't economically viable yet, or if the required volume isn't available, temporary storage is essential. Introducing economic subsidies could help, but this would be a direct cost for governments or the EU. A political reform introducing a material bank principle, especially for strategic and critical resources, would be beneficial.
2. Toxicified materials require permanent storage to prevent the creation of polluted areas that would later require costly detoxification.
3. Dumping resources without detoxification or future storage plans should be prohibited. Organic materials should ideally undergo composting or biogas generation and then be used for land fertilization, provided they don't contain heavy metals or toxins. If they do, a process to separate heavy metals and nutrients would be necessary.

"Is Incineration Helpful or Harmful?"

The IPCC's 2022 assessment report highlights significant CO₂e savings achievable through waste-to-energy processes, particularly when coupled with CCU+S/CCS technology. These processes offer substantial opportunities for recovering metals, salts, and other raw materials from ash. The energy generated can be utilized for industrial processes or for heating/cooling industrial or residential areas.

- a) Incineration facilitates source separation, allowing for the recirculation of metals, salts, and nutrients.
- b) The substantial energy output can reduce reliance on fossil fuels.
- c) Incinerating resources free from unwanted substances, suitable for direct material recycling, should be prioritized.
- d) Plastics unsuitable for recycling can be incinerated in waste-to-energy plants equipped with CCU+S/CCS technology. Alternatively, storing these plastics until they can be utilized is an option, as plastics in a separate landfill storage are relatively stable.

New approach to resource management

In her 2022 article "The Limits to Growth Model: Still Prescient 50 Years Later," Gaya Herrington revisited the work "Limits to Growth" and highlighted the urgent need for a new approach to resource management.

Herrington's analysis affirmed the accuracy of the data and projections presented in the 1972 book, highlighting the necessity for a fundamental change in our trajectory. She emphasized the imperative of adopting a resource-centric perspective, particularly in urban settings where flows of resources serve as a primary source.

Crucially, Herrington stressed the inclusion of a detoxification dimension in such frameworks to avert the burden of environmental cleanup and associated costs falling on future generations. To effectively address these challenges, Herrington proposed three key focus areas:

1. **Resource Utilization and the Resource Plants Principle:** Herrington proposed a major overhaul of current systems like wastewater treatment plants. Instead of just reducing harm, these facilities could be repurposed to produce valuable resources. This shift would allow society to go beyond merely lessening negative effects and actively increase the availability of resources.

2. **Emphasis on Quality:** Herrington emphasized the importance of focusing on the quality of products and raw materials rather than just their origin. This means moving away from traditional measures and standards to ensure that end products meet high-quality standards regardless of where they come from.
3. **Integration of Detoxification Principles:** Herrington highlighted the vital need to incorporate detoxification principles into every aspect of managing resources. By detoxifying materials at every stage of their lifecycle, we can reduce environmental damage and protect present and future generations from pollution. Essentially, Herrington's message emphasizes the importance of reshaping how we interact with resources, promoting innovation, and placing sustainability at the forefront to effectively address 21st-century challenges.

Our Key Considerations at Ragn-Sells

When we develop new innovations or processes, we prioritize aspects that extend beyond the conventional waste hierarchy. Here are our key considerations:

1. **Reducing the Demand for Primary Raw Materials:** We emphasize that the output or raw materials we produce should aim to lessen the necessity for sourcing primary raw materials. This approach aligns with our goal of conserving natural resources and minimizing the environmental impact associated with extraction and processing.
2. **Detoxification of Material Flows:** Recognizing the evolving understanding of hazardous materials, we underscore the importance of detoxifying material flows. By integrating detoxification processes into our operations, we aim to mitigate environmental harm and safeguard the well-being of future generations.
3. **Consideration for Future Generations:** We advocate for responsible waste management practices that do not burden future generations. This perspective reflects our commitment to sustainability and ethical stewardship of resources."

CASE: Stop being so toxic!

Recognizing the pressing need to tackle global issues like resource depletion and environmental pollution, Ragn-Sells has chosen "detoxification" as the central theme for our CASE competition. This competition serves as a vital platform for fostering innovation and collaboration, inviting participants to develop solutions aimed at detoxifying material flows, reducing environmental harm, and enhancing resource efficiency.

By focusing on detoxification, our goal is to inspire actionable ideas that contribute to the advancement of a circular economy and the promotion of environmental sustainability. Through this competition, we aim to harness the collective creativity and ingenuity of students to address real-world challenges and drive positive change. ‘

Therefore, we extend our invitation to students to explore and address issues within the theme of "detoxification" and present their innovative approaches to addressing these challenges. Together, we can pave the way for a cleaner, greener future.