RAGN-SELLS' VIEW ON CIRCULAR ECONOMY

RAGN-SELLS

CONTENT

“IF WE ARE SERIOUS ABOUT CREATING A SUSTAINABLE SOCIETY, WE NEED TO USE THE MATERIALS WE ALREADY HAVE, OVER AND OVER AGAIN.

SUMMARY

According to the UN[1], the extraction and processing of natural resources account for about 50 percent of climate change, 90 percent of biodiversity loss, and 90 percent of the threat to access to water.

Transitioning to a circular economy is crucial to our ability to mitigate climate change, the depletion of our natural resources, and the risk of overshooting planetary boundaries. But the current view on waste stands in the way of this transition.

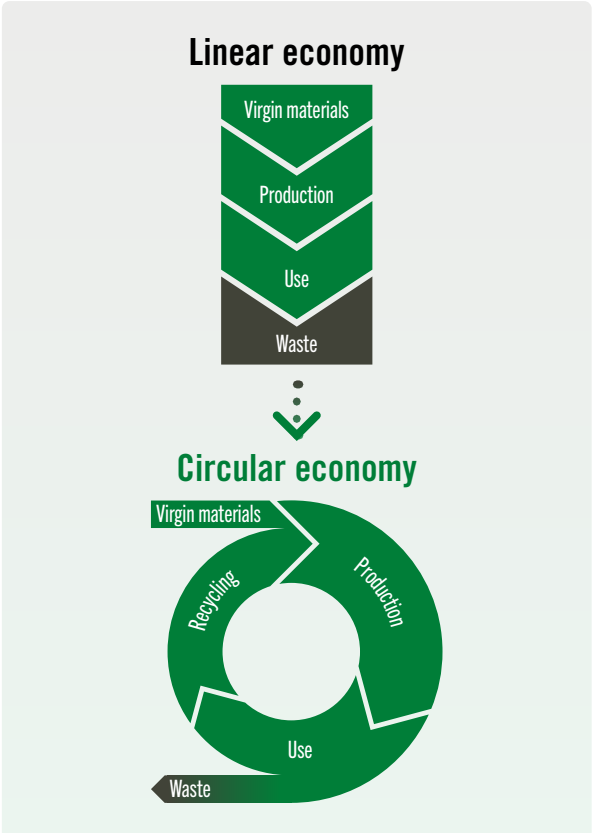
- Making society circular requires a whole **new attitude towards waste**, where waste is treated as a source of sustainable resources. This requires extensive reforms of legislation, taxes, and regulation.
- A general ambition to reduce the amount of waste does not lead to a circular economy. Instead, the important ambition must be the long-term **reduction of the unsustainable extraction of increasingly depleted natural resources**.
- The so-called waste hierarchy, more or less fundamental to all current legislation and regulation of waste in Europe and other developed countries, does not address the right issues, thereby **counteracting efforts to establish large-scale circular flows**.
- The waste hierarchy, or any principle aimed at the general reduction of waste, needs to be abandoned and replaced with a **fundamental strategy for a sustainable supply of raw materials**, used as the starting point for all legislation and regulation.
- All **production of materials needs to be the given the same conditions**, regardless of whether its origin is waste or virgin production.
- A **new definition of waste** must be established, allowing more waste flows to be used as sources of raw materials.
- Virgin materials do not fully bear **the cost of its extraction and emissions**, which gives them a competitive advantage compared to recycled materials. This skewed market condition needs to be adjusted.
- The lawful and lucrative use of harmful substances in goods makes many potential material loops impossible. **The polluter, who benefits from introducing harmful substances into the system, must pay** for them to be taken out of the system.

WHY IS THE TRANSITION TO A CIRCULAR ECONOMY SO IMPORTANT?

Every year, about 100 billion tonnes of raw material is used in the world. In only five years, the extraction of virgin materials has increased by 10 billion tonnes. Since the turn of the millennium, this extraction has increased by 70 percent, and since 1970 it has tripled[2].

At the same time, only 7.2 percent of the global economy is circular[3], meaning that it consists of materials that have already been used, replacing virgin materials. In 2018, this number was 9.1 percent. Despite increased recycling, the world has rapidly become less circular since the extraction of virgin materials has increased so much faster.

This development has devastating consequences. According to the UN[4], the extraction and processing of natural resources account for about 50 percent of climate change, 90 percent of biodiversity loss, and 90 percent of the threat to access to water. As traditional sources for raw materials become increasingly depleted, it takes more and more energy to extract the same amount. Similarly, many other forms of pressure on the planet also increase, such as the use of land and the amount of pollution.



Additionally, the production of many crucial raw materials is concentrated to a select few countries. This gives them an unproportionate amount of power and causes problematic dependency on imports for the rest of the world. The EU currently classifies 34 raw materials as critical[5]. These materials are essential to the EU economy and often irreplaceable, but the risk of supply issues is high, for example because of geopolitical challenges to import. The list has grown rapidly, from 14 materials in 2011 to 34 in 2023.

The good news is that relatively small changes to our sourcing of raw materials could have a profound impact. The pledges already made under the Paris Agreement are not enough to keep the world from heating up too much. But just doubling the circular share of the global economy from today's small numbers would limit global warming to well under two degrees Celsius, according to the UN-backed Circularity Gap Reporting Initiative[6].

Consequently, the transition to a circular economy is completely crucial for mankind. If the world fails to do this, it will be impossible to manage the fight against climate change and several other imminent threats to the planet.

Many nations and blocs, including the EU, have clearly committed to transferring to a circular economy, and have action plans in place to make it happen. However, the traditional linear economy includes several obstacles to such a transfer.

These obstacles fall into three main categories:

1. **The impeding effects of the waste hierarchy;**
2. **The separate regulation of waste, and**
3. **The flawed pricing of raw materials.**

Below, we take a closer look at these three.

1

THE WASTE HIERARCHY, AN OBSTACLE TO A CIRCULAR ECONOMY

Since the 1970s, regulation of waste in most wealthy nations is governed by some form of the so-called waste hierarchy. In the EU, UK, Australia, and many other countries, this hierarchy is the foundation for laws, taxes, permits, and practically all policies that concern waste in any way.

The waste hierarchy lays down an order of preference for waste management, where the most favoured option is to prevent that waste is produced at all. This rung on the ladder is followed by the reuse of materials that have served their purpose; recycling of materials; energy recovery; and as the least favoured option, landfill.

The waste hierarchy represents an outdated view on waste. It can be seen as an attempt to mitigate negative consequences of a linear economy.

In today's linear economy, where raw materials are constantly produced, waste is primarily created in the following ways:

- **Through inefficiency, carelessness, and wastefulness in production processes**, e.g., spillage materials from construction sites or food waste.
- **As a consequence of the extraction of virgin resources**, e.g., waste rock from mining and the so-called tailings that are left when the commercially valuable materials have been separated out.
- **As a by-product from the processing of virgin materials**, e.g., slags from the blast furnaces used to process iron ore.
- **As a consequence of reducing emissions**, e.g., the residue that is formed when contaminants are removed from exhaust gases in incineration facilities or sewage sludge from wastewater treatment plants.
- **Through human consumption**, e.g., banana peels, packaging, and sewage.

As long as the linear economy has easy access to raw materials, the long-term and indirect effects of the extraction of raw materials are not seen as a big problem. But the direct and apparent negative consequences from waste, such as pollution, smell, or the spreading of infections, have been immediately problematic. Hence, it is logical that society so far has focused on the waste problem, rather than the extraction of resources.

The waste hierarchy

However, as the access to pure and highly concentrated raw materials decreases, we have resorted to sources of increasingly poor quality: more diluted, more polluted, and more distant. Extracting these raw materials now requires more and more energy, as well as additional resources – water, land, machinery, and input chemicals. This dynamic applies to any and all raw materials.

Today, therefore, the problems caused by our increasing extraction of raw materials from poor quality virgin sources – the climate crisis, the threat to biodiversity, the

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lack of water – have a much greater impact than the effects of the amount of waste. Hence, the conditions that made the waste hierarchy logical no longer apply.

This development also means that the actual difference in quality and concentration between virgin materials and waste as sources of raw materials is shrinking. In some cases, it no longer exists. For example, the concentration of copper in bottom ash from incineration – a waste – is higher than that in the copper ore in existing mines. Similarly, the ashes from incinerated sewage sludge, also classified as waste, contains higher concentrations of phosphorus than mined phosphate rock. Despite this, the market and legislative conditions for these raw material sources are radically different since the waste hierarchy applies only to the ashes, not the ore.

Waste as a resource

In an increasingly circular economy, raw materials are increasingly produced from sources currently classified as waste. This shows why reducing the amount of waste in general should not be a goal in itself. In fact, in the long run, waste will be our only source of supply. The main issue is to minimise the extraction and processing of increasingly diluted virgin resources.

Hence, today's waste hierarchy does not address the right issue. It leads us to focus on the wrong direction, counteracting the possibility to establish large-scale circular flows.

One effect of the waste hierarchy is that the economic incentives and policies of many economies aim to reduce waste rather than virgin extraction of materials. One such example is taxes on waste put into landfills, a measure that typically does not apply to waste related to virgin extraction.

The end of detrimental "recycling solutions"

Another obvious consequence of the waste hierarchy is the way in which quantitative targets are set and monitored. For example, the EU measures the percentage of waste collected, and the percentage recycled. But these measurements do not provide any information about the most pressing issue: whether or not the recycling actually replaces the use of virgin materials. Many complex, mixed wastes are in practice difficult to recycle into new materials and are instead used as filling material in construction or to cover discontinued landfills, since this is also considered recycling. We often see examples of constructions that are not even needed but created as a way for the waste owner to avoid paying landfill taxes. This way, seemingly ambitious targets can be met without actually putting any valuable resources to use again as intended, simply because we are measuring the wrong things.

Consequently, the waste hierarchy leads to the emergence of detrimental "recycling solutions". As a result, raw materials that potentially could have been used again in the future are instead scattered and lost forever. It also slows down the development of new methods for recycling complex waste and recycling-friendly product design, again because our indicators measure the wrong things.

Hence, the waste hierarchy actively works against the transition to a circular economy.

> **"The ambition must be the long-term reduction of the unsustainable extraction of increasingly depleted natural resources.**

New principles needed

Attempts to use regulation to create circularity, by placing demands on waste management ("recycle x percent of the waste") instead of production ("use x percent of recycled materials") has also created a beneficial environment for less serious actors who offer the waste owner cheap, but inferior, solutions.

In addition, it has never been beneficial for society to minimise all waste streams – quite the opposite. Several waste flows are created as a consequence of reducing direct emissions harmful to people and the environment. For example, in order to reduce the amount of sludge waste, wastewater treatment facilities would have to do a worse job of purifying wastewater, which of course no one advocates.

There are a few special cases where the waste hierarchy is still relevant. Waste that is created from pure wastefulness or recklessness, such as food waste or waste from low-quality production processes, should be minimised as much as possible. The waste hierarchy could also, in theory, make some sense if it were also applied to waste related to virgin extraction, with dramatic consequences for a global economy that is still less than 10 percent circular. However, as a fundamental principle for how to treat waste not related to virgin extraction, it is no longer functional.

The waste hierarchy also lacks a dimension which is completely fundamental to a circular society: detoxification. Harmful substances which, entirely legally, are added to products must be managed in a safe way and should absolutely not continue to circulate. This is a huge obstacle for the transition to a circular economy, but the waste hierarchy does not address this problem.

Reformation of regulations

We need a fundamental reform of the regulation of permitted substances and materials, or it will remain impossible to establish large-scale circularity. But even if this reform were to happen overnight, society will for many years to come contain substances that we do not want in circulation. Examples include asbestos and PCBs, both long since banned in the EU but still part of many buildings. For these reasons, the transition to a circular economy also requires a long period of detoxification and management of waste not designed for circularity. In

many cases, this will require an increase in the amount of waste, rather than a decrease.

As mentioned, the waste hierarchy contributes to the scattering of waste – i.e., our future resources – throughout society. Since the hierarchy also lacks mechanisms to manage potentially harmful substances, policies based on it (such as landfill taxes) lead to local pollution.

To make a circular economy possible, we must replace the waste hierarchy with a new governing principle. Instead of minimising the amount of waste, our overarching goal must be to reduce the unsustainable extraction of virgin materials by using raw materials over and over again.

If such a principle, focused on resources, would be the basis of all regulation, taxation and other policies, society can secure a sustainable supply of raw materials over time. It would allow for the raw materials we already have extracted to be used efficiently, without posing a threat to our health, our environment, or our climate. If the waste hierarchy remains the main governing principle, we will continue to reward inefficient "recycling solutions", make it impossible to scale up the extraction of raw materials from waste flows, and keep digging the materials we need straight from the earth.

> **"The waste hierarchy needs to be replaced with a strategy for a sustainable supply of raw materials.**

2

THE HARMFUL SEPARATE REGULATION OF WASTE

Since society traditionally has viewed waste as a problem, we also treat waste as something to be removed, preferably at the lowest possible cost. This has led to waste being treated as an isolated issue and governed by separate legislation and regulation.

The goal of the legislation is partly sanitation, partly to prevent damage stemming from the actual waste management; not to supply society with its raw materials in a safe manner. From this point of view, it still appears logical to work to reduce the amount of waste as much as possible: waste is a problem, and the less of a problem we have, the better. In the case of waste resulting from inefficient processes (spillage), it also makes sense to reduce waste to increase efficiency; however, far from all waste flows are the results of inefficiency. All together this has led society to design powerful mechanisms that slow down the transition to a circular economy.

- The extraction of raw materials, regardless of origin, requires scale to be profitable. When the origin is waste, a special set of legislation applies, a patchwork of rules and taxes designed to reduce the amount of waste. This makes it difficult to reach sufficient scale.
- Many waste streams could be used as input to industries. But since the use of waste is regulated separately, industries rarely have the applicable permits to use waste in production. This has also led to many industry standards not allowing waste as a raw material, which creates a barrier for the creation of loops.
- The ambition to minimise waste has made it impossible to store waste like other types of raw materials, usually due to bans or taxation. This also makes it difficult to achieve scale. Nor is it possible to store large amounts of waste in anticipation of new technology or new market conditions which make it feasible to extract raw materials from the waste.
- Unlike virgin materials, the separate regulation of waste often makes it difficult, prohibitively expensive, or even illegal to move waste. This is especially true for cross-border trade where national regulations collide. This forces countries to try to create their own national loops, which is less efficient since potential scale as well as access to technology and competence are limited.

Secure necessary raw materials

The protection of human health and the environment should be very stringent. There are examples of successful waste legislation, such as the ban on landfilling organic materials, a practise which previously led to huge emissions of greenhouse gases; or the Basel Convention ban on export of hazardous waste to countries that lack sufficient capacity to safely manage the waste. However, the protection of human health and the environment has to be guaranteed in a way that does not impede our possibilities to secure necessary raw materials in a different way than virgin extraction.

Instead, what we today call waste needs to be considered as a source of raw materials like any other.

The same conditions have to apply to the extraction of raw materials from waste streams as to the extraction of virgin materials, without market distortions such as separate regulation, requirements, or taxation. Otherwise, the traditional sourcing of raw materials will always be an easier and cheaper option, despite the fact that it causes several of humanity's biggest problems, and despite the ambition of many nations and blocs to make the transition into a circular economy.

> **"What we today call waste needs to be considered as a source of raw materials like any other.**

2

For example, the nutrient phosphorus can be extracted from incinerated sewage sludge. The product is of a higher quality, contains less pollutants, and has a significantly lower climate impact than the phosphorus imported to the EU, predominantly from mines in Morocco and Russia. Phosphorus is also listed as a critical raw material in the EU. But EU legislation still does not allow recycled phosphorus to be used in animal feed, since it originates from waste (sludge).

The comprehensive reform required must be based on a new view on waste. This means that we have to establish new definitions for what constitutes waste.

For example, current EU legislation defines[7] waste as "any substance or object which the holder discards or intends or is required to discard". In a circular economy, this definition is a barrier, because it does not provide any information regarding the potential for the substance or object to be a source of valuable raw materials. At the same time, not all existing material can be circulated, for example because of toxic contents.

To make it possible to replace the waste hierarchy with a principle based on society's need for sustainable raw materials, waste should instead be defined by the following fundamental criteria:

- **A material lacking economic value**, or
- **A material where information about its content is lacking**, preventing the use of or extraction of raw materials from this material, or
- **A material which is illegal, or unsuitable considering industry standards**, to use as a raw material in production, or
- **A material containing unwanted substances**.

> **"All production of materials needs to be the given the same conditions, regardless of whether its origin is waste or virgin production.**

These four criteria, separately or in any combination, define flows where the recycling of materials – given existing technology and pricing of goods and emissions – is very difficult, or risk spreading harmful substances in society. Such flows are the only which should be regarded as waste.

This would mean that everything not covered by this definition could legally be used as a source of raw materials. In addition, the difficult and costly work of defining so-called end of waste criteria, the terms that today have to be fulfilled for a material not to be labelled as waste, would no longer be needed.

The transition to a fossil free society will require the continued extraction of virgin materials. For example, the coming decades of electrification will require more copper and rare earth metals than are found in today's waste streams. But a changed fundamental view on waste, focusing on our need to secure the supply of raw materials, is an absolute requirement for our ability to break the harmful dependence on virgin materials.

3

FLAWED PRICING MODELS STAND IN THE WAY OF CIRCULARITY

There are many reasons why recycled materials have a hard time competing with virgin materials, with the lack of circularity as a consequence. But the mechanism that in practice creates the advantage for virgin materials remains the same: the flawed pricing of raw materials and emissions.

Virgin materials do not fully bear the cost they cause through extraction and processing. There is simply no cost to producers associated with the continued extraction of new materials, even though this practise is responsible for half of the world's climate emissions. Neither does the price increase as we get closer to depleting the world's easily accessible resources. The impact of the raw material on issues more difficult to measure, such as local pollution and threatened biodiversity, is to an even lesser extent reflected in the pricing of the raw material.

Dysfunctional pricing

Markets have gotten used to this pricing model and optimised all processes for profitability under these conditions. This is an incredibly effective obstacle to the transition to a circular economy. The fact that the actual price of a product is not reflected in its market value means that producers actually benefit from participating in and contributing to the harmful, yet increasing, extraction of virgin materials, instead of circularity. Therefore, it is also very difficult to create change without the introduction of forceful corrective mechanisms.

In a circular system, traditional waste managers are producers of raw materials, using waste as the origin of the raw materials instead of mines. This requires raw materials and emissions to be priced in a way which better reflects actual costs and the relative scarcity of the raw material.

This will steer development towards circularity and away from wastefulness in a more efficient way than legislation because it will make it profitable to economise valuable resources and to design products intended to be recycled. Only then will we close in on the actual goal: reducing the extraction of virgin materials.

When it comes to emissions of greenhouse gas, the EU has tried to place the cost on the actor who profits from emitting through the ETS, the EU Emissions Trading System. ETS puts a price on about three-quarters of emissions within the EU and leaves it to the market to trade emissions allowances. A high price on each tonne of carbon dioxide within the ETS makes it more profitable to reduce one's emissions. Since recycled materials have a significantly lower climate impact than virgin materials, this contributes to making recycled materials more attractive.

The ETS is a successful example of a pricing mechanism that indirectly contributes to making the price of raw materials reflect its actual costs. But in order to have full effect and move the production of raw materials towards significantly increased circularity, prices would likely have to be even higher.

An additional obvious effect of dysfunctional pricing is that producers are able to profitably manufacture and sell products which are impossible to recycle, or worse, which cause pollution further down the chain. They simply pass the bill to someone else, completely legally and sanctioned by the current system. Even pollutants that do not cause immediate harm create problems by complicating the recycling of other valuable raw materials in the same waste streams.

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3

Polluters has to pay

One obvious example of this is the use of PFAS, a large group of synthetic substances with a wide range of use in society. Research increasingly indicates that PFAS substances are detrimental to our health. In addition, they are extremely slow to break down and accumulate in the environment. Therefore, these substances should definitely not continue to circulate, which causes potentially valuable materials in PFAS-ridden waste streams to become non-recyclable. One gram of an ordinary PFAS substance today costs about 0,10 euros, while the cost of detoxifying water contaminated with PFAS may be several thousand times higher.

Currently, it is not the polluter, the company adding PFAS to their product, who bears the cost of detoxification. On the contrary it is very lucrative thanks to the desirable qualities of these substances. Most of the time, the public is forced to pay for significantly more expensive waste management instead, or for decontamination when local levels of PFAS go dangerously high. Contaminated waste streams also make recycled materials more expensive, which again leads the industry to use virgin materials, slowing down the transition to a circular society.

This has to change by fully implementing the so-called Polluter Pays Principle. This principle was adopted by the OECD as early as 1972, but it is obvious that is has not had intended effect.

> **“ The polluter, who benefits from introducing harmful substances into the system, must pay for them to be taken out of the system.**

Whoever earns money from a product that contains hazardous materials, creating a problem for society, must bear the costs caused by the problem. If producers could save money by making sure that their products are free from harmful substances, and that it is possible to manage them in a circular way once they are no longer wanted, change would come as a result.

The skewed pricing of raw materials will persist as long as society at large and recycling companies bear the cost of cleaning up other people’s pollution. This asymmetry, which contributes to more beneficial conditions for virgin materials than recycled materials, effectively hampers society’s work to achieve a circular economy.

LINKS

1 https://www.resourcepanel.org/file/1192/download?token=TxJ-c8OY

2 https://www.resourcepanel.org/reports/global-resources-outlook

3 https://www.circularity-gap.world/2023

4 https://www.resourcepanel.org/sites/default/files/documents/document/media/gro_2019_fact_sheet.pdf

5 https://rmis.jrc.ec.europa.eu/?page=crm-list-2020-e294f6

6 https://www.circularity-gap.world/2021

7 https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32008L0098&from=SV#d1e720-3-1