Industry
and circular economy

More than a third of Austria's greenhouse gas emissions are caused by industry[1], as the production of steel, iron, chemical products, cement, and glass is energy- and process-related emission-intensive[2] [3]. This makes industry very significant. In addition, many of our consumer goods are imported[5] [6]. Both require a large number of natural resources, such as coal, oil, natural gas, metals, and rare earth elements for high-tech products, whose extraction is harmful to the environment[7] [8].

New economic cycles

Today, product development often still follows a linear logic[9]. This involves primarily using raw materials that must first be extracted or mined (primary raw materials). In most cases, waste disposal is not considered during product development, which inevitably leads to a "throwaway economy"[10]. In the future – especially in resource-scarce Europe[11] – it will be essential to keep raw materials in cycles.

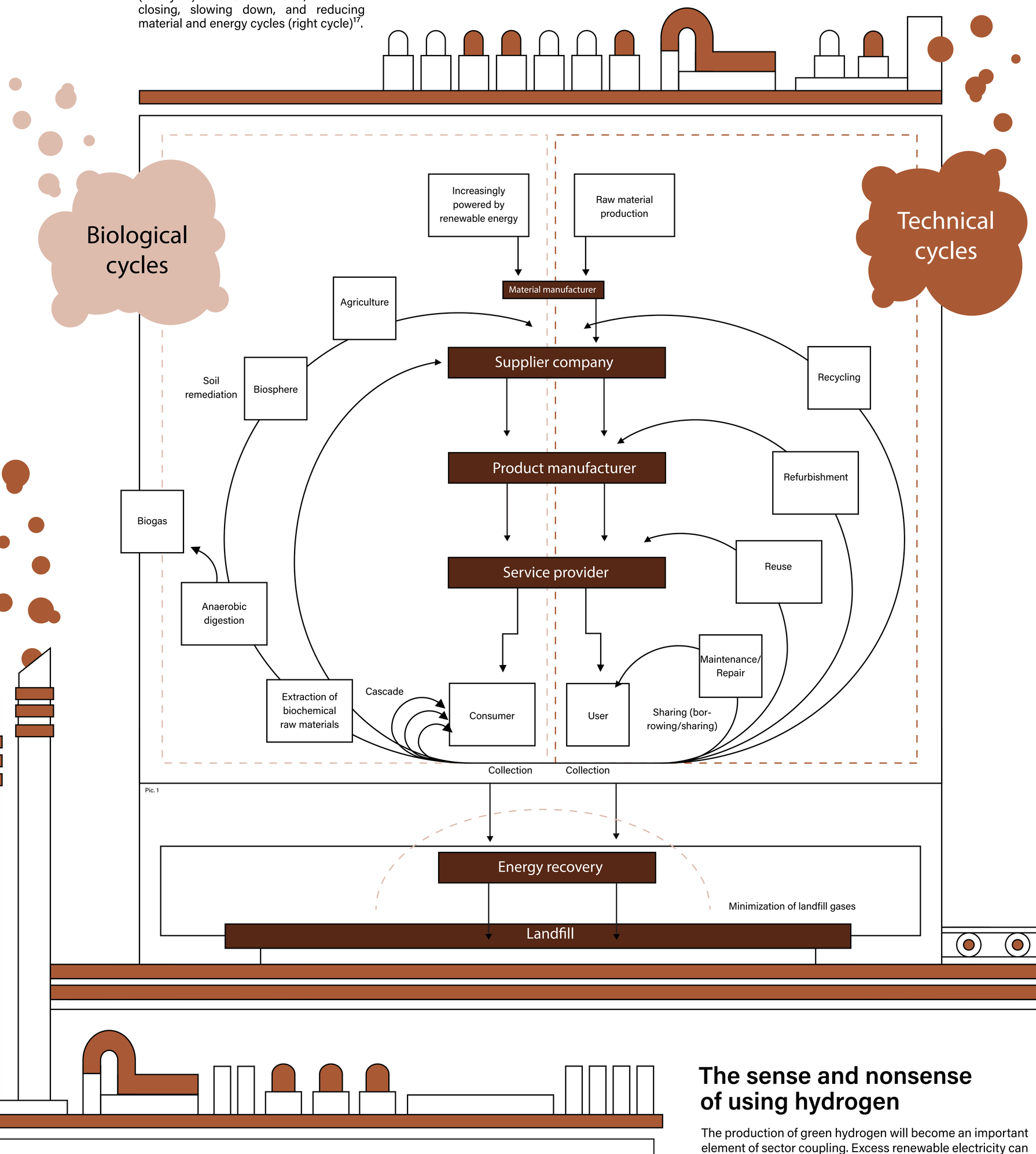
The aim is to reduce the demand for primary raw materials. Currently, in Austria and the EU, only slightly more than one-tenth of resource needs are met through recycling[12].

It should be noted that with recycling, material quality decreases depending on usage duration and purpose, requiring a new use to be found for a material or product. This is called cascading use. For example, batteries from electric vehicles can be used as energy storage in buildings for many additional years[13].

The final step is often incineration for heat generation.

The functioning of the circular economy

Circular economy means, on the one hand, using natural resources as much as possible and in a meaningful way, which are renewable and thereby bind carbon (left cycle). On the other hand, it is about closing, slowing down, and reducing material and energy cycles (right cycle)[17].



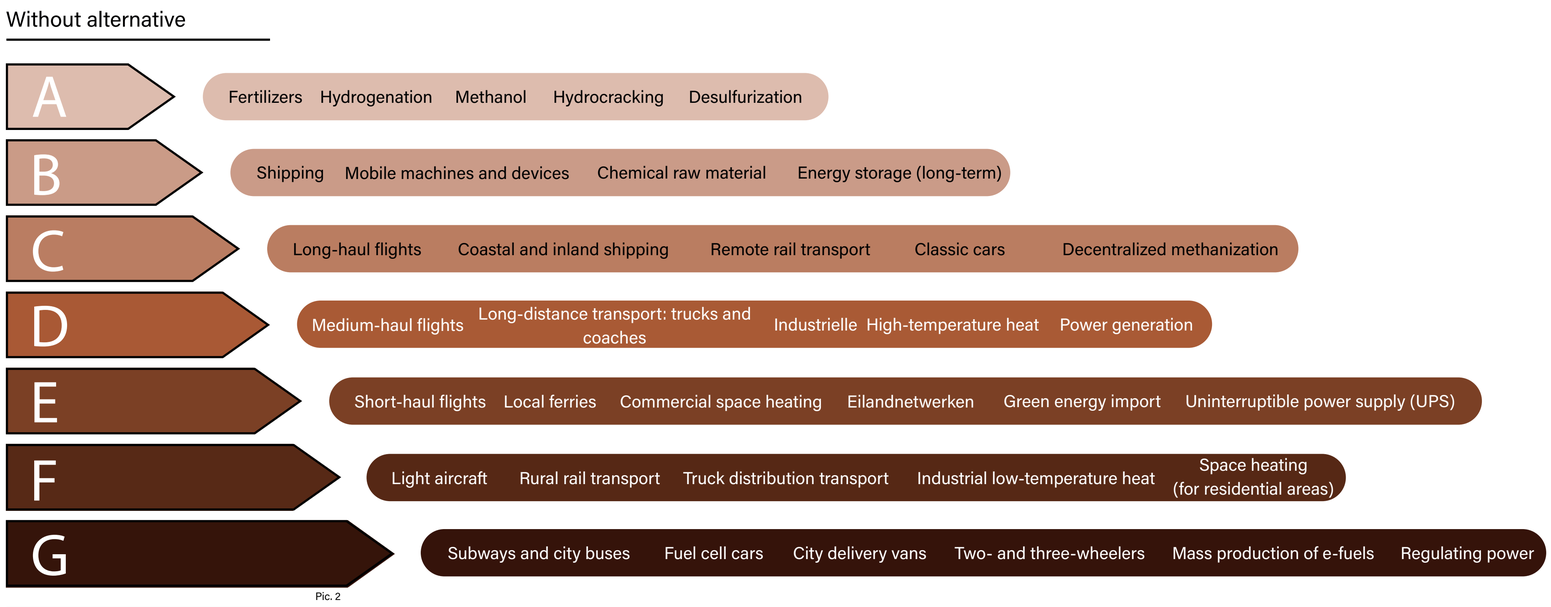
Pic. 1

Sustainable products and services

Companies will need to adapt or expand their business models by, for example, reducing their raw material consumption through eco-design or Product-as-a-Service offerings (such as leasing or subscription models). Good disassemblability, repairability, and durability of products contribute significantly to the development of a circular economy[15].

Another approach to reducing emissions lies in the bioeconomy, where fossil raw materials are replaced with bio-based ones[16].

Applications of clean hydrogen



Pic. 2

The sense and nonsense of using hydrogen

The production of green hydrogen will become an important element of sector coupling. Excess renewable electricity can be used to produce hydrogen (H_2) and oxygen (O_2) from water via electrolysis. Hydrogen is easier to store and transport than electrical energy stored in batteries. Existing gas pipelines could be adapted for the transport and storage of hydrogen[18].

Another challenge is the utilization of electrolyzers required for hydrogen production: the longer these operate, the more economical the system becomes and the less subsidy is required[19]. Achieving high utilization during fluctuating power production, as is the case with renewable energy sources, will therefore be crucial[20].

However, we will not be able to produce hydrogen in abundance, as its production is energy-intensive and difficult to fully supply using renewable energy sources[21]. It would thus be wise to limit hydrogen use to hard-to-decarbonize sectors, such as the fertilizer, steel, or basic materials industries, as well as aviation and shipping. Hydrogen will remain the "champagne" of the energy sector for a long time[22] [23] [24].

[1] ohne öffentliche Strom- und Wärmeproduktion
[2] vgl. UBA, 2023a, S. 105
[3] vgl. UBA, 2023a, S. 125f.
[4] vgl. UBA, 2023a, S. 129
[5] vgl. Fischer et al., 2022, S. 5ff.
[6] vgl. Luckeneder et al., 2021, S. 12
[7] vgl. Statistik Austria, 2023c
[8] vgl. Luckeneder et al., 2021, S. 5ff.
[9] vgl. Wieser & Kaufmann, 2022, S. 9f.
[10] vgl. CCCA, 2023b, S. 1
[11] vgl. Europäische Kommission, 2023a
[12] vgl. Eurostat, o. J.
[13] vgl. Ellen MacArthur Foundation, 2021, S. 54
[14] vgl. Wieser & Kaufmann, 2022, S. 10
[15] vgl. Ellen MacArthur Foundation, 2021, S. 21
[16] vgl. Ellen MacArthur Foundation, 2021, S. 62
[17] vgl. CCCA, 2023b, S. 1f.
[18] vgl. ÖVGW und FGW, o. J.
[19] vgl. Agora Energiewende, 2022, S. 32f.
[20] vgl. Frontier Economics, 2021, S. 46ff.
[21] vgl. Frontier Economics, 2021, S. 51f.
[22] vgl. IPCC, 2022b, S. 1315
[23] vgl. Liebreich, 2021
[24] vgl. Agora Energiewende, 2022, S. 12

Pic. 1: Eigene Darstellung basierend auf CCCA, 2023b, S. 2
Pic. 2: Eigene Darstellung basierend auf Liebreich, 2021

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