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Key point points new bioresources narrative

- In a climate-neutral, circular economy carbon will remain essential for renewable products. Realizing renewable carbon sources requires an immediate full commitment to building a green industry and increasing the supply of sustainable bioresources. This provides the Netherlands with opportunities to remain a forerunner and an economic powerhouse in the agricultural and chemical sectors
- In a circular economy, we keep the carbon we use in use for as long as possible by improving the quality of products and reusing raw materials. By using bioresources, it is possible to produce essential products such as building materials, feedstock for the chemical industry, fuels and medicines, while at the same time contributing to strengthening sustainable agriculture, forestry and simultaneously can improve the quality of the living environment and the reduction of biodiversity loss.
- Under the right conditions, the production of bioresources can provide multiple benefits to deliver in sustainable country- and forestry and for nature conservation and -development¹.
- Bioresources play an important role in removing carbon from the atmosphere through Bio-energy Carbon Capture and Storage (BECCS). This is necessary to reduce the concentration of carbon in the atmosphere.
- For the realization of the conversion to sustainable carbon and green industry, European policy is needed. The Netherlands can take a leading role in setting up the preconditions thanks to a strong industrial cluster, strategic position of ports and hub in international supply chains.

Structure New Narrative Bioresources

- We need bioresources
- bioresources have multiple advantages
- Supply by renewable carbon
- What happen next?

¹ We also refer to this as ecosystem services, which means that we take into account the value of, among other things, biodiversity, healthy soil, nutrient cycle closure, CO2 storage, water (quality, quantity, buffering capacity for wet-dry conditions), and a healthy living environment.

We need bioresources

- In a climate-neutral and circular economy, we still need carbon. Our future energy system will primarily consist of renewable sources, significantly reducing dependence on fossil resources. However, carbon remains indispensable for materials in products, in sustainable fuels such as those for aviation and shipping, and for permanently removing CO₂ from the atmosphere (negative emission technologies). To achieve this, it is necessary to replace fossil carbon with renewable carbon sources such as sustainable bioresources, recycled materials, and, likely in the longer term, CO₂ captured from the air. All three of these sources will need to coexist.
- To achieve renewable carbon sources, a full commitment to building a green industry is immediately necessary. The essential transformation of the fossil industry requires the development and deployment of key technologies based on sustainable carbon chains. As outlined in the "Exploration of pathways towards climate neutrality 2050" by the Netherlands Environmental Assessment Agency, the success of this green industry depends on the use of sustainable bioresources and innovations in scaling up technologies to support the future green product portfolio.² The Netherlands can take a leading position in the development of this future green product portfolio within the context of European cooperation. By taking the initiative to establish the framework necessary for the industrial transition to sustainable carbons—especially bioresources—this leadership can secure future economic potential and broader prosperity.
- In a circular economy, the prolonged and repeated use of renewable carbon is fundamental, ultimately leading to (permanent) storage. However, the opportunities offered by bioresources in this approach remain underexposed, particularly within the policy-driven approach to circularity.

Bioresources have multiple benefits

- The production of bioresources, under the right conditions,³ provides multiple benefits in sustainable agriculture, forestry and nature development. Bioresources are fundamentally important for the creation of multiple consumer products and can therefore be grown for a wide range of diverse and often complementary purposes.
- In this way, the production of bioresources contributes to the necessary sustainability of the agri-chains and industry by contributing to the prevention of depletion in the current land use systems. Think of protecting soil with cover and catch crops, improving water storage and water quality, improving air quality, protecting and increase biodiversity. Additionally, 'construction crops' such as mammoth grass, elephant grass and hemp offer possibilities. These crops can be used for biobased construction and thus offer the Dutch agricultural sector a future perspective.
- We also create multiple products from crops and through their processing. Examples include how straw or pellets are made from the stems of food and animal feed crops. Flax cultivation can be used for linen production, where the fibers are used for high-quality insulation materials in homes or furniture. Processing techniques in green chemistry, such as pyrolysis or syngas production, provide resources like biomethanol, from which many products and materials can be made. Wood from production forests⁴ is used for sustainable building materials that store CO₂.
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² PBL, 'Exploration of pathways towards climate neutrality 2050'

³ Like all EU Member States to have to leave to establish in article 29 by the Directive Renewable Energy (REDIII).

⁴ Almost all forests in Europe (and actually all forests in the Netherlands) have an equivalent function for nature, recreation, and production. Ecosystem services as a whole are more valuable than the wood that comes from them.

Processing techniques in green chemistry, such as pyrolysis or the production of syngas, yield basic raw materials like biomethanol, which can then be used to create numerous products and materials. Wood from production forests is used for sustainable building materials that store CO₂. Residual and by-products from this process play a vital role as raw materials for the energy sector and the chemical industry. For example, through the Fischer-Tropsch process, woody biomass can be converted into renewable fuels or used to replace fossil feedstocks in the chemical industry. During the gasification steps in this process, the surplus biogenic CO₂ released can be captured and stored. This results in negative emissions or CO₂ that can be used for the production of synthetic fuels or permanently stored.

- In short, the multiple benefits of bioresource production can contribute to strengthening sustainable agriculture and forestry, improving the quality of our living environment, and reducing biodiversity loss.

Supply of renewable carbon resources

- The amount of harvestable bioresources in the Netherlands can increase through integration into agriculture, optimal use of sludge from water purification and high-quality processing of bioresources out waste that now yet is becoming burned. Further be able to sugars out beets or corn can be used in ethanol production, with the proteins ending up in animal feed. The lignin fraction out fast growing Elephant grass can serve as binder in asphalt and maintenance and thinning of supplies materials that can be used in construction, chemistry and biofuel production.
- The Netherlands, being a densely populated area with a relatively large base industry and a hub in international production chains, requires the import of bio-based raw materials. Our country can benefit from the import of biomass within the EU and the market power of the EU. Mutually accepted certification schemes, sustainability criteria, and monitoring systems guarantee a stable supply of bioresources and a level playing field. It is important to note that the Netherlands lacks sufficient physical space to meet the full future demand for renewable carbon resources.

What needs to be done?

- European policy is needed for the development of green products from sustainable carbon sources. In this context, it is important to provide broad visibility and support for the principles of the initiative for a “Joint Statement on a European Sustainable Carbon Policy Package,”⁵ launched by the Netherlands, Czech Republic, Ireland, and France. These countries urge the European Commission to:
 - Create market demand through instruments such as a European obligation on the use of sustainable carbon with goals in product standards and regulations;
 - A European strategy to stimulate the availability of sustainable carbon;
 - Consistency and coherence between the various policy areas;
 - Build in technology-neutral incentives and support innovation for sustainable alternative carbon sources;
 - Additional instruments that should lead to a global level playing field.

Build green industrial policy on synergy and shared investments

- Within the context of European cooperation, the Netherlands can take a leading position based on a green industrial policy. The Netherlands has large ports, a leading industry, and a well-developed agricultural cluster. The transition to sustainable carbon sources, especially bioresources, thus offers great opportunities and enables the Netherlands to maintain the position of current production clusters and transform them into sustainable resources and (value) chains. This is crucial for our future earning potential, preventing leakage effects through the relocation of production activities, and contributing to prosperity and well-being.

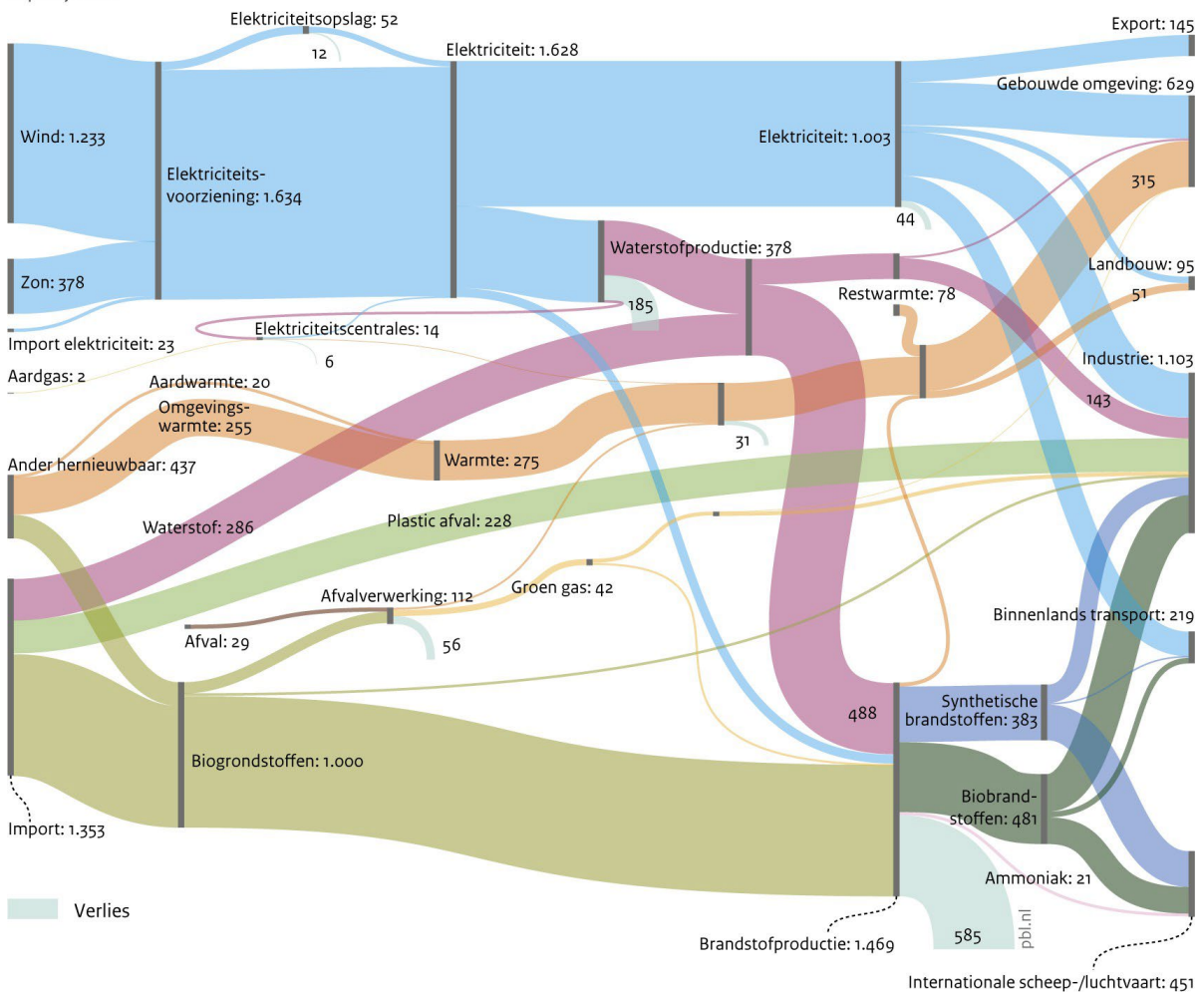
⁵ [Joint Statement on a European Sustainable Carbon Policy Package](#).

Targeted investment support and innovation policy are needed in conjunction with the above-mentioned integrated European approach.

- The Netherlands currently relies heavily on fossil carbon in areas where renewable electricity will soon be used. The use of fossil carbon will decrease significantly in the coming years. For the remaining carbon demand, renewable and circular sources are needed. There are different ways in which this remaining demand can be met. The Netherlands Environmental Assessment Agency (PBL) has developed various scenarios in the Exploration of pathways towards climate neutrality 2050" study to show how the Netherlands can become a climate-neutral society by 2050. One of the findings from this research is that sustainable bioresources, regardless of the path that the Netherlands will take, will be deployed on a large scale⁶. Below is an example of what energy flows in the Netherlands could look like in 2050 if the Netherlands no longer used fossil energy carriers. In this scenario, at least 1,000 petajoules of bio based raw materials would be needed (see figure below).

Energiestromen Nederland 2050, traject Specifiek-Ruim met CCS tot 20 Mt/jaar (SR20)

in petajoules



Bron: PBL

⁶ PBL, 'Exploration of pathways towards climate neutrality 2050'

- The 'Sustainable Industry Lab', a collaboration between science, industry, and NGOs, analyzed in the report '*Green Choices for the Dutch Basic Industry*' that approximately 20 million tons of 'circular' carbon will be needed in 2050. This circular carbon is essential for replacing fossil carbon in fuels and as a raw material for industrial processes. Additionally, processing renewable carbon into green products will require approximately 500 petajoules (PJ) of renewable electricity, primarily for the production of green hydrogen. A biobased and circular industry in the Netherlands will thus create a significant additional demand for renewable electricity, which is crucial for the required green hydrogen.⁷
- Scaling up the use of bioresources for the demand for materials, chemicals, and bioenergy helps to achieve economies of scale and regulate the supply chains. Feedstock for chemicals and materials is mainly sourced from the same production facilities as for biofuels and relies on the same supply chains for bioresources. As a result, it is possible to rapidly scale up in sectors that can quickly avoid fossil fuels using the existing infrastructure, and a gradual shift in demand takes place over time. Ultimately, the development of the bioresources supply chains will lead to the use of carbon that can be stored for the long term.

Production of Sustainable bioresources contributes to strategic autonomy

- The demand for sustainable bioresources presents opportunities for economic development, more sustainable agriculture and forestry, and can help initiate the necessary adjustments to counter climate change. The use of bioresources aligns with the goal of making Europe less dependent on the import of fossil raw materials and contributes to a greater degree of strategic autonomy. The extent to which this happens depends on the pace at which the availability of sustainable bioresources as an alternative carbon source increases. This ambition and the shift toward sustainable agriculture and the expansion of forests, especially in the European context, provide good opportunities for this.
- The Dutch industry already uses sustainable bioresources and will require a growing amount of bioresources in the coming decades, based on long-term contracts with regular deliveries. This is currently not possible through the availability of bioresources within the country or from the EU. International bioresources will still be necessary. Moreover, bioresources in international supply chains offer opportunities for local economic and social development. A Dutch industry using bioresources ensures that farmers and forest managers will produce more bioresources. The demand for sustainable bioresources from industry does not lead to less availability, but rather more and better production. Ensuring socially fair supply chains is an important complement to the sustainability framework, and associated co-investments in (international) bioresources production need stimulation.

Ensuring Sustainability

- Sustainable carbon can only be made available if the sustainability of bioresources is properly ensured and meets the established sustainability criteria, preferably at the European level. There is already a well-functioning system for energy applications that can be further developed for all bioresources applications.⁸ Independent certification and verification are crucial in this process. In a sustainable system, we look at the streams that become available from crops for food, chemicals, (construction) materials, and fuels. Bioresources are also needed for the realization of CO₂ capture and storage from the atmosphere (CDR).

⁷ The Sustainable Industry Lab (2023), [Groene Keuzes voor de Nederlandse Basisindustrie](#).

⁸ Like all EU Member States to have to leave to establish in the Directive Renewable Energy (REDIII).

- Sustainability certification leads to continuous improvement and innovation, making it an important tool for integrating enhanced ecological insights and raising sustainability ambitions, including ensuring social justice in bioresources chains.⁹
- Communicating the necessary use of bioresources and ensuring information about the integrity of sustainability criteria is essential for creating positive support for the deployment of sustainable carbon.

The Netherlands: powerhouse for a biobased circular industry

- Climate change is increasingly putting pressure on CO₂ absorption in forests and soils, and is also straining global food supply. The urgency to stop adding new fossil CO₂ to the atmosphere is therefore high, requiring rapid development of renewable electricity capacity, advanced efficiency, and the replacement of fossil carbon in products. The use of biobased feedstocks directly replaces new fossil carbon in the system, and the production, if effectively embedded, contributes to protecting against the effects of climate change (mitigation and adaptation).
- A successful scaling of a sustainable green carbon base is highly dependent on setting up better and more sustainable land use systems, including the greening of our food production system. We need land whose use is sustainable in the long term, positively influencing soil, biodiversity, and water management.
- From a policy perspective, the multiple values, or ecosystem services, in land use and the use of biobased feedstocks, including crops for food and feed for different applications, should be approached in an integrated manner. The task in the coming decade will be to manage and guide the greening of land use, the climate emergency, the building of reliable and sustainable biobased supply chains, and addressing the scarcity of water and space. By connecting these challenges, new solutions, shared investments, and business models will emerge.
- The Netherlands is well-positioned to take a leading role in driving the green transition of industry, scaling up the supply chains of sustainable biobased feedstocks, and the necessary shift to sustainable land use.

⁹ IEA Bioenergy (2023), [Approaches to sustainability compliance and verification for forest biomass](#) and By der Veen, et al., “Designing bio-based value chains for social justice: The potential of Capability Sensitive Design” in [Energy Research and Social Science \(November 2024\)](#).