



# Thriving Ports within Planetary Boundaries in Europe and Rotterdam

From Vision to Policy Recommendations

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## Policy Brief



This brief focuses on the key role ports must play in shaping thriving economies and healthy societies aligned with ecological limits. It highlights urgent needs and opportunities for ports to change, with the planetary boundaries as the compass. Moving from vision to implementation, five policy recommendations and three mindset shifts are outlined for port transformation.

Five policy recommendations for port decisionmakers and policymakers in Europe and Rotterdam:

- 1. Bring ports and the maritime sector under one coherent governance framework that prioritises planetary health and long-term societal prosperity.**
- 2. Document, regulate, and actively reduce the comprehensive environmental footprints of ports and port-enabled activities.**
- 3. Improve ports' local footprints on ecosystems and urban communities through integrated land- and maritime spatial planning.**
- 4. Bolster the implementation of greenhouse gas emissions reductions aligned with planetary boundaries.**
- 5. Turn ports into vectors of just transitions, durable clean jobs and regenerative economy (i.e., an economy that restores and improves ecosystems) through reskilling, new economic clusters and nature-based solutions.**

Underlying these five recommendations, three main mindset shifts are needed to transform ports into stewards of prosperity aligned with the planetary boundaries:

- 1. From single-issue solutions and siloed efficiency to systemic coherence and governance**
- 2. From narrow focus on local operations and emissions to full responsibility for throughput impacts across port-enabled value chains**
- 3. From small, incremental adjustments to absolute reductions in the amount of material passing through the port to realign with ecological limits**

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**The One Planet Port Foundation (OPP)** is a science-based organization that unites communities, workers, researchers, and policymakers to translate academic research into real-world interventions that reimagine port activity, restore nature, protect health, and support good jobs within a liveable planet.

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## The Problem & the Vision

**Ports are central, yet largely ignored, actors of planetary health and governance.** Ports enable 80% of global maritime trade (UNCTAD, 2025), enforce rules applicable to ships, and connect trade to industries and transport (One Planet Port Foundation, 2026). Ports are anchored in local territories but also connected to regional and global trade, material and energy flows, acting as central nodes (Peyrelongue, 2014) in these economic systems. This is especially true for the Port of Rotterdam, Europe's largest seaport with a throughput of 428 million tonnes of cargo in 2025 (Port of Rotterdam Authority, 2025a) and handling approximately 11.9% of total EU port tonnage in 2023 (Port of Rotterdam Authority, 2025b) as visualised in Figure 1.

The Port of Rotterdam allocates land to logistics, industry, and energy companies while facilitating trade in agricultural commodities, fossil fuels, fertilisers, biomass and consumer goods that require land use, resources extraction and human labor in other countries and continents. The scale and influence of this port mean that any transition achieved in Rotterdam will reverberate across the Netherlands, Europe, and the global maritime system, advancing shared environmental, sustainability and justice objectives.

However, ports and the shipping, industry and energy activities they enable are responsible for **wide ranging climate and environmental harms** affecting local ecosystems and the planet's life-supporting processes (e.g., the atmosphere, water cycles, nutrient cycles). Port-enabled activities are responsible for greenhouse gas emissions that contribute to global warming and ocean acidification, biodiversity loss through ports' spatial use and expansion, and multiple forms of pollution (chemicals, waste waters, aerosols, nutrient runoff, etc.) affecting the health of coastal communities and local ecosystems. Port-city-territories (Hein et al., 2023) are often pollution and ocean acidification hotspots due to the convergence of heavy shipping traffic, port operations, and industrial activities which create **cumulative pressures** on coastal populations.

**Europe lacks a comprehensive governance framework and policies** that address these far-reaching impacts of ports and port-enabled activities. At the level of the European Union (EU), countries and cities, institutional boundaries and the multi-scalar nature of port activities create unclear and overlapping governance mechanisms (Hein, 2019) that fail to monitor and regulate port-enabled environmental impacts across land, sea and global processes. This creates major gaps in climate and environmental policy as well as public accountability and democratic dialogue around ports' roles in achieving just sustainable transitions.



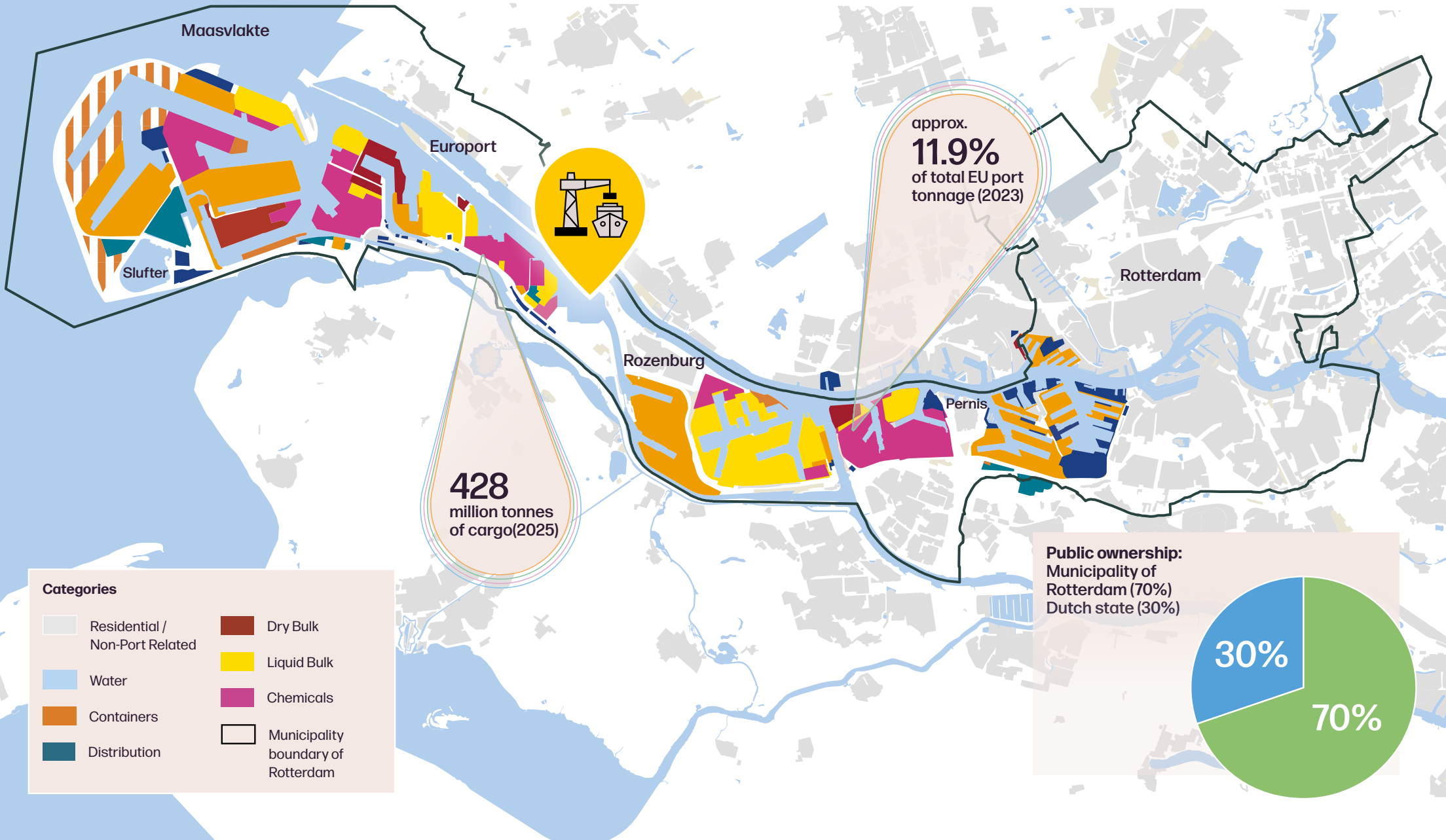
Source: Roger - [stock.adobe.com](https://www.adobe.com).

via One Planet Port (OPP) Vision Report (Gilliam et al., 2026).

At the same time, the interconnected nature of port ecosystems offers major opportunities to turn ports into forces for positive change (Jansen, 2025). Major European ports like Rotterdam can reevaluate their local impact in the port-city-territory, their role in global value chains and set new environmental standards that inspire other ports to follow. **Ports in Europe and Rotterdam can become stewards of prosperity that advance health and social justice for communities, regenerate natural ecosystems, and align economic activity with planetary stability.** For this vision to become reality, ports and governing institutions must enact policy change, take decisive action and embrace new values and mindsets. This Policy Brief highlights five policy recommendations and the underlying mindset shifts to realign port decisions and impacts to achieve planetary stability.

**The Planetary Boundaries framework** grounds these policy recommendations in robust Earth system science and reveals synergistic solutions for decisionmakers to make a net-positive impact on local health, coastal ecosystems, and our planet's life-supporting systems. This Brief is a policy-focused summary of the **One Planet Port Vision Report** (Gilliam et al., 2026) which provides an extensive analysis of ports' impacts across the nine-planetary boundaries along with a Vision and recommendations for port transformation in Europe and Rotterdam.

Figure 1. Rotterdam, a Dutch port with global impacts



## The Planetary Boundaries Framework: a systemic compass

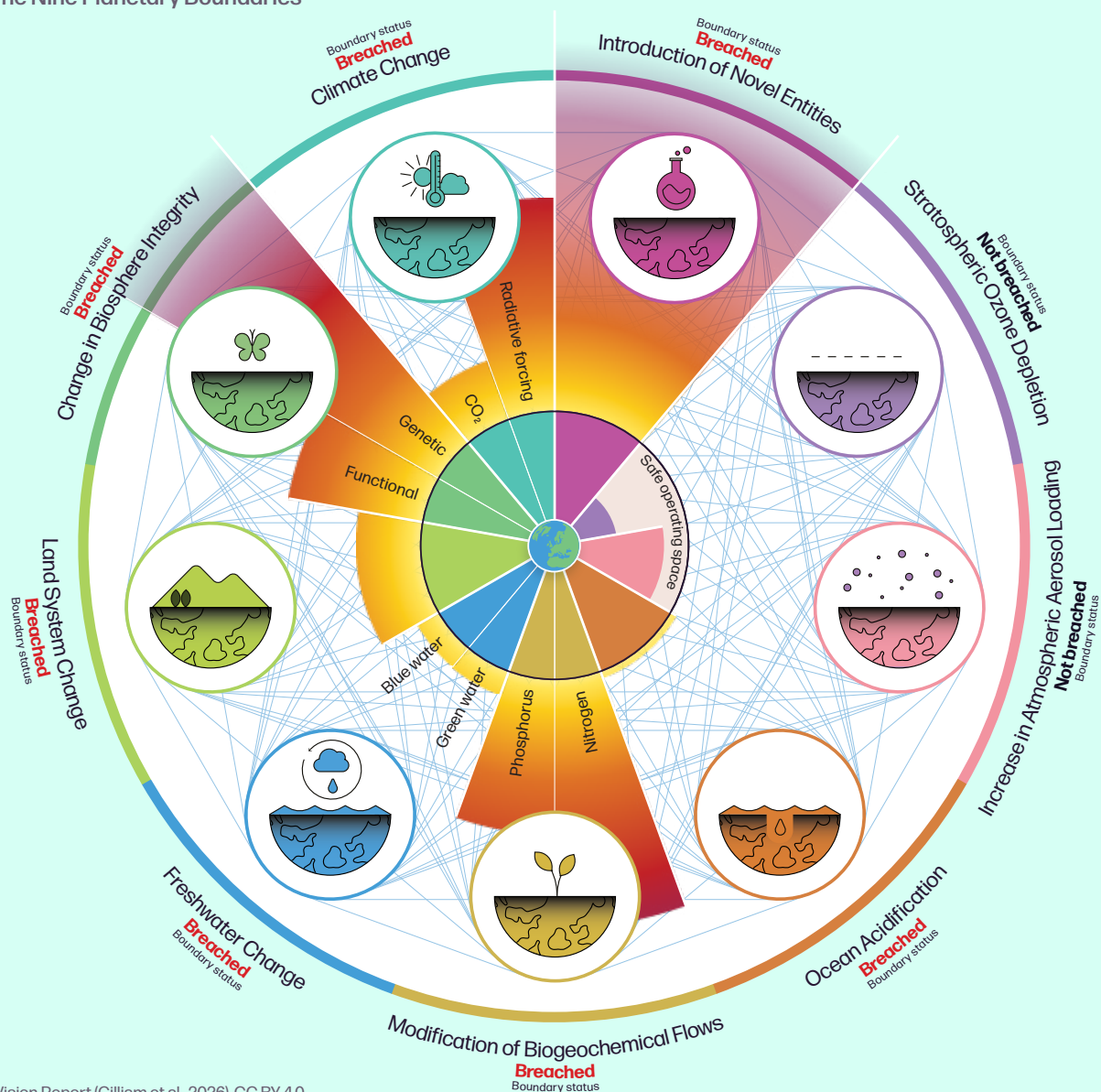
Societal prosperity, maritime trade and energy security depend on Earth systems, which make life possible on our planet. The Planetary Boundaries Framework defines a safe operating space for humanity (Rockström et al., 2009) by identifying nine biophysical limits (fig. 2), beyond which the risk of large-scale and potentially irreversible Earth system changes increase. Due to human activities, seven of the nine planetary boundaries have now been crossed (Planetary Boundaries Science, 2025), see Table 1.

These boundaries are **interconnected**. Crossing one boundary can affect others and push them beyond safe limits. Maintaining the safe operating space that supports long-term human well-being requires staying within all nine boundaries simultaneously.

Applying this framework to ports and port-enabled activities reveal that **ports directly create, and indirectly facilitate, multiple cumulative pressures on all nine**










**biophysical processes** (fig. 3). This is especially true for major global trade hubs such as Rotterdam, whose impacts extend far beyond its physical boundaries. Rotterdam functions as one of the world’s largest industrial complexes, hosting multiple power plants and oil refineries that convert crude oil into fuels and petroleum products for distribution across Europe (Port of Rotterdam Authority, n. d.). In 2025, 4.6 million tonnes of fossil fuels were bunkered in the Port of Rotterdam (Port of Rotterdam Authority, 2025a). This makes the port a key contributor to fossil fuels use, itself the single largest source of human-caused greenhouse gas emissions responsible for climate change. Its petrochemical infrastructure also ties the port to the production, storage, and distribution of novel entities, which creates pathways for spills, leaks, and emissions, enabling massive flows of plastics and chemicals to European markets. This, in turn, contributes to waste that degrades into the environment at end-of-life, spreading persistent pollutants into ecosystems, animals, and humans.

Figure 2. The Nine Planetary Boundaries



Source: OPP Vision Report (Gilliam et al., 2026). CC BY 4.0.

**Table 1.** Overview of the Planetary Boundaries and their threshold value.

Planetary Boundary	Description	Threshold value
 Climate Change	Disruption of Earth's energy balance caused by greenhouse gases and other climate forcing agents, measured through atmospheric CO <sub>2</sub> concentration and total radiative forcing.	<b>Exceeded</b>
 Change in Biosphere Integrity	Loss of biodiversity and ecosystem functioning across terrestrial and marine systems.	<b>Exceeded</b>
 Land System Change	Conversion of natural ecosystems (especially forests) for agriculture, urbanization, and infrastructure.	<b>Exceeded</b>
 Freshwater Change	Alteration of global freshwater cycles, including groundwater depletion and surface water disruption.	<b>Exceeded</b>
 Modification of Biogeochemical Flows	Disruption of nitrogen and phosphorus cycles from fertilisers, agriculture, and industrial activity.	<b>Exceeded</b>
 Ocean Acidification	Decline in ocean pH caused by absorption of atmospheric CO <sub>2</sub> .	<b>Exceeded</b>
 Introduction of Novel Entities	Release of synthetic chemicals, plastics, and other human-made substances into the environment.	<b>Exceeded</b>
 Increase in Atmospheric Aerosol Loading	Concentration of fine particulate matter and aerosols affecting climate and health.	<b>Safe</b>
 Stratospheric Ozone Depletion	Depletion of the protective ozone layer that shields Earth from harmful UV radiation.	<b>Safe</b>

In spite of these impacts, ports are not held accountable for their enabling role in trade, energy and industrial activities that drive ecological and social harm beyond operational and national boundaries (e.g., resource extraction, water stress, deforestation, exploitative working conditions, climate change) and whose impacts are most felt by the Majority World (Alam, 2008) peoples (Cuevas Valenzuela et al., 2023). One Planet Port developed the concept of **throughput impacts** (fig. 4) to capture the full range of biophysical impacts associated with ports and

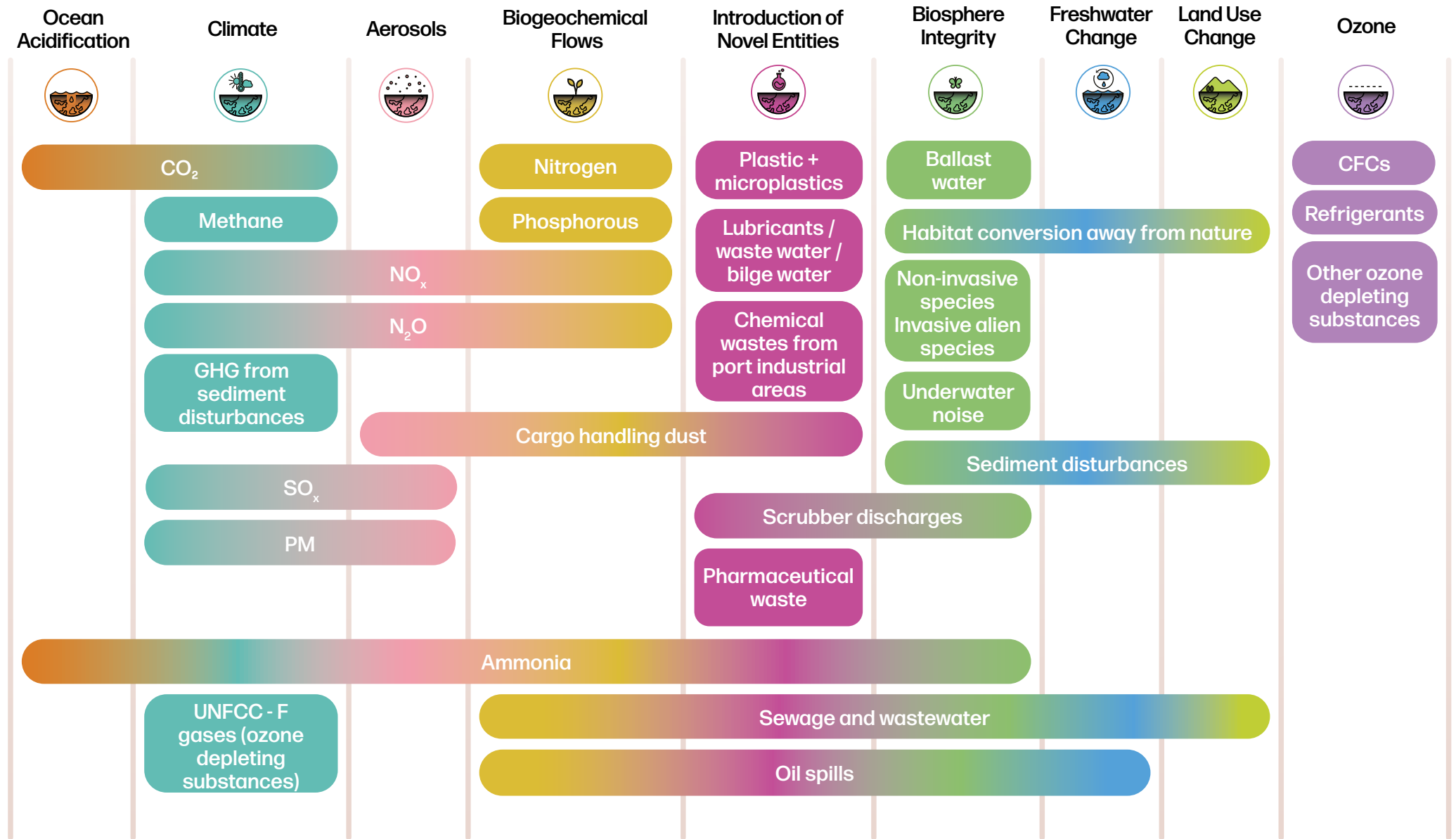
maritime shipping (including material and energy flows, emissions, pollution, land and water use, and ecosystem degradation), both via direct and indirect operations. Throughput impacts capture the full set of planetary boundaries pressures embodied in the materials and products moving through a port across their entire lifecycle, from resource extraction and production to transport, use, and end-of-life, revealing impacts that remain invisible when ports are assessed only on direct operations.



Source: Frank - [stock.adobe.com](https://stock.adobe.com),  
via One Planet Port (OPP) Vision Report (Gilliam et al., 2026).

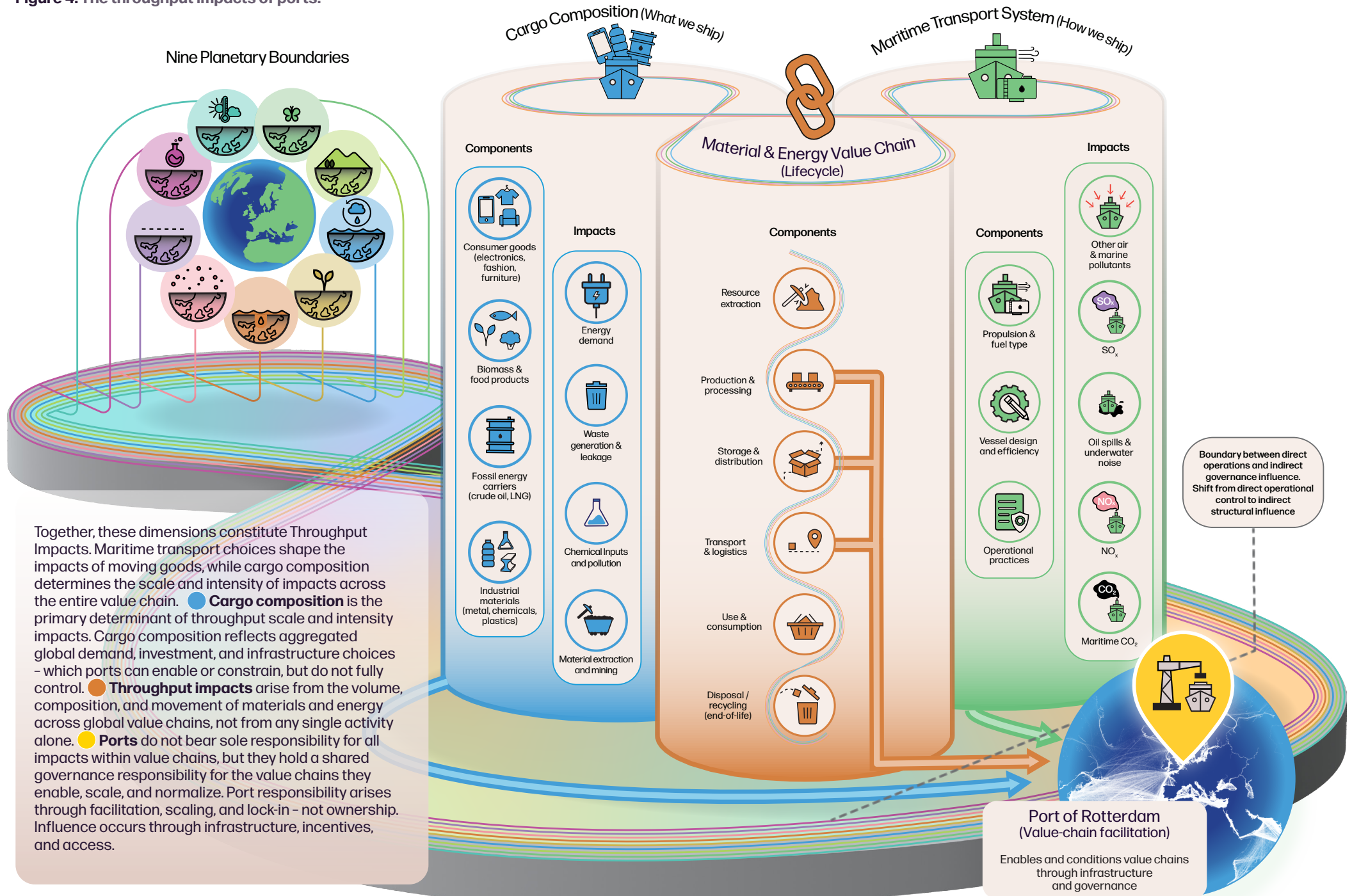
Figure 3. Key maritime and port inputs affecting multiple planetary boundaries.

## Key maritime and port inputs affecting multiple planetary boundaries



Source: OPP Vision Report (Gilliam et al., 2026). CC BY 4.0.

Figure 4. The throughput impacts of ports.



Source: OPP Vision Report (Gilliam et al., 2026). CC BY 4.0.

Existing international and European regulations, including MARPOL, the Paris Agreement, and the Biodiversity Beyond National Jurisdiction (BBNJ) agreement, address only a narrow slice of the full spectrum of ecological breakdown caused by shipping, direct port activities, and the value chains that ports facilitate. **Seven of the nine planetary boundaries have already been breached, yet international governance frameworks exist in substantive form for only two:** climate change (Paris Agreement) and, partially, biosphere integrity (Kunming-Montreal Global Biodiversity Framework). Even where frameworks exist, they are fragmented and sector-specific rather than grounded in a systems-based approach, and the gap between policy ambition and environmental reality continues to widen (Planetary Boundaries Science, 2025).

Shipping regulation is particularly limited in scope. Climate policy for the sector remains almost exclusively focused on CO<sub>2</sub> equivalents (CO<sub>2</sub>e), while the **indirect N<sub>2</sub>O emissions** generated when nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>) undergo chemical transformation in the environment are not accounted for in the International Maritime Organization (IMO) GHG Studies, nor addressed in proposals under IMO's Net Zero Framework for shipping (Vision Report, 2026). **This blind spot is set to deepen:** the

sector's planned transition to ammonia as a low-carbon fuel – scaled up through Rotterdam and other major ports – will substantially expand ammonia production, transport, and combustion, intensifying reactive nitrogen flows at precisely the moment when biogeochemical flows are identified as one of the most dangerously breached planetary boundaries (Planetary Boundaries Science, 2025). Even small rates of NH<sub>3</sub> slip or indirect N<sub>2</sub>O formation across the ammonia value chain risk cancelling climate benefits while generating cascading nitrogen pollution in coastal and marine ecosystems – pressures that fall entirely outside current regulatory frameworks.

Beyond nitrogen, the most critical regulatory gaps include: land degradation and soil health; ocean acidification, including regional hotspots near ports; aerosol emissions (ultrafine particles, Black Carbon); and novel entities (PFAS, plastic pellets, microplastics, tyre wear particles, flame retardants). **The interaction and cumulative local accumulation of these pressures** in fragile coastal ecosystems and their effects on human health remain largely unmonitored and ungoverned. Closing these gaps requires a fundamental departure from siloed, issue-specific regulation toward integrated, systems-based governance that reflects the full complexity of planetary boundary interdependencies.



Source: Thomas - [stock.adobe.com](https://www.stock.adobe.com), via One Planet Port (OPP) Vision Report (Gilliam et al., 2026).

## Recommendations

### 1. Bring ports and the maritime sector under one coherent governance framework that prioritises planetary health and long-term prosperity.

Ports and shipping are regulated through disconnected instruments and policies at the European and national level. This fragmentation leads to inconsistent monitoring, delayed implementation, weak enforcement, and siloed measures that fail to address the cumulative environmental impacts of ports and port-enabled activities.

**The forthcoming European Ocean Act provides an important opportunity to set up a coherent ocean governance framework** aligned with planetary health, and to fill gaps in current regulations by guiding the revision of the Maritime Spatial Planning Directive (MSPD), Marine Strategy Framework Directive (MSFD) and Alternative Fuels Infrastructure Regulation (AFIR). The recently adopted EU Ports Strategy highlights ports' roles in protecting marine ecosystems but lacks concrete measures to reduce ports' wide-ranging environmental impacts. The Strategy's narrative of port expansion and competitiveness along with the proposed Regulation on speeding-up environmental assessments pose serious risks of environmental harms and deprioritisation of environmental objectives at the port level. Further port expansion is not compatible with

meeting climate targets and staying within safe planetary boundaries conditions. The European Ocean Act can bring together all regulations addressing marine protection and regenerative nature based solution, spatial planning, the maritime sector and ports under a science-based framework for ocean governance, integrating:

- MSFD environmental objectives;
- MSPD spatial planning requirements;
- EU ETS, FuelEU Maritime and AFIR;
- Sulphur and Ship-Source Pollution Directives;
- Ports Strategy and Industrial Maritime Strategies; and
- relevant IMO and other international instruments.

The EU Ocean Act's **core goals and indicators of success should focus on improvements in ocean health and coordinated responsibility** of maritime stakeholders, not on increased efficiency and simplification of ocean governance. National, city and port decisionmakers also have a key responsibility in ensuring that the different EU regulations are translated into coherent policies and actions addressing ports' environmental impact, as further discussed below.



Source: Kruwt - [stock.adobe.com](https://www.stock.adobe.com), via One Planet Port (OPP) Vision Report (Gilliam et al., 2026).

## 2. Document, regulate, and actively reduce the comprehensive environmental footprints of ports and port-enabled activities.

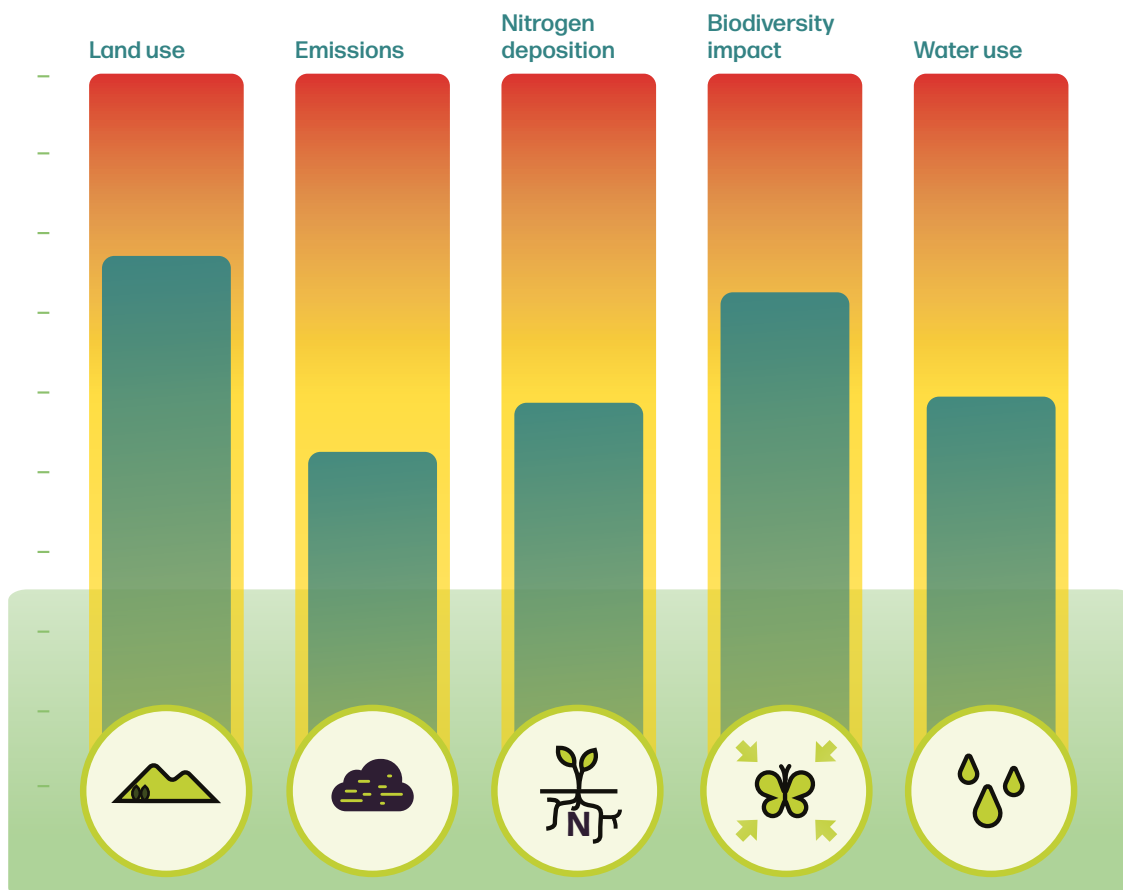
There is currently no European environmental accounting and monitoring system that comprehensively addresses ports’ systemic environmental impacts. Variations in accounting methodologies and coverage prevents comparative assessments of ports’ impact and the enactment of policies and interventions aligned with the latest data and Earth system science knowledge. There is an urgent need for the EU to implement **mandatory, harmonised monitoring of throughput-impacts** throughout ports’ value chains, including those of tenant companies. The European Ocean Act could reinforce the EU Ports Strategy with practical measures requiring port governing bodies to review their land-use agreements, phase out high-emissions and high-throughput impact activities, and implement rewards for tenants investing in activities with low environmental impacts; as reinforced in Recommendations 4 and Recommendation 5.

At the port level, port governing bodies should take **measures to monitor and reduce material and energy flows** contributing to environmental harm and phasing out the most harmful flows, including coal, LNG, oil, plastics and chemicals based on fossil feedstocks. Concretely, ports can:

- publish a **port-wide Energy-Material Flow Account** and commit to annual updates;
- adopt **sufficiency-based access criteria** that grant port access (use of space, infrastructure and logistics) to companies and economic activities that meet societal needs and align with planetary boundaries, without excess or unnecessary throughput.
- adopt an **environmental capacity budget** for port areas, with integrated limits on land use, emissions, nitrogen deposition, biodiversity impact and water use (fig.5).

Such measures would help ensure that port operations and the development of new activities stay within scientifically defined safe operating spaces.

Figure 5. Set and enforce a Fixed Environmental Capacity Budget for port areas



Source. OPP Vision Report (Gilliam et al., 2026), CC BY 4.0.

### 3. Improve ports' local footprints on ecosystems and urban communities through integrated land- and maritime spatial planning

Major ports such as Rotterdam and Antwerp are generally driven by dominant logics of expansion and economic competitiveness that create a **disconnect with local communities and ecosystems** (Jansen, 2025). The Port of Rotterdam used approximately 2,455 hectares of the Voordelta Natura 2000 area, equivalent to three Rotterdam city centres, to build the new port and industrial area known as Maasvlakte 2 (Rijkswaterstaat, 2014). Port expansion has caused the loss of areas of natural and cultural significance (Cardoso, 2025), while shipping and industrial activities enabled by ports affect air and water quality, and in turn human health. For example, nitrogen pollution poses increased risks of respiratory diseases, cardiovascular problems, and premature death (Tokaya et al., 2024).

New port spatial developments and energy infrastructure projects risk aggravating ecological harm in already fragile coastal and port environments where multiple anthropogenic stressors concentrate (e.g., nutrient pollution from port runoff and ballast water discharge, heavy metal contamination from antifouling paints and industrial operations, and thermal pollution from cooling water discharge). Therefore, preserving healthy communities and ecosystems in densely populated coastal

areas requires **spatialised environmental assessments** that measure the cumulative and synergistic effects of port-enabled activities across marine and land ecosystems. Permit-granting for port expanded land use and infrastructure development should be subject to robust ex-ante environmental and social impact assessments integrating health, biodiversity, land use change, cultural practices and social acceptance.

**Better alignment between the European Ocean Act, the MSPD and the MSFD** would ensure that marine areas and land-sea interactions are mapped and reflected in ex-ante environmental assessments, while enabling policymakers to set limits to port expansion. Major ports such as Rotterdam, Antwerp and Hamburg should adopt a strict **“no new virgin land capacity” approach**, i.e., phasing out or scaling down the most environmentally harmful activities within port areas to free up physical and environmental capacity for strategic new uses (see Recommendation 5), through targeted phase-out plans, redevelopment corridors, and conditional leasing. Additionally, spatial plans should prioritise conservation of existing biodiversity over restoration, ensuring habitat connectivity and supporting the interdependent systems that healthy ecosystems rely on. Multi-use spatial solutions that deliver ecological and economic co-benefits, as well as vertical storage systems and multi-storey logistics facilities can support port operations and cargo handling capacity without new spatial expansion into nature areas.

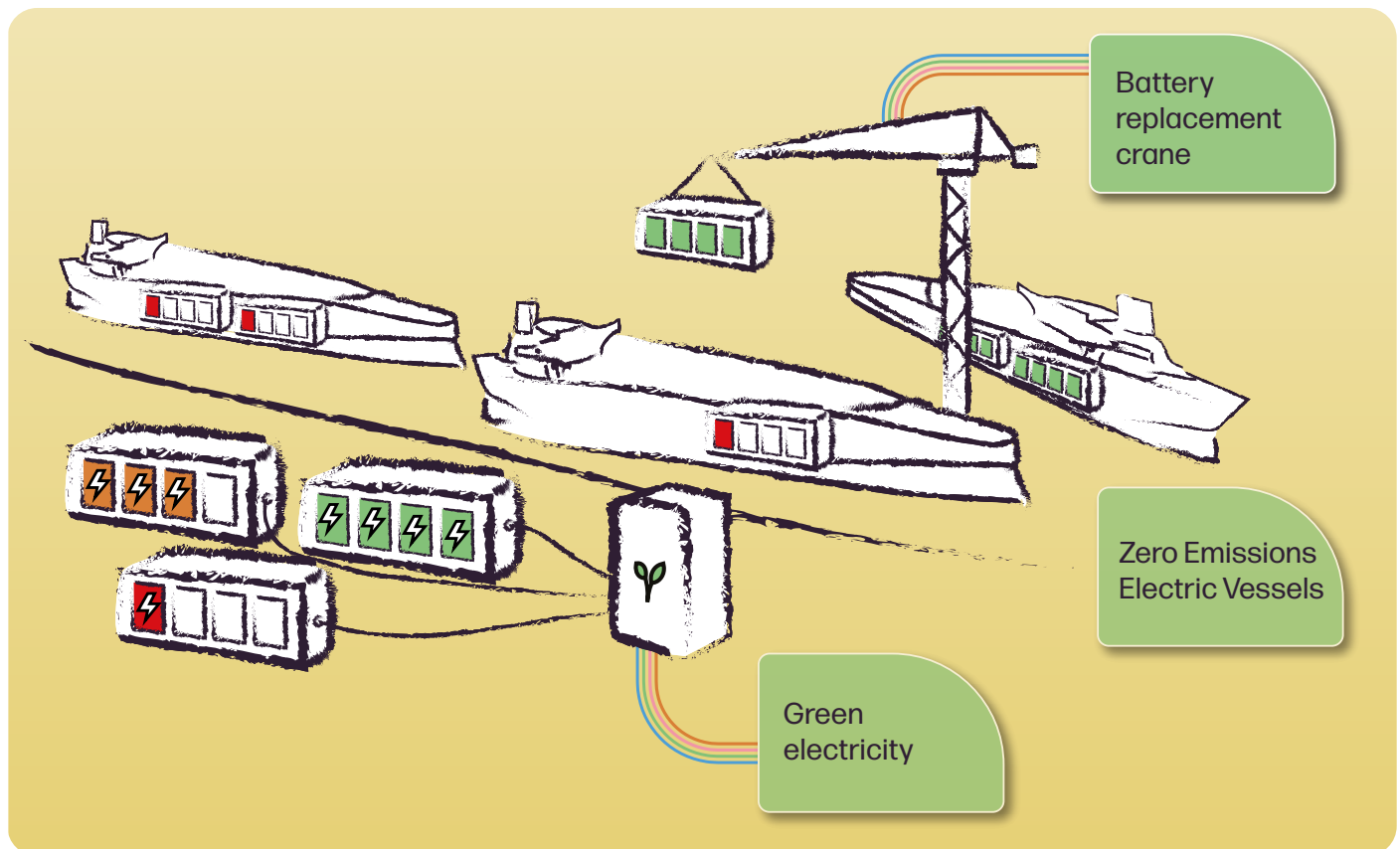
### 4. Bolster the implementation of greenhouse gas emissions reduction measures aligned with planetary boundaries

Reducing greenhouse gas emissions across port operations, port industries, port-facilitated value chains, and the maritime sector is a priority for the health of humans, the ocean and the planet. Greenhouse gas emissions are drivers of climate change and ocean acidification, with far-reaching harmful effects on extreme weather events, disrupted food production, declining water resources and biodiversity. Methane and nitrous oxide specifically are pushing the climate system further beyond safe limits (World Meteorological Organization, 2025).

The European Ocean Act should accelerate the reduction of greenhouse gas emissions via maritime

transport through **Green Shipping Corridors, alternative maritime fuels, energy infrastructure, shore-side electricity and clean technologies**, with ports playing a central enabling role (see fig.6). Policymakers should combine investments and flagship projects with clear enforcement mechanisms and additional energy saving measures to meet GHG reduction targets in maritime shipping. **Wind-assisted propulsion** such as rotor sails and wing sails can significantly cut fuel consumption while reducing shipping impacts on marine ecosystems and should be clearly incentivised by EU and national policymakers. Port governing bodies should adopt financial incentives, such as port fees or discounts, to reward ships using low-impact fuels, wind propulsion, shore-side electricity for charging batteries, and practicing slow steaming.

Figure 6. Support ship hybridisation and battery solutions



Source. OPP Vision Report (Gilliam et al., 2026). CC BY 4.0.

Policy makers at the EU (Ocean Act and revised AFIR regulation) and national levels should also embed a **clear definition of sustainable maritime fuels backed by mandatory lifecycle assessments (LCAs) of fuels**, accounting for production methods, supply chain emissions, land-use change impacts for biofuels, and operational issues. Lifecycle assessments (LCAs) should explicitly include methane slip, potential ammonia (NH<sub>3</sub>) slip from ammonia-fuelled vessels, nitrous oxide (N<sub>2</sub>O) emissions from combustion of alternative fuels and indirect N<sub>2</sub>O emissions from nitrogen oxides (NO<sub>x</sub>) and NH<sub>3</sub> transformed in the environment. This approach would ensure that new fuels deliver real, net environmental benefits rather than hidden trade-offs.

**Tenant companies** operating in ports are responsible for a large proportion of GHG emissions. In Rotterdam, around 20 Mton of emissions stem from the wider port ecosystem as opposed to 3.2 kton of emissions from direct port operations (Port of Rotterdam Authority, 2024; Port of Rotterdam Authority, 2025a). From 2025, the Port Authority requires new clients to operate carbon-neutrally from the outset (although exceptions may apply according to the 2025 Annual Report), while existing tenants must

enter sustainability agreements at contract review points. From 2024, companies and vessel owners investing in sustainability measures receive discounts on rental and leasehold contracts (2.5% and an additional 1% for reaching net-zero operations) and port dues (skippers who share their emissions data receive a 5% discount on inland port dues), with large emitters required to submit verified reduction plans (Port of Rotterdam Authority, 2024; Port of Rotterdam Authority, 2025a). Additionally, the Port Authority introduced the CarbonBid financial instrument in 2025 which supported eight projects (mobile shore power, electric reach stackers and battery powered inland vessels, etc.) to stimulate emissions reductions (Port of Rotterdam Authority, 2025a). This example shows how Port Authorities can both incentivise and begin to hold tenant companies accountable for reducing their climate and wider environmental impacts. As highlighted in Recommendation 1, policy makers at the EU and national levels should accelerate the adoption of such contractual port practices by requiring Port Authorities to review land-use agreements, require tenant companies to phase out high-emissions activities, and reward tenants with low environmental impact.

## 5. Turn ports into vectors of just transitions, durable jobs and an economy that regenerates Earth’s subsystems through reskilling, new economic clusters and nature-based solutions

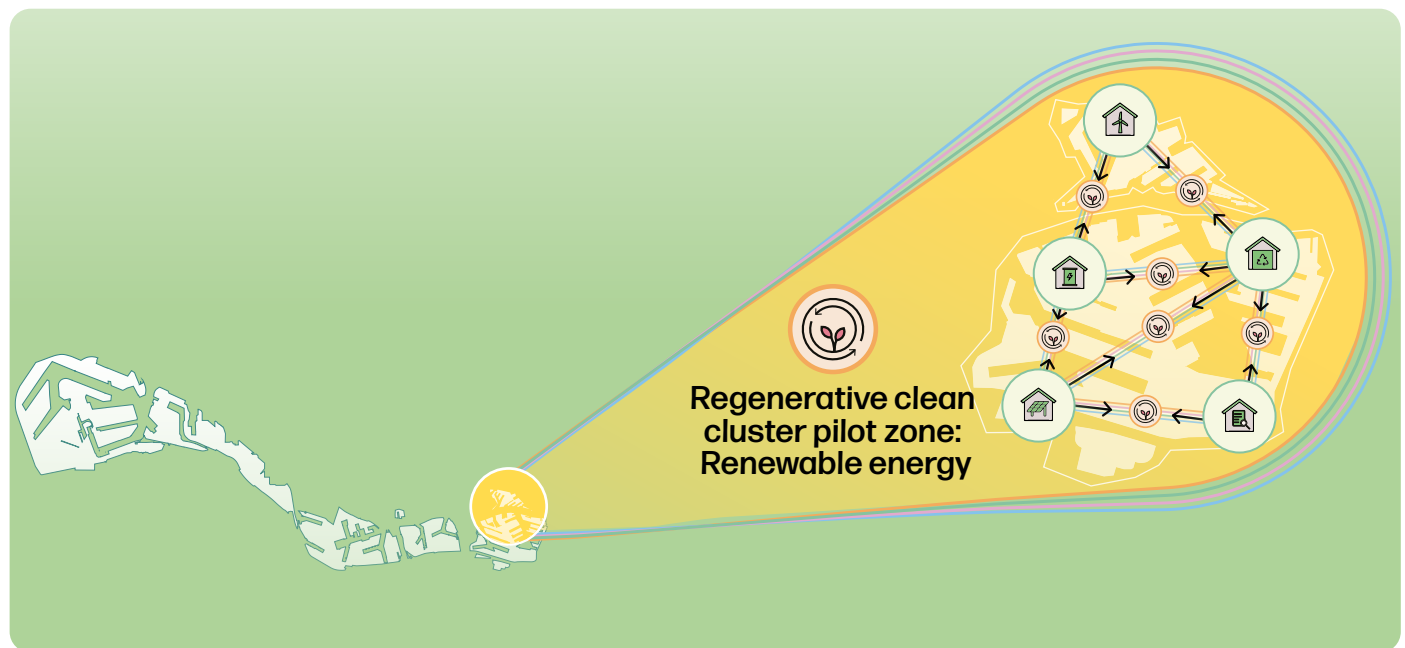
Ports currently facilitate extractive economic activities and technological innovations, particularly oil refineries, the production of plastic nurdles and PFAS, liquified natural gas (LNG), and the utilisation of carbon capture and storage (CCS). A stark illustration is the ExxonMobil carbonate fuel cell CCS pilot under construction at Rotterdam’s Botlek site: despite receiving a €30.5 million EU public subsidy, it targets the capture of approximately 9,200 to 12,400 tonnes of CO<sub>2</sub> per year (European Commission, 2025) - a negligible fraction of the Port of Rotterdam’s total annual emissions of around 20 million tonnes CO<sub>2</sub>e. This reflects a broader pattern in which policy and investment remain narrowly focused on marginal CO<sub>2</sub> reductions, while the wider system of impacts associated with port activities (including value chain impacts, nitrogen pollution, novel entities, and biodiversity degradation) remains largely outside the scope of governance frameworks.

Such activities and technological approaches drive environmental harm and pose risks across the different

planetary boundaries. Ports should shift to circular and regenerative economic activities that create durable jobs, attractive to young generations, and that simultaneously restore and improve ecosystems. As explained in Recommendation 1 and Recommendation 4, this requires ports to reassess their land-use agreements and increasingly make space for companies that prioritise just, sustainable, societal prosperity.

Port Authorities can initiate this transformation by **designating and prioritising areas for circular and regenerative industry clusters** (fig. 7), which could begin as a pilot zone and scale out as benefits accrue. Such clusters can reduce reliance on primary resources (using fewer raw virgin materials) and lower land and emissions pressures. Ports can encourage industrial symbiosis by linking waste and resource flows between firms and promote on-site recycling and remanufacturing (prioritising nutrient recovery, metals, and bio-based materials over fossil-derived plastics, where prevention and substitution must take precedence over end-of-pipe recycling) to further reduce transport-related land impacts. They can also provide spatial and policy support to steward-owned and sufficiency-oriented enterprises that integrate ecological limits, societal well-being, and clean port job creation at their core.

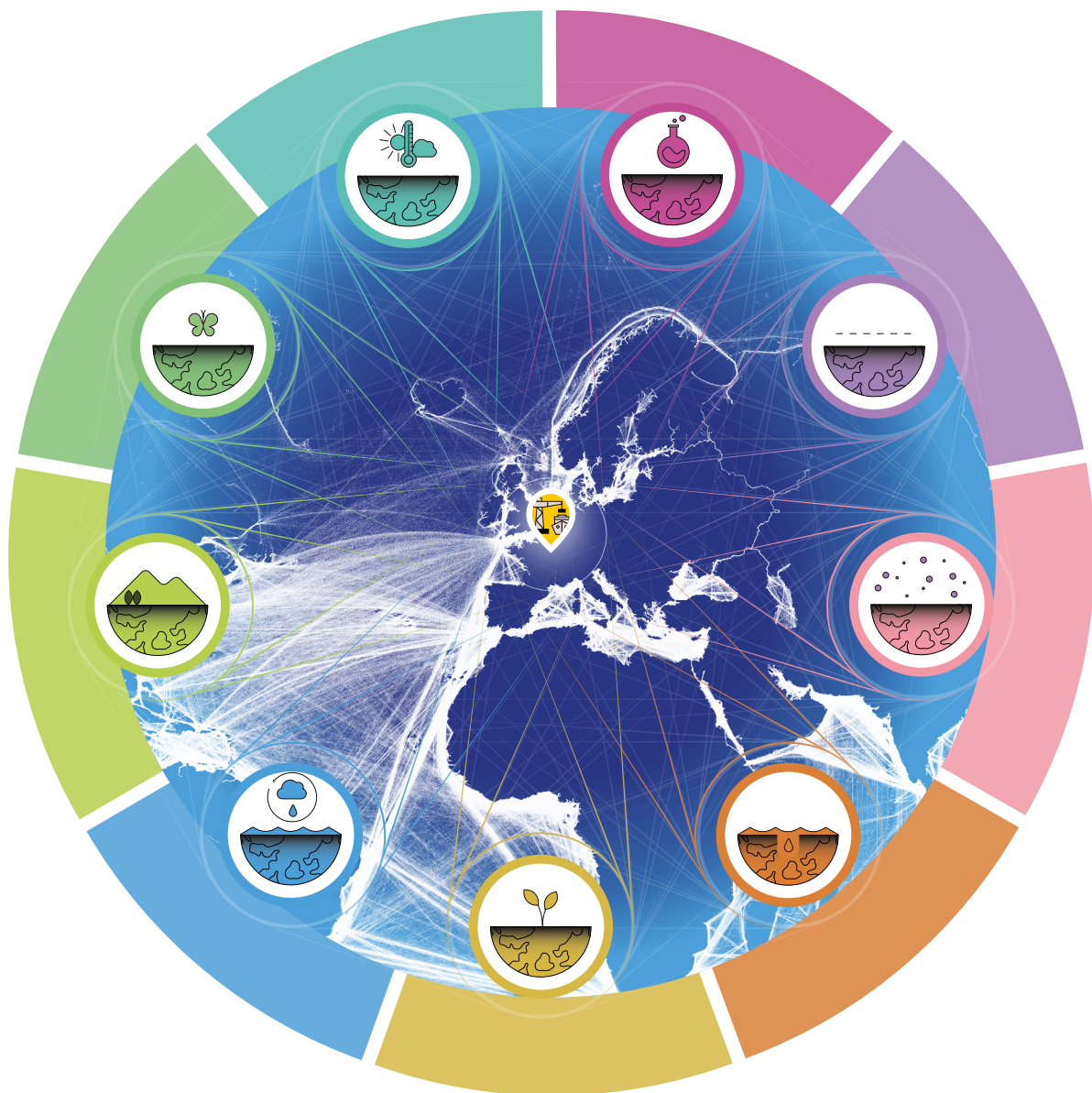
Figure 7. Promote Regenerative Economy Clusters



Source. OPP Vision Report (Gilliam et al., 2026). CC BY 4.0.

Port Authorities can coordinate their development as multi-functional zones that integrate logistics, energy transition infrastructure, and **nature-based solutions** which reintroduce healthy habitats, especially for declining species that play important ecosystem functions. Nature-based solutions can enhance land and water management in port areas, for instance via green buffers, living shorelines, and vegetated logistics zones that enhance biodiversity and climate resilience. In upstream catchment areas, agroforestry and wetland restoration can reduce sedimentation, nutrient runoff and flood risk affecting port operations.

Circular and regenerative clusters can provide fertile ground for research and innovation, to develop business models that create durable jobs and shared prosperity. These hubs can support talented innovators with long-term contracts and infrastructure, building the foundational societal and social tissue and infrastructure to move from experimentation to implementation at scale (Klitsie, 2021). As sustainable economic activities expand, ports should establish a **Port Workforce Transition Fund** that supports reskilling and secure livelihoods for workers shifting into electrification, efficiency retrofits, nature-restoration efforts, and circular processing, in partnership with unions, educational institutions, and industry.

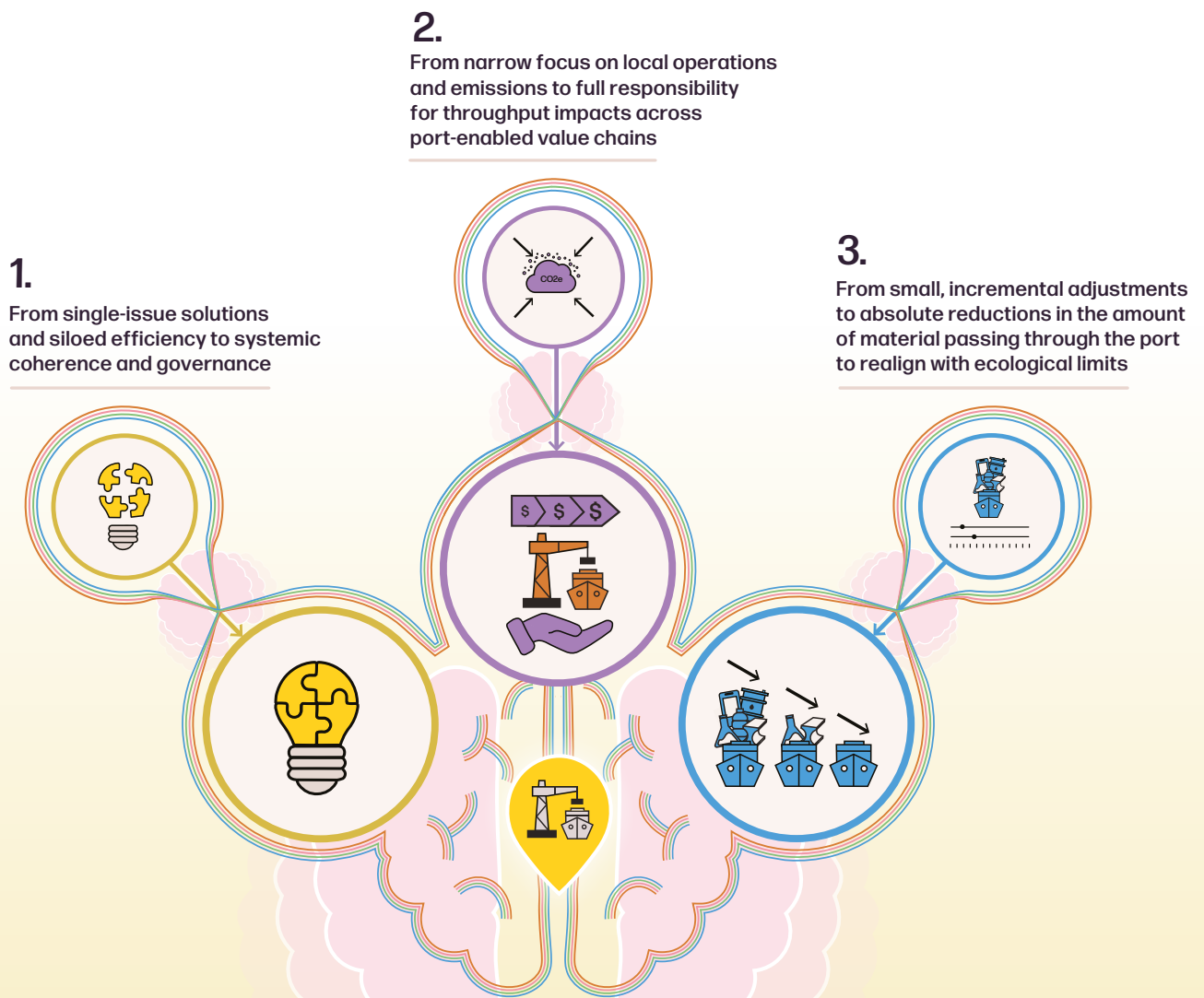


# The way forward: three mindset shifts for port transformation

The five recommendations above present concrete actions that port decisionmakers and policymakers at the EU and Dutch levels can take. The way these recommendations are turned into decisions and actions matters greatly. They cannot be seen in isolation, but rather as part of a **systematic reevaluation of the role and impact of ports within local, regional and global systems**. The transformation of ports to thrive within planetary boundaries in Europe and Rotterdam needs to

be rooted in community participation, social justice, public transparency, adaptive planning and systemic thinking. Changes in mindsets are needed to embrace these new ideas, processes and ways of interacting between ports, society and ecosystems. This report concludes with three mindset shifts, as an invitation for port governing bodies, policymakers, city planners, communities, researchers and One Planet Port Ambassadors to come together to discuss how we can make the necessary changes together.

## Three mindset shifts for port transformation:



These changes are not “nice-to-haves” when times are good. They are vital for ports’ strategic self-interest and the health of our planet.

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