Understanding and Measuring International Spillovers

Final background paper prepared at the request of Ministry of Foreign Affairs of the Netherlands for the spillover workshop on 12 June 2025, in Amsterdam, Netherlands and revised based on the outcome of the workshop

25 September 2025

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Understanding and measuring international spillovers: Summary

In a highly interconnected world, countries' actions towards sustainable development may positively or negatively influence other countries' ability to achieve the Sustainable Development Goals (SDGs). Therefore, it is important to consider the impacts that domestic policies may have beyond national borders, to avoid negative environmental, social, and economic externalities, known as spillovers, and ensure policy coherence underlined under SDG17 (Partnerships for the Goals). More than half of the 169 SDG targets have a transboundary component (Ino et al., 2021). Measuring and understanding international spillovers is therefore essential for the design of effective sustainable development strategies that do not undermine other countries' ability to achieve the SDGs.

Several frameworks, research methods, and databases have been developed before and after the adoption of the SDGs in 2015 to measure and curb negative spillovers. This background paper aims to present different approaches and methodologies used to measure international spillovers. It was developed to initiate and inform discussions on the possibility of developing an integrated framework for measuring international spillovers in the Netherlands that took place on 12 June 2025, in Amsterdam, and was later updated based on the outcome of this workshop.

The paper does not claim to provide a comprehensive overview of all the existing methods. It focuses on the methods and tools developed by the UN Sustainable Development Solutions Network (SDSN), Dutch organizations (Statistics Netherlands (CBS)/PBL Netherlands Environmental Assessment Agency), and the Organisation for Economic Co-operation and Development (OECD). Led by the SDSN, the paper builds on various rounds of comments and suggestions received from the SDSN, OECD, CBS and PBL.

While the document describes and discusses overarching frameworks for tracking various forms of international spillovers (financial, trade-related, security-related, and others), it focuses more specifically on tools, methods, and databases used to measure and curb trade-related spillover effects (which can be considered as one important category of international spillover). This is particularly relevant in the Dutch context, considering that the Netherlands steadily maintains its position in the top ten countries of the different trade flows (measured as a share of total goods imports and exports expressed on a per capita basis). In 2022, the Netherlands ranked sixth in the world both in terms of global goods exports and imports. While the country heavily relies on imports of goods, more than half of the goods imports were destined for re-exports in 2022, because the country serves as a major hub in global trade. Overall, according to Statistics Netherlands, in 2020, the global land use footprint of Dutch imports was about thirteen times the surface area of the Netherlands. Even excluding reexports, the land use footprint was still nearly four times the surface area of the Netherlands. The material footprint and the greenhouse gas footprint of Dutch imports amounted to 1,687 billion kilograms and 505 billion kilograms of CO_2 equivalents, respectively (CBS, 2024).

The document also outlines persisting challenges associated with measuring and curbing international spillovers. These include a lack of up-to-date, consistent data; sensitivity of the results to databases

used; complex normative issues, such as responsibility, attribution, national interest versus global common goods. Enhancing data quality, timeliness, statistical robustness, global country coverage, and relevance is key to facilitating broader international comparisons beyond the European Union. However, it is important to acknowledge that the data will never be perfect. The lack of complete data should not serve as a justification for delaying governmental efforts to clean up supply chains. In the Dutch context, sufficiently accurate data exists that can enhance the quantitative and qualitative assessment of spillovers in high-impact areas and provide an evidence base for policies aimed at reducing negative effects.

Considerable work has been undertaken in the Netherlands to assess various spillover effects via the Monitor of Well-Being (Brede Welvaart) 'elsewhere' framework. However, the Dutch authorities should also consider expanding the existing national framework for spillover assessment and integrating additional indicators, building on the frameworks and tools presented in this document.

The importance of measuring specific spillover indicators, particularly those related to social impacts, plastic and electronic waste, chemical pollution, and the mining sector, has been emphasized. Furthermore, the SDSN International Spillover Index also indicates several indicators that deserve significant attention in the Netherlands, as its performance on these indicators is below the OECD average. These include greenhouse gas emissions, air pollution from nitrogen embodied in imports, fatal work-related accidents associated with imported goods, imported deforestation, water scarcity, exports of hazardous pesticides and plastic waste, along with corporate tax havens, financial secrecy, and shifted profits of multinationals. Understanding the root causes of these negative impacts and identifying effective policies and solutions will be crucial to improving the country's performance.

When choosing indicators, it is essential to reflect on their intended purpose, the objectives they can help achieve, and the policy changes they may drive. Therefore, this process for developing a coherent integrated framework for spillover assessment will require stronger coordination on priority-setting across relevant departments and national programmes, as well as engagement with key stakeholders, including the scientific community, the private sector, and civil society.

Furthermore, the integration of transboundary considerations into domestic policymaking and budgetary decisions is not systematically done in the country. It is proposed to identify thematic highimpact areas relevant to the Dutch context that require immediate attention and explore policy options that can mitigate negative impacts abroad while reinforcing positive ones. The selection of high-impact areas needs to be a consultative process, engaging relevant stakeholders, including policymakers, academia, the private sector, and civil society. A forward-looking approach to spillover effects is also needed in order to establish national goals and design policies aimed at reducing the negative impacts. Policy- and solution-oriented indicators are also necessary to evaluate the government's efforts to address these issues.

Based on the findings of this document and the outcomes of the spillover workshop, we underline the following possible avenues for future spillover work in the Dutch and global contexts:

1. **Analyze in detail Dutch spillover performance and the evolution of the policy landscape, and come up with recommendations to expand the existing national spillover monitoring framework.** This report and series of roundtables would aim to answer the following questions: (1) How much and what kind of spillover impacts are being generated by the Netherlands? (2) How much progress has been made to curb these spillover effects, including the evolution of the policy landscape? (3) How can spillover effects be better incorporated in planning and monitoring frameworks? The latter question would aim to explore notably how

the existing Dutch framework for monitoring international spillovers can be improved and expanded. This analysis could be incorporated into the Dutch Voluntary Reviews.

2. **Conduct a series of policy briefs focusing on the spillover impacts and policies of specific industries (*e.g.,* minerals, food, textile) or commodities (*e.g.,* coffee, cocoa, soy), particularly relevant in the Dutch context.** These policy briefs would combine quantitative analysis at the industry and/or commodity level, but also qualitative and policy analysis of existing legal and policy frameworks and persisting gaps. It would also focus on solutions and pathways to strengthen the governance of specific supply chains.

3. **Conduct global empirical work on international spillover data and come up with recommendations for the post-2030 Agenda and the indicator framework**. Building on the success of the Global Commons Stewardship Index (2021-2024), the Dutch government and SDSN – working closely with Yale and Tokyo University – could join forces to support the preparation of the next generation of reports and databases to track systematically international spillovers of Nation States on the Global Commons, with specific comparative and quantitative assessments of the Dutch spillovers by industries and commodities, and by combining the insights of MRIO models with GIS technologies. This assessment would also aim to come up with specific recommendations on how to incorporate international spillovers in the post-2030 global framework for sustainable development.

4. **Mobilize the SDSN networks to understand countries' efforts to incorporate spillover effects in sustainable development policies and SDG reporting mechanisms**. The SDSN could mobilize its global network of researchers and practitioners to collect new evidence on the integration of spillover effects in government strategies, policies, and monitoring. This could build on SDSN's experience in collecting primary data, for instance, via "SDSN's Survey of Government Effort for the SDGs", and the "SDSN-OECD-CoR survey on the role of cities and regions for the SDGs in a changing landscape" (2023).

5. **Leverage cutting-edge methods to measure countries' supply chains' vulnerability and exposure to major climate and geopolitical events**. Geopolitical events, unilateral measures, and the increased frequency of natural disasters can significantly impact global supply chains, yet countries might be exposed in different ways to such disruptions. Building on the emerging literature, the SDSN and partners could pioneer a major program of work on countries' vulnerability to disruptions and shocks in international supply chains from increased natural disasters, extreme weather events (heat waves, typhoons, slow onset events, etc.), biodiversity threats, and the changing geopolitical landscape.

Analyzed Approaches for Spillover Assessment: Summary table

Tool	International Spillover Index	Global Commons Stewardship Index	Statistical Monitor of WellBeing (Brede Welvaart)	National consumption and production footprints	Transboundary impacts	Mechanisms in place to enhance policy coherence for sustainable development (SDG 17.14.1)
Lead institution	SDSN	SDSN, University of Tokyo, and Yale University	CBS	PBL and CBS	OECD	OECD (Public Governance) & UNEP
Goal	It measures the positive and negative effects of countries' actions on other countries' ability to achieve the SDGs.	It quantifies the effects of countries' actions on the shared spaces of the Global Commons, including the oceans, ozone layer, atmosphere, and biodiversity.	It measures the impact of the Netherlands on well-being in other countries, in the two following domains: trade and aid, and environment and resources.	It calculates various footprint indicators of both Dutch consumption and production.	It assesses transboundary impacts using a typology of five international flows. Different indicator sets are used for the measurement of each transboundary flow.	It assesses institutional and organisational mechanisms that can support efforts in enhancing policy coherence for sustainable development, including mechanisms for addressing transboundary impacts.
Main dimensions	1.Trade-related environmental and social impacts 2.Financial flows (tax havens, unfair tax competition, ODA, other) 3.Security spillovers (export of major conventional weapons)	1. Production-based environmental impacts 2. Consumption-based environmental impacts 3. Environmental dimensions: Aerosols, GHG emissions, Terrestrial biodiversity, Marine biodiversity, Nutrient cycles, and Water cycles.	Well-being 'elsewhere', which includes: - Trade and aid (Total imports of goods, from Europe, Africa, America, Asia, Oceania, LDCs; Official development assistance; Remittances) - Environment and resources (Land use footprint, Material footprint, GHG footprint)	1. Greenhouse gas footprint 2. Material footprint 3. Land footprint 4. Biodiversity footprint 5. Water footprint	1. Financial flows 2. Movement of people 3. Trade flows 4. Environmental flows 5. Knowledge transfers	1. Political Commitment 2. Long-term Vision 3. The Integration of Sustainable Development into Policy and Finance 4. Whole-of-government Coordination 5. Sub-national Engagement 6. Stakeholder Engagement 7. Impacts Assessment 8. Monitoring, Evaluation, and Reporting
Number of indicators	16	24 in total, with 15 capturing consumption-based impacts	20 for well-being elsewhere, plus 2 on cross-border dependencies	5	The set of indicators can be adjusted based on general relevance, data availability, and country coverage. Several OECD indicators and data sets can be used to support the assessment.	24 individual survey questions
Time horizon	Mainly backward-looking	Mainly backward-looking	Mainly backward-looking	Mainly backwardlooking	Mainly backward-looking	Near real-time and forward-looking evaluation of institutional and organisational mechanisms.
Main denominator	Mainly per capita	Per capita and absolute terms	Mainly per capita	Mainly per capita, and absolute terms	Mainly per capita	Not applicable
Level of analysis	International	International	National	National	International	National

Country coverage (as of June 2025)	167	193	1	1	Datasets include 80 economies	26
Website	https://sdgtransformationcenter.org/spillovers	https://gcsi.unsdsn.org/	https://www.cbs.nl/engb/dossier/well-being-and-thesustainable-development-goals	https://www.pbl.nl/en	https://www.oecd.org/en/publications/understanding-the-spillovers-and-transboundaryimpacts-of-public-policies_862c0db7-en.html https://www.oecd.org/en/data/datasets/intercountry-input-output-tables.html https://www.oecd.org/en/data/datasets/greenhouse-gas-footprint-indicators.html https://www.oecd.org/en/topics/subissues/trade-in-value-added.html https://www.oecd.org/en/data/datasets/tradein-employment.html https://www.oecd.org/en/topics/subissues/foreign-direct-investment-qualities-andimpact.html	https://www.oecd.org/en/topics/policycoherence-for-sustainabledevelopment.html

Introduction

In today's interconnected world, countries' actions can affect other countries' ability to achieve the Sustainable Development Goals (SDGs) by exporting negative or positive environmental, social, and economic externalities as "spillovers" to other countries. Therefore, it is important to consider the impacts that domestic policies may have beyond national borders, to avoid negative environmental, social, and economic externalities, known as spillovers, and ensure policy coherence underlined under SDG17 (Partnerships for the Goals). More than half of the 169 SDG targets have a transboundary component (Ino et al., 2021). Measuring and understanding international spillovers is therefore essential for the design of effective sustainable development strategies that do not undermine other countries' ability to achieve the SDGs.

Several frameworks, research methods, and databases have been developed to measure and curb negative spillovers. Their inclusion in SDG monitoring frameworks does impact the overall assessment of SDG performance and progress at the country level (Lafortune et al., 2020). At the European level, international spillovers were incorporated in larger aggregates that aim to track countries' efforts on sustainable development. There are also ongoing efforts to incorporate some of these databases into long-term modelling pathways and scenarios, for example, to evaluate the effects of various policies related to sustainable land use and food systems (FABLE, 2025). Some of these methods and databases were used to assess countries' vulnerability to disruptions and shocks in international supply chains, including climate-related disasters, sudden policy changes, and geopolitical risks (Koks, 2016; Koks et al., 2016; Koks et al., 2019).

This background paper was developed at the request of the Ministry of Foreign Affairs of the Netherlands to initiate a discussion with relevant national organizations on how the existing Dutch framework for monitoring international spillovers, the Monitor Well-being 'elsewhere', can be improved and/or expanded, building on the existing approaches and methodologies.

The paper focuses on the methods and tools developed by the UN Sustainable Development Solutions Network (SDSN), Dutch organizations (Statistics Netherlands (CBS)/PBL Netherlands Environmental Assessment Agency), and the Organisation for Economic Co-operation and Development (OECD). It does not claim to provide a comprehensive overview of all the existing methods for spillover assessment. Other organizations have also developed important approaches to measure and curb negative spillovers at the global, country or corporate level. These include (among others) the European Commission (via Eurostat or the Joint Research Centre (JRC), the Villars Institute, the European Climate Foundation, or SYSTEMIQ.

Led by SDSN, the paper builds on various rounds of comments and suggestions received from SDSN, OECD, CBS and PBL, and integrates key messages of the workshop, which took place on 12 June 2025, in Amsterdam.

While the document describes overarching frameworks for tracking various forms of international spillovers (financial, trade-related, security-related, and others), it focuses more specifically on tools, methods, and databases used to measure and curb trade-related spillover effects. This is particularly relevant in the Dutch context, considering that the Netherlands steadily maintains its position in the top ten countries of the different trade flows.

The document also highlights challenges in measuring and addressing international spillovers and suggests potential avenues for future work on spillovers in both Dutch and global contexts, for consideration by the Netherlands Ministry of Foreign Affairs.

Part 1. Key Concepts and Definitions

1.1 Definition and categories of international spillovers

For this document, we retain the definition proposed by Shmidt-Traub et al (2019), which considers that: "*International spillover effects are said to occur when one country's actions generate benefits or impose costs on another country that are not reflected in market prices and therefore are not "internalized" by the actions of consumers and producers"*. The benefits or costs may be referred to as positive or negative externalities. Therefore, spillovers can be either positive or negative.

Schmidt-Traub et al., 2019 identify the following categories of international spillovers:

- *Environmental spillovers* relate to the use of natural resources and pollution, including deforestation and biodiversity loss, water stress, greenhouse gas (GHG) emissions;
- *Socio-economic spillovers* include the application of international labor standards, particularly across international supply chains, the exploitation of workers in developing countries, child labor and forced labor, including modern forms of slavery, occupational hazards;
- *Spillovers related to finance and governance* include international development finance, unfair tax competition, banking secrecy, profit shifting, and money laundering;
- *Security spillovers* include negative externalities, such as the trade in arms, particularly small arms, and organized international crime.

The OECD identifies two additional categories: *spillovers related to movement of people*, including migration, human trafficking, brain drain/gain, victims of forced labour, refugees, tourism; and *spillovers related to knowledge transfer*, including flows of scientific knowledge, cross-border data transfer, data protection legislation (Ino et al., 2021).

1.2 Main methods for measuring trade-related international spillovers

Through imports and the international trade system countries can foster development, support income and employment in other countries, but also contribute to deforestation, water scarcity, and climate change. Trade-related spillover effects can be calculated in different ways. The two main accounting approaches include:

- Production-Based Accounting (PBA) approach, which quantifies all effects caused within a country's borders that a government can address with local supply-side strategies (Peters, 2008).
- Consumption-Based Accounting (CBA) approach, which quantifies the externalities that each country's consumption generates beyond its borders. CBA measures all effects related to a country's consumers, whether domestic or international. It can also identify appropriate demand-side interventions, particularly in consumption patterns.

Prominent methods use consumption-based accounts, thereby focusing on international environmental, social, and economic impacts that are driven by imports and domestic consumption.

Different methods for assessing international trade-related spillovers can be grouped into three broad categories:

1. Multi-Regional Input-Output (MRIO): MRIO analyses combine internationally harmonized input-output tables and trade statistics for sectors or groups of products and services. MRIOs quantify trade-related spillovers related to environmental, socio-economic, security, and governance/finance spillovers. This top-down method offers comprehensive global coverage of the full supply chain. In turn, it operates at high levels of aggregation. It generally measures

average impacts and cannot distinguish between context-specific technologies, efficiencies, and intensities of resource use and pollution. As a result, MRIO methods are best suited for assessing aggregate spillover effects at the sector level or for product groups. Results can be presented for each country. A major advantage is the relative ease with which analyses can be conducted and represented for different countries once the MRIO tables have been set up. Country coverage is limited, however, by the scope of available MRIO databases. Commonly used databases to conduct MRIO analyses include Gloria, Exiobase, GTap, Eora, and FIGARO.

2. Life Cycle Assessment (LCA): LCA uses a bottom-up approach to assess the environmental impact of individual products and their production processes across geographic and temporal scales. LCA is also increasingly being applied to socio-economic impacts. The principal advantage of this method lies in the high product resolution and the ability to consider different production technologies. However, the analytical scope of the LCA method is limited by the system boundary or cut-off, the so-called "truncation problem" (Reap et al., 2008), which needs to be defined for any product. As a result, LCA cannot be as comprehensive as MRIO. They also require vast volumes of data, which may be unavailable, particularly where information is commercially sensitive. Owing to these constraints, LCA is less suitable than MRIO to quantify SDG spillover effects at the national level.

3. Material-Flow Analyses (MFA): MFA allows tracking specific material flows along supply chains and across countries. This tracking can be done at high spatial resolution, but primarily for raw or less processed commodities. To some extent, this limitation can be overcome by including conversion factors (*e.g.,* from feed to livestock products). As for the MRIO and LCA methods, there have been more applications of the MFA methodology to environmental impacts than to socio-economic impacts so far. Like LCA, MFA also suffers from the truncation problem, so it cannot be as globally comprehensive as MRIO, and it is hard to estimate country-level impacts (Schmidt-Traub et al., 2019).

Hybrid approaches are often applied to combine the advantages and to overcome the constraints of the different methods.

However, measuring spillover effects is a challenging task; national statistical offices are not always mandated to measure or report on international spillovers. Data on cross-border spillover effects tends to be sparse and incomplete, particularly in middle- and low-income countries. The increasing length and complexity of supply chains, inconsistent international databases, political sensitivities, and difficulties of clearly assigning responsibility for negative externalities to individual countries along the complex supply chain complicate efforts to assess trade-related spillovers (Schmidt-Traub, 2019). Another challenge is the lack of resources or incentives for research groups to develop new, or improve existing, methods for spillover analyses, and to continue updating data sets and producing continued time series over many years. Many scientific assessments are one-off analyses that seek to demonstrate a new methodology, so continuous time series data is not systematically available. Another challenge is the collection of large volumes of high-resolution data, some of which are considered commercially sensitive by the companies that own the data.

The rest of the paper focuses on the work undertaken by SDSN (and partners), CBS, PBL, and OECD.

Part 2. Comparison of frameworks, methods and tools

2.1 SDSN (and partners) approach to measuring international spillovers

The SDSN has been analyzing and quantifying international spillover effects in the context of the SDGs for many years. Building on the 2017 SDG Index (Sachs et al., 2017), and on a conceptual policy brief (Schmidt-Traub et al., 2019), the SDSN developed an International Spillover Index that measures environmental, social, security, and financial spillovers, notably embodied in imports and exports. Spillovers and trade-related effects are also incorporated in many other SDSN initiatives including the Global Commons Stewardship Index, SDSN's work on policy pathways (including FABLE modeling work to promote long-term, integrated and sustainable agri-food systems) but also in SDSN's survey of government efforts and commitments for the SDGs (qualitative work). Throughout the years SDSN organized numerous events, workshops and discussions on metrics and policies to curb and address international spillovers notably with the German government.

SDSN assessed international spillovers for specific supply chains (textile, food, minerals) for the EU, which include information about Dutch performance. It also organized high-level technical and policy workshops and events to curb spillover effects, including at the UN High-Level Political Forum. This work led to partnerships with Eurostat on spillover metrics (Eurostat, 2021) and with the University of Tokyo and Yale Center for Environmental Law & Policy around the Global Commons Stewardship Index (Ishii et al., 2024). The SDSN work on spillovers was notably featured in the 2022 SDG resolution adopted by the European Parliament (European Parliament, 2022/2002(INI)), in the OECD/European Commission report on transboundary impacts (OECD/EC-JRC, 2021), in the 2023 Global Sustainable Development Report (GSDR, 2023), and is used extensively by national governments notably in the context of Voluntary National Reviews. The SDSN spillover index is also integrated into a new framework for measuring sustainable and inclusive wellbeing developed by the European Commission's Joint Research Center (Benczur, P. et al., 2025).

2.1.1 The International Spillover Index

The International Spillover Index is composed of 16 indicators, including two that are used only in the dashboards for OECD countries. The 14 remaining indicators are used to calculate the International Spillover Index Score. These indicators can be organized into three categories of international spillovers: environmental and social impacts embodied into trade; economy and finance; and UNbased multilateralism, peace, and security. Ten of sixteen indicators are related to trade (see Table 1). A full description of indicators is provided in Annex 1.

Table 1: List of the spillover indicators included in calculating the International Spillover Index

Indicator	SDG relevance
Exports of hazardous pesticides (tonnes per million population)	2
Scarce water consumption embodied in imports (m^3 H_2Oeq/capita)	6
Fatal work-related accidents embodied in imports (per million population)	8
Victims of modern slavery embodied in imports (per 100,000 population)	8
Air pollution associated with imports (DALYs per 1,000 population)	12
Nitrogen emissions associated with imports (kg/capita)	12
Exports of plastic waste (kg/capita)	12

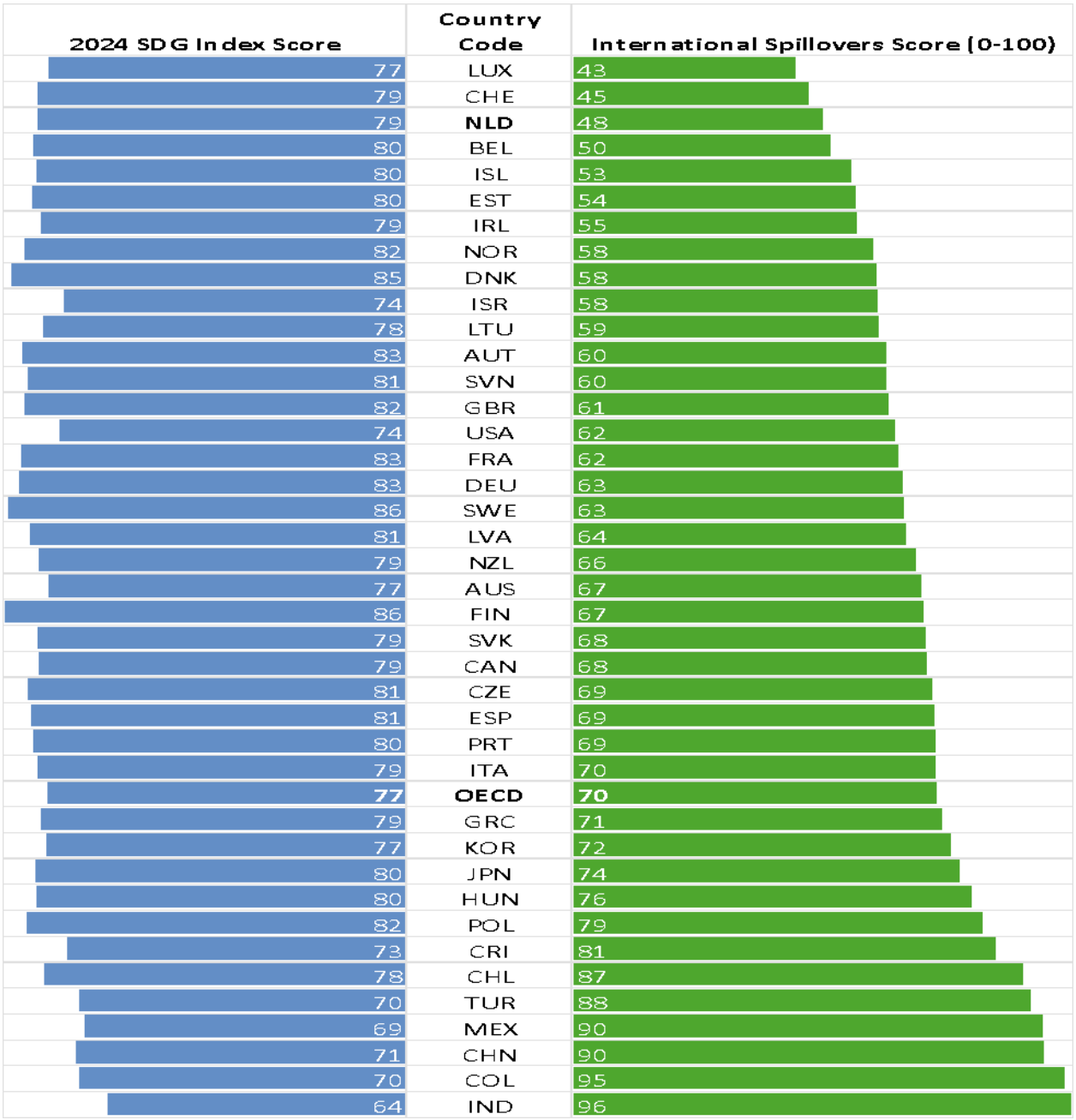
GHG emissions embodied in imports (tCO_2/capita)	13
Marine biodiversity threats embodied in imports (per million population)	14
Imported deforestation (m^2/capita)	15
Exports of major conventional weapons (TIV constant million USD per 100,000 population)	16
For high-income and all OECD DAC countries: International concessional public finance, including official development assistance (% of GNI)	17
Corporate Tax Haven Score (best 0-100 worst)	17
Financial Secrecy Score (best 0-100 worst)	17
Shifted profits of multinationals (US$ billion)	17
Index of countries' support to UN-based multilateralism (worst 0-100 best)	17

On an annual basis, SDSN produces the International Spillover Index as part of the Sustainable Development Report, assessing countries' positive and negative effects on other countries' abilities to achieve the SDGs. The International Spillover Index Score is calculated as the arithmetic average of a country's score on all of the indicators, weighted equally. The score ranges from 0 to 100, where a lower score denotes more negative spillover impacts and a higher score denotes fewer negative spillover impacts. Netherlands' and other countries' rankings can be found at https://dashboards.sdgindex.org/rankings/spillovers.

This background study presents the performance of the Netherlands on a different set of spillover effect indicators, focusing primarily on trade-related spillovers. The analysis focuses on the European region and uses the OECD average value as a benchmark.

It exists a strong link between the SDGs and spillovers. Countries that perform relatively well on the SDGs may have done so by causing negative externalities, such as environmental degradation, in other parts of the world. SDG progress is often positively correlated with increased negative spillovers. In the 2024 edition of SDSN's Sustainable Development Report (Sachs et al., 2024), the Netherlands ranks #24 out of 166 countries on the SDG Index – its score is 79.2, however it ranks #162 out of 166 countries on the International Spillover Index, with a score equal to 47,8 (see Figure 1).

Figure 1: SDG Index Score vs Spillover Score, worst 0-100 best



Annex 2 provides figures with various types of spillovers, focusing on the OECD countries, including the Netherlands, and large economies (China, India) on a per capita basis.

The SDSN International Spillover Index indicates that certain indicators—such as greenhouse gas emissions, air pollution from nitrogen embodied in imports, fatal work-related accidents associated with imported goods, imported deforestation, water scarcity, exports of hazardous pesticides and plastic waste, along with corporate tax havens, financial secrecy, and shifted profits of multinationals —deserve significant attention in the Netherlands, as country's performance on these indicators is notably worse compared to the OECD average.

2.1.2 The Global Commons Stewardship Index

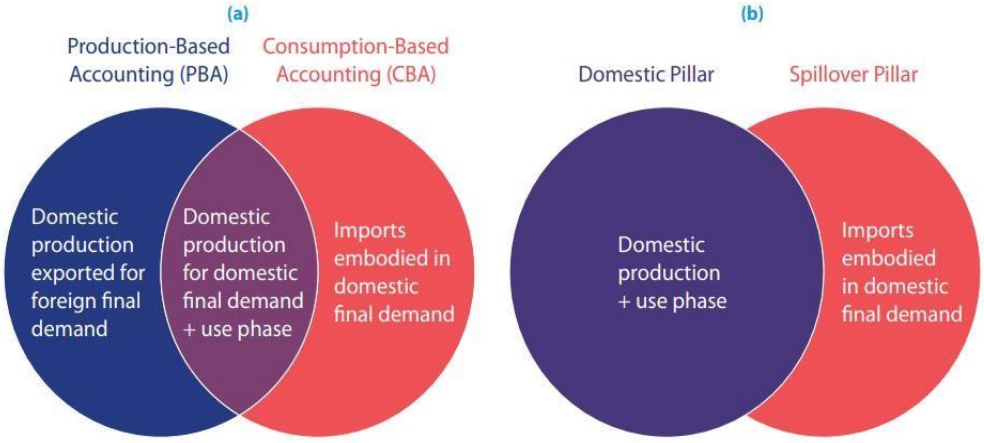
In addition to calculating the International Spillover Index, since 2020, SDSN in partnership with the Center for Global Commons at the University of Tokyo, the Yale Center for Environmental Law & Policy, and SYSTEMIQ has been producing the Global Commons Stewardship Index (GCSI). Published annually, this index assesses how countries affect the Global Commons, including the oceans, ozone layer, and

atmosphere, as well as common resources such as biodiversity, both domestically and internationally through trade (see https://gcsi.unsdsn.org/). The methodology was first described in Lafortune et al., 2021.

These impacts are grouped into six sub-pillars: Aerosol emissions, GHG emissions, biodiversity loss in Terrestrial and Marine biomes, and disruptions to Water and Nutrient cycles. The assessment also identifies sectoral drivers of global spillover impacts and identifies the major countries exporting and importing the associated products.

The GCSI indicators are constructed to capture two different categories of impacts, namely, impacts that occur at a national level (Domestic) and impacts that take place internationally (Spillover). In the 2024 edition of the GCSI report, there are 39 indicators in total, comprising 24 indicators of domestic performance and 15 indicators of performance on international spillovers (see Table 2). A full description of GCSI indicators is provided in Annex 3.

To quantify a country's production and consumption patterns, two main accounting techniques are used (Peters & Hertwich, 2008): production-based accounting (PBA) and consumption-based accounting (CBA). PBA covers the impacts generated within a country's borders. CBA provides a different framework, considering the impacts for domestic consumption, whether they occur abroad or internally. In figure (a) below, the circle on the left captures all the negative impacts due to domestic production, with the blue part representing the effects incorporated in exports. The circle on the right includes all the negative effects linked to domestic final demand, with the red part indicating the spillover effects covered in imports. Both methods incorporate use-phase emissions related to household and government consumption. Figure (b) shows that the set of measures included in the domestic pillar of the GCS index refers to the PBA analysis, while the spillovers complement these metrics with data on the negative impacts embodied in the goods and services imported by each country, based on the calculations of the CBA analysis. In fact, supply chains can extend over a multitude of countries, involving several national and international impacts as activities are organized in several countries before arriving at the destination country (see https://gcsi.unsdsn.org/).



The 2024 GCS Index uses Release 057 of the GLORIA global environmentally extended MRIO database (Lenzen et al., 2022), constructed in the Global MRIO Lab (Lenzen et al., 2017) at the University of Sydney. The sectoral and bilateral analyses use Release 059 of GLORIA. Detailed methodology can be found at:https://s3.amazonaws.com/sustainabledevelopment.report/2024/2024-gcs-index-technicalappendix.pdf. Dutch GCSI country profile can be found at

https://gcsi.unsdsn.org/profiles/netherlands. Table 2: Global Commons Stewardship Index and its indicators

Subpillar	Indicator	Spillovers	Unit	Input Data Sources
Aerosols	Domestic SO_2 emissions	X	kg/capita	EDGAR 6.1 (European Commission Joint Research Centre, 2019)
	Domestic NO_x emissions	x	kg/capita	
	Domestic black carbon emissions	x	kg/capita	
GHG Emissions	Domestic GHG emissions	x	t CO_2e/capita	EDGAR 7.0 (European Commission Joint Research Centre, 2022)
	GHG emissions from land use change		t CO_2e/capita	
	CO_2 emissions embodied in fossil fuel exports		t CO_2e/capita	UN Comtrade (UN Department of Economic and Social Affairs, 2022)
Terrestrial Biodiversity	Unprotected terrestrial biodiversity sites		%	Birdlife International (2022)
	Unprotected freshwater biodiversity sites		%	Birdlife International (2022)
	Domestic land use related biodiversity loss	x	global PDF/capita	GLORIA
	Domestic fresh water biodiversity threats	x	spp./million	Peterson et al. (2020)
	Domestic deforestation	x	%	Iablonovski et al. (2024)
	Domestic export of CITES- listed terrestrial animals	x	WOE/million	CITES Trade Database (UNEP-WCMC, 2022)
	Red List Index of species survival		scale 0 to 1	IUCN (2022)
	Biodiversity Habitat Index		scale 0 to 1	CSIRO
Marine Biodiversity Loss	Unprotected marine biodiversity sites		%	Birdlife International (2022)
	Domestic marine biodiversity threats	x	spp./million	Peterson et al. (2020)
	Domestic export of CITES- listed marine animals	x	WOE/million	CITES Trade Database (UNEP-WCMC 2022)
	Domestic vulnerable marine animals	x	tonnes/capita	*Sea Around Us*
	Fish caught from overexploited or collapsed stocks		%	*Sea Around Us*
	Fish caught by trawling		%	*Sea Around Us*
Nutrient cycle	Sustainable Nitrogen Management Index		scale 0 to 1.4	Zhang Lab at University of Maryland
	Domestic Hypoxia from coastal eutrophication	x	kg/capita	Berthet et al. (2024)
Water Cycle	Domestic scarce water consumption	x	m^3 H_2Oeq./capita	GLORIA
	Domestic water stress	x	m^3 H_2Oeq./capita	GLORIA

Data gaps remain a key challenge in quantifying impacts on the Global Commons. Key data gaps include:

- Terrestrial Biodiversity Loss: Loss of functional biodiversity; Loss of intact areas and wilderness, including trade-related losses.
- Marine Biodiversity Loss: Depletion of fish stocks resulting from trade, including overfishing in marine international waters; Coastal contamination, particularly from plastics, including traderelated releases.
- Water Cycle: Water consumption measured at the basin level; Groundwater depletion, including those captured in trade.

- Stratospheric Ozone Depletion: Undeclared or illicit production of ozone-depleting substances (ODS), including trade in ODS; Reduction of ODS in existing products or in temporary storage. Novel entities: Pollution of plastics and pesticides, including those embodied in trade.
- Physical cross-border flows of pollutants in air and water.

2.2 Current practices for measuring spillovers in the Netherlands

Based on input provided by PBL, Statistics Netherlands/CBS, and SDSN desk research

2.2.1 Statistical Monitor of Well-being (Brede Welvaart): Including "WellBeing Elsewhere"

Since 2018, Statistics Netherlands (CBS) has been producing a statistical Monitor of Well-being (*Brede Welvaart*). The UNECE CES Recommendations on Measuring Sustainable Development were the first set of statistical recommendations for the measurement of inclusive and sustainable well-being. The CES Recommendations distinguish between three dimensions: well-being 'here and now', 'later', and 'elsewhere'. Each dimension provides a specific perspective on distributional justice or inclusiveness: intergenerational, intragenerational, and international.

This measurement tool allows the government to gain a multifaceted understanding of Dutch society and its progress towards well-being and the SDGs. Since 2019, the Monitor features a separate dashboard of 293 indicators to reflect the Netherlands' progress in each of the SDGs.

The Monitor of Well-being considers three main aspects of well-being: 'here and now', 'later', and 'elsewhere':

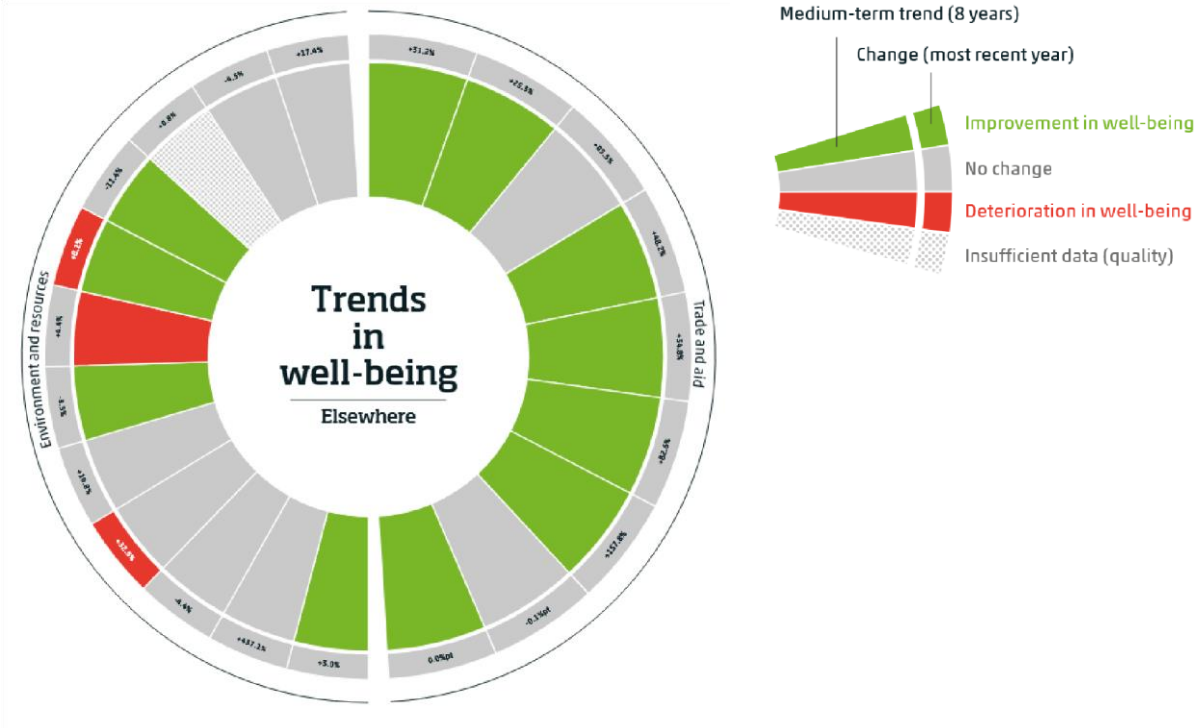
- Well-being 'here and now' concerns the quality of life of the current generation and comprises eight themes: subjective well-being; material well-being; health; work and leisure time; housing; society; safety; and the environment.
- Well-being 'later' concerns the resources that the next generation will need to generate its well-being 'here and now'. It assesses the sustainability of well-being measured in terms of economic, natural, human, and social capital. This dimension is essentially about sustainability.
- Well-being 'elsewhere' measures Dutch policies' impact on well-being in other countries, in the two following domains: trade and aid, and environment and resources. The first domain describes the generally positive effects of Dutch international trade on the well-being of its trade partners; the second deals with the predominantly negative effects from the perspective of the environment. The dimension 'elsewhere' relates to international spillovers.

Well-being 'elsewhere' is composed of the following indicators:

Trade and aid	Unit
Total imports of goods	€ per capita
Imports of goods from Europe	€ per capita
Imports of goods from Africa	€ per capita
Imports of goods from America	€ per capita
Imports of goods from Asia	€ per capita
Imports of goods from Oceania	€ per capita
Total imports from LDCs	€ per capita
Official development assistance	% of GNI
Remittances	% of GDP
Environment and resources	**Unit**
Greenhouse gas footprint	tonnes CO2 equivalents per capita

Material footprint	tonnes per capita
Imports of metals	tonnes per capita
Imports of metals from LDCs	kg per capita
Imports of non-metallic minerals	tonnes per capita
Imports of non-metallic minerals from LDCs	kg per capita
Biomass imports	tonnes per capita
Biomass imports from LDCs	kg per capita
Fossil fuel imports	tonnes per capita
Fossil fuel imports from LDCs	kg per capita
Land footprint	hectares per capita

Trends in well-being Elsewhere are then depicted in a wheel.



The inner ring of the well-being trends provides information on the trend (medium-term trend based on available data points in the years 2015–2022). The outer ring shows the average change in the last reporting year relative to the previous year. The colours of boxes indicate whether the indicator is moving in the direction that is associated with an increase (green) or a decrease (red) in well-being (see well-being and SDGs).

Statistics Netherlands calculates the following footprints of imports, including imports for re-exports, intermediate imports processed for domestic consumption, and intermediate imports processed for export:

- Land use footprint (forest, cropland, pastures, and land used for mining);
- Material footprint (use of biomass, fossil fuels, metals, and non-metallic minerals);
- Greenhouse gas footprint: (emissions of greenhouse gases, including CO_2 (from biomass and fossil fuels), N_2O (nitrous oxide), and CH_4 (methane)).

CBS also compares its footprints with other countries of the EU.

To calculate the footprint of these imports, CBS uses the Dutch trade data and the PBL-FIGARO dataset (In 't Veld & Wilting, 2024). This is a modified MRIO based on the FIGARO MRIO, with the GLORIA MRIO being used to add more detail and new environmental data (CBS, 2024).

CBS also calculates 'cross-border dependencies' as part of well-being 'elsewhere'. It comprises indicators describing dependence on energy imports, economic dependence on exports, and the greenhouse gas footprint (see resilience dashboard).

Cross-border dependencies	Unit
Dependence on energy imports	% of energy imported
Economic dependence on exports	% of GDP generated by exports
Greenhouse gas footprint	tonnes CO_2 equivalents per capita

2.2.2 Computation of consumption and production footprints

CBS Statistics Netherlands and PBL Netherlands Environmental Assessment Agency calculate various footprint indicators of both Dutch consumption and production, see Table 3 (Walker et al., 2017; Walker et al., 2023). These footprints include material use and environmental pressures both within the Netherlands and abroad (Wilting and van Oorschot, 2017; Wilting, 2021; Wilting and in 't Veld,2025). Three of the consumption footprint indicators are also included in the Monitor of Wellbeing (see 2.2.1). The footprint indicators are published bi-yearly in the Integral Circular Economy Report (ICER) in which PBL offers an overview of the state of the transition towards a circular economy in the Netherlands (Hanemaaijer et al., 2025).

Table 3: International Spillovers and related indicators calculated by PBL

Spillover	Indicator	Data sets/data challenges with sources	Measurement unit	Methods measurements	Key
Spillovers from upstream supply chain of Dutch consumption	Greenhouse gas footprint (of Dutch consumption)	FIGARO and GLORIA MRIO's, Eurostat for environmental extension	Tonnes CO2e	MRIO footprints	Trade data and data of environmental extension for nonOECD
''	Material footprint	''	Tonnes material	''	''
''	Land footprint	''	Hectares	''	''
''	Biodiversity footprint	''	MSA-loss·m^2·years	''	''
''	Water footprint	''	m^3 water	''	''
Spillovers from the upstream supply chain of Dutch production	For all five consumption footprints (greenhouse gases, material, land, biodiversity, and water), PBL, together with Statistics Netherlands, calculates production footprints as well. Data sources, measurement units, and methodology are the same as for consumption footprints.				

2.2.3 Other policy-related work on spillovers in the Netherlands

PBL conducts various policy analyses to address environmental pressures in supply changes. Some key examples include:

- Specific footprints have also been compared to scaled Planetary Boundaries to assess to what extent the Netherlands lives within the safe operating space (Lucas and Wilting, 2018a, b; Lucas et al., 2020). Such analysis helps to set a benchmark for environmental footprints and can assist policymakers in defining national policy targets in line with global environmental challenges and agreements.
- PBL has reflected on the Dutch ambition to halve the ecological footprint by 2050 (van Oorschot et al., 2021); an ambition that was recently abandoned. The study not only looks at development in footprint indicators retrospectively, but it also discusses options to reduce the footprint.
- Together with the Dutch Central Bank, PBL investigated the risks related to biodiversity loss for investments by Dutch financial institutions, including investments abroad (DNB and PBL, 2020).
- Footprint indicators were the starting point for discussing the role of low- and middle-income countries in the Dutch circular economy transition, which aims at reducing environmental pressure across value chains (Brink et al., 2021a; Brink et al., 2021b; Lucas et al., 2022).
- PBL is developing several Sankey diagrams to understand the flow of specific resources (imports and exports), including related environmental impacts and policies/programs that deal with specific parts of these supply chains. Examples include critical raw materials, soy, and palm oil.
- In an exploratory study, PBL has looked at the available information on the size and location (country) of scop-3 emissions from large Dutch companies (Roelfsema et al., 2024).
- PBL is developing a model to address circular economy policies, including future projections of footprints, with and without specific policies.

A new program within PBL, called Netherlands in an international context, is aimed at providing a policy perspective to consciously deal with cross-border impacts of the Dutch economy, with a focus on sustainability transitions. Besides looking at environmental footprints, the program takes a broader and sometimes more qualitative perspective to discuss impacts abroad and related policy perspectives, taking into account different perspectives on international responsibility and international trends that have impacts on the Netherlands.

2.3 OECD work on measuring international spillovers and policy coherence

Based on the input provided by OECD

2.3.1 Overview of the OECD's policy and statistical tools related to spillovers

OECD Work on International Spillovers focuses on five areas, depicted in a diagram below:

Legal instruments

The OECD has numerous legal instruments[1] with recommendations related to international spillovers. These instruments cover institutional mechanisms designed to address transboundary impacts, for example, the Recommendation of the Council on the Assessment of Projects, Plans and Programmes with Significant Impact on the Environment and the Recommendation of the Council on Policy Coherence for Sustainable Development.

Other instruments address transboundary impacts within specific policy areas. For example:

- Recommendation of the Council on the Role of Government in Promoting Responsible Business Conduct;
- Decision-Recommendation of the Council on the Reduction of Transfrontier Movements of Wastes;
- Recommendation of the Council on the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector;
- Declaration on Better Policies to Achieve a Productive, Sustainable and Resilient Global Food System.

Legal instruments act as frameworks for the work of different OECD policy communities and directorates.

Conceptual approaches

The OECD has developed work on conceptual approaches for the measurement of transboundary impacts. This includes approaches within the context of the 2030 Agenda (Ino et al., 2021) and Policy Coherence for Sustainable Development (PCSD)[2]. The operationalisation of these approaches has been explored through proposed portfolios of indicators, based on OECD datasets.

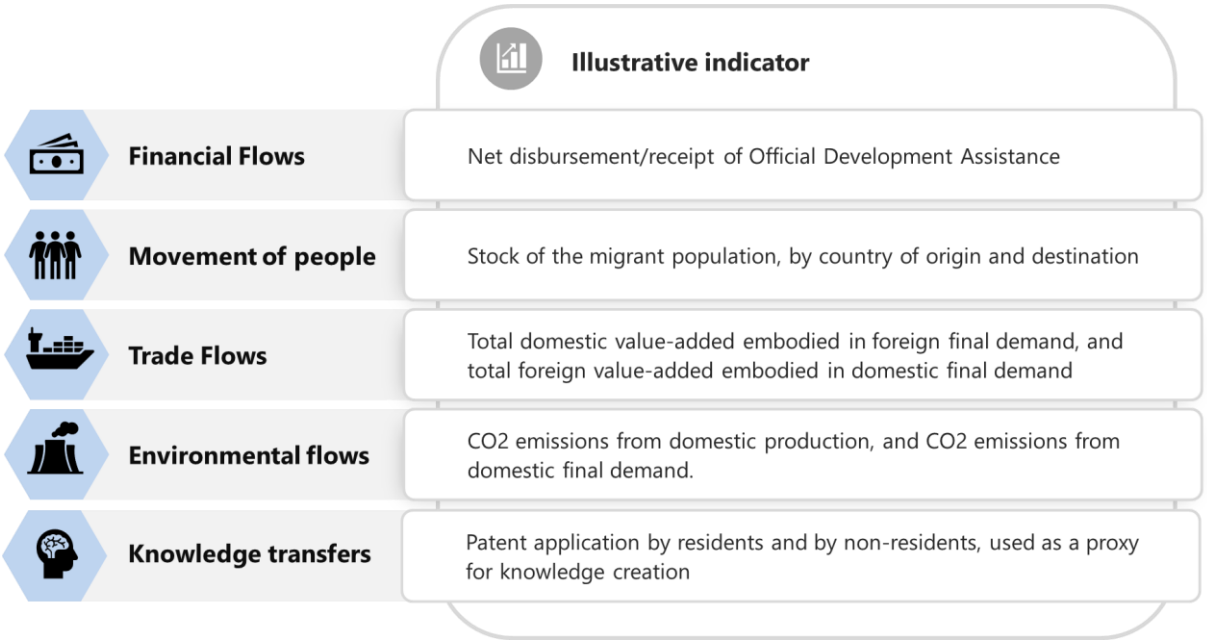
The OECD also develops conceptual approaches for the measurement of spillovers within the context of specific thematic areas. For example, the recent analysis on Measuring Carbon Footprints of AgriFood Products (OECD, 2025a). Other proposals under development are based on analytical work on the spillover effects of climate change mitigation policies.

[1] Institutional and organisational mechanisms: structures, systems, processes and working methods applied by the government across all branches and levels of government as well as by key stakeholders (Recommendation of the Council on Policy Coherence for Sustainable Development OECD/LEGAL/0381)

[2] Better Policies for Sustainable Development 2016 (OECD, 2016); COHERENCE for SUSTAINABLE DEVELOPMENT: Tracking progress on policy coherence for sustainable development at the national level: What and how to measure? (2017)

Data and indicators

The OECD collects data used to map a range of spillover effects:



Source: OECD/EC-JRC (2021), *Understanding the Spillovers and Transboundary Impacts of Public Policies: Implementing the 2030 Agenda for More Resilient Societies*, OECD Publishing, Paris/European Union, Brussels, https://doi.org/10.1787/862c0db7-en.

The data is available in the OECD Data Explorer. Specific examples include:

- Inter-country input-output (ICIO) tables provide an international statistical infrastructure that maps flows of production, consumption, investment within countries, and flows of international trade in goods and services between countries, broken down by economic activity, by industry, and by country, globally and consistently, and for a period that makes such data fit for analytical purposes. The OECD ICIO tables are a key tool for measuring transboundary (or cross-border) economic and environmental impacts of production and consumption. Specifically, they are used to track how the activities in one country affect other countries through global value chains (GVCs). These tables integrate data on production, trade, and intermediate inputs across countries and sectors.
- The ICIO tables underpin the Trade in Value Added (TiVA) data, which record the value added embedded in the goods and services produced in a country and consumed elsewhere.
- ICIO tables are also used to assess the demand-based CO2 emissions of each country, i.e., the CO2 embedded in the goods and services consumed domestically, wherever the CO2 was emitted along the production chain.
- Data for other common indicators of spillover effects include:
  - Foreign Direct Investment (financial flow),
  - Imports from developing countries (trade flow),

- Migrant flows and migrant populations (movement of people), and
- Imports of energy and mineral resources (trade & environmental flows).

- Climate Action Dashboard | OECD: features key indicators to track progress towards climate objectives and provide a snapshot of country climate action. The Dashboard has four main building blocks, starting with the status of GHG emissions. It describes their developments in activities or sectors, impacts on climate and the environment, and the associated risks and vulnerabilities, the policies and actions to mitigate and adapt to climate change, and the derived socio-economic opportunities that contribute to a just transition.

Other relevant datasets include:

- Plastic Leakage - Estimations from 1990 to 2019: This dataset displays estimations of plastic leakage from mismanaged and littered waste and plastic leakage to aquatic environments, in million tonnes (Mt) of plastic. This dataset provides estimates of plastics leakage for the 15 global regions of the OECD ENV-Linkages model, detailed in the Annex of the OECD Global Plastics Outlook.
- Plastic Waste in 2019: This dataset displays estimations of plastic waste in 2019, in million tonnes (t) of plastic for the 15 global regions of the OECD ENV-Linkages model, detailed in the Annex of the OECD Global Plastics Outlook.
- Waste - Hazardous waste: generation and movements: This dataset presents information on national production, movement, and disposal of hazardous waste.
- Agricultural greenhouse gases emissions: unit of measure: tonnes of CO2-equivalent
- Environmental statistics, accounts, and indicators. The OECD collects official data and statistics from countries on the state of the environment and natural resources, compiled using internationally harmonised methodologies and definitions.

Name of the spillover	Indicator	Data sets/data sources measured	Unit of Measure	A brief description of how it is	Key challenges	Potential improvements
Greenhouse gases	Greenhouse Gas Footprints (GHGFP)	OECD ICIO tables, OECD Air Emissions Accounts (AEA)	Gt CO_2 equivalent	The GHG emissions Footprints Indicators are calculated by combining the 2023 edition of the OECD Inter-Country InputOutput (ICIO) Tables and other GHG Emissions databases, such as Air Emissions Accounts to produce estimates of emissions from consumption (or demand) perspectives. The new set of GHG footprint indicators replaces a previous set of indicators based solely on CO_2 emissions from fuel consumption.	Inconsistent conversion of non-CO_2 emissions into CO_2-equivalent due to different Global Warming Potential (GWP) factors used across data sources.	Expand ICIO coverage to include more countries (especially major exporters and populous economies), add finer industry detail (e.g. agriculture, metals), and better capture Scope 3 emissions including those from capital goods.

Employment	The Trade in Employment (TiM) database (a collection of indicators). And the Trade in Employment by characteristics (TiMBC) database.	The OECD's InterCountry InputOutput (ICIO) database	Domestic employment embodied in foreign final demand *Combined unit of measure:*	The Trade in Employment (TiM) database is a collection of labour market indicators designed to provide additional insights into global production networks and supply chains, as a complement to the Trade in Value Added (TiVA) indicators.	The main challenge with decomposing trade in employment by workforce characteristics is the availability of detailed information by gender, age, occupation, or education. Almost all sources with this	Expand TiMBC coverage across countries, industries, and years; improve employment data by gender and other characteristics; and strengthen national statistics through
			Percentage of employment	Estimates of employment or compensation of employees embodied in foreign final demand (or in gross exports) can reveal the extent to which a country's workforce depends on its integration into the global economy. The Trade in Employment by characteristics (TiMBC) database serves as an extension of TiM, whereby TiM indicators of employment are decomposed by characteristics, namely gender, age, education and occupation. This exercise is done at the expense of a reduced country, industry and time coverage.	information were not designed for detailed industry level analysis, which is necessary for the exploratory analyses of GVCs.	larger labour force survey samples harmonised with national accounts.
Foreign direct investment (FDI)	FDI Qualities Indicators	The indicators are constructed from various firm- and industry-level data sources. The main sources of data on development outcomes include: the World Bank Enterprise Surveys, OECD Statistics, ILO Statistics, Financial Times' fDi Markets database, International Energy Agency.	Various: % (employment share), CO_2 (tons), productivity levels, patent counts, etc.	The set of indicators measures the sustainable development impacts of FDI in host countries. The new metrics focus on five clusters derived from the 17 SDGs: productivity and innovation; employment and job quality; skills; gender equality; and, the carbon footprint.	The FDI Qualities Indicators show correlations, not causation, so they can't confirm whether FDI causes specific outcomes or vice versa. Interpreting results without additional context can be misleading. For example, FDI in polluting sectors might look negative at first glance, but could actually lead to cleaner practices if foreign firms bring better technologies. The indicators need to be used carefully, with further analysis to understand real impacts.	Expand country and sector coverage; improve access to firm-level, genderdisaggregated, and environmental data; and integrate the indicators into causal analysis frameworks to better understand the impact of FDI on sustainable development outcomes.

Thematic analysis

The OECD provides thematic analysis on policy areas with important spillover effects. The aim is to provide insights and context to inform policies and global dialogue. This analysis deepens understanding on the impact pathways underlying spillover effects.

Recent examples include:

- Working Together for Better Climate Action (OECD et al., 2024),
- OECD Inventory of Export Restrictions on Industrial Raw Materials 2024 (OECD, 2024),

- Harnessing trade and environmental policies to accelerate the green transition (OECD, 2025b).

Recommendations on institutional mechanisms for addressing transboundary impacts

The OECD conducts development cooperation, Peer Reviews, and learning. Reviews provide an indepth assessment of a country's strengths and challenges, including approaches for addressing transboundary impacts. Peer Review recommendations help countries to make the most of their development co-operation (*e.g.,* through integrating consideration of transboundary spillover effects into regulatory impact assessments).

Progress on the implementation of OECD Recommendations by their Adherents is also monitored through reports to the OECD Council. For example, the 2024 Report on the Implementation of the OECD Recommendation on Policy Coherence for Sustainable Development (PCSD).

Additionally, the OECD is also developing a methodological framework to assist its members in measuring transboundary impacts. OECD countries convene in PCSD Focal Points meetings to discuss challenges and good practices for spillover measurements, data availability, and accessibility.

Policy dialogue

OECD Centres provide opportunities for policy dialogue. For example, the OECD Development Centre brings together policymakers from countries of all regions and income levels. The Governing Board is the Development Centre's supervisory body. Members interact on an equal footing to exchange their development experiences, decide on the Centre's priorities, and enrich its work, to accelerate progress towards global sustainable development.

The OECD Network of National Focal Points for Policy Coherence provides a forum for the discussion on Policy Coherence for Sustainable Development. Meetings are held regularly with OECD Member and Partner countries to share good practices, including discussions on transboundary impacts.

The OECD is also active in organising side events for the UN High-Level Political Forum. Over the past few years, numerous side events have been convened for discussion and peer learning amongst OECD Members and partners on policy coherence. Events in 2025 focus on measuring transboundary impacts and thematic areas such as the Ocean Economy.

OECD Members have also expressed interest in considering the spillovers tied to OECD Recommendations. Work is ongoing to develop a screening process to systematically assess the transboundary impacts of new OECD Legal Instruments, such as Recommendations.

1.3.2 The OECD's work on SDG 17.14.1 (institutional mechanisms in place on policy coherence for sustainable development)

Alongside UNEP, the OECD also acts as a co-custodian for SDG indicator 17.14.1, facilitating data collection for OECD Member Countries. This indicator assesses institutional and organisation mechanisms that can support efforts in enhancing policy coherence for sustainable development, including mechanisms for addressing transboundary impacts.

The current indicator framework is composed of 8 themes, listed below:

1. Political Commitment
2. Long-term Vision
3. The Integration of Sustainable Development into Policy and Finance
4. Whole-of-government Coordination
5. Sub-national Engagement

6. Stakeholder Engagement
7. Impacts Assessment
8. Monitoring, Evaluation, and Reporting

The latest round of data collection for this indicator was launched in August 2025, building on existing OECD datasets and experience implementing the OECD Recommendation on Policy Coherence for Sustainable Development. This, combined with the updated methodology, will provide a new set of results for the SDG indicator.

Part 3. Progress made and persisting challenges for measuring international spillovers

Based on insights from the international workshop in Amsterdam, Netherlands on 12 June

The workshop organized in Amsterdam on 12 June 2025 allowed to unpack differences and similarities across these various frameworks and progress and persisting challenges in spillover measurement.

Over the last decade, there has been some significant progress in frameworks and databases available to measure and curb negative international spillovers. The OECD & UNEP managed to come up with an internationally agreed framework to measure SDG 17.14.1 (Mechanisms in place to enhance policy coherence for sustainable development). International and regional initiatives, including in Europe, have led to the development of more reliable and timely data to track consumption-based spillovers. Eurostat now systematically incorporates spillovers in its annual SDG report. Several platforms, including, for example, the SCP-HAT data platform, now provide easy access to a wealth of data on trade-related spillovers. The SDSN and partners have discussed major governance priorities to clean up specific supply chains, including textile, food, and minerals. At the country level, there is a growing recognition that well-being elsewhere should be incorporated in monitoring and statistical frameworks, including in the Netherlands.

From a policy perspective, the 2025 Resolution on the SDGs presented by the European Parliament on July 1st continues to emphasize the importance of addressing the EU's international spillover effects:

> *Paragraph 90: "Emphasises that policy coherence for development is a binding obligation under Article 208 of the TFEU aiming at integrating the economic, social, and environmental dimensions of sustainable development at all stages of the policymaking cycle, in order to foster synergies across policy areas, identifying and reconciling potential trade-offs, as well as addressing the international spillover effects of EU policies."*

Yet, there are persisting challenges, as provided below, that require further work and analysis. However, these challenges should not prevent countries from curbing spillovers, particularly in the Dutch context, where such obstacles are limited.

Persisting issues of data: quality, consistency, and timeliness

Data on cross-border spillover effects is often sparse and incomplete, particularly in middle- and lowincome countries. There is a lack of globally comparable data on certain types of environmental spillovers generated via physical flows (*e.g.,* air and water, see pp. 13-14). Additionally, the types of data available and the statistical capacity vary from country to country. Not all spillover indicators are updated frequently. Lack of up-to-date, consistent time series data complicates adequate statistical analysis and can deter policymakers from using it in decision-making. The key takeaway is the need to enhance data quality, timeliness, statistical robustness, global country coverage, and relevance. Improving these aspects will facilitate broader international comparisons beyond the European Union.

However, it is important to acknowledge that the data will never be perfect. The lack of complete data should not serve as a justification for delaying governmental efforts to clean up supply chains. In the Dutch context, sufficiently accurate data exists that can enhance the quantitative and qualitative assessment of spillovers in high-impact areas and provide an evidence base for policies aimed at reducing negative effects.

Diversity of methodologies for measuring spillovers

Several data sets, indicators, and approaches for measuring spillovers have been proposed by different actors. Many insights can be gained from the various methods used to measure international spillovers. Despite some differences, there are notable similarities and complementarities among these approaches. By comparing these methods, the Netherlands can identify critical indicators that are currently overlooked and integrate them into the existing *Monitor Well-being* framework to better capture spillover effects in the country. For instance, it was stressed that the country needs to measure specific spillovers, particularly related to social impacts, plastic and electronic waste, chemical pollution, and impacts related to the mining sector.

However, when selecting additional indicators, it is crucial to consider their intended purpose, the objectives they support, and the potential policy changes they may drive. This process requires the development of a conceptual framework with key priorities for monitoring social and environmental pressures exerted on the planet. Such a framework will guide the assembly of a portfolio of indicators and ensure that the collection of relevant data is done in a consistent and systematic way. Where possible, indicators used to monitor international agreements—such as the SDGs, the Paris Climate Change Agreement, and the UN Convention on Biological Diversity—should also be integrated.

The development of a framework necessitates enhanced coordination across relevant departments and national programmes, as well as engagement with key stakeholders, including the scientific community, the private sector, and civil society.

Alignment across various approaches is also needed to facilitate coherence and comparison, as well as to fill critical data gaps. The European Commission's Joint Research Center (JRC) recently developed a new framework for measuring sustainable and inclusive well-being, integrating various approaches (Benczur, P. et al., 2025). Additionally, the OECD is also developing a methodological framework to assist its members in measuring transboundary impacts. The OECD and JRC's work on methodological frameworks can guide the Netherlands in measuring spillovers and transboundary impacts more systematically.

Normative issues: attribution, responsibility, and selection bias

Comparing countries' spillovers and footprints often entails difficult normative decisions. The causal relationships between the choices of people in a particular nation and the effects on other people elsewhere in the world can be very complex and often cannot be captured in a single indicator.

There is also a key normative question when comparing countries' spillovers: what constitutes each country's fair share, and what responsibilities it should assume in addressing global challenges. The per capita scaling method is often applied for this purpose. However, other principles, such as the polluter pays principle, historic responsibility and debts, and emissions per unit of GDP, can also serve as valuable benchmarks for evaluating existing footprints and putting them into perspective.

There is also bias in the selection of phenomena that should be included in well-being 'elsewhere'.

How to deal with problematic normative selections that can serve immediate national interests but in the long run lead to global challenges, for instance, tax evasion by multinational companies; exports of arms, pesticides, and waste products, particularly to least developed countries; or national interference in the politics of other countries?

The complexity of value chains with multiple stakeholders and other interrelationships also raises questions about attribution and responsibility. For instance, meat consumption has a substantial environmental footprint. Who is responsible for it: the consumer who desires to eat meat, the supermarket that offers a variety of cheaper and more expensive meat products, slaughterhouses and wholesalers who supply butchers and supermarkets, multinationals that produce cattle fodder, or farmers in South America who level the jungle forest so they can produce soy for European agriculture?

Moreover, this complexity may have long historical roots that began with our ancestors, but over which we no longer have any say. Statistical data show the current level of various effects on well-being 'elsewhere' and their recent development. However, environmental pressures and vested interests (e.g., multinational corporation ownership of land and intellectual property rights) have accumulated over long periods, adding to the complexity of making normative decisions.

Another difficulty is how to measure sensitive or statistically invisible and elusive phenomena. For example, cross-border problems of water availability and quality (e.g., pollution and dams in rivers) that are difficult to attribute and measure, or the occurrence of forced labour and child labour in value chains that are reported but not statistically measured.

To date, the available indicators often paint an overly positive picture, as some of the more ethically problematic issues are difficult to capture statistically.

Lack of systematic incorporation of spillover metrics in policy, regulatory, and investment tools

While significant work has been done in the Netherlands to assess various spillover effects, systematic integration of transboundary considerations into domestic policymaking and budgetary decisions remains rare.

As a starting point, it is essential to identify thematic high-impact areas relevant to the Dutch context that require immediate attention and explore policy options that can mitigate negative impacts abroad while reinforcing positive ones. The selection of high-impact areas needs to be a consultative process, engaging relevant stakeholders, including policymakers, academia, the private sector, and civil society.

As mentioned above, the SDSN International Spillover Index shows that certain indicators - such as greenhouse gas emissions, air pollution from nitrogen embodied in imports, fatal work-related accidents associated with imported goods, imported deforestation, water scarcity, exports of hazardous pesticides and plastic waste, along with corporate tax havens, financial secrecy, and shifted profits of multinationals - deserve significant attention. The Netherlands' performance on these indicators is notably below the OECD average. Identifying the high-impact areas that drive these negative effects and the policy instruments needed to minimize them would be an essential step forward.

For specific high-impact supply chains and commodities, it is important to analyze key material flows to gain a better understanding of where resources originate, where they are directed, and what role the country can play in mitigating their impacts. This analysis could also help identify key stakeholders involved and responsible for these impacts. Furthermore, it could determine which parts of the supply chains are governed by existing policies and whether these policies incorporate considerations of spillover effects, and identify opportunities for improvement.

Conducting a model-based analysis could also help clarify the effects of various policy measures, identify potential trade-offs, and detect both positive and negative spillovers across different

highimpact areas. Undertaking this process entails considering multiple questions, including: What are the most effective policy options for addressing specific spillovers? What is the technological potential of certain options? How feasible is the implementation of these options? How willing are consumers, retailers, supermarkets, and others to change unsustainable practices? How responsible is the international trade system? What percentage of commodities in the Dutch market is produced according to internationally agreed-upon standards? In-depth analyses of specific high-impact domains can inform and support country-level reforms and yield recommendations for public and private actors within selected sectors.

There is also a need for a forward-looking approach to spillover effects to establish national goals aimed at reducing these spillovers and to identify the policies and strategies to achieve those goals. Policy- and solution-oriented indicators are necessary to evaluate the government's efforts to address these issues. For instance, it would be beneficial to set relevant goals that enable the Netherlands to achieve a circular economy within planetary boundaries by 2025. The key issue is determining the appropriate level of ambition, and PBL's ongoing efforts to scale planetary boundaries to the national level and to establish related goals are highly pertinent in this regard.

Countries also need guidance on how to measure and integrate transboundary considerations into domestic policymaking more systematically. While some national legal instruments reflect transboundary impacts, these considerations are not yet a standard part of regulatory impact assessments. The OECD is currently developing a screening process to systematically assess the transboundary impacts of its new legal instruments, and a similar process is also needed at the national level.

Part 4. Possible avenues for future work on international spillovers

This brief paper discussed and compared various frameworks, methodologies, and databases used to measure international spillovers. It primarily focused on methodologies developed by SDSN, CBS, PBL, and the OECD, and on trade-related international spillovers in the context of the SDGs. It highlighted the progress made since 2015 in measuring trade-related spillovers and incorporating these measures into SDG monitoring tools at global and European levels. Yet, it also identified persisting data gaps at the international level and differences in methodologies and frameworks.

Based on the findings of this brief paper, including the outcome of the spillover workshop that took place on 12 June 2025 in the Netherlands, we underline the following possible avenues for future work between the Dutch Government and partners on international spillovers in the Dutch context and globally:

1. **Analyze in detail Dutch spillover performance and the evolution of the policy landscape, and come up with recommendations to expand the existing national spillover monitoring framework.** This report and series of roundtables would aim to answer the following questions: (1) How much and what kind of spillover impacts are being generated by the Netherlands? (2) How much progress has been made to curb these spillover effects, including the evolution of the policy landscape? (3) How can spillover effects be better incorporated in planning and monitoring frameworks? The latter question would aim to explore notably how the existing Dutch framework for monitoring international spillovers can be improved and expanded. This analysis could be incorporated into the Dutch Voluntary Reviews.

2. **Conduct a series of policy briefs focusing on the spillover impacts and policies of specific industries (*e.g.,* minerals, food, textile) or commodities (*e.g.,* coffee, cocoa, soy), particularly relevant in the Dutch context.** These policy briefs would combine quantitative analysis at the industry and/or commodity level, but also qualitative and policy analysis of existing legal and policy frameworks and persisting gaps. It would also focus on solutions and pathways to strengthen the governance of specific supply chains.

3. **Conduct global empirical work on international spillover data and come up with recommendations for the post-2030 Agenda and the indicator framework**. Building on the success of the Global Commons Stewardship Index (2021-2024), the Dutch government and SDSN – working closely with Yale and Tokyo University – could join forces to support the preparation of the next generation of reports and databases to track systematically international spillovers of Nation States on the Global Commons, with specific comparative and quantitative assessments of the Dutch spillovers by industries and commodities, and by combining the insights of MRIO models with GIS technologies. This assessment would also aim to come up with specific recommendations on how to incorporate international spillovers in the post-2030 global framework for sustainable development.

4. **Mobilize the SDSN networks to understand countries' efforts to incorporate spillover effects in sustainable development policies and SDG reporting mechanisms**. The SDSN could mobilize its global network of researchers and practitioners to collect new evidence on the integration of spillover effects in government strategies, policies, and monitoring. This could build on SDSN's experience in collecting primary data, for instance, via "SDSN's Survey of Government Effort for the SDGs", and the "SDSN-OECD-CoR survey on the role of cities and regions for the SDGs in a changing landscape" (2023).

5. **Leverage cutting-edge methods to measure countries' supply chains' vulnerability and exposure to major climate and geopolitical events**. Geopolitical events, unilateral measures, and the increased frequency of natural disasters can significantly impact global supply chains, yet countries might be exposed in different ways to such disruptions. Building on the emerging literature, the SDSN and partners could pioneer a major program of work on countries' vulnerability to disruptions and shocks in international supply chains from increased natural disasters, extreme weather events (heat waves, typhoons, slow onset events, etc.), biodiversity threats, and the changing geopolitical landscape.

Part 5. Annexes

Annex 1 SDSN International Spillover Index and Indicators

Spillover	Indicator	Data sets/data sources	Measurement unit	Methodology, brief description
Environmental spillover	Exports of hazardous pesticides	FAO	tonnes per million population	Exports of pesticides deemed hazardous to human health, standardized by population. Due to volatility, the calculation uses the average value over the last 5 years.
Environmental spillover	Scarce water consumption embodied in imports	UNEP	m^3 H_2Oeq/capita	Water scarcity is measured as water consumption weighted by scarcity indices. In order to incorporate water scarcity into the virtual water flow calculus, water use entries are weighted so that they reflect the scarcity of the water being used. The weight used is a measure of water withdrawals as a percentage of the existing local renewable freshwater resources.
Environmental spillover	Air pollution associated with imports	UNEP	DALYs per 1,000 population	
Environmental spillover	Marine biodiversity threats embodied in imports	Lenzen et al. (2012) data updated to 2018	per million population	Threats to marine species embodied in imports of goods and services.
Environmental spillover	GHG emissions embodied in imports	Lenzen et al. (2022)	tCO_2/capita	CO_2 emissions embodied in imported goods and services.
Environmental spillover	Nitrogen emissions associated with imports	UNEP	kg/capita	Emissions of reactive nitrogen embodied in imported goods and services. Reactive nitrogen corresponds here to emissions of ammonia, nitrogen oxides and nitrous oxide to the atmosphere, and of reactive nitrogen potentially exportable to water bodies, all of which can be harmful to human health and the environment.
Environmental spillover	Exports of plastic waste	UN Comtrade	kg/capita	The average annual amount of plastic waste exported over the last 5 years expressed per capita.
Environmental spillover	Imported deforestation	GSCI	m^2/capita	
Social spillover	Fatal workrelated accidents embodied in imports	Alsamawi et al. (2017) data updated to 2018	per million population	The number of fatal work-related accidents associated with imported goods. Calculated using extensions to a multiregional input-output table.
Social spillover	Victims of modern slavery embodied in imports	Malik et al. (2022)	per 100,000 population	Victims of forced labor embodied in supply chains. Calculated using a multi-regional input-output table (Gloria) extended with a slavery satellite account.
Security spillover	Index of countries' support to UNbased multilateralism	SDSN	worst 0-100 best	
Security spillover	Exports of major conventional weapons	Stockholm Peace Research Institute	TIV constant million USD per 100,000 population	Volume of major conventional weapons exported, expressed in constant 1990 US$ millions (TIV) per 100,000 population. The trend-indicator value is based on the known unit production cost of a core set of weapons and does not reflect the financial value of the exports. Small arms, light weapons, ammunition and other support material are not included. Values were calculated using a 5year average on the latest ten years of data. (*The inclusion of an indicator on the exports of major conventional

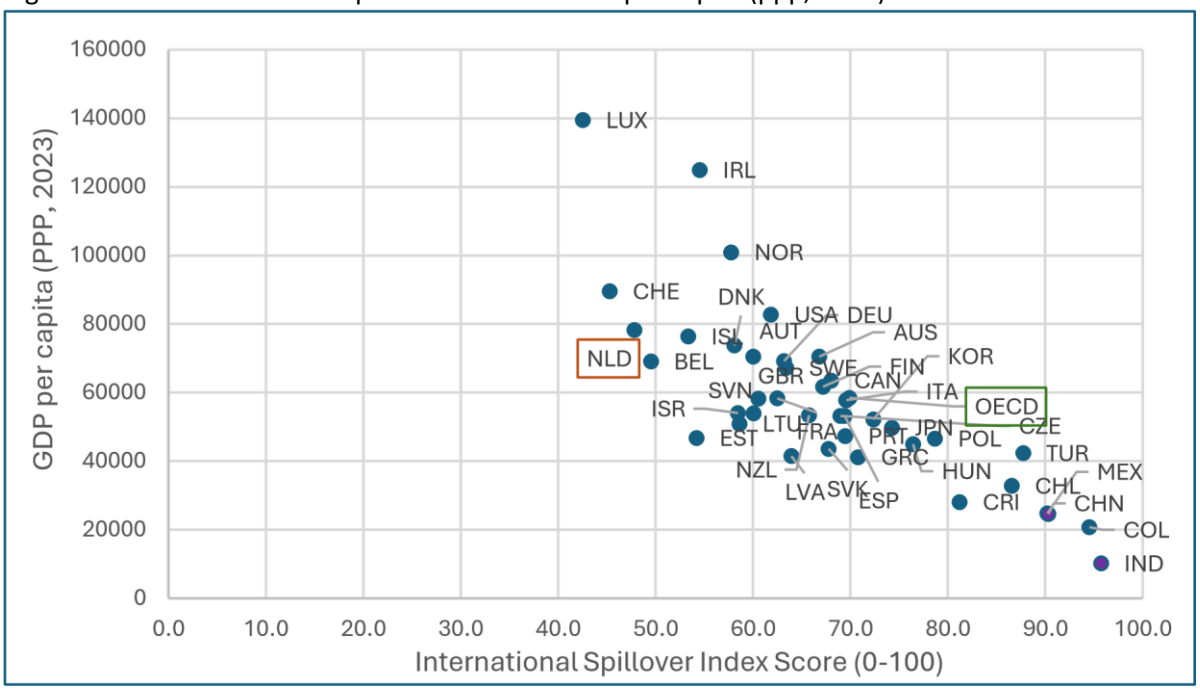
				weapons should not be interpreted as a value judgment by the authors on the policies implemented in the context of the war in Ukraine).
Financial spillover	International concessional public finance, including official development assistance	OECD	% of GNI	The amount of official development assistance (ODA) as a share of gross national income (GNI). It includes grants, "soft" loans (where the grant element is at least 25% of the total) and the provision of technical assistance and excludes grants and loans for military purposes. There is a break in the series because from 2019, the ODA grantequivalent methodology is used whereby only the “grant portion” of the loan, i.e. the amount “given” by lending below market rates, counts as ODA.
Financial spillover	Corporate Tax Haven Score	Tax Justice Network	best 0-100 worst	The Corporate Tax Haven Score measures a jurisdiction’s potential to poach the tax base of others, as enshrined in its laws, regulations and documented administrative practices. For countries with multiple jurisdictions, the average value across the jurisdictions was assigned to the country.
Financial spillover	Financial Secrecy Score	Tax Justice Network	best 0-100 worst	The Index measures the contribution of each jurisdiction to financial secrecy, on a scale from 0 (best) to 100 (worst). It is calculated using qualitative data to prepare a secrecy score for each jurisdiction and quantitative data to create a global scale weighting for each jurisdiction according to its share of offshore financial services activity in the global total. For countries with multiple jurisdictions, the average score of the jurisdictions was used.
Financial spillover	Shifted profits of multinationals	Zucman et al. (2019)	US$ billion	Estimation of how much profit is shifted into tax havens and how much non-haven countries lose in profits from such shifting. Based on macroeconomic data known as foreign affiliates statistics. Negative values indicate profit shifting.

Annex 2 SDSN International Spillover Index: Netherlands' position

- Figure 2 illustrates the relationship between high GDP per capita and lower Spillover Index scores, indicating a stronger negative impact. In the case of the Netherlands, the figure shows this strong correlation, with a Spillover Score of 47.8, reflecting a significant international impact.
- Figure 3 illustrates the indicator GHG emissions embodied in imports (tCO_2 per capita) for the year 2024, showing that the Netherlands' level at 9.5 tCO_2 per capita is nearly double the OECD average of 4.9.
- Figure 4 focuses on air pollution embodied into international trade (DALYs per 1,000 population). It shows that the Netherlands has a value of 16.3 against the OECD average of 8.2 in 2024.
- Figure 5 shows the results related to the emissions of reactive nitrogen embodied in imported goods and services (kg/capita); the Netherlands value is of 69 while OECD's value is 29.
- Figure 6 illustrates the level of deforestation abroad caused by goods imported for final consumption at home (measured in m^2 per capita), based on 2022 data. The Netherlands ranks among the top three OECD countries with the highest levels of imported deforestation, recording a value of 53 compared to the OECD average of 16.
- Figure 7 presents the levels of threats to marine biodiversity embodied in imports of goods and services (per million population), showing that the value for the Netherlands is 0.263, which is below the OECD average of 0.37.
- Figure 8 is related to imported water scarcity. This indicator is measured as water consumption weighted by scarcity indices (m^3 H_2Oeq per capita). With a value of 4,133 m^3 H_2Oeq per capita, the Netherlands ranks among the top five OECD countries with the highest levels of imported scarce water, highlighting the significance of its indirect impact on global water resources.
- Figure 9 shows the level of exports of hazardous pesticides (tonnes per million population). The Netherlands ranks in the sixth position in 2022, with a value of 45.20, while the value for OECD is 11.77.
- Figure 10 focuses on the exports of plastic waste (kg/capita). In 2024, the valued of the Netherlands was in the top 3 with a value of 30, which is more than 5 times higher than the OECS's value.
- Figure 11 focuses on a social spillover indicator: the number of victims of forced labor embodied in supply chains (per 100,000 population). In 2018, the Netherlands recorded a level of 121, which is higher than the OECD average.
- Figure 12 presents the number of fatal work-related accidents associated with imported goods (per million population). It shows that the OECD average in 2018 was below 2, while the Netherlands recorded a value of 4.08.
- Figure 13 presents the level of exports of major conventional weapons (TIV constant million USD per 100,000). It shows that the Netherlands has a value of 2.02 against the OECD average of 1.72.
- Figure 14 illustrates the amount of official development assistance as a share of gross national income (GNI), showing that the value of the Netherlands is 0.66, which is higher than the OECD average of 0.37.
- Figure 15 provides an overview of the Corporate Tax Haven Score (best 0-100 worst). In 2021, the value of the Netherlands was higher than the average of the OECD, with a respective score of 74 and 40.
- Figure 16 focuses on the Financial Secrecy Score (best 0-100 worst). It results that the Netherlands ranks at the second position, with a value of 70.53.
- Figure 17 shows the shifted profits of multinationals (US$ billion); data is available for only six countries in Europe, including the Netherlands with a value of 136 billion in 2021.

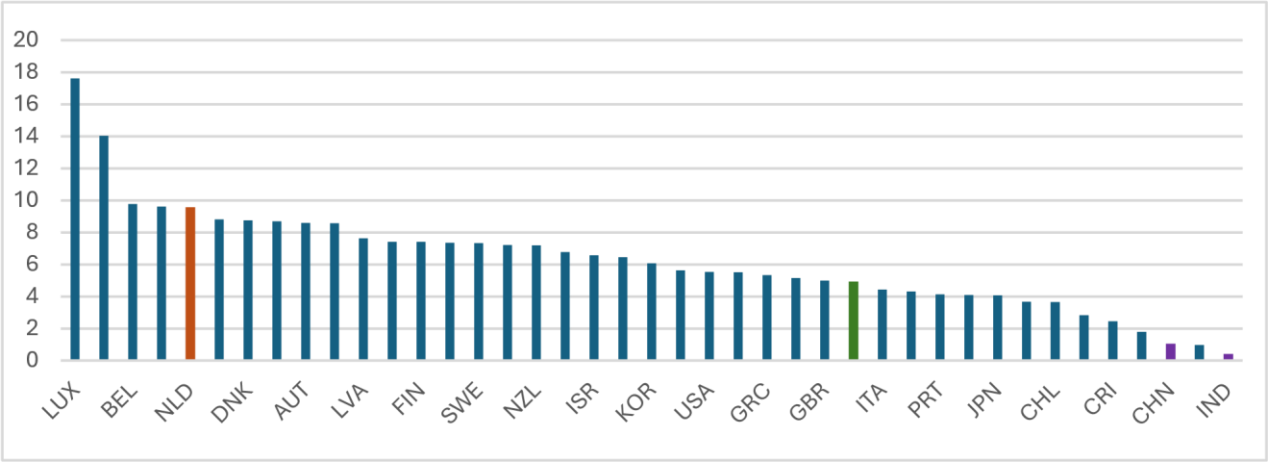
- Figure 18 presents the Index of countries' support to UN-based multilateralism (worst 0-100 best). In 2025, the value of the Netherlands was 67,94 that still remains comparatively high compared to the OECD average of 49,53.
- Finally Figure 19 provides a series of screenshots from SDSN's Bilateral Spillover Impacts (BSI) tool that offers visual representations of a selection of bilateral social, economic, and environmental spillover effects arising from international trade or financial interactions between countries. The BSI tool incorporates various metrics extracted from MRIO models. Associated maps for the Netherlands are presented, indicating the level of impacts and countries concerned.

Figure 2: 2024 International Spillovers Score vs GDP per capita (ppp, 2023)



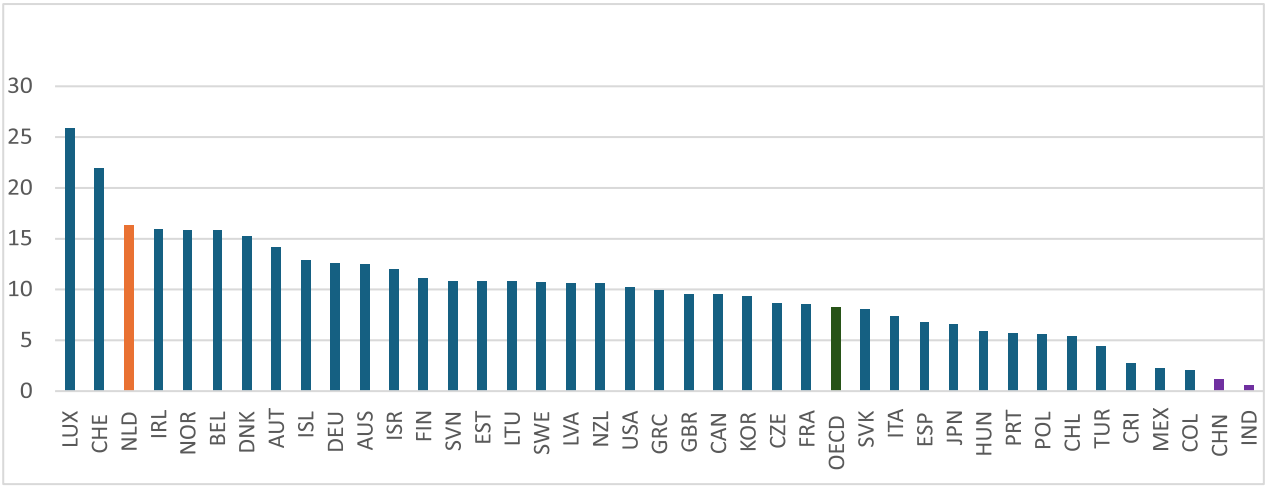
Source: World Bank and Sachs et al., 2024

Figure 3: Imported GHG emission (tCO_2 per capita), 2024



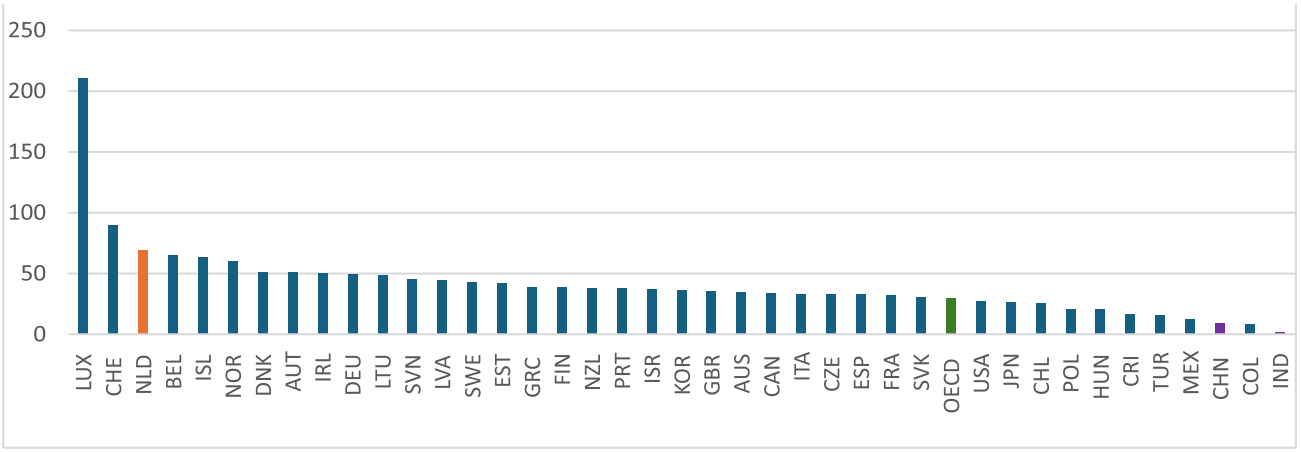
Source: UNEP, 2024

Figure 4: Air pollution associated with imports (DALYs per 1,000 population), 2024



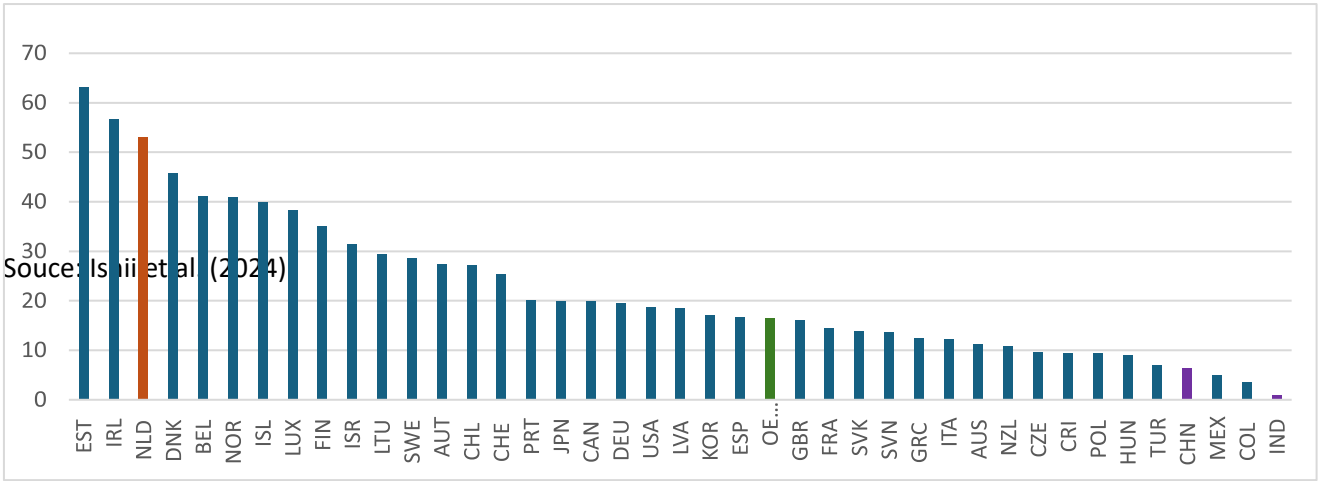
Source: UNEP, 2024

Figure 5: Nitrogen emissions associated with imports kg/capita, 2024



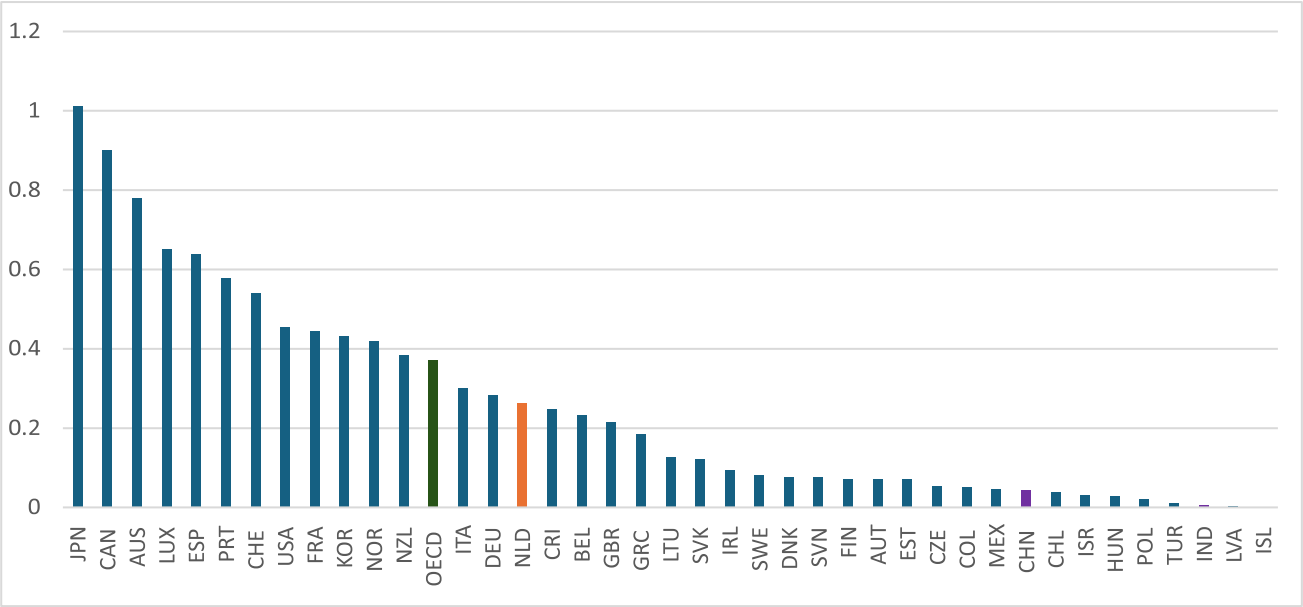
Source: UNEP, 2024

Figure 6: Imported deforestation (m²/capita), 2022



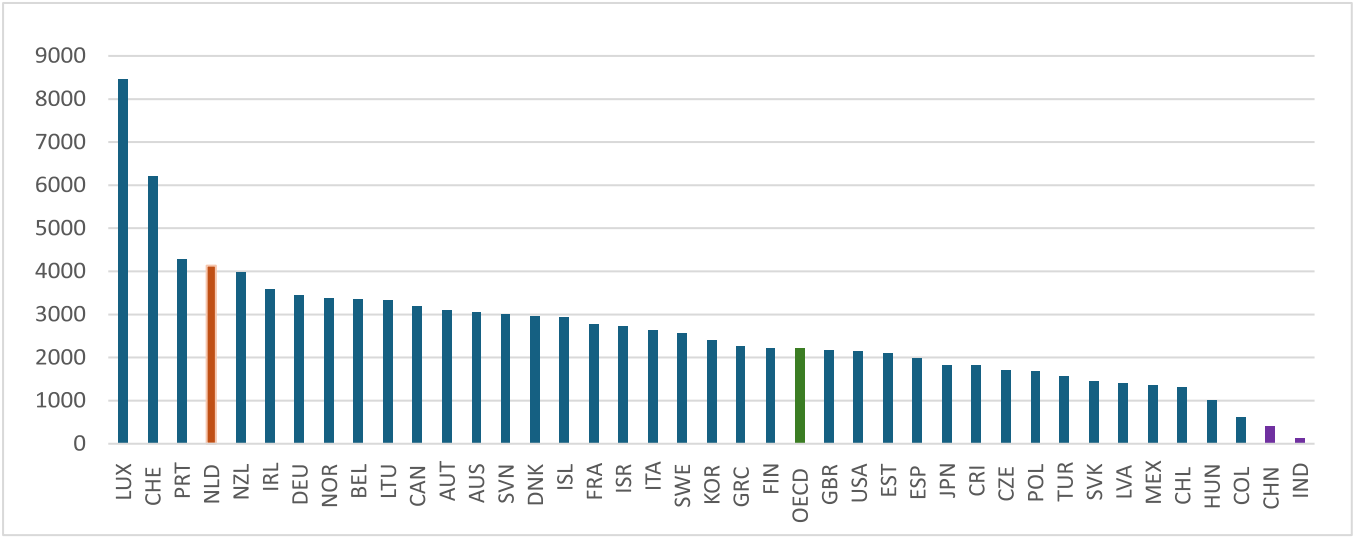
Source: Ishii et al. (2024)

Figure 7: Marine biodiversity threats embodied in imports (per million population), 2018



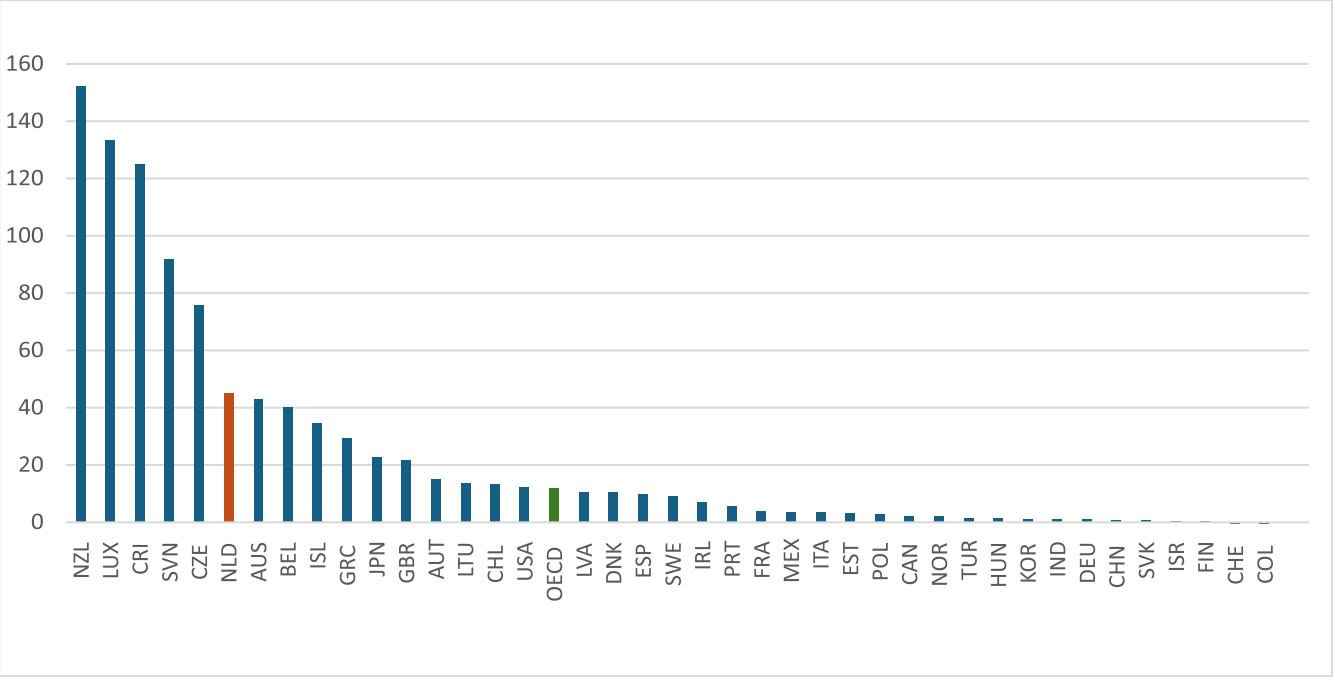
Source: Lenzen et al., 2012

Figure 8: Imported Scarce water (m^3 H_2Oeq/capita), 2024



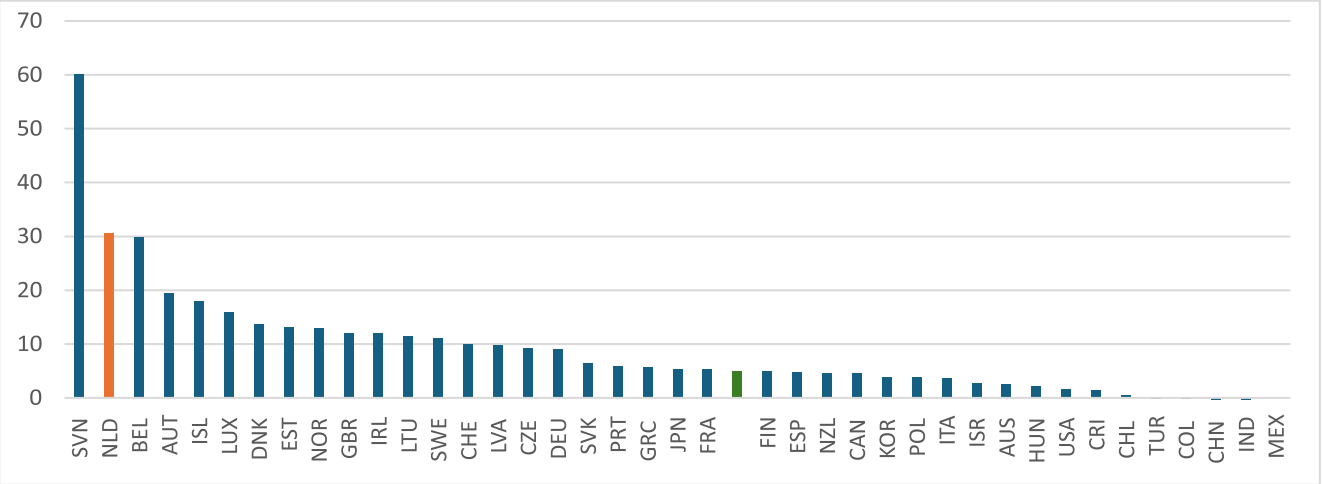
Source: UNEP, 2024

Figure 9: Exports of hazardous pesticides (tonnes per million population), 2022



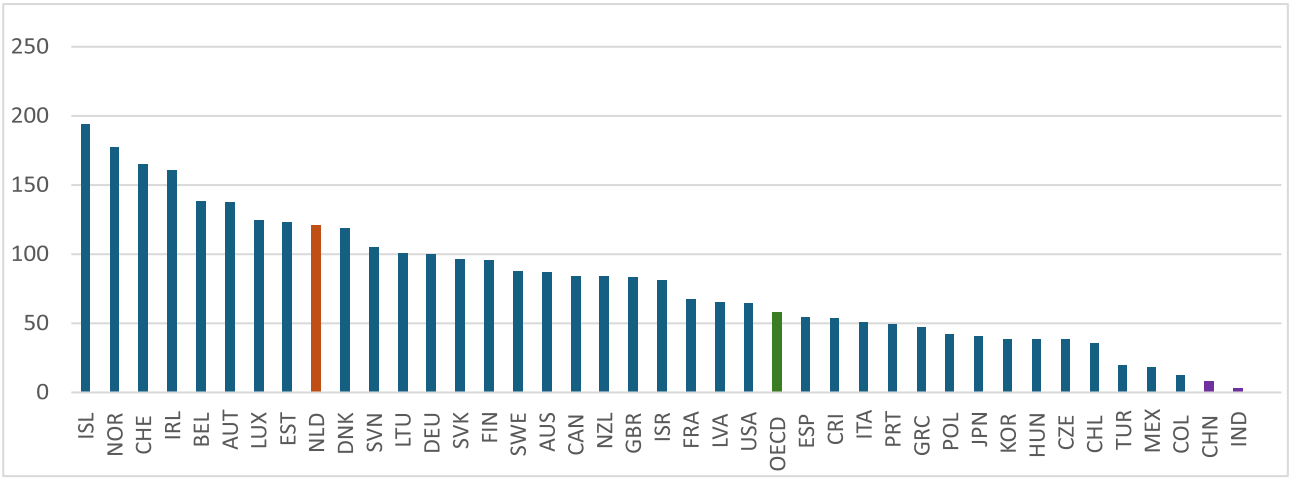
Source: FAO, 2022

Figure 10: Exports of plastic waste (kg/capita), 2024



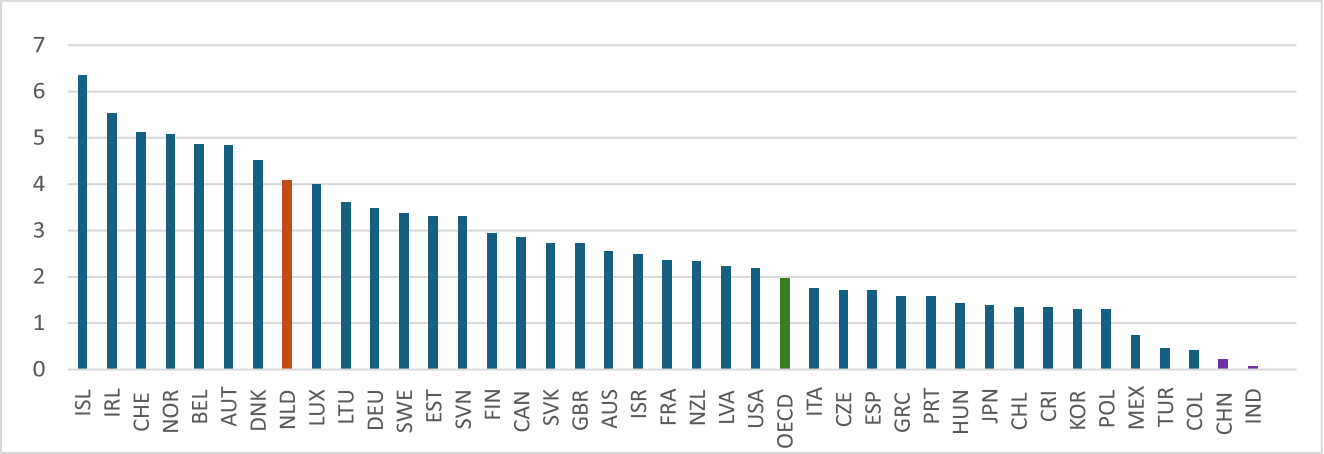
Source: Comtrade,2024

Figure 11: Victims of modern slavery embodied in imports (per 100,000 population), 2018



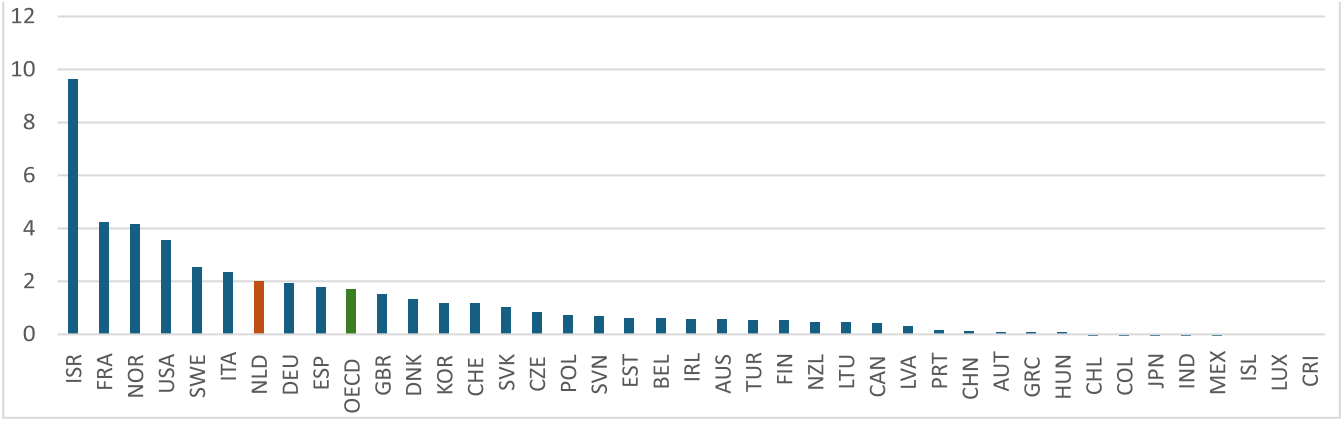
Source: Malik et al., 2022

Figure 12: Fatal work-related accidents embodied in imports (per million population), 2018



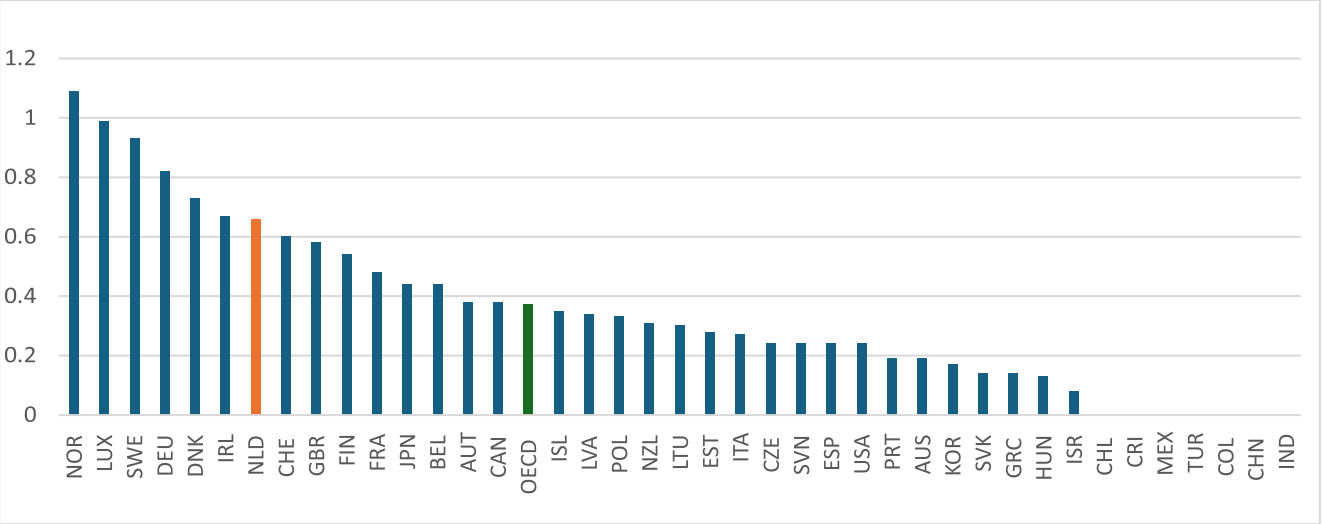
Source: Alsamawi et al., 2017

Figure 13: Exports of major conventional weapons (TIV constant million USD per 100,000 population)



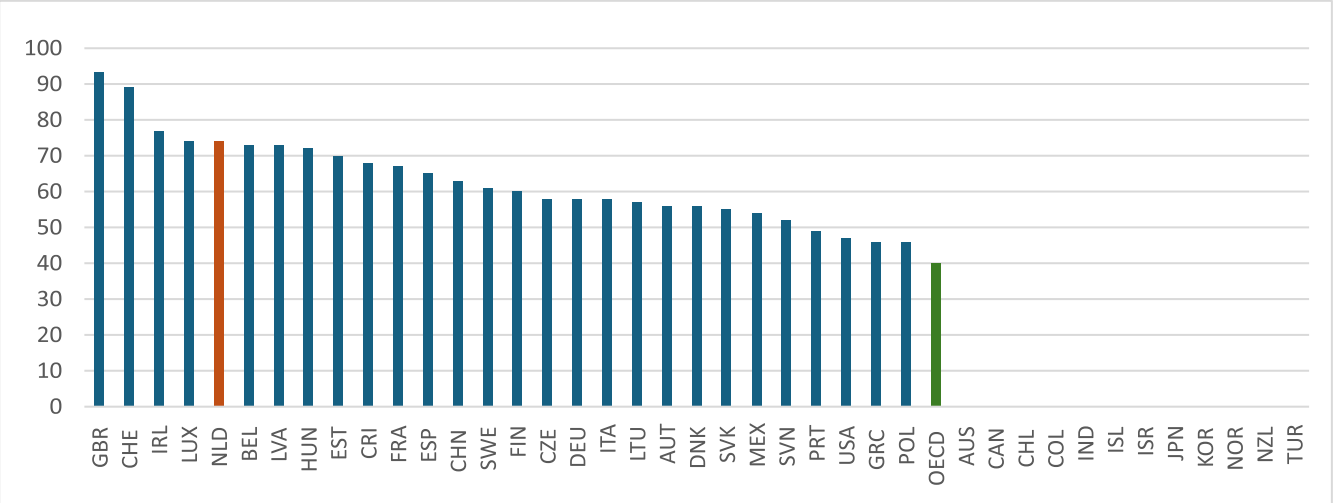
Stockholm Peace Research Institute, 2024

Figure 14: For high-income and all OECD DAC countries: International concessional public finance, including official development assistance (% of GNI), 2023



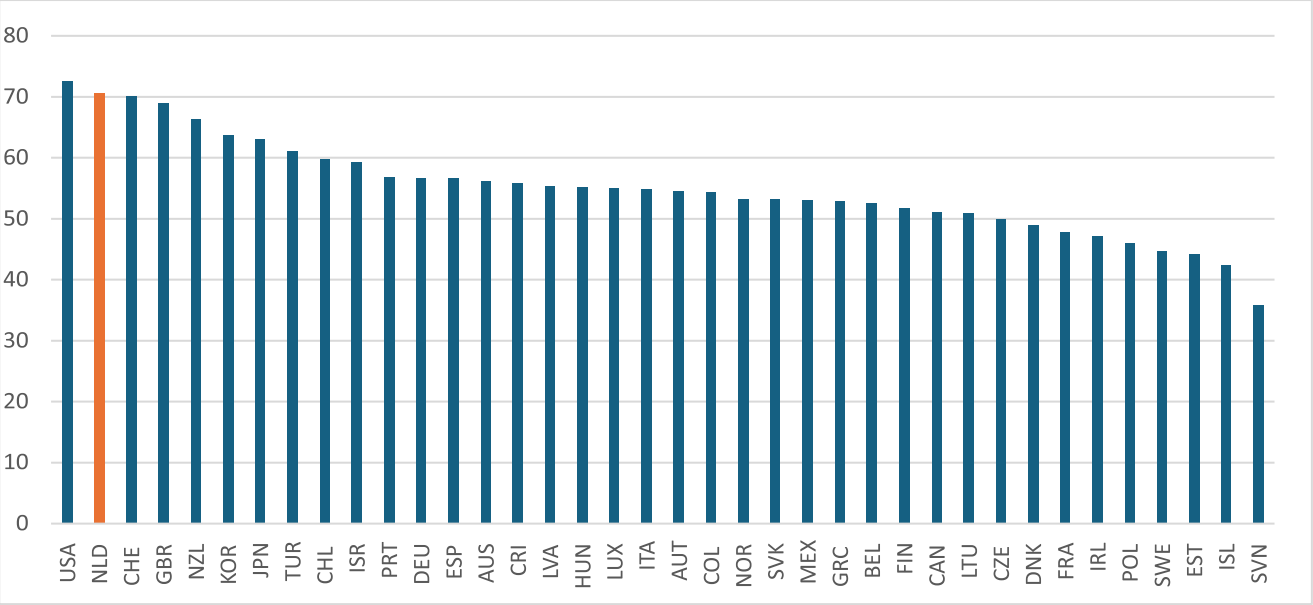
Source: OECD, 2023

Figure 15: Corporate Tax Haven Score (best 0-100 worst), 2021



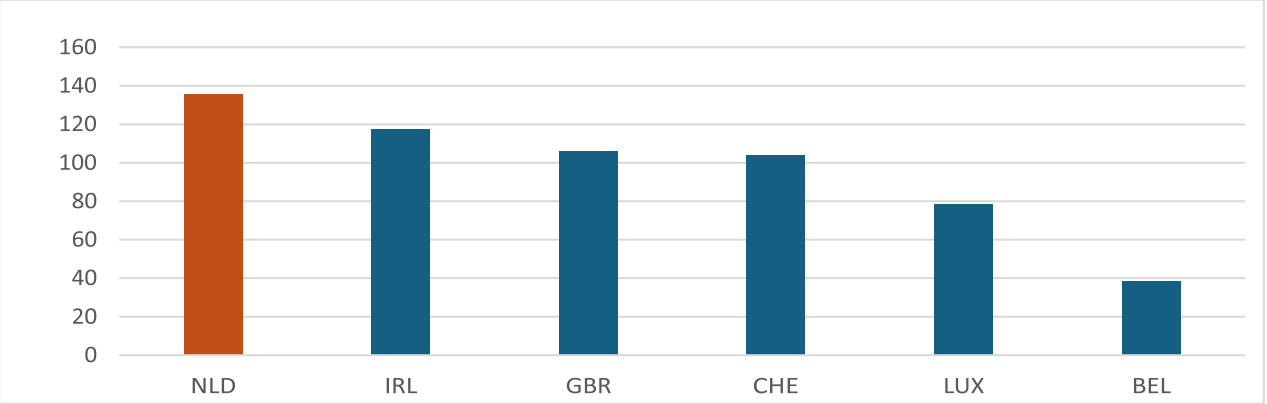
Source: Tax Justice Network, 2021

Figure 16: Financial Secrecy Score (best 0-100 worst), 2022



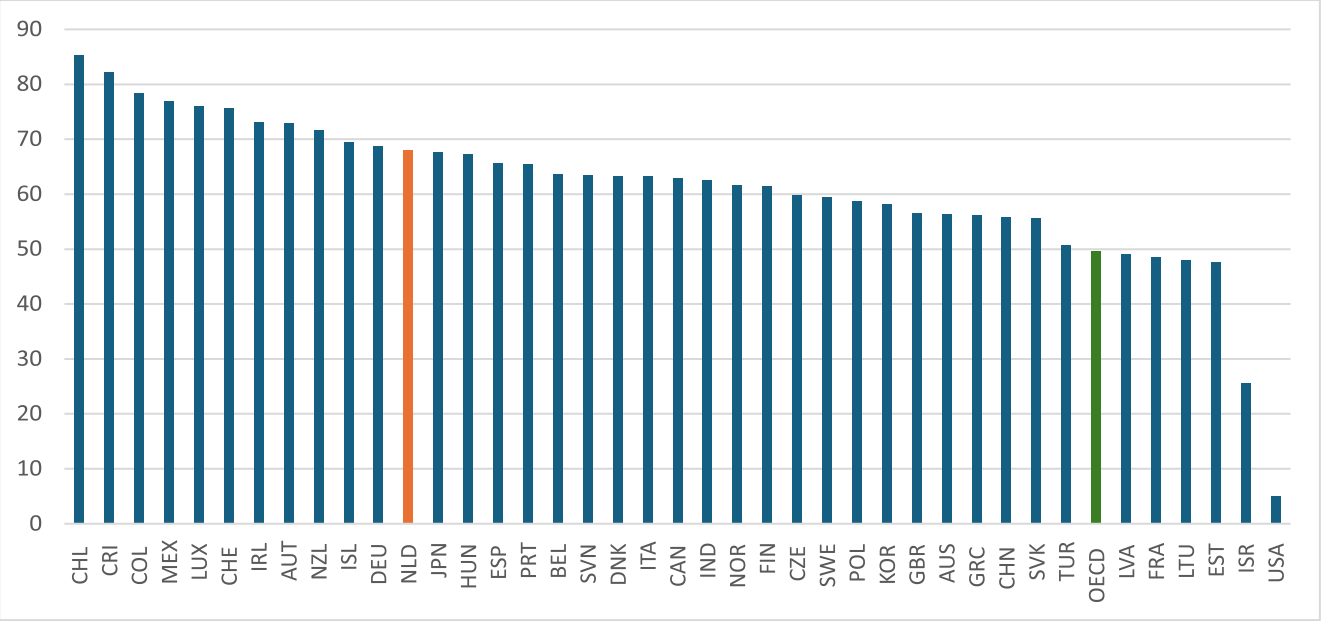
Source: Tax Justice Network, 2022

Figure 17: Shifted profits of multinationals (US$ billion), 2021



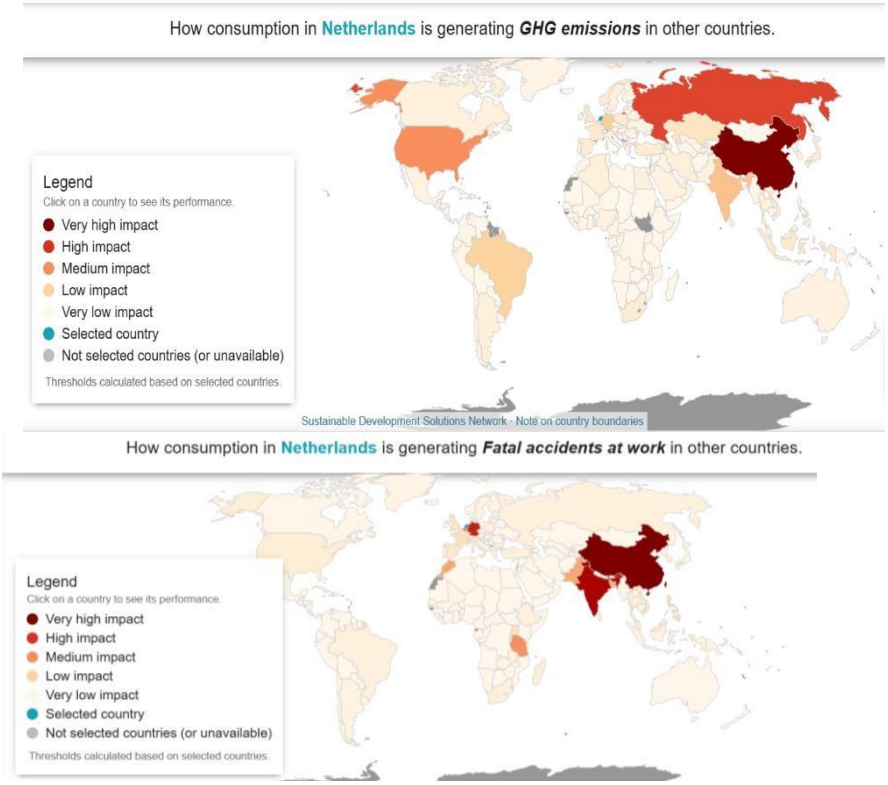
Source: Atlas, 2021

Figure 18: Index of countries' support to UN-based multilateralism (worst 0-100 best), 2025

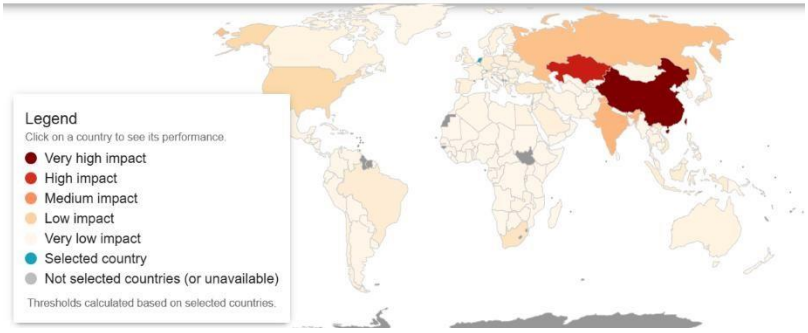


Source: SDSN, 2025

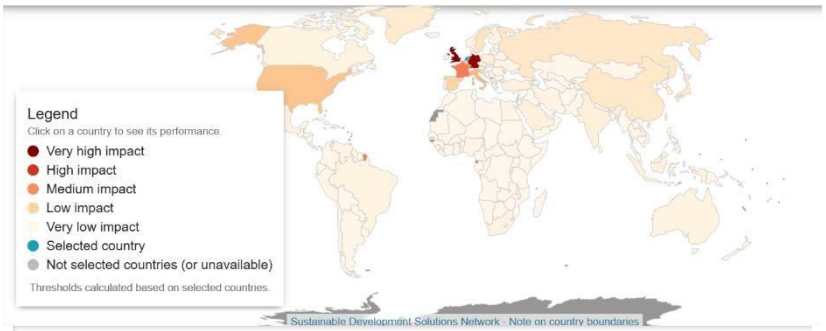
Figure 19: A series of screenshots from SDSN's Bilateral Spillover Impacts



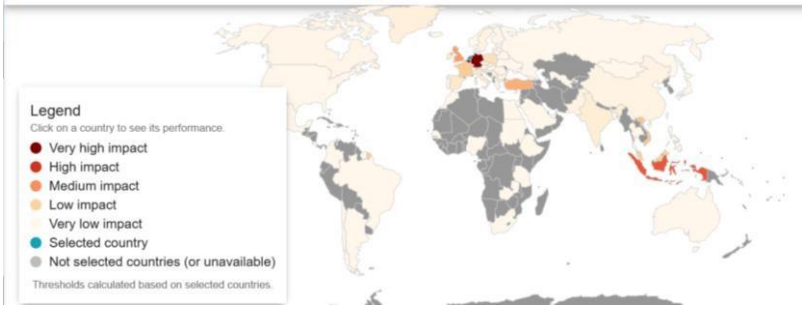
How consumption in **Netherlands** is generating ***SO2 emissions*** in other countries.



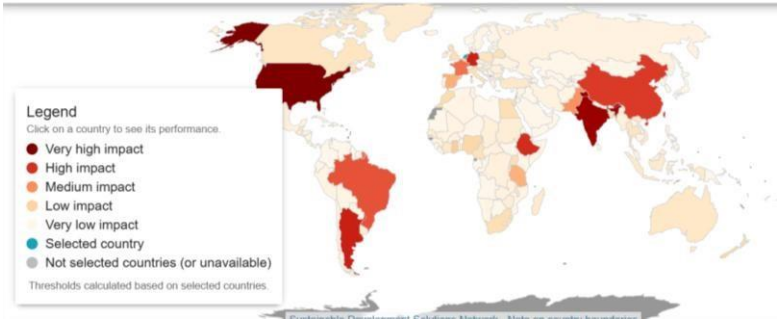
How consumption in **Netherlands** is generating ***Scarce water consumption*** in other countries.



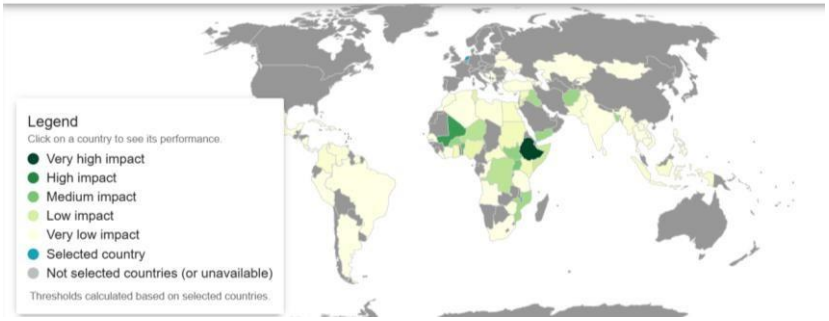
How much ***plastic waste (Kilograms)*** **Netherlands** export to other countries..



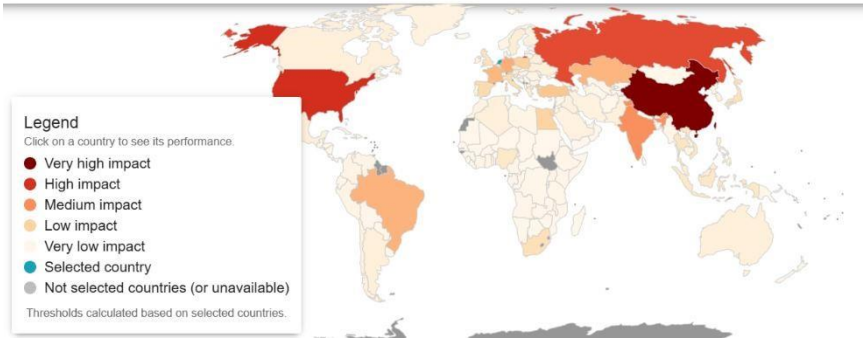
How consumption in **Netherlands** is generating ***Nitrogen*** in other countries.



How much ***ODA (million US dollars)*** is allocated by **Netherlands** to other countries.



How consumption in **Netherlands** is generating ***NOx emissions*** in other countries.



Annex 3 GCS Index and its indicators

Subpillar	Indicator	Spillovers	Unit	Description	Input Data Sources
Aerosols	Domestic SO_2 emissions	X	kg/capita	SO_2 emissions embodied in domestic production of goods and services for domestic consumption and export.	EDGAR 6.1 (European Commission Joint Research Centre, 2019)
	Domestic NO_X emissions	x	kg/capita	Nitrogen oxides (NOX) emissions embodied in domestic production of goods and commodities for domestic consumption and export.	
	Domestic black carbon emissions	x	kg/capita	Black carbon emissions embodied in domestic production of goods and services for domestic consumption and export.	
GHG Emissions	Domestic GHG emissions	x	t CO_2e/capita	Greenhouse gas emissions (CO2, CH4, N2O, FGasses [HFCs, PFCs, SF6]) in CO_2-equivalent embodied in domestic production for domestic consumption and exports.	EDGAR 7.0 (European Commission Joint Research Centre, 2022)
	GHG emissions from land use change		t CO_2e/capita		
	CO2 emissions embodied in fossil fuel exports		t CO_2e/capita	CO_2 emissions embodied in the exports of coal, gas, and oil. Calculated using a 5-year average of fossil fuel exports and converting exports into their equivalent CO_2 emissions. Exports for each fossil fuel are capped at the country's level of production.	UN Comtrade (UN Department of Economic and Social Affairs, 2022)
Terrestrial Biodiversity	Unprotected terrestrial biodiversity sites		%	The mean percentage area of terrestrial Key Biodiversity Areas that is not covered by protected areas and remains at risk.	Birdlife International (2022)
	Unprotected freshwater biodiversity sites		%	The mean percentage area of freshwater Key Biodiversity Areas that is not covered by protected areas and remains at risk.	Birdlife Internatio nal (2022)
	Domestic land use related biodiversity loss	x	global PDF/capita	Fraction of global species that are committed to extinction as a result of domestic anthropogenic land use for crops, pasture, and forestry, for domestic consumption and export.	GLORIA
	Domestic fresh water biodiversity threats	x	spp./million	Number of freshwater species threatened as a result of domestic production of goods and services for domestic consumption and export.	Peterson et al. (2020)
	Domestic deforestation	x	%	Annual tree cover loss due to agricultural commodity production, and the forestry sector. It does not include temporary loss due to wildfires or urbanization.	Iablonovski et al. (2024)
	Domestic export of CITES- listed terrestrial animals	x	WOE/million	Direct export of CITES-listed terrestrial and freshwater species, converted to Whole Organism Equivalents.	CITES Trade Database (UNEP-WCMC, 2022)
	Red List Index of species survival		scale 0 to 1	The change in aggregate extinction risk across groups of species. The index is based on genuine changes in the number of species in each category of extinction risk on The IUCN Red List of Threatened Species.	IUCN (2022)
	Biodiversity Habitat Index		scale 0 to 1	Estimates the effects of habitat loss, degradation, and fragmentation on the expected retention of terrestrial biodiversity. CSIRO calculates the BHI from remote sensing data and other studies of ecological diversity. A score of 100 indicates that a country has experienced no habitat loss or	CSIRO

				degradation, and a score of 0 indicates complete habitat loss.	
Marine Biodiversity Loss	Unprotected marine biodiversity sites		%	The mean percentage area of marine Key Biodiversity Areas that is not covered by protected areas and remains at risk.	Birdlife International (2022)
	Domestic marine biodiversity threats	x	spp./million	Number of marine species threatened as a result of domestic production of goods and services for domestic consumption and export.	Peterson et al. (2020)
	Domestic export of CITES- listed marine animals	x	WOE/million	Direct export of CITES-listed marine species, converted to Whole Organism Equivalents.	CITES Trade Database (UNEPWCMC 2022)
	Domestic vulnerable marine animals	x	tonnes/capita	Catch of marine species within a country's EEZ classified as vulnerable (or unable to be classified due to insufficient reporting).	*Sea Around Us*
	Fish caught from overexploited or collapsed stocks		%	The percentage of a country's total catch, within its EEZ, that is comprised of species that are overexploited or collapsed.	*Sea Around Us*
	Fish caught by trawling		%	The percentage of a country's total fish catch caught by trawling.	*Sea Around Us*
Nutrient cycle	Sustainable Nitrogen Management Index		scale 0 to 1.4	The Sustainable Nitrogen Management Index is a one-dimensional ranking score that combines two efficiency measures in crop production: Nitrogen Use Efficiency and land use efficiency (crop yield).	Zhang Lab at University of Maryland
	Domestic Hypoxia from coastal eutrophication	x	kg/capita	Excessive reactive nitrogen emissions (NH3, NOx, and NO3-) from agriculture, transport, and industrial sectors, which are aimed at both domestic consumption and export, and their detrimental effects on coastal water eutrophication.	Berthet et al. (2024)
Water Cycle	Domestic scarce water consumption	x	m^3 H_2Oeq./capita	Volume of scarce water embodied in domestic production of goods and services for domestic consumption and export.	GLORIA
	Domestic water stress	x	m^3 H_2Oeq./capita	Volume of water stress-weighted blue water use embodied in domestic production of crops for domestic consumption and export.	GLORIA

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