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Identifying and assessing subsidies and other incentives harmful to biodiversity: A comparative review of existing national-level assessments and insights for good practice

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A comparative review of existing national-level assessments and insights for good practice

Environment Working Paper No. 206

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Abstract

Despite calls for the reform of incentives, including subsidies, harmful to biodiversity, including under the Convention on Biological Diversity and its 2011-2020 Aichi Targets, very few countries to date have undertaken what is considered the first step in this process, namely, to identify and assess the types and magnitudes of any incentives in place at the national level which are harmful for biodiversity or the environment more broadly.

This paper begins with a brief literature review on subsidies harmful to biodiversity, followed by a detailed review and comparison of the existing national level studies to identify and assess subsidies and other incentives harmful to biodiversity or the environment. The report concludes with guidance and good practice insights to identify and assess subsidies and other incentives harmful to biodiversity, at national level.

Key words: Biodiversity, biodiversity harmful subsidies and incentives, environmentally harmful subsidies.

JEL codes: Q01, Q5, Q57, Q58

Résumé

En dépit des appels à réformer les subventions et autres incitations préjudiciables à la biodiversité, notamment dans le cadre de la Convention sur la diversité biologique et de ses objectifs d'Aichi 2011-20, très peu de pays ont jusqu'à présent engagé des études pour repérer les incitations éventuellement en place au niveau national qui nuisent à la biodiversité ou à l'environnement plus généralement, et en évaluer la nature et l'ampleur.

Ce document s'ouvre sur un bref passage en revue des publications sur les subventions dommageables pour la biodiversité, qui est suivi d'un examen détaillé et d'une comparaison des études déjà menées au niveau national pour recenser et évaluer les subventions et autres incitations préjudiciables à la biodiversité ou à l'environnement. En conclusion, il présente des orientations et esquisse de bonnes pratiques pour identifier et évaluer les subventions et autres incitations dommageables pour la biodiversité au niveau national.

Mots clés: biodiversité, subventions et incitations dommageables pour la biodiversité, subventions préjudiciables à l'environnement.

Classification JEL: Q01, Q5, Q57, Q58

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Executive Summary

Government support, including subsidies, is pervasive in countries around the world. Each year governments transfer the equivalent of at least USD 800 billion in support to a variety of economic sectors. Much of this support is potentially environmentally harmful – and could be market distorting. Despite international calls for incentives, including subsidies, harmful to biodiversity to be eliminated or reformed, only very few countries have embarked on the first step in this process, which is to undertake a national level study to identify and assess incentives, including subsidies, that are harmful to biodiversity.

This report aims to provide an in-depth analysis of the existing national level studies that have identified and assessed incentives, including subsidies, harmful to biodiversity (or the environment) and to provide good practice insights for governments wishing to undertake similar national level studies. The report begins with a brief review of the literature on incentives, including subsidies, harmful to biodiversity. It then proceeds, for the first time, to provide a comparative analysis of the relatively few national analytical studies that have been undertaken to date, to identify and assess subsidies and other government support harmful to biodiversity (or the environment more broadly). The report concludes with good practice insights and guidance on the key steps necessary to undertake such a national analytical study. It is intended for any government that wishes to undertake a similar study of their own for the first time, also in line with on-going calls under the Post-2020 Global Biodiversity Framework of the Convention on Biological Diversity.

About 23 studies have been undertaken that aim to identify and assess subsidies and other incentives that are harmful to biodiversity or to the environment. These span 12 countries (Austria, Denmark, Finland, France, Germany, Ireland, Italy, Lithuania, the Netherlands, Norway, Sweden and Switzerland) and two regions (Nordic and EU). Most of these studies examine environmentally harmful subsidies, with only 8 focussing on biodiversity. The studies vary in the sectors covered (though this is not related to whether the study focuses on biodiversity or on the environment) – with nearly all studies covering agriculture, fisheries, and many covering the transport and tourism sectors, among others; the types of subsidies and other incentives that are included in the scope; and the approaches used in various steps of the analysis (e.g. desk research, surveys and interviews, workshops).

Drawing on the literature review and on the approaches used in the national analytical studies, the report recommends that four key steps are undertaken in conducting such a national analytical study: 1) Scoping, to define the types of subsidies and other incentives harmful to biodiversity to be covered; 2) Screening, to identify the subsidies and other incentives potentially harmful to biodiversity; 3) Data gathering; and 4) Assessing the extent of harm to biodiversity.

Together, these steps would allow governments to then select which subsidies and other incentives harmful to biodiversity they prioritise for reform, and to proceed sequentially as needed. This will entail understanding the effects of reform on economic, social and environmental indicators, learning from past examples of reform and developing realistic reform plans that address the needs of the poorest.

1 The need to reform incentives, including subsidies, harmful to biodiversity

1.1. International context, including the Convention on Biological Diversity

Available data indicate that government support to different economic sectors is pervasive throughout countries worldwide. Every year, countries transfer billions in government support – including subsidies - to different economic sectors. Much of this support is potentially environmentally harmful. Government support distorts prices and resource allocation decisions, altering the pattern of production and consumption in an economy. As a result, government support, including subsidies, can have negative effects on the environment that are unforeseen, undervalued or ignored in the policy process. For example, agricultural support can lead to the overuse of pesticides and fertilizers, and in fisheries to the overexploitation of fish stocks. Fuel tax rebates and low energy prices stimulate the use of fossil fuels and greenhouse gas emissions and subsidies for road transport increase pollution (OECD, 2005[1]).

Not all types of government subsidies, however, are bad for the environment. Some subsidies are used to generate environmental benefits, such as payments to farmers to plant trees to reduce agricultural run-off or maintain ecosystems (OECD, 2005[1]).

Recent estimates indicate that government support, including subsidies, that are environmentally harmful and market distorting totals more than USD 800 billion a year (OECD, 2021[2]).[1] This support and other subsidies that can have large environmental footprints are summarised in Table 1.1. In contrast, global finance mobilised to promote biodiversity conservation and sustainable use (covering domestic and international, public and private finance) has been estimated at about USD 78-91 billion (2015-17 average) (OECD, 2020[3]).

The UN Convention on Biological Diversity (CBD) has long recognised the need to address incentives, including subsidies, harmful to biodiversity. The 2011-2020 Aichi Biodiversity Target 3 called, by 2020, for the elimination, phasing-out or reform of incentives, including subsidies, which are harmful to biodiversity, as well as the development and application of positive incentives for the conservation and sustainable use

[1] This is based on government support to the production and consumption of fossil fuels which, according to OECD-IEA estimates, totalled USD 478 billion in 2019 based on data across 81 economies, and that more than half of the government support to agricultural producers (USD 345 billion in 2017-2019 average) is provided in ways that are most harmful to the sector's sustainability – based on data across 54 economies. An earlier OECD report (OECD, 2020[3]) reported these totalled at least USD 500 billion a year, based on government support to fossil fuels at USD 340 billion in 2017 (based on data across 76 economies) and government support to agriculture producers provided in ways that are most harmful to the sector's economy at USD 116 billion in 2017, across OECD countries only.

of biodiversity.[2] In 2014, Parties to the CBD adopted a timeline and milestones for implementing Target 3. According to decision XII/3, by 2016, Parties should have finalised national analytical studies that identify candidates for elimination, phase-out or reform of incentives, including subsidies, harmful for biodiversity, and that identify opportunities to promote the design and implementation of positive incentive measures.[3]

These issues continue to be a focus of the Post-2020 Global Biodiversity Framework (GBF) under the CBD. In the first draft of the Post-2020 GBF, for example, proposed Target 18 stated: "Redirect, repurpose, reform or eliminate incentives harmful for biodiversity, in a just and equitable way, reducing them by at least USD 500 billion per year, including all of the most harmful subsidies…".

While the Global Biodiversity Outlook (GBO-5) (The Convention on Biological Diversity, 2020[4]) found that little progress had been made on Aichi Target 3, to date however, only a very limited number of countries have even undertaken any form of national analytical study to identify incentives, including subsidies, harmful to biodiversity. Examples include France (CAS, 2011[5]), Germany (Umweltbundesamt, 2021[6]); (Zerzawy et al., 2021[7]), Italy (MATTM, 2019) and Switzerland (Gubler, Ismail and Seidl, 2020a[8]).

Meanwhile, calls for action to address environmentally harmful subsidies have also been made across a range of other Conventions and agreements, such as in Sustainable Development Goal Targets 12.c (on fossil fuel subsidies) and 14.6 (on certain forms of fisheries subsidies), the World Trade Organisation and by the G7 and G20 (see (OECD, 2017[9]) for an overview).

This report provides a comparative review of existing national analytical studies to identify and assess incentives, including subsidies, harmful to biodiversity - or the environment, and insights for good practice for any other countries that may wish to undertake similar assessments.[4] The report begins with a brief literature review on biodiversity (and environmentally) harmful support, including subsidies (Section 2). Section 3 presents a systematic compilation and comparative analysis of the scope and methodology adopted in the existing national studies that identify and assess subsidies harmful to biodiversity or the environment. It covers studies conducted in Austria, Denmark, the EU, Finland, France, Germany, Ireland, Italy, Lithuania, the Netherlands, the Nordic Council, Norway, Sweden and Switzerland.[5] Finally, Section 4 provides guidance and good practice insights to identify and assess incentives, including subsidies, harmful to biodiversity at the national level.

[2] For the most recent update on the status and trends on the use of positive incentives, see (OECD, 2021[61]), "Tracking Economic Instruments and Finance for Biodiversity – 2021".

[3] And by 2018 Parties should have finalised policy plans that: identify harmful incentives; provide a prioritised list of measures leading to their eventual elimination, phase-out, or reform; provide a prioritised list of measures leading to the introduction or strengthening of positive incentives; and set out associated timelines and milestones for implementation.

[4] It therefore also responds to CBD COP14, Para 12, which states: "Notes the useful role of national studies to identify harmful incentives and opportunities for removal or reform of harmful incentives, including subsidies, and in scoping and identifying the most effective policy action, invites interested organizations, such as the organizations and initiatives mentioned in the previous paragraph, to consider undertaking a systematic compilation and analysis of existing studies with a view to identifying good-practice methods for identifying harmful incentives and developing appropriate policy responses, and develop a standard or template for such standards as voluntary guidance;"

[5] Annex A reviews the extent to which these studies have identified priorities for reform.

Table 1.1. Support, including subsidies, to activities that can have large environmental footprints

Description	Source	USD Billion/year
Support measures for production and consumption of fossil fuels	OECD/IEA	351 billion in 2020 (81 major economies)
Water supply and sanitation	Andres et al. (2019)	320 billion (year n/a) (global, excluding China and India)
Support to agricultural production considered potentially most environmentally harmful and market distorting	OECD (2020)	112 billion in OECD countries. 345 billion across 54 economies (annual average 2017 – 19)
Support to fisheries	OECD (2020)	9.4 billion (annual average 2016-2018) of which 3.2 spent on policies that reduce costs of inputs (39 countries)

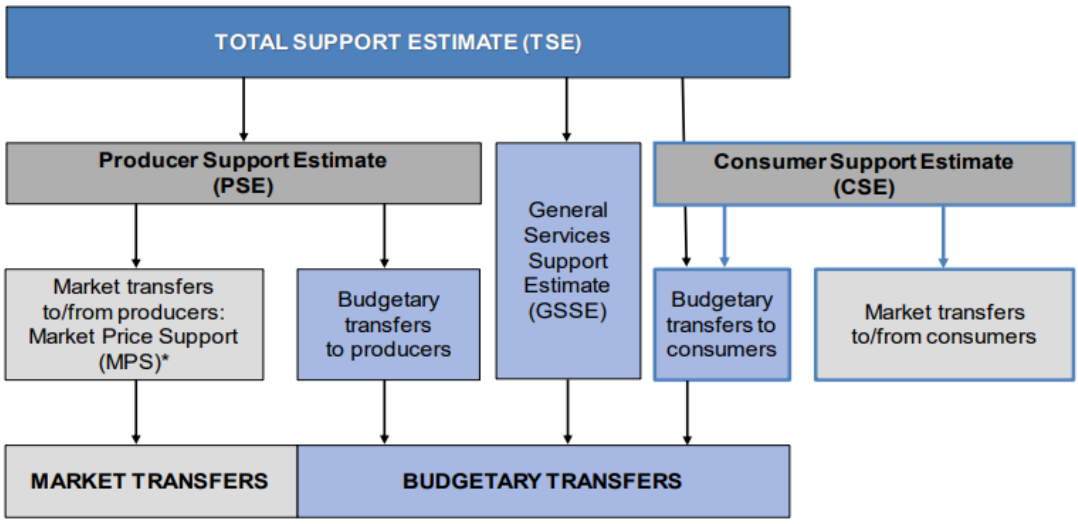
Note: OECD work prefers and uses exclusively the term "support" rather than subsidies to refer to the contents of the Producer Support Estimates (PSE) – for agriculture, the Fisheries Support Estimates (FSE) databases and the Inventory of Support Measures for Fossil Fuels, at least in part to avoid becoming entangled in the debate over subsidy definitions. Not every support policy in the FSE, for example, would be considered a subsidy in the WTO sense (OECD, 2017[10]).

Sources: OECD/IEA www.oecd.org/fossil-fuels/; (Andres et al., 2019[11]), "Doing More with Less: Smarter Subsidies for Water Supply and Sanitation." World Bank, Washington, DC.; OECD (2020), OECD Secretariat calculations based on OECD Producer and Consumer Support Estimates, OECD Agricultural Statistics (database), http://dx.doi.org/10.1787/agr-pcse-data-en; (OECD, 2020[12]), OECD Review of Fisheries 2020, based on OECD Fisheries Support Estimates (database).

Box 1.1. OECD data on government support including subsidies

It is important to note that the OECD data on government support to agriculture includes but is not limited to subsidies. The fraction of total government support to agriculture that is potentially environmentally harmful and market distorting includes various policy measures, including market price support.[6] Market price support is not a budgetary transfer (see Figure 1.1). As such, market price support cannot be repurposed or redirected. It can however be eliminated or reformed.

Figure 1.1. Structure of OECD agricultural support indicators



Note: *Market Price Support (MPS) is net of producer levies and excess feed cost.

Source: OECD (2021), Agricultural Policy Monitoring and Evaluation 2021: Addressing the Challenges Facing Food Systems, OECD Publishing, Paris, https://doi.org/10.1787/2d810e01-en (Figure 1.7).

[6] Further work to examine the environmental impacts of MPS with limits on production would be merited.

2 Incentives, including subsidies, harmful to biodiversity – and the relation to the "environment"

2.1. A literature review on incentives, including subsidies, harmful to biodiversity

The literature on subsidies and other incentives harmful to biodiversity is gradually increasing over time (OECD, 2003[13]); (OECD, 2005[1]); (TEEB, 2009[14]); (SCBD, 2011[15]); (Withana et al., 2012[16]); (Oosterhuis and ten Brink, 2014[17]); (OECD, 2017[18]); (OECD, 2019[19]) (OECD, 2021[2]). The literature has examined various aspects, ranging from how subsidies can impact biodiversity (Box 2.1 and Table 2.1), to how they can be identified (OECD, 2005[1]); (Withana et al., 2012[16]) and insights on how they can be addressed (OECD, 2005[1]); (OECD, 2017[18]).

The OECD also releases annual updates of the Agriculture Policy Monitoring and Evaluation publication (e.g., (OECD, 2021[20])) and the fossil fuel inventory and biennial updates of the Review of Fisheries reports, which inter alia quantify government support to these various sectors. In terms of reform efforts, the OECD provides the Secretariat for the G20 voluntary peer review of the reform of inefficient fossil fuel subsidies, and provides updates on progress (e.g., (OECD/IEA, 2021[21]) and insights on reforming fossil fuel subsidies (Elgouacem, 2020[22]). In the context of fisheries, examples of national experiences of and insights for reform are covered in (OECD, 2011[23]) and (OECD, 2020[12]).

In the studies that focus more specifically on biodiversity harmful subsidies, the sectors generally covered include agriculture, fisheries, water, energy and transport (Withana et al., 2012[16]), building on (TEEB, 2011; (Oosterhuis and ten Brink, 2014[17])). Other sectors that have been referred to include forestry or industrial forest plantations (ODI, 2015[24]); (Bull et al., 2006[25]), and indirect impacts on biodiversity from subsidies encouraging soil sealing or urban sprawl (Oosterhuis and ten Brink, 2014[17]). The types of impacts that can arise are briefly described below.

Box 2.1. How certain subsidies and other incentives lead to potentially harmful effects on biodiversity

Certain subsidies can impact negatively on biodiversity in many different ways, directly and indirectly, at different geographic scales, and over different time periods. Direct adverse impacts can occur when forested land is converted to biofuel crops, for example, or roads are built in biodiversity rich areas. Indirect effects include climate change which then impact biodiversity, or indirect land use change (ILUC) related to biofuels targets and subsidies. Impacts can be immediate (e.g. land conversion, road build, oil spills), arise over time (e.g. pollution loading leading to critical ecological thresholds being passed in due course, eutrophication events), and/or spread over many years (e.g. fisheries capacity growth, increased fossil fuel consumption) and felt acutely only by subsequent generations. Impacts can occur locally (e.g. subsidies for road building), regionally (e.g. subsidy for hydrological power generation using dams on rivers), nationally (e.g. peatland conversion leading to loss of habitats, ecosystems or species of national importance), internationally (e.g. resource extraction impacts, or water subsidies in water stressed cross border river basins), and globally (e.g. climate change).

Overall impacts may be less clearly negative, for instance, where the incentive creates both positive and negative impacts (e.g. a hydro power plant mitigating the impacts of climate change) or due to the existence of policy filters (e.g. cross compliance requirements in the case of agricultural subsidies). On the other hand, some subsidies may appear at first sight benign but may in fact have negative effects, depending on their design or how beneficiaries respond to them (e.g. subsidies for modernisation and decommissioning of fishing fleets).

The range and complexity of the impacts underlines the importance of assessing carefully the effects of new subsidies and the need for any assessment of reform options to take a sufficiently wide look at the benefits of reform.

Source: (Withana et al., 2012[16]).

Table 2.1. Examples of biodiversity-related impacts of various potentially harmful support and subsidies

Description of support or subsidy	Channels for environmental harm	Impacts on biodiversity
Agricultural support	Incentives for farmers to grow water-inefficient crops.	Salinisation, water-logging and/or decline in groundwater tables leading to changes in local ecosystems
Pesticide subsidies	Overuse of pesticides and inefficient application	Pesticides contaminate groundwater aquifers and impact ecosystems.
Fertilizer subsidies	Overuse of fertilizer and inefficient application leading to fertilizer leaching and loss to the atmosphere.	Direct impacts on ecosystems, impaired air quality, climate change and stratospheric ozone
Water subsidies	Overuse of water. Use of inappropriate technologies.	Depletion of water bodies leading to habitat destruction. Salinization and water-flow problems
Fisheries support	Overcapacity, increased fishing effort, illegal, unreported and unregulated fishing	Overfishing and depletion of stocks, marine habitat destruction
Energy and mining	Increase in greenhouse gas emissions; pollution	Climate change as a key pressure on biodiversity loss; habitat fragmentation, ecosystem degradation
Transport	Transport infrastructure such as roads, and greenhouse gas emissions	Habitat fragmentation, ecosystem degradation, climate change
Forestry	Enhanced forestry capacity and increased consumption	Primary forest loss and ecosystem degradation
Infrastructure	Soil sealing, urban sprawl	Habitat fragmentation, ecosystem degradation

Source: Based on (OECD, 2003[13]); (Sur, Umali-Deininger and and Dinar, 2002[26]); (Bull et al., 2006[25]); (ODI, 2015[24]).

2.1.1. *Agriculture*

Agriculture subsidies, when they lower input costs and/or enhance output prices, can have an impact on intensification and extensification. Intensification can imply greater levels of input such as fertilisers, pesticides, other chemicals, irrigation or more mechanisation. This can have various impacts on biodiversity such as the loss of non-target species (pollination from bees), grasslands, wetlands, eutrophication of various ecosystems, and soil degradation and erosion (TEEB, 2009[14]); (Sud, 2020[27]). Extensification may lead to the conversion of more natural land into agricultural land through land use change. For an earlier review, see (OECD, 2003[13]). Further, agricultural support may influence cropping choices (spatial and temporal diversity), tillage practices, frequency and type of crop rotations, farm entry and exit decisions, all of which may impact biodiversity. The relationship between agricultural support policies (adapted from the OECD Producer Support Estimate (PSE) classification) and a selection of environmental impacts is analysed in a range of country settings, using a farm-level and a market-level model. Based on the analyses, market price support and payments based on unconstrained variable input use were the most environmentally harmful among the various PSE measures (Henderson and Lankoski, 2019[28]). For more information, see (OECD, 2021[20]).

2.1.2. *Fisheries*

Fisheries support can lead to increased fishing effort, over-capacity and can encourage illegal, unreported and unregulated (IUU) fishing (OECD, 2017[29]), (OECD, 2020[12]), (World Bank, 2016[30]). When this is the case, fisheries support can play a role in the depletion of fish stocks, as well as marine habitat destruction (e.g. via bottom trawling), and by-catch of non-target species (also of seabirds, (Wilcox and Donlan, 2007[31]) (OECD, 2017[29]). The prohibition, by 2020, of certain forms of fisheries subsidies that contribute to over-fishing, over-capacity and IUU fishing has been called for under Sustainable Development

Goal 14.6. Negotiations are on-going at the World Trade Organization to establish multilateral disciplines on such subsidies, with partial agreement reached at the 12th session of the Ministerial Conference in June 2022. It is important to note that "the management system in place can address the negative effects of certain subsidies (e.g. setting a total allowable catch and allocating individual transferable quotas limits overfishing and excessive capital investment), but only when it is effective, enforced and provides the right incentive to fishers to operate at an optimal level of capital investment and effort." (OECD, 2017[29]).

Payments based on the use of variable inputs, in particular fuel, are found to be the most likely to provoke increased fishing effort, while payments based on fixed capital formation, such as support for vessel construction, are most likely to encourage increased capacity. Support to fishers' income has a more indirect and potentially weaker distortionary impact on capacity and effort but it still has the potential to result in increases in fishing effort and capacity and harmful impact on associated fish stocks. Support that contributes to ensuring that fisheries resources are appropriately managed and that regulations are enforced, can be instrumental in reducing the harmful impacts of fishing (OECD, 2017[29]; OECD, 2020[12]).

2.1.3. *Water abstraction or use*

Below-cost pricing of water provision can lead to over-use and wastage, and exacerbate problems of over-abstraction and pollution. While pricing structures for municipal and industrial water services increasingly reflect the full costs of providing the services, agricultural water use – primarily for irrigation – remains heavily subsidised, which encourages inefficient use of often scarce resources in some regions (OECD, 2003[13]), and can have adverse impacts on wetlands (though surface and groundwater extraction), wildlife and landscapes (Verones et al., 2013[32]). (OECD, 2021[33]) reviews water policy performance and governance among OECD countries, including subsidies of various kinds.

2.1.4. *Energy and mining*

Energy subsidies (e.g., for fossil fuels, biofuels) can lead to both direct and indirect impacts on biodiversity. Direct impacts may include greater number of oil spills (due to enhanced capacity) with major ecological impacts; and impacts to migratory birds from power lines and wind farms. Indirect impacts include those via climate change, which is a growing pressure on biodiversity. Adverse impacts of mining can include contamination of soil, groundwater and surface water and ecosystems by chemicals, damage and degradation of forests (CBD, 2018[34]); (Giam, Olden and Simberloff, 2018[35]).

2.1.5. *Transport*

Subsidies to transport can also have direct and indirect impacts on biodiversity. Transport infrastructure such as roads, for example, can result in forest or other forms of habitat fragmentation, and noise pollution. Shipping can result in excess underwater noise, pollution and direct impacts of vessels on animals. Indirect impacts such as increasing GHG emissions, which cause climate change, are a pressure on biodiversity. Generally speaking, it is important to make a distinction between public passenger transport and rail freight versus private passenger transport, road haulage and air transport.

2.1.6. *Forestry*

Certain subsidies that increase investment in the forestry sector may lead to increased forest loss by: enabling inefficient logging companies to operate profitably; reducing government revenues, thereby reducing funds available to invest in activities that could promote sustainability; reducing the price of forest products, which stimulates increased consumption; encouraging companies to log, unsustainably because of greater than normal profits (ODI, 2015[24]). In a literature review of timber plantations and their role in forest conservation, (Pirard, Dal Secco and Warman, 2016[36]) find that the role of subsidies is ambiguous. This is because while they give plantations an active role in conservation as their establishment can occur

before natural forest scarcity reaches a critical level, they can also artificially lower prices and hence may have repercussions for rebound in wood demand, lower production costs in remote forests or even for agriculture, leading to forest conversion (e.g. energy subsidies). Intensive management of timber production may result in trade-offs especially with local ecosystem services, such as water purification and regulation, nutrient cycling, soil maintenance, genetic diversity maintenance, recreation and possibly cultural values (Baral, Guariguata and Keenan, 2016[37]). Poorly designed forest subsidies can also lead to monocrop plantations (Heilmayr, Echeverría and Lambin, 2020[38]).

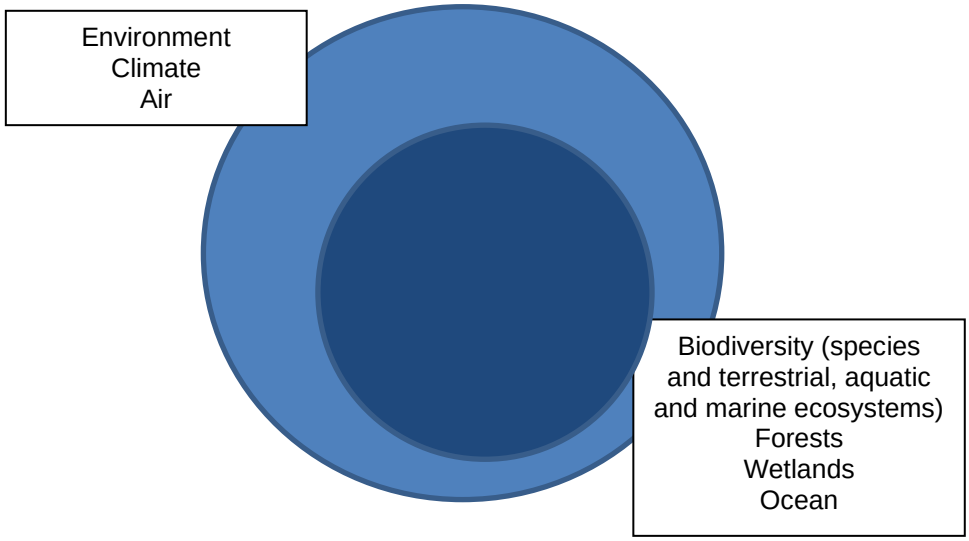
2.1.7. *Infrastructure and other subsidies encouraging soil sealing and urban sprawl*

Subsidies that encourage soil sealing and urban sprawl more generally can also adversely impact biodiversity. These may include subsidies for housing and other construction projects on undeveloped land and green areas, commuter bonuses that may indirectly favour urban expansion and require a larger transport network, and municipal budgets depending mainly on urbanisation fees by virtue of which more soil sealing means more revenues for local authorities (EU, 2012[39]).

2.2. Biodiversity vs. environmentally harmful subsidies

Most of the national-level studies undertaken to date to identify and assess harmful subsidies focus on the environment rather than on biodiversity. While the studies do not tend to provide a definition of what is meant by environment or biodiversity, categories that are covered in studies examining environmentally harmful subsidies (EHS) include waste, pollution, resource use, land and water. These categories are also relevant to biodiversity. A stylised representation of the relationship between biodiversity and the environment is depicted in Figure 2.1. While climate is categorised here as outside the scope of biodiversity, it is important to note that climate change is one of the five key pressures on biodiversity loss (Díaz et al., 2019[40]). As such, subsidies that lead to larger greenhouse gas emissions, for example, will also indirectly impact on biodiversity. The Swiss (Gubler, Ismail and Seidl, 2020a[8]) and German (BfN, 2019[41]) studies on biodiversity harmful subsidies, for example, also cover energy subsidies.

Figure 2.1. A stylised figure on "biodiversity" and the "environment"



Source: Authors.

3 A comparative analysis of existing national studies to identify and assess subsidies harmful to biodiversity or the environment

Several countries have undertaken national level studies to identify and assess biodiversity harmful subsidies or, more broadly, environmentally harmful subsidies - where biodiversity is either explicitly or implicitly included. This section compares the context and background, scope and approaches adopted in these national level assessments.

3.1. National level analytical studies: context and background

A search for national level assessments of potentially biodiversity or environmentally harmful subsidies resulted in a set of 23 studies, covering 12 countries and two regions (EU and the Nordic countries). Of the 23 studies, eight cover subsidies harmful to biodiversity, one focuses on climate, and 15 focus on subsidies harmful to the environment (Table 3.1).[7] The great majority of studies – 21 in all – are official documents published either by governments, commissions established by the government, or state agencies and research institutions. Two studies published by NGOs are also included for the insights they provide on methodological issues. The context and background of these studies is briefly described to provide a better understanding of why they were undertaken and what their purpose was.

Table 3.1. Existing national level studies on environmentally and biodiversity harmful subsidies

Country	Study	Date	Organisation	Scope (biodiversity / environment)
Austria	List of perverse incentives and subsidies (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2019)	2019	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology	Environment
Denmark	Environmentally harmful subsidies (IMV, 2005)	2005	Environmental Assessment Institute	Environment
European Union	EU subsidies for polluting and unsustainable practices (Usubiaga et al., 2011[42])	2011	Study commissioned by the European Parliament	Environment

[7] The 2019 version of the Italian catalogue includes a chapter on biodiversity that provides a conceptual framework for subsidies harmful to biodiversity. An inventory of environmentally harmful and friendly subsidies in Flanders was also developed in 2013 (Franckx and et al., 2013[71]), though it is not reviewed in this report.

	Study supporting the phasing out of environmentally harmful subsidies (Withana et al., 2012[16])	2012	Institute for European Environment Policy on behalf of the European Commission, DG Environment	Environment
Finland	Budget review 2019 (Finnish Ministry of Finance, 2018[43])	2018	Ministry of Finance	Environment
	Subsidies harmful to biodiversity (Ympäristöministeriö 2015)	2015	Ministry of the Environment	Biodiversity
France	Les aides publiques dommageables à la biodiversité / Public incentives that harm biodiversity (Sainteny et al., 2011[44])	2012	Centre d'analyse stratégique	Biodiversity
	Green Budgeting: Proposition de méthode pour une budgétisation verte (Alexandre et al., 2019[45])	2019	General Inspectorate of Finance (IGF) and the General Council for the Environment and Sustainable Development (CGEDD)	Environment
	Rapport sur l'impact environnemental du budget de l'État / Report on the environmental impact of the public budget	2021	Ministry of Finance and Ministry of Ecological and InclusiveTransition	Environment, incl. biodiversity
Germany	Umweltschädliche Subventionen in Deutschland: Aktualisierte Ausgabe 2018 (Umweltbundesamt, 2021[6])	2021	Umweltbundesamt / Federal Environment Agency	Environment
	Reduction of environmentally harmful subsidies and compensatory payments for agricultural pollutants – Economic instruments for biodiversity conservation (Schlegelmilch, 2020[46])	2020	Federal Agency for Nature Conservation	Biodiversity
	Environmentally Harmful Subsidies in Germany: Focus on Biodiversity. How harmful incentives endanger biological diversity (Zerzawy et al., 2021[7])	2021	Forum Ökologisch-Soziale Marktwirtschaft (FÖS) on behalf of Deutscher Naturschutzring (DNR)	Biodiversity
Ireland	Fossil Fuel and Similar Subsidies 2012-2016 (CSO, 2016[47])	2016	Central Statistics Office	Environment
	The Environmental Impact of Fiscal Instruments (Morgenroth, Murphy and Moore, 2018[48])	2018	Economic and Social Research Institute	Environment
Italy	Catalogo dei Sussidi Ambientalmente Favorevoli e dei Sussidi Ambientalmente Dannosi 2018 (Catalogue of Environmentally Friendly and Environmentally Harmful Subsidies 2018) (MATTM, 2019[49])	2019	Ministry of the Environment, Land & Sea	Environment, with a chapter on biodiversity
Lithuania*	Aplinkai Žalingu Subsidiju Ivardinimas, Ju Vertes Bendroje Šalies Mokesciu Sistemoje Nustatymas. Aplinkai Žalingu Subsidiju Nustatymo Metodikos Parengimas/ Designation of "environmentally harmful subsidies and their value in a common country tax system. Establishment of a methodology to determine environmentally harmful subsidies (Smart Continent, 2014)	2014	Smart Continent on behalf of the Ministry of the Environment	Environment
Netherlands	Environmentally harmful subsidies (Drissen, Hanemaaijer and Dietz, 2011[50])	2011	PBL Netherlands Environmental Assessment Agency	Environment
Nordic Council	The Use of Economic Instruments in Nordic Environmental Policy 2010–2013 (Bragadóttir et al., 2014[51])	2014	Study prepared for the Nordic Council of Ministers	Environment
Norway	Kartlegging av StØtteordninger med negative konsekvenser for naturmangfold (Magnussen et al., 2020[52])	2020	Menon Economics for the Ministry of Environment	Biodiversity
Sweden	Potentiellt miljöskadliga subventioner 2 (Naturvårdsverket 2017)	2017	Swedish Environmental Protection Agency	Environment
	Avskaffa klimatskadliga subventioner (Naturskyddsföreningen, 2018)	2018	Swedish Society for Nature Conservation	Climate
Switzerland	Rapport du Conseil fédéral sur le classement de la motion 06.3190 (Studer Heiner) du 8 mai 2006: Ecologisation de la fiscalité et des subventions (Swiss Federal Council, 2013)	2013	Swiss Federal Council	Environment
	Biodiversitätsschädigende Subventionen in der Schweiz (Gubler et al., 2020a)	2020	Swiss Federal Institute for Forest, Snow and Landscape Research WSL	Biodiversity

Note:* This report does not seem to be in the public domain.
Source: Authors.

In Austria, the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2019) published a list of environmentally harmful incentives and subsidies.[8] The list draws on previous studies including those undertaken by the (Umweltdachverband, 2014[53]) and the Austrian Institute of Economic Research (Kletzan-Slamanig and Koppl, 2016[54]). The Umweltdachverband (2014) report was an update on its previous report in 2010 and covers environmentally harmful subsidies in transport, resource use and industry. Subsidies for agriculture are not covered. Since direct payments or agri-environmental payments may have directly positive environmental effects, the report argues that is difficult to identify such subsidies as clearly harmful to the environment. The survey provides a factual compilation and offers reform options that also consider the social aspects. The study undertaken by Austrian Institute of Economic Research focuses on the environmental impacts of direct subsidies or tax measures at the federal level in the areas of energy production and use as well as transport.

In Denmark, a study by the Institut for Miljøvurdering (Environmental Assessment Institute) is the earliest included in this review (IMV, 2005[55]). It sets out to inform those involved in environmental policymaking about the concept of harmful or perverse subsidies. It consists of two parts: the first part discusses definitions and the theoretical background, whereas the second part looks at empirical examples of the use of subsidies in different sectors and the linkages to environmental damage. The examples cover agriculture, fishery, energy production, transport, water and forestry. The environmental consequences of providing subsidies in the different sectors are described qualitatively and by means of empirical examples. Policy options for how to approach the reduction of harmful subsidies are also discussed.

In the European Union, the EU's 6th Environmental Action Programme, adopted in 2002, recognised that the identification and, where possible, removal of EHS is a first step towards correcting prices and reducing subsidies' potential negative effects on the environment (European Union, 2002). The need to phase out EHS was reiterated in the Roadmap to a "Resource Efficient Europe" [COM(20111)571] which includes a milestone that 'by 2020 EHS will be phased out, with due regard to the impact on people in need'. A study by (Withana et al., 2012[16]) supported the European Commission (DG Environment) in implementing the call in the resource efficiency roadmap to phase out EHS by 2020. The study focuses specifically on EHS at the level of EU Member States; it identifies key types of EHS and examines cases of existing EHS across a range of environmental sectors and issues. Through research and consultation with experts, the study team identified over 80 cases of EHS in EU Member States, of which 24 case studies are examined in depth. The study also analyses examples of good practices in the reform of EHS in EU Member States and the lessons that can be learnt from these cases. Finally, based on this analysis, it develops practical recommendations on phasing out and reforming EHS to support the objectives of the Europe 2020 Strategy and the resource efficiency agenda.

A study by (Usubiaga et al., 2011[42]) examined subsidies for polluting and unsustainable practices in the EU budget, with a focus on spending on agriculture, structural and cohesion policy, transport and energy, and fisheries. The study was commissioned by the Committee for the Environment, Public Health and Food Safety of the European Parliament. The report provides an overview of the environmental relevance of the largest fields of expenditure within the EU budget. Based on existing methodologies, it assesses the sustainability level of key budget items in the EU sectoral policies. It also provides recommendations in the context of a potential reform of subsidies that would contribute to the alignment of the EU budget towards a more sustainable growth path as called for in the EU 2020 Strategy.

Finland has built up considerable experience in identifying and assessing environmentally harmful subsidies. Its first systematic assessment was published by the Ministry of the Environment in 2013, covering the years 2009-2012 (Hyyrynen, 2013[56]). This report identified 400 measures of which 50 were

[8] The list is available on the Ministry's website at www.bmk.gv.at/themen/klima_umwelt/klimaschutz/nat_klimapolitik/kontraproduktiv.html.

examined in detail. The mapping involved any aid that increased production and thus, in principle, increased the environmental burden. A second report published by the Ministry in 2015 looked specifically at biodiversity harmful subsidies (Ympäristöministeriö, 2015[57]). Most recently, Finland's budget proposal in 2019 contains a chapter with a focus on sustainable development. The appropriations included in the budget proposal that promote the goals of the focus area "A carbon-neutral and resource-efficient Finland" were identified. In addition to appropriations and taxes, the chapter contains a section on environmentally harmful subsidies. Environmentally harmful subsidies are estimated to amount to EUR 3.5 billion compared to positive subsidies of around EUR 1.7 billion (Finnish Ministry of Finance, 2018[43]).

In France, the Planning Act on the implementation of the Environment Round Table (Grenelle I, August 2009) explicitly provides that "the State, on the basis of an audit, will review tax measures that are harmful to biodiversity and will propose new tools to allow a gradual transition to a tax regime that will better suit to new environmental challenges." This act prompted the Centre for Strategic Analysis to set up, at the request of the Secretaries of State for Ecology and Planning, a group made up of experts in the field, economists, trade union representatives, businesses, environmental groups and members of Government (Sainteny et al., 2011[44]). The working group adopted a three-phased approach, including a survey of public incentives likely to be harmful to biodiversity; an attempt to describe certain links between public incentives and the loss of biodiversity; and recommendations on reconfiguring public incentives identified as harmful.

In 2020, the French government published its first "Green Budget" as an annex to the 2021 Finance Bill (French Government, 2020). It provides an assessment of the "green" impact of all State budget expenditures; covers tax expenditures; reflects environmental concerns across six areas, including climate change, biodiversity and pollution; and rates expenditures both favourable to and harmful to the environment. The Green Budget was prepared by a working group of representatives from the Ministry of Finance (Budget Directorate, Treasury and Economic Analysis Directorate, Tax Policy Directorate) and the Ministry of Ecological and Inclusive Transition. The working group applied the methodology outlined in a 2019 report prepared by the General Inspectorate of Finance (IGF) and the General Council for Ecology and Sustainable Development (CGEDD) to the whole budget (Alexandre et al., 2019[45]). A further Green Budget was published in 2021 to accompany the 2022 Finance Bill (French Government, 2021[58]).

In Germany, the German Federal Environment Agency has published a series of reports on environmentally harmful subsidies.[9] The 2021 publication is the fifth in the series (Umweltbundesamt, 2021), following earlier reports in 2008, 2010, 2014 and 2017. The report is structured around a sectoral approach identifying EHS in four main sectors: energy supply and use; transport; construction and housing; and agriculture, forestry and fisheries. Each chapter begins with a section providing an overview of the adverse effects of the subsidies on the environment and on human health and resource consumption and is followed by a description of the main environmentally harmful subsidies in the sector in question. The reports also contain a chapter that describes how an eco-oriented subsidy control system can contribute to a systematic reduction in environmentally harmful subsidies and to achieving a sustainable policy on subsidies.

A report by the Federal Agency for Nature Conservation (BfN, 2019[41]) specifically looked at subsidies harmful to biodiversity, and is reviewed below. Another report by Forum Ökologisch-Soziale Marktwirtschaft (FÖS) on behalf of Deutscher Naturschutzring (DNR) also takes stock of those environmentally harmful subsidies in Germany that have a negative impact on biodiversity. It describes in detail examples of particularly significant subsidies from the four areas of mining of raw materials, agriculture, transport and construction. For these, an assessment is made of the extent to which they are

[9] The German Federal Environment Agency webpage on environmentally harmful subsidies contains links to these reports www.umweltbundesamt.de/en/environmentally-harmful-subsidies#direct-and-indirect-subsidies.

harmful to biodiversity. In addition, the share of these subsidies that is harming biological diversity is quantified (Zerzawy et al., 2021[7]).

In Ireland, the Irish Central Statistics Office prepared its first compilation of Potentially Environmentally Damaging Subsidies in the context of the initiative by Eurostat to develop a new module in its environmental accounts on this topic (CSO, 2016[47]). It notes that the United Nations SDGs contain several indicators that are of relevance to environmentally harmful subsidies. Subsequently, these data have been linked to biodiversity loss in a Policy and Institutional Review (PIR) of finance arrangements in Ireland (McGuinness and Bullock, 2020[59]). In addition, this comparative review draws on a research report that identifies environmentally harmful subsidies in Ireland with a specific focus on tax expenditures. This report selected four examples of tax expenditures for a more detailed assessment of their environmental impact (Morgenroth, Murphy and Moore, 2018[48]).

In Italy, the Italian Catalogue of Environmentally Friendly and Harmful Subsidies was developed by the Ministry of Environment, Land and Sea (MATTM) in response to a request by the Italian Parliament, as part of a general effort to analyse and evaluate fiscal erosion due to tax breaks and tax expenditures.[10] The first version of the Catalogue was prepared in 2016 drawing on the technical assistance of Sogesid s.p.a., an in-house environmental consultancy of the Italian Ministry of Environment and Territory and the Ministry of Infrastructure and Transport. The catalogue is updated on an annual basis and the third edition is used for this review (MATTM, 2019[49]). The third edition includes a special chapter devoted specifically to biodiversity harmful subsidies, as does the fourth edition (MITE, 2022[60]).

The Catalogue analyses the subsidies by sector: agriculture, energy, transport, and also covers VAT reliefs and other subsidies, considering both direct subsidies and tax expenditures, with reference to the financial effect in 2018. The evaluation of the identified subsidies was made after internal discussions of the MATTM/Sogesid Working Group and took into consideration findings from the wider scientific literature on this issue. The Ministry of Economy and Finance supported the preparation of the Catalogue through quantitative updates and evaluations connected to the identified tax expenditures.

In 2020 Italy established (Ministerial Decree no. 29 of 5 February 2020) an Interministerial Commission for the study and elaboration of proposals for the ecological transition and for the reduction of environmentally harmful subsidies. The Commission has started the gradual conversion of existing environmentally harmful subsidies (so-called SAD) into environmentally friendly subsidies (so-called SAF, using the Italian acronyms). The ultimate purpose of this process is to redirect the resources already allocated to a specific sector towards "green" solutions that are environmentally sustainable and virtuous, without altering the overall size of the transfers to the sectors and categories currently receiving the benefits. The Commission is required to undertake its work with the full involvement of social partners, local authorities, relevant associations and movements engaged in climate action, universities and researchers. Following a first round of consultations six environmentally harmful subsidies have initially been restructured. The Commission has identified a further seven EHS in the 2018 Catalogue of Environmentally Harmful Subsidies on which it began consultations in 2021.

In the Netherlands, a note by the PBL Netherlands Environmental Assessment Agency provides an overview of the nature and magnitude of environmentally harmful subsidies in the Netherlands (Drissen, Hanemaaijer and Dietz, 2011[50]). It identifies these subsidies and draws on other studies to quantify their magnitude. The paper only briefly discusses the actual effects on nature and the environment of abolishing these subsidies, as it deems the current information to be rather limited and requiring further research. The paper concludes with an overview of the possibilities to abolish a number of these subsidies. It makes a

[10] Article 68 of the Law 28th December 2015, n. 221, “Measures on environmental issue to promote green economy and to reduce the over-consumption of natural resources” (published on Official Journal – General Series n. 13 dated 18th January 2016, entered into force on 2nd February 2016).

distinction between those that can be abolished within the Netherlands and those for which EU agreement and decision-making would be needed or desirable.

Nordic Council. A study commissioned by the Nordic Council examined the use of economic instruments in Nordic environmental policy (Bragadóttir et al., 2014[51]). The study was in two parts. The first part presents an overview of developments in the Nordic countries regarding economic instruments and the second contains a thematic study of environmentally harmful subsidies. This looks at case studies of three EHS and the possibilities to reform them: differential taxation in favour of diesel over petrol in transport; EU direct payments to farmers; and overallocation of allowances in the EU Emissions Trading Scheme. A concluding chapter looks at the political economy surrounding the application of subsidies and presents a method for ranking environmentally harmful subsidies suitable for reform based on their environmental and budgetary effects.

In Norway, a study was completed in 2020 that identifies subsidies harmful to biodiversity (Magnussen et al., 2020[52]). The report was undertaken by Menon economics, in co-operation with the Norwegian Institute for Nature Research, which was contracted by the Norwegian Ministry of Environment along with other relevant ministries. The purpose of the project, beyond following up on Aichi Target 3 under the Convention on Biological Diversity, was to bring forth systematic knowledge on Norwegian subsidy schemes that could have effects on biodiversity.

In Sweden, the Swedish Environmental Protection Agency (SEPA) made its first survey of potentially environmentally harmful subsidies in 2005. It published a follow-up study in 2012 and this was further revised in 2017 (Naturvårdsverket, 2017). This latest survey focuses on three sectors - transport, energy, and agriculture and fisheries. The survey reports on 56 subsidies, of which 8 have been added in the latest update and 3 are brand new, while 15 subsidies that were previously reported are no longer relevant. An appendix to the survey gives specific details on the 56 subsidies that were included. The Swedish Society for Nature Conservation produced a report in 2018 examining subsidies that were damaging to the climate (Naturskyddsföreningen, 2018). This focused entirely on subsidies in the form of tax expenditures that favoured fossil fuel use in Sweden.

In Switzerland, the context for a Swiss Federal Council report on the greening of taxes and subsidies was a parliamentary motion proposed in May 2006 (Heiner Studer, 06.3190) which called for a classical environmental tax reform. Increased taxes would be levied on non-renewable energy and the net proceeds of this tax should be used to decrease the tax burden on labour. Because of popular opposition to this approach to tax reform, the motion was amended in 2010 to require the Federal Council to present a report to Parliament on the effectiveness of the current framework conditions in relation to the sustainable management of natural resources. The resulting report examined the fiscal conditions currently applied to the management of natural resources and identifies environmentally harmful incentives in taxation and Confederation grants as well as considering possibilities for improving the current system (Swiss Federal Council, 2013).

The report was prepared under the direction of the Federal Finance Administration (FFA). Given its thematic focus, it was written in collaboration with the Federal Office for the Environment (FOEN) and with the help of the Federal Tax Administration (FTA) and the Federal Customs Administration (FCA). It is limited to taxation and subsidy interventions of the Confederation, due to the financial autonomy of the cantons. The study examined specific subsidies and tax expenditures in a range of sectors (agriculture and food, national defence, transport and economic development). Based on this initial scoping, it identified a limited number of subsidies in the transport and energy consumption areas for more detailed analysis.

A subsequent report by the Swiss Federal Institute for Forest, Snow and Landscape focused specifically on biodiversity harmful subsidies (Gubler, Ismail and Seidl, 2020a[8]). The purpose of the report was to give a comprehensive overview of biodiversity harmful subsidies in Switzerland, given the alarming trend in biodiversity loss and that country's commitment to phasing out such subsidies in its 2012 Biodiversity Strategy. The study identified 162 subsidies harmful to biodiversity and makes recommendations on how

they can be abolished or reconfigured. These are divided into four categories depending on an evaluation of the severity of their impact on biodiversity.

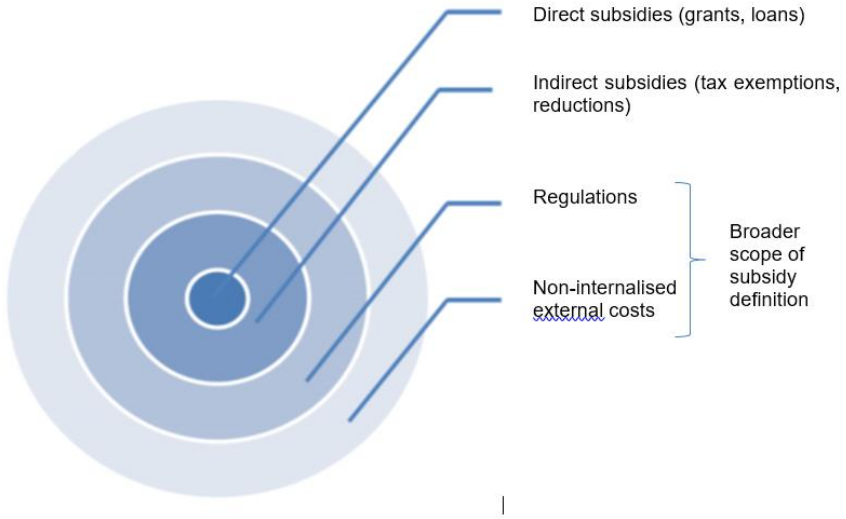
3.2. Review and comparative analysis of the national-level studies

3.2.1. *Scoping – deciding what subsidies to include*

The national assessments under review all use a broad definition of a subsidy to include tax exemptions as well as government expenditures, although with some important differences. While there is no universally accepted definition of a subsidy, the one most commonly used is that of (OECD, 2005[1]) which states “In general, a subsidy is the result of a government action that confers an advantage on consumers or producers, in order to supplement their income or lower their costs” (pg. 16). As this refers to a government action, it does not include non-internalised externalities in its coverage of a subsidy, which is associated with a market failure, rather than a government failure. And, in any case, correcting for non-internalised environmental externalities requires the use of policy instruments such as those covered in (OECD, 2021[61]).

The Austrian national assessment (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2019) builds on two earlier reports by (Umweltdachverband, 2014[53]) and WISO, the Austrian Institute of Economic Research (Kletzan-Slamanig and Koppl, 2016[54]). The Umweltdachverband study discusses the definition of environmentally harmful subsidies. In addition to direct (government expenditure) and indirect (tax expenditures) subsidies, it includes regulations that promote environmentally harmful behaviour. It also discusses whether (non-internalised) external costs should be treated as an (implicit) EHS. While sympathetic to the idea on the basis that “the lack of internalisation of external costs means that environmentally friendly solutions have to accept competitive disadvantages”, the study documents these separately from environmentally harmful subsidies. This is done partly because it recognises that external costs can also include accident costs, health costs, noise or congestion costs and not only environmental costs. The WISO report has a similar discussion of the definition of a subsidy, summarising the different boundaries in a diagram reproduced as Figure 3.1. It highlights the difficulties of putting a monetary value on external costs, pointing to several methodologies used in the economic literature.

Figure 3.1. Different delimitations of the concept of a subsidy in the Austrian national assessment



Source: (Kletzan-Slamanig and Koppl, 2016[54]).

In defining a subsidy, the Danish national assessment (IMV, 2005[55]) recognised the distinction between on-budget (direct grants and payments) and off-budget outlays (through tax policies, infrastructure provision, preferential loans, price regulation and import/export tariffs). While this is referred to as indirect support in this chapter, the Danish study defined a further indirect subsidy impact that impacts producers through market transactions caused by direct subsidies. This further indirect impact operates through higher prices for products or lower prices charged for input goods or services purchased from an upstream industry that is able to discount its prices because of the subsidies it itself receives. It gives, as an example, subsidies that lower agricultural prices that are indirect subsidies to the food processing industry. The study notes that non-internalised externalities could be considered implicit subsidies but it does not include them within the scope of its report, arguing that internalising externalities can be seen as a separate policy area to be targeted by appropriate measures.

The EU assessment (Withana et al., 2012[16]) notes that the OECD definition of a subsidy only encompasses government action (i.e., that confers an advantage to consumers or producers). In some cases non-action, e.g. not applying road pricing to cover costs of roads, not applying VAT on food or excise taxes on certain fuels, or not internalising externalities, leads to prices not reflecting environmental and social costs and hence creates implicit subsidies. While a broad definition (including both full cost pricing and internalisation of externalities) is operationally difficult, the study argues that it is important to recognise that such implicit subsidies exist and can be quite significant in several sectors. Thus, it applies a broader definition of subsidies including, where possible, subsidies resulting from government non-action.

The EU assessment identifies seven different “economic types” of subsidies referring to the specific economic or financial form of a subsidy which may be helpful in identifying subsidies in future national assessments. Working definitions for each of the seven economic types of EHS analysed are provided in the study together with illustrative examples to elaborate each category. The seven types of EHS examined are:

- direct transfers of funds (e.g. coal mining subsidies)
- potential direct transfers of funds (e.g. limited liability for nuclear accidents and oil spills)

- provision of goods or services including specific infrastructure (e.g. a road servicing a single mine or factory)
- provision of general infrastructure (e.g. a highway)
- income or price support (e.g. price premiums for electricity from waste incineration)
- foregone government revenues from tax credits, exemptions and rebates (e.g. from excise duty for fuels, favourable tax treatment of company cars)
- preferential market access, regulatory support mechanisms and selective exemptions from government standards (e.g. feed-in tariffs)
- implicit income transfers from the lack of full cost pricing (e.g. under-pricing leading to incomplete coverage of drinking water costs, charging for road infrastructure)
- lack of full resource pricing (e.g. absence of charges or fees on rock extraction)
- non-internalisation of externalities (e.g. damage to ecosystems from bottom trawling and dredging).

In France, the earlier working group settled on an extensive definition of public incentives harmful to biodiversity that simultaneously includes explicit (direct) subsidies, tax credits, regulatory advantages and the failure to enforce or the partial enforcement of regulations as well as implicit subsidies (Sainteny et al., 2011[44]). However, implicit subsidies are not included in the presentation of the French green budgets (French Government, 2021).

The German national assessment (Umweltbundesamt, 2021[6]) also adopts a broad definition of a subsidy, arguing that it is not sufficient to screen direct subsidies only. It underlines the importance of looking at all forms of policy intervention to cover indirect subsidies as well. In line with OECD (OECD, 2005[1]) Germany's national assessment argues that the definition of indirect subsidies should not be extended to include the non-internalisation of environmental externalities. Although failure to internalise negative environmental externalities places a burden on the environment and society as a whole, it argues that this is a general problem of inadequate environmental policy and is not attributable to targeted concessions for specific parties. Internalisation of environmental externalities is an overriding maxim which goes beyond subsidy policy. Similar to the Danish study, externalities are not covered in the German study.

In Ireland, the (CSO, 2016[47]) assessment included only schemes that were regarded as a subsidy; and were considered potentially environmentally damaging. This study also follows the OECD definition of a subsidy. A subsidy is classified as a potentially environmentally damaging subsidy if it is likely to incentivise behaviour that could be damaging to the environment irrespective of its importance for other policy purposes. Examples of such subsidies include providing fossil fuels at lower prices to certain industries and providing fuel allowances to households to alleviate fuel poverty. Providing fuels at a subsidised price may result in increased emissions through unnecessary use of such fuels. An alternative to household fuel allowances is refurbishment of the property through improved attic, wall, floor, and window insulation.

The later Irish study (Morgenroth, Murphy and Moore, 2018[48]) focused on tax expenditures. Its starting point was the official list of tax expenditures provided by the tax administration (Revenue Commissioners). It used the broader term "fiscal instrument" to encompass both explicit tax expenditures and other fiscal measures that affect the absolute and relative taxation of goods, services and activities. For example, a lower VAT rate is not included in the official list of tax expenditures but clearly might impact on behaviour. It also included implicit subsidies as a fiscal instrument, pointing to cases (such as taxes on the extraction of aggregates) where taxes are employed in other countries but not in Ireland as a form of tax expenditure.

The Italian national assessment (MATTM, 2019[49]) notes that, according to art. 68 of the Law n. 221/2015 "the subsidies are considered in their broader definition and include, among others, incentives, benefits, subsidised loans, exemptions from taxes directly related to environmental protection". The assessment notes that this definition matches the OECD definition and is widely shared by most of the scientific community. The Catalogue divides subsidies into two main categories: direct subsidies (spending laws) and tax expenditures (or indirect subsidies); implicit subsidies due to the failure to internalise external costs

are not included in the national assessment. Nor does the assessment consider the provision by the State of infrastructural goods or services to be a subsidy.

The Netherlands national assessment (Drissen, Hanemaaijer and Dietz, 2011[50]) also notes that the OECD definition of subsidy refers only to active government regulation, not to government inertia that also causes negative environmental impacts. Therefore, non-internalised external costs such as stress on the environment which are not being factored into prices through policy measures are not considered as environmentally harmful subsidies. This study also excludes as outside the scope of the paper the question of whether prices adequately reflect the scarcity balance, or how this could be improved in case they would be found to be inadequate.

The coverage in the Norwegian study was all subsidy schemes and other direct and indirect support schemes in the state budget. In the first step, schemes that obviously did not have insignificant negative consequences for biological diversity were identified. This amounted to approximately 160 subsidy schemes and more than 40 tax and tax exemption schemes. After further examination, 16 schemes were thought to have negative effects, and were evaluated via a simplified assessment. Upon closer assessment of these schemes, some were found to have smaller or more indirect effects on biodiversity than initially assumed during screening. A number of schemes were also assessed collectively by sector (or geographically), e.g. grants that include support for construction and infrastructure, business activities, cultural heritage measures and activities on Svalbard. The study also found that only a few of the schemes have significant, direct negative effects on biodiversity. Also, to a large degree, subsidies have only been provided with requirements regarding environmental considerations in general, not biodiversity in particular. The study finds that there is room for both stricter requirements and more specific requirements to safeguard biodiversity.

The schemes considered most relevant (subsidies and tax reliefs) were assessed more thoroughly in a second stage, among other things with regard to other positive and negative environmental effects and socio-economic consequences of the scheme being phased out or substantially changed.

The 16 schemes considered most likely to be harmful to biodiversity are under:

- The Ministry of Agriculture and Food - 7 schemes across agriculture, forestry and reindeer husbandry.
- The Ministry of Transport - 5 schemes that provide support for road, rail, sea and air transport.
- The Ministry of Climate and Environment - 2 schemes, across predators and climate measures.
- The Ministry of Petroleum and Energy - 1 scheme; flood and landslide prevention.
- In addition, the study assessed the tax benefit scheme “lower limit for ground rent tax”.

The Swiss (2013) national assessment asserts that a tax or subsidy has inappropriate ecological incentives if it has the incidental effect of promoting a harmful behaviour for the environment and therefore has a negative impact on one or more environmental domains (Swiss Federal Council, 2013). The report briefly reviews the state of the environment in Switzerland recognising that in many areas the exploitation of natural resources does not comply with the principles of sustainability. In examining incentives, it covers environmental taxes as well as environmentally harmful subsidies.

A caveat in the Swiss (2013) coverage of subsidies is that the existence of harmful impacts for the environment is considered an inappropriate ecological incentive only if it is an unintended side effect of the tax or subsidy policy. A tax or subsidy is not included if the environmental damage results from the intended goal of the policy. For example, subsidies for the construction and maintenance of road and rail infrastructure are not counted in the inventory, even though they may result in damage to the environment, because such damage is unavoidable to achieve the objective. In the agricultural context, a subsidy can be environmentally harmful if it leads to an increase of the production volume, but only if this increase is not the purpose of the grant.

The Swiss (2020) assessment builds on the OECD (2005) definition of a subsidy and includes explicit (direct), explicit (indirect) and implicit subsidies (Gubler, Ismail and Seidl, 2020a). It also considers perverse financial incentives even where formally a subsidy does not exist. An example would be the earmarking of transport taxes for transport infrastructure even though such earmarking does not necessarily lower the cost of providing that infrastructure. Legislation or regulations that may result in perverse incentives for biodiversity conservation are not included in the study.

3.2.2. *Screening – determining environmentally harmful subsidies*

This section provides examples of the specific subsidies that were identified in the national assessments as potentially harmful to biodiversity or the environment. Where information is provided, it also describes the procedures used in the different assessments to select these subsidies and to identify why they were considered biodiversity or environmentally harmful. In general, the studies that examine EHS follow a sectoral approach, although the definition and coverage of sectors differs across assessments.

The Danish national assessment (IMV, 2005) notes that the linkages between subsidies and their environmental effects can be complex. A very general link is when subsidies cause increased production (of output or input), and this production has environmentally harmful effects. Price support and input/output support are types of support that can be expected to have relatively large effects on production and thus be harmful to the environment and the economy. Another link is when a subsidy results in old, environmentally harmful technologies not being replaced by new more efficient ones, because the subsidy favours the old technology – this is the so-called “lock-in effect”. Furthermore, the stringency of environmental policy (“policy filters”) and the environment’s assimilative capacity will also affect the final environmental damage. This report recommends adopting the OECD framework (Figure 3.1) and the OECD toolkit (quick scan, checklist) to identify significant instances of environmentally harmful subsidies.

The case studies identified in the report cover agriculture, fisheries, energy production, transport, water and forestry. The focus is on general environmental effects rather than biodiversity, although potential negative biodiversity effects of agricultural monocultures and intensification, of dam-building on aquatic biodiversity, of transport infrastructure due to habitat fragmentation, of water scarcity induced by water subsidies, of overfishing due to fishery subsidies, and of grant-aided plantation forestry are highlighted. Since quantitative data on the size of the subsequent environmental effects is very scarce, the environmental consequences of providing subsidies in the different sectors is described qualitatively and by means of examples. Because the OECD method of identifying EHS had not been used in practice when the report was drafted, and because of its comprehensive nature, it was not used in the assessment and such analysis was left for future exploration. The assessment clarifies that the described negative effects on the environment are general effects from the overall existence of activity in the sector, and not just results of using harmful subsidies. Harmful subsidies may increase these negative effects compared to a situation without subsidies, but the size of this quantitative effect is not assessed.

The EU study (Withana et al., 2012[16]) examines EHS across the following nine sectors and environmental issues: agriculture and land, climate change and energy, fisheries, food, forestry, materials, transport, waste and water. Identifying potential EHS was undertaken via a two-stage approach. First, a preliminary scoping analysis of examples of EHS was carried out to identify examples of potential EHS in EU Member States. A questionnaire was circulated in March-April 2012 to over 170 experts across Europe including relevant authorities, experts, academics, NGOs and the private sector. The resulting inventory of potential EHS in EU Member States identified 82 separate measures in one or more EU Member States with potentially environmentally harmful effects. In the report, these are further classified into seven economic subsidy types and include both on-budget and off-budget subsidies. The report stresses that the inventory was not intended as a comprehensive inventory of all potential EHS in EU Member States, but rather to provide a summary overview of those cases identified through the research and stakeholder consultation undertaken for this study.

In a second stage, based on the scoping analysis, stakeholder consultation, and additional literature reviews carried out by the study team, a short list of cases to be examined was identified. Cases were selected based on their environmental harmfulness; loss of purpose; economic and financial relevance; social relevance; impacts on policy coherence; relevance to Member States; data availability; geographic coverage; and balance across the identified sectors and economic types of EHS. The final selection of cases was informed by discussions with selected experts and made in consultation with the European Commission. The study examines 24 short cases of existing EHS in EU Member States and 10 cases of reform that offer insights on successful EHS reform (Table 3.2).

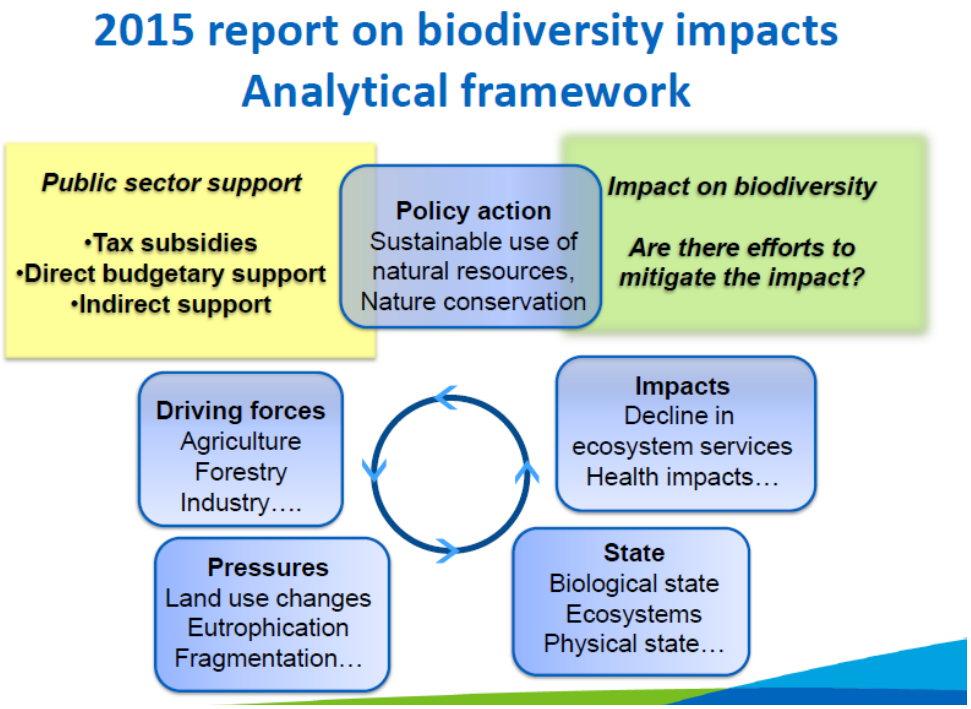
Table 3.2. Cases examined in the EU assessment

Sector	Case Study
Agriculture	Interpretation of eligibility criteria for Common Agricultural Policy payments Fuel duty reliefs and exemptions for agriculture Subsidies contributing to unsustainable land use and soil sealing
Climate and energy	Support for nuclear energy producers – limited liability, accumulation of accruals, research Preferential treatment of the hard coal-mining industry Support for biofuels Feed-tariff for electricity generated by co-generation
Fisheries	Investments for the modernisation of fishing vessels Subsidies for vessel scrapping
Food	Reduced VAT rate for food
Forestry	Provision of low interest loans for peatland drainage to improve forestry investments Exemption from land tax for reforestation and afforestation on wetlands
Materials	Indirect subsidy to rock extraction
Transport	Tax deductions for commuters Absence of road pricing for freight and passenger transport Company car taxation Car fleet renewal schemes
Waste	Reduced environmental charge rate for waste incineration Incomplete producer responsibility for waste electronic and electrical equipment Feed-in tariffs for the generation of energy from waste incineration and landfill gas Subsidies for the construction of waste incineration plants
Water	Reduced VAT rate for drinking water Irrigation subsidies Implicit subsidy for the use of nitrogen-rich fertilisers in agriculture

Source: (Withana et al., 2012[16]).

The Finnish government's 2015 report is another national assessment that has a particular focus on biodiversity (Ympäristöministeriö, 2015[57]). It notes that very few direct subsidies undermine biodiversity. Subsidies that may have a potentially harmful effect are mostly tax expenditures. The report does not set out to assess whether the aims of the subsidy could be achieved more effectively in other ways, but rather to increase transparency by highlighting potentially adverse impacts on biodiversity. An Expert Network on Biodiversity Protection and Sustainable Use contributed to the report by producing and commenting on drafts. It references the French study and uses the OECD DPSIR (Driver, Pressure, State, Impact and Response) framework to assess the link between public sector support and biodiversity. The framework for the review is shown in Figure 3.2. The blue elements in the figure describe the effects of human activity on the natural environment. Each subsidy is assessed for its potential impact on driving forces and pressures and the resulting impacts reviewed.

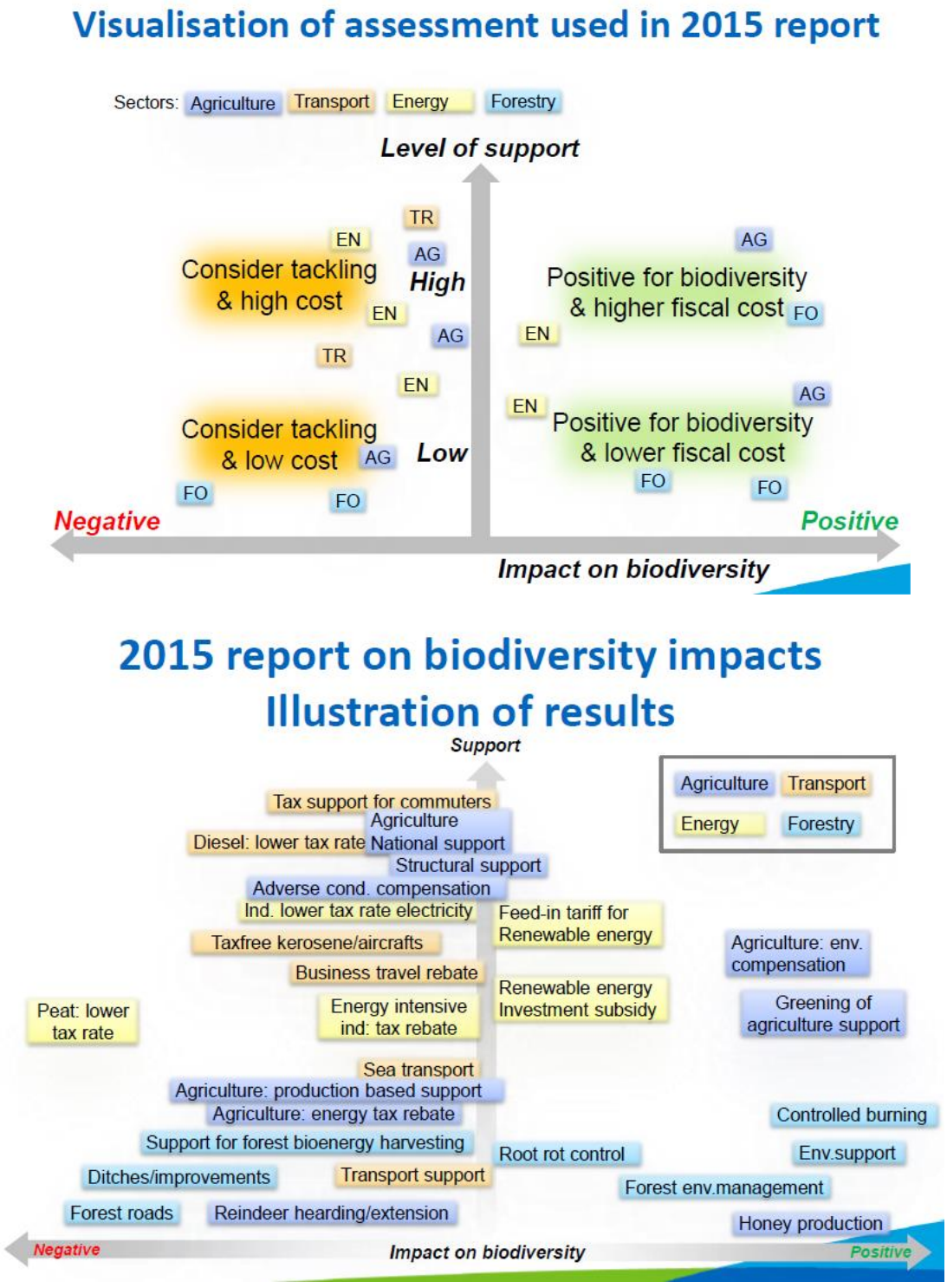
Figure 3.2. Analytical framework linking subsidies and biodiversity in Finland



Source: Presentation by Honkatukia, O. (2018), Experiences with self-review of fossil fuel subsidies in Finland, Ympäristöministeriö.

The link between subsidies and biodiversity was visualised in a support cloud as shown in Figure 3.3. The upper panel identifies different quadrants depending on the biodiversity impact (positive/negative) and support level (high/low), while different colours are used to represent different sectors. Examples of how different subsidies are positioned on these axes are shown in the lower panel. What the visualisation underlines is that many of the larger subsidies in monetary terms may have a negative impact on biodiversity but that it is likely to be limited. On the other hand, some targeted subsidies that may be relatively small in volume of support can have significant negative effects on biodiversity. Such ranking can be helpful in determining priorities for reform.

Figure 3.3. Visualisation of the link between subsidies and biodiversity in Finland



Source: Presentation by Honkatukia, O. (2018), Experiences with self-review of fossil fuel subsidies in Finland, Ympäristöministeriö.

The green budgets in France also include a focus on biodiversity harmful subsidies (French Government, 2021, based on the methodology outlined in (Alexandre et al., 2019[45]). The environmental impacts of expenditures are classified under six headings: impacts on climate mitigation, climate adaptation, water,

waste, pollution, and biodiversity. For each of these environmental impacts, a "traffic light" system is used by assigning a score from -1 to 3 to each expenditure, depending on its environmental impact. The negative score of -1 indicates that the expenditure has a direct negative impact on one of the environmental domains or encourages behaviour that could have a negative impact. Neutral expenditures are given a score of 0 indicating that they do not have a significant environmental impact one way or the other. Expenditures with a positive score have a positive impact on the relevant environmental domain but to different degrees. Expenditures are given a score of 1 if they have a positive long-term impact but short-term impacts may be more controversial, or they may present a risk of long-term technological lock-in. Expenditures are given a score of 2 if, despite not have a specific environmental objective, they can be shown to have a positive indirect impact. Expenditures are given a score of 3 if they have an intended environmental objective or contribute directly to the production of an environmental good or service. Summing the subsidies that have a score of -1 for biodiversity provides an estimate of the total amount of biodiversity harmful subsidies.

The earlier French working group report that analysed public incentives that harm biodiversity noted that a causal link between public incentives and biodiversity can be difficult to establish because such links are often indirect or vague (Sainteny et al., 2011[44]). The working group considered the DPSIR ("Drivers-Pressures-States-Impacts-Responses") model as recommended by the OECD. This model involves selecting indicators, at the level of driving forces (drivers) as well as pressures (deterioration of habitat, overexploitation, pollution, invasions) and ecosystem responses. The group very quickly realised that the relationships among these indicators could be complex and even challenging.

The assessment drew on research published over the last two decades on the accelerating pace of biodiversity loss and on the existence of five major pressures that are responsible for it:

- destruction and the qualitative deterioration of habitats owing to fragmentation, changes in land use, land development, simplification and the intensification of farming practices
- overexploitation of renewable natural resources (fishery resources, water, soil and forests)
- pollution (nitrates, pesticides, heat pollution and drug residues)
- climate change, which exerts an influence on all balances but is the object of many other forms of actions and policies
- invasive exotic species.

It then reviewed harmful public incentives that could contribute to each of these sources of damage to biodiversity.

- ***Public incentives encouraging habitat destruction and fragmentation.*** Examples included preferential incentives for purchasing new housing, which is less expensive the further it is from city centres, compared to home improvement that does not consume space; reductions in the cost of transportation that lead to urban sprawl; incentives to intensify or to maintain intensive farming (aid having an influence on the price of factors of production) and the simplification of landscapes (aid determining whether or not semi-natural elements such as hedgerows, stands of trees, ponds and the choice of crops are maintained); public support for the construction of linear transportation infrastructure in land habitats or a dam in water habitats; fees for services or for the use of the public domain that do not sufficiently factor in biodiversity costs.
- ***Public incentives encouraging the overexploitation of renewable natural resources.*** Examples likely to encourage soil overexploitation which is reflected in depleted carbon stocks included changes in land use (ploughing up pasture land for annual crops, soil sealing in agricultural areas); the intensification or maintenance of intensive practices that reduce the carbon content of soil (indirect measures encouraging production yield, mechanisation and the use of inputs). Public incentive packages that contribute to increasing overexploitation of the seas and fish stocks include the exemption from the domestic consumption tax on petroleum products (TIPP). Public incentives that intensify overexploitation of water resources include inappropriate

rates for household usage; some exemptions from water charges for industrial users; and water charges for irrigation water in agriculture that do not limit consumption.

- ***Public incentives encouraging pollution.*** Public incentives encouraging emissions mainly concern laws or taxes on industry and transportation that insufficiently internalise costs and that offer little incentive in the areas of fossil fuel and biomass use. Water pollution appears to be clearly under-charged, both in urban and rural areas, where nitrates from agricultural sources are causing large-scale problems in some rural areas.
- ***Public incentives encouraging the introduction and the spread of invasive exotic species.*** The expert working group identified very few subsidies that directly encourage the spread of invasive species. Such incentives result mainly from the State's failure to act at the regulatory level in the fight against this threat and against the non-internalisation of negative external costs.

The Irish national assessment (CSO, 2016[47]) classified subsidies into four categories: Fossil fuel support; Agriculture and food support; Transport support; and Fishing and aquaculture support. Agricultural subsidies can result in nutrient pollution and loss of biodiversity as well as increasing demands on water abstraction. Transport support can incentivise the purchase of vehicles while fishing support includes grants that may result in larger catches. The specific criteria used to identify those subsidies that are potentially environmentally damaging are not described. Much of the data was collected from the publicly available annual accounts of government departments and organisations, as well as from the tax administration (Revenue Commissioners). Estimates were made of revenue foregone due to certain tax expenditures. A later Irish assessment (Morgenroth, Murphy and Moore, 2018[48]) first conducted a simple assessment of potential environmental impacts of a large number of existing and potential fiscal instruments. In total, 142 measures are considered. The environmental impacts considered cover the main domains of climate change, air quality, water quality and land; 246 impacts are identified, which implies that on average measures impact on more than one domain. The most widespread impact is on climate change emissions, with 98 measures having impacts. The least common impact is on water, with just 23 measures. Just over half the measures were assessed to have a likely positive impact. Because assessing the environmental impacts of all the identified measures was beyond the scope of the report, four measures were selected for detailed analysis. These were: the difference in excise rates between petrol and diesel, the zero-value added tax (VAT) rate on fertiliser, the rebate scheme on diesel excise for the haulage industry, and the possible introduction of an air passenger duty.

The Italian national assessment (MATTM, 2019[49]) analyses subsidies by sector: agriculture, energy, transport, VAT reliefs and other subsidies, considering both tax expenditures and direct subsidies, with reference to the financial effect in 2018. The basic list of tax expenditures is taken from the Ministry of Finance 2017 Annual Report on Tax Expenditures, which shows the financial effects of non-expected revenue for the years 2018-2020. This lists concessions in relation to the current tax system and includes, among others, tax deductions, VAT reduced rates, and tax credits.

The Italian assessment identified those subsidies with an environmental impact in the following way. After evaluation by the MATTM/Sogesid Working Group, all subsidies were classified as either environmentally friendly (EFS), environmentally harmful (EHS), environmentally neutral (ENS) or uncertain. Environmentally neutral subsidies are those subsidies that do not have significant environmental impacts. Such subsidies are in principle not included in the catalogue to avoid overloading the reader, as this would mean listing all subsidies in the Italian fiscal system. The catalogue is intended as a list of subsidies that are expected to have an environmental impact. Subsidies are classified as uncertain in cases in which there is a difficulty in determining the environmental impact of the subsidy (positive or negative), postponing a deeper analysis to following editions of the Catalogue. An example provided is investment in the development of forests and in the improvement of forest profitability, for which it was considered necessary to analyse specific local projects to assess the sustainability of reforesting practices and forest management. To classify subsidies into these categories, the Catalogue makes use of OECD methods

(e.g. the quick scan, checklist), with the aim of providing policymakers the information needed for EHS removal and the adoption and strengthening of EFS.

The agricultural subsidies identified are broadly those paid under the EU's Common Agricultural Policy. They include direct payment schemes (basic payment scheme; specific and voluntary coupled support; payment for agricultural practices beneficial for the climate and the environment (Greening); payment for young farmers); agricultural policy interventions financed through the Common Market Organization, providing support to specific sectors (for example, fruit and vegetables, wine, and olive oil); and subsidies to activities funded through the 2014-2020 Rural Development Programme. National tax breaks were also included.

For energy subsidies, in additional to direct subsidies and tax expenditures noted in the State budget, the Catalogue takes account of off-budget subsidies for instance, incentive mechanisms for renewable energy and energy efficiency, and Emissions Trading Schemes. Subsidies to renewable energy production and advancements in energy efficiency are managed through financial mechanisms included in the electricity bill (compensation schemes). The Catalogue estimates the "foregone revenue" due to allowances allocated free of charge in the European Emission Trading System (ETS) as a subsidy as it distorts the price of carbon going against the international requirements for emission reductions. Since auction revenues and accrued interest are transferred to a special State Treasury account and subsequently reallocated to spending chapters related to measures to fight climate change, free allocation represents foregone revenue that public bodies could invest in mitigation and adaptation. Finally, it considers as a subsidy the different fiscal treatment of gasoline and diesel.

The 2019 third edition of the Italian Catalogue devotes a special chapter to the identification of biodiversity harmful subsidies. The logic framework for the analysis is constructed based on the following set of assumptions:

A. Production and consumption choices, influenced by *input and output prices,* impact on the pressures affecting the conservation status of biodiversity.

B. The causal relationship between the subsidy and biodiversity is due to changes induced by the subsidy in production and consumption behaviour by households and businesses relative to a business-as-usual baseline without the subsidy.

C. The changes in individual behaviour can either exacerbate or ease the pressures on biodiversity.

D. The impact of the subsidy is assessed in terms of conservation or reduction of biodiversity as an indicator of the state of "health" of ecosystems and the variety of species living in them.

E. The potentially harmful or favourable impact of a subsidy is assessed on a *ceteris paribus* basis, i.e. without taking into account interactions with all other economic and/or social variables and therefore keeping the latter constant.

F. The subsidy is assessed solely based on its environmental impact and does not account for impacts on economic growth, equity or other stated objectives of the subsidy.

The chapter reviews the state of biodiversity in Italy and delimits the field of investigation to some of the principal pressures affecting its status: (i) climate change and greenhouse gases; (ii) change in land use, (iii) pollution, (iv) over-use of resources, (v) standardised preferences (this refers to the impacts on agricultural biodiversity due to the fact that consumers demand only a limited range or variety of crops and animal breeds, thus leading to the disappearance of traditional crops and varieties), and (vi) invasive alien species. For each of these pressures, the most important drivers are identified in a matrix format where each cell contains a qualitative description of the link between the driver and the pressure based on the ceteris paribus assumption. As an example, the cell combining Population growth (a driver) and Land use change (a pressure) indicates that with the same technology, consumer preferences, per capita quantity

consumed, etc., a subsidy that stimulates population growth leads to a change in land use from natural to agricultural land (to feed that population or to produce materials for their consumption). This results in consequences for biodiversity associated with that specific pressure. Climate change is deliberately not included in this matrix because it is seen as the biggest pressure impact on biodiversity across all levels (genetic diversity, taxonomic diversity and ecosystem diversity). Any subsidy that increases greenhouse gas emissions is assumed de facto to have an adverse impact on biodiversity.

The outcome of the analysis is another matrix identifying the expected impact on biodiversity of the most relevant subsidies included in the catalogue. The columns of the matrix represent the individual subsidies and the rows represent the drivers of the pressure triggered by the subsidy. The cell entries include:

- the impact in terms of tightening (↗) or relaxation (↘) of the pressure
- the pressure triggered by the driver (Soil= change in land use; Inq=Pollution; Sfr= over-exploitation of resources; Prf Stand=Standardized Preferences; Invasiv=Invasive alien species)
- a brief description of the association and impact
- whether the subsidy is environmentally friendly harmful and for which different levels of biodiversity (E=Ecosystem; S=Species; G=Genetics).

As an example, the cell entry below indicates that the subsidy in question (A1) affects the driver "agricultural technology" by increasing the pressure "pollution" and therefore is harmful to ecosystem biodiversity. The description indicates the causal mechanism at work.

	Subsidy A1
Agricultural technology	↗= Inq Description Harmful: E

In January 2022, the Italian Ministry of Ecological Transition published the fourth National EHS-EFS Catalogue with a section dedicated to BHS[11] (MITE, 2022[60]) and the first exploratory estimates. The analysis included five sectors: i) agriculture and fisheries, ii) energy, iii) transport, iv) VAT, and (v) others. The BHS estimated for 2019 and 2020 were EUR 38 billion and EUR 36 billion, respectively. They consider the impact on biodiversity, ecosystems and natural capital, independently from other environmental impacts (e.g. climate, waste). The EHS estimates, considering all environmental impacts, amounted for 2019 and 2020 to EUR 24.5 billion and EUR 21.6 billion, respectively (in some cases, priority has been given to climate impact over biodiversity impact).[12]

The Netherlands assessment (Drissen, Hanemaaijer and Dietz, 2011[50]) identifies its EHS by drawing on a list of EHS drawn up in previous reports on this subject. It questions whether all subsidies previously identified as environmentally harmful fall into this category and excludes some subsidies for this reason (an example would be the free distribution of emission rights for agricultural products under quota, which the earlier report had considered an environmentally harmful subsidy and this assessment disputes). Only subsidies greater than EUR 100 million are included in order to focus on the most important potential EHS.

[11] See: www.mite.gov.it/pagina/economia-ambientale.

[12] BHS estimates were higher than EHS estimates as some subsidies assessed as generally speaking environmentally friendly, may be considered as harmful from the specific perspective of biodiversity according e.g. to the criteria of the DNSH principle (for example, renewable energy with potential impact on biodiversity, electric private transports and goods transport on roads).

Examples of the measures identified in the Netherlands study include:

Agriculture:

- lower VAT rate on meat and dairy products
- lower VAT rate on ornamental plant cultivation
- lower prices for energy used in greenhouse horticulture

Transport:

- lower tax rate on red diesel (used in agriculture, construction, coastal and inland shipping)
- subsidies for delivery vans (due to differential taxation compared with passenger vehicles)
- fiscal benefits to commuter transportation by car, and the use of company vehicles
- abolition of the road tax exemption for veteran cars
- exemptions on excise duty and VAT on kerosene
- VAT exemption on air tickets

Energy:

- lower tariffs for energy taxation on large-scale use
- freely distributed emission credits under the EU Emissions Trading Scheme
- exemptions on excise duty and VAT on shipping.

The Nordic Council assessment (Bragadóttir et al., 2014[51]) does not comprehensively assess EHS in the Nordic countries but instead, selects three subsidy measures for detailed analysis. These were selected to be relevant to more than one Nordic country; to include both on-budget and off-budget subsidies; and to cover more than one sector. The selected cases are:

- lower energy tax on diesel used in transport compared to petrol
- EU direct payments to farmers
- overallocation of emission allowances in the EU Emissions Trading Scheme.

The 2017 Swedish national assessment was based on guidance on identifying potentially harmful environmental subsidies previously published by SEPA in 2014 (Naturvårdsverket, 2017). This took the form of a tutorial intended to assist government ministries identify non-tax-related potentially environmentally harmful subsidies within their areas of activity. The tutorial is divided into five phases, where each phase consists of a number of steps with questions to answer.

- **Identify:** What subsidies does the authority administer? Which of these can be environmentally harmful?
- **Describe**: What is the purpose of the subsidy? Who benefits from the subsidy?
- **Assess**: Does the subsidy fulfil its purpose? How does the subsidy affect the environment?
- **Develop**: How can the negative environmental impact of the subsidy be reduced?
- **Report**: Report the survey.

The guidance handbook advises to examine the ministry accounts to identify expenditure items that refer to grants or transfers. It presents a list of economic activities that can potentially give rise to harmful environmental effects. Where a subsidy has the potential to impact the level of activity in one or more of these sectors, it should be retained for further investigation, otherwise it can be ignored. For the subsidies retained, detailed information on the purpose, beneficiaries, scale and status of each subsidy is requested, as well as an assessment whether it is still relevant and effective in meeting its goal. A qualitative assessment should be made of its potential environmental effects, using an environmental impact assessment tool that is provided. If the assessment shows that the subsidy has negative effects on the

environment, but that the purpose of the subsidy is still relevant, suggestions are sought as to how the purpose could be achieved with reduced negative environmental impact, e.g. by attaching environmental conditions or changing or deleting specific terms or conditions. Templates are provided for how both the subsidies not investigated further and those that are investigated for their potentially harmful environmental effects should be reported.

The Switzerland national assessment (Swiss Federal Council, 2013) identifies subsidies as those that are accounted in the Federal budget. In addition, it uses the list of tax expenditures published and updated by the Federal Tax Administration which also provides estimates of the government revenue foregone. The focus is on four areas – transport, agriculture, national defence and economy - as it was felt that remaining subsidies (e.g. social welfare) were unlikely to be environmentally harmful.

The following method was chosen to identify perverse incentives:

- Environmental assets whose condition may be influenced by tax and subsidy instruments were identified starting with the natural resources. From there, the fundamental drivers of unsustainable development were determined. They are the starting points for corrections.
- An inventory of taxes and subsidies listing potential environmentally inappropriate taxation and subsidies was established. This list includes 22 specific measures across a range of sectors, although the list is dominated by agricultural subsidies. The evidence base that results in undesirable environmental incentives according to the above definition was identified on this basis.
- Finally, measures were examined in order to eliminate adverse incentives that are not already corrected in other projects.

With respect to individual income tax, the study identifies the deduction of travel expenses and tax incentives to home ownership through the underestimation of the rental value as potentially environmentally harmful. These two deductions encourage problem behaviour in terms of the environment, as the first lowers costs of mobility and the second reduces the cost of housing. Both can result in urban sprawl as well as the risk of a worsening of emissions attributable to traffic.

The exclusion from the scope of VAT enjoyed by the sale and rental of buildings and premises which favours housing over other property subject to VAT was recognised as an EHS as it encourages the conversion of land for housing and excessive energy use. Tax exemption of international air traffic was also identified, as were tax rebates on mineral oils enjoyed by selected groups (transport dealers, farmers, foresters, extraction companies of natural stone and professional fishermen). The refund is made based on the quantity of mineral oils consumed which, by reducing marginal costs, is an inappropriate incentive to consume more. The report notes that, in the case of agriculture and forestry, reimbursement is made on a standardised basis, which reduces average but not marginal costs, and thus mitigates the inappropriate incentive.

With respect to agricultural subsidies, the report highlights the grant to lower the price of milk for cheese production to enable the cheese industry to remain competitive while using Swiss raw materials. This grant was introduced after the cheese trade between Switzerland and the EU was fully liberalised on 1 June 2007. The subsidy provided a stimulus to milk production and thereby caused an increase in the number of animals, potentially a source of environmental pollution through the production and import of fodder, the use of manure and higher emissions with an impact on climate.

The assessment considers that most programmes supported by "general direct payments" (contributions to the surface and contributions to slopes) have only an indirect effect on production and are therefore of little concern. The report identifies the "Contributions to the care of animals consuming roughage" (UGBFG contributions) and "contributions for the care of animals in difficult production conditions" (DCAG contributions) as harmful subsidies that can induce an increase in the herd size. Although these subsidies are intended to ensure the multifunctional benefits of agriculture, the UGBFG and DCAG payments are not well targeted, hence their classification as a perverse incentive. The report notes that these

contributions will be abolished from 1st January 2014 as part of the future development of agricultural policy in the years 2014-2017.

The focus of the more recent Swiss assessment (Gubler, Ismail and Seidl, 2020a[8]) is on subsidies harmful to biodiversity. The following procedure was used to identify BHS:

- Based on existing literature and an expert workshop, the status of biodiversity and the main sources of degradation were identified.
- A second expert workshop identified over 150 drivers of these degradation pressures. Drivers where there was no evidence of a link to subsidies were discarded.
- The subsidies influencing the remaining drivers were identified based on a literature review and further bilateral interaction with experts as well as on the basis of a questionnaire distributed among environmental experts.
- Experts divided the biodiversity impact of the subsidies into four qualitative classes depending on the strength of the linkage: not significant, minor, medium and strong. Furthermore, the biodiversity harmful share of the subsidy was allocated to three classes: fully biodiversity harmful; partially biodiversity harmful; and biodiversity harmful depending on method of implementation. Finally, the subsidies were divided into four classes depending on the presumed difficulty of reform or restructuring: slight, medium, high and excessive (this latter implying that the subsidy should be abolished).
- Finally, for each subsidy or perverse financial incentive a reform proposal was made that would minimise the adverse biodiversity impact, either through changing the conditions of the subsidy, the instruments used, or removing it entirely.

In the study, over 160 subsidies were identified with damaging effects on biodiversity to varying degrees.[13] They were found in the following sectors: transport, agriculture, forestry, energy production and consumption, settlement development, tourism, wastewater disposal and flood protection. Of these, 47% are on-budget subsidies (e.g. direct cash transfers), 39% are off-budget subsidies (e.g. tax breaks), 9% are covert subsidies (e.g. external costs) and 5% are perverse financial incentives (e.g. the earmarking of charges). Individual subsidies damage biodiversity to varying degrees: in 55% of cases, the level of damage is low, in 23% medium and in 10% high. In 10% of cases, the effects are not clear. Often it is a low level of damage caused by many individual subsidies which in aggregate produces a strong overall impact.

3.2.3. *Assessing – establishing the negative impact on biodiversity*

As incentives including subsidies can have different effects in different settings, a better understanding at the national level of the magnitude and actual impacts of subsidies on biodiversity is needed. In addition to the amount of the subsidy, the extent of the damage to biodiversity is relevant to deciding how harmful a subsidy is. Thus, two steps undertaken in national assessments to assess the impacts on biodiversity are (a) quantifying the size of environmentally and/or biodiversity harmful subsidies, and (b) quantifying the negative impacts on the environment and/or biodiversity. The treatment of these two steps is considered together in this section. Although many assessments provide quantitative estimates of the size of the subsidies, just one study (Nordic Council, (Bragadóttir et al., 2014[51]) tries to quantify the magnitude of the environmental and biodiversity damages due to these subsidies and then only for three selected case studies.

The Austrian assessment of EHS prepared by the Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (2019) is shown in Table 3.3. It covers subsidies in the energy,

[13] A matrix listing all of the individual subsidies and their characteristics can be downloaded from the website of the project (Annex VI) www.wsl.ch/de/projekte/biodiversitaetsrelevante-fehlanreize.html.

transport and housing sectors but not agriculture. Most of the measures take the form of tax exemptions rather than direct subsidies. These reports set out in detail the way in which these subsidies were quantified. However, they do not attempt to assess or quantify the environmental damage associated with these subsidies, and there is no specific focus on subsidies harmful to biodiversity.

Table 3.3. Environmentally harmful subsidies in Austria

Sector and measure	Nature of measure	Value of subsidy (EUR million)
Energy		
Support for plants and/or infrastructure using fossil fuel energy sources	Subsidy	12 (annually until 2020)
Energy tax rebate for energy-intensive companies	Tax exemption	400 (2017)
Manufacturers' privilege for producers of energy products (tax exemption from fossil fuels)	Tax exemption	160 (2017)
Energy tax exemption for non-energy Use of fossil fuels in manufacturing	Tax exemption	300 (2010-2013)
Research expenditure on fossil fuels	Subsidy	1.1 (2010-2013)
Transport		
Differential energy taxation in favour of diesel	Tax exemption	710 (2018)
Mineral oil tax exemption of inland waterway transport	Tax exemption	50 (2017)
Mineral oil tax exemption for kerosene in aviation	Tax exemption	380 (2017)
VAT exemption for international flights	Tax exemption	185 (2013)
Flat-rate taxation of company cars regardless of private use	Tax exemption	225 (2016)
Supports for commuter travel	Tax exemption	171 (2017)
Tax exemptions for certain kinds of vehicles (e.g. taxis, rental cars, hearses, etc.).	Tax exemption	16 (2017)
Tax exemptions for tractors and other vehicles for use in agriculture and forestry	Tax exemption	70 (2017)
Mileage allowance for use of private vehicle for business purposes	Subsidy	130 (2010)
Housing		
Support for housing construction	Subsidy	275 (2013-2016)
Property tax exemption for areas used for parking	Tax exemption	150 (2011)
Compulsory provision of parking/garage spaces in new construction	Regulatory incentive	
Other		
Support for snow-making facilities	Subsidy	11.8 (2014-2018)
Total		Approximately 3,250

Source: Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (2019). The years for which the monetary estimate is made are shown in brackets.

The French "Green Budget" (French Government, 2021[58]) concludes that, out of a total of EUR 587 billion in budgetary spending and tax expenditures, EUR 47.8 billion has an impact on the environment (including EUR 11.4 billion in tax expenditures):

- EUR 32.5 billion is favourable to the environment on at least one environmental criterion without having a negative effect on other environmental criteria.
- EUR 4.5 billion is favourable to the environment on at least one criterion but has negative effects on one or more other criteria, mainly transport infrastructure, notably railways.
- EUR 10.8 billion is unfavourable on at least one environmental criterion without having any favourable impact on other criteria, mostly tax expenditures (EUR 7.2 billion, notably the fuel tax).

The report indicates for each subsidy measure for which environmental criterion it has an impact, including biodiversity, but this is a qualitative assessment rather than a quantitative one.

The German national assessment of EHS in 2018 (Umweltbundesamt, 2021[6]) is shown in Table 3.4. A wide range of measures is included but energy and transport subsidies dominate the total. Only a purely qualitative account of the cause-and-effect relationships between the subsidies and their harmful environmental impacts is presented in view of the difficulty of quantitatively assessing the various adverse environmental effects of the individual subsidies. The assessment explains that the difficulties in quantification arise from the varied and interlinked environmental impacts of subsidies. It notes that it can be difficult to establish a direct causal connection between a subsidy and environmental damage. And because the effects – in view of the changes they induce in the behaviour of economic subjects and the large number of boundary conditions – are virtually impossible to isolate, it is even more difficult to quantify the impacts of the individual subsidies on a specific environmental asset. Moreover, the effect of environmentally harmful subsidies is rarely confined to a single environmental asset or to health or resource consumption but has adverse impacts on several environmental factors at once. This is due to the complexity of ecological relationships and the interactions between environmental assets, human health and resource consumption. Nonetheless, for each measure identified in the inventory, the report indicates the likely primary and secondary adverse impacts under the seven headings climate, air, water, soil, biodiversity and landscape, health and resource consumption.

Table 3.4. Environmentally harmful subsidies in Germany, 2018

Sector	EUR m
1 Energy supply and use	**25,374**
Reduction on electricity tax and energy tax for the manufacturing industries and for agriculture and forestry	1,144
Peak equalisation scheme for eco tax in the manufacturing industries	1,720
Tax reduction for certain energy-intensive processes and techniques	1,290
Coal subsidies	2,003
Privileges for the lignite industry	1,263
Energy tax reductions for coal	min. 287
Manufacturer privilege for producers of energy products	85
Energy tax exemption for non-energy uses of fossil fuels	342
Free allocation of CO2 emissions trading allowances	min. 1,299
Free distribution of emission allowances	2,134
Grants to electricity-intensive enterprises to offset electricity price increases due to emissions trading	219
Special compensation provisions under the Renewable Energy Sources Act for electricity-intensive enterprises and railways	5,400
Internal power privilege under Renewable Energy Sources Act (industrial sector)	3,660
Preferential treatment of grid fees for energy-intensive industries	611
Privileges for special-contract customers with regard to concession charges for electricity	3,600
Reduced rates of Combined Heat and Power surcharge for the manufacturing sector and energy-intensive industries	316
Subsidies for nuclear power	n.q.
Export credit guarantees (Hermes cover) for coal-fired and nuclear power plants	1
2 Transport	30,822
Energy tax reduction for diesel fuel	8,202
Distance-based income tax allowance for commuters	6,000
Tax allowance for using private vehicles for business purposes	min. 3,100
Biofuels	960
Energy tax exemption for inland waterway transportation	min. 141
Financing of cruise shipping using KfW-Ipex credits	n.q.
Energy tax concessions for mobile machinery and vehicles used exclusively for goods handling in seaports	25
Flat-rate taxation of privately used company cars Exemption of kerosene from energy tax	8,357

VAT exemption for international flights	3,997
Reduction in flight safety charges due to public subsidy	n.q.
Support for regional airports	min. 40
3 Construction and housing	**3,050**
Home ownership grant	81
Home renter grant	46
Promotion of saving for building purposes	n.q.
Promotion of social housing	1,191
Joint Agreement for the Improvement of Regional Economic Structures	n.q.
Building child allowance	6
KfW-home building programme	1,726
4 Agriculture and forestry, fisheries	**6,179**
Agricultural subsidies of the European Union	n.q.
Tax rebate for agricultural diesel	467
Exemption of agricultural vehicles from vehicle road tax	470
Fisheries subsidies of the European Union	n.q.
Environmentally harmful VAT concessions	min. 5,242
TOTAL	65,425

Note*:* n.q. = non-quantifiable.
Source*:* (Umweltbundesamt, 2021[6])

Another German study by the Federal Agency for Nature Conservation (Schweppe-Kraft, Schlegelmilch and Berger, 2019[62]) reviews how the objective in various international agreements to remove biodiversity harmful subsidies could be achieved. It identifies the drivers and pressures for biodiversity loss and groups these into three main classes: land use change, agricultural and forestry management practices, and climate change. It defines a biodiversity harmful subsidy as one that reinforces these drivers for loss of species and habitats. A particular focus of this study is the potential to introduce levies on external costs due to agricultural practices, particularly nitrogen surpluses and crop pesticides, and to use the revenue to promote environmentally friendly practices in the same sector.

The harmful subsidies in the areas of settlement, transport and agriculture add up to approx. EUR 22 billion per year. Adding energy subventions, which are also harmful to nature because they are harmful to the climate, the total is as much as EUR 55 billion per year. This stands in contrast to the value of nature conservation expenditure of the federal and state governments for measures in the areas of territorial protection, maintenance and development of biotopes, and support for environmentally friendly farming practices in the order of around EUR 600 million per year.

The FÖS study identified 29 separate potentially environmentally harmful subsidies with a total value of EUR 67 billion per year (Zerzawy et al., 2021[7]). However, it recognised that not all of them have a direct impact on biodiversity. It was not able to determine the total value of the biodiversity-damaging share of the identified subsidies within the scope of the study, but it presented estimates for five selected subsidies shown in Table 3.5. For these subsidies, the biodiversity damaging share was quantified and the extent of the damaging effect was assessed according to the categories low, medium and high. The criteria for this were the causality between subsidy and biodiversity loss, the area impact, the impact intensity and the duration of the intervention. These are also the criteria used in the Swiss WSL study discussed in more detail later in this section (Gubler, Ismail and Seidl, 2020b).

Table 3.5. Assessment of the biodiversity damaging effect of selected subsidies in Germany

Subsidy	Subsidy volume Billion euros p.a.	Biodiversity damaging share	Biodiversity damaging share in billion euros p.a.	Extent of the damaging effect
Discounts from the extraction levy	0.63	Completely	0.63	Medium
Common Agricultural Policy (CAP) first pillar*	4.85	Predominantly	3.39-4.85*	High
Reduced VAT rate on animal-based products	5.2	Completely	5.20	High
Travelling allowance	4.8	Partially	2.40-3.36	High
"Baukindergeld"	1.0	Partially	0.265**	High

Source: (Zerzawy et al., 2021[7]).

The Irish assessment (CSO, 2016[47]) provides estimates of the amount of potentially environmentally damaging subsidies (PEDS) distinguishing between direct and indirect subsidies (the latter covering tax expenditures calculated on the basis of revenue foregone). The Irish estimate also highlights the importance of tax expenditures which are as important as direct subsidies in most years and even more important in the later years shown in Table 3.6. While direct subsidies are dominated by agricultural subsidies, indirect supports are dominated by tax rebates on fossil fuels.

Table 3.6. Direct and indirect potentially environmentally harmful subsidies in Ireland, 2012-2016, EUR million

Sector	2012	2013	2014	2015	2016
Direct					
Fossil fuel supports	557.6	561.7	627.5	561.4	533.9
Agriculture and Food supports	1,600.5	1,492.0	1,470.0	1,129.8	1,254.8
Transport supports	7.4	7.6	7.8	7.6	7.6
Fishing and aquaculture supports	2.8	2.5	3.4	3.4	3.0
Indirect					
Fossil fuel supports	1,702.7	1,753.1	1,752.4	1,917.3	1,917.3
Agriculture and Food supports	303.7	267.9	268.9	332.2	235.4
Transport supports	2.6	7.0	52.4	57.6	74.1
Fishing and aquaculture supports	8.9	19.4	23.9	25.2	13.3
Total Direct	2,168.3	2,063.8	2,108.7	1,702.4	1,799.3
Total Indirect	2,017.9	2,047.4	2,097.6	2,332.3	2,293.4

Source: (CSO, 2016[47]).

Fossil fuel direct supports include levy payments by consumers to support electricity production including from peat-fired power stations as well as social welfare payments to reduce electricity, gas and fuel bills. The agriculture and food direct supports include direct payments to farmers as well as marketing and promotional expenditure and market supports. The transport direct support is the subsidy paid for regional air services. Fishing direct support includes various schemes to promote the fishing industry.

The main contributor to fossil fuel indirect support is revenue foregone from lower rates of excise duty applied to specific types of fuels. In the agriculture and food sector, the main indirect supports are VAT relief on fertilisers and other inputs, as well as various tax reliefs and exemptions available to farmers in the course of their business. The indirect transport support includes various reliefs on vehicle registration tax which have grown rapidly in the later years shown in the table. The indirect support to fishing includes VAT relief on fishing vessels as well as income tax reliefs.

As the Irish data refer to potentially environmentally damaging subsidies, a further step is needed to assess whether and to what extent there is damage to the environment or biodiversity resulting from these subsidies. A Policy and Institutional Review on biodiversity finance has made a qualitative assessment of the impact of these PEDS on biodiversity in Ireland (McGuinness and Bullock, 2020[59]). It concluded that incentives which have an overt negative impact on biodiversity have diminished in the past decade. It noted, for example, that agricultural support payments are now largely decoupled from production, although there continues to be losses of hedgerows and clearance of scrub habitat, the latter sometimes to avoid any loss of area eligible for area-based direct payments. The Review observes that the scale of agricultural support transfers provides an opportunity to do more to ensure no net loss of biodiversity. It also highlights the role of afforestation grant payments, noting that environmental criteria for receipt of these grants have been tightened. In the transport and industrial sectors, the Review notes that fuel and energy tax rebates provide social and economic benefits, but potentially encourage excess use with implications for greenhouse gas emissions and consequently for climate change and biodiversity.

Another Irish assessment (Morgenroth, Murphy and Moore, 2018[48]) used a two-step procedure to identify environmental effects. The first step was to determine the likely change in behaviour that a particular measure will give rise to. For example, a tax relief on construction should result in more construction than if the relief did not exist. The second step was to assess what effect more construction might have on each of four environmental domains - air, water, land and emissions. Various caveats with this approach were noted. It was not always certain if the environmental effects were positive or negative, as this might depend on the way the activity is carried out (new construction on a greenfield vs. a brownfield site). Furthermore, the assessment does not identify the scale of the impact. This is important because a small negative environmental impact may be acceptable in the context of the other aims of a particular measure. For the 142 measures included in this survey, a total of 246 environmental impacts, either positive or negative, were identified (a full list of measures and environmental impacts is provided in an annex to the study). Table 3.7 summarises the numbers of likely effects identified under the headings of air, water, land and emissions, divided between those with broadly positive and negative impact. Measures with land and water impacts are likely to have the greatest direct impact on biodiversity, although measures with air and emissions impacts will have indirect impacts.

Table 3.7. Environmental effects identified for fiscal instruments in Ireland

Domain of effect	Positive	Negative	Total
Air	40	27	67
Water	10	13	23
Land	17	41	58
Emissions	57	41	08
	124	122	246

Source: (Morgenroth, Murphy and Moore, 2018[48]).

The approach in the Italian assessment (MATTM, 2019[49]) is to allocate subsidies into four categories, environmentally friendly, environmentally harmful, environmentally neutral, and those with uncertain effects. Of the 171 measures analysed in total, 72 measures were classified as harmful and 26 as uncertain. Three sectors were examined in detail – agriculture, energy and transport – plus a range of other subsidies as well as the impact of reduced VAT rates. Most harmful subsidies are indirect subsidies and consist mainly of concessions/reductions in excise duties, particularly in the energy sector, followed by reduced VAT rates. Agriculture and fisheries harmful subsidies, on the other hand, are all direct subsidies. Many agricultural subsidies are also classified as having uncertain environmental effects. The reported size of tax expenditures and direct subsidies in the transport sector is low, in part because some relevant instruments (e.g. differential taxation of fuels) have been included under the energy heading. The amount and allocation of harmful and uncertain subsidies is summarised in Table 3.8.

Table 3.8. Subsidies with harmful or uncertain environmental impacts in Italy, 2018, EUR million

Sector	Harmful subsidies	Subsidies with uncertain effect	Total
Agriculture			
Tax expenditure	-	311,40	311,40
Direct subsidy	269,51	4.829,28	e
Total	269.51	5.140,68	5.410,19
Energy			
Tax expenditure	11.761,33	78,10	11.839,43
Direct subsidy	1.402,00	-	1.402,00
Total	13.163,33	78,10	13.241,43
Transport			
Tax expenditure	1.636,70		1.636,70
Direct subsidy		48,90	48,90
Total	1.636,70	48,90	1.685,60
Other subsidies			
Tax expenditure	655,30	1.561,20	2.216,50
Direct subsidy	-	404,95	404,95
Total	655,30	1.966,15	2.621,45
Reduced VAT	4.023,60	1.416,00	5.439,60
Total	19.748,44	8.649,83	28.398,27

Source: (MATTM, 2019[49]).

The Netherlands assessment (Drissen, Hanemaaijer and Dietz, 2011[50]) used several studies on environmentally harmful subsidies to provide an indication of the magnitude of the most relevant environmental subsidies in the Netherlands. It estimates that, in 2010, this amounted to a total of between 5 and 10 billion euros. A more precise number is difficult to derive, as this strongly depends on varying criteria and methods of calculation. Because the included amounts relate to different years, or vary according to the literature, the assessment does not present them in the form of a table. The paper notes that it only provides a general insight into the magnitude of environmentally harmful subsidies in the Netherlands. Despite these caveats, for comparison purposes the main EHS identified in the Netherlands and their fiscal cost is shown in Table 3.9.

Table 3.9. Size of identified subsidies with environmental impacts in the Netherlands, 2010, EUR billion

Subsidy	Sector	Amount
Raising the VAT rate from low to high for meat and possibly also dairy products	Agriculture and food	1.1
Raising the VAT rate on ornamental plant cultivation from low to high	Agriculture and food	0.39
Lower tariffs for energy used in greenhouse horticulture	Agriculture and food	0.10-0.17
Lower tax rate on red diesel (used in agriculture, construction, coastal and inland shipping)	Transport	0.13-0.26
Subsidies for delivery vans	Transport	1.6
Fiscal benefits to commuter transportation by car, use of company vehicles	Transport	1.1
Abolition of the road tax exemption for veteran cars	Transport	0.15-0.30
Exemptions on excise duty and VAT on kerosene	Transport	1.7
VAT exemption on air tickets	Transport	n.a.
Exemptions on excise duty and VAT on shipping	Transport	0.44
Lower tariffs for energy taxation on large-scale use	Energy	1.6
Freely distributed emission credits under the ETS	Energy	n.a.

Source: (Drissen, Hanemaaijer and Dietz, 2011[50]).

The Nordic Council assessment (Bragadóttir et al., 2014[51]) does not claim to be comprehensive. Three cases of environmentally harmful subsidies were chosen for a more detailed analysis. To compare and evaluate the effects of a subsidy removal, monetary values are attributed to the environmental effects. The most credible references for the values used in each case study were sourced from the literature. The value of the subsidy in the case of lower energy tax on diesel was calculated using the revenue foregone method, although in addition this study makes estimates of likely behavioural changes by producers and consumers which partly explains the range of estimates shown in Table 3.10. In the case of the agricultural direct payments, it is the direct budget cost. In the case of the overallocation of allowances, this is deemed an EHS because it lowers the market price of emission allowances below the social cost of carbon. The fiscal cost is treated like a tax exemption and measured on this basis.

The environmental cost of the lower energy tax on diesel was calculated based on the costs of the air pollutants, impacts on climate change and upstream and downstream processes derived from previous literature. In the case of direct payments and the overallocation of emission allowances, the OECD three-linkages model was used to estimate the potential environmental damage.

The final column of this table calculates the ratio of the environmental to the fiscal impact, which is used as a measure of the political feasibility of reform.

Table 3.10. Overview of fiscal and environmental impact of removing three identified EHS (Nordic Council)

EHS	Environmental impact	Fiscal impact	Environment/fiscal impact
Lower energy tax on diesel used in transport compared to petrol	EUR 89-223 m	EUR 1-3 bn	0.07-0.22
EU direct payments to farmers	EUR 61-135 m	EUR 218 m	0.28- 0.62
Overallocation of allowances in the EU Emissions Trading Scheme	EUR 240m	EUR 1 bn	0.24

Source: (Bragadóttir et al., 2014[51]).

The Swedish study (Naturvardsverket, 2017[63]) quantifies both direct subsidies and tax expenditures with potentially harmful environmental effects within the three sectors energy, transport, and agriculture and fisheries, while noting some caveats around the tax expenditure calculations. One shortcoming of the method is that the effects of any behavioural changes are not included in the central government budget's accounts of tax exemptions. In addition, the possibility that the normal tax rate might be lower if the tax base were expanded is not considered. In a country with a high tax burden, subsidies in the form of tax exemptions will likely be large. A country that has a low tax burden will not show such large tax exemptions, even if tax exemptions occur. As Sweden has internationally high taxes, its subsidy figures are also large when tax exemptions are included. The study warns that international comparisons of subsidies in the form of tax exemptions should be made with great caution, both in terms of relative tax expenditures and absolute monetary expenditure.

The size of potentially environmentally harmful subsidies reported in the Swedish survey are provided in Annex I of that report. The figures refer to those subsidies that could be quantified; not all subsidies could be quantified. Transport subsidies (mainly in the form of tax exemptions) are the largest group, followed by Energy subsidies and then Agriculture and Fisheries. Some of the biggest subsidies in the Transport sector include the lower tax rate on diesel for motor transport compared to petrol, income tax deductions for travel to work costs above a minimum threshold, the reduced VAT rate for passenger transport including public transport and taxi travel, and support for forest roads to make areas to be felled easier to reach. Major subsidies in the Energy sector include the reduced energy tax on electricity used in manufacturing and data centres, energy tax exemption for biofuels, peat, etc. for heating, and reduced energy tax on fuels

used on combined heat and power plants. The main subsidies in the Agriculture and Fisheries sector are direct payments to farmers and structural support for the fishing industry. While the environmental issues likely to be affected by each subsidy are reported in the survey, there is no specific focus on biodiversity. As the data available ranges across different years, the study does not add up across the amounts identified.

The Swedish study (Naturskyddsföreningen, 2018[64]) that examined the size of climate-damaging studies only included tax expenditures for fossil fuel measures. Swedish tax expenditures in total amount to approximately SEK 30 billion per year. Tax exemptions for fossil fuels amounted to SEK 12.4 billion in the 2017 state budget. The single largest item was the tax reduction for diesel fuel, around SEK 8 billion. Travel deductions and the benefit car system created revenue losses of at least another 7.3 billion. In addition, there are free allocations of emission rights and surpluses of emission rights, the tax exemption for fuel for international flights, VAT exemptions and operating grants.

The Swiss national assessment (Swiss Federal Council, 2013[65]) observes that estimating the impact of taxes and subsidies on the environment is complex and unreliable. The production and consumption of all goods and services can have an influence on the environment; taxes and subsidies can enhance or reduce this influence. The concrete environmental impacts depend on the exact design of the tax (tax base, scale, tax relief, etc.), price elasticity and avoidance and transfer process. Regarding subsidies, similar factors make it difficult to estimate their environmental impact, which is determined by the management of grants (amount, terms, etc.) and deadweight. The identification of the environmental impact of a tax or subsidy is also made more difficult by the complexity of the ecological balance. These impacts are rarely limited to a single ecological field: in most cases they affect several areas simultaneously and the severity of the environmental impacts varies. Thus, inferring causality is not always possible. The ecological impact of these instruments can only be roughly estimated. For this reason, the identification and presentation of potentially environmental harmful subsidies in the report is purely qualitative.

The size of the identified environmentally harmful subsidies in Switzerland according to the (Swiss Federal Council, 2013[65]) study is shown in Table 3.11. The assessment notes that the magnitude of these amounts gives an indication of the importance of environmentally harmful subsidies but should not be treated as an indication of the environmental costs they cause.

Table 3.11. Size of identified subsidies with adverse environmental impacts in Switzerland, 2012, CHF million

Subsidy	Sector	Amount
Supplements for the dairy industry	Agriculture and food	298.0
Contributions to keep animals consuming roughage (UGBFG)	Agriculture and food	503.4
Contributions to keep animals in difficult conditions (DCAG)	Agriculture and food	351.5

Source: (Swiss Federal Council, 2013[65]).

The impact of differences in definitions (scope) and methodology is shown by comparing these results with those estimated in the WSL study (Gubler, Ismail and Seidl, 2020a[8]). Although the latter only covers biodiversity harmful studies and not all environmentally harmful studies, it concludes that the overall total of subsidies it could quantify amounted to CHF 40 billion in 2018. Of this, CHF 15 billion (39%) is entirely damaging to biodiversity, CHF 19 billion (47%) is partially damaging to biodiversity and CHF 6 billion (14%) is damaging subject to implementation. In contrast, the public sector spends annually - depending on the calculation – CHF 520 million to 1.1 billion on biodiversity protection. In addition to the quantifiable subsidies, some subsidies could not be quantified often because they were either tax expenditures or implicit subsidies. The main sectors in which subsidies contribute to biodiversity damage are shown in Table 3.12. The largest number of subsidies harmful to biodiversity were in the Agriculture sector, but the

largest value was in the Transport sector. A feature of this Swiss study was that it tried to assess how damaging the subsidies were to biodiversity. The Transport and Energy sector subsidies stand out as being particularly harmful to biodiversity whereas, despite the large number of subsidies and their considerable value, the majority of Agriculture subsidies were classified as only partially harmful to biodiversity. This classification can help to prioritise those subsidies where reform is most urgent.

Table 3.12. Number of subsidies harmful to biodiversity in Switzerland

Sector	Number of subsidies incl. perverse financial incentives	Number of quantifiable subsidies	Value of quantifiable subsidies	Share completely harmful to biodiversity	Share partially harmful to biodiversity	Harmful depending on implementation
Transport	34	32	26	51%	35%	14%
Agriculture	46	46	7.6	19%	66%	15%
Forestry	8	7	0.34	0%	68%	32%
Energy	31	16	1.7	44%	55%	1%
Settlement development	28	n.a.	n.a.	n.a.	n.a.	n.a.
Tourism	9	9	0.37	2%	98%	0%
Waste water disposal	4	n.a.	n.a.	n.a.	n.a.	n.a.
Flood protection	3	n.a.	n.a.	n.a.	n.a.	n.a.
Total	163	110	40	58	69	n.a.

Note: n.a. not available means that the value of the subsidy could not be quantified. The total row is taken from figures in the report and is not the sum of the columns.
Source: (Gubler, Ismail and Seidl, 2020a[8]).

3.2.4. *Reforming – proposing pathways for change*

The main purpose of the national assessments reviewed is to create an inventory of EHS and BHS. However, several assessments take the further step of setting out priorities for reform. This involves not only evaluating the environmental and fiscal impacts of each measure, but also the objectives of the subsidy, whether these objectives remain relevant and are realised and, if so, whether there are alternatives that could achieve the objectives of the subsidy at a lower environmental cost. It can also involve identifying the social and political considerations that need to be addressed in designing a pathway to reform. While the political economy issues involved in the reform of environmentally harmful studies is beyond the scope of this report, a summary of the findings and recommendations in those assessments that considered this aspect is provided in Annex A.

4 National-level guidance to identify and assess incentives, including subsidies, harmful to biodiversity

The recent Global Biodiversity Outlook (CBD Secretariat, 2018) concluded that only a very limited number of countries have undertaken any form of national level analytical study to identify and assess incentives, including subsidies, harmful to biodiversity. This is an essential starting point for the commitment embodied in Aichi Target 3 to eliminate, phase out or reform incentives, including subsidies, harmful to biodiversity in order to minimise or avoid negative impacts. Several OECD countries have been at the forefront of these efforts, as summarised in the previous sections. The objective of this section is to draw out, from the literature review and the approaches used in the existing national assessments, some guidelines or good practice insights that could be helpful to countries embarking to identify and assess incentives, including subsidies, harmful to biodiversity for the first time.

These guidelines draw both on previous efforts to construct a framework or toolbox to identify environmentally harmful subsidies as well as synthesising the national experiences. Among previous efforts is the toolbox developed by the OECD to identify environmentally harmful subsidies. This toolbox includes the "quick scan" tool, the "checklist" tool (OECD, 2005[1]), and the "integrated assessment framework (OECD, 2007[66]) (for a summary of these, see (Valsecchi et al., 2009[67]). Many of the national assessments reviewed here explicitly used these tools.

The value of the national level assessments is that they demonstrate how these frameworks can be operationalised and put into practice. The key characteristics of the national level assessments are summarised in Table 4.1.

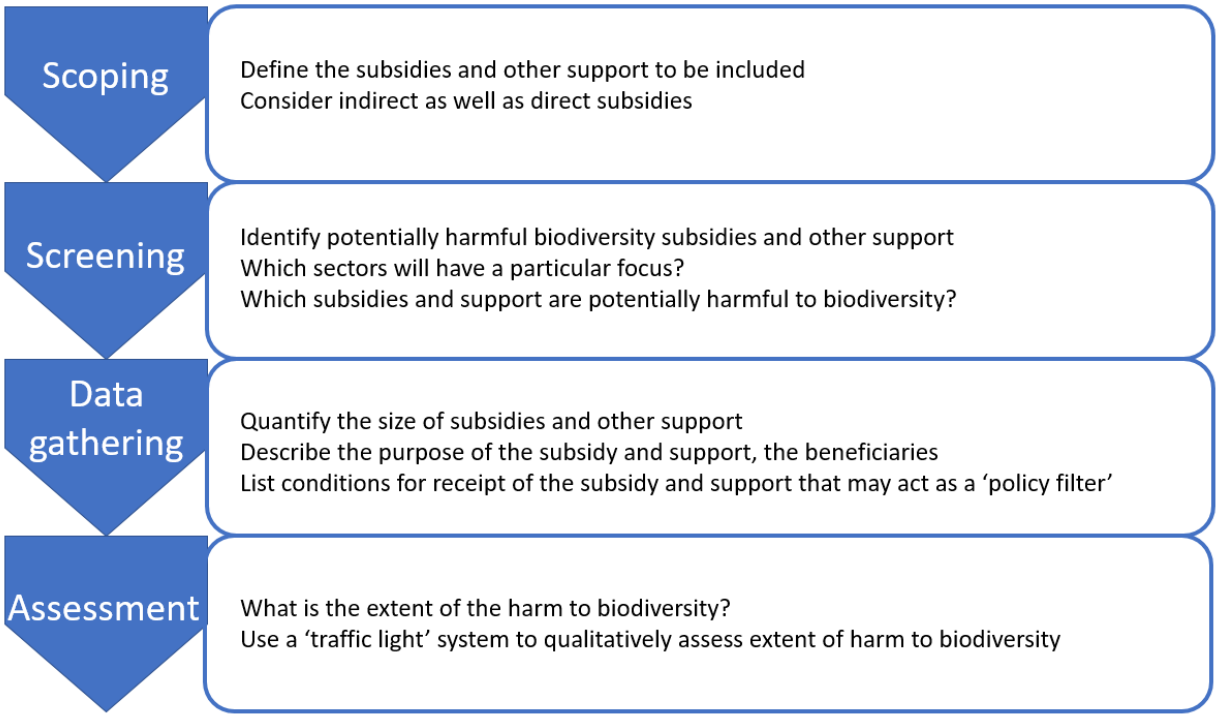
Table 4.1. Comparative summary of national-level studies

	EHS or BHS	Scope of review	Sectors covered	Total monetary estimate of E/BHS
Austria (2019)	EHS	Direct subsidies, tax expenditures, regulatory laws. Non-internalised external costs treated separately.	Energy infrastructure, transport and aviation, housing infrastructure, tourism	Yes, but approximate as data is from different years
Denmark (2005)	EHS	On-budget (direct grants and payments) and off-budget outlays (through tax policies, infrastructure provision, preferential loans, price regulation and import/export tariffs).	Agriculture, fishery, energy production, transport, water and forestry	No. Covers examples of subsidies
EU (2011)	EHS	Direct subsidies, tax expenditures, non-internalised external costs	Agriculture, structural and cohesion policy, transport and energy, and fisheries	
Finland (2015)	BHS	Tax subsidies, direct budgetary support, indirect support	Agriculture, transport, energy, forestry	Yes

Finland (2013)	EHS		400 measures identified, 50 examined in detail	
France (2011)	BHS	Explicit (direct) subsidies, tax credits, regulatory advantages, failure to enforce or partial enforcement of regulation, and implicit subsidies (non-internalised external costs)	Adopted a pressure approach. Relevant sectors include transport and housing infrastructure, agriculture, water, energy	No
France (2021)	EHS incl. BHS	Direct subsidies and tax expenditures	All expenditures in the public budget	Yes
Germany (2021)	EHS	Direct and indirect subsidies	Energy supply and use, transport, construction and housing, agriculture, forestry, fisheries	Yes
Germany (2019)	BHS	Direct and indirect subsidies	Settlement (housing), transport, agriculture, energy	Yes
Ireland (2018)	EHS	Focus on tax expenditures	Considered 142 measures, and identified 246 environmental impacts (positive or negative)	No
Ireland (2016)	EHS	Direct and indirect subsidies	Fossil fuels, agriculture and food, transport, fishing and aquaculture	Yes
Italy (2019)	EHS BHS	Direct subsidies and tax expenditures (i.e. indirect subsidies)	Agriculture, energy, transport, other, reduced VAT	Yes
Netherlands (2011)	EHS		Agriculture, transport, energy (and some others)	Yes (approximate only)
Nordic Council (2016)	EHS	Any unrequited financial assistance provided by the government	Differential taxation in favour of diesel ore petrol in transport, EU direct payments to farmers, over-allocation of EU ETS allowances	No. Selected examples only.
Norway	BHS	All subsidy schemes and other direct and indirect support schemes	All sectors	No
Sweden (2017)	EHS	Direct subsidies and tax expenditures	Transport, energy, and agriculture and fisheries	Yes
Switzerland (2013)	EHS		Agriculture and food, national defence, transport and economic development.	Yes
Switzerland (2020)	BHS	Direct benefits, foregone revenue (tax deductions), non-internalised external costs	Transport, agriculture, forestry, energy production and consumption, settlement development, tourism, wastewater disposal and flood protection	Yes

The framework used to develop insights on developing national level assessments to identify and assess subsidies harmful to biodiversity consists of four steps (Figure 4.1).

Figure 4.1. Framework to identify and assess national subsidies and other support harmful to biodiversity



Source: Authors.

4.1. Step 1. Scoping - Defining the types of subsidies to be covered

The first step is to identify the range of subsidies to be included in the national assessment. This is a conceptual step that requires clarification before individual measures can be identified. The broader the definition of a subsidy, the more measures will be relevant to be evaluated for their biodiversity impact. It may be important to adopt a wider definition if the additional measures that are brought within the scope of the analysis have potentially greater adverse effects on biodiversity than a narrower definition.

Economic support measures come in a wide variety of forms, including direct and indirect support payments, tax expenditures through tax concessions to specific industries or regions, market price support, and other regulations that enhance the competitive position of particular industries or sectors (OECD, 2006[68]). Consequently, reforming biodiversity harmful subsidies involves more than identifying direct budget subsidies and removing them. Indirect support such as tax expenditures, selective exemption from environmental taxes or governmental regulations, preferential market access, and price support represent different types of off-budget support which have in principle the same effects as direct subsidies, but in a less transparent way.

Many of the national assessments refer to the discussion and definition of a subsidy provided in (OECD, 2005[1]). The report noted that there is no definition of a subsidy that is universally accepted by all who use the term - national accounts statisticians, trade negotiators, environmental economists and the general public. It defined a subsidy as a result of a government action that confers an advantage on consumers or producers, in order to supplement their income or lower their costs. This is a broad definition of subsidies. It includes both direct on-budget subsidies (e.g. explicit transfer of funds and other forms of government

expenditure) as well as off-budget or indirect subsidies (such as tax exemptions and rebates, preferential market access, market price support, etc.).

An issue for decision in this step is whether the subsidy coverage should include implicit subsidies (external costs or "uncorrected market failures" that are not formally regulated or priced through some form of economic instrument such as taxes, fees and charges or quotas). Inclusion of implicit subsidies was recommended in a few of the national assessments, but most argued against it because of the difficulty in putting a monetary value on external costs and because it is a policy principle that goes beyond subsidy policy. This approach is also in line with OECD (2005). For countries embarking on their first national assessment of subsidies and other incentives harmful to biodiversity, trying to identify and quantify non-internalised environmental externalities is a substantially larger task, and one which arguably goes beyond the scope of identifying government subsidies that are harmful to biodiversity.

Scanning the literature review and the national assessments summarised in the previous sections will provide valuable insights on the range of subsidies that are potentially relevant and that should be included.

4.2. Step 2. Screening - Identification of potentially harmful biodiversity subsidies

Once the scope of the subsidies to be included in the assessment has been clarified, the next step is to make a list of those subsidies that are potentially harmful to biodiversity. These could be, for example, use of fossil fuels for energy, intensive use of fertilisers in arable farming, or building on open land. A biodiversity harmful subsidy is defined as one that increases the use of something that has a specific negative impact on biodiversity. In this step, the net should be cast wide to include all those sectors and activities likely to have an adverse effect on biodiversity (potentially harmful subsidies). Assessing whether a harmful effect actually exists in practice, and how severe it is, is undertaken later in Step 4.

Most assessments will find it useful to start with a list of specific sectors that are known a priori to potentially impact biodiversity. This list will certainly include agriculture, forestry, fisheries, energy, infrastructure, transport, construction and housing, and water. The literature review and national assessments summarised in section 2 and 3 provide additional insights on other sectors that might be considered. The national assessment should include a qualitative discussion of the nature of the causal relationship between the level of activity in a sector and its putative effect on biodiversity.

Once a list of sectors has been established, the assessment can then proceed to identify all subsidies, direct and indirect, that affect the level of activity in those sectors. If a subsidy does not potentially affect the level of activity in a sector, there is no need to retain it for further analysis. This step will require a thorough review of budget documents as well as discussion with sectoral experts from relevant Ministries and agencies to identify and understand the policy framework that underpins the grant of subsidies as well as other incentives that may influence the level of activity. To identify tax expenditures, the agency in charge of tax collection may already publish a list of tax expenditures that can be used. As part of the exercise, it may be useful to survey experts including NGOs to identify measures that potentially could be harmful to biodiversity to ensure as comprehensive a list as possible.

The output from this step will be a list or inventory of potentially harmful biodiversity subsidies for further assessment.

4.3. Step 3. Data gathering

Once the inventory of potentially harmful subsidies is established, the assessment needs to gather relevant data on these subsidies. The data needed include both the size (amount) of the subsidy but also a detailed description of its purpose, its beneficiaries and any conditions attached to its receipt by a beneficiary. It

may be helpful to keep track of this information by preparing "fact sheets" that bring the relevant information on each subsidy together in a consistent manner.

An example of such a "fact sheet" is shown in Figure 4.2. This builds on a template prepared by the Biodiversity Finance (BIOFIN) Initiative of the United Nations Development Programme (UNDP) in connection with its Biodiversity Finance Policy and Institutional Review (PIR) designed to better understand the complexity of drivers of biodiversity loss and their connection to finance flows. One of the steps in a PIR is the collection of data on beneficial and harmful subsidies.

Table 4.2. Example of a template to record information on potentially harmful subsidies and other support

Heading	Description
Existing subsidy or support more broadly	Name of the subsidy and support analysed
Responsible stakeholder/organisation/agency	Stakeholders/organisation and agency involved or related to the subsidy and support
Sector	Relevant sector(s)
Drivers	Describe the motivations explaining the introduction and continuation of the subsidy and support
Direct or indirect	Is it a direct or indirect subsidy or support?
Financial value	Financial value of the subsidy or support
Description – intended objective and beneficiaries	Describe the main objectives of the subsidy/support, the intended beneficiaries, and criteria for eligibility
Benefits (social, environmental, economic)	Describe the different benefits that the subsidy/support has and will have on social, environmental and economic aspects Example: Agriculture subsidy to support rural employment
Biodiversity benefits	Are there ways that the subsidy benefits biodiversity?
Biodiversity-harmful impacts	What harmful impacts on biodiversity can be expected or are known? (see Step 4 of these guidelines)
Relevant legislation	Describe the main laws and regulations creating the subsidy or support
Links to related studies including cost-benefit studies, economic evaluations etc.	Describe different sources of analysis related to the subsidy or support (e.g., any economic justification)

Source: Adapted from (UNDP, 2018[69]).

The output of this step in the assessment will be a quantified list of potential harmful subsidy expenditures together with a description of how they operate to increase the level of activity in the targeted sector. This, in turn, provides the information needed for the fourth and final step in the assessment process.

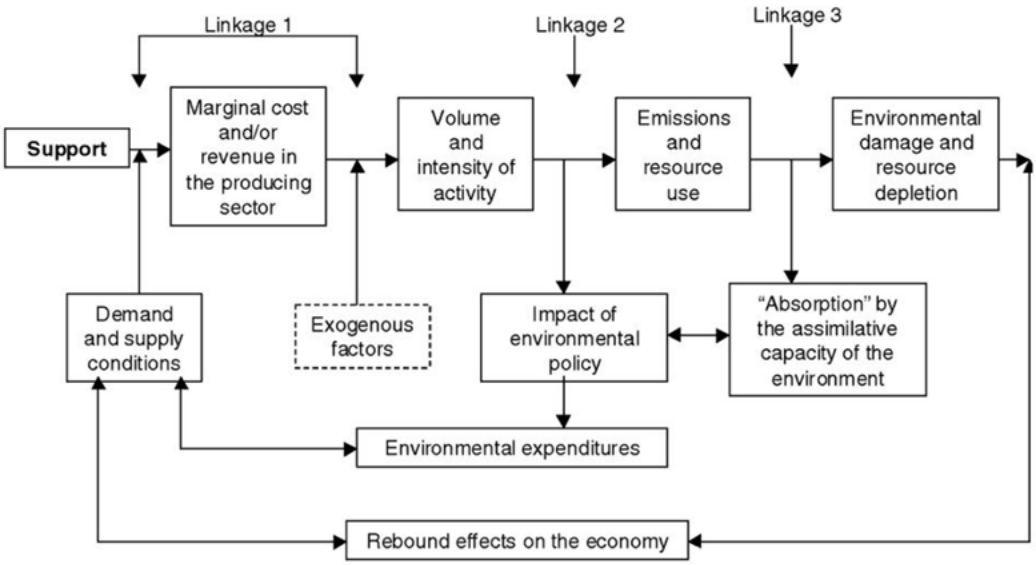
4.4. Step 4. Assessing – what is the extent of harm to biodiversity?

Once the data has been gathered on all of the subsidy and support measures in the initial inventory, the final step is to determine whether there is a significant adverse impact on biodiversity arising from each subsidy or other support more broadly. While quantifying the size of a potential biodiversity-harmful subsidy/support is the first step in assessment, it may bear no relationship to the cost of the biodiversity or broader environmental damages caused. An environmental assessment of the subsidy/support ascertains as far as possible what adverse effects the subsidy has for the environment or for biodiversity. This is in many ways the most complex step in the process of preparing a national assessment, partly because of the data requirements but also because it requires different skill sets and expertise. The first three steps can be completed by those with an environmental economic, financial or accounting background and with a good knowledge of the policy process. This assessment step will need to draw much more on experts in

ecology, in conservation and in the biological sciences in order to ascertain the likely magnitude of the effects on biodiversity.

In previous work, the OECD has spelled out a three-linkage model to assess the impacts of support measures on the environment which can also be applied to biodiversity (Figure 4.2). The first link shows the extent to which the support measure increases output in the economy. The second link shows how the increase in output affects emissions and resource use. The increase in actual levels of emissions and resource use depends on how much of the increase is "filtered out" by environmental policies. The third link is a dose-response relationship that describes the assimilative capacity of the environment. It shows the extent to which the increase in emissions, or resource use, causes actual environmental damage. The quality of information available to assess and quantify the strength of these linkages may vary considerably. Furthermore, the strictness of environmental policy ("policy filters") and the environment's assimilative capacity will also affect the final environmental damage.

Figure 4.2. Links between support measures and environmental impacts



Note: As with all analyses, results will depend on the chosen assumptions, methodologies and available data such that the quantitative results will always be subject to some degree of uncertainty.
Source: (OECD, 2005[1]).

The OECD has developed several tools ("quick scan", checklist, integrated assessment) that can be used to systematise the assessment process (OECD, 1998[70]) (OECD, 2005[1]) and which have been used in several of the national studies reviewed in section 3. The studies summarised illustrate how varied and interlinked the environmental impacts of subsidies are. It can be difficult to establish a direct causal connection between a subsidy and environmental damage. There can be considerable uncertainty in establishing both the impact of the subsidy on the level of activity, and the impact of the level of activity on biodiversity. The biodiversity impacts are not only a function of the size of the subsidy, but also of its design, the existence of flanking policies and "policy filters", and the environmental context.

Sometimes, the impact on biodiversity may be indirect rather than direct. For example, a subsidy encouraging greater use of fossil fuels in transport may not impact biodiversity directly. But climate change caused by the greenhouse gas emissions from the use of fossil fuels can have adverse consequences for biodiversity. Capturing these different impact mechanisms will require detailed analysis of individual subsidies. Analysts may be able to draw on results from bio-economic models which are analytical tools

that integrate biophysical and economic models. The biophysical and economic components of these models are developed based on historical observations or theoretical relations. Based on these assumed relationships, these models can be used to evaluate the ways in which subsidies effect production, markets and the environment including biodiversity. Where subsidies and other forms of support are altered, the opportunity should be taken to conduct ex-post empirical assessments to provide empirical evidence on the strength of these relationships.

Nonetheless, given the uncertainties, establishing quantitative estimates of the adverse impact on biodiversity of a particular subsidy or support measure is usually not possible. Only one of the studies reviewed in section 3 attempted to do this, and then only for a group of three subsidies. Instead, a more common and feasible approach is to conclude with a qualitative assessment, often using a “traffic light” system in which the adverse biodiversity impact is rated as low, medium or high. This qualitative approach is recommended for those undertaking a national assessment for the first time. Together with information on the size of the subsidy this will provide useful insights to policymakers on which subsidies and other support to prioritise in terms of subsequent efforts to reform or eliminate biodiversity harmful subsidies or support.

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Annex A. Reforming subsidies harmful to biodiversity

Several national level assessments took the final step of setting out priorities for reform. This involves not only evaluating the environmental and fiscal impacts of each measure, but also the objectives of the subsidy, whether these objectives remain relevant and are realised and, if so, whether there are alternatives that could achieve the objectives of the subsidy at a lower environmental cost. It can also involve identifying the social and political considerations that need to be addressed in designing a pathway to reform. The political economy issues involved in the reform of environmentally harmful studies is not the focus of this document. However, the findings and recommendations in those studies that considered this aspect is summarised in this Annex.

The Danish assessment (IMV, 2005[55]) looks at the barriers to removing harmful subsidies. It draws on the rent-seeking literature to explain the different political economy factors behind broadly targeted subsidies (health, education, and social welfare) and narrowly targeted subsidies (such as agricultural support or fishing subsidies). Because the benefits of the former are widely dispersed as are the tax costs of funding these programmes, they are likely to become campaign issues and be determined in elections. In the case of narrowly-targeted programmes, because the benefits are concentrated the beneficiaries have a great incentive to lobby to continue the subsidy programme, but because the costs of widely dispersed and relatively small at an individual level, the taxpaying voter has little incentive to invest energy to oppose them. Political resistance to these subsidies is made even more difficult since the environmental consequences are usually less visible, eventuate with a lag, and are thus harder to attribute to a specific policy concession. The report (perhaps optimistically) argues that more extensive and accurate information about the benefits from eliminating harmful subsidies will increase the knowledge of the population (voters) and counterbalance the arguments from interest groups. It thus makes a strong plea for transparency including the availability of internationally comparable data to assist in the elimination of EHS.

The EU study (Withana et al., 2012[16]) uses a checklist of criteria to rank its set of 30 potential EHS in terms of their priority for reform. Five criteria enter the decision-making model:

- ***Objectives***: In many of the cases examined, the objective of the subsidy or rationale remains at least partially valid (e.g. providing support to low-income households in the cases of reduced VAT on food and drinking water, facilitating home ownership by low-income households, improving the efficiency of the fishing fleet, or providing partial compensation for high labour taxes in the case of company car taxation). However, the analysis indicates that in some cases the rationale or objective of the subsidy may no longer be valid, such as in the case of the reduced VAT rate for food, given the declining share of food (including non-alcoholic beverages) in total household expenditure over the years.
- ***Design***: In cases where the rationale or objective remains (partially) valid, the subsidy in place may not be the most (cost) effective or efficient means of achieving the policy objective. The assessment quotes the case of the reduced VAT rate for drinking water in Greece, which is motivated on social grounds of protecting low-income households, but mainly benefits high-income households and contributes to the environmental problems related to the (over-)exploitation of water resources.
- ***Social impacts***: The social impacts of the subsidies vary across the cases. Some subsidies reach their target beneficiaries (e.g. commercial fisherman, active farmers, operators of incineration plants) and have little impacts on wider society, while others may have major unintended social impacts such as the negative health impacts related to extractive mining, risks related to potential

nuclear accidents, or health impacts of transport emissions. Given the way subsidies are designed, they may reach target beneficiaries (e.g. low income households), but end up benefiting other groups more, as in the quoted examples of the VAT reduction applied to food in Luxembourg and to drinking water in Greece.

- ***Environmental impacts***: This point summarises the environmental impacts that were assessed in Step 4 of the framework. These impacts may arise because the subsidy affects consumption and production behaviour and thus has an indirect impact on the environment, e.g. contributing to "urban sprawl" through the provision of commuter subsidies In other cases, the subsidy may have direct environmental impacts such as the impacts of uranium mining and risk of nuclear accidents in the case of support for the nuclear industry in Germany, or the depletion of fisheries resources and damage to ecosystems through subsidies for vessel scrapping. In some cases, the environmental impact may be mitigated by "policy filters", either built-in to the subsidy itself (e.g. in the case of vessel scrapping) or in the form of environmental regulations (e.g. emission standards for cars; environmental permits for quarrying).
- ***Financial and economic impacts***: The assessment found significant differences in terms of the absolute size of the subsidy and associated impact on public budget. But this element is also intended to cover unintended economic effects (for example, higher private car mileage from the favourable treatment of company cars exacerbates congestion and accident costs in several EU Member States). Another example cited was the implicit subsidy to the use of nitrogen-rich fertilisers in France**,** due to the lack of taxation of those fertilisers related to their impacts. Not only is there a cost to the public budget, but the excessive use of those fertilisers subsidy leads to eutrophication and green algae along parts of the French coast which are estimated to lead to tourism losses and cleaning costs for coastal municipalities.

These criteria were used to assess the priority for reform using a traffic light system. The selected EHS were set out in matrix form, with each row devoted to an individual measure and the columns representing the five decision criteria. The cells of the matrix were then coloured based on the following assessment:

- Green: There are no particular problems relating to the criteria.
- Orange: There are some concerns with this particular criteria and further attention is useful. It is not, however, an over-riding problem suggesting a pressing need for reform.
- Red: There are significant concerns with respect to the criteria and further attention or reform is needed.

Based on this matrix the national assessment identifies several cases where the selected EHS need potential reform. It calls for additional analysis to confirm this assessment and to explore further the multiple benefits of potential reform and practical options for reform.

The EU study (Withana et al., 2012[16]) includes a section looking at case studies of successful EHS reform, noting that examining such cases can be useful to demonstrate that EHS reform can work and how. Ten in-depth cases of EHS reform in EU Member States are chosen for examination. Examples include the elimination of reduced excise tax rate for diesel used in agricultural machinery in the Netherlands; reduction of energy tax exemptions for companies in Germany; reduction of exemptions from energy and CO2 taxes for certain fossil fuels in Sweden; road charging in Austria; and reform of water pricing in the Czech Republic. The report notes that the level of success of EHS reform varies across the ten cases examined. The study also notes that the cases examined account for only a small share of EHS and that, overall, progress in EHS reform remains slow.

The EU assessment identifies several enabling factors that help to drive reform forward. It observes that these drivers vary from case to case and often a mix of different factors come together to create a window of opportunity for reform. Some of the key drivers of reform in the cases examined are set out below:

- A shift in political priorities following the election of a new government or influenced by some external event (e.g. the Fukushima accident in Japan) can trigger reform.
- Problems with the subsidy itself may trigger reform if it was found to not reach its objective/target audience; that it was no longer valid; or that it had problems in its design.
- Economic and financial crisis and the resulting need for fiscal consolidation and budgetary discipline has been an important impetus for EHS reform.
- Public or stakeholder pressure can drive reform in certain contexts, as seen in the commitment to phase out of nuclear energy in Germany by 2022.
- For EU Member States, legislation and commitments at EU level can be a powerful driver of reform. For example, the provision in the Water Framework Directive which requires implementation of the user-pays principle and cost recovery principle in water pricing has driven the introduction of water abstraction charges in certain regions.

The assessment also highlights the importance of the way the reform is implemented. The gradual implementation of a reform has helped in some instances to improve its acceptability among the general public. Prospects for EHS reform can be strengthened when it also entails simplification, reducing administrative costs and the risk of fraud. Opposition against a subsidy reform measure may be easier to overcome if it is presented as part of a large package, such as a major (tax) reform. The prospect of compensatory measures for the affected sector(s) may increase the political acceptance of the reform, even if this compensation is only partial. It cites a Netherlands example where part of the additional tax revenues from the abolition of “red” diesel was recycled to the agricultural sector through “green” subsidies, e.g. as subsidies for animal housing systems with low emissions. The report notes that the message of reform needs to be carefully formulated and communicated clearly to the wider public in order to generate support. This may mean putting more emphasis on important co-benefits of the reform rather than the environmental benefits as such (even if they are real and important).

Finally, the EU report also deals with the obstacles that policy makers can meet when attempting to reform EHS and addresses possible ways to overcome these obstacles. For this purpose, it uses the categories of obstacles distinguished by the OECD (2005) to structure the evidence on obstacles emerging from the case studies examined, relevant literature, and stakeholder consultation.

The German assessment (Umweltbundesamt, 2021[6])considers that its aim is to analyse whether the reasons for the subsidy make sense, whether and how it achieves its intended purposes, and what negative, environmentally harmful (side) effects it causes. Where the subsidy has a legitimate objective, it is then necessary to examine whether the adverse environmental effects can be reduced, for example by employing alternative means of assistance, modifying the subsidy, or making use of supporting instruments.

The Nordic Council assessment (Bragadóttir et al., 2014[51]) notes that the greater the positive environmental effect of reforming an environmentally harmful subsidy, the easier it is to motivate its reform. At the same time, the larger the fiscal gain from a reform proposal, the larger the economic incentive for going forward with a reform proposal. By combining the impacts, it is possible to single out which environmentally harmful subsidies could be reformed to generate positive effects in both areas. These authors describe reform of environmentally harmful subsidies with significant positive effects for both the public finances and the environment as “low-hanging fruits”. This study uses three case studies to show the application of this approach. It provides a general discussion of the political feasibility of reform in each case but stops short of providing a detailed roadmap for reform.

The Swedish study (Naturvardsverket, 2017[63]) notes the need for more rigorous analysis of the environmental impacts of potentially environmental harmful subsidies. It recommends investigating the harmful effects of subsidies before they are introduced. Once subsidies are in place, it takes a long time

to abolish them. A subsidy should be subject to an impact assessment before it is introduced or abolished, both with regard to government and sector financial effects as well as environmental effects, and these effects added together in socio-economic calculations.

The Swiss WSL study (Gubler, Ismail and Seidl, 2020a[8]) assesses the feasibility of reform of the subsidies it identified based on expert judgement. It recommended that 40% of the biodiversity damaging subsidies identified should be abolished. For 9% of cases, no recommendation could be made. For 51%, redesigning or diverting the subsidy was recommended: the political and administrative difficulty involved should be relatively low for 18% of these cases, medium for 51% and high for 31%. For each subsidy where redesign was recommended, the study proposed an alternative approach on which this assessment of political feasibility was based.