Fossil Fuel Subsidies in the Netherlands: Is Reform a No Brainer or Brain Teaser?

Master Thesis Policy Economics

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Abstract
This report applies the OECD inventory approach for identifying and quantifying fossil fuel subsidies (FFSs) to the Netherlands, intending to build the most accurate and complete fossil fuel subsidy (FFS) inventory to date. The broad scope applied spans FFSs across the government's direct transfer of public funds, tax revenue foregone, price support, and risk transfers to the government. This categorization gives a policy level understanding of how public funds support fossil fuels in the Netherlands. While some may see the removal of FFSs as a "no brainer," this report suggests that the identification, quantification, and economic assessment of these policies is more of a "brain teaser." The economic analysis shows negative economic effects that come with both keeping and removing FFSs, illustrating that FFS reform (FFSR) requires a nuanced perspective from policymakers. Finally, the report summarizes the upcoming policy changes and proposals that will reduce or remove FFSs in the Netherlands. Much of the low hanging fruit has been identified, and additional FFSR will be more of a "brain teaser." Policymakers must be focused on international coordination to implement these policies and to progress toward national and European climate goals.

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1 Introduction

Fossil fuel subsidies (FFSs) are public policies that benefit or give a preference for fossil fuel production or consumption over alternative energy sources (OECD, 2015; UNEP et al., 2019). A significant problem of fossil fuel use is the high carbon content, as fossil fuel combustion generates carbon dioxide (CO2) and other greenhouse gas (GHG) emissions. FFSs are related to the economic concept of externalities. In a perfectly competitive economy, resources are efficiently allocated when a market equilibrium is reached in which nobody can be made better off unless somebody else is made worse off (Pareto, 1897). When externalities are present, a market failure exists that prevents this efficient allocation from being reached (Pigou, 1920). Externalities occur when the relevant market party does not fully internalize economic activities, and no compensation is paid to make up for these actions. A carbon price can address this economic problem by forcing the market party to internalize the full societal cost of their consumption and production activities. FFSs have the opposite effect and instead act as a negative carbon price by lowering the price of fossil fuels.

With this rationale, economists often consider the removal of FFSs a "no brainer." FFSs hinder the progress toward Dutch and European climate goals and exacerbate climate change effects. Lower fossil fuel prices make decarbonization activities and renewable energy alternatives less effective and attractive (OECD, 2020). Removing FFSs would allow fossil fuel prices to reflect their actual cost more accurately. Higher prices would encourage the move away from fossil fuels and lower related economic distortions. With a starting point of higher and more realistic fossil fuel prices, climate policies would work more effectively if FFSs were removed (IISD, 2019). However, governments continue to cite economic reasons for sustaining them, like carbon leakage, international competitiveness, and security of energy supply. In addition, political inertia, vested industry interests, and lack of public awareness hinder the process of FFS reform (FFSR; Milieudefensie, 2020).

1.1 Fossil Fuel Subsidies are in Focus

Awareness of FFSs has grown among policymakers. The G20 called to phase out "inefficient FFSs" at its Pittsburgh Summit in 2009 (G20, 2009). In 2015, the United Nations (UN) solidified this mission to be met by 2030 in Sustainable Development Goal (SDG) 12.c.1 ("rationalize inefficient FFSs that encourage wasteful consumption by removing market distortions"; UN, 2015). Moreover, the Paris Agreement of 2015 includes commitments for countries to make financial flows "consistent with a pathway towards low GHG emissions and climate-resilient development" (UNFCCC Article 2.1.c, 2015). Most recently, the COP 26 Glasgow Climate Pact of 2021 included a specific call upon nations to phase out inefficient FFSs (UNFCCC, 2021).

The European Commission (EC) considers FFSR necessary for the European Union (EU) to meet its decarbonization commitments (EC, 2019c). To reach the European Green Deal, the EU committed to 55% less CO2 emissions by 2030 compared to 1990 levels in the recently proposed Fit for 55 Package (Fit for 55; EC, 2019b, 2021a). By 2050, the EU wants to be climate neutral. The Dutch government committed to at least 55% less CO2 emissions by 2030 compared to 1990 as a domestic goal in the 2021-2025 Coalition Agreement (Rijksoverheid, 2021).

Many academic studies using empirical and theoretical models agree that FFSR is a powerful tool to help countries reach their climate goals (Mundaca, 2017; Erickson et al., 2020; Matsuo and Schmidt, 2017; Chepeliev and van der Mensbrugghe, 2020). Moreover, the literature finds evidence for these subsidies' harmful environmental impacts. Ellis (2010) reviewed six prominent modeling and empirical studies since the 1990s that conclude FFSR, defined as the removal of consumer subsidies that keep fuel prices low, would reduce CO2 emissions (1.1% reduction by 2010 to 18% reduction by 2050) in countries globally (Burniaux et al., 1992; Larsen and Shah, 1992; IEA, 1999; OECD, 2000; Saunders and Schneider, 2000; Burniaux et al., 2009). The estimates of FFSR vary in the literature depending on regions, timeframes, models, and assumptions, especially around the benchmark price for fossil fuels[1]. For consumer FFSR alone, Burniaux and Chateau (2014) and Schwanitz et al. (2014) found global emission reduction estimates of between 6.4% and 8.2% by 2050[2]. Most drastically, the International Monetary Fund (IMF) projected that global CO2 emissions would fall by 36% below baseline levels with efficient fuel pricing of social and environmental externalities in 2025 (Parry et al., 2021)[3]. This higher level of fuel prices would be enough to keep global warming within the Paris Agreement goal of 1.5 to 2.0 degrees Celsius.

1.2 Adding to the Debate

By applying a broad scope, this report aims to identify and quantify additional FFSs to compile the most accurate and complete FFS inventory for the Netherlands. A bottom-up analysis, like an inventory assessment, deepens the understanding of individual policies producing FFSs and can help policymakers execute reforms more effectively. The inventory will incorporate FFSs identified by the most prominent existing estimates, supplemented by others discerned from conversations with experts in the field[4]. This report will focus on adding transparency to the quantification of FFS estimates.

[1] IISD (2019) provides an overview of the studies.
[2] Consumer subsidies can keep fuel prices low. Producer subsidies can lower production costs or increase producers' revenues (Ellis, 2010).
[3] The IMF analysis assumes a carbon price of $USD 60 per ton in 2020 (with intervening or earlier years calculated with the assumption that this rises annually at $USD 1.5 per ton) to use a common price for cross-country comparison.
[4] Including conversations with the Ministry of Finance, Ministry of Economic Affairs and Climate (experts on different subtopics), CPB (experts on different subtopics), and PBL (Herman Vollebergh).

Second, this report will conduct an economic analysis of each FFS to provide insight into the associated trade-offs and consequences of FFSR. To develop practical and thoughtful policy reform, all economic effects of these subsidies must be assessed comprehensively on a case-by-case basis (Valsecchi et al., 2009). Many FFSs still have economic reasons for existing but also for being removed. Balancing these objectives is inherent in policy reform. This economic analysis is lacking in previous reports on FFSs in the Netherlands and can assist policymakers with the complexity of FFSR.

Finally, this report summarizes progress being made on FFSR. Upcoming policy changes or proposals are identified per policy that would reduce the scale of or remove FFSs. This analysis is new to the debate and provides insights into the progress being made toward Dutch and European climate goals.

1.3 Outline of Report

Section 2 provides a detailed account of the FFS debate's development in the Netherlands and the most prominent approaches and estimates to date. Section 3 outlines the assessment framework by explaining the Organization for Economic Cooperation and Development (OECD) inventory approach and reviewing the economic theory. Section 4 exhaustively applies the OECD inventory approach to identify and categorize FFSs in the Netherlands. Each policy is analyzed, quantified if data is available, and evaluated according to the economic theory outlined in Section 3. 19 FFSs are identified, 14 of which are quantified. Progress already made in policy reform is summarized to cover how the policies and the FFSs estimate will change in upcoming years. Section 5 follows the same process as Section 4 to create a second inventory of related subsidies, which covers policies that more indirectly support the fossil fuel industry. Seven related subsidies are identified, 2 of which are quantified. Section 6 assesses the implications of the inventory, focusing on progress being made to reduce or remove FFSs. Chapter 7 discusses the main takeaways of the analysis, which highlight how FFSs and FFSR are more of a "brain teaser" than a "no brainer."

2 A Review of Fossil Fuel Subsidies

2.1 Evolution of Debate in the Netherlands

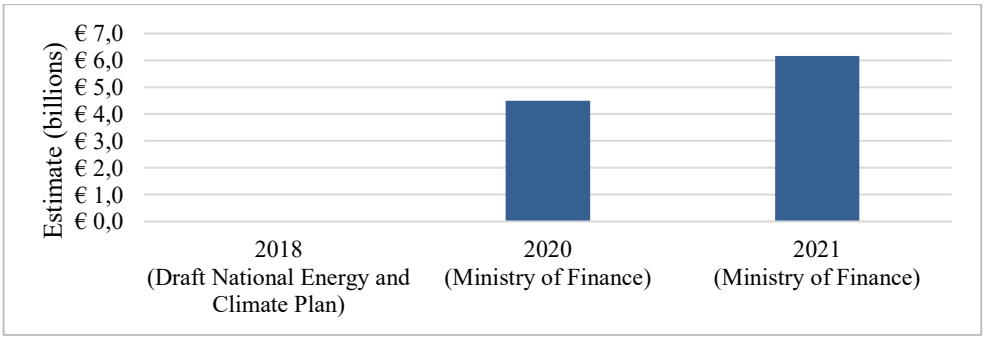
Despite the calls to phase out inefficient FFSs, little action was taken on reform following the Pittsburgh Summit in 2009. In the Netherlands, the urgency around FFSR has increased in recent years, coinciding with a changing definition of a FFS. Until end-2018, the Dutch government reported that there were no FFSs in the country and had no plans for reform (EC, 2018; ODI, 2019). The country received criticism as this evaluation was part of a climate target and policy reporting initiative by the EC for all member states (European Parliament and the Council, 2018). The Netherlands used a narrow definition at the time and considered only subsidies for the consumption of energy from fossil fuels. Meanwhile, the Overseas Development Institute and Climate Action Network Europe (ODI and CAN Europe, 2017),

ODI (2019), and UN Environment Programme, OECD, and the International Institute for Sustainable Development (UNEP, OECD, and IISD, 2019) were urging countries to broaden their definition to provide a comprehensive view of public funds supporting fossil fuel consumption and production.

Shortly after, the Dutch government expanded its definition and began mapping FFSs under this wider breadth. The Ministry of Economic Affairs and Climate Policy (EZK) commissioned the Clingendael International Energy Programme to write a report on the definition and approaches to measuring FFSs (CIEP, 2020). The Netherlands volunteered for a G20 peer review assessment, resulting in a published inventory of FFSs in the Netherlands in 2020 (OECD and IEA, 2020). This evaluation widened the definition to include direct budgetary transfers and tax measures resulting in revenue foregone for the government. Since 2020, the Ministry of Finance has reported this inventory (EZK, 2020). In 2022, they also listed fossil fuel-related public expenditures.

Graph 1: Evolution of Government-Reported FFSs Estimates

The government-reported estimates for FFSs have increased rapidly in recent years. The magnitude has evolved alongside the changing scope of the FFS inventory.



Sources: 2018: EC (2018); 2020: EZK (2020); 2021: Ministerie van Financiën (2022b). For 2021, all values are from 2021 except for the subsidy for using kerosene in international air travel. Here the 2019 estimate is used because COVID-19 restrictions affected 2020; there were no volumes available for 2021 yet.

The government uses the World Trade Organization (WTO) definition but does not report on more indirect subsidies (WTO, 1994; see Section 3.1). The government has received criticism for this from environmental groups and think tanks like Milieudefensie, Both ENDS, Oil Change International (OCI), ODI, and CAN Europe. Milieudefensie (2020) published an influential report expanding the scope of FFSs in the Netherlands to include more forms of government support. These environmental groups have focused on state-owned enterprises (SOEs) and public finance for fossil fuels (e.g., export credit agencies) in the Netherlands (ODI and CAN Europe, 2017; Milieudefensie, 2020; Molnar et al., 2022). This research has helped turn the public debate to consider this broad definition.

2.2 Current Estimates for Fossil Fuel Subsidies in the Netherlands

Varying estimates for FFSs in the Netherlands have emerged, as organizations diverge in their definition and approach. The scale of FFSs looks extremely different across them, as the estimates range from

none to $USD 13.6 billion for 2021. The International Energy Agency (IEA) and IMF have used a *price-gap approach*. This top-down method provides a model-based estimate of the difference between (1) a reference price for fossil fuels that includes the value of negative externalities and (2) the consumer fuel price. By including unpriced externalities of fossil fuels in this reference price, the IMF comes to the largest estimate for FFSs in the Netherlands. The OECD, the Netherlands Ministry of Finance, and environmental action groups have used a bottom-up *inventory approach* that quantifies individual policies that support fossil fuel use[5].

I will now give an overview of prominent estimates to discuss and compare the approaches. This assessment will help inform the approach used in this report.

Table 1: Prominent FFS Estimates in the Netherlands

The most notable FFS estimates for the Netherlands use either the price-gap or inventory approach. Varying definitions, assumptions, counterfactuals, and timeframes lead to remarkably different estimates.

Institution(s)	Approach	Estimate for the Netherlands
IEA	Price-gap approach	None
OECD and IEA	Inventory approach	€ 4.5 billion in 2020
Milieudefensie	Inventory approach	€ 4.9 billion yearly average between 2016 and 2020
Ministry of Finance*	Inventory approach	€ 6.2 billion in 2021
IMF	Price-gap approach, with socially efficient price	$USD 13.6 billion in 2021

Sources: IEA (2021a); OECD and IEA (2020); Milieudefensie (2020); Ministerie van Financiën (2022b); IMF (2021).
* All values are from 2021 except for the subsidy for using kerosene in international air travel. Here the 2019 estimate is used because COVID-19 restrictions affected 2020; there were no volumes available for 2021 yet.

IEA The Netherlands has no FFSs under the IEA price-gap approach because it does not hold supply costs below the international market price. Some countries do this to make energy more affordable for poorer income groups and to make domestic goods more attractive (CIEP, 2020).

OECD and IEA[6] Using the WTO definition, the G20 peer review considered the OECD inventory categories of direct budgetary transfers and tax measures that result in government revenue foregone. OECD and IEA (2020) identified thirteen subsidies that benefit the production and consumption of fossil fuels. Seven of the thirteen were quantified with budget documentation reported by the Dutch government. They include two subsidies for the exploration, development, production, and refining of fossil fuels and eleven subsidies to end-users of fossil fuels. The Dutch government published this inventory in 2020 (EZK, 2020).

[6] A more recent, different estimate from OECD is available publicly in OECD (2022). The database uses the same categorization but lists different subsidies and comes to a significantly lower estimate of $287 million (7 of 15 subsidies quantified). Versus OECD and IEA (2020), the database excludes the quantification of two subsidies for international flights and maritime transport and includes two unquantified subsidies for COVID-related environmental tax deferrals. Link

Milieudefensie Milieudefensie uses the WTO definition and implements the OECD inventory, with a separate estimate for public finance for FFSs and SOEs. The report identified 22 public spending, tax breaks, and price and income support policies, including 15 quantified subsidies representing a yearly average of €4.9 billion between 2016 and 2020. Milieudefensie also identified ten public finance and SOE investments in oil and gas. They find that the total government support dispersed by loans, credit support, and SOE investments equals €3.4 billion on average between 2016 and 2020. Milieudefensie (2020) uses this total amount due to data limitations, though this is not theoretically the subsidy. In theory, the subsidy would equal only the revenue foregone from the government providing this support at a below-market value. ODI and CAN Europe (2017) use a similarly broad definition as Milieudefensie; this estimate is not discussed separately because Milieudefensie (2020) is more recent.

Ministry of Finance The Ministry of Finance uses the WTO definition and reports on expenditures and revenue foregone as FFSs. For the reported expenditures, there is no precise demarcation between fossil and green fuels; some are clearly fossil fuels (e.g., coal, natural gas), while others are less obvious but still rely on fossil fuels (e.g., biomass, electricity generation). The Ministry of Finance applies a broad definition when in doubt, even though some measures could contribute on balance to less CO2 emissions (e.g., carbon capture and storage). Three budgetary expenditures were identified for 2021[7]. Additionally, the inventory includes 13 subsidies of foregone government revenue from FFSs. These qualify as revenue foregone if there is any deviation from the regular or baseline energy tariffs. Of the 16 policies identified in 2021, 12 are quantified[8]. There is an overlap of 12 policies with Milieudefensie (2020). OECD and IEA (2020) report the same inventory, except for the budgetary expenditures.

IMF The IMF uses a top-down approach to assess FFSs based on total fossil fuel use for liquid fuels, natural gas, and coal (Parry et al., 2021). Therefore, no direct link between FFSs and policy measures is available. Unlike the IEA, the IMF calculates an $USD 0.5 billion explicit subsidy for natural gas consumers, equal to 4% of the total subsidy estimate. The explicit subsidy represents an undercharging for supply costs and producer subsidies, though it is unclear which policy leads to this (Parry et al., 2021). The other 96% of the total subsidy estimate represents the implicit subsidy, consisting of the underpricing of environmental effects of fossil fuel use (e.g., global warming effect, local air pollution, road congestion) and associated consumption taxes (e.g., what would have been collected if the price were higher because environmental effects were included).

[7] A fourth expenditure (hydrogen backbone) is excluded because it begins in 2022. See Ministerie van Financiën (2022b).

[8] All values are from 2021 except for the subsidy for using kerosene in international air travel. Here the 2019 estimate is used because COVID-19 restrictions affected 2020; there were no volumes available for 2021 yet.

3 Fossil Fuel Subsidies Assessment Framework

Section 2 provided a broad overview of FFSs. A framework is now developed to understand the individual policies contributing to FFSs. This report will apply the framework to identify, quantify, and economically assess FFSs in the Netherlands.

3.1 Definition and OECD Inventory Approach

The inventory approach gives the most transparency to policymakers and is the most practical for FFSR. The methodology can measure FFSs in high-income countries, where the price-gap approach usually does not give a comprehensive view. In high-income countries, domestic fuel prices are often higher than international prices due to value-added tax (VAT) and fuel taxes. Additionally, the inventory approach allows countries to look bottom-up at their policy instruments to categorize policies across types to understand which support fossil fuels. That said, the quantification is more complicated with this approach than the price-gap approach. The definition of a FFS must first be interpreted. Each policy must be evaluated against this interpretation, and a counterfactual must be chosen. There can often be insufficient data to estimate the size of the subsidy.

The WTO definition of a subsidy is the basis for the OECD inventory categories (OECD, 2015; UNEP et al., 2019)[9]. To encapsulate the types of subsidies provided by the government and its agents, the WTO developed this definition in the ASCM (Agreement on Subsidies and Countervailing Measures) in 1994:

> "(a) (1) there is a financial contribution by a government or any public body within the territory of a Member (referred to in this Agreement as "government"), i.e., where:
>
> (i) a government practice involves a direct transfer of funds (e.g., grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g., loan guarantees);
>
> (ii) government revenue that is otherwise due is foregone or not collected (e.g., fiscal incentives such as tax credits);
>
> (iii) government provides goods or services other than general infrastructure, or purchases goods;
>
> (iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments; or
>
> (a) (2) there is any form of income or price support in the sense of Article XVI of GATT 1994[10]; and (b) a benefit is thereby conferred."

[9] Though the OECD formally uses the term "support" instead of subsidy, there is a wide overlap between these terms in practice and similar inventories will be constructed (UNEP et al., 2019).

[10] The General Agreement on Tariffs and Trade (GATT) is an international trade agreement first signed in 1947. It was updated in 1994, with Article XVI devoted to subsidies.

164 WTO members signed the ASCM, which has legal force. The definition is broad and can be summarized as "any financial contribution by a government, or agent of a government, that confers a benefit on its recipients in comparison to other market participants" (WTO, 1994; IISD, 2020). For FFSs, this means policies that incentivize fossil fuel production or consumption over alternatives (OECD, 2015; UNEP et al., 2019). The definition encompasses policies that change the relative price of fossil fuels (OECD, 2015). The UNEP, IISD, and OECD recommend using the WTO definition and OECD inventory for assessing progress towards SDG 12.c.1 ("amount of FFSs per unit of GDP (production and consumption)"). The G20 peer review process similarly urges countries to take this broader approach to define a FFS.

The OECD inventory comprises the following categories. The explanations are based on a typology for the OECD inventory categories developed by UNEP et al. (2019).

3.1.1 Direct Transfer of Government Funds

This category represents direct spending, budget, and off-budget transfers by the government to fossil fuel producers or consumers. Equity infusions, targeted public spending, and payments to individual recipients in fossil fuel sectors by government bodies are included. The category also comprises capital transfers; for example, this refers to investment grants from the government to other institutional units to finance the costs of acquiring fixed assets (UNEP et al., 2019). Additionally, government procurement of energy at above-market prices is in this category, as this practice increases revenues for the producers or distributors of this energy (UNEP et al., 2019). This category also includes government ownership of fossil energy-related assets with more favorable terms and conditions than in the market.

3.1.2 Tax Expenditures, Other Revenue Foregone, and Underpricing of Goods and Services

This category includes tax revenue foregone by the government providing exemptions, deductions, rebates, credits at lower rates, or deferrals. Under-pricing of government-owned energy resources, infrastructure, or other goods and services provided at below-market rates is also included (UNEP et al., 2019). The subsidy's value depends entirely on the benchmark chosen. Subjective choices are thereby introduced into this approach, as some party must choose the counterfactual (Valsecchi et al., 2009). For tax exemptions and differentiated tax schemes, the subsidy value is highly dependent on the baseline tax rate assumed and will be significantly different depending on the choice (CIEP, 2020).

Many subsidies in this category are outdated, as they are embedded in the tax code and often come from the EU level through the Energy Tax Directive (ETD). Last updated in 2003, the ETD is meant to harmonize energy taxes in the EU to maintain a well-functioning market (EC, 2021b). These tax system subsidies can remain in place with no required legislative approval, as they are almost always deliberated outside the budgetary framework (UNEP et al., 2019). The complex tax structure in developed countries

like the Netherlands is especially relevant to FFSs. OECD and IEA (2020) encourage the Netherlands to include these tax expenditures in national reports, or they will not be evaluated effectively.

3.1.3 Induced Transfers, e.g., Price Support

This category includes government interventions that distort the price received by producers and paid by domestic consumers (UNEP et al., 2019). Often, this involves keeping the price below a certain level to favor consumers, but governments also sometimes keep prices above a certain level to favor producers. Market regulation, border controls or taxes on imports or exports, and domestic purchase or supply mandates can be used for this price manipulation (UNEP et al., 2019).

3.1.4 Transfers of Risk to Government

This category includes risk transfers to the government, and ultimately taxpayers, through loans, insurance, or guarantees at below-market rates or more favorable terms than a private lender would provide (UNEP et al., 2019). The risk can be transferred through the government's direct involvement in an industry, like a state-owned enterprise (SOE) in which the government participates through an ownership stake. This category also includes debt restructuring or cancellation, where the government has the power to decide this for specific firms. The government can also provide guarantees for remediating environmental damage by assuming responsibility for the processes. UNEP et al. (2019) consider this category the most complex and lacking available data[11]. Measures in this category have been identified in G20 countries but are mostly unquantified to date (UNEP et al., 2019).

3.1.5 FFS Definition in This Report

Demarcating FFSs is complex. Though the WTO's definition is widely accepted, there is still room for interpretation, which explains the varying estimates and breadths of FFSs considered in the figures from different institutions. The definition of a FFS is still often debated, as different stakeholders may have varying views about how wide they want the scope to be. Moreover, subsidies are not always easy to identify, and the counterfactual scenario determining the subsidy's size is often unclear. Normative judgment is inevitably introduced to their identification and quantification. Some divergences also come from data limitations and complexities; for example, FFS estimates often have left out risk transfers to the government.

This report applies the broad definition explained in Section 3.1. FFSs are public policies that benefit or give a preference for fossil fuel production or consumption over alternatives (OECD, 2015; UNEP et al., 2019). The breadth captures fiscal and implicit subsidies, which are less transparent but confer

[11] "Data on financing, and the conditions of financing, is not always publicly available… Risk-related data is also often not publicly available and requires access to a uniform methodology of putting a financial value to this risk… Apart from the aforementioned data challenges, a detailed understanding of the energy sector, risk quantification, and corporate financing may be required, to evaluate the level of support provided through concessional financing, insurance, and assumption of risks." (UNEP et al., 2019).

significant benefits on the fossil fuel industry. Though mapping these subsidies is complex due to data availability and measurement choices, keeping them "off-budget" means they receive less attention and are more likely to persist longer (IEA, 2006). They are the most prevalent type of subsidy in countries with high socio-economic development and are relevant to any analysis in the Netherlands (CIEP, 2020).

The different types of subsidies add complexity to the assessment process and require a nuanced perspective. To accommodate this complexity, I will cover FFSs in line with the above definition but also will consider subsidies under a newly defined category of "related subsidies." Related subsidies represent policies that do not fall neatly into the definition but more indirectly still support fossil fuel consumption or production. Section 5 will explain this category in more detail.

3.2 Economic Theory of (Fossil Fuel) Subsidies

This report aims to provide policymakers with a policy-level understanding of key considerations to inform FFSR. The economic effects of each subsidy must be understood to recognize the repercussions of potential changes. For certain subsidies, it can be challenging to trace interacting effects or understand their rationale; this lack of clarity can slow down reform of these subsidies (Bruvoll et al., 2011). FFSs also often have political roots, as they are the most accessible policy tool to satisfy influential interest groups (Victor, 2009). Almost all FFSs have both reasons to exist and to be removed, highlighting the governments' difficult but realistic trade-offs. Economic theory provides core economic arguments to understand the effects of subsidies on an economy. I will now summarize economic arguments to remove FFSs and to maintain FFSs, which will form the basis of the economic assessment per FFS in Section 4. Economic concepts unique to a particular subsidy will be explained in Sections 4 and 5.

3.2.1 Economic Arguments to Remove a Fossil Fuel Subsidy

Inefficiency (e.g., Market Distortion): Negative externalities (e.g., CO2 emissions) have no market price and represent a market failure (Pigou, 1920). The free market will be unable to get to an efficient allocation of resources without intervention by the government. In the case of CO2 emissions, a more efficient allocation of resources would be possible if these emissions had a price (Pigou, 1920; Baumol and Oates, 1971). The economic problem of FFSs is that they have the opposite effect. Instead of market participants internalizing the price of their CO2 emissions, FFSs subsidize this negative externality and lower the cost of CO2 emissions. This market distortion misallocates resources in an economy, undermining the incentive for market participants to reduce CO2 emissions and invest in renewable energy (OECD, 2015). The energy transition is unnecessarily costly and inefficient if it is undertaken from a starting point of misallocated resources in the economy (CPLC, 2017). Moreover, subsidies for fossil fuels are complicated because of their global environmental impacts and significant international trade as a commodity, making them more challenging to address domestically (OECD, 2015).

FFSs encourage excessive production and wasteful consumption by encouraging substitution towards fossil fuels over the economically efficient level. The lower price and cost of fossil fuels influence investment decisions because it changes the rate of return on assets and activities (OECD, 2015). Investors will invest excessively in fossil fuel sectors, and capital will be locked into fossil fuel assets for long time horizons. These investment flows are especially harmful to staying within a 1.5-degree warming scenario, as the IEA's World Energy Outlook (2021b) concluded that to reach this scenario there is no room for new oil and gas projects beyond those already approved in 2021. Moreover, fossil fuels and sustainable alternatives are substitutes: a lower fossil fuel price discourages the production and consumption of sustainable fuels. Removing FFSs would allow fossil fuel prices to reflect their full social costs more closely, making sustainable fuels a more attractive substitute. The substitution effect would be more substantial if fossil fuels were to reflect their social cost with externalities.

Regardless of a policy's goal, distortions are introduced into the market if the policy is not properly targeted. FFSs already direct market players away from reducing their CO2 emissions. In the case of improper targeting of FFSs, more market players than necessary receive a subsidy for fossil fuel use that they do not need. Correspondingly, more market players than necessary benefit from lower fossil fuel prices and are less incentivized to reduce CO2 emissions.

Public Resources: FFSs distort a government's scarce public resources. Some FFSs take up a share of the budget, while other FFSs lead to uncollected government revenue. FFSs also misinform government investment decisions, as these judgments are based on artificially low prices for fossil fuels. FFSs lead to less public budget for other government priorities (e.g., healthcare, social security, education).

Stranded Assets: Government involvement in financing fossil fuel assets implies exposure to stranded assets (Ansar et al., 2013). Stranded assets represent environmentally unsustainable assets that lose their value prematurely or unexpectedly, resulting in devaluations or write-offs (Caldecott et al., 2013). The government's allocation of public funds to stranded assets represents a "lock-in" of high carbon investments and wasted government resources (Gerasimchuk et al., 2017). The government is also exposed to stranded asset risk even if it has not invested in the company. The government may have to bear "transition costs" when things go wrong or provide compensation to help unsustainable assets shift their business models to be more sustainable (Caldecott et al., 2013). Without the government bearing these risks for certain companies, business cycle swings can be exacerbated, leading to potentially costly and unpredictable consequences for system-wide stability and economic performance.

The risks of stranded assets are not well understood and might not be accurately priced, leading to potentially large overexposure to these assets (Caldecott et al., 2013). Biases like path dependency and short-term decision-making compound these risks and the exposure of businesses. Firms are then

influenced to invest in protecting the assets and business models they already have rather than evolving with long-term changes in mind, like investing in becoming more sustainable. The government has a role in reducing stranded asset risk, for instance, by setting and communicating long-term goals so companies can more effectively align their strategies in response (Trinks et al., 2022b).

Stranded assets are a risk factor that commands a risk premium (Trinks et al., 2022a). By contrast, countries that score high on sustainable development action face lower borrowing costs (Capelle-Blancard et al., 2019). In this regard, the government's exposure to fossil fuel assets can be a risk transfer (e.g., from the private sector to the government). The government could lower the risk by positively influencing sustainability practices within the institutions.

3.2.2 Economic Arguments to Support a Fossil Fuel Subsidy

International Competitiveness: The government supports many FFSs because they would ensure a level playing field for companies with international competitors (OECD and IEA, 2020). Without these subsidies, companies would face reduced profits if they do not raise consumer prices, which would disadvantage them in an international market. Moreover, many tax exemptions or reductions come from the EU ETD but are implemented nationally. Eliminating these policies in just one country has cross-border effects and would disadvantage this country compared to neighboring countries[12]. Adjusting fiscal policies depends heavily on the international tax system and cross-border actions (CIEP, 2020).

The empirical literature does not agree on the size of the economic effect relevant to international competitiveness. An empirical literature review by Dechezleprêtre and Sato (2017) finds that environmental regulations result in a statistically significant negative effect on trade, employment, plant location, and productivity. However, compared to other determinants of trade and investment location choices, the impacts of environmental regulations are relatively small. Mulatu (2018) finds no evidence of a trade-off between economic performance and environmental regulation in his review of the empirical literature on international competitiveness. Bollen et al. (2020) estimate that a carbon tax of €200 per ton of CO2 for industry on top of the EU ETS would lead to a production loss of just 5% in the Netherlands. The limited effect comes from the relatively moderate increase in production costs and the relatively inexpensive options available to reduce CO2 emissions.

Carbon Leakage: The Dutch government frequently uses carbon leakage as an argument to support maintaining FFSs (OECD and IEA, 2020). Carbon leakage occurs when higher energy prices or taxes in the Netherlands encourage companies to move to countries where they can pay less. These effects damage the Dutch and EU economy while displacing CO2 emissions to a place where production, in

[12] Therefore, member states most often take advantage of the full scope of tax exemptions or advantages offered in the ETD, though it is often not mandatory to do so (EZK, 2020).

many cases, is less regulated and more polluting. The decrease in CO2 emissions in Europe is then partially offset by increased emissions elsewhere. The overall carbon leakage effect heavily depends on the strictness of non-EU climate policy (CPB, 2022).

Many studies have focused on estimating the carbon leakage effect, with mixed results across ex-ante and ex-post research. As reviewed by Branger and Quirion (2014) and Carbone and Rivers (2017), ex-ante studies using model simulations have predicted CO2 leakage effects of 5% to 30%. Simulations by CPB Netherlands Bureau for Economic Policy Analysis (CPB) and PBL Netherlands Environmental Assessment Agency (PBL; Vollebergh et al., 2019) find that a uniform CO2 price in the Netherlands would lead to more carbon leakage in sectors like energy-intensive industries and electricity generation. Bollen et al. (2020) project that a carbon tax of €200 per ton of CO2 for industry on top of the EU ETS would cause leakage equal to 58% of CO2 emissions. The leakage to carbon-intensive companies mainly outside of Europe negates emissions reductions undertaken domestically due to the tax[13]. That said, ex-post empirical studies have found limited evidence of carbon leakage. Dechezleprêtre et al. (2014; 2022) found that multinationals did not shift outside of the EU because they fell under the EU Emissions Trading System[14] (EU ETS). The econometric literature review by Verde (2020) finds no evidence of carbon leakage for firms under the EU ETS. Naegele and Zaklan (2019) also do not find any evidence of carbon leakage for European manufacturing sectors due to higher emissions costs under the EU ETS. Possible contributing factors include free emissions allowances or a low EU ETS price until recently.

Security of Energy Supply: FFSs can help promote investment in energy exploration and production to reduce energy dependence on other countries. The supply of fossil energy sources remains relevant during the Netherlands' energy transition. Energy supply independence has become increasingly important since the energy crisis following Russia's war on Ukraine (European Parliament, 2022).

Double Taxation: The total CO2 price in a sector is a crucial benchmark for climate policy, as multiple policy instruments price fossil fuel use (PBL, 2021a). Pricing towards an efficient CO2 price is phased in through instruments like the EU ETS and energy taxes. Certain FFSs can be efficient if they mitigate the interacting effects of these policy instruments. Specifically, some energy taxes are exempted to avoid double taxation for companies that fall under the EU ETS.

[13] The logic is as follows. A flat CO2 tax in the Netherlands reduces export from CO2-intensive production processes in the Netherlands to Europe. Other European countries start producing these products for themselves. Exports from these countries to countries or regions outside of Europe decline. To compensate for lost exports, countries or regions outside of Europe expand their production to maintain consumption. Outside Europe, the CO2 intensity of industrial activities is on average 2.5x higher than in Europe. The relocation of production activity leads to additional CO2 emissions. The extra demand for industrial products outside of Europe also is accompanied by increased demand for electricity. Thereby, the CO2 emissions may be as much as 5x higher than Europe. Countries outside of Europe also do not have binding CO2 caps. Finally, additional production in other countries will entail GDP growth, leading to additional demand for these products.

[14] The EU ETS is a carbon emissions market that operates on a cap-and-trade principle. A decreasing amount of total GHG emissions can occur from installations that fall under the ETS, which buy or receive a limited number of tradable emissions allowances.

3.2.3 Economic Arguments Depending on Fossil Fuel Subsidy

Equity: FFSs can keep fuel prices low and often are intended to expand energy access for poorer income groups. In practice, FFSs are regressive and disproportionately benefit wealthy groups, which can afford to pay and use more fossil fuels (Arze del Granado et al., 2012). Coady et al. (2015) found that the top income quintile receives over six times more subsidies than the bottom income quintile on average in several countries. Large corporations are also often the beneficiaries of FFSs, as seen in the inventory in Sections 4 and 5. FFSs are inconsistent with the polluter pays principle, which says that those who pollute should be the ones to pay the cost of their polluting activities (LSE, 2022). FFSs prevent polluting companies from bearing the full societal cost burden of their energy use. Enforcing the polluter pays principle limits the extent to which taxpayers bear the damages of fossil fuels (Milieudefensie, 2020).

On the other hand, there could be reason to maintain certain FFSs for longer in cases when their removal has unequal impacts. There has been growing concern over the distributional effects of climate policy, particularly concerning policy impacts on poor people (Maestre-Andrés et al., 2019). The literature has primarily found that the adverse effects of subsidy removal fall on the poor, as poorer income groups are more likely to be heavily dependent on subsidies and face affordability issues with higher fuel prices (Ruggeri-Laderchi et al., 2013; Vagliasindi, 2012; Rentschler and Bazilian, 2016).[15]

Safeguarding Public Interests (Through Ownership Stakes): The government has ownership stakes in particular companies, also known as SOEs, to exert influence on the company to safeguard certain public interests (Ministerie van Financiën, 2022c). Some ownership stakes are permanent because the government considers it essential to have a lasting influence on these companies' activities. In other cases, the stake is temporary to safeguard public interests for some time; however, these companies can operate without government involvement. To justify participation by the state, a company must play in an industry with a particular market structure (e.g., natural monopoly[16]) or have strategic importance (e.g., for infrastructure or the economy). The government takes these ownership stakes if it believes that the market or society cannot sufficiently safeguard public interests with laws and regulations. These public interests give an economic rationale for the government to support these companies and their activities using their ownership stake. The government takes on the company's risk and exposure, so there must be a valid rationale. This report focuses on companies supporting or relying on fossil fuels.

[15] A related argument is that it is fair to allow developing countries to use fossil fuel energy, thereby keeping FFS, for longer than developed countries to develop economically. "Accounting for national circumstances" and the needs of developing countries are emphasized in SDG 12.c. As this report focuses on the Netherlands, this will not be explored in depth.

[16] In this case, it is most efficient for one company to own an activity rather than have multiple companies perform the same activity. As the sole provider of the activity, this company could abuse its market power. In some cases, legislation, regulation, or supervision can prevent this. If the public interest depends strongly on this one company, the government will take an ownership stake (Ministerie van Financiën, 2022c).

However, the government may not be the most efficient shareholder. The expectation of government compensation or bailout could incentivize managers of SOEs to take increased risks, borrow excessively, and not be efficient overall (IMF, 2020). IMF (2020) compares the financial performance of SOEs and private firms across a sample of 1 million firms in 109 countries. On average, private firms' profits and labor productivity were higher than SOEs' across countries. Firm productivity of SOEs was lowest when the government had a majority ownership stake. Weak governance and corruption are key issues for SOEs. SOE productivity was at its lowest in countries with weak governance on average. SOEs in countries with the highest levels of perceived corruption were 1/3 as productive compared to private firms. This productivity gap dropped to 7% in countries with strong governance.

Employment: The Netherlands is home to many energy-intensive industries that have supported economic growth and employment in the country historically (e.g., glasshouse horticulture, refineries, natural gas production). Within sectors and occupation types, the energy transition can have substantial effects. There can be short-term frictions as employment shifts from more carbon-intensive to less carbon-intensive sectors (CPB and PBL, 2018). Empirical evidence suggests that climate policies are skill-biased against manual workers and favor technicians (Marin and Vona, 2019).

Empirical evidence is somewhat mixed on how much carbon pricing or energy price fluctuations affect employment. Venmans et al. (2020) reviewed prominent ex-post empirical assessments and found no statistically significant effects of carbon pricing on employment for the whole economy. Hille and Möbius (2019) found no statistically significant effects of rising energy prices for manufacturing sectors but did find significantly positive effects on net employment for the economy as a whole. This result implies that job losses in energy-intensive industries are balanced by job creation in other sectors that serve the energy transition. The increased job creation possibilities in less energy-intensive sectors have been a focus of other studies. In its net-zero emissions by 2050 scenario, IEA (2021b) estimates that 14 million new jobs will be created in the clean energy sector by 2030 versus a loss of 5 million jobs in fossil fuel production. Jaeger et al. (2021) concluded that green investments generally create more jobs per $1USD million spent than non-green investments worldwide. Garrett-Peltier (2017) found that, with $1USD million in spending on renewables or energy efficiency, 7.49 full-time-employment (FTE) jobs were created, as opposed to 2.68 FTE jobs if the spending went to fossil fuels.

3.3 Overview of Behavioral Changes

FFS removal increases fossil fuel prices, which will trigger behaviors such as substituting renewable energy sources, lowering energy use, or moving consumption or production to countries where fossil fuels are cheaper (e.g., carbon leakage). Behavioral effects are important because they will impact the ultimate size of FFSs. Some studies have attempted to simulate and estimate the associated effects with models. The behavioral model developed by Monasterolo and Raberto (2019) finds that phasing FFSs

out gradually in a high-income EU country could 1) create conditions to foster a stable, low-carbon energy transition by incentivizing low-carbon investment and 2) support positive socio-economic effects by creating green jobs and capital investment. Other academic studies have used long run price elasticities to calculate the effects of increasing a CO2 tax (e.g., similar effect to removing a FFS). Hammar and Sjöström (2011) implement this approach and find that CO2 tax increases in Sweden result in behaviors to reduce fossil energy use, which had almost an exact correlation with CO2 emissions in the study. Price elasticities are also used to show behavioral effects across time horizons. Mundaca (2017) estimates that price elasticities for diesel and gasoline are at least three times higher in the long run than in the short term across regions, particularly in countries with high FFSs. To encourage short run behavioral change, theoretical studies have found that complementary policies are needed alongside fossil fuel price increases to address investment barriers and trigger switching behavior for households and firms (Rentschler et al., 2018; Fay et al., 2015)[17].

4 Fossil Fuel Subsidies: Quantification & Economic Analysis

4.1 Objective

This section conducts a bottom-up analysis of FFSs in the Netherlands, with all categories of the OECD inventory considered. The inventory will combine several FFSs identified by the sources in Section 2.2, though only the ones that fall under the definition in Section 3.1 are included. This restricts the scope of the inventory to FFSs that correspond to this interpretation. Interviews with subject matter experts inform the inclusion of additional FFSs in the inventory. The goal is ultimately to expand the list of FFSs currently reported by the Dutch government.

The analysis of FFSs depends on the definition and reasoning applied, introducing subjectivity into any assessment. This report takes a broad perspective on policies that could be classified as a FFS. Some policies were more clearly FFSs, while others were up for debate. Section 5 distinguishes FFSs from "related subsidies," which are subsidies that were considered but did not unambiguously fall under the definition of FFSs implemented in this report.

4.2 Methodology

For each subsidy, four questions are addressed. This process was informed by a review of the existing literature and databases on FFSs, supplemented by conversations with subject matter experts.

1) Explanation - what is the policy measure, and why is it a subsidy?
2) Quantification - how large is the subsidy?
3) Economic analysis - what is the economic rationale for the subsidy?
4) Upcoming changes - are there recent policy developments that will affect the subsidy?

[17] Investment barriers identified include information, capacity, infrastructure, and financial constraints.

This report focuses on adding transparency to each policy's quantification. Quantifying a subsidy requires a benchmark for what would apply in the absence of the policy, or a counterfactual. I will take the baseline costs or tax rate as the counterfactual. To limit the scope of the analysis, I will only focus on the budgetary size of each subsidy. For example, the subsidy resulting from specific energy users paying a reduced rate would equal the difference between the reduced rate and the otherwise applicable rate, multiplied by those energy users' consumption. Behavioral effects (e.g., carbon leakage; tax avoidance) would lead to a smaller realized budgetary effect if the subsidy were removed. I exclude the monetary value of externalities for the same reason of limiting the scope, as the calculation of externalities on the policy level is complex. Incorporating externalities would lead to significantly higher energy prices and, thereby, higher subsidy estimates.

I will use 2021 as the reference year. I will use a previous year if data is unavailable or not representative due to COVID-19 anomalies. I will explain how to calculate the subsidy in theory if data is unavailable.

4.3 Categorization and Quantification of Fossil Fuel Subsidies

In Table 2, FFSs are sorted in the OECD inventory: #1 direct transfer of government funds (2 policies); #2 tax expenditures, other revenue foregone, underpricing of goods and services (14 policies); #3 induced transfers (0 policies); and #4 transfer of risk to the government (3 policies). Fourteen policies are quantified; the remaining five did not have enough data publicly available to be quantified. The third column in Table 2 indicates which policies are newly identified, newly identified and quantified, or newly quantified, as compared to the most recent FFS inventory published by the Dutch government for 2021 (Ministerie van Financiën, 2022b). The Dutch government's inventory is used as a comparison because this report's goal is to expand the scope of this inventory.

Two additional policies are quantified ("newly quantified" in Table 2). Data from the Ministry of Finance was used in these quantifications. Six additional FFSs were identified that have not yet been listed in the government's inventory. Three of these are also newly quantified ("newly identified & newly quantified" in Table 2), while the other three could not be quantified due to calculation complexities and data limitations ("newly identified" in Table 2). Four of these FFSs were previously identified by Milieudefensie (2020) and are indicated by a footnote.

Table 2: Fossil Fuel Subsidy Inventory in the Netherlands (2021)

Policy-by-policy overview of FFSs identified based on the definition in Section 3.1. Additions to the Dutch government's most recent inventory are summarized in the third column (Ministerie van Financiën, 2022b).

Measure	Estimate (millions)	Additions to the Dutch government's inventory
Inventory #1: Direct Transfer of Government Funds		
Free EU ETS Emissions Rights for Certain Sectors	2,059	Newly identified & newly quantified
Indirect EU ETS cost compensation	173	
Total	**2,232**	
Inventory #2: Tax Expenditures, Other Revenue Foregone, Underpricing of Goods &Services		
2a: Energy Tax (including ODE) and Coal Tax		
Degressive energy tax structure[a]	6,356	Newly quantified
Tax exemption for use of natural gas for electricity generation in CHP plants	729	
Reduced natural gas tax rate for greenhouse horticulture industry	136	
Tax refunds for energy-intensive processes	135	
Coal tax exemption of use of coal in electricity generation	86	
Tax refund for religious and nonprofit institutions	37	
Coal tax exemption for dual use	26	
Total	**7,505**	
2b: Excise Tax		
Exemption for use of kerosene in international air travel[b]	2,357	
Exemption for use of diesel and fuel oil for commercial navigation in inland and community waters[c]	1,733	
Different tax rates between diesel and gasoline combined with different tax rates between gasoline and diesel cars in car taxes[d]	1,216	Newly quantified
Biodiesel taxed equally as regular diesel[e]	303	Newly identified & newly quantified
Refinery exemption	NQ	
Total	**5,609**	
2c: Other Taxes		
Value-Added Tax (VAT): exemption for international airline tickets[f]	1,802	Newly identified[g] & newly quantified
State Profit Share (SPS) levy: Investment deduction for exploration and production of natural gas in North Sea	NQ	
Total	**1,802**	
Inventory #3: Induced Transfers, e.g., Price Support		
N/A		
Inventory #4: Transfer of Risk to the Government		
Insured fossil fuel projects by Atradius Dutch State Business (DSB)	NQ	Newly identified[g]
Permanent ownership stake in FMO Dutch Development Bank	NQ	Newly identified[g]
Permanent ownership stake in certain companies	NQ	Newly identified[g]
TOTAL ALL MEASURES	**17,148**	

As of reference year 2021. I will use a previous year if data is unavailable or not representative due to COVID-19 anomalies. Ordered by size in each category. NQ: not quantified (in this report) because of data restrictions.

[a] The counterfactual assumed for this estimate has a particularly large impact on the estimate's size. Without this policy, the total estimate would be €10.8 billion. Please refer to the explanation in Section 4.4.1 for more detail. [b] Estimate is from 2019 (Ministerie van Financiën, 2022b). Volumes were not yet available for 2021, and the 2020 estimate was significantly lower due to COVID-19 restrictions. [c] Inland navigation and international marine bunker consumption volumes are reported and calculated separately based on relevant excise duties. 2021 figures were not yet available, so 2020 was used. [d] Only data available was the fuel tax estimate from 2020 and car tax estimate from 2022. [e] Estimate is from 2020, the most recent year reported by CBS. [f] Estimate is based on EC and CE Delft analysis with base year of 2015 (2019a). [g] Also identified by Milieudefensie (2020).

4.4 Inventory #1: Direct Transfer of Funds

1) Free EU ETS Emissions Rights for Certain Sectors

Explanation EU member states can grant free emissions allowances to certain carbon leakage-sensitive companies that fall under the EU ETS (EC, 2022a)[18]. By lowering these companies' ETS costs, free emissions allowances aim to protect the international competitive position of the companies and discourage them from leaving the EU. With this policy, the government subsidizes fossil fuel consumption by reducing companies' emissions costs.

Quantification (EC, 2022e): €2.1 billion (2021) EC-established benchmarks determine the allocation of free emissions rights (EC, 2022e)[19]. Each product (e.g., aluminum, plaster, hot metal) has one of 54 GHG emissions benchmarks that installations must meet to be eligible (EC, 2022g)[20]. In phase 4 (2021-2030) of the EU ETS, sectors at the highest risk of carbon leakage receive 100% of their allowances for free (EC, 2021d). Free allocation for less carbon leakage-exposed sectors will have their free rights phased out from 30% in 2026 to 0% in 2030. With a counterfactual of no free allowances, the subsidy is the total free emissions rights distributed to companies in the Netherlands for 2021. The EC's National Allocation Table shows that the Netherlands received 39.1 million allowances in 2021. With an average EU ETS price of €52 for 2021, the monetary value of the rights is €2.1 billion (Bloomberg, 2021).

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness Carbon leakage	Inefficiency: Some emissions reduction incentives may exist, as installations face an opportunity cost of selling emissions rights on the market rather than using them (Jegou and Rubini, 2011). However, free emissions rights reduce the EU ETS's carbon price signal and its corresponding incentive to invest in emissions reductions (Pellerin-Carlin et al., 2022). Inefficiency (targeting): Free allowances can be overallocated. Firms can sell these rights on the market for windfall profits without changing emissions levels (Jegou and Rubini, 2011). CE Delft (2021c) found that 37 million more free allowances than needed were allocated to industry (excluding aviation) from 2008 to 2019. These allowances could be sold on the market for additional profits worth €1.6 billion (CE Delft, 2021c). Public resources: From 2013 to 2020, 43% of available ETS allowances were allocated for free, many to airlines (EC, 2022b). Allowance auctioning is a revenue source the government loses when giving free emissions rights.

[18] The EU ETS is a carbon emissions market that operates on a cap and trade principle. A decreasing amount of total GHG emissions can occur from installations that fall under the ETS, which buy or receive a limited number of tradable emissions allowances.
[19] The benchmarks are adapted every few years to ensure they are effective and reflect technological progress.
[20] Please refer to Annex I in the EU ETS Directive for the product benchmarks, see Link

Upcoming Changes The Carbon Border Adjustment Mechanism (CBAM) has been proposed in Fit for 55 to address carbon leakage and would remove the need for free emissions rights in applicable sectors (EC, 2021c). The CBAM would place an import tax on carbon content at the EU's external border (CPB, 2022). The tax will apply to carbon-intensive product groups (e.g., cement, electricity, fertilizer, iron and steel, and aluminum), which are carbon leakage-sensitive. Free emissions rights in CBAM sectors would be phased out from 2026 to 2035. Separately, a carbon levy was introduced in the Netherlands in 2021 to increase the emissions reduction incentive provided by the EU ETS for Dutch firms; this charges a levy on any industrial emissions above a continuously declining threshold (IEA, 2020).

2) Indirect EU ETS Cost Compensation

Explanation EU member states can partially compensate carbon-leakage sensitive companies for additional electricity costs indirectly incurred from the EU ETS (Ministerie van Financiën, 2022b). These indirect costs come from the higher prices that electricity carriers charge their customers due to the increased costs of buying EU ETS emissions allowances. Eligible companies fall in one of the (sub)sectors sensitive to carbon leakage (EC, 2019a). They also must subscribe to energy efficiency covenants (MJA3, MEE) and create long-term energy efficiency plans with yearly progress reports (OECD and IEA, 2020). The government subsidizes these companies' energy consumption by allocating public funds to cover their electricity costs.

Quantification (RVO, 2021a): €173 million (2021) EU member states must report yearly on funds provided under this policy. For the Netherlands, €173 million was allocated to 92 companies in 2021 for the previous year, 2020. EC guidelines determine the compensation and set a maximum amount per installation according to predetermined efficiency benchmarks (EC, 2012)[21]. The compensation flowed to industrial sectors, including chemical (48 companies), metal (22), paper & carton (19), and others (3).

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Carbon leakage	Inefficiency (targeting): The policy is not targeted at the most carbon-leakage sensitive sectors (IEA, 2020). Inefficiency: The subsidy only flowed to industrial, energy-intensive companies. These companies incompletely internalize their energy costs and have less incentive to lower their electricity use (RVO, 2021a).

[21] A full explanation of the compensation determination can be found in EC (2012). Companies receive compensation linked to their average production or energy consumption in a reference period (2005 to 2011). For products eligible for an electricity consumption efficiency benchmark, the maximum aid payable per installation depends on several factors: aid intensity (e.g., total aid as a percent of eligible costs), CO2 emissions factor; European Union Allowance (EUA) forward price at year t-1; the applicable product-specific electricity consumption efficiency benchmark; and the baseline output. For products ineligible for this benchmark, the compensation uses the first three factors, a fallback efficiency benchmark, and baseline electricity consumption.

Upcoming Changes The scheme's first phase provided compensation through 2021 (Ministerie van Financiën, 2022b). The EC approved the scheme's second phase, reasoning that carbon leakage risk has increased due to recent high electricity prices. The decision provides a budget of €835 million for the Netherlands from 2021 to 2025 (EC, 2022f). Additional qualification requirements will be attached; for example, companies must invest at least 50% of compensation in projects that provide substantial CO2 emissions reductions, or they must cover at least 30% of their electricity use with carbon-free sources.

4.5 Inventory #2: Tax Expenditures, Other Revenue Foregone, Underpricing of Goods and Services

4.5.1 Energy Tax

The energy tax structure for natural gas and electricity comprises four brackets in the Netherlands, with tax rates decreasing as consumption increases. Please see Appendix A.2 for the rates for 2021. In 2013, the Opslag Duurzame Energie (ODE) was added to the energy tax as a surcharge levy to fund the Stimulering Duurzame Energieproductie en Klimaattransitie (SDE++; see section 5.2). Including ODE, the 2021 rates in the first tax bracket for natural gas (0 to 170 cubic meters; m3) and electricity (0 to 10,000 kilowatt-hour; kWh) were €0.43366 per m3 and €0.12428 per kWh, respectively. Including ODE, the 2021 rates in the fourth tax bracket for natural gas (10 million+ m3) and electricity (10 million+ kWh) were €0.0361 per m3 and €0.00096 per kWh, respectively. There is also a tax levied on coal consumption; in 2021, the tax was €15.29 per 1,000 kilograms (kg) of coal.

1) Degressive Energy Tax Structure

Explanation In the Netherlands, large energy consumers face much lower tax rates on natural gas and electricity than small energy consumers. With a degressive structure, large energy consumers pay relatively less energy tax than smaller energy consumers (CE Delft, 2021a). The revenue foregone can be considered a subsidy for large energy consumers[22].

Quantification (Ministry of Finance): €6.4 billion (2021) OECD and IEA (2020) recommend calculating the subsidy using the household tax bracket rate as the counterfactual. The tax advantage for larger consumers is equal to the differences between the first bracket tax rate and the second, third, and fourth tax bracket rates for natural gas and electricity. These tax rate differences are multiplied by the corresponding bracket's energy consumption to calculate the budgetary effect of taxing higher energy consumers at this higher rate. Compared to a uniform tax rate equal to the first bracket rate, the static budgetary effect from energy consumers in the second, third, and fourth brackets was €6.4 billion[23].

[22] The high tax rate for households arguably provides a strong incentive to reduce energy consumption. That said, the focus here is on the subsidy provided to large energy consumers who have their consumption subsidized through these low tax rates.

[23] Calculation based on Tax & Customs Administration data. This represents the isolated ex-ante budgetary effect. The value is slightly higher than what is reported in CPB (2022), where a minor behavioral effect is incorporated for an estimated €6.3 billion in 2021. The counterfactual of the first bracket rate is a strong assumption, and it is unlikely in practice that a uniform energy tax rate would be that high. With a

As the Netherlands has a high tax rate on households compared to other European countries, a significantly large subsidy is estimated using the first tax bracket as the counterfactual (OECD and IEA, 2020). Every estimate depends on the benchmark tax rate chosen in a less or non-degressive tax structure. The Ministry of Finance anticipates quantifying the budgetary effect of the degressive energy tax structure in the next Miljoenennota, likely using the first bracket rate as the counterfactual.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness Carbon leakage Double taxation: Electricity falls under the EU ETS, so emissions from electricity generation are already taxed.	Equity: Small and large consumers have unequal tax burdens. In 2021, the tax (EB+ODE) on natural gas was almost 4x higher in the first tax bracket than in the second tax bracket. It is over 11x higher in the first bracket than in the fourth bracket. Large energy consumers profit from the degressive tax structure at the expense of small consumers. Inefficiency (incentive): Large energy consumers face a small and insufficient incentive to transition to cleaner energy sources (CE Delft, 2021a). A higher energy tax rate would increase their incentive to switch to more sustainable energy, as is the case for households.

Upcoming Changes The tax structure will become less degressive, as the tax rates are expected to increase in the higher energy consumption brackets (Rijksoverheid, 2022). This modification aligns with the proposed adjustments to the EU ETD from Fit for 55 (CPB, 2022). The tax rate will increase for natural gas and fall for electricity in the coming years, as the government wants to encourage the shift to more renewable energy and away from fossil fuels (AZ, 2022).

In Fit for 55, the EC proposed the EU ETS-BRT (Building and Road Transport), a separate ETS for the infrastructure and road transport sectors starting in 2026 (CPB, 2022). This system reduces the role of energy taxes in CO2 pricing, as emissions now subject to energy taxes will then be priced under this new, separate cap-and-trade market. As emissions allowances in the ETS-BRT would be phased out by 5.15% each year, energy taxes should be modified to avoid double taxation on the same emissions. It would be most efficient for emissions to be priced under the EU ETS-BRT (or EU ETS) so that the CO2 price is harmonized on the European level and CO2 reductions can be taken with the most cost-efficiency (CPB, 2022). As part of getting to negotiation positions for Fit for 55, the European Council decided to delay the EU ETS-BRT by one year (European Council, 2022). Lastly, with Fit for 55, total

counterfactual of the fourth bracket rate, the total budgetary loss in comparison with the present bracket rates would be €9.8 billion, as all energy consumers pay less energy tax. The tax revenue foregone in the definition of this report would then be zero. If the tax rates were instead made uniform to the average of the second and third bracket rates, the total budgetary loss in comparison with the present bracket rates would be €4.3 billion. In this case, households and smaller companies pay less energy tax and large energy consumers pay more. The tax revenue foregone for this situation is not calculated.

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emissions for the electricity sector would fall to 0 in 2040 (EZK, 2022e). If electricity generation no longer releases CO2 emissions, an electricity tax is no longer necessary for CO2 pricing.

2) Tax Exemption for the Use of Natural Gas for Electricity Generation in Combined Heat and Power Plants

Explanation Natural gas used for electricity generation is exempted from energy tax under the EU ETD, including in combined heat and power (CHP) plants with at least 30% electricity efficiency (OECD and IEA, 2020). CHP plants co-generate heat and electricity from fuel (usually natural gas) simultaneously, enhancing the efficiency of energy generation (CE Delft, 2021a). CHP plants are most frequently used in gas-fired power plants and the industrial and greenhouse horticulture sectors (CPB, 2022). The government is subsidizing a subset of CHP plants by forgoing energy taxes from a subset of large natural gas consumers. CHP plants in industrial sectors often fall under the EU ETS, while CHP plants in greenhouse horticulture sectors more often do not (CE Delft, 2021b).

Quantification (Ministry of Finance[24]): €729 million (2021) Central Bureau of Statistics (CBS) data is available for total natural gas consumption by CHP plants as of 2019. The CBS estimates the breakdown of energy consumption across tax brackets for CHP plants across sectors[25]. This breakdown confirms that the average electrical efficiency threshold for CHP plants meets 30% across sectors (= electricity production / natural gas used)[26]. The counterfactual is the tax rate that would have been applied without the input exemption for each bracket (see Appendix A.2). The tax revenue foregone is equal to the energy consumption per bracket, multiplied by the respective tax rates.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Double taxation: Third parties already pay electricity tax when it is delivered by CHP plants (CE Delft, 2021a). The ETD sets the exemption (EZK, 2020). International competitiveness: Especially relevant, as many CHP plants operate in export-oriented sectors (CE Delft, 2021a).	Inefficiency (targeting): Double taxation is only prevented when electricity is supplied to third parties. Double taxation does not occur for the heat and electricity consumed by the CHP plant itself, which are not taxed at all (CE Delft, 2021a). Equity (polluter pays principle) Inefficiency: More clearly sustainable energy sources could be incentivized with a subsidy (CE Delft, 2021a).

[24] Source: Data provided by Ministry of Finance and is not publicly available.

[25] Gas consumption can be broken down across tax brackets for all sectors except horticulture; for this sector, CBS makes an estimate. Consumption has been assumed as constant since 2019 due to a lack of data and forecasts for its development.

[26] Most sectors reached this goal on average in 2019, so the calculation uses the whole basis of energy consumption. The food and beverage industry and paper industry had average electrical efficiency of less than 30% in 2019. Since this is an average, there could have been some installations that reached this threshold, and the energy use is relatively low in these sectors. Therefore, the calculation uses the full amount.

Upcoming Changes This exemption will be reduced as of 2025 (Ministerie van Financiën, 2022b). The Dutch government's Coalition Agreement 2021-2025 agreed to limit the exemption to just natural gas used to generate electricity delivered to the grid (Rijksoverheid, 2022). Limiting this exemption is still under negotiation at the EU level as part of the EU ETD's revision (PBL, 2021b).

3) Reduced Natural Gas Tax Rate for Greenhouse Horticulture Industry

Explanation The greenhouse horticulture industry pays a reduced natural gas tax rate in the first and second brackets of consumption (CE Delft, 2021a). This energy-intensive industry consists of many small companies that fall into these lower brackets and would face high taxes under the normal degressive structure. The tax revenue foregone is a subsidy; despite their high energy consumption, most greenhouse horticulture companies benefit from a lower natural gas tax rate.

Quantification (Ministry of Finance[27]): €136 million (2021) Dutch Tax and Customs Administration data is available for aggregate natural gas taxes paid per bracket through 2020. Natural gas consumption per bracket is estimated by dividing taxes paid per bracket by the bracket's tax rate. The counterfactual is the standard tax rate in the first and second brackets (see Appendix A.2). The subsidy is the difference between the standard and reduced rates, multiplied by gas consumption for the respective bracket.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Double Taxation: The greenhouse horticulture sector has a separate CO2 sector system that aims to price CO2 emissions for companies that do not fall under the EU ETS (RVO, 2022d)[28]. The sector agreed to this system in exchange for reduced tax rates. Without the reduced rates, there would be double taxation under the energy tax structure and CO2 sector system. Equity: The reduced rate helps equalize tax pressure felt by the smaller-scale horticulture sector with other energy-intensive sectors (OECD and IEA, 2020). International competitiveness	Inefficiency Since 2017, CO2 emissions have not been decreasing in the sector (LNV, 2022). Primary factors include the increased use of CHP plants and the limited effectiveness of the CO2 sector system in incentivizing less fossil fuel use. The annual sectoral caps do not provide a sufficient incentive for sustainability (LNV, 2022). Inefficiency: Reduced incentive to use alternative energy sources for an energy-intensive industry. Equity (polluter pays principle)

Upcoming Changes[29] The sector aims to be climate neutral by 2040 (EZK, 2022e). In the Coalition Agreement 2021-2025, the government decided to remove the reduced rate in 2025 (Rijksoverheid,

[27] Source: Data provided by Ministry of Finance and is not publicly available.

[28] The CO2 sector system applies to a company if 1) most of a greenhouse horticulture business is used for agriculture, 2) the greenhouse is a side activity but has a glass surface of 2500 m2 or more, and 3) it does not participate in the EU ETS (RVO, 2022d). No compensation is paid if eligible companies stay under the agreed CO2 emissions allocation for a year. If they exceed the limit, they must pay a fee to the government.

[29] More broadly, the sector will be affected by the less degressive energy tax structure (e.g., smaller and larger energy consumers treated more equally), the higher tax rates on gas and lower tax rates on electricity (e.g., stimulate electricity use), and the reduced ODE rates in the second and third brackets for electricity in 2023 (LNV, 2022).

2021). The CO2 sector system will be replaced with an individual system so that each company is sufficiently incentivized to produce energy efficiently and become climate neutral (LNV, 2022). This system is in discussion until 2023 and would be implemented in 2025.

4) Tax Refunds for Energy-Intensive Processes

Explanation Several energy-intensive processes are eligible for an energy tax refund (OECD and IEA, 2020). The natural gas tax can be refunded for companies using mineralogical and metallurgical processes. The electricity tax can be refunded for companies using metallurgical, chemical reduction, and electrolytic processes. Both these refunds represent tax revenue foregone, as taxes go uncollected for processes with significant energy use.

Quantification (Ministerie van Financiën[30]): €135 million (2021) CBS estimated the energy use per bracket for these exemptions in 2019. The breakdown is assumed to be similar to 2021. The counterfactuals used are the natural gas and electricity tax rates that would have applied per bracket without the exemption (See Appendix Table A.2). The tax revenue foregone equals the energy consumption per bracket, multiplied by the applicable tax rates.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness Carbon leakage Double taxation: Some emissions are priced under the EU ETS (OECD and IEA, 2020).	Inefficiency: Reduced incentive to move away from fossil fuels is especially relevant as these companies already benefit from the degressive energy tax structure with their high energy consumption. Equity (polluter pays principle)

Upcoming Changes The energy tax exemptions for mineralogical and metallurgical processes will be removed in 2025 (Rijksoverheid, 2022). Removing these exemptions is still under negotiation on the EU level as part of the proposed revision of the EU ETD (CPB, 2022).

5) Coal Tax Exemption for the Use of Coal in Electricity Generation

Explanation Coal consumption is exempted from tax if the coal is used in electricity generation (OECD and IEA, 2020). By forgoing this tax revenue, the government is subsidizing the use of coal.

Quantification (Ministerie van Financiën[31]): €86 million (2021) CBS data is available for the use of coal in electricity generation as of 2019. Forecasts from the Climate and Energy Outlook 2020 are used to project consumption to 2021 (PBL, 2020). The counterfactual is the coal tax rate that would apply

[30] Source: Data provided by Ministry of Finance and is not publicly available.
[31] Source: Data provided by Ministry of Finance and is not publicly available.

without the exemption (see Appendix A.2). The subsidy is the projected consumption for 2021 multiplied by the counterfactual.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Double taxation: Electricity generated at the time of delivery is already taxed by the EU ETS (OECD and IEA, 2020). The argument to avoid double taxation comes from the EU ETD.	Inefficiency: Plants have a reduced incentive to transition from coal to renewable energy. Equity (polluter pays principle)

Upcoming Changes The base of the scheme will gradually decrease until 2030, as all electricity generation using coal will be banned starting in 2030 in the Netherlands (NL-EITI, 2019).

6) Tax Refund for Religious and Non-Profit Institutions

Explanation Religious and non-profit institutions are eligible for a 50% refund of energy taxes (Ministerie van Financiën, 2022b). As these organizations typically fall in low energy consumption brackets, the tax refund partially compensates them for their relatively high energy costs. By refunding these taxes, the government is subsidizing these institutions' energy use.

Quantification (Ministerie van Financiën[32]): €37 million (2021) Tax and Customs Administration data is available for the total natural gas and electricity consumption for churches and non-profit institutions that applied for a refund in 2020. Institutions cannot be placed in their respective tax brackets to calculate their energy taxes, as individual-level consumption data is not publicly available. The Ministry of Finance calculates the subsidy as €37 million, which is taken to be the best estimate for 2021[33]. Most of the amount flows to non-profit institutions (€25.8 million of €37 million for 2020).

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Equity: These institutions cannot benefit from generic refunds via corporate income tax, which they do not pay (Ministerie van Financiën, 2022b)[34]. Removing the subsidy would disadvantage them compared to other institutions eligible for generic refunds.	Inefficiency: The refund reduces the incentive to lower energy use.

Upcoming Changes Pending the EC's negotiations, CO2 emissions from natural gas and electricity use for buildings will be priced under the EU ETS-BRT (see Section 4.5.1 #1).

[32] Source: Data provided by Ministry of Finance and is not publicly available.

[33] Another approach gives a higher estimate of €58 million by assuming churches and non-profit institutions are small energy consumers that fall into the first tax bracket. For this assumption, the total energy tax paid across churches and non-profits is the first tax bracket tariffs for natural gas and electricity, multiplied by the total gas and electricity consumption. The subsidy is 50% of this amount.

[34] These were implemented after the government began receiving revenue from energy and environmental taxes, which it wanted to redistribute in the form of lower corporate income tax to businesses (OECD and IEA, 2020).

7) Coal Tax Exemption for Dual Use

Explanation Businesses using coal with a dual purpose (e.g., as fuel and for another reason[35]) are eligible for an energy tax refund (OECD and IEA, 2020). By refunding these companies' taxes on coal use, the government is providing a subsidy to companies using high energy-intensive processes.

Quantification (Ministerie van Financiën[36]): €26 million (2021) CBS data is available for the basic metal industry, which is the primary user of coal with a dual purpose. The total use of coal in the basic metal industry is assumed to be applicable for this exemption. As data is unavailable after 2019, coal consumption is assumed to be constant from 2019 onwards. The counterfactual is the coal tax rate that would apply without the exemption (see Appendix A.2). Tax revenue foregone equals this coal tax rate multiplied by coal consumption. The subsidy is mainly allocated to Tata Steel.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness Carbon leakage Double taxation: CO2 emissions are priced for companies that fall under the EU ETS.	Inefficiency: The reduced incentive for moving away from coal is especially relevant given the high energy-intensive processes that fall under this exemption. Equity (polluter pays principle)

4.5.2 Excise Tax

An excise duty is a tax on certain consumer goods, including liquid fuels (OECD, 2019).

1) Exemption for the Use of Kerosene in International Air Travel

Explanation Fuels used in international commercial air travel (e.g., kerosene) are exempt from excise duties under the EU ETD (OECD and IEA, 2020)[37]. The exemption is based on guidance first developed in the 1944 ICAO Chicago Convention (EC, 2022c). By exempting a polluting industry from the tax on fossil fuel use, the government (and the EU) is subsidizing aviation's significant fuel consumption.

Through bilateral agreements, EU member states could levy a tax on kerosene for intra-EU flights; as of 2020, no member state has done this (TE, 2020a). That said, some flights do face excise duties or taxes on fuels. The kerosene tax exemption does not apply to pleasure (e.g., non-commercial) travel. Since 2021, the Dutch government has implemented a flight tax for every passenger departing from a Dutch airport (see Section 4.5.3 #1). Intra-EU flights fall under the EU ETS, though free emissions rights flowing to the aviation sector limit the pricing effect (Uitbeijerse et al., 2022). For international

[35] According to the EC, "an energy product has a dual use when it is used both as heating fuel and for purposes other than as motor fuel and heating fuel," see link
[36] Source: Data provided by Ministry of Finance and is not publicly available.
[37] From EU ETD Article 14. See Dutch tax code exemptions section, see link

flights, the UN Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) requires the compensation or avoidance of only CO2 emissions over 2019 levels (IATA, 2022), though this provides a limited incentive to reduce emissions (Uitbeijerse et al., 2022).

Quantification (Ministerie van Financiën, 2022b): €2.4 billion (2019[38]) Kerosene is a medium oil that is used as a fuel for aircraft (CBS[39]). CBS reports on the volume of bunkers of kerosene-type jet fuel in the Netherlands[40]. The counterfactual is the excise duty that applies to other medium oils, e.g., €521.68 per 1,000 liters in 2021 (Belastingdienst, 2022b). The revenue foregone is this excise duty multiplied by the bunkers of kerosene.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International development: As part of the Chicago Convention in 1944, the exemption's goal was to develop air transport for international cooperation, development, and trust between nations following World War II (IATA, n.d.). Double taxation: some CO2 emissions fall under the EU ETS.	Inefficiency: This kerosene tax exemption leads to significant underpricing in international aviation. The ETD is outdated and does not reflect the EU's legal climate commitments (EC, 2021b). Equity (polluter pays principle)

Upcoming Changes The EU has proposed changes to the exemption in its revision of the EU ETD in Fit for 55. The proposed minimum kerosene tax for intra-EU passenger flights would start in 2023, with 10% yearly increases over ten years (PBL, 2021b)[41]. Fit for 55 also proposes to decrease free emissions rights to 0 in 2027 and reduce total emissions under the ETS-SAM (Stationary installations, Aviation, and Maritime transport)[42] by 4.2% instead of 2.2% per year for the system to work more efficiently (PBL, 2021b). There is also an initiative, ReFuelEU Aviation, for stimulating the production and use of sustainable fuels in the aviation sector. In the Netherlands, the goal, which is higher than at the EU level, is to have 14% sustainable aviation fuels blended by 2030 and 100% by 2050 (IenW, 2020).

[38] Volume estimate was not yet available for 2021, and the 2020 estimate was significantly affected due to COVID-19 restrictions. Therefore 2019 volume is used.
[39] CBS information airplane kerosene ("halfzware olie"), see link. Medium oil is a mineral oil, which "are produced from refined hydrocarbons obtained from crude oil by distillation" (Bay, 2001).
[40] Bunker fuels are those used in planes and ships for international transportation. IPCC and UNFCCC set the reporting methodology, see link.
[41] The proposal exempts air travel purely for cargo transport. The minimum tax rate should be phased in for pleasure travel and business jets from 2023. For commercial travel, the phase-in will be longer.
[42] EU ETS-SAM refers to a newly formed EU ETS in Fit for 55. This would combine the existing sectors of industry, electricity production, and intra-EU air travel with the newly proposed sector of maritime transport (CPB, 2022).

2) Exemption for the Use of Diesel and Fuel Oil for Commercial Navigation in Inland and Community Waters

Explanation Maritime shipping, including international and intra-EU sea navigation, does not face excise duties on fuel use under the EU ETD (OECD and IEA, 2020; Belastingdienst, 2021a)[43]. Additionally, fuel for inland navigation is exempted from excise tax in the Netherlands based on the Mannheim Convention (EC and CE Delft, 2019b). By exempting maritime shipping from paying taxes on its fossil fuel use, the government (and EU) is subsidizing fuel consumption in a polluting industry.

Quantification (Ministerie van Financiën, 2022b): €1.7 billion[44] (2021) Mineral oils used for the propulsion of ships or ships' needs on board are exempt from excise duties for commercial ships (e.g., not recreational). For all marine travel, heating and other gas oil are used (e.g., oil for use other than road transport)[45]. For cross-border shipping (e.g., bunkers), heavy oil is also used. The excise duties that apply to these oils (€521.68 per 1,000 liters in 2021 for heating and other gas oil; €38.4 per 1,0000 kg in 2021 for heavy oil) are used as the benchmark excise tax rates (Belastingdienst, 2022b). For inland navigation, the excise duty for heating and other gas oil is multiplied by the volume of heating and other gas oil consumed; for international marine travel, this calculation is repeated for heating and other gas oil as well as for heavy oil.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness: Ships can change their routes or their cargo routes to avoid paying taxes, which would affect the competitive position of European seaports (CE Delft, 2022). Carbon leakage: With this exemption's removal, the most polluting ships will likely avoid European seaports or bunker fuels elsewhere (CPB, 2022).	Equity (polluter pays principle: The shipping industry accounted for over 1 billion tons of GHG emissions in 2018, increasing 9.6% from 2012 (IMO, 2020). Inefficiency: This exemption reduces the incentive to use alternative energy. Refineries in the Netherlands are large producers of marine fuels, and Dutch ports are a global center to bunker them (IEA, 2020).

Upcoming Changes In Fit for 55, shipping emissions in the EU will be priced under the EU ETS from 2023 onwards, with a four-year phase-in period to get to 100% participation (CPB, 2022). Shipowners will then fall under the ETS and have to buy carbon allowances for all energy used in European ports and any voyages between EU ports as well as for half the energy used in any voyages that start or finish

[43] From EU ETD Article 14. See Dutch tax code exemptions section, see link. CBS defines inland marine navigation as: "all domestic passenger and freight water transport, inland waterway, maritime and coastal shipping departing from and arriving in Dutch ports. Includes work on sea, like dredging, construction and maintenance of offshore rigs and offshore wind turbines. Does not include fishing" See Link. CBS defines international marine navigation as ships departing from Dutch ports and arriving in foreign ports. See Link

[44] Inland navigation and international marine bunker consumption volumes are reported and calculated separately. 2021 figures were not yet available, so 2020 figures were used. For inland navigation, this amounted to an excuse duty (on gasoil) avoided of €121 million. For international marine bunkers, this amounted to an excuse duty (on gasoil and heavy fuel oil) avoided of €1.6 billion.

[45] Gasoil has almost identical properties to transport diesel; however, the excise duty is different (CBS, see link).

at an EU port (CE Delft, 2022). This greenhouse gas intensity of energy used by ships calling at European ports must decrease by 6% in 2030 and 75% in 2050 compared to 2020 (PBL, 2021b).

3) Different Tax Rates between Diesel and Gasoline Combined with Different Tax Rates between Diesel and Gasoline Cars in Car Taxes[46]

Explanation Diesel is taxed at a lower rate per liter than gasoline for road transport (OECD and IEA, 2020; Harding, 2014; TE, 2020b). Diesel is more environmentally harmful and more energy-dense than gasoline. A surcharge is applied to diesel cars' motor vehicle tax to compensate for diesel's lower fuel tax (OECD and IEA, 2020). These policies are meant to offset each other but do not do so in practice. Though the motor vehicle tax is higher for diesel cars than gasoline cars, diesel consumption is taxed at a lower rate than gasoline consumption. This provides an incentive to consume more diesel, the more environmentally harmful fuel, than gasoline.

Quantification: €1.2 billion (2020) Every estimate depends on assumptions about the benchmark tax rate (EZK, 2020). The counterfactual for the subsidy provided by the lower diesel tax is the gasoline tax rate per liter. The tax advantage for diesel is the difference between the diesel and gasoline tax rates (UnitedConsumers, 2022)[47]. Based on 2020 rates, €0.30 of tax revenue is foregone for each liter of diesel consumed. CBS reports on the total liters of diesel consumed in the Netherlands in 2020. Multiplying this value by the counterfactual, the total revenue foregone is €2.1 billion[48]. The budgetary effect of the motor vehicle tax differential must be subtracted from this amount to find the net subsidy.

No public data on the diesel surcharge in the motor vehicle tax is available for the total aggregated tax paid for diesel compared to gasoline. The Ministry of Finance provided a yearly estimate of €836 million as of June 2022. Assuming this amount is similar to the amount in 2020, the net subsidy is the difference between the fuel tax subsidy and the diesel surcharge: €1.2 billion.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness: The Netherlands argues that the tax rate is lower on diesel to maintain a level playing field with neighboring countries for the transport sector (OECD and IEA, 2020).	Inefficiency: The two policies do not offset each other as intended (OECD and IEA, 2020). Inefficiency: It would be more efficient to raise the diesel fuel tax so that it is priced according to the higher CO2 emissions per liter of diesel. The higher price of diesel would help incentivize the use of and investment in more CO2-efficient vehicles (Milieudefensie, 2020).

[46] Many other car tax exemptions in the Netherlands further reduce the cost of fossil fuel-based transportation (SEO, 2022). Many fall outside this report's definition, as the exemptions are tied to car ownership instead of fuel consumption. This motor vehicle tax is included because of its purpose to offset this fuel tax.

[47] Petrol tax rate per liter of €0.80, diesel tax rate per liter of €0.50 in 2020.

[48] Source: CBS motor fuel sales by volume. 2020 is the most recent year available, see link

Upcoming Changes The revision of the EU ETD proposes that minimum fuel taxes should be highest on those fuels most harmful to the environment (EC, 2022d).

4) Biodiesel Taxed Equally as Regular Diesel

Explanation Biodiesel is a more sustainable form of diesel, with 8% less energy per volume than regular diesel (Belastingdienst, 2022b). Biodiesel and diesel are taxed at the same rate so that the energy in biodiesel is taxed at an implicitly higher rate (PBL, 2021a)[49]. By taxing them equally, the government is providing a subsidy for diesel consumption.

Quantification: €303 million (2020) The energy content of diesel is 35.9 megajoules per liter (MJ/L), compared to 33 MJ/L for biodiesel (Belastingdienst, 2022b). The tax on diesel and biodiesel was €0.50 per liter in 2020 (UnitedConsumers, 2022). The tax rate paid per MJ of energy equals €0.014 per MJ for diesel and €0.015 per MJ for biodiesel. The counterfactual used is biodiesel's tax rate per MJ of energy; there is then foregone revenue for diesel because it is taxed at a lower tax rate per MJ. If diesel's energy content were taxed like biodiesel, it would be taxed at €0.55 per liter. This implicit tax is applied to the total liters of diesel consumed in 2020 (CBS). I subtract taxes already paid (e.g., the standard tax rate on diesel of €0.50 per liter multiplied by liters of diesel consumed in 2020).

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
	Inefficiency: The government wants to support the shift to biofuels to make the transport sector more sustainable. The excise tax rates are inefficient, as the effective price of the less energy-intensive fuel (biodiesel) is higher than the more energy-intensive fuel (diesel).

Upcoming Changes The revision of the EU ETD proposes changes to fuel taxes, so fuel tax rates depend on energy content and environmental performance rather than volume (EC, 2022d).

5) Refinery Exemption

Explanation Refineries do not face excise taxes on fuels used for their own purposes under the EU ETD, assuming that these fuels are produced within the immediate surroundings of the refinery (OECD and IEA, 2020). This indirectly encourages refineries' fossil fuel consumption by lowering the price and represents a subsidy for this highly energy-intensive industry.

Quantification: NQ There is a lack of data on refinery consumption, as was confirmed by experts within the Ministry of Finance. Conceptually, the subsidy equals the volume of fuel that refineries consume for

[49] The higher implicit tax rate is compensated if there is 10% or more fuel blending, though in 2018, this was rarely achieved (PBL, 2021a).

their use multiplied by the excise tax rate paid on the rest of their fuel use (e.g., benchmark is the rate refineries would pay if there were no exemption). If the six refineries in the Netherlands are assumed to fall in the fourth tax bracket, their energy taxes would already be relatively low. The size of the subsidy would then be relatively small.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness Double taxation: CO2 emissions are priced for companies in the refinery sector that fall under the EU ETS (OECD and IEA, 2020).	Equity (polluter pays principle): Refineries already fall into low tax brackets and pay relatively less tax with the degressive tax structure. Inefficiency: Reduced inventive is significant for the Netherlands, which has six large refineries in its ports of Rotterdam (5) and Amsterdam (1) (IEA, 2020).

4.5.3 Other Taxes

Value-Added Tax (VAT)

VAT is a tax on the sales of a business and is included in the price of goods or services (Belastingdienst, 2020). 21% is the standard rate, but exemptions of 0% or 9% exist for certain goods and services.

1) VAT Exemption for International Airline Tickets

Explanation There is a 0% VAT rate on international air transport of passengers (RVO, 2021b; ICAO, 2000[50]). The government is subsidizing the aviation industry by forgoing an important source of government revenue on a luxury good.

Quantification (EC and CE Delft, 2019a): €1.8 billion (2015) By assuming the standard rate of 21% as the counterfactual, there is a 21% discount on international air tickets. The discount can be applied to the Netherlands' average international airline ticket price and multiplied by airline ticket sales to find the budgetary effect. Based on EC and CE Delft (2019a), passenger demand for international airline tickets was 23.1 million tickets in 2015. These tickets would be 21%, or €78, more expensive including VAT than the average ticket price of €371 excluding VAT. Multiplying these gives the foregone government revenue from excluding VAT from these tickets: €1.8 billion. These statistics are from 2015 but are the best available given data limitations[51].

[50] VAT is charged on domestic flights in the Netherlands (EC and CE Delft, 2019a). The effect on total ticket sales is expected to be insignificant because of very few domestic flights.

[51] Refer to EC and CE Delft (2019a) for the complete analysis. Their modeling includes behavioral effects (e.g., 21% decrease in demand due to 21% higher ticket prices), employment, and climate effects. Including this, they estimate €1.5 billion of aviation-related fiscal revenue if international air tickets were taxed with 21% VAT.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
International competitiveness: International Civil Aviation Organization (ICAO) and International Air Transport Association (IATA) argue that international air travel by nature is primarily outside of tax jurisdictions, and the industry-wide exemption ensures a level playing field (EC and CE Delft, 2019a).	Public resources: VAT is an important source of tax revenue for countries (TE, 2018). Forgoing this revenue for a large industry is a drain on the public budget. Equity: Air travel is one of two luxury goods not subject to a standard VAT rate (TE, 2018). Equity (polluter pays principle)

Upcoming Changes There do not appear to be upcoming changes to the VAT exemption, likely due to the high complexity of international reform required. Instead, the Dutch government has implemented a flight tax of €7.845 for every passenger departing from a Dutch airport since 2021 (Ministerie van Financiën, 2022d[52]). This amount is relatively low and does not tax kerosene directly, which would link the tax to environmental damage. It also does not apply to transfer passengers and cargo flights (Uitbeijerse et al., 2022). The price of air travel does increase, and the price difference between tickets for air travel and other types of transportation is reduced. The higher ticket price will raise the size of the VAT exemption subsidy, as the 21% discount will be applied to a higher ticket price.

State Profit Share (SPS) Levy

The Dutch state owns all minerals in the subsurface of the Netherlands by Dutch law (IEA, 2020). As set in the Mining Act, the SPS levy is a resource rent tax that extraction permit holders for Dutch soil pay over excessive profits from mining activities[53]. On top of the corporate income tax, the SPS levy charges these companies an additional 50% tax on ring-fenced profits, which includes profits from exploration and production activities. The SPS levy reduces oil and gas companies' abnormal profits from extraction activities[54]. For an idea of its budgetary effect, the government expects to collect €900 million of tax revenue for 2023 based on the levy's current structure (EZK and Ministerie van Financiën, 2022).

1) Investment Deduction for Exploration and Production of Natural Gas in the North Sea

Explanation Companies subject to the SPS levy can deduct 40% of their investment costs for new offshore exploration and production investments from taxable income under the SPS levy (OECD and IEA, 2020). In 2021, the deduction increased to 40% from 25% and applies to all new offshore exploration and production investments. This is a follow-up to the "small fields policy" that began in 1974 to stimulate gas production from smaller oil and gas fields in the North Sea (OECD and IEA,

[52] The flight tax is expected to increase to €24 as of 2023, see link.
[53] Source: Mining Act, see link.
[54] It should be noted that this levy also incentivizes the government to encourage oil and gas extraction due to their sharing in the profits.

2020)[55]. By excluding a significant portion of investment costs for new projects from income subject to the SPS levy, the government is forgoing tax revenue and subsidizing new gas exploration and production in the Netherlands.

Quantification: NQ Theoretically, the subsidy would equal the sum of investment costs deducted across all new offshore exploration and production projects in one year (e.g., 40% of the projects' yearly investment costs; counterfactual is no investment cost deduction). It is beyond the scope of this report to quantify the foregone revenue, as there is limited data available for investment costs. To give an idea of this policy's potential effects, EBN estimates that 232 to 335 billion m3 of gas can be extracted from the small fields between 2018 and 2050 (Tweede Kamer der Staten-Generaal, 2018).

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Security of energy supply: This investment deduction subsidizes the risk and cost of undertaking projects to secure domestic energy production (OECD and IEA, 2020). Natural gas will take years to phase out completely. The government prefers domestic production over gas imports because it gives independence and avoids CO2 emissions from imports. Substitution: Developing these fields is a substitute for extracting in Groningen, which carries significant risks due to decades of production (NL-EITI, 2019).	Stranded assets: Many smaller fields developed under the small field policy were not actually extracted from and became stranded assets, representing wasted government resources (OECD and IEA, 2020). Inefficiency: The incentive does not align with the IEA's World Energy Outlook (2021b). A subsidy like the investment deduction lowers producers' breakeven project costs, making it more attractive to pursue new exploration and production projects (Erickson et al., 2020).

4.6 Inventory #3: Induced Transfers

FFSs under this category were not identified in the Netherlands.

4.7 Inventory #4: Transfers of Risk to Government

1) Insured Fossil Fuel Projects by Atradius Dutch State Business

Explanation Atradius Dutch State Business (DSB)[56] is the export credit agency (ECA) of the Dutch government (Milieudefensie, 2020). On behalf of and for the account and risk of the government, Atradius DSB covers the financial risks of export transactions and investments for national export businesses that operate in uncertain markets (Atradius DSB, n.d.)[57]. In return for a risk premium or interest payments, these businesses have their projects insured or guaranteed by Atradius DSB and,

[55] At this time, the Dutch government wanted to increase domestic energy production following the energy crisis in the early 1970s.
[56] Atradius DSB is part of Atradius Group. Atradius DSB focuses only on the Netherlands and operates independently (Atradius Group, 2020).
[57] The government does not make investments itself, but, as Atradius DSB's only client, it works closely with Atradius DSB and establishes rules with which transactions must comply. These are transactions with medium-term credit (longer than one year) or a medium execution period that are of sufficient interest for the Netherlands. More information (e.g., arrangements of Atradius DSB and types of insured risks) is available (Atradius DSB, n.d.).

thereby, the Dutch government. With export credit insurance, these companies can mobilize financing from banks or other investors that they would otherwise not be able to.

Export credit insurance promotes exports from the Netherlands and domestic business abroad, with a significant focus on fossil fuels historically. The loans are structured to be breakeven so that the premiums received are sufficient in the long term to absorb net claims (Ministerie van Financiën, 2021a). The government's backing gives Atradius DSB a high credit rating and sends a message to the market that the government prioritizes the organization's activities (IISD, 2020). Private investors' risks are reduced, encouraging private investment in Atradius DSB's activities that would not occur otherwise (Tucker et al., 2020). Even though Atradius DSB does not give concessional terms for its activities, the government's involvement "de-risks" its financing[58].

As Atradius DSB's activities have largely been in fossil fuel projects, the government is supporting these projects and implicitly encouraging other investors to pursue them. Atradius DSB is an "insurer of last resort," operating complementary to the market with a focus only on projects with "non-marketable risk," e.g., what would otherwise not be financed by the market (Atradius Group, 2020). Thereby, Atradius's projects result from the government's backing. Given the need to transfer risk to the government, the projects will mainly be riskier or larger than projects financed by the market.

Quantification: NQ The risk the government takes on has a price. Atradius DSB insures riskier projects than the market; assuming these higher risk projects are insured at the average market risk premium, there is foregone revenue. There is limited data available to quantify this effect, and it is beyond the scope of this report to quantify the corresponding subsidy. To illustrate the government's potential fossil fuel exposure, Atradius DSB insured 27 fossil fuel-related projects with maximum damage insurance of €1.5 billion in 2020[59]. Between 2015 and 2020, Atradius DSB insured €7.7 billion in energy projects abroad, with 83% going to fossil fuel projects (Molnar et al., 2022).

[58] International restrictions limit the financing terms and conditions that Atradius and other ECAs can offer so that a level playing field is maintained and competition is encouraged among exporters (OECD, n.d.).
[59] Based on Atradius's methodology for determining whether a project is fossil fuel-related. A full overview of projects is here: Link

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Economic development: Encourages investor confidence in riskier projects abroad so that more projects occur. International competitiveness: Without the government's backing, Atradius DSB's competitive position would deteriorate if other ECAs continued to benefit from government backing.	Inefficiency: Activities related to the exploration and exploitation of new oil and gas fields can generally not be insured anymore to reach a 1.5-degree warming scenario (IEA, 2021b; Ministerie van Financiën, 2021c). Stranded assets: With ECA support, there is a crowding in effect, as government involvement in the market increases private finance in the market (Fossil Free ECAs, n.d.). Empirical evidence suggests that fossil fuel financing flowing to lower income countries has resulted in more stranded assets (Tucker et al., 2020). Employment: Molnar et al. (2022) found that Atradius DSB's investments in export finance could create more jobs if allocated to renewable projects in the future.

Upcoming Changes During the COP26 in Glasgow, the Netherlands committed to a declaration for aligning international government support with the green energy transition (Ministerie van Financiën, 2021c). This declaration included forming and implementing a new policy for ending new direct government support for the international unabated fossil energy sector before the end of 2022, except for clearly defined circumstances in line with the 1.5-degree warming goal of the Paris Agreement. Based on conversations with experts within the Ministry of Finance, they expect complying with the declaration will limit Atradius DSB to insure only 15% of currently insured fossil fuel-related projects. The goal is unlikely to be reached by the end of 2022. For a level playing field, it is crucial that as many countries as possible sign the declaration. The Netherlands is also a member of the Export Finance for the Future (E3F) with six other countries. E3F aims to bring member countries' export credit insurance in line with the Paris Agreement (Both Ends, n.d.).

2) Permanent Ownership Stake in FMO Dutch Development Bank

Explanation The government holds a permanent ownership stake (51%) in FMO, which focuses on fostering sustainable economic growth in developing countries by providing capital or loans to private parties in the financial, energy, and agriculture sectors (Ministerie van Financiën, 2020). The government's majority ownership gives FMO a higher credit rating and sends a message to the market that the government prioritizes the organization's activities (IISD, 2020). The government's involvement reduces private investors' risk and mobilizes financing from parties that would not occur otherwise. Even though FMO does not give concessional terms for projects, the government's involvement "de-risks" the financing (Tucker et al., 2020). As FMO's activities have historically been in fossil-fuel projects, the government has supported these projects and implicitly encouraged investors to pursue them. As FMO focuses on projects that would not get financed in the market, FMO's projects

result from the government's backing. With the transfer of risk, projects will mainly be riskier or larger than what is financed by the market.

Quantification: NQ The risk the government takes on has a price. That said, there is limited data available, and it is beyond the scope of this report to quantify this form of subsidy. To give an idea of the fossil fuel exposure, FMO made an average annual commitment of €35.4 million to fossil fuel projects from 2016 to 2020 (Milieudefensie, 2020).

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Safeguarding public interest: The public interest in sustainable economic growth in developing countries (Ministerie van Financiën, 2021b).	Stranded assets: The government is taking on the stranded asset risk of FMO's fossil fuel-related projects. Inefficiency (safeguarding public interest): Inefficiency is introduced by the government acting as a shareholder.

Upcoming Changes As of June 2021, FMO has committed to stop direct investments in fossil fuels (FMO, 2021). This commitment immediately halted investment in upstream and mid-stream stand-alone activities, with a five-year timeline to phase out investments in integrated mid/down-stream activities for power generation. Certain fossil fuel projects can be financed under exceptional circumstances.

3) Permanent Ownership Stake in Certain Companies

Explanation The government takes ownership stakes in certain companies to exert influence on the company to safeguard public interests (Ministerie van Financiën, 2022c)[60]. Many are energy-related, largely due to the significant domestic production of natural gas since the discovery of the Groningen natural gas fields. The companies in Table 3 invest in, consume from, or support the fossil fuel industry. The government has some influence on the companies in line with its ownership stake, though it does not have authority over the day-to-day running and management. The government's participation should be like a private shareholder to not advantage these companies over the market[61]. That said, the government's backing leads to higher credit ratings for these companies and sends a message to the market that the government prioritizes their activities (IISD, 2020). Additionally, the government is taking on these companies' risks and exposure in the fossil fuel industry.

[60] In certain companies, the Dutch government's role as shareholder and policymaker are combined, e.g., EBN, GasTerra (Ministerie van Financiën, 2020). In others, these roles are separated across the Ministry of Finance as shareholder and another ministry as policymaker, e.g., GasUnie, FMO, Port of Rotterdam.

[61] The participation of the government is not meant to affect market conformity and competitiveness of the market. More information about the government's influence can be found in the Ministry of Finance's yearly report on companies with government ownership (2021b).

Table 3: Overview of Fossil Fuel-Related SOEs

The government has an ownership stake in many companies involved in or exposed to the fossil fuel industry. Their business activities, public interest(s), and other relevant information are outlined below.

Company description	Public interest (according to Ministry of Finance)	Additional Information
Gasunie *(100% government owned)*		
Transport company that controls infrastructure and transport-related activities of natural gas in the Netherlands [a]	Guarantee security of natural gas transport and supply	Government is also involved in the company's efficiency, safety, and sustainability
Port of Rotterdam Authority *(29.2% government; 70.8% Rotterdam municipality)*		
Manager, operator, developer of the port of Rotterdam (largest port in Europe)	Continuity and quality of the port of Rotterdam Efficient market relations Nautical safety Sustainable use of space	54% of incoming goods are in the form of fossil fuels (Milieudefensie, 2020); considered important to the Dutch economy and employment and the Netherlands' access to world markets for their position in trade
KLM (*5.9% government)*		
Dutch airline that merged with Air France in 2004 under Air France-KLM	Network quality Market access Airline politics	Considered important to accessibility, economy, and competitiveness of the Netherlands
Air France-KLM (*9.3% government)*		
Holding company of Air France and KLM	Participate at holding company level to safeguard Dutch public interest in network quality of the airline	Considered important to match France's stake to protect Schiphol's position in international aviation (Schuur, 2022)
Schiphol (*69.8% government)*		
Operator of Dutch airports, most important being Amsterdam Airport Schiphol	Interest of aviation for the Dutch economy, by ensuring international accessibility and network quality	More international flights possible from the Netherlands because Schiphol is a hub for transport passengers from nearby countries (Schuur, 2022); good international air accessibility is considered important for Dutch economic development
Energie Beheer Nederland (EBN) (*100% government)*		
Private company that implements policy for exploration, production, transportation, and sale of natural gas	Exploration, production, transport, and sale of natural gas	EBN typically takes a 40% stake in all fossil fuel projects in the Netherlands (Milieudefensie, 2020)
GasTerra *(Effectively 50% government [b]; 50% Shell and ExxonMobil)*		
International gas trading company	Management of the Netherlands' natural resources Implement small field policy [c]	Until 2022, company has obligation to purchase natural gas from small fields in the North Sea at the market price under small field policy

Data in table primarily from Ministerie van Financiën (2020) and Ministerie van Financiën (2021b).

[a] GasUnie also owns some international pipelines, including in north Germany, between the Netherlands and the UK, and between Russia and Western Europe (NL-EITI, 2019). [b] The government has a 10% ownership stake. EBN, which is 100% government-owned, holds a 40% stake. The Dutch government therefore has an effective stake of 50%. [c] The small field policy was introduced in 1974 and guaranteed the purchase of natural gas extracted from small fields in the Netherlands. In the Gas Act, GasTerra has the statutory obligation to buy this gas at market prices. See Gas Act: Link

Quantification: NQ The risk and exposure the government takes on through its ownership has a price. Quantifying this subsidy type is outside this report's scope, given the complexities and data limitations.

Assessment

Economic Rationale For FFS	Economic Rationale Against FFS
Safeguard public interests: Often competitiveness of the Dutch economy, security of energy supply, or accessibility of the Netherlands (Ministerie van Financiën, 2022c). Natural monopoly (GasUnie, GasTerra, Schiphol, Port of Rotterdam Authority): These companies are in natural monopoly markets. The government rationalizes stepping in to avoid an abuse of power.	Inefficiency: The incentive provided by the government's ownership does not align with the IEA's World Energy Outlook (2021b). Stranded assets: The government is taking on the stranded asset risk of these companies. Inefficiency (safeguarding public interest): Inefficiency can be introduced by the government acting as a shareholder (IMF, 2020).

Table 4: Upcoming Changes – Overview of Recent Initiatives of Fossil Fuel-Related SOEs

The government does not expect to change its ownership stakes in these SOEs. The companies do engage in initiatives to contribute to the energy transition. These initiatives are summarized in this table.

Company	Initiative
GasUnie	Converting part of its gas network into a hydrogen network (Ministerie van Financiën, 2022b). It is also focused on Porthos, a project with the Port of Rotterdam Authority and EBN, to store CO2 under the North Sea.
Port of Rotterdam Authority	Goal of 49% reduction of CO2 emissions by 2030 compared to 2019. Focused on CO2 capture projects and projects that develop the application of (green) hydrogen in the port
KLM	Subject to ReFuelEU Aviation (see section 4.5.2 #1) and a domestic goal to have 14% sustainable aviation fuels blended by 2030 and 100% by 2050 (IenW, 2020)
Air France-KLM	Same as KLM
Schiphol	By 2030, Schiphol's ground operations should be zero emission and waste. It has endorsed "Destination 50", an initiative for net-zero aviation in and departing from Europe. It has pledged to invest 15 million in sustainable fuel projects in coming years.
EBN	Focus on shifting from Groningen production to small fields in North Sea. Also on making the gas value chain more sustainable
GasTerra	In the process of winding down as its business activities will terminate at the end of 2024

Data in table is primarily from Ministerie van Financiën (2021b). Other sources used are noted.

5 Related Subsidies: Quantification and Economic Analysis

This report aims to look at FFSs with a broad perspective and identify additional policies that possibly constitute a FFS. During my research, I found that the interpretation of the FFS definition varies. Some policies are thereby more unambiguously FFSs than other policies. Therefore, I have created a separate inventory of "related subsidies" to cover policies that more indirectly support fossil fuels or expose the Dutch government to fossil fuels. These policies are divided into two categories. First, "transition subsidies" provide public funds to fossil fuel companies but ultimately have the primary goal of accelerating the energy transition. Second, "general subsidies" are taken advantage of by fossil fuel companies but have their primary goal of supporting any industry rather than just fossil fuels. This section discusses these subsidies to highlight the nuanced perspective required to define and categorize these financial flows. Their assessment also helps emphasize the extent of subsidies flowing to the fossil fuel industry and the government's exposure to fossil fuels.

5.1 Categorization and Quantification of Related Subsidies

Below is a table with related subsidies across the OECD inventory: #1 direct transfer of government funds (4 policies); #2 tax expenditures, other revenue foregone, underpricing of goods and services (3 policies); #3 induced transfers (0 policies); and #4 transfer of risk to the government (0 policies). Two policies were quantified, and three did not have enough data available to be quantified. In addition, two policies were quantified but not added to the total because they take effect after 2021, the base year of this inventory. I still include and explain these two transition subsidies to highlight the scale of compensation-tied public funds flowing to the fossil fuel industry.

Excluding one of the energy innovation subsidies (SDE++), these policies are all additions to the inventory reported by the Dutch government (Ministerie van Financiën, 2022b). The compensation to NAM, the other energy innovation subsidy (RD&D funds for energy research), and the energy investment deduction were identified in Milieudefensie (2020).

Table 5: Related Subsidies Inventory in the Netherlands (2021)[62]

Policy-by-policy inventory of related subsidies, which support fossil fuel consumption or production more indirectly than the FFSs in Table 4.

Measure	Estimate (€ millions)	Type of Subsidy
Inventory #1: Direct Transfer of Government Funds		
Compensation to Exxon and Shell (NAM owners) for loss in revenue due to early phase-out in Groningen	1,500	Energy transition
Energy innovation subsidies*	821	Energy transition
Compensation for phasing out coal-fired power plants by 2030 (TBD)**	NA	Energy transition
Compensation for production limit on coal-fired power plants (2022)**	NA	Energy transition
Total	**2,321**	
Inventory #2: Tax Expenditures, Other Revenue Foregone, and Underpricing of Goods and Services *2.a: Energy Tax*		
Energy Investment Deduction	NQ	Energy transition
2.b: Corporate Income Tax		
Loss Relief	NQ	General
Liquidation and Cessation Loss Scheme	NQ	General
Inventory #3: Induced Transfers, e.g. Price Support		
N/A		
Inventory #4: Transfers of Risk to the Government		
N/A		
TOTAL MEASURES	**2,321**	

Ordered by size in each category. As of reference year 2021. I will use a previous year if data is unavailable or not representative due to COVID-19 anomalies. NA = not applicable for 2021. NQ = not quantified (in this report).

*Includes SDE++ and RD&D energy research funds. **These subsidies begin after 2021 and are not included in the total.

5.2 Inventory #1: Direct Transfer of Funds

1) Compensation to ExxonMobil and Shell as NAM Owners for Loss in Revenue due to Early Phase Out in Groningen

Explanation In the Norg Agreement, the Dutch government made an agreement with the Nederlandse Aardolie Maatschappij (NAM), a joint venture with Royal Dutch Shell (Shell) and ExxonMobil, to end gas extraction in Groningen on an expedited timeline (EZK, 2022b). This agreement aims to prevent further damage to the province and its population by closing the field earlier than the goal of 2024. Compensation is provided for the NAM's revenue loss due to its ownership of the Norg storage facility (Norg). The agreement includes modifying Norg to prevent the extraction of 11.9 Nm3 of natural gas

[62] Some sources identified other policies that are not included in the table. OECD (2022) and Energy Policy Tracker (2022) include a special tax deferral for entrepreneurs that faced payment issues during the COVID-19 pandemic from 1) taxes on almost entirely CO2-based passenger cars and motorcycles, and 2) environmental taxes. This deferral is excluded because it is temporary and of a small scale. Milieudefensie (2020) included transporting aircraft fuel to military and civilian airports via the underground pipeline network by the Defense Pipeline Organization. There is not enough information on the government's involvement to determine whether this is a subsidy. Milieudefensie (2020) also includes fossil fuel projects of government-owned commercial banks ABN AMRO (56.3% government ownership) and SNS Bank (now Volksbank; 100% government ownership) as public finance for fossil fuels. These are not included as they do not fit into either category of related subsidies. Milieudefensie (2020) included government accounting for the costs of earthquake damages and related costs from the Groningen natural gas field. With public investment and partnerships, the government assisted in developing the field and profited significantly from natural gas production alongside the Nederlandse Aardolie Maatschappij (NAM). This involvement gives grounds for the government's role in providing compensation alongside NAM for the significant destruction in the province caused by extraction-related earthquakes. This compensation is therefore excluded from the inventory.

from the Groningen field[63]. Additionally, an energy supply is ensured for the Netherlands while reducing the extraction and resulting damage from the 2019/2020 gas year (from October to September) onwards. The Norg Agreement represents public funds being allocated to ExxonMobil and Shell so that they do not bear the full cost of their extraction activities in Groningen while taxpayers do. This compensation is a transition subsidy, as the government's primary goal of intervening is to force the closure of the Groningen gas fields on an expedited timeline.

Quantification (EZK, 2022b): €1.5 billion (2021) With no compensation as the counterfactual, the subsidy is the total public funds paid per year in compensation. As outlined in the Norg Agreement, compensation is market-based and decided by an independent arbitrator. It comprises 1) extra purchasing costs borne by GasTerra[64] to acquire pseudo-Groningen gas stored in Norg, 2) extra transportation costs, 3) extra costs due to loss of flexible use of Norg, and 4) lost income due to loss of optimization opportunities in the sale of gas by GasTerra. Across the five gas years 2019-2024, the independent arbitrator estimates the total compensation to be €7.5 billion, with the highest costs falling in gas year 2021/2022 onwards due to high gas prices. This estimate is based on projections, and the actual compensation will depend on market prices at the end of the relevant year. Due to the uncertainty, a simple average of the compensation across the five years is used, resulting in €1.5 billion for 2021.

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
Equity: Compensate for NAM's losses because of the government intervening to close the fields. Additionally, it can be seen as fair that the government is partially responsible for this compensation, as it profited from gas production in the province. It was involved as EBN (see Section 4.7 #3) in the management of gas extraction for many decades.	Equity (polluter pays principle)

2) Energy Innovation Subsidies

Explanation The government offers subsidies to stimulate investments in renewable energy. These are transition subsidies with the primary goal of reducing CO2 emissions. Despite their intention, only a portion of the subsidy flows to truly renewable energy. There is a hidden subsidy for fossil fuels in the funds allocated to projects that still release CO2 emissions or support fossil fuels.

Subsidy Scheme for Sustainable Energy (SDE++) is offered to companies to stimulate large-scale production of renewable energy and CO2 reduction (RVO, 2022b). This adoption subsidy compensates

[63] This involves filling the storage facility with pseudo-Groningen gas rather than gas from the Groningen field. Groningen produces low-calorific gas on which the Netherlands is widely dependent. To ensure supply, pseudo low-calorific gas, a blending of high-calorific gas with nitrogen, can be used as a supplement (GasUnie, 2021).
[64] See Section 4.7 #3 for more explanation of GasTerra.

for the difference between market prices and costs of energy and CO2 emissions (CPB, 2021). The subsidy incentives the transition from natural gas to electricity in carbon-intensive sectors. Projects using less obvious fossil fuels such as biomass (including co-firing), green gas, as well as carbon capture and storage (CCS)/carbon capture and utilization (CCU) are eligible. Though they represent more sustainable alternatives to traditional fossil fuels, they still produce CO2 emissions in some way[65].

Research, Development & Demonstration (RD&D) funds for energy research are allocated to fossil fuel companies through the public budget (RVO, 2020). This subsidy focuses on energy innovation funds and schemes for efficient and sustainable energy supply (e.g., MOOI; DEI+; TSEI Industrie; TSE Gebouwde Omgeving, HER+), some of which end up flowing to the fossil fuel industry[66]. The companies do not report what they do with the subsidy.

Quantification: €821 million (2021[67]) With no subsidy as the counterfactual, the subsidy is the total funds allocated through these policies that actually support fossil fuels. Ministry of Finance (2022d) reported a provisional figure of €813 million in 2021 for SDE++ funds allocated to biomass (€369 million), biomass with co-firing (€356 million), green gas (€88 million), and CCS (€0)[68]. RVO reported that, of €255 million invested in energy research and innovation in 2020, €8 million (3%) went explicitly to fossil fuels[69]. The breakdown for the types of projects receiving funds is not available.

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
Spillover effects: Subsidizing projects contributing to CO2 reduction can increase innovation in new technologies to help the energy transition.	Inefficiency: New fossil fuel projects are inconsistent with IEA's World Energy Outlook (2021b). Inefficiency: The projects supported include ones that incentivize continued CO2 emissions. These technologies should be temporary rather than long-term solutions.

[65] For more information on these processes, see Milieu Centraal or Bioconomy. Biomass refers to materials of plant or animal origin that can be used as a raw material (e.g., building material, clothing, paper, food) or as an energy source (e.g., burning, gasification, fermentation) in place of traditional fossil fuels (Milieu Centraal). It is considered renewable, as the material can grow back; however, it still emits CO2 when burned. Biomass co-firing occurs when coal is supplemented up to 30% by biomass in coal-fired plants (Bioconomy). Green gas is made from biogas, which is produced from biomass and then purified and improved to form green gas (Milieu Centraal). CCS/CCU captures and stores CO2 from fossil fuel use before it is released into the air (Milieu Centraal). This technology does not actually reduce our society's reliance on fossil fuels but mitigates the climate effect. Additionally, it is only a partial solution, as it captures and stores a portion of CO2 emissions.

[66] Funds for scaling up of energy technology (e.g., EIA, SDE++), payments to universities, and public investments in energy research through fiscal instruments (e.g., WBSO) and government loans (e.g., MKB+) were excluded. There are some more generic RD&D measures, like WBSO, that fossil fuel companies may still be eligible for and take advantage of (IEA, 2020). Those are outside of this report's scope; see RVO (2020) for more detail on these policies.

[67] SDE++ funds are for 2021. RD&D energy research budget is not available for 2021, so 2020 is used.

[68] This represents projects starting in 2021. As of 2020, 6 CCS/CCU subsidy requests were submitted, but these either did not start in 2021 or were rejected (RVO Results SDE++ 2020, see Link). For more context, in the 2021 round, all CCS projects were rejected for the SDE++ subsidy. These were all linked to the delayed Aramis project, which is building new infrastructure to transport CO2 to the North Sea's empty gas fields for CO2 storage. The SDE++ allocation to CCS is expected to increase in the coming years. RVO Results SDE++ 2021: Link

[69] €56 million (22%) went to renewable energy sources, while other categories could be a mix of the two: generation techniques and storage (€31 million, 12%), hydrogen and fuel cells (€16 million, 6%), energy saving (€105 million, 41%), nuclear energy (€7 million, 3%) and other energy research (€32 million, 8%). See RVO (2020) for more detail.

3) Compensation for Phasing out Coal-Fired Power Plants[70] by 2030 (TBD)

Explanation In December 2019, a law was passed in the Netherlands prohibiting coal use in electricity production after 2030[71]. For coal plants with an electrical efficiency of less than 44%, this law enforced their closure before 2025. Three coal-fired plants in the Netherlands with an electrical efficiency of 44% or more started production in 2015 or 2016 (SOMO, 2021)[72]. The law includes a provision that the government may provide compensation for the closures if the plants are "disproportionally affected" by the law compared to other plants. This compensation is a transition subsidy, allowing the government to reach climate goals more quickly. While it keeps heavy polluters from bearing the total cost burden of their actions, the compensation is legally defensible as the government offered it (EZK, 2021a). Potentially, it could also be legally defended under the Energy Charter Treaty (ECT) if the forced closure of coal plants is shown to adversely affect the plants and jeopardize their investments (SOMO, 2021).

Quantification: NA Because this compensation will take place after 2021, the total count of related subsidies in Section 5.1 excludes this subsidy. The compensation amount is still under discussion, given recent developments and volatility in energy markets. To give an idea of the subsidy's potential scale, two approaches are presented for estimating the compensation that the government is willing to or may end up paying to coal plants for their forced closure. No compensation is the counterfactual.

First, the government offered to compensate one of the three plants for their voluntary closure, resulting in Riverstone's Onyx Power Plant applying for a subsidy of €212.5 million (EZK, 2021d). However, the plant ultimately declined the subsidy so it could stay open and take advantage of the profit potential of recent historically high energy prices (EZK, 2022a). It is unclear if any plant will receive this subsidy, but this can be seen as a lower bound estimate.

Second, the coal-fired plants have filed claims under the ECT against the Dutch government requesting compensation for damages from the forced closure by 2030. If state measures adversely affect their business and investments, the ECT allows the plants to sue governments before international tribunals to claim compensation in an investor-state dispute settlement (SOMO, 2021). Originally meant to protect energy companies' investments in more volatile countries, the ECT is now being used by fossil fuel companies to demand compensation for activities they must stop. The ECT allows a broad range of measures to be challenged as long as they negatively affect investments of a company in the energy sector (Bernasconi-Osterwalder and Brauch, 2019). The ECT is not specific about determining the value of compensation, though this should be based on getting back to the situation that would exist if the policy had not been enacted (SOMO, 2021). The validity of these claims under the ECT is still being

[70] Coal-fired power plants burn coal to generate electricity.
[71] Law prohibiting coal in electricity production, see Link
[72] The fourth and oldest coal-fired plant in the Netherlands, RWE's Amer plant, is meant to halt production by 2025 and will switch fully to biomass (SOMO, 2021). No compensation has been offered to the plant because it has a sufficient time horizon to transition.

debated: coal plants argue this policy causes a forced closure for which they do not have a profitable alternative; on the other hand, national and EU climate goals were clear, and the coal plants have a ten-year timeframe from 2020 to 2030 to prepare and transition (e.g., to recoup investments or produce electricity with biomass; Tweede Kamer der Staten-Generaal, 2021). RWE filed a claim for €1.4 billion, and Uniper filed a claim for up to €1 billion (World Bank, 2021a, 2021b; SOMO, 2021)[73]. The total, €2.4 billion, can be seen as a higher bound estimate.

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
Equity: Compensate for losses forced by government intervention in closing fields. The Dutch government was responsible for handing out the permits for these plants to be built. RWE thought this meant a "reliable investment climate" enforced by the Dutch state and also had the intention of transitioning the plant to biomass (SOMO, 2021). However, they do not anticipate this transition will be possible by 2030 without subsidy.	Economic viability: Research suggests that the coal plants were already unprofitable at the time of these claims, indicating that they should not receive compensation from the government (SOMO, 2021). Stranded assets: For plants built in 2015 and 2016, the risk of stranded assets was evident as climate goals were already set. Under closure law, a five- to ten-year transition period should provide operators with enough time to recover investments to an extent and prepare to transition (SOMO, 2021). If coal plants receive compensation, they shift transition and stranded assets risks and costs to taxpayers and the government.

Upcoming Changes The EU is discussing modifications to the ECT, which would require unanimous consent from all 55 member countries.

4) Compensation for Production Limit on Coal-Fired Power Plants *(2022)*

Explanation To reduce CO2 emissions in the short term, the Dutch government introduced a 35% limit for coal plants' maximum capacity from 2022 to 2024 (EZK, 2021c). The production limit decision in 2021 followed the Urgenda Climate Case, which confirmed the government's legal obligation to reduce emissions significantly and quickly due to its human rights obligations (Supreme Court of the Netherlands, 2019). As the decision to instate the production limit was taken shortly before it was enforced, the government offered compensation for the plants' resulting loss in revenue (EZK, 2021c). This compensation is a transition subsidy, as the policy's primary rationale is to reduce CO2 emissions.

The European energy crisis forced the government to lift the cap in June 2022 (EZK, 2022d). The current high energy prices have resulted in a significant profit increase for coal plants. The coal-fired plants are legally within their right to demand the already promised compensation from the government. Because

[73] Uniper is expected to withdraw its claim pending shareholder approval of a package of financial measures for Uniper provided by the German state (Uniper, 2022). The company faced financial trouble in 2022 due to shortages of Russian gas. Onyx may be submitting a claim under the ECT, but this has not yet been filed, see Link.

it begins in 2022, the total related subsidies estimate in Section 5.1 excludes this subsidy; however, it is explained to highlight the scale of compensation-tied public funds flowing to the fossil fuel industry.

Quantification*:* **NA** It has not been concluded how much compensation will be allocated for damages coal plants face due to the production limit. Compensation requests were submitted in March and are still under consideration by the Minister of Climate and Energy (EZK, 2022c). No estimate has been provided publicly by the government. For an idea of the scale of compensation, the media has reported an estimate of €1.5 billion (van Santen, 2022). Extremely high energy prices in 2022 have led this value to be higher than expected. No compensation is the counterfactual.

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
Equity: Compensate for losses forced by government intervention of restricting productivity of plants.	Equity: The plants received outsized profits during the first half of 2022 due to high energy prices. To receive compensation from the government as well seems unfair.

5.3 Inventory #2: Tax Expenditures, Other Revenue Foregone, Underpricing of Goods and Services

5.3.1 Energy Tax

1) Energy Investment Deduction

Explanation The energy investment deduction ("energie-investeringsaftrek") aims to stimulate investments into renewable energy by allowing deductions of investment costs up to 45.5% from energy taxes, but it also can be used for gas-based projects (e.g., gas-fired boilers, ovens, CHP plants; RVO, 2022a). The investment deduction is a transition subsidy, with the primary goal of incentivizing renewable energy investments to meet climate goals. Despite its intention, only a portion of the subsidy flows to truly renewable energy. A hidden subsidy for fossil fuels exists in the allocation to gas-based projects that will still contribute to CO2 emissions.

Quantification: NQ No publicly available data exists to disaggregate the subsidy amount and determine how much went to the gas-based projects (Milieudefensie, 2020). With no deduction as the counterfactual, the subsidy would be the deducted investment costs associated with gas projects in 2021.

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
Spillover effects: Subsidizing projects contributing to CO2 emissions reductions can increase innovation in new technologies to help the energy transition.	Inefficiency: New oil and gas projects are inconsistent with the IEA's World Energy Outlook (2021b). Inefficiency: The projects supported include ones that incentivize continued CO2 emissions. These technologies should be temporary rather than long-term solutions.

5.3.2 Corporate Income Tax

For private or public limited companies, corporate income tax must be paid on taxable profit in a financial year, reduced by any deductible losses (RVO, 2022c).

1) Loss Relief

Explanation As of 2022, losses can be used to offset taxable profit up to €1 million, plus 50% of the taxable profit above €1 million[74]. Losses can be carried forward indefinitely or carried back one year. By reducing the profit over which corporations pay corporate income tax, this policy provides a subsidy in the form of government revenue foregone. This tax benefit is a general subsidy available to companies paying corporate income tax. However, many fossil fuel companies have historically used this measure. Drilling for oil and gas fields implies frequent significant profits and losses. This regulation is thereby more applicable to the fossil fuel sector.

Quantification: NQ In theory, this subsidy would be the total avoided taxes by fossil fuel companies using this policy, assuming no offset as the counterfactual. Data is mostly unavailable, and quantifying this is highly complex. The subsidy's scale will be much smaller in 2022 than in previous years. Before 2022, the amount that could be carried back or forward was unrestricted, so many fossil fuel companies notoriously used this rule to avoid paying corporate income tax in the Netherlands (PwC, 2020a).

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
International competitiveness: The original rationale of loss relief was to encourage establishing businesses in the Netherlands (Eerste Kamer der Staten-General, 1994).	Public resources: By limiting taxable profit, the policy has led to significantly less public tax revenues, especially from oil and gas companies. For example, Shell paid no profit tax in 2019 (Shell, 2020). This inefficiency is reduced due to the new quantitative restrictions on the rule.

2) Liquidation and Cessation Loss Scheme

Explanation As of 2021, this policy allows a Dutch entity to deduct up to €5 million of losses associated with a dissolved subsidiary from taxable profit. Above €5 million, these losses are only deductible when liquidated assets are situated in the EU/European Economic Area, if the applicable party has 50%+ control of the liquidated subsidiary, and if the liquidation took place within three years of the decision to liquidate (PwC, 2020b)[75]. By reducing the profit over which corporations pay tax, this policy provides a subsidy in the form of government revenue foregone. This tax benefit is a general subsidy available to companies paying corporate income tax. However, with many large losses and profits, fossil fuel companies have historically used this measure.

[74] Corporate income tax law, Chapter IV, Article 20: Set-off of losses. Link

[75] Corporate income tax law, Article 13d, see Link. For the law on the limitation to the liquidation and cessation loss scheme, see Link.

Quantification: NQ In theory, this subsidy would be the total avoided taxes by fossil fuel companies using this policy, assuming no offset as the counterfactual. The data is mostly unavailable, and quantifying this is highly complex. The subsidy is expected to be significantly smaller in 2021. Previously, the regulation had an unlimited time horizon and geographic scope, encouraging more risk-taking and financing of projects by fossil fuel companies knowing they could offset their losses. Moreover, they frequently have subsidiaries in other countries.

Assessment

Economic Rationale For Related Subsidy	Economic Rationale Against Related Subsidy
Liquidity: This policy improves the liquidity of companies that face losses from dissolved subsidiaries.	Public resources: By limiting taxable profit, the policy has led to less public tax revenues, though the recent restrictions on the rule reduce this inefficiency.

5.4 Inventory #3: Induced Transfers

Subsidies under this category were not identified in the Netherlands.

5.5 Inventory #4: Transfers of Risk to the Government

Subsidies under this category were not identified in the Netherlands.

6 Implications of the Inventory

6.1 Assessment of the Estimates

6.1.1 FFS Inventory

This report's comprehensive assessment of FFSs results in a significantly larger estimate for FFSs in the Netherlands than previous evaluations: €17.1 billion. €17.1 billion represents the budgetary size of 14 of the 19 FFSs that could be quantified based on available data, thus representing a lower bound of the actual size of FFSs. It should be noted that this estimate is a result of the counterfactuals chosen as benchmarks in this analysis. These choices involve subjective judgments, and the selection of alternative benchmarks will lead to substantially different estimates. The largest subsidy in the inventory, the degressive energy tax structure, is entirely dependent on the chosen benchmark of the first and highest tax bracket rate. For this reason, I also show the FFSs estimate excluding this subsidy: €10.8 billion.

The newly quantified FFS from the degressive energy tax structure is one component of this report's larger estimate. Ministry of Finance (2022d) and Milieudefensie (2020) also identified this FFS but did not quantify it. The same is true for the FFS from the use of diesel and gasoline combined with different tax rates between diesel and gasoline in car taxes. These newly quantified FFSs amount to €7.6 billion. Moreover, three newly identified FFSs were quantified in this report (e.g., free EU ETS emissions rights for certain sectors; biodiesel taxed equally as regular diesel; VAT exemption for international airline

tickets), representing a total of €4.2 billion. Aggregating the newly quantified FFSs, five additional FFSs were quantified in this report that sum up to €11.8 billion. This mostly explains the increase in this report's estimate compared to previous assessments made for the Netherlands[76].

Compared to estimates using the price-gap approach, this report's larger estimate comes from considering more types of subsidies. The stark difference between the price-gap estimates of the IEA (without externalities) and IMF (with externalities) shows how much larger the estimate may be if externalities were included. Meanwhile, behavioral effects would lead to less budgetary revenue actually collected if FFSs were removed, as higher fossil fuel prices incentivize market players to change their behavior.

6.1.2 Related Subsidies Inventory

The related subsidies in Section 5 represent €2.3 billion in public funds that more indirectly support fossil fuels. This value constitutes the budgetary size of two of seven related subsidies identified in this report. Excluding one of the energy innovation subsidies, these policies are all new compared to the inventory reported by the Dutch government.

6.2 Assessment of Action Taken

Many steps have been proposed or are being taken that will reduce the scale of or remove FFSs in the inventory. Table 6 summarizes the upcoming and planned changes for the FFS inventory identified in Section 4. This overview makes it clear that more reform to reduce FFS is happening than ever before to reach Dutch and EU climate goals. EU-level reform primarily comes from Fit for 55, which is still in the proposal stage (PBL, 2021b; CPB, 2022; European Council, 2022). Dutch-level reform primarily comes from the Coalition Agreement 2021-2025 (Rijksoverheid, 2021; 2022). No significant upcoming changes to the related subsidies were found, so these policies are not included.

The "no brainer" actions to remove FFSs have already been identified with the many EU and national policy proposals. Therefore, the low hanging fruit has mostly been addressed, and the removal of remaining FFSs becomes more of a "brain teaser."

[76] The other difference comes from the budgetary expenditure on SDE++ (€813 million). This is included in the FFS estimate of the Dutch government but not in the estimate in this report (it is in the related subsidies inventory instead).

Table 6: Summary of Planned Changes across FFS Inventory in the Netherlands (2021)

Policy-by-policy overview of upcoming changes to FFS identified in Section 4.

Measure	Upcoming Changes
Inventory #1: Direct Transfer of Government Funds	
Free EU ETS Emissions Rights for Certain Sectors	→Fit for 55: CBAM proposed (EC, 2021c) →Carbon levy in NL in 2021 (IEA, 2020)
Indirect EU ETS cost compensation	→Second phase has more energy efficiency requirements (EC, 2022f)
Inventory #2: Tax Expenditures, Other Revenue Foregone, Underpricing of Goods &Services *2a: Energy Tax (including ODE) and Coal Tax*	
Degressive energy tax structure	→Coalition Agreement: less degressive in 2023 (Rijksoverheid, 2022) →Fit for 55: ETS-BRT expected for 2027, with emissions rights phased out by 2040 to 2044; revisions to ETD would make tax structure less degressive (CPB, 2022; European Council, 2022)
Exemption for use of natural gas for electricity generation in CHP plants	→Coalition Agreement: limited as of 2025 to natural gas used to produce electricity that is delivered to the grid (Rijksoverheid, 2021)
Reduced natural gas tax rate for greenhouse horticulture industry	→Coalition Agreement: remove reduced rate by 2025 (Rijksoverheid, 2021) →CO2 sector system expected to change to CO2 individual system in 2023 (LNV, 2022)
Refunds for energy-intensive processes	→Coalition Agreement: energy tax exemptions for mineralogical and metallurgical processes will be removed in 2025 (Rijksoverheid, 2022)
Coal tax exemption of use of coal in electricity generation	→Base of scheme will decrease until 2030 (Dutch law prohibiting coal use in electricity production after 2030)
Refund for religious and nonprofit institutions	→Fit for 55: EU ETS-BRT expected in 2027 and to phase out emissions rights by 2040 to 2044 (CPB, 2022; European Council, 2022)
Coal tax exemption for dual use	
2b: Excise Tax	
Exemption for use of kerosene in international air travel	→Fit for 55: EU ETD revision has minimum kerosene tax for intra-EU flights in 2023, 10% yearly increases for 10 years; ReFuel EU (PBL, 2021b); reduce emissions for intra-EU flights under ETS-SAM, with free allowances phased out by 2027 (CPB, 2022) →CORSIA applies to other international flights (IATA, 2022) →Dutch goal of 14% sustainable aviation fuels blended by 2030 and 100% by 2050 (IenW, 2020)
Exemption for use of diesel and fuel for commercial navigation in inland and community waters	→Fit for 55: from 2023, shipping emissions under EU ETS, with 3 year phase in period (CPB, 2022); GHG intensity of energy use 75% less by 2050 (PBL, 2021b)
Different tax rates between diesel and gasoline combined with different tax rates between gasoline and diesel cars in car taxes	→Fit for 55: EU ETD revision includes taxing most environmental harmful fuels highest (EC, 2022d)
Biodiesel taxed equally as diesel	→Fit for 55: EU ETD revision includes taxing most environmental harmful fuels highest (EC, 2022d)
Refinery exemption	
2c: Other Taxes	
VAT: exemption for international airline tickets	→Flight tax in NL since 2021, expected to increase (Ministerie van Financiën, 2022d)
SPS levy: Investment deduction for exploration and production of natural gas in North Sea	
Inventory #4: Transfer of Risk to the Government	
Insured FF projects by Atradius DSB	→Commitment to end new direct government support for international FF sector before end of 2022 (Ministerie van Financiën, 2021c)
Permanent ownership stake in FMO	→FMO committed to stop direct investments in FF (FMO, 2021)
Permanent ownership stakes in certain companies	→New renewable energy projects (Ministerie van Financiën, 2021b)

6.2.1 European Level

The Fit for 55 Package aims to reduce GHG emissions in 2030 by 55% compared to 1990 levels, with a goal of climate neutrality by 2050. EU member states agreed on negotiation positions in June 2022 (European Council, 2022). The European Council is now negotiating with the European Parliament to conclude the package. It is unclear how long this will take. A significant amount of the anticipated changes to the FFSs rely on Fit for 55 proposals (e.g., revision of EU ETD, ETS-BRT, CBAM, shipping under EU ETS). In particular, the expansion of the EU ETS (with ETS-SAM and EST-BRT) to cover ¾ of CO2 emissions in the EU will play a crucial role in providing an incentive to reduce CO2 emissions on the EU level in a cost-effective way (CPB, 2022). Revisions to the EU ETD require unanimous approval from EU member states and may prove challenging to achieve (PBL, 2021b). It has not changed since 2003 for this reason (CPB, 2022).

Whether the changes in Table 6 are enough to reach the EU's climate goals of 55% less GHG emissions by 2030 is unclear. While Fit for 55 includes promising reforms, the negotiations are ongoing, which introduces uncertainty around its passing and about how ambitious the final package will ultimately be. Additionally, multiple years are required to phase in many of the measures. Delays in the introduction of certain policies are already emerging (e.g., ETS-BRT by one year; European Council, 2022).

6.2.2 Dutch Level

Measures at the Dutch level are more immediate, with changes already happening (e.g., carbon levy and flight tax in the Netherlands) or happening in the coming years (e.g., elimination of energy tax exemptions or reductions). Ahead of the EU, the Netherlands decided to limit FFSs in energy taxes (e.g., the exemption for mineralogical and metallurgical processes removed in 2025; restriction on exemption for CHP plants in 2025; making energy tax structure less degressive in 2023). Additionally, the Netherlands is concentrated on sectors like greenhouse horticulture that were not a focus at the EU level in Fit for 55 (PBL, 2021b). This sector's energy transition will rely on domestic policy to reach the sector's goal of climate neutrality in 2040. The Dutch government and the sector are taking positive steps, though these are still uncertain and under discussion.

The question can be asked for each FFS in the inventory whether the Netherlands can or should do more to speed up the pace of reform. It becomes a "brain teaser" again as to what else the Netherlands can do in the short term to move fast enough to reach its climate goals. More analysis per regulation is required to say with certainty where the Netherlands should take additional action, as reform depends on the international political context and economy. One area of opportunity could be to phase in more planned EU ETD revisions in the Netherlands prior to an EU-wide agreement (e.g., a minimum kerosene tax; higher flight tax; taxing environmentally harmful fuels higher), as the Netherlands has already been taking early action in this area. Policies for which no identified upcoming changes in Table 6 could be

an opportunity; however, these are smaller in size or not quantified, making it hard to assess whether it is worth it for the Netherlands to focus scarce resources and time on this.

6.2.3 Focus Going Forward

To phase out FFSs and reach climate goals, Dutch policymakers should prioritize international coordination to ensure the actualization and implementation of policies in Table 6. International competitiveness and carbon leakage are most frequently used as economic arguments to support FFSs, illustrating how crucial EU and global climate policy are to FFSR. It is difficult economically and politically for countries to implement changes to many of these policies individually, as it means disadvantaging themselves against other countries if this is not done in unison. Therefore, EU-level legislation can be most efficient for FFSR, even though the process may be slower, demand more nuance, and require more coordination than implementing national policies. For example, CBAM's introduction at the European level is crucial for mitigating carbon leakage and diminishing the strength of carbon leakage as an economic argument for FFSs. Moreover, the EU ETS's expansion is crucial for providing an EU-wide incentive to reduce CO2 emissions.

If proposals of Fit for 55 are passed and phased in with sufficient time before 2030, the FFSs estimate should decrease by 2030. From a longer-term perspective, the proposals should lead to significant reductions by 2050 and progress toward the EU's goal of climate neutrality. The long-term goals are crucial to set expectations and guide behavioral changes in companies and households to reduce fossil fuel use. However, not much more can be said about this goal's achievement, as it depends on the pace of European policy decisions and the policies' implementation and effectiveness.

Assessing progress towards international goals concerning FFSs is also tricky, as these goals are relatively vague (see Section 1.1). The "inefficient" FFSs that the G20 and UNFCCC have called out are not clearly defined (G20, 2009; UNFCCC, 2021). While UNEP et al. (2019) provide a methodology to measure FFSs in the context of SDG 12.c, there is no clarity on the difference between "efficient" and "inefficient" FFSs or how to meet this goal. The same vagueness has been called out in the Paris Agreement's goal of aligning financial flows with low GHG emissions and climate-resilient development (UNFCCC, 2015). FFSR becomes much more challenging without explicitly defined goals and timelines. This uncertainty also complicates measuring progress and assessing whether the policy changes in Table 6 are enough to meet climate goals set for 2030 and 2050.

7 Conclusion

This report's inventory provides policymakers with a detailed account of policies supporting fossil fuels. New FFSs are identified and quantified, providing new focus areas for the FFS debate and broadening the scope of previous FFSs estimates made for the Netherlands. Compared to the Dutch government's most recent inventory, three FFSs are newly identified, three FFSs are newly identified and quantified, and two FFSs are newly quantified. Further, for the first time, a comprehensive economic analysis at the policy level is conducted as part of an FFS inventory. This assessment makes clear the trade-off between economic effects inherent to FFSR. Lastly, upcoming policy changes and proposals relevant to each FFSs are summarized so policymakers can gauge progress toward climate goals and reducing FFSs. Appendix A.3 suggests further research opportunities.

Though the identification and quantification are complex, an inventory analysis helps illustrate each policy's scale, economic effects, and upcoming changes to gain a deeper understanding of FFSs. This type of evaluation can deliver valuable and nuanced takeaways for policymakers. First, new policies are identified that have not yet received attention in the FFSs debate. The broad definition applied in this report can encourage the expansion of perspective around what constitutes a FFS. As seen through this report's analysis and two inventories, the interpretation, identification, and quantification of FFSs become more of a "brain teaser" than a "no brainer."

Second, removing FFSs is not straightforward and often carries negative economic repercussions. A policymaker's approach to FFSR must be nuanced and surgical to avoid unintended consequences. A comprehensive economic analysis should inform this process. Third, policymakers have already taken clear steps to reduce the scope of many FFSs in the long term. The low hanging fruit (or "no brainer" part) of removing FFSs seems to have been addressed, while the removal of remaining FFSs is more of a "brain teaser." Upcoming policy changes will reduce the size of certain FFSs, and new policies are being phased in to counteract FFSs with carbon pricing instruments (e.g., EU ETS; CBAM). If the proposed policy changes are successful, the Netherlands will significantly lower its FFSs in the coming decades. This decrease relies heavily on implementing the planned EU-level policies summarized in Table 6. The international coordination required should be a key focus for policymakers.

The accelerating effects of climate change in recent years intensify the urgency of transitioning to a low carbon society. FFSs provide the opposite incentive for the market, as they encourage the production and consumption of fossil fuels over alternatives. Alongside carbon pricing instruments, reforming FFSs is an important step to ensure that fossil fuel prices more accurately reflect their true social cost. My hope is that this report can guide policymakers with FFSR by providing an accurate inventory, comprehensive economic assessment, and an overview of policy action in the Netherlands.

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9 Appendix

Table A.1 Abbreviations and Relevant Translations

Abbreviation	Explanation
ASCM	Agreement on Subsidies and Countervailing Measures
AZ	Ministerie van Algemene Zaken (Ministry of General Affairs)
CAN Europe	Climate Action Network Europe
CBS	Central Bureau for Statistics (Centraal Bureau voor de Statistiek)
CHP	Combined heat and power
CIEP	Clingendael International Energy Programme
CO2	Carbon dioxide
COP26	UN Climate Change Conference in Glasgow
CPB	Centraal Planbureau (CPB Netherlands Bureau for Economic Policy Analysis)
CPLC	Carbon Pricing Leadership Coalition (CPLC)
DEI	Demonstratie energie- en klimaatinnovatie (demonstration energy and climate innovation)
E3F	Export Finance for Future
EBN	Energie Beheer Nederland
EC	European Commission
EIA	Energie-investeringsaftrek (energy investment deduction)
EU	European Union
EU ETD	European Union Energy Tax Directive
EU ETS	European Union Emissions Trading System
EZK	Ministerie van Economische Zaken en Klimaat (Ministry of Economic Affairs and Climate)
FFS	Fossil fuel subsidy
FFSs	Fossil fuel subsidies
FFSR	Fossil fuel subsidy reform
Fit for 55	EU's Fit for 55 Package
G20	Group of Twenty
GHG	Greenhouse gas
HER+	Hernieuwbare energietransitie (renewable energy transition)
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IEA	International Energy Agency
IenW	Ministerie van Infrastructuur en Waterstaat (Ministry of Infrastructure and Water Management)
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IMO	International Maritime Organization
ISDE	Investeringssubsidie duurzame energie en energiebesparing (investment subsidy for sustainable energy and energy savings)
KLM	Koninklijke Luchtvaart Maatschappij NV (KLM Royal Dutch Airlines)
LSE	London School of Economics
Ministry of Finance	Ministerie van Financiën
MJ/L	Megajoules per liter
MOOI	Missiegedreven onderzoek, ontwikkeling en innovatie (mission-driven research, development, and innovation)
NA	Not available
NAM	Nederlandse Aardolie Maatschappij
NL-EITI	Extractive Industries Transparency Initiative Nederland
NA	Not applicable
n.d.	Not dated
NQ	Not quantified
ODE	Opslag Duurzame Energie
ODI	Overseas Development Institute

OECD	Organization for Economic Cooperation and Development
PBL	Planbureau voor de Leefomgeving (PBL Netherlands Environmental Assessment Agency)
PwC	PricewaterhouseCoopers
Rijksoverheid	Government of the Netherlands
RVO	Rijksdienst voor Ondernemend Nederland (National Enterprise Agency)
SDE++	Stimulering duurzame energieproductie en klimaattransitie (stimulus for sustainable energy production and climate transition)
SDG	Sustainable Development Goal
SOE	State owned enterprise
SOMO	Centre for Research on Multinational Corporations
SPS	State profit share
TE	Transport and Environment
T&CA	Tax & Customs Administration (Belastingdienst)
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WBSO	Wet bevordering speur- en ontwikkelingswerk (tax credit for research and development)
WTO	World Trade Organization

Table A.2 Energy Tax Structure – Netherlands (Belastingdienst, 2021b)

Natural Gas (2021)	Bracket 1 0 to 170 m3	Bracket 2 170,001 to 1 million m3	Bracket 3 1 million m3 to 10 million m3	Bracket 4 More than 10 million m3
Normal rate	€ 0.34856	€ 0.06547	€ 0.02386	€ 0.01281
ODE	€ 0.0851	€ 0.0235	€ 0.0232	€ 0.0232
Normal rate + ODE	€ 0.43366	€ 0.08897	€ 0.04706	€ 0.0361

Electricity (2021)	Bracket 1 0 to 10,000 kWh	Bracket 2 10,001 to 50,000 kWh	Bracket 3 50,001 to 10 million kWh	Bracket 4 More than 10 million kWh (individual)	Bracket 5 More than 10 million kWh (business)
Normal rate	€ 0.09428	€ 0.05164	€ 0.01375	€ 0.00113	€ 0.00056
ODE	€ 0.03	€ 0.0411	€ 0.0225	€ 0.0004	€ 0.0004
Normal rate + ODE	€ 0.12428	€ 0.09274	€ 0.03625	€ 0.00153	€ 0.00096

Coal (2021)	per 1000 kg
Normal rate	€ 15.29

A.3 Further Research Opportunities

The analysis in this report only considers the static budgetary effect of subsidies. When accounting for behavioral effects, the estimates could be remarkably different, as market participants change their behavior to avoid paying more for fossil fuels. For example, companies may pass on the effects of higher energy prices to consumers in the form of higher prices. Environmental externalities are also pertinent and incorporating them in an inventory approach would lead to significantly larger estimates. This report's analysis is based on fossil fuel market prices, which are lower than the societally efficient price (e.g., with environmental costs, local air pollution, broader externalities from fuel use; Parry et al., 2021). Further research should focus on implementing both behavioral effects and the monetary value of externalities into estimates for FFSs.

Additional policies warrant further research to determine whether they could be considered FFSs in the Netherlands. For example, import tariffs and nontariff barriers are usually much lower on dirty industries than on clean industries (as defined by CO2 emissions per dollar of output) in most countries (Shapiro, 2020). Differences in trade policy across these industries could be considered a global implicit subsidy to CO2 emissions in internationally traded goods. Additionally, numerous motor vehicle tax refunds, exemptions, and reductions for different types of cars are leading to government revenue foregone (SEO, 2022). These were not fully explored in this report and could potentially be FFSs. More work can be done to quantify the subsidies identified but not quantified in this report, especially under inventory #4: transfer of risk to the government.