



Final report

Study on energy subsidies and other government interventions in the European Union – 2023 edition

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Final report

Study on energy subsidies and other government interventions in the European Union – 2023 edition

EUROPEAN COMMISSION

Directorate-General for Energy

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GLOSSARY OF KEY TERMS

<i>Subsidy inventory</i>	Database which contains subsidy amounts for all countries
<i>Commission study 2023</i>	This year's study, named "Study on energy subsidies and other government interventions in the EU – edition 2023"
<i>Commission study 2022</i>	The previous edition of the study named "Study on energy subsidies and other government interventions in the EU – edition 2022" (COM/2022/642 final)
<i>Commission studies</i>	Previous editions of the study (2019, 2020, 2021 and 2022)
<i>MS Factsheet</i>	Synthesis summary document written about each Member State
<i>MS Representatives</i>	People from Member States that have been contacted in the consultation round
<i>All energies</i>	Used to classify energy efficiency measures or to designate energy produced from a mix of both fossil fuel and low carbon sources or an unknown source
<i>Cross-sector</i>	Used to classify any subsidy which cannot be primarily categorized under a single economic sector

ABBREVIATIONS

CAGR	Compound Annual Growth Rate
DG ENER	Directorate-General for Energy
EC	European Commission
EHS	Environmentally harmful subsidies
EHFFS	Environmentally harmful fossil fuel subsidies
EU	The European Union
EU27	The 27 members of the European Union
EUA	European Union Allowance
FF	Fossil Fuels
FFS	Fossil Fuel Subsidies
FiT	Feed-in tariffs
FIP	Feed-in premiums
HFO	Heavy Fuel Oil
LPG	Liquefied Petroleum Gas
MS / Member States	Member State / Member States within EU27
NECPs	National Energy and Climate Plans
NECPR	National Energy and Climate Progress Report
PP	Petroleum Products
RD&D	Research, Development and Demonstration
RES	Renewable Energy Sources
RES-E	Electricity generated from renewable sources

Executive summary

Energy subsidy trends in the EU27

On the energy subsidies trends since 2015:

- The overall amount of energy subsidies in EU27 has grown from EUR 177 billion in 2015 to EUR 216 billion in 2021 (3.4% CAGR). This amount is expected to reach nearly **EUR 390 billion** in 2022, of which EUR 195 billion is related to the energy price crisis and the subsequent measures taken by Member States to protect households and commercial and industrial consumers.
- Total **fossil fuel subsidies** (FFS) fell to **EUR 56 billion in 2021**, down from ~60 billion between 2015 and 2019, before increasing rapidly to an estimated **EUR 123 billion in 2022**. For 2023, initial estimates suggest that subsidies remained at a similar level, around EUR 110 billion, as support measures linked to the price crisis continued into 2023.
- Renewable energy subsidies fell in 2021 to EUR 86 billion - the first time since 2015 - and rose only slightly to EUR 87 billion in 2022. This was due to high prices on the wholesale electricity market that reduced the subsidy amounts paid under dynamic support instruments. On the other hand, support to energy-efficiency measures increased from EUR 22 billion in 2021 to EUR 32 billion by 2022. Support to all other forms of energy, including electricity as a carrier and nuclear amounted to EUR 180 billion in 2022.
- Member States created more than **230 temporary subsidies** as a response to the energy price crisis. The main beneficiaries of these measures were households (EUR 58 billion), followed by business and industrial consumers (EUR 45 billion) and road transport (EUR 23 billion). Cross-sectoral (untargeted) support was EUR 69 billion.
- Almost all temporary measures were designed to help **support energy demand** and energy affordability in the context of extraordinarily high energy prices. In 2022, amounts spent on demand support tripled compared to 2021, reaching nearly **EUR 250 billion**.

Update and analysis of national phase out plans on fossil fuel subsidies

- Only **47% (EUR 58 billion) of total fossil fuel subsidies in 2022** had a planned **end-date before 2025**. Only about 1% (EUR 1.7 billion) of fossil fuel subsidies have an end-date on the medium term (2025-2030). For the remaining 52% (EUR 64 billion), there is either no end-date yet or the end-date has been set after the year 2030.
- So far only France, Germany, Latvia, Lithuania, Luxembourg and Italy have expressed an intention or made **plans for an economy-wide phase out of FFS**.

Résumé

Évolution des subventions à l'énergie dans les pays de l'UE27

Les tendances des subventions à l'énergie depuis 2015 :

- Le montant global des subventions à l'énergie dans l'UE27 est passé de 177 milliards d'euros en 2015 à 216 milliards d'euros en 2021 (TCAC de 3,4%). Ce montant devrait atteindre près de 390 milliards d'euros en 2022, dont 195 milliards d'euros sont liés à la crise des prix de l'énergie et aux mesures prises ensuite par les États membres pour protéger les ménages et les consommateurs commerciaux et industriels.
- Le montant total des subventions aux combustibles fossiles (FFS) est tombé à 56 milliards d'euros en 2021, contre environ 60 milliards entre 2015 et 2019, avant d'augmenter rapidement pour atteindre un montant estimé à 123 milliards d'euros en 2022. Pour 2023, les premières estimations suggèrent que les subventions sont restées à un niveau similaire, autour de 110 milliards d'euros, car les mesures de soutien liées à la crise des prix se sont poursuivies en 2023.
- Les subventions aux énergies renouvelables ont diminué en 2021 pour atteindre 86 milliards d'euros - pour la première fois depuis 2015 - et n'ont que légèrement augmenté pour atteindre 87 milliards d'euros en 2022. Cela s'explique par les prix élevés sur le marché de gros de l'électricité qui ont réduit les montants des subventions versées au titre des instruments de soutien dynamique. En revanche, le soutien aux mesures d'efficacité énergétique est passé de 22 milliards d'euros en 2021 à 32 milliards d'euros en 2022. Le soutien à toutes les autres formes d'énergie, y compris l'électricité en tant que vecteur et le nucléaire, s'est élevé à 180 milliards d'euros en 2022.
- Les États membres ont créé plus de 240 subventions temporaires en réponse à la crise des prix de l'énergie. Les principaux bénéficiaires de ces mesures ont été les ménages (58 milliards d'euros), suivis par les consommateurs commerciaux et industriels (45 milliards d'euros) et le transport routier (23 milliards d'euros). Le soutien intersectoriel (non ciblé) s'est élevé à 69 milliards d'euros.
- Presque toutes les mesures temporaires ont été conçues pour aider à soutenir la demande d'énergie et l'accessibilité de l'énergie dans le contexte de prix de l'énergie extraordinairement élevés. En 2022, les montants consacrés au soutien de la demande ont triplé par rapport à 2021, atteignant près de 250 milliards d'euros.

Analyse des plans nationaux de sortie des subventions aux énergies fossiles

- Seuls 47 % (58 milliards d'euros) du total des subventions aux combustibles fossiles confirmées en 2022 avaient une date de fin prévue avant 2025. Environ 1 % seulement (1,7 milliard d'euros) des subventions aux combustibles fossiles ont une date d'expiration à moyen terme (2025-2030). Pour les 52 % restants (64 milliards d'euros), il n'y a pas encore de date de fin ou la date de fin a été fixée après l'année 2030.
- Jusqu'à présent, seuls la France, l'Allemagne, la Lettonie, la Lituanie, le Luxembourg et l'Italie ont fait part de leur intention de supprimer progressivement les subventions aux énergies fossiles de leur économie.

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1. Introduction

This report documents the work completed for the Directorate General for Energy (DG ENER) of the European Commission (EC) on the **Study on energy subsidies and other government interventions in the EU – 2023 edition** (Framework Contract MOVE/ENER/SRD/2020/ OP/0008 Lot-2). The work was carried out by a two-member consortium: **Enerdata**, the project lead, and **Trinomics**. It is the latest in a series of DG ENER studies going back to 2014 documenting energy subsidies and related instruments.

The work was structured around six tasks:

- Tasks 1-3: Energy subsidy trends in the EU27
 - Collect, control, harmonise and analyse energy subsidies data trends in the EU27 from 2015 to 2021, 2022 where possible
- Task 4: Preparing an update and analysis of national phase out plans on subsidies; in addition, distinguishing clearly each FFS according to its environmental impact
 - Analyse national fossil fuel subsidy phase out plans
 - Report on the policies either implemented or announced by Member States
 - Distinguish each FFS according to its environmental impact: environmentally harmful or friendly (those that contribute to the reduction of fossil fuel use)
- Task 5: Assesses the accuracy and completeness of the EU27 NECPR progress reports
 - Review the Member State's NECPR
 - Include new information collected through the NECPRs
- Task 6: Preparation of the study, building on all of these

This report starts with a brief background on energy subsidies in the EU, then discusses the approaches, findings, and conclusions for the trends of energy subsidies and for the national plans on energy subsidies separately. Annexes include:

- Theoretical framework
- Country data controls and observations (separate document, in pdf format)
- Member State Fact-sheets (separate document, in pdf format)
- The subsidies database (separate document, in Excel format)

Background

Energy subsidies and government interventions refer to specific initiatives to keep prices for consumers below market levels (e.g. reduced tax rates on road transport fuels) or for producers above market levels (e.g. feed-in tariffs), or to reduce costs for consumers or producers by granting specific benefits. Energy subsidies can consist of direct cash transfers to producers or consumers, indirect support mechanisms (e.g. tax exemptions and tax credits), or also market-based mechanisms providing cross-subsidies between economics actors (e.g. white certificate markets for energy efficiency, electricity capacity mechanisms, etc.).

The most established and detailed categorization of government interventions related to the energy sector has been developed by the European Commission (EC) through the *Study on energy costs*,

*taxes, government interventions and their impact on energy investments*¹ using the concept developed by the World Trade Organization through the *Agreement on Subsidies and Countervailing Measures* (ASCM)². This agreement helped to define the classification of subsidies and government interventions in four main categories:

- **Direct transfers** are direct expenditures by governments to recipients, which could be either consumers or producers. Direct transfers include grants, low-interest or preferential loans.
- **Tax expenditures** are the amount of tax benefits, or preferences, received by taxpayers and forgone by governments. Tax expenditures are relative preferences within a country's tax system that are measured with reference to a benchmark tax treatment set by that country. The amounts of tax expenditures are estimated by governments with reference to a benchmark tax level. Five main different forms have been identified, namely: tax reductions, tax exemptions, tax refunds, tax credits and tax allowances. These instruments may apply to various types of energy-related taxes, such as excise duties, specific electricity taxes, fees financing certain types of technologies (i.e. renewables or cogeneration), carbon taxes, VAT, etc.
- **Income or price supports** encompass various types of economic mechanisms, most of them can be considered as cross-subsidies, i.e. consisting of transferring amounts of money from groups of people / technology / territory to another specific group. Most often, such measures are financed through final consumers' tariffs/prices. Twelve types of interventions have been identified: capacity payments, biofuels blending mandates, renewable energy quotas with tradable certificates, differentiated grid connection charges, energy efficiency obligations, interruptible load schemes, contract for difference, feed-in premiums, feed-in tariffs, consumer price guarantees (cost support and price regulation) and producer price guarantees (price regulation)³.
- **Research, Development and Demonstration (RD&D) budgets** cover various types of provisions of financial aid and/or other preferential mechanisms to support innovation.

The use of subsidies is often justified by governments as a means of addressing market failures or to address social issues and inequalities, but sometimes the rationale driving the subsidy is outdated. Previous editions of the study highlight how the existence of some subsidies can be explained by the social and economic context of the 20th century, and by inertia of Member State economic policy. For

¹ Study on energy costs, taxes and the impact of government interventions on investments. (EU) 2020; Energy EC Publications Database Available at : https://ec.europa.eu/energy/studies_main/final_studies/study-energy-costs-taxes-and-impact-government-interventions-investments_en

Agreement on Subsidies and Countervailing Measures (WTO); WTO online database, n.d. Available at:
https://www.wto.org/english/tratop_e/scm_e/scm_e.htm

³ Definitions used for the last 3 mechanisms are:

- Consumer price guarantees (cost support): Price guarantees (by a public entity-government, regulator...) to a specific group of final customers (e.g. low income households, specific geographic area) for the consumption of energy products (fuels, electricity, heat...) at a certain level, which does not fully cover the total cost of the energy provided.
- Consumer price guarantees (price regulation): Price guarantees (by a public entity-government, regulator...) to all final customers for the consumption of energy products (fuels, electricity, heat...) at a certain level, which does not fully cover the total cost of the energy provided.
- Producer price guarantees (price regulation): Price guarantees (by a public entity-government, regulator...) to a producer of primary energy (fossil fuels, nuclear) or energy products (fuels, electricity, heat...) at a level above the market price.

example, the *Commission study of 2022*⁴ found that of the 590 individual fossil fuel subsidy measures adopted before 2021, around 513 (87%) still exist in spite of the political commitment by the European Union to phase out fossil fuel subsidies.

International initiatives to rationalise and phase-out FFS were announced as early as 2009⁵ and have since increased in number and importance. In June 2022, G7 leaders “...stressed that fossil fuel subsidies are inconsistent with the goals of the Paris Agreement and [reaffirmed their] commitment to the elimination of inefficient fossil fuel subsidies by 2025”. In November 2022, the Sharm-el-Sheikh Implementation Plan was adopted; which calls for “...adoption of policies [...] including accelerating efforts towards the phasedown of unabated coal power and phase out of inefficient fossil fuel subsidies, while providing targeted support to the poorest and most vulnerable in line with national circumstances and recognizing the need for support towards a just transition”.

The European Union (EU) has taken leadership on this issue by pursuing a set of actions and legislative tools to effectively phase-out FFS. The Regulation on the Governance of the Energy Union and Climate Action of December 2018⁶ enacts the EU's commitment to improve reporting and transparency by requiring Member States to report annually on their progress in phasing out energy subsidies, in particular FFS. Additionally, the EU Climate Law of June 2021, which amended the Governance Regulation, requires phasing out all energy subsidies that are incompatible with the objective of climate neutrality in 2050. The text also requires the European Commission to “adopt implementing acts to set out the structure, format, technical details and process (...) [including a] methodology for the reporting on the phasing out of energy subsidies, in particular for fossil fuels”⁷. This new requirement should result in more uniform reporting on the phase-out of energy subsidies across Member States, and ease monitoring and benchmarking activities. The European Commission is also working with Member States to identify other environmentally harmful subsidies (EHS) and to develop a consistent methodology and reporting framework that covers all EHS, also non-energy ones.

The EU Climate Law is complemented by the proposed revision of the Energy Taxation Directive in the Fit for 55 package to align the taxation of energy products with EU energy and climate policies by promoting clean technologies and removing outdated exemptions and reduced rates that currently encourage the use of fossil fuels⁸.

The new Guidelines on State aid for climate, environmental protection and energy (CEEAG) of December 2021 also complements the previous legislative package by targeting the end of “subsidies for the most polluting fossil fuels (...) in light of their important negative environmental effects”⁹.

⁴ COM/2022/642 final: REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL 2022 Report on Energy Subsidies in the EU, 2022. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0642>

⁵ G20 Leaders Statement: The Pittsburgh Summit, September 2009, available at: <https://www.oecd.org/g20/summits/pittsburgh/G20-Pittsburgh-Leaders-Declaration.pdf>

⁶ Governance of the Energy Union and Climate Action, December 2018, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L:2018:328:FULL&from=EN>

⁷ European Union Climate Law, Article 17, paragraph 4, June 2021, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1119&from=EN>

⁸ European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions, 2021. Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541

⁹ Commission endorses the new Guidelines on State aid for Climate, Environmental protection and Energy, 21 December 2021, available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_6982

Although the CEEAG tackles environmentally harmful subsidies, it does not forbid financial support where it is in line with European climate objectives. Indeed, the text authorises Member States to provide subsidies to fossil fuels when they accelerate a “shift away from coal, peat and oil shale activities” such as “aid for the closure of power plants using coal, peat or oil shale and of mining operations relating to coal, peat or oil shale extraction”¹⁰.

In July 2022, the European Parliament adopted the Taxonomy Complementary Delegated Act to introduce gas and nuclear activities into the EU Taxonomy Regulation¹¹. The Taxonomy is the first international classification that defines, lists and organises the environmentally sustainable economic activities into a common language. This provides investors with appropriate definitions of economic activities that can be considered environmentally sustainable and therefore contribute to direct investments towards sustainable projects and activities. In this study, however, the analysis of energy subsidies relies on their environmental classification rather than on the EU Taxonomy.

Despite the many benefits of ending fossil fuel subsidies, efforts to implement such reforms have long been hampered, including by the crucial lack of precise and up-to-date information regarding the amount and type of support measures in place in EU Member States. Although the DG COMP State Aid registry is well designed and effective to follow-up on State aids decided since 2006, subsidies created and implemented before that date are not inventoried and therefore not monitored.

To address this issue, DG ENER has developed an extensive database (the *Subsidy inventory*) gathering a large set of information on all kinds of energy subsidies and government interventions. After a first approach in 2014, DG ENER reiterated its effort to better map the existence of energy subsidies by ordering four sequential studies on this topic in 2018, 2020, 2021, and 2022. The annual *Commission subsidy study* has been annexed to the *State of the energy union report (SOTEUR)*¹² since 2020. The current study builds on the work of these previous reports by adding subsidy data for 2021 and 2022 where available.

¹⁰ Approval of the content of a draft for a Communication from the Commission on the Guidelines on State aid for climate, environmental protection and energy 2022, section 4.12.1 Aid for the early closure of profitable coal, peat and oil shale activities, available at: https://ec.europa.eu/competition-policy/system/files/2021-12/CEEAG_Guidelines_with_annexes_I_and_II_0.pdf

¹¹ COMMISSION DELEGATED REGULATION (EU) 2021/2139. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R2139&from=EN>

¹² Seventh report on the state of the energy union, 2022. Available at: https://energy.ec.europa.eu/topics/energy-strategy/energy-union/seventh-report-state-energy-union_en#documents

2. Methodology and approach

2.1. Objective

The aim of this study was to collect, control, harmonise and analyse energy subsidies data trends in the EU27 from 2015 to 2021 and, if possible, to 2022. This has been done by updating the current energy subsidies inventory (later called *Subsidy inventory*) inherited from the previous editions of the study along with the 2020 EC Study on energy costs, taxes, government interventions and their impact on energy investments¹³ (later called as a whole "*Commission studies*").

A second objective was to highlight subsidies considered as environmentally harmful and calculate their amounts.

A third objective was to update the fossil fuel subsidies phase-out plans implemented by each Member State (MS) looking at their National Energy and Climate Plans and state budgets for the upcoming years and, if possible, to quantify the ambition of the said plans developed.

Notable changes and qualitative observations in the subsidy data collected at country level are available in Annex A.2.

2.2. Theoretical framework addressing energy subsidy

Our analysis is based on the methodological framework used in previous *Commission studies*, which is inspired by the Agreement on Subsidies and Countervailing Measures (ASCM) framework developed by the World Trade Organization (WTO)¹⁴. Accordingly, the subsidy definitions and classifications have remained in line with those of the *Commission study 2022*. We have added a new classification to that well established methodological framework to now also differentiate environmentally harmful from beneficial subsidies. The main axis of analysis, as well as classification, being the following:

- Category
- Instruments
- Energy sources/carriers
- Purposes
- Source of financing
- Economic sectors
- Environmentally Harmful Subsidies (EHS)

The methodology is presented in detail in Annex A.1 *Theoretical framework*.

2.2.1. Data quality

Although many international institutions have repeatedly committed to and called for the phase-out of fossil fuel subsidies (see Background in Chapter 1), complete and specific reporting of energy-related subsidies is a relatively new matter for many institutions and states. As a result, establishing a report on this topic was very challenging and required many cross-controls. Indeed, as no common reporting standard has been agreed upon yet, each actor (international institutions, states, regions)

¹³ « Energy costs, taxes and the impact of government interventions on investments », Trinomics, Enerdata, Cambridge Econometrics, LBST, October 2020. Available at <https://op.europa.eu/en/publication-detail/-/publication/92ae71b0-173a-11eb-b57e-01aa75ed71a1/language-en>

¹⁴ All documents related to WTO Agreement on Subsidies and Countervailing Measures are available at https://www.wto.org/english/tratop_e/scm_e/scm_e.htm

releases data according to their own understanding. The chapter below describes the hurdles our consortium has encountered to update our inventory. We have identified six main varieties of barriers in addition to the lack of common rules and varying scopes of reporting.

2.2.1.1. Accessibility and clarity

The first challenge we have encountered during this study was to identify the sources of information on energy subsidies. Indeed, in many EU countries, **the information is accounted for by disparate institutions** and often no consolidated data is available. Although data on energy/excise tax expenditures are usually well structured, not all the Member States are currently publishing a dedicated report on this form of subsidy. When it comes to direct transfers, the data on subsidies is often divided among reports from many institutions – energy efficiency agencies, building agencies, funding organisations etc. – which provide grants, soft loans or other related subsidies. Information on income and price supports is similarly decentralized and often only available at the institutional level, in this case regulators, competition agencies, or energy efficiency agencies. Finally, the **data scattering** (data dispersed over different official websites or in different documents) **makes it difficult to ensure the completeness of the amounts gathered**¹⁵. At the same time, there is a **risk of double counting**, which requires care when introducing new data into our database.

Another hurdle is the **continuous re-location of the information** due to numerous reorganisations of the websites of the many institutions providing data¹⁶. Consequently, we see these never-ending changes as a serious obstacle for the public to follow-up on energy subsidies developments even in their own countries.

Eventually, another major issue is the **interruption of provision of some documents** because they are no longer produced or no longer made public. For instance, we have noticed that several Member States¹⁷ have stopped or interrupted issuing their annual tax expenditure reports that used to provide valuable information for our reporting on energy subsidies. Such a problem presents a serious obstacle as our analysis requires information produced and published by the MS governments and public administration.

2.2.1.2. Transparency

Unsurprisingly, a continuous issue that we have faced was the **lack of the transparency** – or rather the non-user friendly presentation of the data available. Indeed, in addition to the data scattering issue mentioned above, most of the documents are provided as ‘pdf’, whereas they include quantitative data that would be better suited to a spreadsheet-based format. **Data provided in a spreadsheet-based format is still uncommon**, as well as the presence of subsidies data on government open-data platforms. This is a serious obstacle to compare the data over the years, and to detect new or ended subsidies.

Cases of good practice were also identified. For example, Italy does not yet provide a spreadsheet-based format to reference subsidies information but at least most of these information are published clearly within the ‘Gestore Servizi Energetici’ (GSE) reports.

¹⁵ However, we have developed several processes to cope with this issue in order to ensure a good quality and completeness of the data provided. For more information, see section called *Data collect and control process* in the annexes.

¹⁶ This issue has been overcome in most of the case during the study thanks to our network of country experts, however collecting data on energy subsidies is far from being easy for non-experts.

¹⁷ For more information, please refer to Annex 2: Country data controls and observations

2.2.1.3. Consistency

The consistency of the data collected in the reports on subsidies published by MS varied significantly from one country to another. Indeed, very few countries provide the metadata that are required to set up consistent reporting. Relevant reporting calls for the presence of the following metadata on each measure:

- title,
- objectives,
- description,
- energy carrier / product concerned,
- recipient(s),
- economic sectors,
- legal reference,
- exact scope covered,
- changes in scope,
- data collection methodology,
- explanation on significant variations from one year to year,
- retroactive changes applied to several years in the case of significant changes,
- list of new/ended subsidies,
- start date,
- end date

Indeed, without the above listed metadata, it is difficult to understand potential changes over the years and analyse trends with accuracy. Especially, very **few reports point out the list of subsidies that have been added** (new ones) **or removed** (subsidies phased-out or purely removed for legislative or technical reasons) **from year to year**. Such information would be very useful to perform appropriate follow-up over a period and thus to provide insight on the trends followed by the Member States.

2.2.1.4. Homogeneity and comparability

The homogeneity of the data is also an essential factor in allowing for consistent analysis. In fact, achieving relevant comparisons across years and across countries requires the use of common methodologies. However, as the UNEP and IISD¹⁸ acknowledge, the “*benchmarks are currently set on a country-by-country basis*”, and **as estimation methods applied by countries differ, the international comparability of existing tax expenditure estimates is limited in the absence of a uniform international framework**. Differences in the amount of subsidies reported can be due to a range of factors such as a higher tax benchmark, a stricter definition of the benchmark system, or a more complete set of tax-expenditure accounts.”

Although the UNEP and IISD focus on the issue related to tax expenditures, the same problem applies to many measures. This is true of, for instance, the various electricity capacity mechanisms implemented in recent years. Even though these measures are quite recent, no common reporting method has been enforced across the MS. Therefore, the *Subsidy inventory*, which is based on public

¹⁸ Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals, UNEP and IISD, June 2019. Available at <https://www.unep.org/resources/report/measuring-fossil-fuel-subsidies-context-sustainable-development-goals>

information, includes many instances of subsidies whose content differs although the measures have the same name.

The lack of a uniform international framework can also have a large impact upon comparability between Member States as each country can classify similar measures as either subsidies or not. As an example, in the Netherlands, while the degressive tax structure subsidy already exists since 1998 for gas and 2001 for electricity¹⁹, the Dutch Ministry of Finance only started reporting data from 2022²⁰ while the data has been available since 2018. These new subsidies represent substantial new amounts (EUR 3.7 billion for 2022 alone, and EUR 4.6 billion for 2021) which were not accounted in the *Commission study 2022*. While this type of degressive tax system might exist in other EU27 countries, none of those reported those as a subsidy (as per our investigations).

2.2.1.5. Granularity

The issue of the granularity of the data is also essential to better analyse the evolution of energy subsidy policies and compare countries with each other. Indeed, the granularity of the data reported varies depending on the countries, making comparisons more difficult. For instance, where reporting exists, one single subsidy amount can cover all the technologies consolidated, several technologies grouped together or also only one single technology/carrier/product. This depends on the MS reporting rules. Similar issues also apply to tax expenditure reports. Overall, **it is still rare to have a complete disaggregation of the subsidy amounts per energy carriers/products or by beneficiaries.**

2.2.1.6. Timeliness and punctuality

The publication speed has been another obstacle to this study. While for some Member States, data have been collected, controlled, and harmonised for 2022 based on data included in their budgets, for other countries, several sources of data were not yet published at the time of updating the *Subsidy Inventory*. Indeed, our report was written based on data collected up until 24th July 2023, therefore some subsidy amounts were still not available for the year 2022. This observation holds true for data provided by many national institutions within the Member States, but also for international organisations such as the OECD and even to official statistics published by the European Commission²¹. As a result, a portion of the data for the year 2022 could not be collected.

To address this issue, we have repeated the approach used in the *Commission study 2022*: missing data for 2022 have been identified, quantified, and estimated to enable the comparison with previous years. In every graph presented in the report, if the subsidy scheme is still ongoing in 2022 and if no data for 2022 is presented in the inventory, it is assumed that the 2022 subsidy amount is equal to that of 2021²². This conservative approach allows for visual comparison across years. But even if this approach is suitable for long term subsidies, there exists a limitation for temporary measures.

¹⁹ <https://zoek.officielebekendmakingen.nl/kst-30375-2.html>

²⁰ The «Degressive Tax System» for gas and electricity in the Netherlands allows smaller consumers (i.e. households) to pay significantly higher tariffs per energy unit than large energy-intensive users. This tax system has been classified for the first time by the Dutch Ministry of Finance in its “rijksfinancien fiscale regelingen” in 2022. Available at:

https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.rijksfinancien.nl%2Fsites%2Fdefault%2Ffiles%2Fbestanden%2Fopen_data%2FFiscale%2520regelingen%25202023.xlsx&wdOrigin=BROWSELINK

²¹ At the time we write the report, i.e. 28th July 2023.

²² Due care was taken in using this approach. However, in certain cases where the subsidy amount depends on energy (market) prices, the 2022 amount would be underestimated.

The risk of incorrect estimate has been mitigated by filling in accurate end-date values for those temporary measures.

⌘ To be confirmed : Amounts under such assumption are indicated with hatching on graphs.

Where uncertainty is high, analysis of trends performed in the following sections are limited to the period 2015-2021. Moreover, we anticipate some data for 2022 to be adjusted retroactively by the responsible national authorities and must therefore be interpreted with caution.

2.2.2. Data control through 2023 NECPR

By 15 March 2023, Member States had to report for the first time to the Commission on the status of implementation of their integrated national energy and climate plans by means of an integrated national energy and climate progress report (NECP), including information on progress towards the national objectives and on the policies and measures concerning the phasing out of energy subsidies, in particular for fossil fuels. This reporting should be done in line with the formats set out in the Commission Implementing Regulation (EU) 2022/2299 of 15 November 2022²³

The NECP data constitutes a set of goals related to subsidies as well as a list of energy subsidies submitted by the country in question. This information was largely used to i) determine whether any subsidies had not been included, ii) verify the amounts of funding these subsidies received and iii) verify other technical components (e.g., subsidy names, start and end dates, etc.). For a more detailed view of the data collected through NECPRs, see section 4.2.3.

2.2.3. Data control through consultation round

In the interest of improving data control, a consultative stage involving MS representatives was a key part of the post-data collection process. The objectives were to improve the robustness of the database and the analysis, to better involve Member States in the topic of energy subsidies, and to support the Commission in implementing a more uniform reporting on the phasing out of energy subsidies, in particular for fossil fuels²⁴.

Once we collected and controlled the subsidy data, we submitted it to MS representatives to review, comment on, and update the data as needed.

This process was also performed during the previous *Commission studies* with representatives of some countries and generalised to all Member States during this *Commission study 2023*. In general, contacts have brought valuable comments, corrected some minor mistakes, and enriched the inventory.

The table hereafter gives an overview of the feedback received on a country basis, with the following information:

- *Feedback received* – marks ✓ / ✗ means feedback was received / not received, respectively
- *Information provided* – Complete / Partial / Limited, along with details about information received

²³ Regulation (EU) 2022/2299, EUR-Lex database (2022). Available at: EUR-Lex - 32022R2299 - EN - EUR-Lex (europa.eu)
²⁴ In accordance with the 2021 State of the Energy Union report. European Commission, State of the Energy Union 2021 – Contributing to the European Green Deal and the Union's recovery, 26 October 2021. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0950#footnote115>

Table 1: Feedback received at the end of consultation round (as of 28th July)

Country	Feedback received	Information provided
Austria	✓	Full. Comments, data correction
Belgium	✗	Answered but required more time to revise subsidies. Thus not received on time to be included in this study.
Bulgaria	✓	Full. Comments, data correction
Croatia	✗	E-mail delivered, but no reply received
Cyprus	✓	Full. Comments, data correction
Czechia	✗	E-mail delivered, but no reply received
Denmark	✗	E-mail delivered, but no reply received
Estonia	✓	Full. Comments, data correction, nice explanations
Finland	✗	E-mail delivered, but no reply received
France	✗	E-mail delivered, but no reply received
Germany	✗	E-mail delivered, but no reply received
Greece	✗	E-mail delivered, but no reply received
Hungary	✓	Full. Comments, data correction
Ireland	✓	Full. Comments, data correction, new subsidies
Italy	✓	Limited feedback. No data modification. Suggestion to remove measures.
Latvia	✗	E-mail delivered, but no reply received
Lithuania	✗	E-mail delivered, but no reply received
Luxembourg	✓	Limited feedback. No data modification.
Malta	✓	Limited feedback. Most data deleted without explanation
Netherlands	✓	Full. Comments, data correction
Poland	✗	E-mail delivered, but no reply received
Portugal	✗	E-mail delivered, but no reply received
Romania	✗	E-mail delivered, but no reply received
Slovakia	✓	Limited feedback. Some additional data/correction (in dark red), some comments clarifying measures
Slovenia	✓	Full. Comments, data correction
Spain	✗	E-mail delivered, but no reply received
Sweden	✗	E-mail delivered, but no reply received

3. Energy subsidy trends in the EU27

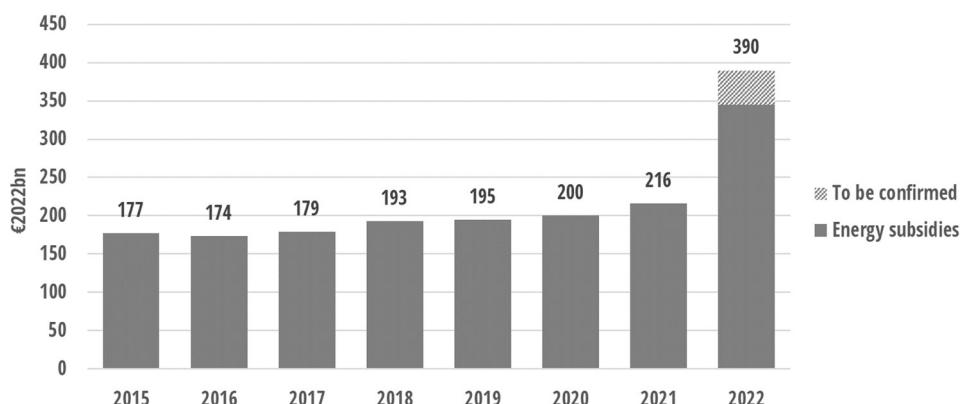
*Note: The following section analysed energy subsidies trends in the EU27 Member States for the period 2015 to 2022. This timeframe was chosen primarily to investigate progress made since the Paris agreement. All values (unless otherwise indicated) stated in this report are in 2022 euro (real values) and expressed in billion euro (**€2022bn**). Exceptions are noted.*

In general, the terms used in the analysis have been chosen to be as self-explanatory as possible. However, certain terms, such as “All energies”, “energy industries” and “cross sectors” can be confusing. In this report, “all energies” applies to measures related to energy produced from a mix of both fossil fuel and low carbon sources or an unknown source. “Cross-sector” refers to any subsidy which cannot be primarily categorized under a single economic sector. For example, the Swedish subsidy “energy tax exemption for natural gas”, which provides a tax exemption to both private and industrial customers would be considered a cross-sector subsidy as it cannot be said to be primarily industrial or primarily for households. In particular, several subsidy measures adopted in the last two years in response to energy price rises (cf. section 3.4.2) were cross-sectoral in nature.

3.1. General overview and considerations

The updated *Subsidy inventory* currently includes 2 100 subsidies of which 1 760 are still active in 2022. The overall amount of energy subsidies in the EU27 has grown from EUR 177 billion in 2015 to **EUR 216 billion in 2021** (3.4% CAGR) and is expected to reach nearly **EUR 390 billion in 2022** (Figure 1).

Figure 1: Overall energy subsidies in the EU27 (2015-2022; EUR2022bn)²⁵



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching).

The growth in the total amount of subsidies needs to be viewed in the context of the energy price crisis and the subsequent measures taken by Member States to protect their household and industrial consumers. As a response to the energy price crisis, a large number of temporary subsidies were created or expanded to help alleviate the impact of high and volatile prices. Many of these measures were intended to be limited only to periods when, e.g., until the end of 2022 to help reduce the burden on consumers.

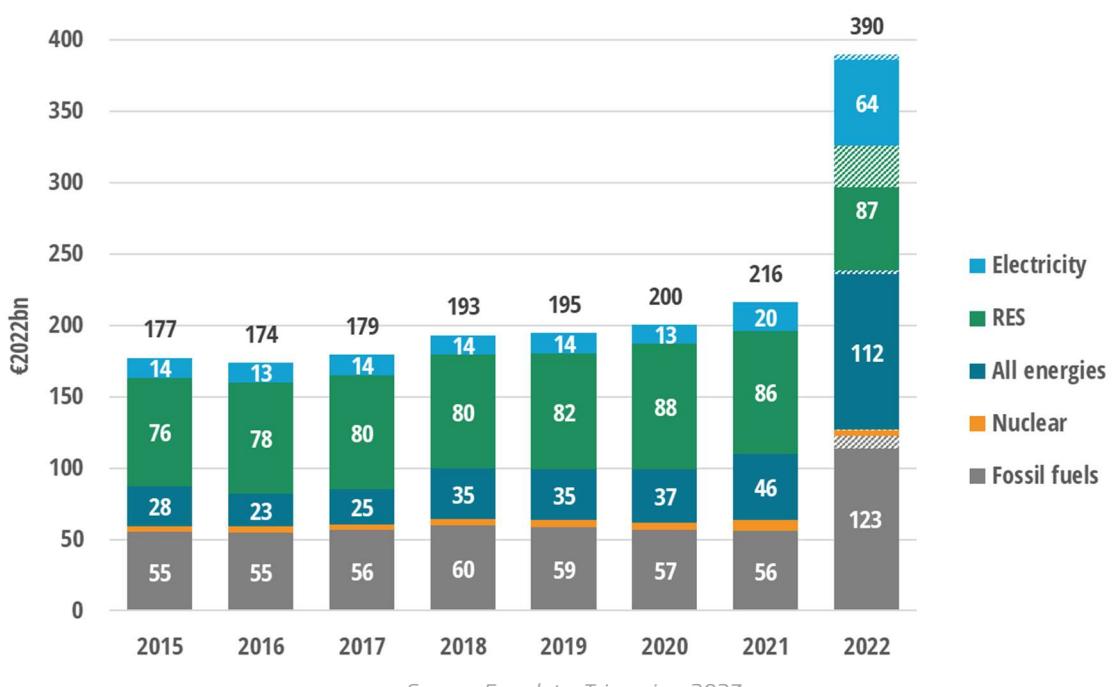
²⁵ Data under the “To be confirmed” category amounted to 12% of the total amount included in the *Subsidy inventory* for the year 2022.

3.2. Trend of energy subsidies by main energy sources

Between 2015 and 2021, the overall energy-related subsidies in the EU27 MS increased by 22%, or approximately EUR 39 billion. The level of subsidies remained fairly stable between 2015 and 2017. From 2018, the increase is mainly driven by increasing subsidies for energy efficiency (as part of "All energies").

Figure 2 shows the allocation of the financial support by main energy sources / carriers²⁶, while the evolutions in the distribution are presented in Figure 3. The "Fossil fuels" category decreased slightly between 2018 and 2021, its share in energy subsidies fell by 5 percentage points over this period (see also section 3.3.3). Support to renewables continued to increase until 2020 (EUR 88 billion) but it fell to EUR 86 billion in 2021 and EUR 87 billion in 2022. Subsidies to electricity remained relatively stable until 2020, before increasing by around 50% in 2021. The increase recorded for nuclear in 2019 corresponds mostly to exceptional payments (more details under the section 3.3.5 Nuclear).

Figure 2: Subsidies by main energy source in the EU27 (2015-2022; EUR2022bn)



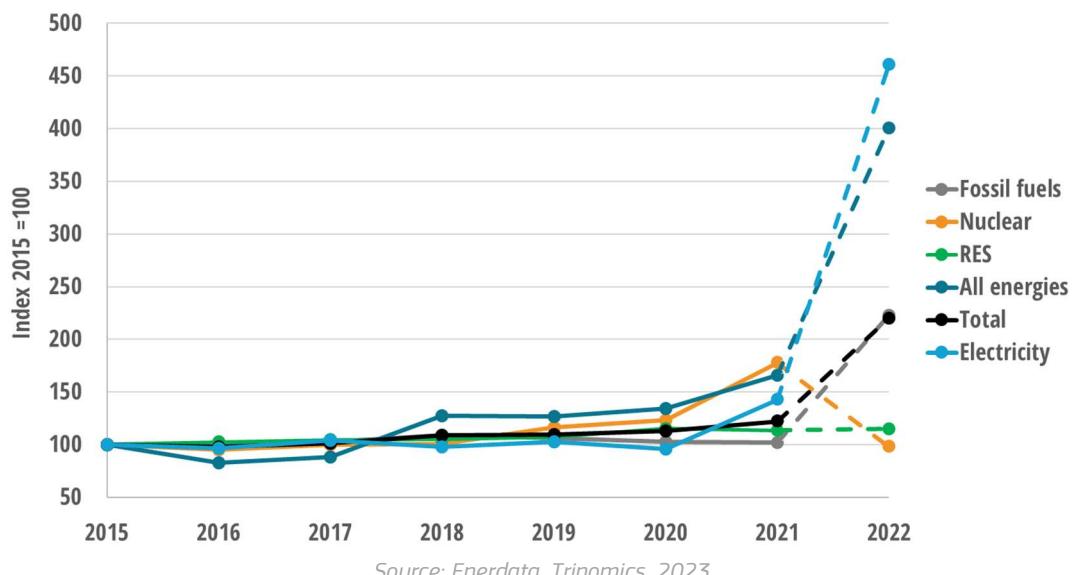
Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching).

As highlighted by Figure 3, overall energy-related subsidies have significantly grown in 2022 (+80% compared with 2021, +120% compared with 2015). Electricity subsidies are expected to increase 3 times compared with 2021 and 4.5 times compared with 2015. 'All energies' subsidies in 2022 could be 2.4 time higher compared to 2021 and 4 times higher compared to 2015. Subsidies for fossil fuels could double and reached their highest level since 2015.

²⁶ For more information regarding the main energy sources classification please refer to Annex A.1.1.

Figure 3: Energy subsidies trend by main energy source (2015-2022; base = 2015)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented by dotted lines).

3.3. Subsidies by energy carrier

In this section, energy subsidies are analysed according to the energy carrier used. This classification²⁷ describes the medium used to transport, deliver or store the energy. It differs from the main energy sources split in the previous section. For example, RES and nuclear technology are mostly found in the electricity carrier.

3.3.1. Status of the data collected

Data analysed in this section covers around 2 100 subsidies identified and collected for the period 2015-2025; of these, almost 1 300 were active in 2021 and around 1 100 in 2022.

For 2022, the total amount of subsidies collected are into actual and estimated costs. The definition of “actual” and “estimated” amounts is provided in Annex (A.1.4.2). The estimated data for 2022, shown with hatching on the figures²⁸, represented 12% of the total amount included in the *Subsidy inventory* for this year.

3.3.2. Analysis

The distribution of volumes by energy carrier observed in 2021 is in line with that recorded since 2015, with electricity remaining the most supported energy product in the EU27, capturing 63% (EUR 136 billion) of the total subsidies in 2021.

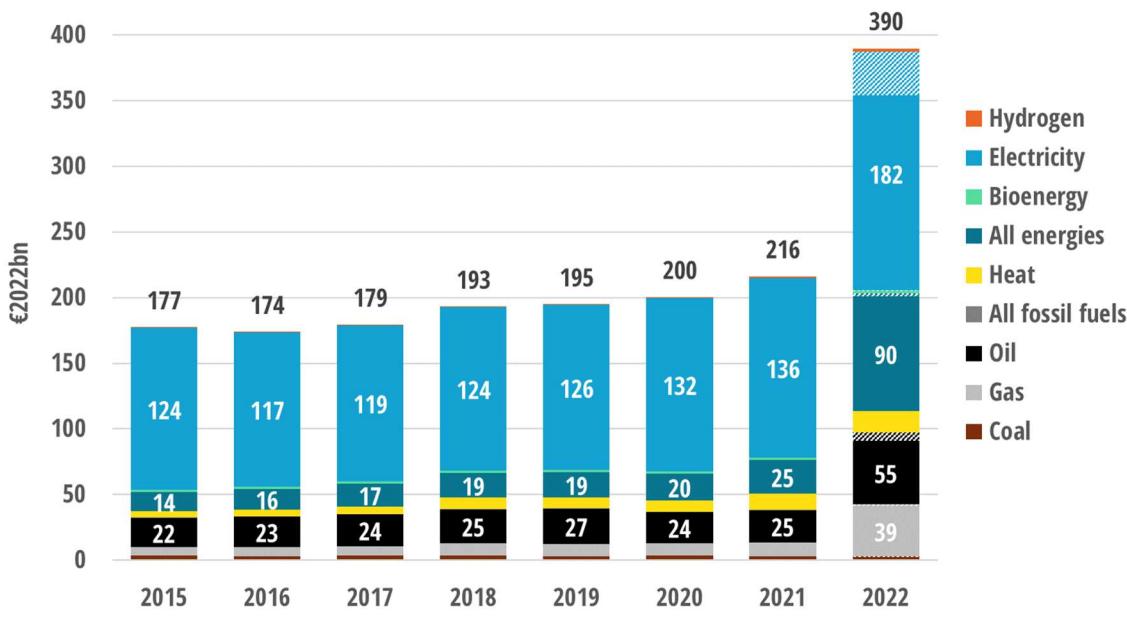
Figure 4 shows that subsidies provided in absolute terms have grown slowly from EUR 177 billion in 2015 to EUR 216 billion in 2021. Subsidies directly supporting fossil fuels (Coal, Gas, Oil, All fossil fuels combined) have grown by an average of 5% a year between 2015 and 2019. They fell by 7% in 2020 before rising again by 4.5% in 2021 to reach EUR 38 billion.

²⁷ For more information regarding the main energy carriers' classification please refer to Annex A.1.1.

²⁸ See explanation in paragraph 2.2.1.6.

The overall amount of energy subsidies is expected to almost double in 2022 (compared with 2021). Electricity remains the most heavily subsidised product and is expected to account for more than 45% of the amounts distributed. ‘All energies’ subsidies rise sharply (+11 points), as do gas subsidies (+5 points).

Figure 4: Energy subsidies by main carriers in the EU27 (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching).

3.3.3. Fossil fuel subsidies

3.3.3.1. Status of the data collected

Fossil fuel measures include close to 720 FFS of which around 420 are still active in 2022. Since the *Subsidy inventory* conducted in 2022, 86 new FFS have been identified and added while 60 subsidies have ended. These changes are listed in country notes in Annex A.1.11. The following section analyses trends until 2022, while an overview of the ongoing fossil fuel phase out plans is presented in section 4.3.

The total FFS reported for 2021 reached EUR 56 billion and are distributed in 60% of actual costs (EUR 34 billion, around 300 measures) and 40% estimated costs (EUR 22 billion, around 170 measures). Data yet to be confirmed for year 2022 were estimated at EUR 9 billion (appears as hatched areas in the below graphs).

Fossil fuel subsidies cover financial support to all fossil primary energies and electricity generated by burning fossil fuels. In some cases, multi-energy subsidies are not reflected into the fossil fuel category, but rather into “All energies” category (see Annex A.1.7).

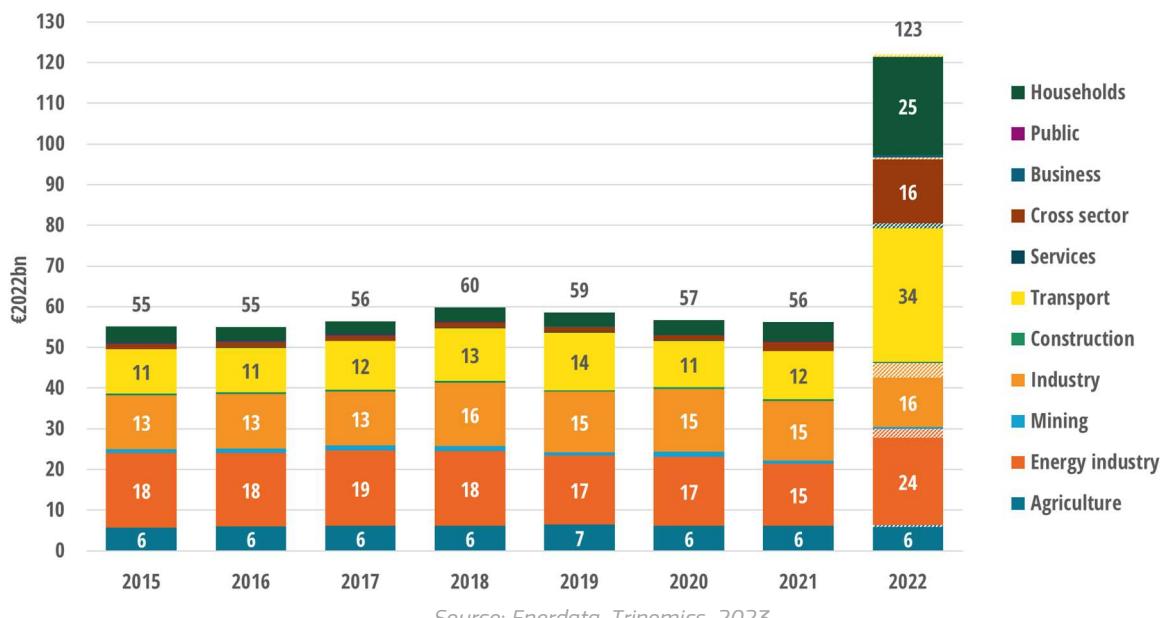
3.3.3.1. Analysis

FFS fell by 1% in 2021, continuing the downward trend observed since 2018²⁹ (Figure 5). The 2021 decrease is mainly caused by a large decrease (EUR -2 billion) in subsidies to the energy industry³⁰ sector, reflecting the end of industry subsidies designed to help offset consumer costs during the initial pandemic confinements of 2020.

This downward trend is ended in 2022, due to the resurgence of energy industry subsidies to counteract the effects of the energy price crisis. Subsidies to households have increased by EUR 1 billion in 2021, whereas they had tended to be fairly stable in prior years.

FFS is expected to more than double between 2021 and 2022, from EUR 56 billion to EUR 123 billion. This increase is due to increased support to *households*, the *transport* sector and the *energy industry* to cope with rising prices and protect consumers. It should be noted that *industry* is the only sector to see its subsidies fall significantly, continuing their downward trend³¹.

Figure 5: Fossil fuel subsidies in the EU27 by economic sector (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Figure 6 shows that most of the FFS allocated throughout the EU27 countries since 2015 are intended to support energy demand, for example by limiting the costs of energy consumption with lower tax rates on energy products. Their share varies between 67% and 74% and is expected to reach its highest level in 2022 because of governments responses to the energy crisis (see section 3.4.2). Since 2015, 20% to 30% of the FFS subsidies were meant to support electricity production; this share is consistently decreasing. Subsidies specifically directed to industry restructuring such as

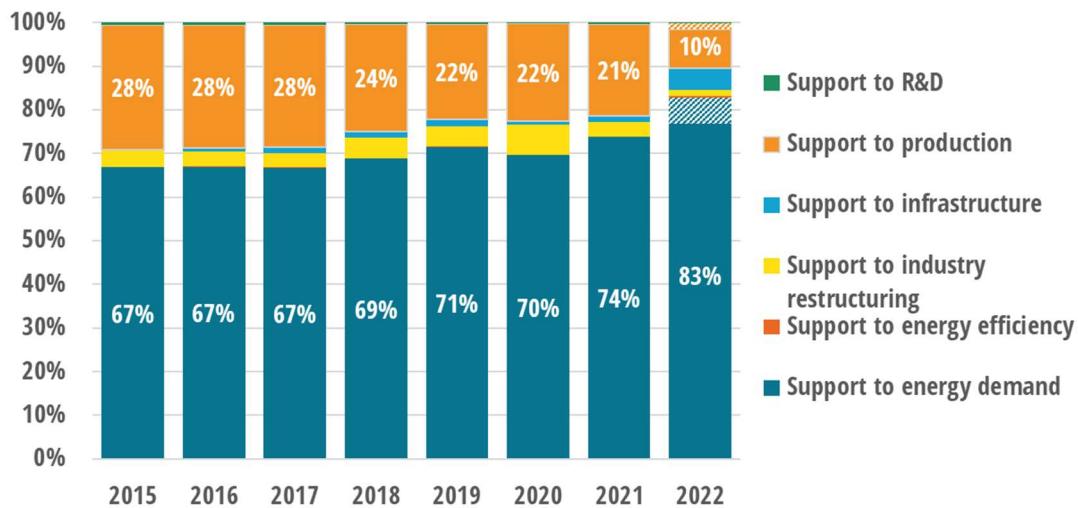
²⁹ The EUR 3.5 billion increase in FFS in 2018 is partly due to the change in classification of the degressive tariff structure for gas and electricity in the Netherlands, which was not reported by the Dutch government as a subsidy before that date and therefore not included in the database. The Netherlands is the only country for which actual amounts linked to this mechanism have been declared, but they certainly also exist in other countries without being declared as such.

³⁰ The term covers energy extraction, conversion, refining, infrastructure, transmission, distribution, storage, waste management and retail.

³¹ For more information regarding the classification used for economic sectors please refer to Annex A.1.1.

aids to close coal/lignite power plants and coal mines represent a small and decreasing share of the total FFS (3.4% or EUR 1.7 billion) in 2021. The classification used for subsidy purpose is provided in Annex A.1.1.

Figure 6: Fossil fuel subsidies in the EU27 by purpose (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Around half of the FFS reported in 2021 were delivered by **Germany** and **France** (EUR 13 billion each), followed by **Italy** (EUR 5 billion), **Spain** (EUR 4.3 billion), and **Belgium** (EUR 4 billion) (Figure 7).

In **Germany**, FFS were historically stable at EUR 15 billion until 2018 and then declined due to reductions in tax exemptions for transport (due to lower air traffic, from 2020) and tax reductions on gas to be used as a fuel or for power generation, as well as reductions in aids to subsidize the use of coal. On the other hand, the subsidy for the selling of German coal to the electricity grid and steel industry as well as decommissioning costs was originally decreasing, but jumped in 2020 to EUR 2.2 billion, due to one-time payments to manage contaminated sites³². Since then, this subsidy has been only used for decommissioning and decontaminating coal sites.

Subsidies aimed at the shut-down of coal-fired power plants and the rehabilitation of the old coal-mining sites peaked in 2020 (EUR 3.2 billion, compared to EUR 1.6 billion in 2019); these are back to EUR 1.3 billion in 2021. Starting in 2020, Germany launched a tender mechanism for the phase-out of hard coal (around EUR 350 million subsidised in 2020 and around EUR 240 million in 2021), as well as compensation payments for the decommissioning of coal plants (around EUR 180 million per year expected until 2038).

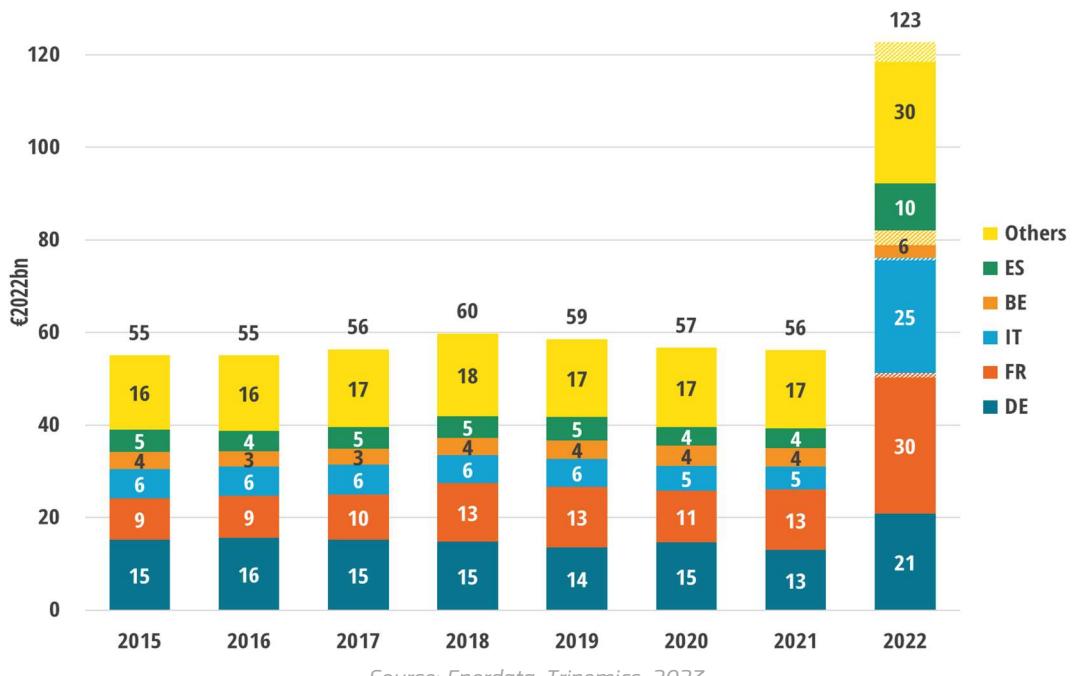
After a noticeable increase in FFS in 2018 (due to growing tax reduction on off-road gasoil and exemption of excise duties on petroleum products for its overseas departments and territories),

³² 28. Subventionsbericht des Bundes 2019 – 2022, Bundesministerium der Finanzen (2021). Available at: https://www.bundesfinanzministerium.de/Content/DE/Downloads/Broschueren_Bestellservice/28-subventionsbericht.pdf?__blob=publicationFile&v=6

France's subsidies have risen slightly but steadily (apart from a fall in 2020 due to lower consumption of petroleum products during the lockdowns, particularly in transport).

For some countries, the amount reported for FFS is uncertain due to poor data quality or lack of transparency. It was the case for example in Poland in the few past years, although some improvements were noticed recently (further details available in A.1.11).

Figure 7: Fossil fuel subsidies in the EU27 by country (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

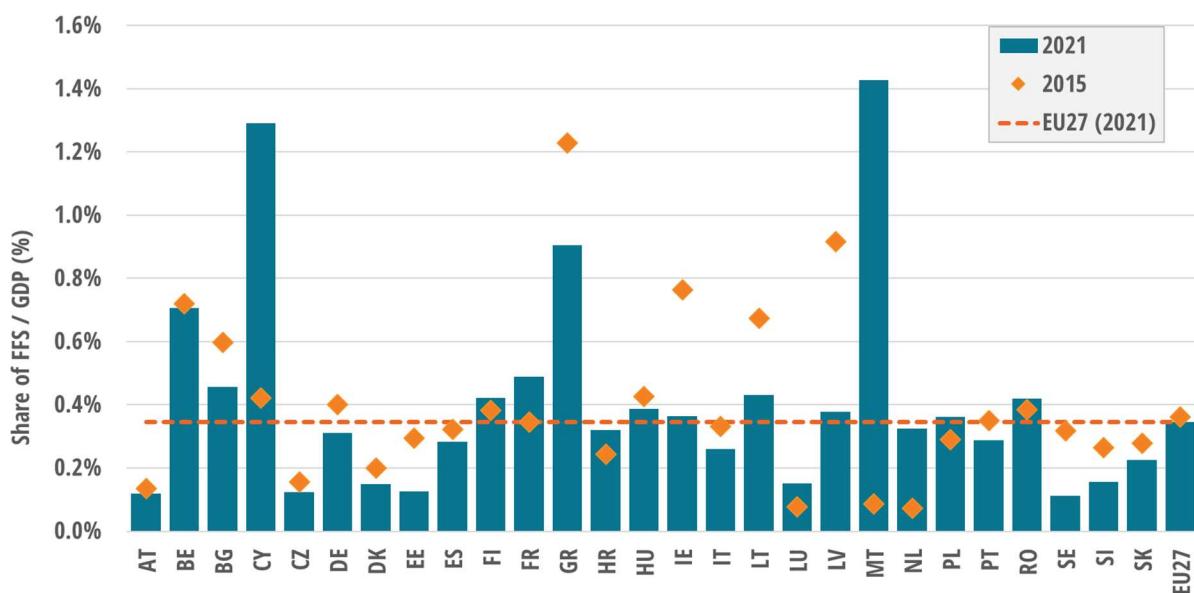
NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

The importance that each Member State gives to supporting fossil fuels can be assessed by analysing the subsidy amounts in relation to its GDP, also called the *FFS intensity* (such intensity does not include subsidies aimed at transitioning out of coal). Figure 8 presents the *FFS intensity* in 2015 (light orange diamonds) and 2021 (blue bars). The gap between the top of the bars and the light orange diamonds represents the FFS intensity variation between 2015 and 2021.

On average, FFS represented 0.35% of the total EU27 GDP in 2021 (the share remained stable since 2015). However, the trend followed by MS over 2015-2021 varied as shown in Figure 8.

Namely, the countries which have increased their FFS intensity in 2021 compared to 2015 are: Cyprus, Croatia, Finland, France, Luxembourg, Malta, the Netherlands, Poland, and Romania. This increase can be interpreted as a greater reliance of the economies of these countries on FFS. On the other hand, the countries which reduced the most their FFS intensity since 2015 are Estonia, Ireland, Latvia, and Sweden.

Figure 8: Fossil fuel subsidies as share of GDP by Member State (2015 vs 2021; %)



Source: Enerdata, Trinomics, 2023

Figure 9 shows the amounts of FFS by energy product³³ in 2021 for the MS spending the most, as well as their share in their respective GDP. The average *FFS intensity* in the EU was 0.35% in 2021. Among the large countries, France displays a higher FFS intensity (0.49%) than the EU average, while Germany's FFS intensity (0.33%) is very close to the EU average, and Italy (0.25%) and Spain (0.31%) stand below the average.

Oil and Petroleum Products ("oil") were the most supported fossil fuels in 2021 and represented 46% (EUR 26 billion) of the EU27 FFS total. The other strongly supported energies are gas (27% of the EU27 total amount of FFS in 2021) and coal (15%). Petroleum products are, apart from their role in transport and industrial sectors, important to note for their specificity with respect to taxation. The most important example of this specificity is the taxation difference between gasoline and diesel fuels for transport, which is further highlighted in Textbox 3-1.

For the first time, in 2021, **France** became the EU27 country that spends the most on FFS; the country committed EUR 8 billion to oil in 2021, which represented around 63% of the country's FFS, and a third of the total EU27 amount for oil. Oil subsidies aim to support energy demand in the country for all economic sectors: transport, agriculture, households, industry, construction, etc., mainly under the form of excise taxes.

Germany is the second largest FFS contributor in the EU27. The breakdown between energy has changed slightly in 2021. Previously, most of the country's FFS were assigned to coal (around 46%) and gas (around 38%), mainly through support to electricity production which has high shares of fossil fuels. The country provides large support to coal-fired power generation and more directly by subsidising the coal industry and miners. Regarding gas, the country supports the sector mainly via energy tax reductions and exemptions. In 2021, gas became the most supported energy within the

³³ For more information regarding the energy products classification please refer to Annex A.1.1.

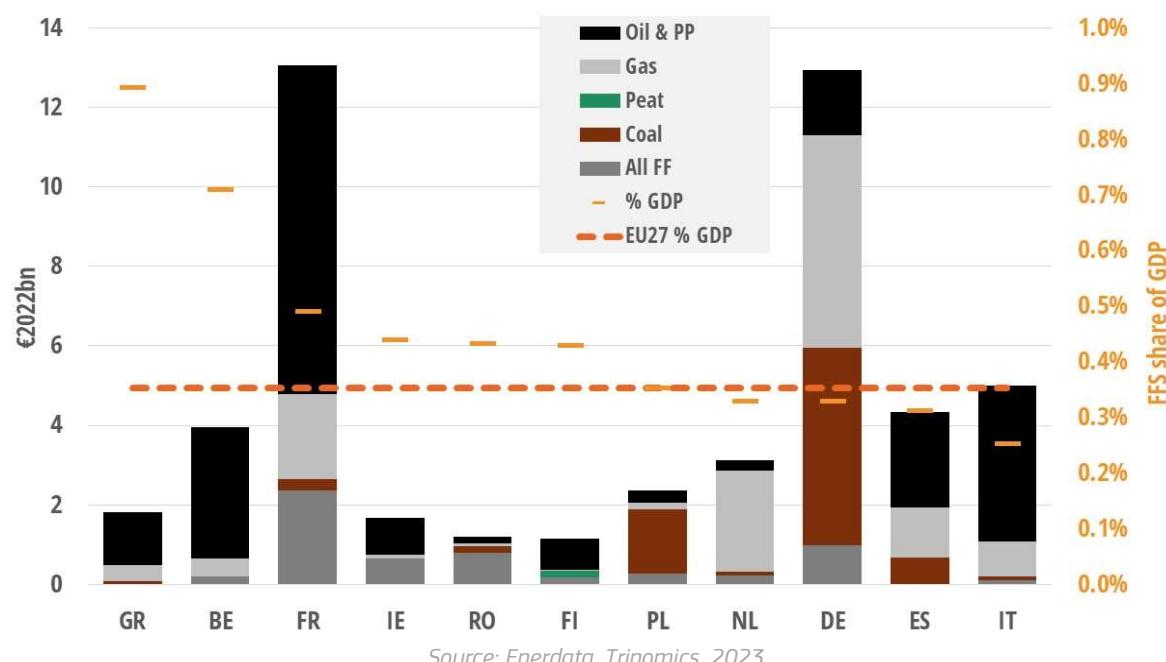
FFS in the country, representing 41% of the total amount, ahead of coal (38%). However, Germany remains the biggest contributor to coal subsidies in the EU, with 60% of all MS coal subsidies.

Italy provided the third largest amount of FFS payments in 2021 (EUR 5 billion), and the second highest of oil subsidies (EUR 4 billion). Oil subsidies represent almost 80% of FFS subsidies in the country. The main supports are tax exemptions for diesel, kerosene, and PP to support activities such as freight and passenger transport, agriculture and fisheries.

Spain spent EUR 4.3 billion in FFS in 2021 of which almost 60% as reductions on excise taxes on hydrocarbons and excise tax exemptions for the transport, agriculture and industrial sector, and 15% for CHP power plants.

In 2021, **Belgium** allocated EUR 4 billion to FFS of which more than 84% for oil (EUR 3.3 billion). The subsidies were dedicated to excise tax exemptions, reduced excise duty and tax refunds for kerosene, gasoil, LPG and HFO for the transport and industry sectors.

Figure 9: Share of FFS per GDP for selected Member States, 2021 (EUR2022bn)



As part of other ongoing changes to the treatment of fossil fuels and FFS in particular the EU is moving towards the adoption of a new regime for energy taxation. This program, called the updated Energy Taxation Directive (ETD), will set new minimum rates for fuel taxation across the EU. These changes are explained in greater detail below in Textbox 3-2, but the broad implications are that minimum rates will more closely reflect a fuel's level of pollution per unit of energy, rather than the other economic, social and political factors which govern the prior taxation regime.

Textbox 3-1: Diesel vs gasoline tax difference

In almost every country of the EU27, gasoline has a higher taxation rate than diesel. In 2019, only Belgium had the same tax rate for both products, and Slovenia had a lower rate for gasoline starting in 2021. Elsewhere, the level of tax difference varied between EURc3/l and EURc30/l with a European average around EURc11/l. This difference decreased in the EU27 between 2015 and 2019 (-1% per year) but has since widened back to 2015 levels in 2021 and 2022.

In line with the previous *Commission studies*, the excise tax difference favouring diesel over gasoline is not included in the *Subsidy inventory* that supplements the study³⁴. Indeed, the definition of tax expenditure as the exemption, exclusion, or deduction from the base of a tax for a given product means that excise tax difference between gasoline and diesel does not fit within the subsidy framework.

We have estimated the favourable tax treatment for diesel to reach EUR 13 billion³⁵ for the EU27 in 2020, with five countries accounting for 71% of that amount: Germany (EUR 3.4 billion), France (EUR 1.7 billion), Italy (EUR 1.6 billion), Spain (EUR 1.7 billion) and Netherlands (EUR 0.8 billion). In 2020, this amount rose compared to 2019 (+1%) but has been globally decreasing since 2015 (-2% per year).

This difference in taxation is being addressed at both the national and EU-levels. At the national level some countries have begun transitioning their excise tax regimes to reduce diesel consumption for environmental and public health reasons. At the EU level there is an ongoing process to amend and update the Energy Taxation directive in the interest of taxation by fuel category, in which diesel and gasoline would have the same minimum rate. Part of the impetus for this change is to encourage countries to reconsider their taxation regimes on energy products, and thus reconsider the tax differences between fuels like diesel and gasoline³⁶.

Textbox 3-2: Changes to the Energy Taxation Directive

The ETD scheme has formed the basis of regulating energy taxes in the European Union for 20 years without significant revision, nor adjustment for inflation³⁷. As mentioned in Textbox 3-1 on Diesel and Gasoline taxation, the differences in minimum rates between various fuels can manifest as tacit financial incentive for one fuel over another, even if that fuel is subsidized per the normal definition.

³⁴ Although this tax difference could be seen as a form of tax expenditure as the level of taxation differs between the two fuels that are mainly consumed for the same purpose, i.e. road transport, we define tax expenditure as the exemption, reduction or refunds from the base of a tax for a given product (by opposition to different tax level for a given energy use, which would impose to compare the level of taxation to all the energy product for this given use, e.g. taxation of electricity, gas, gasoline, diesel, LPP for the energy use in road transport). Moreover, currently, most of the MS do not consider the excise tax difference between diesel and gasoline as tax expenditure. We have identified only Denmark, Italy and Sweden reporting such measures in their national tax expenditure reports.

³⁵ To estimate this amount we have collected, from the TAXUD CIRCABC database, the excise tax rates for gasoline and diesel in each country (effective rate at 1st January of each year) and calculate the tax difference between both, in euros. Then, we got energy consumption estimations from the Odyssee database. We only considered diesel consumed by personal private vehicles, as freight transport that benefit from reduced tax rate was already covered by the main *Subsidy inventory*. Finally, we multiplied the excise tax differences with diesel consumption. As consumption data for 2020 were yet available in Odyssee database, we use that of 2019.

³⁷ Council Directive COM/2021/563 (EC). EUR-Lex Database2021. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0563>

In June 2021, a proposal to update this regime began the legislative process to become EU law. This new proposal is intended to have three effects on minimum tax rates for all member states: change in the scope, base unit, and intent of the tax regime.

- 1) The base unit of taxation will shift from volumetric measures (liters, kilograms) to energy content (GJ). While these two units are related, the change towards real energy content is designed to prioritize efficiency improvements and incentivize transitions away from the most polluting fuels.³⁸
- 2) Change to scope mainly entails the creation of a set of four fuel “types” depending upon their level of emissions. Rather than having a specific rate for petrol vs. diesel, these types of carbon intensive fuels will have their minimum rates at an equal level. This categorization system is intended to help with incentivizing fuels with lower environmental impact. The four types currently proposed are further disaggregated based on 3 usage categories (propellants, motor fuel for non-road uses, and heating fuel). An example is listed below of minimum rates for propellants (along with % change compared to current minimums)³⁹:

- EUR 10.75/GJ – Petrol (+2%), Gasoil/diesel (+22%), Kerosene (+23%), Non-sustainable biofuels
- EUR 7.17/GJ – Liquid Petroleum Gas (+47%), Natural gas (+176%), Non-sustainable biogas, Non-renewable fuels of non-biological origin
- EUR 5.38/GJ – Sustainable biofuels/biogas
- EUR 0.15/GJ – Low-Carbon Fuels (renewable fuels of non-biological origin, advanced sustainable biofuels/biogas)

*** Note: several “transition” fuels will have their minimum rates gradually increased in the 10 years following the directive’s commencement. E.g., Natural gas will rise from EUR 7.17 to EUR 10.75 between 2023 and 2033.

- 3) The overall intent of this new regime is to align the taxation system with the green transition and environmental goals of the EU. These proposed changes are designed to close what EU legislators consider perverse fuel use incentives. Notably, the proposed ETD specifically introduces fuel taxation for fishing, maritime shipping, and aviation sectors for the first time, which have been slower in their decarbonisation efforts, with fuel tax exemptions playing a role alongside larger technical challenges.⁴⁰

3.3.4. Renewable energy sources

3.3.4.1. Status of the data collected

Our inventory comprises more than 500 RES subsidies, of which 90% are actual data provided by the responsible authorities, indicating that they are closely monitored and result in good data quality. The remaining values were estimated to obtain disaggregated values, e.g., by breaking down the electricity mix by energy source, or to obtain values that were not provided by the authorities, e.g., values of certificate systems. For FiT/FiP and RES quotas, missing data for 2022 due to later publication dates have been estimated and adjusted based on the variation rate from MS where data

³⁸ Council Directive COM/2021/563 (EC). EUR-Lex Database2021. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0563>

³⁹ DRAFT REPORT on the proposal for a Council directive restructuring the Union framework for the taxation of energy products and electricity (recast). Available at: https://www.europarl.europa.eu/doceo/document/ECON-PR-719624_EN.pdf

⁴⁰ Council Directive COM/2021/563 (EC). EUR-Lex Database2021. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0563>

for 2022 have already been published. Only Poland and Sweden have provided complete data for the estimation of certificate values.

Uncertain data for year 2022 represent a third of the RES subsidies amount included in the *Subsidy inventory* for year 2022.

3.3.4.2. Approach about negative amounts related to certain RES subsidies

In some countries the subsidies for electricity from renewables in 2021 have been reported by official sources with lower values compared to 2020, or even negative values; this phenomenon was amplified in 2022. Since the second half of 2021, energy prices have been rising, which leads to situations where wholesale prices have exceeded the level of some FiT/FiP contracts concluded with project owners, which in turn create situations where suppliers owe money back to regulators instead of receiving money under “contracts for difference”.

Negative values were observed for example in Ireland under the Renewable Energy Support Scheme (RESS). Consequently, total amounts of renewable energy production support to solar and onshore wind were negative in 2021. In France, public energy service charges aimed at supporting renewable energies through FiT/FiP could represent revenue of EUR 8.5 billion for the State budget in 2022. In other countries (e.g. Germany, 2021-2022) support to renewable electricity has decreased significantly. At EU level, subsidies for FiT/FiP decreased by 11% in 2021 and are likely to decrease even further in 2022 (Figure 10).

Negative amounts can be of interest to assess the efficiency of a mechanism, or useful to assess the competitiveness of RES for example. But this is not the goal of this study, so we rather made the choice to integrate negative amounts as zero, considering that a negative amount cannot be considered as a benefit for the consumer or the producer and thus, as a subsidy in line with the definition for the study. While not considered here, some of these figures are reported in the Country observation annex.

3.3.4.3. Analysis

Our results show that subsidies for RES decreased for the first time in 2021, by EUR 1.3 billion compared to 2020 (-1.5%). This is mainly due to the increase in wholesale prices on electricity markets. Indeed, if the FiT/FiP contracts are contracts for difference, when the wholesale price on the electricity markets exceeds the reference tariff, the difference between the two is paid back to the State. This highlights how renewable energies (particularly electric ones) may contribute to public finances in the context of high wholesale energy prices, which could partly finance the exceptional expenses linked to consumer protection measures.

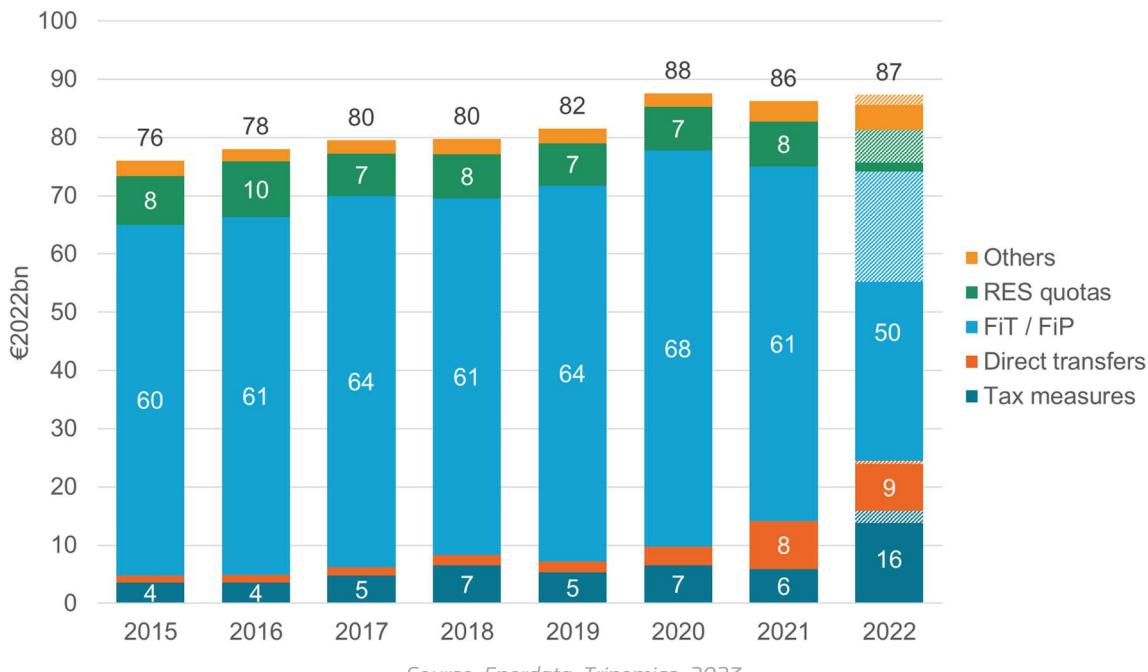
Among all the identified subsidy instruments (Table 8), feed-in tariffs and feed-in premiums remain the largest support schemes by volume for RES technologies in 2021 (see Figure 10). They represent more than 70% of total RES subsidies, i.e. EUR 61 billion in 2021.

As renewable energies are mainly supported through market-based instruments (e.g. feed-in premiums and RES quotas with tradable certificates), the level of support is influenced by the market environment, i.e. supply interruptions, declines in demand or evolutions in prices influence the subsidy amount. Given the market disruptions caused by the COVID-19 pandemic, the war in Ukraine and the resulting surge in prices, we expect data for 2022 to be adjusted retroactively by the responsible national authorities, which must therefore be interpreted with caution.

Direct transfers (mainly grants) strongly increased in 2021 to reach EUR 8 billion (EUR +5 billion compared to 2020) and became the second most used instrument in RES subsidies (10%). This is

largely due to the grants dedicated to RES production and electrical infrastructures included in Spain's recovery, transformation and resilience plan (EUR 2.9 billion), as well as increased support to single measures to boost the share of renewable energy for heating and cooling in Germany (EUR +1.4 billion). RES quotas with tradable certificates represent the third highest share (9%) in RES subsidies.

Figure 10: Renewable energy subsidies by subsidy instrument (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

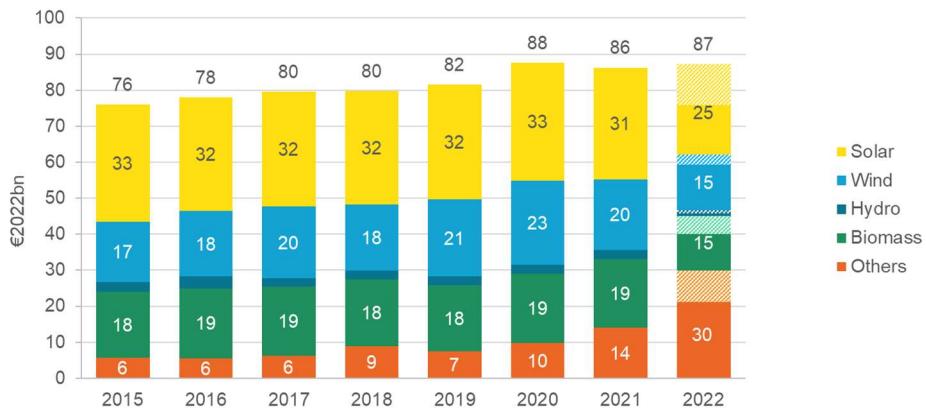
NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Figure 11 shows that solar energy technology received the largest share of subsidies for renewables in 2021 (EUR 31 billion) followed by wind (EUR 20 billion) and biomass (EUR 19 billion). Hydro, which is mostly a mature and already broadly deployed technology, receives little financial support (EUR 2 billion). Solar and wind are mostly supported by feed-in tariffs (FiT) or feed-in premiums (FiP). Even though solar accounted in 2021 for a lower share in energy production than wind (382 TWh of electricity from wind and 161 TWh of electricity and heat from solar⁴¹), it received higher financial support.

Important to note that certain projects which involve renewable energy (e.g., green hydrogen) may be included or not depending on their conformity with the data collection methodology. Hydrogen in particular is interesting as many present projects are greenlit with the intention of being low-carbon or even fully renewable but with some fossil fuel support at commencement, and as such hydrogen deserves its own analysis (cf. Textbox 3-3).

⁴¹ Electricity production capacities for renewables and waste, Eurostat (2022). Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Electricity_and_heat_statistics#:~:text=increased%20by%2024.7%20%25.,Production%20of%20electricity,Table%201%2C%20Figure%201.

Figure 11: RES subsidies by technology (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

The approach by technology and by country (Figure 12) shows a very heterogeneous situation across countries that partly relates to weather conditions in the EU. In most cases, countries have opted for technologies with greater local potential, such as solar PV in countries with high solar irradiation (Greece, Malta, Cyprus, Portugal, and Italy), or biomass in forested countries (Latvia, Finland, Estonia, Sweden, and Croatia). Germany and France present quite balanced spending across technologies reflecting both their large and various territories, and their ambition to promote a mix of solutions.

Croatia, also a country with high solar potential, have not invested much in solar in the past, either due to an insufficient legal framework or a low priority in the previous national energy and climate strategy and insufficient financial support⁴². In 2021 the Croatian government introduced a new EUR 783 million support scheme for electricity produced by RES, including solar⁴³, to meet the objectives of the country's latest Integrated Energy and Climate Plan⁴⁴.

The large amount of multi-RES subsidies in Spain is linked to the recovery, transformation and resilience plan, which finances the development of various RES, hydrogen and electricity infrastructures to cope with the integration of these new renewable capacities.

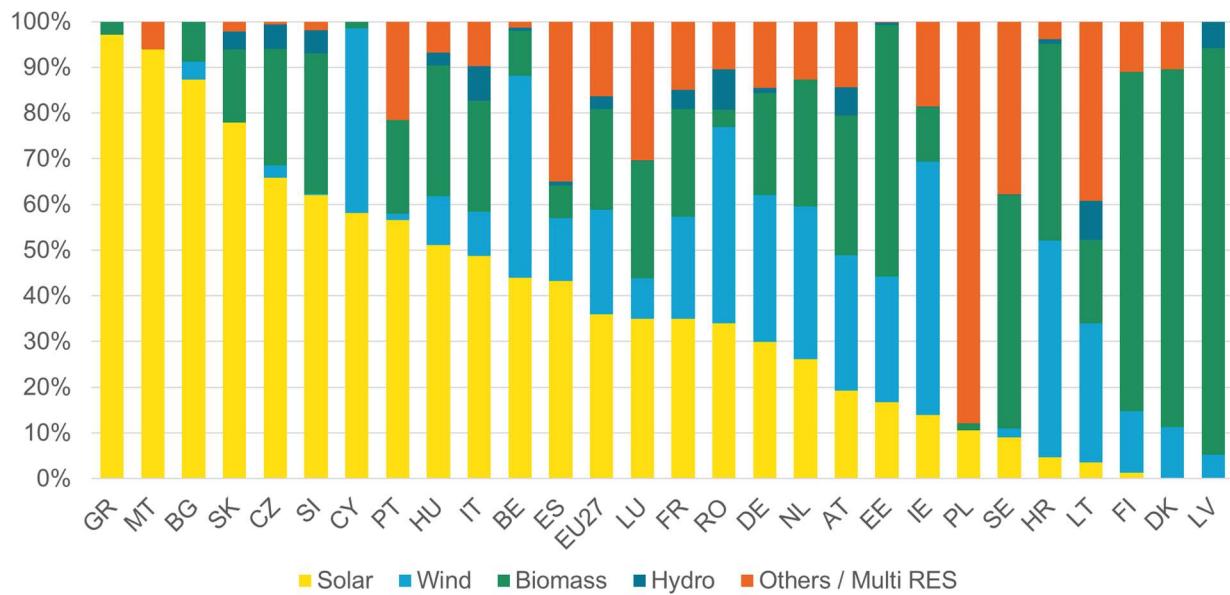
Most of the amounts collected for Poland cover several or all RES, and it has not been possible to estimate a breakdown by technology. In particular, the amount linked to green certificates (which represent more than 70% of RES subsidies in the country) has not been disaggregated.

⁴² "R., PEET: The Political Economy of Energy Transition in Southeast Europe – Barriers and Obstacles", Gallop, P., Gray, E., Nikolovska, E., Mustață, A., Petcu (2021). Available at: <https://library.fes.de/pdf-files/bueros/sarajevo/18313.pdf>

⁴³ "State aid: Commission approves €783 million Croatian scheme to support production of electricity from renewable energy sources", European Commission, (2021) Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_6422

⁴⁴ "First Draft of the Integrated Energy and Climate Plan for the Period from 2021 to 2030", Republic of Croatia – Ministry of Environment and Energy. Available at: https://energy.ec.europa.eu/system/files/2019-02/croatia_draftnecp_en_0.pdf

Figure 12: Share of RES subsidies by technology by Member State (2021; EUR2022bn)

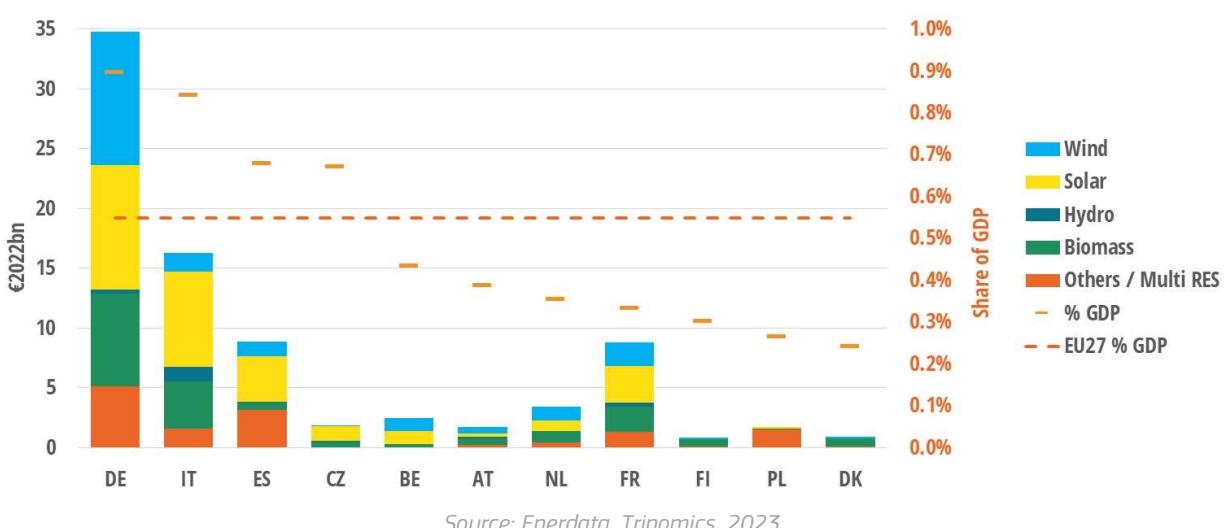


Source: Enerdata, Trinomics, 2023

Figure 13 compares the volume of RES subsidies by technology with MS's GDP in 2021. This indicator measures how committed a country is in supporting the development of renewables. In 2021, RES subsidies represented 0.55% of total EU27 GDP, similarly as in 2015 (0.52%).

Germany leads the ranking in absolute (EUR 35 billion) and relative (0.90% of GDP) terms. Italy follows in absolute and relative terms (EUR 16 billion, 0.84% of GDP). France's share of GDP of 0.33% (EUR 8.8 billion) is significantly lower than the EU average. The EU median share of RES subsidies in the GDP is 0.30%, quite below the average. Thirteen countries spend less than half the EU-average on RES subsidies, namely Hungary, Bulgaria, Poland, Denmark, Slovakia, Malta, Slovenia, Latvia, Sweden, Cyprus, Luxembourg, Portugal, and Ireland.

Figure 13: RES subsidies in selected Member States, % GDP (2021; EUR2022bn)



Source: Enerdata, Trinomics, 2023

Textbox 3-3: Hydrogen

According to the *Subsidy inventory* developed for this study, we were able to observe an emergence of hydrogen-related subsidies in the last few years. These subsidies were of minor scale until 2020, amounting to EUR 280 million across all member states. However, the sector experienced a substantial increase in financial support starting from 2021 and hydrogen-related subsidies reached EUR 2.5 billion in 2022. Throughout the course of that year, 22 countries within the EU27 implemented subsidies dedicated to hydrogen (all types). Prior to 2018, these subsidies were solely sourced from public research and development expenditures. However, by 2022, they constituted one-third of the total subsidies, with a stronger focus on supporting hydrogen production and project development. This shift can be attributed to the maturation and commercialization of hydrogen technology.

An important step for further support of hydrogen produced via electrolysis has been taken by the European Commission by the approval of Hy2Tech and Hy2Use, both as Important Project of Common European Interest⁴⁵, in July and September 2022 respectively. These two IPCEI were jointly prepared by 16 Member States: Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Slovakia, Spain and Sweden. As part of Hy2Tech, 35 companies will participate in 41 projects and the Member States will provide up to EUR 5.4 billion in public funding. It is expected to contribute to the development of technological breakthroughs, including new highly efficient electrode materials, more performant fuel cells, and innovative transport technologies. Through Hy2Use, 29 companies will participate in 35 projects and Member States will provide up to EUR 5.2 billion in public funding. It aims at developing highly innovative technologies expected to reduce greenhouse gas emissions in industries such as cement, steel and glass sectors that typically face higher barriers to decarbonise. Amounts collected in the *Subsidy inventory* through the IPCEI scheme for hydrogen reach EUR 1.1 billion in 2023.

On top of this EU-level objective, several EU member states have announced their own hydrogen strategies and electrolysis capacity targets by 2030: Denmark (4-6 GW), France (6.5 GW), Italy (5 GW), Germany (5 GW), and Spain (4 GW).

Notable projects listed in the *Subsidy inventory* include a EUR 450 million investment for a 200 MW electrolyser being developed by Iberdrola in Spain for fertilizers production, a EUR 143 million support to the Hybrit initiative in Sweden for the development of a fossil-free value chain in steelmaking processes and EUR 114 million for two Power-to-X projects in Denmark aiming to produce hydrogen for the transport sector.

3.3.5. Nuclear energy

3.3.5.1. Status of the data collected

As already documented in the *Subsidy inventory* 2022, subsidies identified as nuclear are significantly smaller than those for fossil fuels and renewables. Indeed, the *Subsidy inventory* 2023 contains only 40 subsidies, of which 31 are actual amounts and 9 are estimates. For 17 Member States, the subsidies that target RD&D were estimated based on 2021 amounts, as data were not yet available for 2022.

⁴⁵ *Important Projects of Common European Interest* programme: a European mechanism aimed at promoting innovation in strategic and promising industrial fields through transnational European projects.

3.3.5.2. Analysis

Three countries represent a combined 90% of subsidies to the nuclear industry over the period 2015-2021 (Figure 14). France, with the greatest commitment to nuclear power in the Union, represents 44% of on nuclear subsidies (an average of EUR 2.2 billion per year). These subsidies are generally dedicated to R&D in the nuclear field, funding long-term costs of nuclear energy use such as waste management, and finally payments related to an early closure program for the Fessenheim plant.

Germany, the second largest, represents slightly less at EUR 1.8 billion per year or 35% of total spending. These expenditures seem likely to reduce in coming years however, as plant closures finish and nuclear is replaced in Germany by other electricity sources (cf. Textbox 3-4). Indeed, in recent years the German nuclear subsidy package has primarily been early closure payments, including a settlement in 2021 with remaining nuclear operators.

Finally, Italy represents approximately EUR 0.5 billion per year, or 12% of nuclear subsidies, despite the country not having operational nuclear facilities since 1990. These subsidies are largely related to site decommissioning, waste management, and other post-closure costs.

Figure 14: Subsidies to nuclear power in the EU27 (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

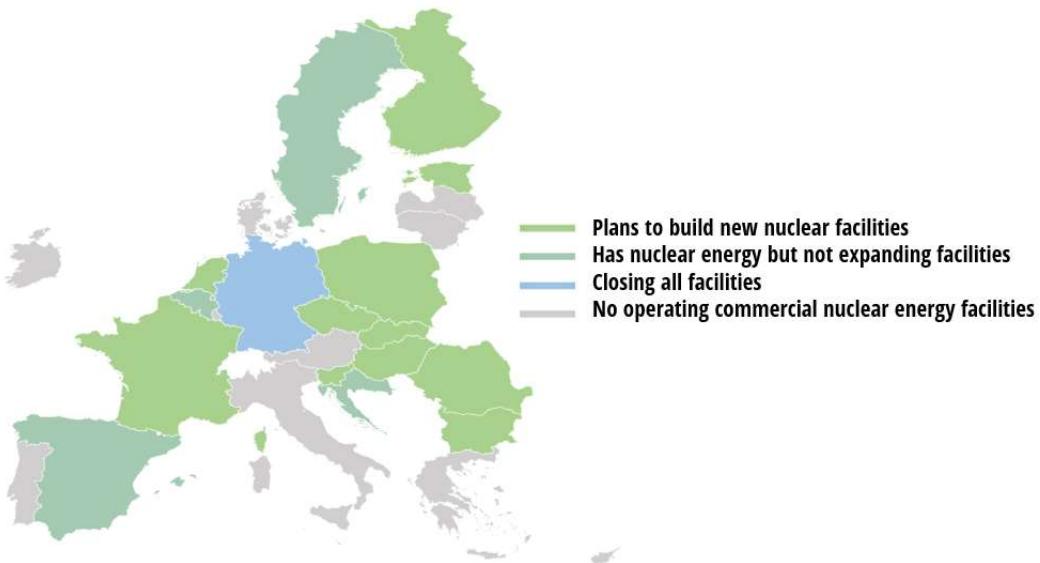
Subsidies to nuclear increased from EUR 4.3 billion in 2015 to EUR 7.6 billion in 2021 (see Figure 14). This increase is due to several factors. In the *Commission study 2022*, the amount attributed to the capacity market mechanism in France started being disaggregated by energy. Consequently, we now estimate that the amount of subsidy attributed to nuclear through the capacity market mechanism in France varied around EUR 0.4 and EUR 1.0 billion between 2017 and 2021. This amount is expected to decrease in 2022 as the cost of energy in general increased compared to 2021, thus making the capacity mechanism less costly as the price of electricity covered the capacity costs. The remaining part of the overall increase in nuclear subsidies in 2021 has to do with decommissioning costs from both France and Germany (cf. Textbox 3-4).

Not included in the 2021 or 2022 subsidies, but likely to influence future calculations are the programmes to expand nuclear facilities in the Netherlands, Czechia, Slovenia, Slovakia, Hungary, Poland, Romania, Bulgaria, and Finland.⁴⁶ (Figure 15). Of these, only Bulgaria and Romania do not

⁴⁶ Plans for new nuclear facilities (WNO). World Nuclear Organization 2022. Available at: <https://world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.aspx>

have existing subsidisation programmes. The combined value of the other 7 countries' existing programmes amounted to EUR 340 million (5% of total nuclear subsidies) in 2021. If all planned and under construction reactors are built the level of subsidisation would be expected to increase to reflect this greater reliance on nuclear energy. As can be seen in Figure 15 below, nuclear energy's role in the broader EU energy system is still evolving, with many countries still either operating reactors, choosing to build new facilities, or both.

Figure 15: Nuclear energy policies of EU27 Member States



Source: Enerdata, Trinomics, 2023

In 2021, subsidies to nuclear are distributed between tax expenditures that are mainly supporting energy demand; RD&D budgets; direct transfers, which support infrastructure or industry restructuring as well as income or price supports that correspond to France capacity market mechanism⁴⁷.

⁴⁷ This distribution must be considered with caution as the nuclear sector remains highly opaque. Therefore, a proportion of the subsidies declared as directed towards R&D could in fact support infrastructure or industry restructuring.

Textbox 3-4 Changes to nuclear decommissioning policy from the energy crisis

In France and in Germany, the implementation of national legislation that includes limited or complete end of the use of power from nuclear energy has led to substantial payments to utilities operating nuclear power plants for early closures of their assets. This legislation was to greater or lesser extent impacted by the energy crisis in 2022, which led to certain adjustments, extension or cancellations of decommissioning plans.

In 2015, France decided to cap nuclear energy production capacity and diversify its power generation mix. The public utility EDF was forced to close its Fessenheim plant; the financial consequences linked to the cap were covered by a compensatory protocol between the State and the operator. The protocol provides for several mechanisms for adjusting the amount of compensation: the fixed part, amounting to EUR 370 million, was paid in full in December 2020; the amount of the variable part, determined by parameters set in the protocol, is to be paid later as the compensation for the shortfall of the selling of electricity by EDF will also depend on future electricity market price⁴⁸. However, other closures, notably related to this 2015 measure have been reversed. In May 2023, the French parliament passed a policy to end caps to production as well as remove a goal to reduce nuclear energy's share in the electricity supply.⁴⁹ Due to the ongoing energy supply crisis the reactors of Blayais, Bugey, Chinon, Cruas, Dampierre, Gravelines and Tricastin have had their closures, due in 2023, either extended or indefinitely suspended.⁵⁰ As an example, the two oldest operational reactors in Chinon have had their decommissioning extended from the originally planned date at the end of 2022 to the end of 2024. As such, related early-closure subsidies are under the process of being ended or suspended to reflect the conditions of the affected reactors. It should also be noted that many of the key actors in the French nuclear industry are partly or wholly owned by the government, e.g., EDF, AREVA.

In Germany, the accelerated nuclear phase-out was enacted in 2011 following the Fukushima Daichi accident in Japan. This process was delayed slightly to help alleviate the energy supply crisis, however the final reactor at Essenbach went offline in April 2023.⁵¹ In total, the German government paid EUR 2.6 billion in compensation (including EUR 188 million to a Swedish operator) for lost electricity volumes in 2021, following a lawsuit from the plant operators.

The above-mentioned compensation payments and settlements are, according to the methodology used for compiling the report, are considered as “subsidy”, which helps to explain the large apparent increase in spending on nuclear subsidies in 2021.

⁴⁸ State Aid SA.61116, EUR-Lex Database 2021 Available at:

https://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_SA_61116

⁴⁹ Nuclear Expansion Law Passed by French Parliament. Le Monde 2023. Available at:

https://www.lemonde.fr/economie/article/2023/05/16/nucleaire-ce-que-contient-le-projet-de-loi-d-acceleration-de-la-construction-de-nouveaux-reacteurs_6173610_3234.html

⁵⁰ Ibid.,

⁵¹ Nuclear Phase-out plan of the German Federation. Bundestag Federal Office for the Safety of Nuclear Waste Management 2023.

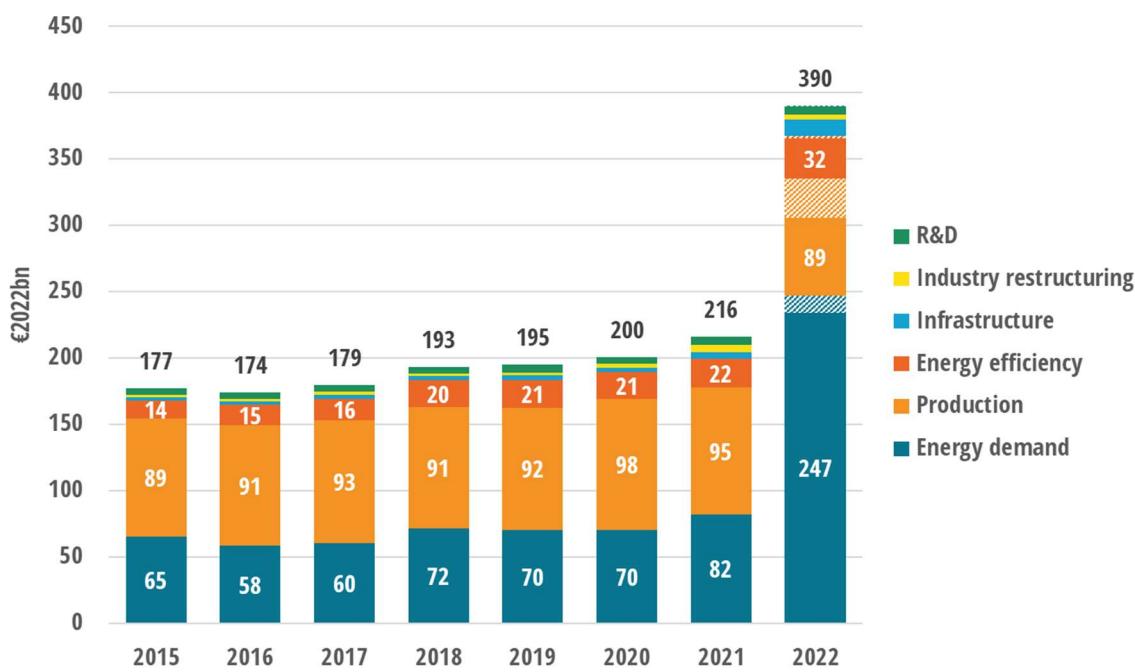
Available at: https://www.base.bund.de/EN/ns/nuclear-phase-out/nuclear-phase-out_node.html#:~:text=The%20last%20three%20nuclear%20power%20plants%20in%20Germany%20were%20shut,April%202023%20at%20the%20latest

3.4. Subsidies by purpose

The total amount of energy subsidies gathered throughout this study for the year 2022 has almost doubled compared to 2021, a drastic change compared to the prior 3.4%/year average growth trend registered over 2015-2021. Financial support directed to energy demand has tripled in 2022 compared to 2021, reaching EUR 247 billion and accounting for 95% of the total increase.

Energy subsidies disbursed for *infrastructure development* purposes multiplied by 2.5 and aid to *energy efficiency* increased by 50% compared to 2021. Support to *industry restructuring* and *energy production* have decreased, respectively by -33% (EUR -2 million) and -7% (EUR -6.7 million), while *R&D support* remained stable (Figure 16).

Figure 16: Energy subsidies by purpose (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

In 2022, support to energy demand overtook support to production as the most funded purpose category, as it represented around 60% of total sum of subsidies spent, and is chiefly attributed to Member State governments' commitments to alleviate the burden of rising energy prices on households and protect economic activity.

The next section analyses more in depth the evolution energy demand support.

3.4.1. Zoom in on energy demand

Data analysed in this section includes around 800 subsidies collected of which more than 700 are still active in 2022.

3.4.1.1. Status of data collected

Subsidies for energy demand cover supports aimed at limiting the costs of energy consumption in various economic sectors. This can be through mechanisms like tax reductions or refunds and address a wide range of economic sectors and agents from energy intensive industries to households. These

kinds of subsidies target all types of energy including renewables, fossil fuels, electricity, and heat, whichever their origin.

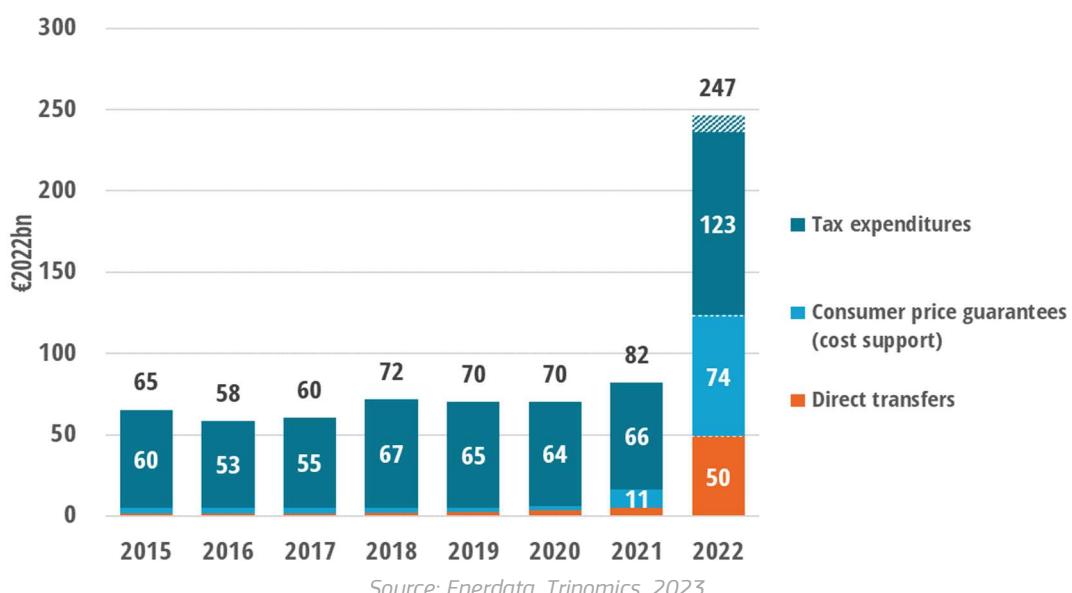
As of July 2023, the estimate of demand-oriented subsidies included EUR 12.6 billion of yet unconfirmed payments for 2022 (~5% of the total).

3.4.1.2. Analysis

Figure 17 presents subsidies aimed at supporting energy demand disaggregated by instrument used. During the period 2015 to 2020, overall spending grew at an average growth rate of 1.5%/year, reaching EUR 70 billion in 2020. Then, support to energy demand grew by 17% in 2021 and then tripled in 2022, reaching EUR 247 billion.

This change can be explained by the context of the energy price crises related to post-COVID recovery and Russia's invasion of Ukraine; and is mostly related to policy support measures that have been put in place by governments since end-2021 and further strengthened in 2022.

Figure 17 Subsidy instruments supporting energy demand (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

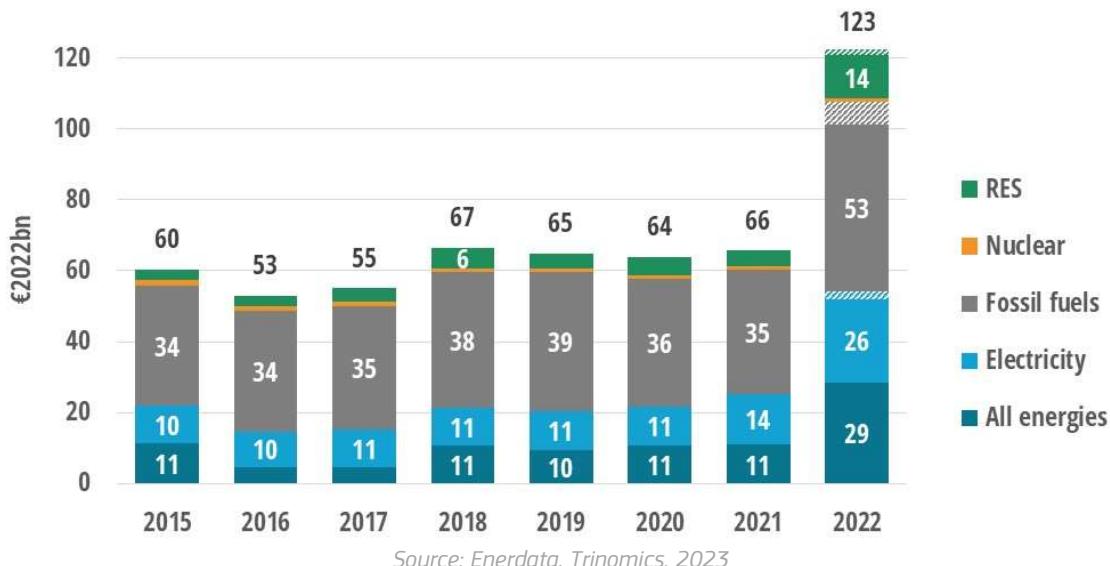
NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Over 2015 – 2020, tax expenditures represented by far the biggest share of total subsidies for energy demand (more than 90%). However, since 2021, direct transfers and consumer price guarantees (income or price supports) have been brought back as part of the policy measures in response to rising energy prices, changing the balance between these instrument (cf. 3.6 Subsidies by category). In 2022, tax expenditures represented half (EUR 123 billion) of the overall support to energy demand, followed by income or price supports (30%, EUR 74 billion), and direct transfers (20%, EUR 50 billion).

In Figure 18, tax expenditures are disaggregated by main energy source. This shows that the lion's share of the tax expenditures go to fossil fuels. In 2022, support to fossil fuels increased by EUR 18 billion and remained the most supported energy source. Nevertheless, its share in total tax expenditures decreased by 10 points (down to 43%) compared to 2021.

This is due to a high increase in support made towards other main energy sources. Tax expenditures supporting electricity have almost doubled and RES more than tripled compared to 2021.

Figure 18 Tax measures supporting energy demand (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

3.4.2. Zoom in on policies related to rising energy prices

Since mid-2021, EU and global energy markets have registered sharp price hikes (natural gas and electricity), primarily due to the strong economic recovery following the COVID-19 pandemic, combined with several additional factors such as the increasing demand for gas, the tightness of the global gas markets, Russian gas market manipulation, the low availability of the French nuclear fleet, a hot and dry summer resulting in increased energy demand for cooling and low renewable and hydro availability. The geopolitical tensions provoked by the Russian invasion of Ukraine in February 2022 and the weaponisation of gas supplies have considerably worsened the situation.

The European Commission and Member States have been tackling the issue of rising energy prices for the past two years: finding alternative energy supplies and reducing energy demand to compensate for the shortfall of Russian gas deliveries. EC policy also aimed to limit overall market volatility and redirect excessive energy sector revenues to citizens and businesses.

Starting in September 2021, EU ministers of energy and transport agreed on the need to tackle rising energy prices to reduce the economic burden on households and companies which were still struggling to recover from the effects of the pandemic. The European Commission in October 2021 published a communication on energy prices, proposing short-term and mid-term measures with a tool-box Member States endorsed and introduced measures mostly in line with the tool-box proposals.

In May 2022, the REPowerEU plan, a joint EU action for more affordable, secure, and sustainable energy was adopted with the aim to reduce dependence on Russian fossil fuels. In June 2022, the EC adopted the new Gas Storage Regulation changing requirement of gas storage, which aimed at 80% of capacity by 1 November 2022 – and at 90% in the years after – to ensure supply for the coming winter.

In July 2022, Energy Ministers agreed on coordinated demand reduction measures for gas to help Member States reduce gas demand by 15%. The plan was based on switching from gas to alternative fuels, incentivising consumption reduction, and reducing heating and cooling. As a strong signal that

highlights the importance to ensure security of supply, the Plan included the possibility to compulsory gas consumption reductions across the MS⁵².

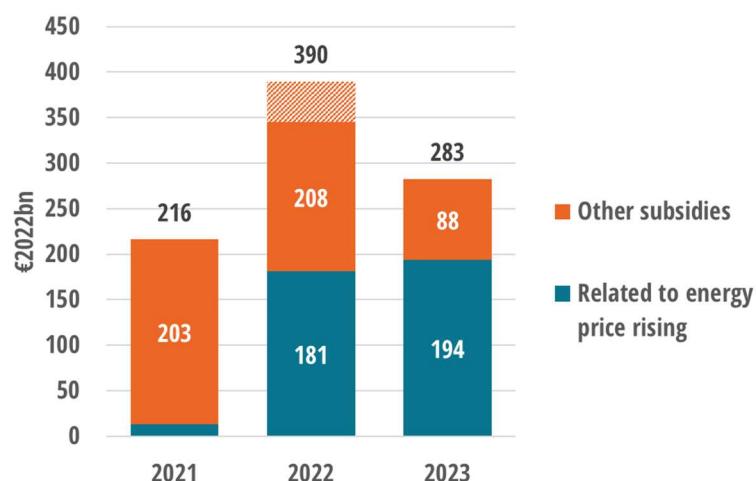
In September 2022, a new emergency regulation to address high gas prices in the EU and ensure security of supply during winter was adopted. In addition, Energy Ministers agreed on a regulation on an emergency intervention to address high energy prices. The measures aimed at reducing electricity demand and capture unexpected energy sector profits to the benefit of citizens and industry.

In addition to these supra-national policies, each MS adopted specific national measures to shield their citizens and their economy from damaging energy prices.

In our inventory, the measures specifically implemented to address energy price rising have been tagged. We identified around **240 such measures for the period of 2021–2022**, and we estimate that EUR 195 billion (including EUR 14bn unconfirmed) have been distributed through these measures, representing 32% of the total support amount during this period. In 2022, they accounted slightly less than 50% of total energy subsidies in the EU27 (Figure 19).

First figures for **2023** show a continuation of massive support. In the medium term, almost 80% of these measures are planned to end before 2025, and 20% have planned end-date after 2030 or none. Complementary analysis on end-dates for FFS are provided in section 4.3.

Figure 19: Energy Subsidies by relation to energy price crisis (2021–2023; EUR2022bn)

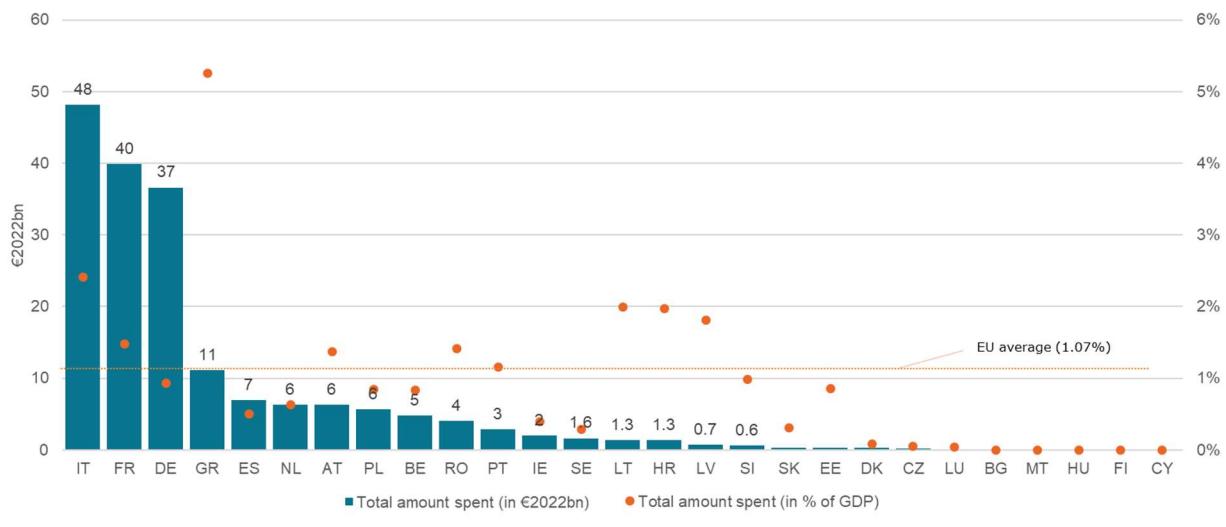


Source: Enerdata, Trinomics, 2023. Figures for 2023 are estimates.

In 2022, measures meant to address the energy price crisis accounted for slightly more than 1.1% of EU27 total GDP. Italy, France, and Germany accounted for almost 70% of the total spending (Figure 20). Relative to its GDP, Greece spent the most to address energy prices relative to its GDP (5%) followed by Italy (2.4%) while Czech Republic spent only 0.1% of its GDP on these type of measures. All other countries spent less than 2% of their GDP.

⁵² EU action to address the energy crisis. EC online publications 2022. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/eu-action-address-energy-crisis_en

Figure 20: Subsidies addressing the energy crisis (EUR2022bn, % of GDP)

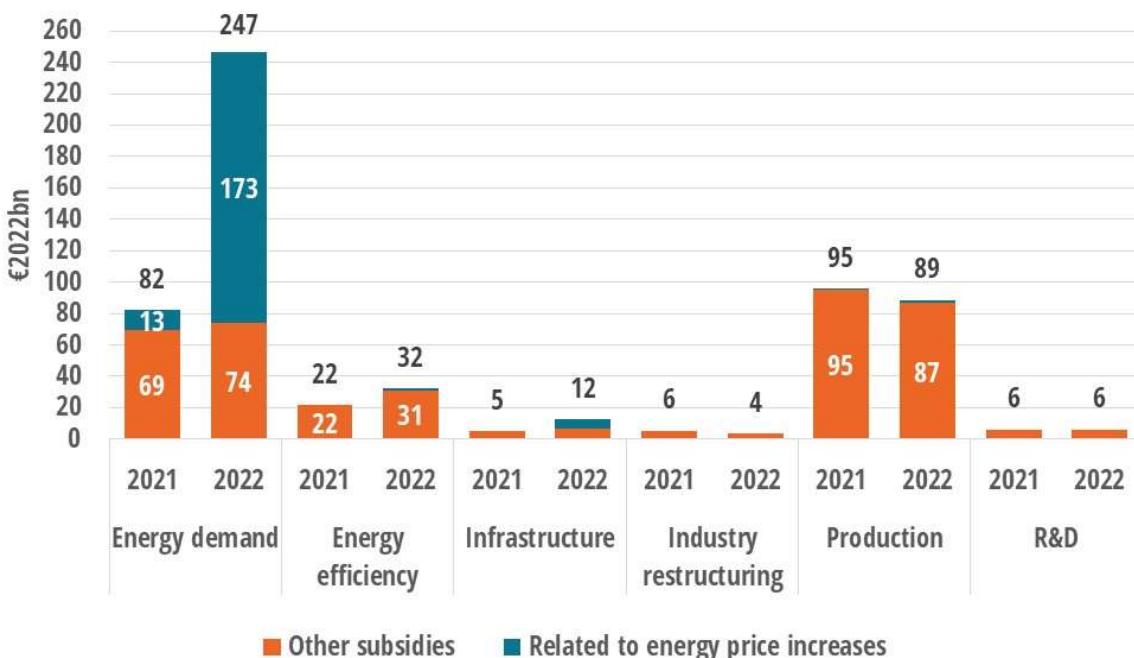


Source: Enerdata, Trinomics, 2023

Figure 21 highlights the purposes of the measures taken by governments to address energy price increases. In 2022, 95% of the subsidies addressing energy price increases were focused on consumers' energy demand. The remaining 5% of energy price increase-related expenditures were distributed in small measures across the remaining sectors.

By contrast, measures unrelated to energy price increases have a significantly more diversified and have a broader distribution across the various goals. Over 40% of these non-price-increase expenditures target energy production (EUR 87 billion), and a further third also support energy demand (EUR 74 billion).

Figure 21: Total amount of energy subsidies by purpose (2021-2022; EUR2022bn)



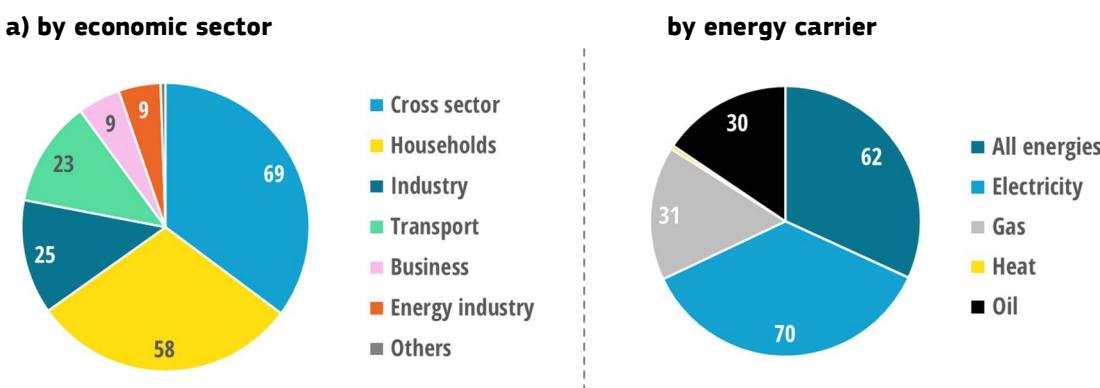
Source: Enerdata, Trinomics, 2023

Figure 22.a shows that, over 2021-2022, most of the targeted subsidies were aimed towards *households* (EUR 58 billion, 30%), followed by *businesses* and *industries*, including the *energy industry* and *others* (EUR 45 billion, 18%), and *transport* (EUR 23 billion, 12%). A significant amount (EUR 69 billion, 33%) was untargeted and covered multiple sectors.

Electricity is the main beneficiary with more than a third (EUR 70 billion) of the financial support during the period. Fossil fuels subsidies account for another third with gas (EUR 31 billion) and oil (EUR 30 billion). Finally, EUR 62 billion of the support addresses energy produced from a mix of fossil fuel and low carbon sources (indicated as “All energies below”).

As explained in Annex A.1 subsidies are collected and controlled in a way to avoid double counting. However, the overall EUR 195 billion mentioned above cannot be considered as pure additional subsidies as a share of these amounts only reinforces existing measures implemented before 2021. Additional analysis are carried out in section 3.5 below.

Figure 22: Energy subsidies addressing price increases in 2021-2022 (EUR2022bn)



Source: Enerdata, Trinomics, 2023

3.5. Subsidies by economic sector

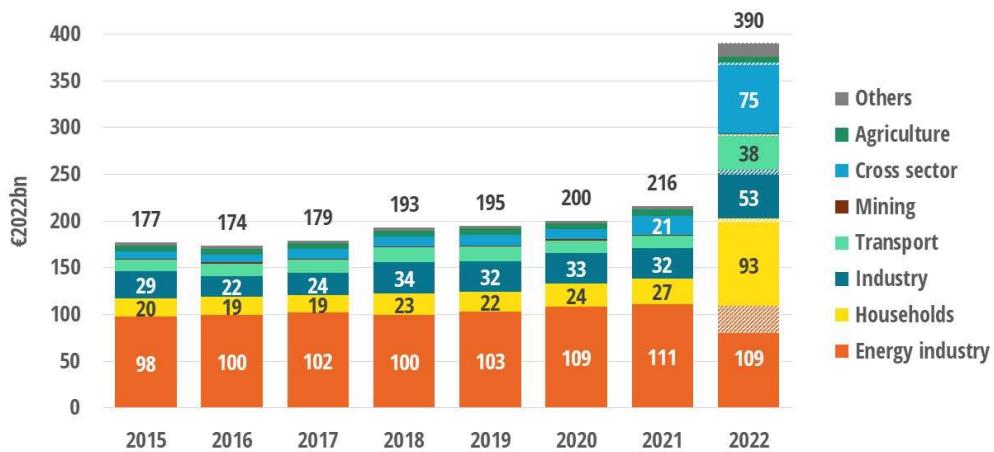
In 2021, the *energy industry* was by far the most subsidised economic sector, receiving EUR 111 billion and representing around 51% of the identified subsidies that year (Figure 23). Of this, EUR 64 billion are FiT/FiP and RES obligations⁵³ (not differentiated in Figure 23). The second and third largest sectors were *industry* (EUR 32 billion, 15%, excl. *mining* and *construction* sectors) and *households* (EUR 27 billion, 13%)⁵⁴.

Data for 2022 shows a change in distribution, driven by increased support to *households* (EUR 94 billion, 24% of the total) as well as for *cross-sectoral* subsidies (EUR 75 billion, 20% up from 10% in 2021). Meanwhile, *industry* is estimated to receive moderately increasing support (EUR 53 billion), leading it to make up a lower proportion of the total expenditure (13%). By contrast the *energy industry* is estimated to receive slightly less in subsidies for 2022 (EUR 109 billion, 28%).

⁵³ FiT, FiP and RES obligations are included by convention in the energy industry, while such payments may confer benefits to actors outside of this sector.

⁵⁴ Business, Construction, Public and Services sectors have been regrouped under the denomination “Others” as their individual amount for 2020 is less than €1 billion.

Figure 23: Energy subsidies by economic sector in the EU27 (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

3.5.1. Transport

The transport sector remains heavily reliant on fossil fuels and associated infrastructure, as well as on government interventions (for example towards greener transport, as explained in Textbox 3-5). Subsidies to the transport sector have increased between 2015 and 2019 to EUR 16 billion (+6.6% annually), before decreasing in 2020 to EUR 13 billion in response to travel restrictions due to the COVID pandemic, then rebounding to EUR 14 billion in 2021. The latter figure includes EUR 11.8 billion for the fossil fuels and the remaining EUR 2.2 billion from alternative transport fuels (electricity, biofuels, etc.) combined (Figure 24).

Figure 24: Energy subsidies by transport mode (2015-2021; EUR2021bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

For 2022, we estimate that total subsidies to the transport sector grew to approximately EUR 38 billion (+155% compared to 2021). As can be seen in Figure 24, road transport remains by far the largest recipient, accounting for 83% of total subsidies (EUR 31 billion), followed by air (EUR

3.6 billion, 9%), water (EUR 1.8 billion, 5%) and rail (EUR 1 billion, 3%). These changes have in large part been attributed to high oil prices⁵⁵.

For 2022, subsidies to oil products⁵⁶ are estimated to be EUR 32.7 billion or 92% of the total transport sector subsidies (not shown on graphs). A major factor in this increase in subsidisation has been temporary measures taken to reduce fuel prices for individual consumers, for example France's "*exceptional discount on fuel prices at the pump*" (estimated at EUR 7.6 billion alone). Additionally, some countries provide support to reduce commuting costs through tax refunds and other incentives, see Textbox 3-6 for greater detail on these measures.

Textbox 3-5: Support to clean mobility

In the current study, we covered subsidies to recharging infrastructure. These subsidies reached EUR 1,05 billion in 2021, with Germany leading the way (EUR 897 million), followed by Italy (EUR 98 million), France (EUR 21 million) Sweden (EUR 13 million), Romania (EUR 9 million), and Denmark (EUR 8 million). Preliminary data for 2022 shows a further large increase, with total subsidy spending on charging infrastructure likely to exceed EUR 2 200 million. Some subsidies have been carried through recovery programmes (e.g. in France with EUR 67 million announced for 2022) or in conjunction with other fuels (biofuel and hydrogen), as in Poland (EUR 186 million announced for 2022). Beyond just electric mobility, subsidies have steadily risen since 2015 for bioenergy, led by Estonia and Finland, peaking at EUR 60 million in 2020, with another EUR 46 million estimated for 2022.

During data collection, we also came across numerous support measures towards clean transport and electric vehicles that do not qualify as energy subsidies per se. We have collected and gathered these measures together in a separate database. Of the 68 support measures we identified since 2015, 24 were directed specifically towards electric vehicles. The remaining 44 support either low emission combustion-engine vehicles, hybrid electric vehicles or low emissions vehicles in general including electric ones. Note that this separate inventory is not exhaustive and does not include all measures in place at the MS level. As with infrastructure, the amount of support in this domain has been increasing since 2015 reaching around EUR 4200 million in 2021, expected to increase to EUR 5,400 million in 2022. It is also Germany that is leading the way with EUR 2 440 million in 2021 followed by Netherlands (EUR 1 054 million), and Sweden (EUR 520 million). For 2022, these countries are expected to remain the largest subsidy providers, with the addition of Italy (estimated EUR 650 million for 2022).

The type of instrument and the sectors targeted vary but a vast majority of measures can be considered as direct transfers (43 measures) and are directed towards households: the typical instrument being a grant for the purchase of a clean vehicle. On the other hand, we also identified mechanisms aimed at businesses and public authorities even though this kind of aid can sometimes be included in bigger schemes financing energy efficiency. Finally, some countries also use tax expenditures (e.g., Germany, where first-time registered fully electric vehicles are excluded from taxes) or easier access to credit (e.g., France, where households or legal entities can access a soft loan to buy a low emission vehicle).

⁵⁵ Domestic aviation and water (navigation) transport tax expenditures were estimated by using a unified method and external sources. The methodology used is detailed in Annex A.1.8.

⁵⁶ Including diesel/gasoil, fuel oil, and other petroleum derivatives

Textbox 3-6: Support to commuters

Commuter benefits are a widely used measure throughout the EU27 MS to support workers by compensating them for their expenses incurred traveling between home and work. Typically, commuter benefits are applied in the form of tax benefits, such as allowances for travel costs or reimbursements. Within the scope of this study, they are not considered as energy subsidies, and are therefore excluded from the inventory because they are not directly supporting the consumption of any energy product.

However, these instruments often lower the costs for (and thus indirectly encourage) living further away from work, which in turn increases energy demand and GHG emissions. Nevertheless, well-designed support to commuters can improve the modal split towards more sustainable transportation and thus reduce the demand for fossil fuels. These measures have been further leveraged in response to elevated energy prices to help limit costs to consumers in certain countries, e.g., Czechia expanding their commuter tax rebate by doubling the allowance. Austria, for another example, has quadrupled the commuter allowance (“Pendlerpauschale”), regardless of the fuel used.

Although these instruments were not specifically targeted in our study, we have often found such measures in several MS tax expenditure reports. As it seems to be a structural fiscal instrument promoting energy consumption, listed below are some key examples encountered during the data collection process, namely through the D-Ticket program which consolidates ticketing nationwide for public transit.

In Germany, the commuter travel allowance (“Entfernungs pauschale”) is deducted from the annual income, equivalent to a tax credit. Total foregone revenues were estimated by the federal tax authority to be EUR 6.7 billion in 2022 according to the Umweltbundesamt⁵⁷. Germany has also provided some additional programs to encourage train travel during 2022’s periods of elevated fuel prices.

In France, a similar measure exists (“Frais de Transport”)⁵⁸ but it only fully applies when living within 40 km of the place of work. Additionally, when using public transport to commute, the employer is obliged to reimburse 50% of the transportation costs. Furthermore, a “sustainable mobility” allowance, which can be applied to car sharing, cycling and rental of electric vehicles, came into force in 2020.

In Spain⁵⁹ and the Netherlands⁶⁰, there is a tax-free mileage reimbursement of EUR 0.19/km, which is paid by the employer on a voluntary basis.

⁵⁷ „Umweltschädliche Subventionen in Deutschland – Aktualisierte Ausgabe 2021“, page 63., Burger, A. and Bretschneider, W. (2021)

⁵⁸ “Frais de transport”, Ministry of Taxes 2022, <https://www.impots.gouv.fr/particulier/frais-de-transport> (last access: 20.06.2022)

⁵⁹ “Mileage Reimbursement in Spain – A Guide for Overseas Employers”, ShieldGeo (2019). Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/eu-action-address-energy-crisis_en <https://shieldgeo.com/mileage-reimbursement-in-spain/> (last access: 20.06.2022)

⁶⁰ “Wat is de maximale reiskostenvergoeding die ik van mijn werkgever kan ontvangen?”, Rijksoverheid (2022). Available at: <https://www.rijksoverheid.nl/onderwerpen/inkomstenbelasting/vraag-en-antwoord/wat-is-de-maximale-kilometervergoeding-die-ik-van-mijn-werkgever-kan-ontvangen> (last accessed: 20.06.2022)

3.6. Subsidies by category

Table 2 below summarises the distribution of energy subsidies in 2022, distributed primarily through income/price support (38%), tax expenditures (35%) and direct transfers (25%). These expenditures are mainly directed towards fossil fuels (31%) and the 'All energies' category (29%). Renewable energy sources captured only 22% of energy subsidies in 2022, while this share was 40% in 2021.

Table 2: Subsidy amounts distribution by category and instrument (2022, %)

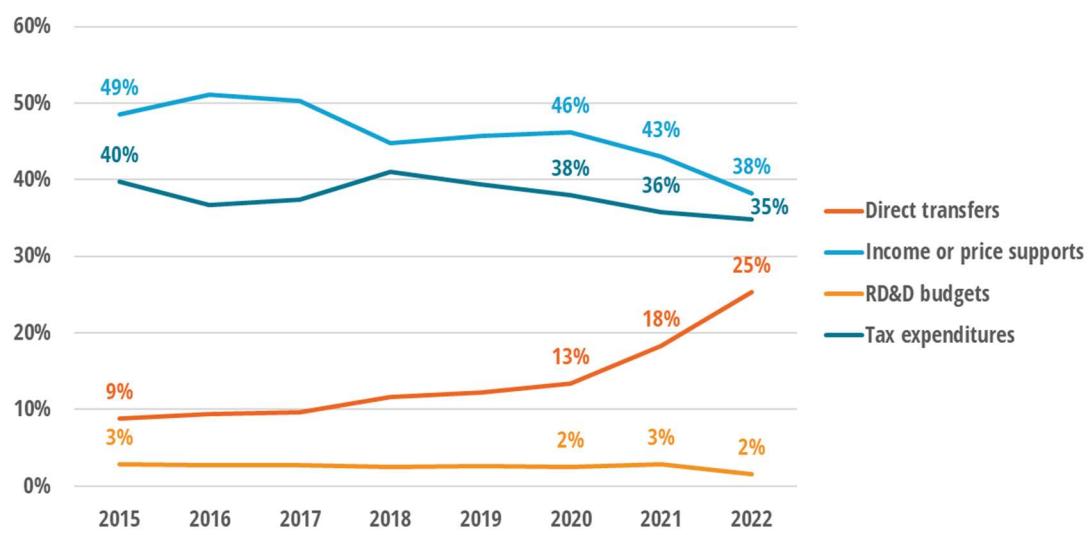
Subsidy category	All energies	Electricity	Fossil fuels	Nuclear	RES	Total
Direct transfers	16%	1%	6%	0%	2%	25%
Tax measures	9%	7%	15%	0%	4%	35%
Income or price support	2%	9%	11%	0%	16%	38%
RD&D Budgets	1%	0%	0%	0%	0%	2%
Total	29%	16%	31%	1%	22%	100%

Please note that in few cases numbers do not add up to the total due to rounding.

As can be observed in Figure 25, over the period 2015-2020, the overall distribution of subsidies by instrument category evolved only slightly.

Since 2021, the overall distribution of subsidies has changed. The slow trend observed during the period 2015-2020 has accelerated and reinforced. Income or price supports remain the most used instrument, but its share is 8 percentage points lower compared to 2020, followed by tax expenditures which lost 3 percentage points, while direct transfers is third with a share that have nearly doubled (+12 points) since 2020.

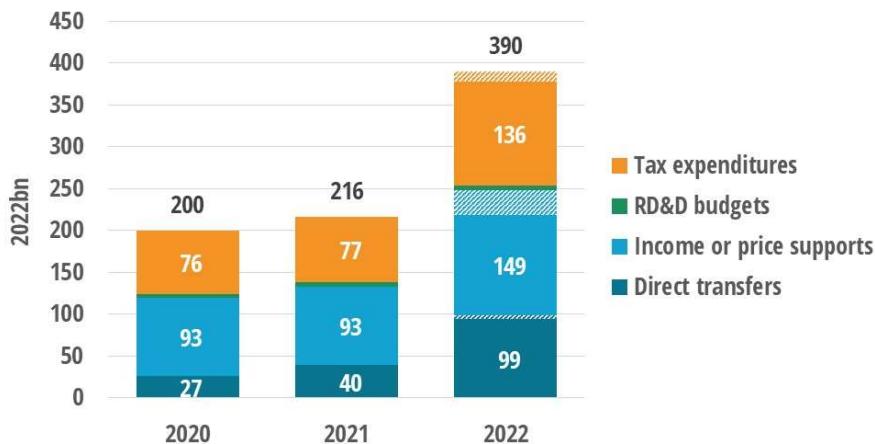
Figure 25: Share of subsidy amounts paid, between 2015 and 2022 (%)



Source: Enerdata, Trinomics, 2023

As Figure 26 shows, every single instrument category has increased since 2020. Between 2020 and 2022, amounts of direct transfers have quadrupled, income or price supports increased by more than a half, tax expenditures by 80% and RD&D budgets by 24%.

Figure 26: Subsidy distribution per instrument between 2020 and 2022 (EUR2022bn)



Source: Enerdata, Trinomics, 2023

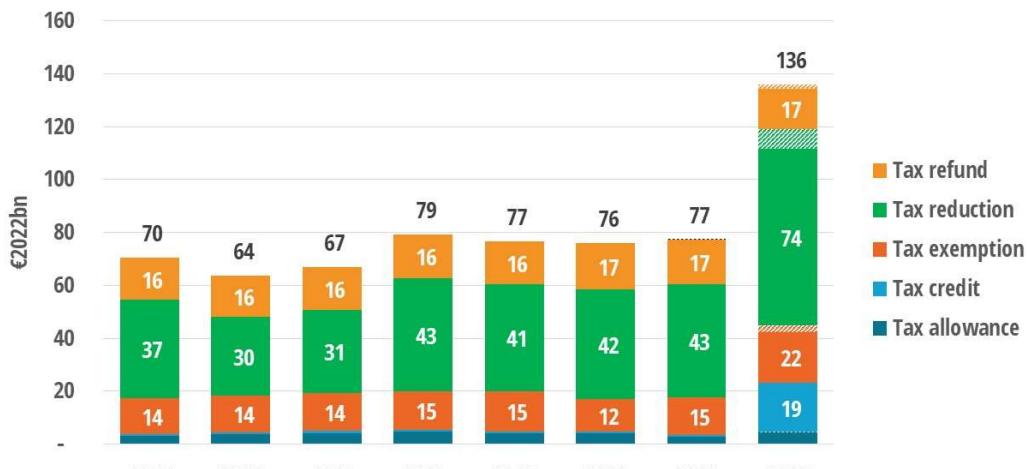
NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

3.6.1. Tax expenditures

After income/price mechanisms, **tax measures were the second largest tool used to subsidise energy in 2022**. The amount provided through these measures increased to EUR 79 billion (or by 13%) from 2015 to 2018 and stabilised around EUR 75 billion until 2021 (Figure 27).

In 2022, total amount of tax subsidy measures increased significantly, reaching an estimated EUR 136 billion. Of these, more than half (EUR 74 billion) were revenue waivers, including VAT reductions. This type of foregone revenue increased by EUR 13 billion (44%) between 2016 and 2021, due to the increasing use of reduced rates. In 2022, the foregone revenue due to tax waivers surged to EUR 74 billion, as a reduced rate on energy products was one of the typical measures used by Member States to address the energy price crisis (cf. Textbox 3-7and Table 3).

Figure 27: Tax expenditure in the EU27 by type of tax (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Tax credits have also jumped in 2022 compared to their historic value, increasing from less than 1% to 14% (EUR 19 billion) of total tax expenditures. 98% of tax credit waivers were created to address

the energy price crises. The remaining tax expenditures considered are divided between tax exemptions (EUR 22 billion in 2022, 16%), tax refunds (EUR 17 billion, 12%), and tax allowances (EUR 4 billion, 3%).

Textbox 3-7: Value Added Tax (VAT)-related measures

Record high energy price increases have put significant pressure on the purchasing power of consumers. In April 2022, the Commission amended its VAT Directive allowing Member States to use reduced VAT rate below 5% (on a limited ranges of supplies) for the first time. Previously, Member States were free to set their standard VAT rate provided it was 15% or above (such a limit was designed to prevent distortions in the EU single market by actors seeking to gain advantage by shifting consumption to other EU states).

14 countries in the Eurozone introduced temporary cuts on their VAT rates on energy since beginning 2022 (cf. Table 3).

By 2030, the application of lowered VAT rates or exemptions on fossil fuels and other goods deemed “environmentally harmful” will have to be phased-out.⁶¹

Table 3: Temporary energy VAT changes in the EU27 since January 2022

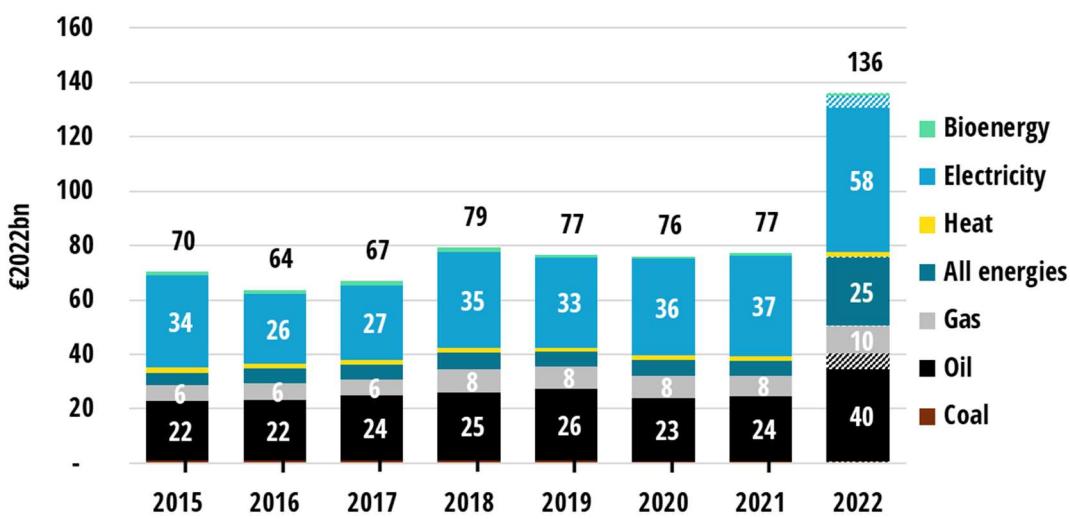
	VAT on electricity	VAT on gas and heat	VAT on transport fuels
AT	-	-	-
BE	↓ 6% VAT (from 21%)	-	-
BG	↓ 9% VAT (from 20%)	-	-
CY	↓ 5-9% VAT (from 19%)	↓ 5% VAT	-
CZ	-	-	-
DE	-	-	-
DK	-	-	-
EE	↓ 9% VAT (from 20%)	↓ 5% VAT (from 9%)	-
ES	↓ 5% VAT (from 21%)	-	-
FI	↓ 10% VAT (from 24%)	-	-
FR	-	-	-
GR	-	-	-
HR	↓ 13% VAT (from 25%)	↓ 5-13% VAT (from 25%)	-
HU	-	-	-
IE	↓ 9% VAT (from 13.5%)	↓ 9% VAT (from 13.5%)	-
IT	↓ 5% VAT (from 10-22%)	↓ 5% VAT (from 10-22%)	-
LT	-	-	-
LU	-	-	-
LV	(heating) ↓ 5% VAT (from 12%)	-	-
MT	-	-	-
NL	↓ 9% VAT (from 21%) Temporary applied. Reduced rate abolished for price ceiling	-	-
PL	↓ 5% VAT	↓(gas) 0% VAT; (heat) 5%	↓ 8% VAT (from 23%)

⁶¹ Council Directive (EU) 2022/542 ; article 105a, paragraph 4. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L0542&from=EN>

	VAT on electricity	VAT on gas and heat	VAT on transport fuels
PT	6% VAT (from 13%)		↓ 13% VAT (from 23%)
RO	-	-	-
SE	-	-	-
SI	9.5% VAT (from 22%)		-
SK	-	-	-

In 2022, electricity was the beneficiary of 42% (EUR 58 billion) of tax expenditure-type subsidies, up from 27% in 2021. Subsidies to fossil fuels through tax measures increased by 57% compared to 2021 and accounted for 46% (EUR 51 billion) of the total amount (cf. Figure 28). Of this sum, almost 80% went to oil, 20% to gas, and the remaining 1% to coal. Around 20% of tax expenditures subsidies are not targeting a specific energy source.

Figure 28: Tax measures by energy sources / carriers (2015-2022; EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Marked gasoil (also called coloured gasoil), which is used for off-road uses in agriculture, construction, industry, rail transport, public administration and for heating purposes in residential and services sectors, benefited from EUR 9.9 billion of subsidies in 2021 (Figure 29). This represents a decrease of 0.4 billion compared to 2020 (-13%) after steadily increasing between 2015 and 2020 (+27%).

As of July 2023, data yet to be confirmed for marked gasoil estimates that 2022 subsidies were worth EUR 3.3 billion, which represents approximately 37% of total estimated amount for 2022, most probably reflecting the decreasing price trend for crude oil and oil products.

Figure 29 also illustrates that three sectors benefited from almost four-fifths of total tax revenues forgone on marked gasoil in absolute value in 2022: the *transport* sector (EUR 2.6 billion), followed by *agriculture* and *industry* (EUR 2.2 billion each). The remaining 22% are shared between *households*, *construction*, and *other* sectors.

During the period 2015-2020, tax revenue forgone by the *industrial sector* showed strong annual increases (+15% per year). At the same time, *agriculture* (including fishing activities) and *construction* were the only sectors on a downward trend (-1.4% per year).

In 2022, support to industry remained quite stable while transport and agriculture decreased compared to 2021 (-11% for transport and -6% for agriculture).

Figure 29: Tax expenditures on marked gasoil by sector (EUR2022bn)



Source: Enerdata, Trinomics, 2023

NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

3.7. Subsidies by environmental assessment

This study introduces the assessment of the environmental impact of energy subsidies, with the aim of the identification of environmentally harmful subsidies (EHS). The 2023 report will focus on fossil fuel subsidies, because the methodology for identifying environmentally harmful subsidies (EHS) for energies other than fossil fuel is still being developed by the European Commission⁶². The assessment is therefore a first step towards a comprehensive overview of all subsidies in future editions of this study.

Changing the scope from identifying and measuring subsidies to determining their environmental impact is a major challenge for all organisations, including the European Commission. All economic activities linked to resource extraction, production, transport and consumption have an impact on the environment. These impacts can be either reinforced or reduced by public policies, including subsidies. Therefore the results of the following chapter should be treated as preliminary, as the services of the European Commission, led by the Directorate-General for Environment, are working to capture and classify all subsidy measures in the EU.

⁶² Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022D0591>

3.7.1. Identifying environmentally harmful fossil fuel subsidies

This report uses the following definition for the environmental assessment of fossil fuel subsidies (FFS):

- **Environmentally harmful:** FFS that incentivises maintaining or increasing in the availability of fossil fuels and/or use of fossil fuels;
- **Not environmentally harmful:** FFS that incentivises decreasing the availability of fossil fuels and/or use of fossil fuels.

The failure to internalise externalities (government inaction or implicit subsidies) is excluded from the current definition of environmentally harmful FFS, in line with the definition of a subsidy used in this report (cf. **Background**).

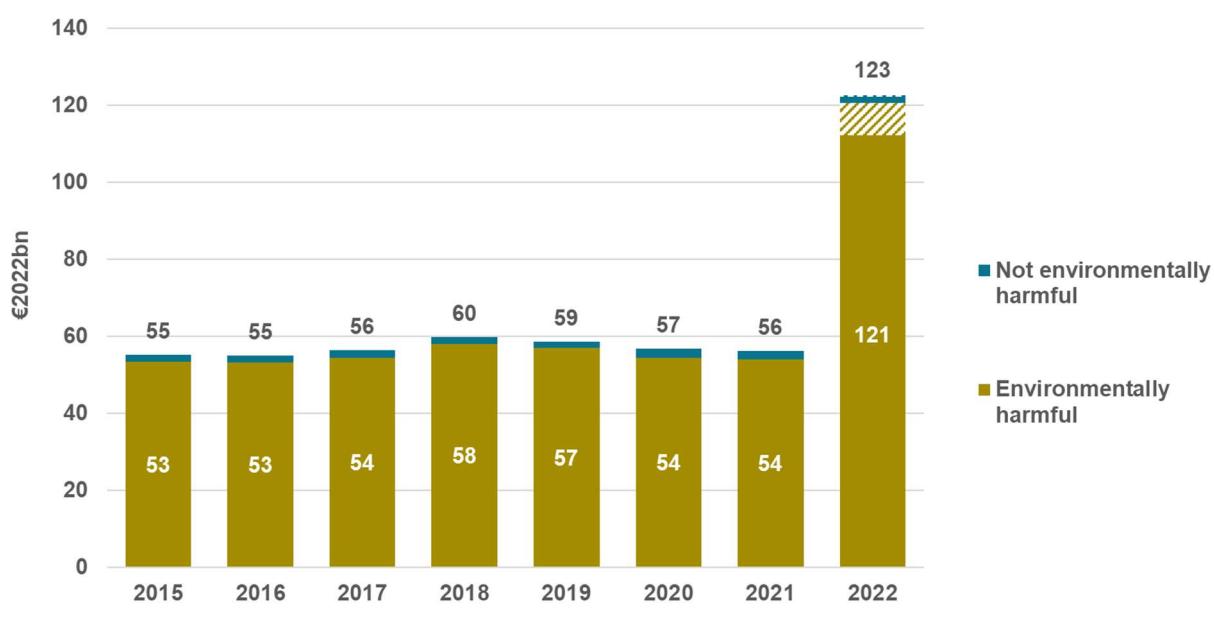
The underlying rationale for the definition for EHFFS and more detailed methodology to determine whether an FFS is environmentally harmful or not is provided in Annex A.1.11.

3.7.2. Analysis

The analysis in this section provides an additional cross-section of the FFS analysis from section 3.3.3 from the perspective of whether a given FFS is considered to be environmentally harmful. This section only covers FFS as identified in section 3.3.3 and not multi-energy subsidies not reflected in the fossil fuel category but the “All energies” category.

Figure 30 shows that *the overwhelming majority* of FFS (98% in 2022) are considered *environmentally harmful*. The total amount of EHFFS in 2022 amounted to EUR 120 billion from around 420 subsidy measures (of which EUR 9 billion are estimates based 2021 data). The total amount of EHFFS have more than doubled in 2022 compared to the previous years. This increase in EHFFS can be fully attributed to measures that have been implemented to tackle the rising energy prices, as discussed in section 3.4.2. These measures are all considered environmentally harmful as they lower the cost of fossil fuel consumption and thereby incentive maintaining the use of fossil fuels, or secure the availability of fossil fuels.

Figure 30: Fossil fuel subsidies in the EU27 by environmental impact (EUR2022bn)



Source: Enerdata, Trinomics, 2023

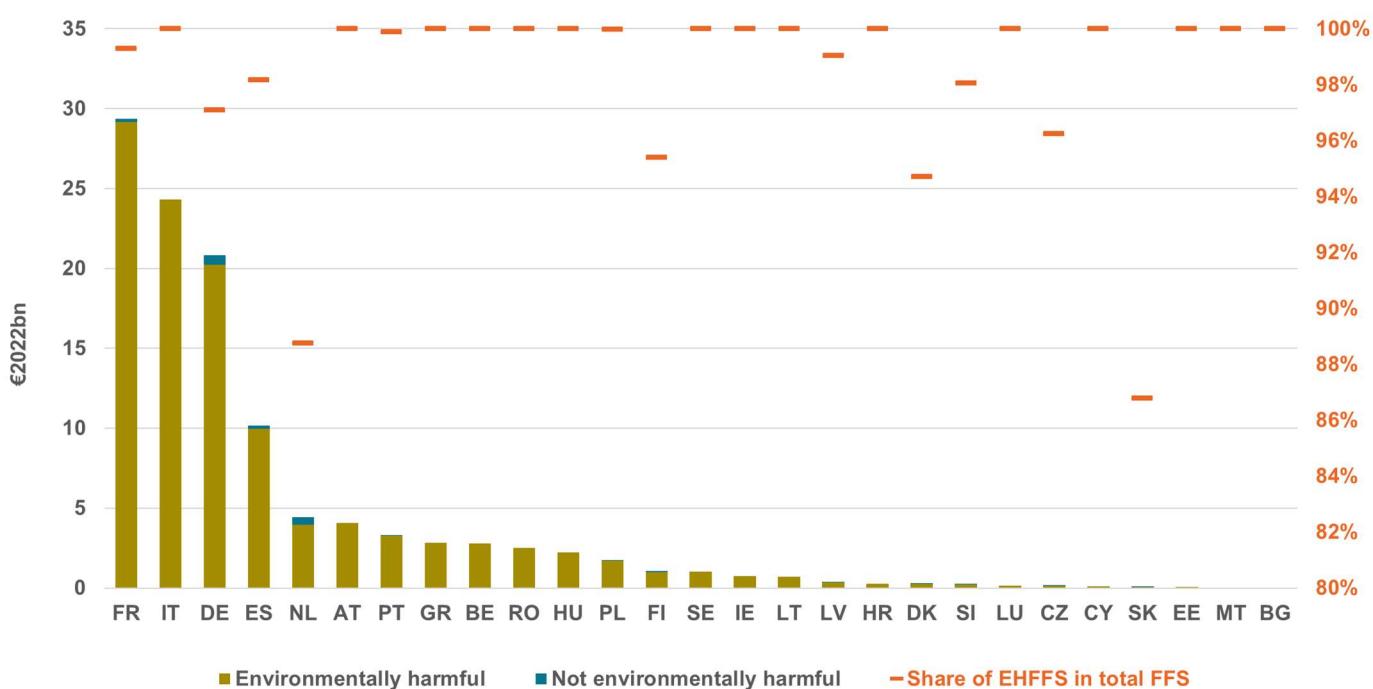
NB: 2022 are preliminary results, some amounts contain yet unconfirmed figures (represented with hatching)

Figure 30 also shows that the FFS considered as not environmentally harmful has stabilised around EUR 2 billion per year from around 30 FFS through the years. The vast majority of these FFS (>95% of the subsidy amount) relate to compensation to companies and workers for curtailment or closure of coal mines and coal-fired power plants, or funding for rehabilitation of the areas where such closures have taken place. The rest of the FFS relate to subsidies for reducing natural gas consumption in households through energy efficiency or replacing their fossil fuel boilers, and financial support to be disconnected from the gas distribution network.

In 2022, France provided the highest amount of EHFFS (EUR 29 billion⁶³), followed by Italy (EUR 24 billion) and Germany (EUR 20 billion), as shown in Figure 31. The amount of EHFFS provided in 2022 increased in almost all Member States as a result of measures introduced to tackle high energy prices. Preliminary data shows that the EHFFS only decreased in Finland (EUR -0.1 billion), Slovakia (EUR -0.06 billion), Denmark (EUR -0.05 billion), Czechia (EUR -0.01 billion) and Poland (EUR -0.01 billion) compared to 2021. These changes were mainly due to a decrease in spending of existing subsidies rather than the abolishment of any EHFFS.

In terms of FFS considered as not environmentally harmful, Germany provided the highest amount (EUR 0.6 billion) in 2022, followed by the Netherlands (EUR 0.5 billion) and France (EUR 0.2 billion) and France (EUR 0.2 billion). In relative terms, in all 27 Member States, the share of EHFFS exceeded 85% of total fossil subsidies; in 17 Member States their share was 100%.

Figure 31: Fossil fuel subsidies by environmental impact in 2022 (EUR2022bn, % of total)



Source: Enerdata, Trinomics, 2023

The figures shown on this chart refer to confirmed fossil fuel subsidies, and don't include EUR 8.98 billion unconfirmed subsidies.

⁶³ These figures refer only to the **confirmed amount** of 2022 fossil fuel subsidies.

It is important to note is that the results in this section are inherent to the definition of EHFFS introduced in this study, the categorisation used in this study to identify FFS and our interpretation of the description of each FFS. A different definition of EHS could yield different findings on EHFFS. Therefore, the authors highlight the need for a harmonised definition and methodology for determining when a subsidy should be considered as environmentally harmful. This underlines the importance of methodology for identifying EHS, which is currently being developed by the European Commission under the Directorate-General for the Environment.

3.8. Other financial supports

3.8.1. Support through freely allocated allowances in the EU ETS

Why are free allowances not considered to be a subsidy?

The free allocation of emission allowances is supposed to reduce the economic burden of companies participating in the EU ETS in order to avoid both the loss of international competitiveness and the carbon leakage effect. In the current phase of the EU ETS, allowances are auctioned and generate government revenue. Therefore, freely allocated allowances would impact the government budget and hence would be included in our database under normal circumstances, similar to tax reductions or waivers on energy products. However, in agreement with the European Commission and continuing the methodology introduced in earlier editions of this report, freely allocated allowances will continue to be treated separately, due to the supranational character of the programme's administration and regulation.

Overview:

In 2005, the EU launched the world's first international emissions trading system (ETS). During its first phase (2005-2007) almost all allowances were given to businesses for free. The second period (2008-2012) saw the proportion of free allocation slightly reduced to around 90%⁶⁴. Since the beginning of the third period (2013-2020), the EU ETS auctioning has become the default allocation method and the power generation sector is obliged to buy all of its allowances and no longer receives free allowances, except for eight countries⁶⁵ that made use of a derogation under Article 10c of the EU ETS Directive. This rule continues in the 4th phase (2021-2030), but only Bulgaria, Hungary and Romania decided to apply Article 10c of the EU ETS Directive in phase 4⁶⁶. This derogation allows the country in question to provide free allocation to parts of the energy sector, with a process by which free allowances are to eventually be replaced by the auction mechanism.

In 2021, the Commission proposed the Carbon Border Adjustment Mechanism (CBAM) which supports the phase out of free allowances while lowering the risk of production outsourcing to less stringent regulatory environments. It is scheduled to be implemented starting with a transitional phase

⁶⁴ "Development of EU ETS (2005-2020)", European Commission (2022), https://ec.europa.eu/clima/policies/ets/pre2013_en (last access: 20.05.2022)

⁶⁵ Bulgaria, Cyprus, Czechia, Estonia, Hungary, Lithuania, Poland, Romania

⁶⁶ "Free allocation for the modernisation of the energy sector, European Commission (2022) https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/free-allocation-modernisation-energy-sector_en (last access: 23.05.2022) & "Report from the Commission to the European Parliament and the Council on the Functioning of the European carbon market in 2021 pursuant to Articles 10(5) and 21(2) of Directive 2003/87/EC (as amended by Directive 2009/29/EC and Directive (EU) 2018/410)" (2022)

beginning the 1st October 2023 until the 31st of December 2025.⁶⁷ The CBAM ensures that importers into the EU pay the same carbon price as production taking place within the EU, it effectively makes any company exporting into the EU subject to a similar measure as the ETS. The CBAM will gradually be implemented in sectors with high risk of carbon leakage, starting in 2023 with iron and steel, cement, fertilisers, aluminium, electricity, and hydrogen. As part of the legislation regarding the CBAM, a review of the mechanism will be concluded before the end of the implementation period, at which point additional sectors under the EU ETS could be integrated into the adjustment mechanism.

In June 2022, the European Parliament adopted its position to work towards phasing out free allowances in the ETS system by 2032⁶⁸ This position will be used as part of the basis for negotiation with member states on amending and expanding the scope of the EU ETS system alongside other measures and targets. (Fit for 55, CBAM, etc.). These negotiations area complemented by another decision taken in December 2022 which has set more restrictive carbon emissions targets for 2030, changing from a 43% reduction to a 62% reduction compared to 2005. Additionally, in 2021, National Implementation Measures (NIMs)⁶⁹ became the standard method for determining the level of free allocation. These documents, based on data collected from 2014-2018, act as estimates of production activity and energy transfers, which then set the level of permitted free allocation based on a common ruleset established for the fourth stage of the ETS⁷⁰. The use of NIMs has been one of the ways that ETS accounting has become stricter to help ensure that the system functions as intended and to gradually reduce the number of free allowances.

Norway, Iceland, and Liechtenstein are also participating in the EU ETS and the system has been linked with the Swiss ETS since 2020. These non-EU27 countries are not considered under the following graphs and calculations, even though their activities also impact the market price.

Results

In phase 3, the number of freely allocated allowances decreased gradually. Between the start of phase 3 in 2013 and the end in 2020, free allocations fell from 955 MtCO₂ to 638 MtCO₂, a reduction of a third. Phase 4 has seen a less precipitous trend: in 2022, 549 MtCO₂ were freely allocated, only 1.1% less than in 2021, compared to a 14% decrease from 2020 and a decrease of 43% from 2013.

The market price remained at EUR 5/tCO₂ for several years after the commencement of the 3rd phase until it started to rise in 2018. Evidence would suggest that the price increase was not driven solely by the demand side. Rather, it seems more likely that the price increase was mainly triggered by regulatory changes, such as the revision of the EU ETS Directive (2018) and the beginning of the 4th phase of the EU ETS in 2021.

⁶⁷“CBAM Latest developments. Available at: https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

⁶⁸ Ibid,

⁶⁹ COMMISSION DECISION (EU) 2021/355 of 25 February 2021 concerning national implementation measures for the transitional free allocation of greenhouse gas emission allowances in accordance with Article 11(3) of Directive 2003/87/EC of the European Parliament and of the Council (2021) Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021D0355>

⁷⁰ COMMISSION DECISION (EU) 2021/355 of 25 February 2021 concerning national implementation measures for the transitional free allocation of greenhouse gas emission allowances in accordance with Article 11(3) of Directive 2003/87/EC of the European Parliament and of the Council (2021) Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021D0355>

Even though the demand decreased sharply in 2020 and 2021 during the COVID-19 pandemic the market price did not collapse, which could be attributed in part to the Market Stability Reserve (MSR), implemented in 2019. However, the impacts of the MSR need to be further analysed to determine the level of price impact it has.⁷¹ Estimates for 2022 and 2023 illustrate that carbon prices may be climbing higher, due to the continued steady reduction in free allowances as well as the MSR and natural gas shortages (leading to more coal burning and higher demand for allowances). Preliminary data for 2023 indicates that prices for allowances are likely to reach an all-time high at nearly 90 EUR/tCO₂ (cf. Figure 32 shows the evolution of the tons of CO₂ freely allowed throughout the ETS adoption process. Overlaid on top of this evolution is the price over time of each tCO₂. Note the sharp increase in 2021 with the commencement of phase 4 of the ETS.

Figure 32). Foregone revenue also exceeded all prior years at an estimated EUR 47.7 billion (cf. Figure 33). Retroactive research regarding free allowances found that in 2021 foregone revenue accounted for at least 49% of possible incomes if a free allowance's value is assumed to be equal to EUA market price.

Short-term actions like, namely, the postponement of allowance auctions should also not be ignored when analysing the evolution of allowance prices. This measure reflects the decisions taken to alleviate the acute issue of allowance supply-demand imbalances, while the MSR and other measures reflect the structural concerns at the heart of the low allowance prices found in stage 2 and early stage 3 of the ETS.⁷²

Compared to the *Commission study 2022* report, the 2012 free aviation emission allowances have risen retroactively by 22.7 MtCO₂, compared to the same report in 2021 and by 43.5 MtCO₂ compared to the 2020 version primarily because aviation ETS accounts were moved from British national authorities to EU based authorities (mainly Germany, France and Spain) after Brexit⁷³ Similar, smaller adjustments also occurred for other years' free aviation allowances for similar reasons. It should be noted that historical allocations and emissions associated with these accounts moved to the respective countries as well. The aviation industry has been one of the areas of focus for the European Union in reducing sectoral emissions, and an updated version of the ETS agreement⁷⁴ was passed in May 2023 which stipulates that aviation emissions are to be subject to the auction system in full by 2026.

Figure 32 shows the evolution of the tons of CO₂ freely allowed throughout the ETS adoption process. Overlaid on top of this evolution is the price over time of each tCO₂. Note the sharp increase in 2021 with the commencement of phase 4 of the ETS.

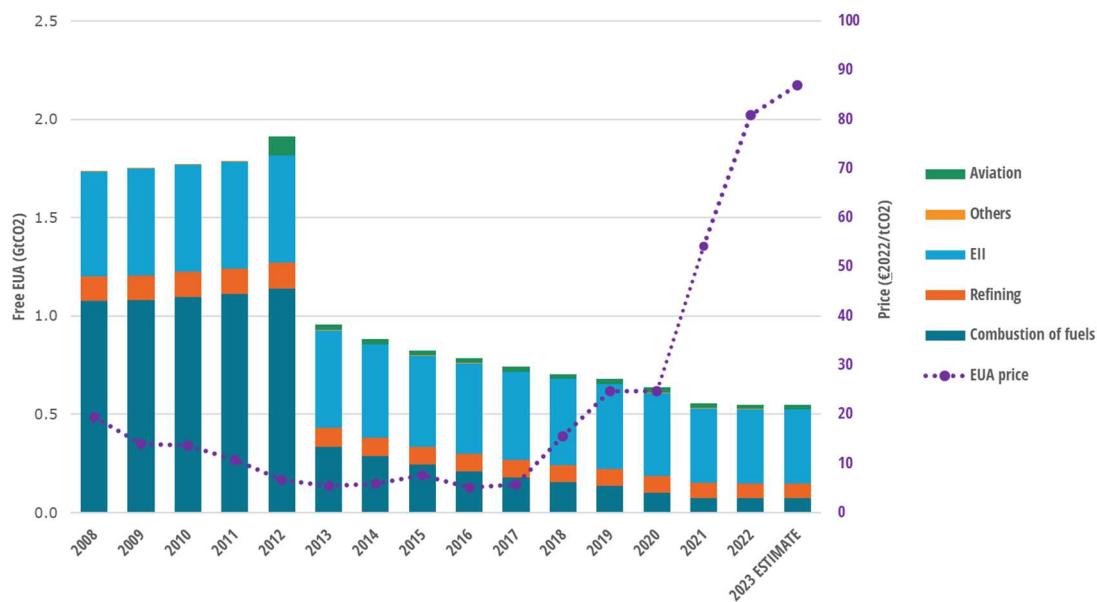
⁷¹ "2022 State of the EU ETS Report", Marcu, A. et al. (2022), Available at: <https://ercst.org/state-of-the-eu-ets-report-2022/> (last access: 25.05.2022)

⁷² "REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the Functioning of the European carbon market in 2021". Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:516:FIN>

⁷³ "Frequently Asked Questions - The impact of Brexit on the EU Emissions Trading System for aviation", European Commission (2021), Available at: https://ec.europa.eu/clima/system/files/2021-09/policy_transport_aviation_faq_aviation_brexit_en.pdf (last access: 25.05.2022)

⁷⁴ Directive 2003/87/EC. European parliament 2003. Available at: <https://eur-lex.europa.eu/eli/dir/2003/87>

Figure 32: Free EUA and average annual EAU price in the EU ETS (2008-2023)



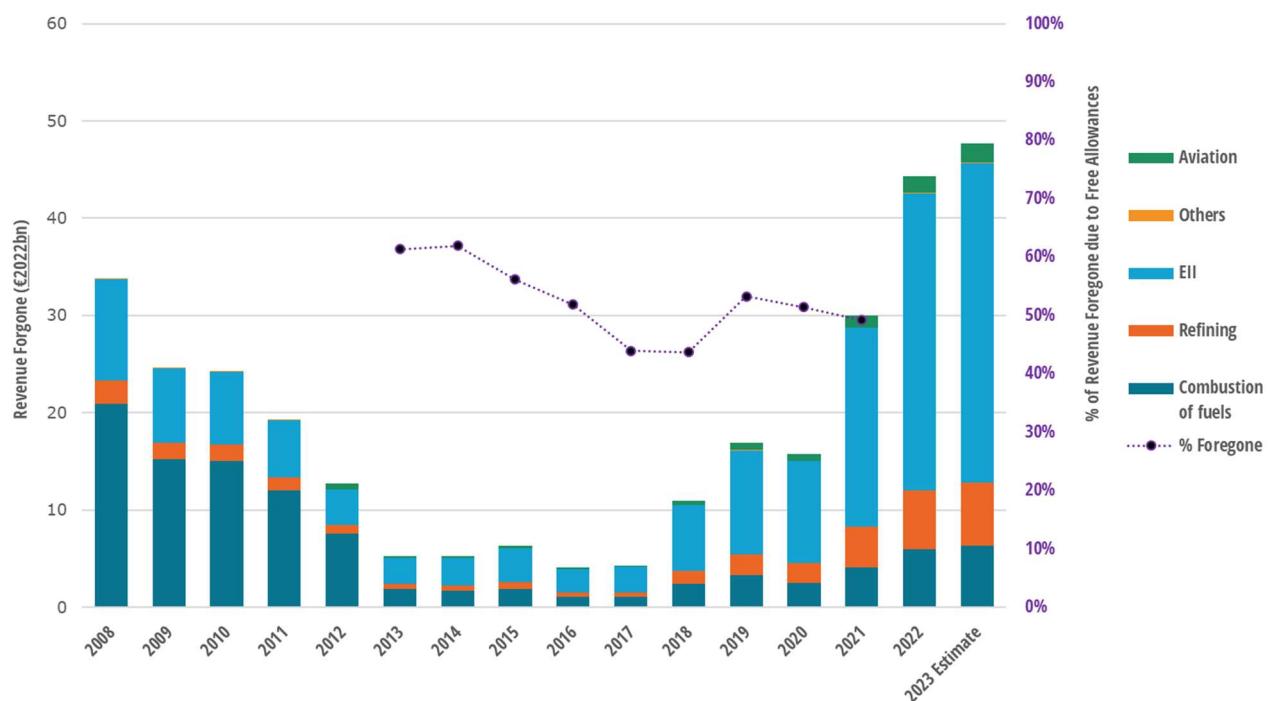
Authors' elaboration based on data from the EEA and ICAP

Figure 33 shows the development of the revenue foregone over the years. The sharp increase of the market price from 2018 onwards had a much bigger impact than the reduction in freely allocated allowances and thus meant higher foregone revenue. It also shows the downward trend of the percentage of foregone revenue between 2013-2021, where high prices and increased reliance on auctions counteracted the absolute increase in foregone revenues.

While these figures would seem to reflect that the ETS system is foregoing huge amounts of revenue, even deep into the phase 3, there are some further points of analysis to mention. First, the ETS has contributed significantly to the reduction of emissions across the EU, and within the scope of the trading system itself emissions have fallen 34.6% (2005-2021).⁷⁵ As the ETS covers approximately 40% of EU-wide emissions, this corresponds to a Union-wide emissions reduction of 13.8%, directly related to the trading scheme. The increase of revenue forgone since 2021 is also accompanied, due to the higher carbon price in 2021, by higher auction revenues for Member States.

⁷⁵ "REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the Functioning of the European carbon market in 2021". Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:516:FIN>

Figure 33: Revenue foregone from free EUA allocations in the EU ETS (2008–2023)



Enerdata based on data from the EEA and ICAP, 2023

3.9. Conclusions

In general terms:

- Energy subsidies in the EU27 MS have increased from EUR 177 billion in 2015 to **EUR 216 billion** in 2021 and reached nearly **EUR 390 billion** in 2022, including **EUR 195 billion** related to the energy price crisis and the subsequent measures taken by Member States.

Regarding Fossil Fuels Subsidies (FFS):

- FFS fell to EUR 56 billion in 2021, before more than doubling between 2021 and 2022 to **EUR 123 billion**. This increase is driven by the financial support directed to the household, transport and energy industry sectors to cope with rising prices and to help protect consumers.
- Various countries increased their FFS intensity in 2021 compared to 2015, which can be interpreted as a greater reliance of the economies of these countries on FFS. 13 Member States⁷⁶ have a higher *FFS intensity* than the EU average (0.35% in 2021) and 14⁷⁷ have lower-than-average FFS intensity.

Regarding Renewable Energy Sources (RES) subsidies:

- RES subsidies decreased** for the first time in 2021 to EUR 86 billion, down by EUR 1.5 billion compared to 2020 level (-1.5%), before slightly increasing back to EUR 87 billion in 2022.

⁷⁶ Namely: Belgium, Bulgaria, Czechia, Finland, France, Greece, Hungary, Ireland, Lithuania, Latvia, Malta, Poland and Romania.

⁷⁷ Namely: Austria, Czechia, Germany, Denmark, Estonia, Spain, Hungary, Italy, Luxembourg, Netherlands, Portugal, Sweden, Slovenia and Slovakia.

- FiTs and FiPs are the largest support schemes by volume for RES technologies in 2021. They represent over 70% of total RES subsidies, i.e. EUR 61 billion in 2021.
- Solar energy technology received the largest share of subsidies for renewables in 2021 (EUR 31 billion) followed by wind (EUR 20 billion) and biomass (EUR 19 billion).

Regarding nuclear energy:

- 3 countries – France, Germany and Italy – represent a combined 90% of subsidies to the nuclear industry over the period between 2015 and 2022.

Regarding measures meant to fight against energy price rising:

- 240 measures meant to fight against energy price rises were identified in this study. Around **EUR 195 billion** have been distributed in 2021-2022 in the EU27 through these measures, representing 32% of the total support amount during this period. In 2022, they accounted for almost half of total financial support to energy. First figures for year 2023 show a continuation of this level of support.
- In 2022, these measures accounted for slightly **more than 1.1% of the total GDP of the EU27**, although distributed across Member States unequally.
- 95% of the energy price rising-linked measures were focused on addressing **energy demand** in 2022.

Subsidies by environmental impact:

- The majority of FFS (98% in 2022) are considered **environmentally harmful**. These EHFFS in 2022 amounted to **EUR 121 billion**, an amount which has more than doubled compared to the previous years (previously around EUR 55 billion/year). This increase in EHFSS is expected to be temporary as it is a direct consequence of measures taken to address the energy price crisis.

4. National plans on subsidies

4.1. Objective

This chapter aims to provide a consolidated overview of national plans on energy subsidies that the Member States have published or communicated to the Commission as of June 2023. Particular attention is paid to plans that contribute to phasing out FFS. Our analysis was fed by the updated annexes VIII and XV of the draft NECPs submitted by Member States in April/May⁷⁸.

Section 4.2 contains an assessment of the accuracy and completeness of the energy subsidy datasets in the progress reports of the NECP, as well as how the result of that assessment has been incorporated to improve the *Subsidy inventory* of this study.

Section 4.3 provides an outlook of each MS's phase out plans for FFS, comparing their efforts to reduce FFS and highlight trends for the EU27 as a whole. The analysis of the MS's plans for phasing out FFS is primarily based on MS fact-sheets in Annex (A.3), supplemented with insights from the NECPRs obtained from the analysis done for Section 4.2.

4.2. National energy and climate progress report

4.2.1. Screening methodology

The NECPR component of the analysis has been designed around assessing the possible differences between Member States accounting practices as compared to the process employed in this study as well as previous editions. Our analysis is focused primarily on two annexes of the NECPR:

- VIII is comprised of a set of goals, set by Member States, to help define their trajectory towards economic targets, e.g., eliminating fossil fuel subsidies.
- Annex XV on the other hand is a submitted list of NECP-relevant subsidies and their characteristics, including most importantly their timelines and expenditures for 2020 and 2021.

Below we explain the process by which we incorporated these elements into our broader analysis.

Annex VIII

This section is predicated on analysing the goals set out in the NECP with respect to energy subsidisation. In particular, the content of the goals with respect to their timeframe, milestones, as well as their broader transparency, accuracy, and consistency.

A key component addressed in this analysis is to determine, using the aforementioned content characteristics, whether the goals are ambitious enough to fulfil these targets and designed thoroughly enough to actually be achieved. For example, if a goal of a country is to eliminate fossil fuel subsidies, however no target date is listed and no steps for achieving this are outlined, then this is noted as being an “incomplete” goal. Once this analysis takes place, all missing features are recorded, and a screening page is returned with any relevant clarifying questions to the MS. Then,

⁷⁸ Please note that since the 30th of June 2023, Member States have begun to issue their new draft NECPs

once the MS has reviewed the screening and responded, we make any relevant updates per their changes and the final version of the MS's goals is available to review.

This component of the NECPR review is admittedly more facilitative, to help determine what the intentions of the government are, and to help analyse the trends in the use of energy subsidies.

Annex XV

This section is reviewed for three main purposes:

1. The first is to compare the figures gathered and estimated throughout our research process with those established by the accounting of the MS in question. In doing so, we can help to verify the accuracy of our sources, and to determine whether our methodology is sound for certain statistics, or even replace estimates with confirmed figures in certain cases. Another side benefit of this stage of analysis is that we can determine the official, governmentally used names of certain programmes, to aid in future research regarding these subsidies.
2. The second main purpose is to help determine whether there were any subsidies which have been missed in this year and prior years' research. For example, certain subsidies are not in the databases we regularly base our research on, or might be missed due to a language oversight (e.g., we might misinterpret a subsidy as another type of legislation, and falsely consider it "out-of-scope"). Obviously, it is best to include these subsidies which we have otherwise missed, and countries submitting their own lists of subsidies helps to mitigate this issue.
3. Finally, the third purpose is an extension of the goal of analysing annex VIII: to help determine the transparency, accuracy, and consistency of the subsidy accounting practices of each MS. As part of the goal of the NECP process, and indeed this report, is to determine how effective Member States are being in their actions to change energy incentives through shifts in subsidisation, it is important to understand whether the MS has a methodological inconsistency with that of the EC. The analysis of Annex XV allows us to get a clearer picture of this by determining if there were any subsidies omitted from the MS's submission and then ask the MS why that might be. This process can help to reveal issues like a definitional inconsistency, such as subsidies for energy efficiency, which should be included based on the methodology of the EC but may be categorised differently in a given MS (e.g., Malta).

4.2.2. Results

The NECPR component proved to be a key element with respect to engaging with the Member States. All 27 MS submitted their annexes, of which 9 chose to review and approve in full the existing EC subsidies, meaning that only annex VIII would need to be analysed. The remaining 11 submitted both annexes and made at least some modifications to the subsidy list. Of these, the largest change was found in France's submitted list of subsidies which contained EUR 7.7 billion less in expenditures than the *Subsidy inventory*. Conversely, the greatest difference in the total number of subsidies (apart from Slovakia⁷⁹) was the Netherlands, which did not include 36 of the subsidies attributed to it in the inventory, mainly due to differences in definitions and methods of aggregation. **Table 4** below elaborates on each country's submissions.

⁷⁹ Slovakia included only one subsidy in its submission, due to a possible miscommunication/misunderstanding of the instructions.

Table 4: NECPR Submissions compared to the Commission study 2022 database

	Additional Subsidies ⁸⁰	Subsidies removed ⁸¹	Budget Discrepancy ⁸²	Comment
Austria	0	0	-	No modification between current NECPR & 2022 study.
Belgium	8	4	EUR +4 861m	NECPR (Annexes VIII and XV) submitted late Additional distinction on the geographic region of the subsidy was included (Flanders, Wallonia, Brussel and on the federal level). 8 new subsidies (EUR 610m in 2021) were submitted with Annex XV, 80% of which is attributable to a fuel card scheme. A substantial amount of 2021 data was submitted (EUR 2,289m) which the EC database had not previously included. The largest of these changes were for tax rebate and reduction on fuel oil, and green certificate programs for renewable energy production.
Bulgaria	1	0	EUR +712m	Subsidy added - Investment free allowances for ETS.
Croatia	5	33	EUR -3 270m	Only FFS reported. Some subsidies combined. Excise fuel exemptions for aviation, maritime activities, or fishing not submitted (EUR -4,7m).
Cyprus	0	0	-	No modification between NECPR & 2022 study.
Czechia	0	0	-	No modification between NECPR & 2022 study.
Denmark	0	0	-	No modification between NECPR & 2022 study.
Estonia	0	1	EUR -3m	Excise tax exemption for biofuels subsidy not reported. Some amounts corrected (not round-up)
Finland	0	2	MDK +706 m	Some amounts modifications.
France	21	19	EUR -7 684m	14/19 new subsidies have no amounts. New subsidies total EUR +1 028m; Significant differences on certain subsidies in common with 2022 study, e.g., MaPrimeRenov' (EUR -1 602m), Energy Poverty Check (EUR -869m)
Germany	0	0	-	No modification between NECPR & 2022 study. (Annexes VIII and XV) submitted late
Greece	0	30	EUR -1 040 m	No modification in the amounts reported. All 30 missing subsidies are for fossil fuels -(EUR -1 040m)
Hungary	0	11	HUF +116m	New amounts collected thanks to the submission (e.g. FIT). A rooftop solar subsidy amount (HUF 211bn) which should be allocated over 4 years was allocated only for 2021. Missing recent subsidies.
Ireland	0	0	-	No modification between NECPR & 2022 study
Italy	0	0	-	No modification between NECPR & 2022 study
Latvia	5	4	-	Most missing and added subsidies have no amounts for 2021. 1 added subsidy +(EUR +0.33m) - GHG reductions
Lithuania	1	0	EUR +245m	A 2022 subsidy was submitted (VAT compensation for district heating) with no 2021 amount. Two gas excise reduction measures explain discrepancy of EUR +216m.

⁸⁰ The number of subsidies submitted by the country which were not already in the *subsidy inventory*.

⁸¹ Subsidies in the *Subsidy inventory* which were removed in a country's submission,(for various reasons, as mentioned here-before e.g. For difference in definition and methods of aggregation or if the MS mentioned that the subsidy had in fact finished earlier than referenced or was cancelled).

⁸² The difference in total subsidy expenditures from the *Subsidy inventory* compared to the country's submission for 2021 data.

	Additional Subsidies⁸⁰	Subsidies removed⁸¹	Budget Discrepancy⁸²	Comment
Luxembourg	0	0	-	No modification between NECPR & 2022 study. (Annexes VIII and XV) submitted late
Malta	3	18	EUR +22m	18 missing subsidies – no amounts (exhausted funds); 3 new subsidies have been added (EUR +22m)
Netherlands	9	36	EUR -96m	13 missing subsidies have no amounts for 2020/21; 8 are RD&D; Others are energy efficiency. The added subsidies are investment and transport sectors & some focus on the clean-industry transition. SDE++ Scheme has not been disaggregated in Annex XV.
Poland	0	0	-	NECPR (Annexes VIII and XV) submitted late. Only modifications made were slight changes to subsidy names. No other discernible difference was found.
Portugal	0	0	-	No modification between NECP & 2022 study.
Romania	0	0	-	NECPR (Annexes VIII and XV) submitted late. Only modifications made were slight adjustments to the names of 4 subsidies. However the changes to the name are not substantial.
Slovakia	0	69	EUR -715m	All EC subsidies missing. Possible misunderstanding of instructions with country representative.
Slovenia	0	0	-	No modification between NECPR & 2022 study.
Spain	1	56	EUR +847m	NECPR (Annexes VIII and XV) submitted late. 1 subsidy added (Royal Decree 477/2021). 3 subsidies submitted are combinations of multiple subsidies presented in the 2022 study. Total budget amount submitted in Annex XV is higher than that of the 2022 study database by about 10%. However, there are still 56 subsidies included in the 2022 study database and not submitted in Annex XV.
Sweden	0	0	-	No modification between NECPR & 2022 study.

4.2.3. Feedback received at the end of NECPR screenings

Each Member State was given an opportunity to respond to a set of observations and comments created by the Enerdata team during the analysis process. These comments generally pertained to the completeness of the data submission, or questions regarding some details of the goals laid out in annex VIII. This feedback process was included to allow one more opportunity for countries to clarify their submitted information so that the comparison between their NECPR and the database collected for this report could be as accurate as possible. Feedbacks regarding NECPR screenings were collected until the end of writing this report (therefore until 28 July 2023). In total, 11 countries gave feedback to the team's comments and analysis as of the writing of this report, and their responses were integrated into their respective annexes where appropriate.

The table hereafter gives an overview of the feedback received after Enerdata sent out the screenings to the Member States with pending questions.

- *NECPR annexes not submitted by the MS* - marks X means annexes were not submitted.
- *Feedback received* – mark ✓ means feedback was received.
- *No feedback received* – mark “–” means that the annexes were received but no feedback were provided after Enerdata’s analysis.
- *Information provided* – Complete / Partial / Limited, along with details about information received.

Table 5: Feedback received at the end of NECPR screenings (as of 11th September)

Country	Feedback received	Information provided
Austria	✓	Response received from MS
Belgium	-	NECPR annexes received late, process still ongoing
Bulgaria	-	NECPR annexes received but no feedback regarding the comments
Croatia	-	NECPR annexes received but no feedback regarding the comments
Cyprus	-	NECPR annexes received but no feedback regarding the comments
Czechia	-	NECPR annexes received but no feedback regarding the comments
Denmark	-	NECPR annexes received but no feedback regarding the comments
Estonia	✓	Annexes received, feedback received by MS & new information submitted
Finland	✓	Annexes received, feedback received by MS
France	✓	Annexes received, feedback received by MS & new information submitted
Germany	-	NECPR annexes received late, process still ongoing
Greece	-	NECPR annexes received but no feedback regarding the comments
Hungary	✓	Annexes received, feedback received by MS & all answers to questions received
Ireland	-	NECPR annexes received but no feedback regarding the comments
Italy	-	NECPR annexes received but no feedback regarding the comments
Latvia	✓	Annexes received, feedback received by MS & new information submitted
Lithuania	✓	Annexes received, feedback received by MS & new information submitted
Luxembourg	-	NECPR annexes received late, process still ongoing
Malta	-	NECPR annexes received but no feedback regarding the comments
Netherlands	✓	Annexes received, feedback received by MS & new information submitted
Poland	-	NECPR annexes received late, process still ongoing
Portugal	✓	Annexes received, feedback received by MS & new information submitted
Romania	-	NECPR annexes received late, process still ongoing
Slovakia	-	NECPR annexes received but no feedback regarding the comments
Slovenia	✓	Annexes received, feedback received by MS & new information submitted
Spain	-	NECPR annexes received late, process still ongoing
Sweden	✓	Annexes received, feedback received by MS & new information submitted

4.3. Outlook on Member States' phase out plans of fossil fuel subsidies

The *General Union Environment Action Program to 2030*, also known as the 8th Environment Action Programme (EAP), requires the Commission and/or Member States to strengthen environmentally positive incentives as well as phasing out EHS and in particular FFS, by, amongst others:⁸³ by “*setting a deadline for the phasing out of fossil fuel subsidies consistent with the ambition of limiting global warming to 1.5 °C*”

Given that the 8th EAP runs until 2030, we have interpreted this as a need to phase out FFS by 2030 in this study. This section consolidates the plans of Member States that contribute to phasing out FFS and the extent to which Member States have set concrete deadlines for phasing out FFS. This builds on the following information in MS fact-sheets relevant to this section:⁸⁴

- Situation about fossil fuel-related policies implemented or announced by the MS
- List of FFS identified in the *Subsidy inventory* in the MS
- Total amount of FFS
- FFS amounts with a planned end-date
- FFS amounts for which the end-date has yet to be planned

The MS fact-sheets only covers FFS as identified in section 3.3.3 and multi-energy subsidies are not reflected in the fossil fuel category but the “All energies” category.

In developing the MS fact-sheets, there were difficulties in capturing the same level of information from one MS to another due to different levels of accessibility, transparency, consistency, homogeneity, granularity, and timeliness of published information. Another issue is the high level of uncertainty regarding the effective implementation of policies announced, due to the inherent constant annual evolution of policies by MS governments. The analysis has therefore been based on the theoretical end-date for each subsidy that was collected and recorded in the *Subsidy inventory* using information accessible to the authors of this study.

4.3.1. End-dates of FFS across Member States

In 2022, the amount of *confirmed* fossil fuel subsidies in the EU27 reached to EUR 113 billion. For 47% (EUR 58 billion), there is a planned end-date on the short-term before 2025 as shown in Figure 34.

Only about 1% (EUR 1.7 billion) of fossil fuel subsidies have an end-date on the medium term (2025–2030). For the remaining 52% (EUR 64 billion), there is either no end-date yet or the end-date has been set after the year 2030.

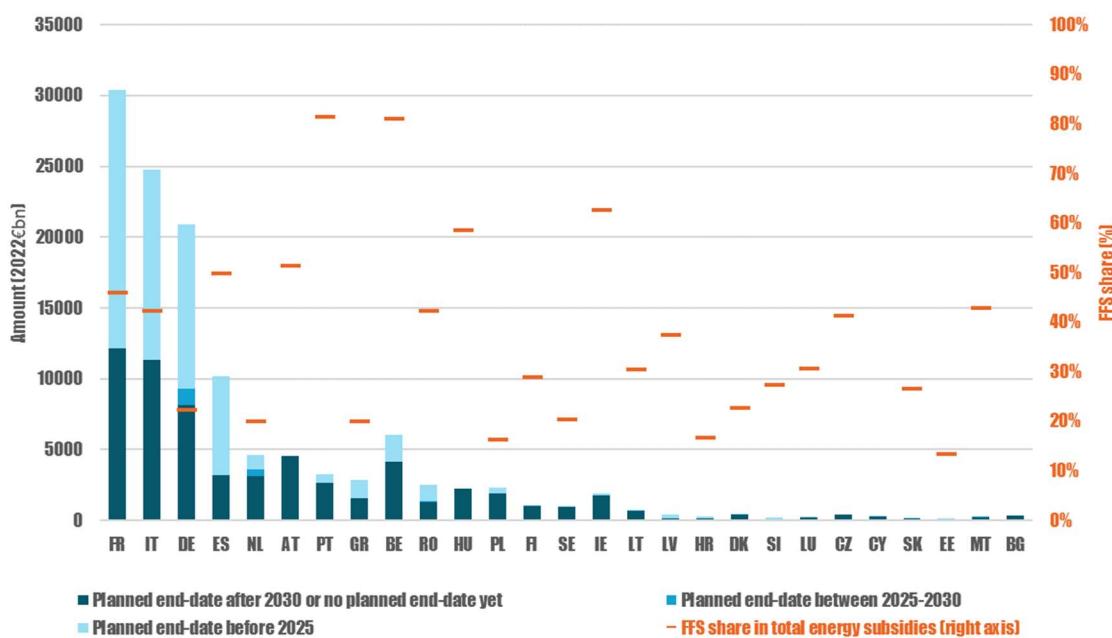
Almost all EU Member States intend to move away from fossil fuels. However, in most Member States this intention has yet to be translated into concrete plans. The power sector is where Member States have the most concrete plans to reduce their reliance on fossil fuels, especially coal. Eight Member States have also set dates for phasing out fossil fuel-based heating in buildings. For the other

⁸³ Article 3 (h) (i) of Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030.

⁸⁴ The MS fact-sheets also contain plans on the subsidies to the nuclear industry and temporary measures to compensate for rising energy costs. Relevant insights from these plans have been incorporated in section 3.3.5 and 3.4.2, respectively.

economic sectors (industry, transport and agriculture), end-dates for fossil fuel use are almost completely absent.

Figure 34: Fossil fuel subsidies by end-date and share of total energy subsidies (%) in 2022



Source: Enerdata, Trinomics, 2023

In general, Member States do not provide end-dates of measures implemented in tax expenditure reports, finance law or national budgets. Some measures include a minimum period for the subsidy to remain in place to provide certainty for the affected parties. However, the decision whether to continue the subsidy beyond the minimum period is generally left for the future. When end-dates are announced, often these are on a relative short term in the next year(s) rather than on the longer term. This is exhibited by the FFS amounts in 2022 with a short-term end-date being significantly higher than ones with an end-date on the medium term.

This does not necessarily mean the abolishment of an FFS measure will come as a surprise. The intention or ambition to end the FFS measure could have already been announced without a clear end-date, leaving affected parties sufficient time to prepare for its ending. In addition, some end-dates may have been proposed by the government, but these have yet to be adopted into law (e.g., in Lithuania and the Netherlands). The presence of intentions to end fossil fuel use and/or FFS supporting their use is further explored for each MS in section 4.3.2.

Nonetheless, it is crucial that the Member States commit to clear end-dates for ongoing FFS as well as improve transparency and accessibility of such information. The absence of information on FFS end-dates impedes our ability to assess whether the EU27 is on track with phasing out FFS that is consistent with the ambition of limiting global warming to 1.5 °C, as mandated by the 8th EAP.

Figure 34 also shows the share of FFS in the total energy subsidies inventoried for each MS. The FFS share can serve as an indicator of the prominence of financial support to fossil fuels compared to other forms of energy. This could be interpreted as a reflection of a government's efforts to incentivise the availability and/or use of energy other than fossil fuels. In addition, Member States with a high share of FFS may encounter more barriers in phasing out these FFS. The relative high share of financial support to fossil fuels could have hampered development or uptake of alternatives

to fossil fuels. Phasing out FFS measures could therefore lead to a higher cost increase and stronger negative socio-economic impacts in Member States that have a relatively large FFS share.

Overall, we can conclude from the data that there has been a decreasing trend in the share of subsidies going to fossil fuels in most Member States across the EU27 in the recent years up to 2021. Several FFS measures also have a clear end-date, which contribute to decreasing the amount of FFS. Looking ahead, the recent energy crisis has led to rising energy prices and corresponding support measures, with preliminary data showing that the amount of FFS has more than doubled in 2022 compared to 2021 (section 3.3.3). As a result, the total amount of FFS increased in almost every MS. However, the overwhelming majority of these measures are temporary and have an end-date on the short-term (section 3.4.2).

An important caveat to the findings in this section is that not all financial support to fossil primary energies and electricity generated by burning fossil fuels sources is reflected in FFS. Where financial support from multi-energy subsidies could not be attributed to fossil fuels or the energy source is unknown, this has been categorised in “All energies” subsidies. However, this just means that the share of FFS in the total energy subsidies may be even larger.

4.3.2. Member States’ FFS phase out plans

The previous section only looked at the current status of FFS with a clear end-date in the *Subsidy inventory*. However, MS could already have plans to phase out FFS and announced their intention or ambition to do so without a clear end-date. Furthermore, Member States could already have a planned end-date for fossil fuel use, which could be throughout the economy, or for a particular sector, fossil fuel or technology. This would also automatically end any subsidies related to those fossil fuels. This section therefore looks at other parameters that could serve as indicators for a Member States plans to phase out FFS based on the MS fact-sheets provided in Annex 2, supplemented with information from the NECPs,⁸⁵ other official announcements from Member States identified for this study and additional public sources.⁸⁶

Table 6 provides an assessment of indicators affecting the phase out of FFS, building on the assessment done in the 2022 edition of this study. Several indicators from the 2022 study have been reformulated to provide further insight in the phase out of fossil fuel use in different economic sectors. The indicators in Table 6 are assessed based on a positive (in green), negative (in red) or and unclear or no contribution (in grey) to the phase out of FFS as follows:

- **Intention to phase out (all) FFS:** this is rated positive if a MS has publicly announced an intention or commitment to an economy-wide phase out of FFS and/or EHS.
- **Intentions or ambitions to phase out fossil fuels:** this is rated positive if a MS has publicly expressed the intention or ambition to stop the use of fossil fuels, with or without a clear end-date. This is also rated positive if the MS has a climate neutrality target in law or long-term plans, for which we assume that there is a need to phase out fossil fuels to be able reach the climate neutrality target. If a MS does not have a climate neutrality target or known intentions to phase out fossil fuels, this indicator is rated “no contribution or unclear”.

⁸⁵ National Energy and Climate Plans. European Commission 2019. Available at: https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

⁸⁶ Including Ember’s EU Power Sector 2030 Targets Tracker and Beyond Fossil Fuels’ Coal Exit Tracker.

If a MS also have plans to expand fossil fuel availability and/or use on top of the absence of a target, this is rated as a negative contribution.

- **Presence of end-dates for fossil fuel extraction:** this is rated positive if a MS has a clear end-date for its fossil fuel extraction activities, even if it is only for a part of its extraction activities. This is rated negative if the MS has plans to expand its extraction activities. If no plans have been found or if the MS does not have fossil fuel extraction activities, this is rated “no contribution or unclear”.
- **Presence of end-dates for fossil fuel use:** this category looks at the presence of clear end-dates for the use of fossil fuels in different economic sectors, because end-dates are generally announced for specific sectors or fossil fuels. This is rated positive if such an end-date is present. This does not have to be for the full sector but could also be for certain applications or types of fossil fuels in the sector (e.g., a ban on the sale and installation of new fuel-oil boilers). This could also be formulated in a way that implies a full phase out of fossil fuel use, e.g., a target of 100% renewable electricity. Even if there is a proposed end-date by the government but not yet fixed in law, this is also rated positive. If there is no end-date present and the MS has plans to expand fossil fuel use in the sector, even if another fossil fuel use is being phased out (e.g., using fuel oil instead of coal for electricity generation), this is rated negative.
- For electricity generation, each MS has also been rated separately on the presence of an end-date for coal-fired power plants. If there is no coal-fired electricity generation in the MS or this has already been phased out as of 30th of June 2023, this is marked as “No coal”.

Table 6: Overview of identified phase out of FFS indicators

Member State	Intention to phase out (all) FFS	Intentions / ambitions to phase out fossil fuels	Ambitions written in laws / plans	End-date for fossil fuel extraction	End-date for fossil fuel use in					
					Electricity generation	Coal-fired power plants	Industry	Transport	Heating (buildings)	Agriculture
Austria					No coal					
Belgium					No coal					
Bulgaria										
Croatia										
Cyprus					No coal					
Czechia										
Denmark										
Estonia					No coal					
Finland										
France										
Germany										
Greece										
Hungary										
Ireland										
Italy										
Latvia					No coal					
Lithuania					No coal					
Luxembourg					No coal					
Malta					No coal					
Netherlands										
Poland										
Portugal					No coal					
Romania										
Slovakia										
Slovenia										
Spain										
Sweden					No coal					

Contribution to FFS phase out Positive contribution Negative contribution Not clear or no information

Table 6 shows that very few Member States have expressed their intention or made plans for an economy-wide phase out of FFS. Italy foresees the phase out of EHS, which include FFS, as a crucial aspect in its reform of its fiscal system. Lithuania indicated its intention to reduce tax incentives for fossil fuels that lead to market distortions, Latvia indicated an intention to suspend of fossil fuel subsidies in their NECP, and Luxembourg committed to stopping any kind of support to fossil fuels. For France and Germany, while they have not made any national plans to phase out fossil fuels yet, as members of the G7 they committed to phasing out inefficient FFS by 2025,⁸⁷ although it is unclear what is defined as inefficient FFS.

Almost all MS did express their intention to reduce and eventually phase out fossil fuels, or have a climate neutrality target in place that infer the intention to phase out fossil fuels. However, so far only Denmark has translated its intention of fossil fuel independence throughout the economy into concrete policy to support their ambition. In Bulgaria, Czechia and Poland, intentions to phase out fossil fuel use have been absent so far. In Poland, there is even the objective to expand the availability of fossil fuels and diversity its supply through the development of new infrastructure for natural gas, LNG and oil.

Various Member States have put in place end-dates to fossil fuel extraction. For example, the Netherlands is closing their largest natural gas field in 2023/2024 and Slovakia is ending support to lignite mining by the end of 2023. However, not all MS are reducing their extraction activities. Estonia still plans to produce shale oil after 2030 and are even building a new shale oil factory. In Poland, the government has an agreement with the Polish Mining Company to maintain hard coal mining operations until 2049.

On the fossil fuel consumption side, significant progress has been made in phasing out coal-fired power plants with 10 Member States not having any coal-fired electricity generation anymore with the most recent Member States joining this list being Portugal (2021), Sweden (2020) and Austria (2020). Another 16 Member States have set a clear date for phasing out their coal-fired power plants. Only in Poland has there not been any consideration on phasing out coal-based electricity. However, a lot fewer Member States have intentions to phase out the use of other fossil fuels in their power sector, with only 7 Member States having expressed an ambition for 100% renewable electricity or a full phase of fossil fuel in electricity generation by a certain date. A few Member States are even planning to expand their fossil-based electricity generation capacity without any indication to eventually phase them out including Belgium, Hungary and Romania. In Ireland, coal-based electricity is being replaced by electricity generated from heavy fuel oil.

In the other fossil fuel consuming sectors, the presence of end-dates for fossil fuel use is much scarcer. In total 8 MS have dates for phasing out fossil fuel-based heating, either in the form of a commitment to phase out fossil fuel use in heating buildings by a certain date, or prohibitions to install new fossil fuel-based heating systems or boilers in new or refurbished buildings. In the transport sector, only Denmark has expressed an ambition to achieve an entirely fossil-free transport sector by 2045. No end-date for the use of fossil fuels in industry and agriculture was found in any of the Member States. The absence of end-dates in the economic sectors does not necessarily mean that the Member States do not have the intention to phase out fossil fuels in those sectors; as noted above, most MS did express the intention to phase out fossil fuels or have a climate neutrality target

⁸⁷ G7 countries send clear message for more climate action and ambitious environmental policy. BMUV 2022. Available at: <https://www.bmuv.de/en/pressrelease/g7-countries-send-clear-message-for-more-climate-action-and-ambitious-environmental-policy>

in place. It does mean that further concrete plans are needed to translate the intention to phase out fossil fuels into clear end-dates.

4.4. Conclusions regarding the national energy and climate progress reports

The NECPR screening component of this report appeared to be a very valuable element to the study. While Annexes VIII⁸⁸ of the NECPRs enabled to gather information regarding national set goals, the study of Annexes XV⁸⁹ allowed us to:

- **Integrate new data** which were not retrieved during the data seeking process (for various reasons such as recent internal figures not available in open-access or not yet published),
- **Replace figures** with more official ones (for example in some cases we were able to retrieve round-up numbers but the Annex's figures were more precise).

Six of the Member States delivered their annexes after the closing date of the study (June 30th 2023), which has not permitted us to perform the full screening for those countries. Of the rest, 9 Member States approved fully the pre-filled subsidies (in such case only annex VIII was analysed). The remaining 11 Member States submitted both annexes and made at least some modifications to the subsidy list which has permitted us to adjust and strengthen the new *Subsidy inventory*.

The final step of the NECPR screening allowed the Member States which had submitted their annexes to respond to a set of observations and comments created by the Enerdata team during the analysis process. Feedbacks regarding NECPR screenings were collected until the end of writing this report (28th July 2023). In total, 11 countries gave feedback to the team's comments and their responses were integrated into their respective annexes where appropriate.

Regarding Member State's phase-out plans of fossil fuels subsidies

Almost all EU Member States have the intention to move away from fossil fuels. However, so far only Denmark has translated this into concrete plans to become completely fossil fuel independent. The power sector is where Member States have the most concrete plans to reduce their reliance on fossil fuel use, with all MS except Poland having already phased out coal-fired power generation or planning to do so with clear end-dates. 8 MS have also set dates for phasing out fossil fuel-based heating in buildings. For the other economic sectors (industry, transport and agriculture), end-dates for fossil fuel use are almost completely absent.

The ambition to move away from fossil fuels is necessarily accompanied by a phase-out of FFS. So far only France, Germany, Latvia, Lithuania, Luxembourg and Italy have expressed their intention to do so. However, concrete end-dates for FFS, including for these 6 Member States, are often unknown or not published by the authorities. In total, 52% of the FFS do not have an end-date yet or the end-date has been set after the year 2030.

⁸⁸ Annex VIII comprises of a set of goals, set by MSs, to help define their trajectory towards economic targets

⁸⁹ Annex XV comprises the *Commission study 2022* database modified by MSs according to their internal data and information.

A. Annexes :

Annex 1: Theoretical framework

Annex 2: Country data controls and observations

Annex 3: Member State Fact-sheets

Annex 4: Subsidy inventory database

A.1. Theoretical framework

A.1.1. Classifications

To be consistent with previous *Commission studies*, we have kept the subsidy definitions and classifications which are based on the Agreement on Subsidies and Countervailing Measures (ASCM) framework stated by the World Trade Organization (WTO)⁹⁰. The said ASCM classifies the subsidies in four main categories (see Textbox below).

Textbox 4-1: Definition of a subsidy within the Agreement on Subsidies and Countervailing Measures (ASCM) of the World Trade Organization (WTO)

Article 1: Definition of a Subsidy

- 1.1 For the purpose of this Agreement, a subsidy shall be deemed to exist if:
- (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) a 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;
- and
- (b) a benefit is thereby conferred.

The WTO typology is commonly used by several international institutions such the OECD, the IRENA and NGOs such as IISD as shows Table 7 which summarises the adaptation by these organisations to the WTO framework.

⁹⁰ All documents related to WTO Agreement on Subsidies and Countervailing Measures are available at https://www.wto.org/english/docs_e/legal_e/24-scm_01_e.htm

Table 7: Energy subsidy classifications (updated from the 2022 study)

WTO ⁹¹ (1994)	DG ENER (2020)	IRENA (2020)	UNEP - IISD - OECD (2019)	OECD (2013)
Agreement on Subsidies and Countervailing Measures	Study on energy costs, taxes, government interventions and their impact on energy investments	Energy subsidies, Evolution in the Global Energy Transformation to 2050	Measuring Fossil Fuel Subsidies in the Context of the Sustainable Development Goals	Inventory of Estimate Budgetary Support and Tax Expenditures for Fossil Fuels
A government practise involves a direct transfer of funds , potential direct transfers of funds or liabilities.	Direct transfers	Direct financial transfer	Direct transfer of government funds Transfer of risk to government (Indirect)	Direct transfer of funds Transfer of risk to government (Indirect)
Government revenue that is otherwise due is foregone or not collected	Tax expenditures	Preferential tax treatment	Tax expenditures, government revenue foregone	Tax revenue and other government revenue foregone
Government provides goods or services other than general infrastructure, or purchases goods	Under-pricing of goods/services	Energy-related services provided by government at less than full cost	Under-pricing of other goods and services	NA
There is any form of income or price support	Income or price supports	Regulation of the energy sector	Induced transfers (price support)	Induced transfers

⁹¹ The WTO proposes a fifth type of subsidy called « Government makes payment to a funding mechanism, or entrusts or directs a private body to carry out the function(s) which would normally be vested in the government and the practise does not differ from practises normally followed by governments » that is excluded from the table because no other study cover this type of subsidy.

In line with previous *Commission studies*, we renewed the defined set of classifications covering the typology of subsidies by category and instruments (Table 8), energy sources/carriers (Table 9), purpose (Table 10), source of financing (Table 12) and economic sectors (Table 11). Fossil fuel subsidies will also be classified according to their environmental impact (Table 13).

Subsidy instruments inventoried in Table 8 can be considered as the “positive list”, i.e. the list of instruments covered by our study.

Table 8: Classification of subsidy category and instruments

Subsidy category	Subsidy instrument
Direct transfers	Soft loans
	Grants
	Others
Tax expenditures	Tax reduction
	Tax exemption
	Tax refund
	Tax credits
	Tax allowance
	Others
Under-pricing of goods/services	Under-pricing of government-owned resources or land
	Under-pricing of government-owned infrastructure
	Under-pricing of other government-provided goods or services
Income or price supports	Capacity payments (electricity capacity mechanisms)
	Biofuels blending mandate
	RES quotas with tradable certificates
	Differentiated grid connection charges
	Energy efficiency obligations
	Interruptible load schemes
	Contract for Difference (CfD)
	Feed-in premiums
	Feed-in tariffs
	Consumer price guarantees (cost support)
	Consumer price guarantees (price regulation)
	Producer price guarantees (price regulation)
	Others
RD&D	Support to Research, Development and Demonstration activities

Table 9: Classification of energy sources/carriers

Main energy sources	Main fuels and carriers	Products and carriers
All energies	All energies	All energies
Heat	Heat	Heat
Electricity	Electricity	Electricity
Nuclear	Nuclear	Nuclear
Fossil fuels	FF-All / several	FF-All fossil fuels
	FF-All / several	FF-Several fossil fuels
	FF-Coal / Lignite	FF-Coal / Lignite
	FF-Natural Gas	FF-Natural gas
		FF-Mine gas
		FF-Shale gas
		FF-Crude oil & NGL
		FF-Oil & Gas
		FF-Petroleum products
		FF-PP-Gasoil
		FF-PP-Blended gasoil
		FF-PP-Gasoline
		FF-PP-Leaded Gasoline
		FF-PP-Unleaded Gasoline
		FF-PP-Blended gasoline
		FF-PP-LPG
		FF-PP-Kerosene
		FF-PP-Fossil-based marine fuels
		FF-PP-Heavy fuel oil (HFO)
	FF-Peat	FF-Peat
Bioenergy	Hydrogen	FF-All fossil fuels
		RES-Biogas
		RES-Biogas
		RES-Biomass & biogas
		RES-Biomass (solid)
		RES-Biomass MSW
		RES-Liquid biofuels
		RES-Liquid biofuels-Biodiesel
		RES-Liquid biofuels-Bioethanol
RES	RES-All / several / others	RES-All
	RES-All / several / others	RES-Several
	RES-Geothermal	RES-Geothermal
	RES-Heat	RES-Heat
	RES-Hydro	RES-Hydro
	RES-Marine energy	RES-Marine energy
	RES-Solar	RES-Solar
	RES-Wind	RES-Wind
		RES-Wind offshore
		RES-Wind onshore

Table 10: Classification of subsidy purpose

Subsidy by purpose
Support to energy demand
Support to energy efficiency
Support to industry restructuring
Support to infrastructure
Support to production
Support to R&D

Table 11: Classification of economic sectors

Economic sectors	Sub-sectors
Energy industry	Energy sector
	-ENER-Fossil fuel extraction
	-ENER-Energy crops
	-ENER-Conversion
	-ENER-Conversion-Refining
	-ENER-Conversion-LNG
	-ENER-Conversion-CHP
	-ENER-Conversion-Electricity production
	-ENER-Conversion-Heating & Cooling
	-ENER-Conversion-Liquid biofuels
	-ENER-Conversion-Biogas production
	-ENER-Conversion-Hydrogen production
	-ENER-Infrastructure
	-ENER-Infra-Transmission
	-ENER-Infra-Distribution
	-ENER-Infra-T&D
	-ENER-Infra-Storage
	-ENER-Assets decommissioning
	-ENER-Waste management
	-ENER-Retail
Agriculture	Agriculture
	-AGRI-Crop, animal production, hunting
	-AGRI-Forestry and logging
	-AGRI-Fishing and aquaculture
Construction	Construction
Mining	Mining
Industry	Industry
	-INDU- Energy-intensive industry
	-INDU- Not energy-intensive-industry
Transports	Transport
	-TRANS-Air transport
	-TRANS-Rail transport
	-TRANS-Road transport
	-TRANS-Water transport
	-TRANS-Public transport
Services (tertiary sector)	Services (tertiary sector)
Business	Business
Households	Households
	-HH-Low income
Public	Public
Cross sector	Cross sectors

Table 12: Classification of source of financing

Source of financing
Government / Public bodies
Final customers
Operators

Table 13: Environmentally Harmful Subsidies (EHS) classification

EHS classification
Harmful
Not harmful

A.1.2. Negative list: data not collected

To be consistent with *Commission studies*, these subsidy types that are not covered are listed below:

- Transport is restricted to fuel tax reductions/exemptions and domestic transport. The study also does not cover:
 - Extra-EU27 international transport
 - Intra-EU27 international aviation
 - Reductions/exemptions of distance-based road charges;
 - Reductions/exemptions or non-existence of potential urban road pricing schemes;
 - Reductions/exemptions of infrastructure charges, including rail, ports, airports.
- Support to nuclear plants decommissioning through:
 - The European Bank for Reconstruction and Development (EBRD), though the International Decommissioning Support Fund (IDSF) in Kozloduy (Bulgaria), Bohunice V1 (Slovakia) and Ignalina (Lithuania)
 - The Central Project Management Agency (CPMA) in Ignalina (Lithuania)
 - The Slovak Innovation and Energy Agency (SIEA) in Bohunice V1 (Slovakia)
- Financial support related to cost of integration of intermittent RES;
- Government ownership (of all or a significant part) in energy companies;
- Government equity infusions in private firms;
- Reduced VAT rates for transport companies (VAT reduction granted to companies involved in the service of shipping goods and/or transporting people);
- Zero-rate VAT for aircraft flights;
- Mileage allowance for employees.

A.1.3. Negative list: data collected apart from main inventory

For clarity matter, it is reminded that the following supporting schemes and measure are not considered as energy subsidy according to definition above (Section A.1.1) and therefore excluded from the *Subsidy inventory*. Nevertheless, we have collected and gathered these measures together in a separate database (*DG_ENER_extra-data_2023.xls*) and commented them in separate textboxes all along this report.

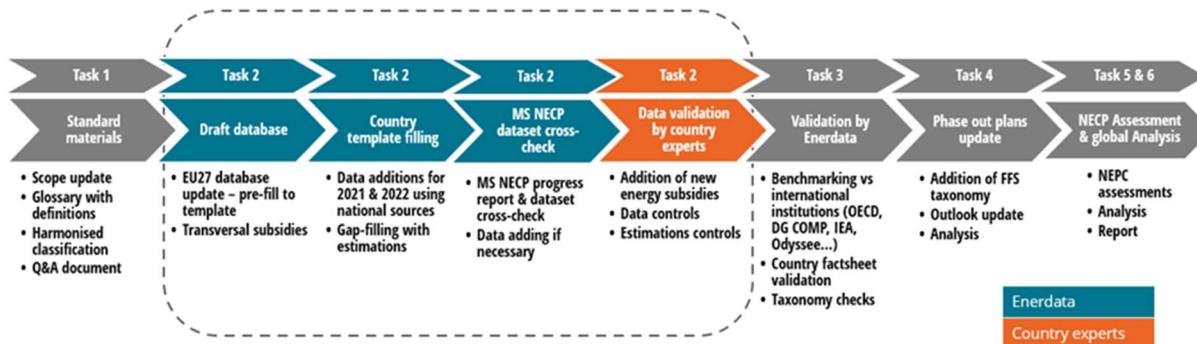
- Diesel vs gasoline tax difference (Textbox 3-1)
- Support to electric mobility, 'clean' vehicle (Textbox 3-5)
- Support to commuter (Textbox 3-6)

A.1.4. Data collect and control process

A.1.4.1. Data collection process

The data collection process was performed in the three steps highlighted below on Figure 35.

Figure 35: Data collection process



A.1.4.2. Data hierarchy

The subsidy data are made of two main types of information:

Actual data gather the amounts directly taken from official documents. They can be either amounts effectively paid (in previous years) or budget amounts assessed by official institutions.

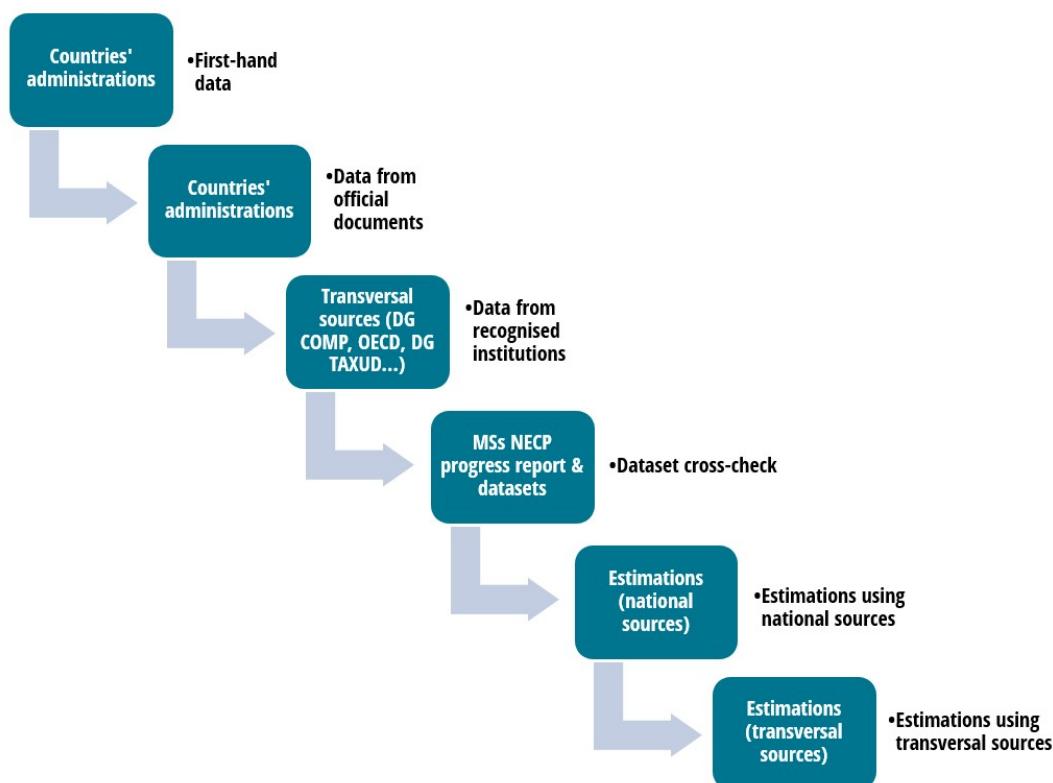
Estimated data are subsidy amounts that have been estimated by either the core team or the country experts. Such estimations are cross-controlled within the consortium and are based on information (energy consumption, tax rates...) taken from official -national or international-institutions.

All along the data collection process, we have used a default data hierarchy that organises and qualifies the data as follows:

1. Data taken from official documents (from ministries, government agencies, energy regulators, statistical offices, Court of Auditors...) are preferred over estimations:
 - Where we have already established direct contact with key employees in Ministries of Finance, we asked them to provide again first-hand information. If they deliver the required information, they are used as the preferred data.
 - Amounts collected in official documents (from ministries, government agencies, energy regulators, statistical offices, Court of Auditors...) from national sources have been preferred over amounts from transversal sources;
 - When official documents were not available, data from transversal sources (OECD, DG COMP State Aid Cases database, MURE....) have been retained.
2. When official data were not available, the core team performed estimations that have later been controlled by country experts:
 - Estimations use national statistics (for energy data) and national data from fiscal/custom/ministry administration;
 - When national data are not available for estimations, we use transversal sources (i.e. Eurostat for energy data, CIRCABC and TAXUD data for fiscal data).

The data hierarchy we suggest deploying during for this study is summarised below in Figure 36.

Figure 36: Data hierarchy chart



A.1.4.3. Data collection principles

The data collection exercise for each task followed principles built on international best practices⁹² comprising:

- Relevance
 - Developed data templates according to task needs and following the scope defined in the inception phase with the DG ENER;
 - Address data gaps of previous *Commission studies*;
 - Focus completion of any gaps left after data collection according to the feedback from DG ENER on the most important issues (if applicable).
- Traceability
 - Include the raw data sources and a link or reference to the source;
 - Indicate the methodology used in estimations;
 - Use a colour code system to reflect the updates made in comparison to versions from previous *Commission studies*.
- Simplicity & functionality
 - Do not duplicate data – where this is needed, link the cells to ensure that changes are reflected;
 - Where calculations are made, this should be done linking the used cells;
 - Consolidate and simplify the databases in the end of each task;

⁹² United Nations (2018) International Recommendations for Energy Statistics (IRES)

- Build upon tools from previous *Commission studies*.
- Coherence and comparability
 - Use defined concepts for data collection across countries;
 - Where possible, use the same source for as many items as available;
 - Cover as large period as possible, with attention to the most recent year available;
 - If a data series is updated using a different source, validate that the data for previous years is aligned with the previous source and – if it is – update the whole data series (if applicable).
- Accessibility and clarity
 - Present the data and metadata for each task in a coherent and clear format, improving on best practices from previous projects;
 - Provide databases, reports and supporting documentation in formats agreed with DG ENER in the shared document management and storage system;
 - Use common database structures across tasks when possible;
 - Indicate the confidentiality level for each dataset and resulting analysis.

A.1.5. Data validation through comparison against other institutions studies

Given the nature of the data collected, which is not well structured nor well transparent across countries, a key issue was to find means to control quality and to ensure the comparability of the data across countries ultimately leading to consistent and relevant analysis. To achieve good data quality, we have implemented several controls by benchmarking our data with that of existing external databases.

Our initial plan was to compare our data against the sources listed below however, as of mid-June 2023 not all of them are updated. Consequently, we were able to collect data from transversal sources depending on their availability. Please note that emojis used hereafter represent the status of the data availability:

- 😐 **DG Competition State Aid Cases:** amounts provided cover years until 2021. Consequently, subsidy amounts for 2022 have not been verified. For this 2023 edition, Enerdata has also enriched the inventory with some of the State Aids cases that are classified under “environmental protection”, but with a clear energy component.
- 😐 **OECD fossil fuels inventory:** Amounts provided by the OECD are covering a period ending in 2021. As a result, subsidy amounts for 2022 have not been verified. Five Member States, namely Bulgaria, Croatia, Cyprus, Malta and Romania are not covered. The next update of the OECD inventory is expected in 2024.
- 😊 **The State of the EU ETS Report** has been released by the ERCST in April 2023. It covers amounts of “Compensation for the indirect costs of EU ETS” for the years 2021.
- 😐 **Odyssee-MURE** database alignment with the inventory has been continued on a country basis. Next update of Odyssee-MURE database for energy efficiency measures is planned for September 2023. Therefore, energy efficiency data from EUROSTAT have been used instead of data from Odyssee-MURE.
- 😐 **The CEER Status Review of Renewable Support Schemes in Europe**, issued in June 2021, covering 2018 and 2019, is available. New report covering 2020-2021, initially expected in June 2022, has not yet been published.

-  **DG TAXUD Excise Duty on Energy:** excise duties are published every semester for many energy products (including petroleum products, natural gas, coal and electricity) for several uses. It has been utilised for estimation purposes.
-  **ACER-CEER Market Monitoring Report (MMR) 2022**⁹³ provided an analysis regarding “Energy Emergency Measures” in Europe. Therefore, ACER’s study has not been used in this study as the scope covered was less broad.
-  **Bruegel National fiscal policy responses to energy crisis** allowed to identify many measures related to the increase of energy prices in Europe since end 2021.
-  The IEA has released a new update of its **energy technology RD&D budget database** in May 2023 encompassing actual data until 2021 and estimates for some EU MS for 2022 and 2023.
-  The **IEA Policies database** provide numbers of energy related policies, of which some cover market-based instruments that are identified as subsidies by the *Commission study 2022*. This database is used for Member States not covered by the OECD.
-  The **Fossil Fuel Subsidy Tracker** updated in November 2022 provides estimates from three international databases.

A.1.6. Data check through consultation round of MS Attachés

For this study, we gave to Member States’ Representatives a chance to crosscheck information collected for their respective country. After being controlled by country experts and validated, country files were shared with contacts named by DG ENER or, alternatively, with energy Attachés contacts (also provided by DG ENER). During a period of 15 days comments and modifications received in return were collected and used to adjust and strengthen country files.

The minority of Representatives have provided valuable feedback as summarised in the table above (2.2.3). In general, it has confirmed or brought only few changes to the amounts delivered by our consortium. Nonetheless, far from being useless, we are rather convinced these feedbacks have contributed to significantly improve completeness of each of the country files, providing new details and sources that were not identified so far.

15 Representatives have returned no feedback at all or were unable to complete the review due. Invoked reasons comprise the following:

- Lack of time
- Disagreement with methodology

In our opinion, the consultation round met its goal by strengthening the new *Subsidy inventory* and improving the overall quality of the *Commission study 2023*.

A.1.7. Subsidy amount allocations

In line with the methodology used in previous *Commission studies*, when relevant and feasible, we have allocated the subsidy amounts related to multi-sectors and multi-energy subsidies based on

⁹³ The MMR 2022 reports a total of €800bn of estimated cost for energy support measures in 2022; a large difference from the amounts reported in this study. This difference is due to differences in the scope of study. Measures such as «Increased stored gas levels», «Obligations to increase lignite stocks», «nationalisation of energy suppliers», ... Available at : https://www.acer.europa.eu/Publications/Electricity_MMR_2022-Emergency_Measures.pdf and <https://app.powerbi.com/view?r=eyJrIjoiNWJiZDLkYjMtnTMyN00ZDUSLThkYzgtNTYzNWU5ODY5NGMyliwidCI6ImU2MjZkOTBjLTcwYWUtNGRmYy05NmjhLTAYzJE4Y2MwMDA3ZSlslmMi0jI9>

MS' energy balances. Subsidy amounts have been allocated according to the two following approaches:

A.1.7.1. Multi-energy subsidy

Amounts reported for multi-energy subsidies were allocated according to their respective shares in the energy mix. For instance, a subsidy amount covering, as a whole, feed-in tariffs for electricity production from CHP burning fossil fuels was apportioned to each fossil fuel depending on their respective shares within the power generation mix.

A.1.7.2. Multi-sector subsidy

Similarly, multi-sector subsidies were allocated to each sector depending on their contribution to the said measure based on energy records in the national energy balance. For instance, a tax reduction on marked diesel (off-road consumption), reported as a whole, was broken down between the various consuming sectors (agriculture, construction, industry...) of off-road diesel according to their individual shares in the total consumption.

A.1.8. Transversal energy subsidies sources

Several types of energy subsidies were incorporated for all the MS using a single source of information to ensure homogeneous treatment across country.

A.1.8.1. Subsidies homogenously estimated for all the MS

To cope with the heterogeneous reporting methods across MS for air and maritime transport tax expenditures and, in line with previous *Commission studies*, we estimated air and maritime (excluding international) transport subsidies using the following formulas:

Tax expenditure on fuel consumption in air transport

Air transport tax expenditure = kerosene consumption for domestic aviation (1 000 litres) x countries' standard excise tax rate for kerosene (in €/1 000 litres)

Tax expenditure on fuel consumption in maritime transport

Water transport tax expenditure = gasoline, diesel and fuel oil consumption for domestic navigation (in toe) x countries' standard excise tax rates for gasoline, diesel and fuel oil (in €/toe)

Energy consumption data are taken from Eurostat⁹⁴ and excise tax rates are extracted from TAXUD semester reporting on Excise duties on energy⁹⁵. Energy consumption amounts for 2022 were estimated as Eurostat does not yet provide annual data for this year and because monthly data were deemed not appropriate due to quality issues.

Regarding **air transport**, we have chosen to estimate the energy consumption for year 2022 using the annual variation of air flights between 2021 and 2022, based on data from Eurocontrol⁹⁶, taking as assumption a perfect correlation between the number of flights and the energy consumption. As Finland, Greece, and Hungary were not included in the Eurocontrol dataset, we have used the average variation of the other 25 MS for these two countries. The excise tax rates were updated for the year 2022 using TAXUD data.

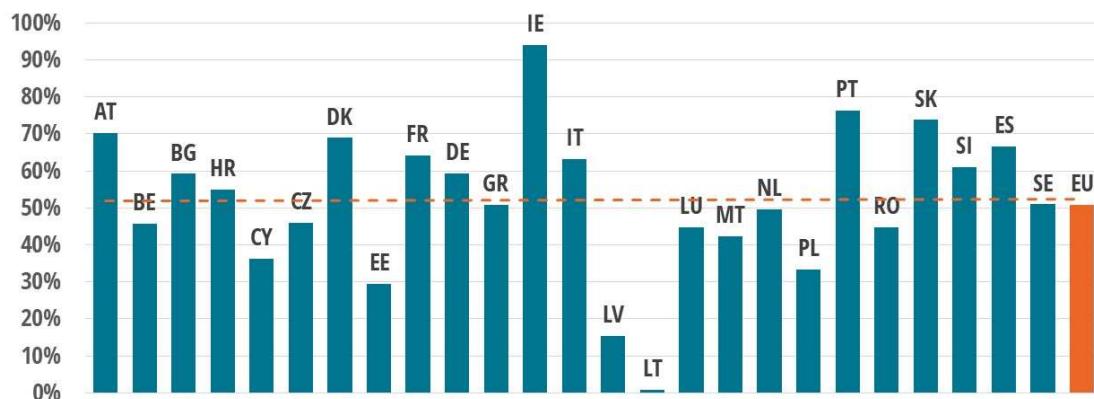
⁹⁴ Available at <https://ec.europa.eu/eurostat/data/database>

⁹⁵ Available at https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-energy_en

⁹⁶ Data are available at <https://ansperformance.eu/data/>

As Figure 37 shows, number of flights continued their strong rebound with the end of travel restrictions in nearly all places, across all Member States except Lithuania (1% increase). The range of variation for the remaining states varied between 15% and 94% increases, with an EU average of 51%.

Figure 37: Variation of flights between 2020 and 2021 in the EU



Source: Enerdata, based on Eurocontrol data, 2023

Regarding **maritime transport**, we have estimated roughly the energy consumption using the annual variation of “Goods transport by inland waterways” between 2020 and 2021, using data from Eurostat⁹⁷, assuming a perfect correlation between the variation of tonnes transported and the energy consumption. Only 12 MS reported data in 2022, therefore, we have used the average variation of these countries (-7.0%) and applied it to the other 15 MS. The excise tax rates were updated for the year 2022 using TAXUD data.

The current inventory also comprises a subsidy corresponding to the tax expenditure on oil products for **fishing** purposes. This subsidy was estimated as the multiplication of the energy products supplied for use as fuel for fishing purpose with the excise tax rates used for navigation in the calculation above. The variation of the energy consumption for fishing purpose between 2021 and 2022 was aligned with that of the maritime transport sector.

Tax expenditure on fuel consumption for fishing

Fishing tax expenditure = gasoline, diesel and fuel oil consumption for fishing (in toe) x countries' standard excise tax rates for gasoline, diesel and fuel oil (in €/toe)

A.1.9. Other financial supports

Methodology

⁹⁷ Eurostat, Goods transport by inland waterways [TTR00007], available at <https://ec.europa.eu/eurostat/databrowser/view/ttr00007/default/table?lang=en>

The total value of freely allocated allowances is the product of two factors: The certificate market price and the allocated quantity of free allowances. The European Environmental Agency regularly publishes an EU ETS database⁹⁸ where the number of freely allocated allowances is indicated. The allowances were allocated to the following sectors: Aviation (code 10 Aviation), Power plants (code 20 Combustion of fuels), Refineries (code 21 Refining of mineral oil), Energy-intensive industries (codes 22 to 44) and others (codes 45, 46 and 99). To estimate the foregone value of freely allocated allowances per year the difference of annual freely allocated allowances and corrections in the aviation sector of each year has been multiplied by the corresponding annual average market price of certificates.

Prices have been taken from EEA⁹⁹ and ICAP¹⁰⁰. It should be noted that these prices are themselves the result of the market mechanism. If the freely allocated allowances had instead been auctioned, this would have an effect on the magnitude and scope of the ETS, in turn affecting the price of each share. Put another way, the free allocations both increase supply of carbon allowances and suppress demand for them, which will have an obvious price distorting effect. As such, the total value used in this report is an estimation based on publicly available information.

The corrections are due to the “Stop the clock” decision in 2012, when freely allocated allowances were returned by aviation companies because of the retroactive suspension of emission trading in international aviation. These corrections are verified each year, leading to annual adjustments as to how many allocations were freely given in the years in question. There is also a Brexit effect, in which a certain amount of freely allocated allowances need to be redistributed from the UK onto other countries, depending upon flight departure/arrival.

$$\begin{aligned}
 \text{Annual foregone revenue in €} \\
 &= \text{Annual average market price (€/tCO}_2\text{)} \\
 &\times \sum_c \text{Freely allocated allowances}_c(\text{tCO}_2) - \text{Corrections to freely allocated allowances}_c(\text{tCO}_2) \\
 c &= \text{EU27 country}
 \end{aligned}$$

Textbox 4-2: Allocation of free Allowances from the European Union Emission Trading System (EU ETS)

Consistent with the Commission Study, the allocation of free allowances from the EU ETS are not considered as an energy subsidy but they are monetized using the methodology outlined below:

EUA ETS support in EUR = $\Sigma t\text{CO}_2$ of free allowances per year x EUA average annual prices in €/tCO₂.

The corresponding amounts will be allocated to the five following economic sectors:

- Aviation (code 10 Aviation);
- Power plants (code 20 Combustion of fuels);
- Refineries (code 21 Refining of mineral oil);
- Energy-intensive industries (codes 22 to 44);
- Others (codes 45, 46 and 99).

EUA ETS volumes and average annual prices will be taken from the European Environment Agency (EEA).

⁹⁸ EEA (2022), European Union Emissions Trading System (EU ETS) data from EUTL, available at: <https://www.eea.europa.eu/data-and-maps/data/european-union-emissions-trading-scheme-17> (last access 20.05.2022)

⁹⁹ EEA The EU Emissions Trading System in 2021: trends and projections, <https://www.eea.europa.eu/publications/the-eu-emissions-trading-system-2>

¹⁰⁰ ICAP (2022), ICAP Allowance Price Explorer, available at: <https://icapcarbonaction.com/en/ets-prices> (last access: 20.05.2022)

A.1.10. Subsidies incorporated directly from external sources

In line with the previous *Commission Study*, the estimated amounts of total public energy research, development and demonstration (RD&D) budgets of the 19 MS covered by the IEA were incorporated into the *Subsidy inventory*, with treatment. As amounts for 2022 are only available for 9 countries, estimating the data for this year was the key treatment of our process. Our estimations relied on using the most holistically effective method of 3 options, that is to say that the option which conformed best to the trends of the prior years' data.

Our first estimation option was to simply replicate the data from 2021. This option was generally used in circumstances in which the data had little to no variance over the prior years.

The second estimation option was to use Excel's "trend" function on the data from 2019-2021, this was used in cases where the data had a clear increasing or decreasing trend and no unexplained variation.

The final option was to use a simple geometric mean of the period 2015-2021, which was used in the case of data having significant year-to-year variation and lacking clear trends, or in which the "trend" function would have resulted in a negative figure (e.g., a sharply decreasing trend from 2019-2021).

A.1.11. Approach to the environmental assessment of fossil fuel subsidies

Environmentally harmful subsidies (EHS) are described or determined in various ways in literature:

- OECD (2005)¹⁰¹ does not provide a definition for EHS. Instead, it provides a checklist for the initial identification of EHS. The checklist concentrates on answering the question whether the removal of a subsidy is likely to result in environmental benefits rather than determining if a subsidy is environmentally harmful.
- Eurostat (2015)¹⁰² also does not establish a definition of EHS but provides two approaches for identifying EHS. The first approach identifies subsidies that according to some established method or checklist are assessed to have an environmentally harmful effect. The second approach identifies subsidies going to (producers in) certain activities or industries which are considered particularly polluting, i.e. based on the beneficiaries.
- The 2022 European Commission study "a toolbox for reforming environmentally harmful subsidies in Europe"¹⁰³ (EHS reform toolbox) categorises a subsidy as environmentally harmful if the negative environmental impacts are increasing due to the existence of the subsidy.

The latter study highlights that identifying whether a subsidy is environmentally harmful is not always straightforward due to two key aspects:

- **The counterfactual:** whether a subsidy is environmentally harmful needs to be considered against the hypothetical reference situation in absence of the subsidy. The counterfactual could be the situation where there is no government intervention, or where an alternative policy applies. The counterfactual would also have to consider the behaviour change of actors affected by the absence of the subsidy. For example, in the counterfactual where there is no subsidy on heat pumps, greenhouse gas (GHG) emissions from heating with natural gas boilers could be higher, but GHG emissions and resource use related to electricity production

¹⁰¹ OECD (2005). Environmentally Harmful Subsidies: Challenges for Reform.

¹⁰² Eurostat (2015). Environmental subsidies and similar transfers – Guidelines.

¹⁰³ Porsch et al (2022). A toolbox for reforming environmentally harmful subsidies in Europe.

would be lower. In this case, the environmental impact in the counterfactual would also change over time as the electricity grid is decarbonised.

- **Environmental impacts:** some subsidies have both positive and negative environmental impacts. For example, subsidies for biofuels contribute to climate change mitigation but could lead to land-use change, deforestation and biodiversity loss if the sourcing of biofuels is not environmentally sustainable.

The EHS reform toolbox therefore indicates that the application of the EHS definition needs to be considered on a case-by-case basis. The 8th Environmental Action Programme mandates the European Commission to develop a methodology for identifying EHS to other than fossil fuel subsidies (FFS) in 2023.¹⁰⁴ Since the methodology for identifying non-FFS EHS is still being developed, this report therefore only focuses on defining and identifying environmentally harmful FFS.

A.1.11.1. Defining environmentally harmful fossil fuel subsidies

FFS, even those that related to abated fossil fuel use, can generally be considered having negative environmental impacts and thus environmentally harmful. The 8th Environmental Action Programme therefore calls for "...phasing out environmentally harmful subsidies, in particular fossil fuel subsidies, at Union, national, regional and local level, without delay" and "...setting a deadline for the phasing out of fossil fuel subsidies consistent with the ambition of limiting global warming to 1.5°C". However, some FFS support a reduction in the production and/or consumption of fossil fuels such as subsidies for the decommissioning of coal-fired power plants. This could lead to lower environmental impacts related to energy use and as such, these FFS could be considered not to be environmentally harmful.

This study provides a methodology for identifying whether an FFS is environmental harmful. Building on the definition of EHS of the EHS reform toolbox, this study uses the following definition for EHFFS:

Fossil fuel subsidies are environmentally harmful if the price or cost reduction that they cause, incentivises maintaining or increasing in the availability of fossil fuels and/or use of fossil fuels, regardless of whether these are unabated or abated.

The definition is based on the following principles:

- All subsidies supporting fossil fuel production and distribution are considered as environmentally harmful. It cannot be determined with absolute certainty how the subsidised fossil fuel that is produced or distributed will used in a manner that will not have negative environmental impacts. In addition, the extraction and production of fossil fuels leads to resource depletion by definition and is often associated with other negative environmental impacts such as pollution, erosion and biodiversity loss through land and sea-use change (e.g. deforestation).
- All subsidies supporting the use of unabated fossil fuels are considered as environmentally harmful. This also includes FFS that support the transition from a high-emission intensive fossil fuel (e.g. coal) to a fossil fuel with fewer GHG emissions (e.g. gas). This is in line with the recommendations of the IPCC for "a substantial reduction in overall fossil fuel use and minimal use of unabated fossil fuels".¹⁰⁵
- Subsidies supporting the use of abated fossil fuel use are also considered as environmentally harmful. Examples of abated fossil fuel use are the use of fossil fuels in combination with

¹⁰⁴ Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a General Union Environment Action Programme to 2030.

¹⁰⁵ IPCC (2023). AR6 Synthesis Report – Summary for Policymakers.

carbon capture and storage or utilisation. In addition to its contribution to climate change, fossil fuel combustion is responsible for localised environmental harm, including air and water pollution that is harmful to human and ecosystem health (such as particulates, nitrous oxides and heavy metals). Energy generation from fossil fuel combustion requires significant amounts of water to power steam turbines which can place stress on water resources. These environmental impacts occur regardless of whether the GHG emissions are abated. Furthermore, all fossil fuel use leads to additional fossil fuel extraction with the associated harm to the environment as noted above. Therefore, even abated fossil fuel use is considered as environmentally harmful.

- Not only FFS that incentivise an *increase* if fossil fuel use or production is environmentally harmful, but FFS that *maintain* the status quo as well. This reduces the ambiguity in relation to the counterfactual. For example, subsidies that compensate for rising gas prices could have contributed to an increase in fuel consumption compared to the counterfactual without compensation. However, gas for heating households has historically been highly inelastic,¹⁰⁶ so the gas consumption in the counterfactual may have been the same and the compensation only reduced the heating costs for households. Nonetheless, that does not take away the fact that compensation contributes to the use of gas, leading to negative environmental impacts.

A.1.11.2. Identifying environmentally harmful fossil fuel subsidies

FFS in the *Subsidy Inventory* have been categorised as “environmentally harmful” or “not environmentally harmful” based on a manual scan of whether the description of their intended aim or objective leads to outcome(s) that meet the EHFFS definition.

FFS categorised as **environmentally harmful** include the following subsidies:

- Exemptions, refunds or reduced tariffs on fossil fuel taxes, including tax credits or vouchers for fossil fuel use;
- Measures that lower the VAT paid on fossil fuels compared to the nominal VAT rate of the Member State;
- Subsidies to lower the cost of using fossil fuel, which could be economy-wide or specific to certain groups including public transportation;
- Compensation measures to mitigate rising energy costs, regardless of whether this is directly to the end-users such as households or distributors to lower the price they charge end-users;
- Subsidised sale of fossil fuels, e.g., compensation for having to sell fossil fuels for a lower price compared to selling it elsewhere;
- Caps or other forms of direct control of the price of fossil fuels;
- Subsidies for maintaining, upgrading and/or modernising the infrastructure for fossil fuel extraction or distribution, or fossil fuel-based power generation;
- Exemptions for paying royalties to the government for the extraction of fossil fuels;
- Capacity payments to fossil fuel-based power generation companies for balancing the electricity net;
- Financial measures to guarantee the capacity and security of supply of fossil fuels or electricity from fossil fuel-based power plants;
- Payments to supply fossil fuels to remote areas;
- Grants or concessional loans for fossil fuel extraction or storage;
- Financial support to building new LNG terminals and the necessary infrastructure for distribution and storage of LNG;

¹⁰⁶ IMF (2022). Natural Gas in Europe – The Potential Impact of Disruptions to Supply.

- Financial support to the development and/or maintenance of district heating systems and combined heat-and-power plants (CHPs) that can use fossil fuels, including high efficiency CHPs;
- Subsidy for electricity generated from fossil fuel-based power plants, including CHPs;
- Financial support to the restructuring of coal-fired power plants to consume natural gas, even if this is intended to be combined with the consumption of renewable energy;
- Funding for research and development for fossil fuel production and/or use.

Some FFS that incentive maintaining or increasing in the availability of fossil fuels and/or use of fossil fuels are conditional to the implementation of environmental management systems or meeting certain energy efficiency targets. While the conditions for obtaining FFS can lead to a reduction in fossil fuel consumption, the FFS themselves still meet the definition of EHFFS and are therefore still considered environmentally harmful.

For FFS categorised as **not environmentally harmful**, this includes the following types:

- Financial incentives for the closing or curtailment of coal mines or other fossil fuel extraction sites;
- Financial incentives for closing or curtailment of coal-fired power plants or other fossil fuel-based power plants;
- Measures to alleviate the costs for companies related to the closure or curtailment of coal mines and/or coal-fired power plants, which could include social costs and damages following closure;
- Income support to former workers of coal mines and/or coal-fired power plants;
- Financial support to the restructuring or rehabilitation of coal mines and fossil fuel-based power plants and/or their surrounding area, as long as it is not intended to result in the consumption of other fossil fuels (e.g., restructuring a coal-fired power plant to a gas-fired one);
- Subsidies to disconnect from the gas distribution network;
- Subsidies to reduce heating that is based on fossil fuel use;
- Compensation for restrictions on fossil fuel use;
- Subsidies to replace existing use of fossil fuels with renewable energy;
- Financial support to energy efficiency that reduce current fossil fuel use, as long as the measure does not directly incentivises the use of other fossil fuels.

A.2. Annex 2: Country data controls and observations

Please refer to file delivered as separate document.

A.3. Annex 3: Member State Fact-sheets

Please refer to file delivered as separate document.

A.4. Annex 4: Subsidy inventory database

Please refer to file delivered as separate document.

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