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Beyond Green Tagging: Linking budgets better with climate goals

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Green budgeting should go beyond green tagging and provide governments with a set of tools for ensuring alignment between countries' international commitments – such as net zero emissions (NZE) commitments, national plans and strategies, medium term budget frameworks and annual budgets. This paper discusses new instruments to better link budgets and results, and it discusses the challenges faced for linking budget and emissions, the necessary steps on the way, and presents the next generation of practices which are being developed in some OECD countries.

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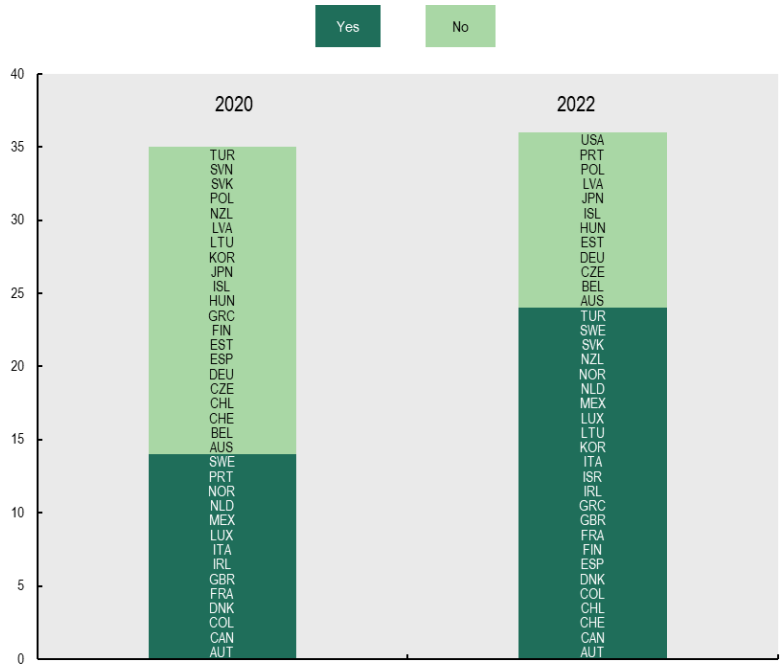
Introduction

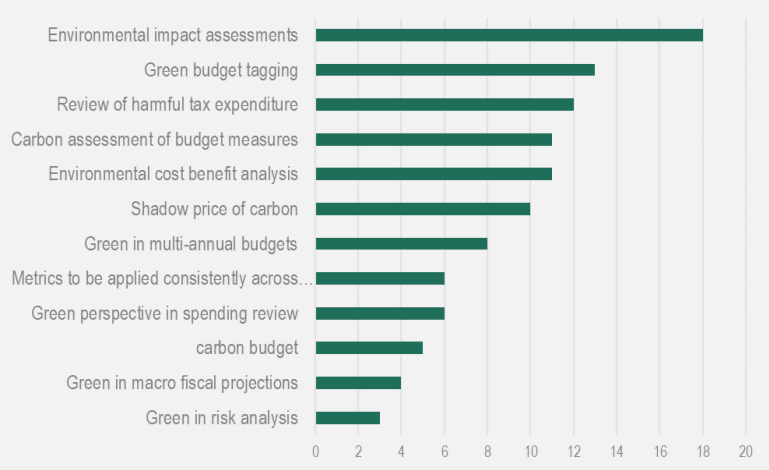
1. The 2022 OECD Survey on Green Budgeting shows that the implementation of green budgeting in OECD countries increased from 14 countries in 2020 to 24 countries in 2022 (Figure 1), meaning that as of 2022, nearly two thirds of OECD countries had implemented green budgeting. The significant increase demonstrates the priority OECD countries are giving to climate action. Case study information shows that this figure has further increased since then, and that green budgeting is now embedded in the budget practices of national governments. As such, the question has moved from whether to implement green budgeting to how to implement it in the most impactful manner within the resources available. As expected, when introducing and developing a new practice, OECD countries are developing and testing a number of different tools (Figure 2).

Figure 1. Green budgeting in OECD countries, 2020 vs. 2022



Source: OECD (2024), Green Budgeting in OECD Countries 2024.

Figure 2. Green budgeting methods and tools in OECD countries, 2022



Source: OECD (2024), Green Budgeting in OECD Countries 2024.

2. Not all budget tools perform as expected, which can lead to innovations that improve the existing tools or give rise to new and better tools. This paper draws on insights from the OECD Paris Collaborative on Green Budgeting (Box 1) to consider the experiences of budget offices from using green budget tagging and to look at the ways OECD countries are moving beyond tagging into the next generation of green budgeting tools and practices.

Box 1. OECD Paris Collaborative on Green Budgeting

The OECD Paris Collaborative on Green Budgeting (PCGB) supports countries design and implement new, innovative tools to improve the alignment of national expenditure and revenue processes with climate and other environmental goals. Aligning national policy frameworks and financial flows on a pathway towards low greenhouse gas emissions and environmentally sustainable development is a crucial step in achieving the objectives of the Paris Agreement on climate change, as well as of the Aichi Biodiversity Targets and the United Nations' Sustainable Development Goals.

The PCGB was launched at the One Planet Summit in Paris on 12 December 2017. It offers a multi-dimensional perspective on public expenditure and budgeting for climate and environmental objectives by bringing together senior officials from budget offices, ministries of climate/environment, independent fiscal institutions, independent climate councils, subnational governments and other relevant stakeholders. The PCGB provides a platform for dialogue and sharing good practices through annual meetings and expert workshops. It also carries out regular cross-country surveys to monitor the progresses in green budgeting practices, and in-depth country reviews, to support countries meet their national targets and international commitments for climate and environment.

The PCGB has developed a framework for approaching green budgeting, developed and implemented two surveys of green budgeting practices in OECD countries (in 2020 and 2022), developed green budget tagging guidelines, published papers, and organised 10 international meeting. The PCGB also supported the introduction of green budgeting practices in independent fiscal institutions, spending reviews, and fiscal reporting.

1 Experiences from green budget tagging

3. Climate and environment considerations have become increasingly relevant for governments in recent years. International commitments such as the Paris Agreement, and strong expectations by citizens that governments address climate change, have spurred momentum across the OECD to prioritise green objectives in policymaking processes. However, it is difficult to assess how budget spending impacts climate/green goals and vice a verse. Indeed, standard classifications of functions of government are based on the primary purpose of expenditure and do not take into account the externalities or secondary purpose of expenditure. This is particularly the case with climate expenditure, as in many cases, climate is only a secondary purpose of other expenditure. For example, investment in renewable energy production would not appear under the Environment function, but under Economic Activity (energy generation). Some policies which are developed for a specific purpose may also have indirect (positive or negative) impacts on climate/environment. Typically, some subsidies have equity and poverty alleviation as a primary objective, but by subsidising fossil fuels for example, they have a negative effect on climate.

4. Green budget tagging is a budget management tool that helps identify the share of public expenditure has a positive, negative or neutral effect on environment. Tagging is not a new budget management tool, nor is it specific to green objectives; it has been used to better understand policy objectives of issues, such as poverty reduction and gender equality. Green budget tagging was first developed by OECD's Development Assistance Committee (DAC) with the 1998 Rio Marker methodology (Box 2).

5. The purpose for developing green budget tagging was to identify the amount of development assistance funds which were spent on climate change, biodiversity and desertification activities. More recently, the EU developed a Taxonomy for Sustainable Activities, which is also used to identify climate and environmental expenditure (European Union, 2020[1]). The purpose is to demonstrate that at least 37% of the EU Green Deal and 2020 Next Generation EU Recovery Plan are allocated to climate objectives. The EU taxonomy is described as a market transparency tool to inform and communicate the direction of investment.

Box 2. OECD Rio Market Methodology

The OECD's Development Assistance Committee (DAC) Rio Marker methodology is a frequent reference point on climate taxonomies. Under the 1998 Rio Marker methodology, expenditure on donor-funded aid projects is tagged to identify projects that contribute to climate mitigation, climate adaptation, biodiversity, and desertification control. A fourth marker on climate adaptation was added in 2010. The markers identify the contribution that the expenditure in question makes to these four areas in one of the following ways:

- **Principal**: The purpose of the activity is explicitly related to any of the four areas. The activity is weighted 100%.

- **Significant**: The activity contributes to, but its principal purpose is not explicitly related to any of the four areas. The activity is weighted 40%.
- **Not targeted**: The activity is not related to any of the four areas. The activity is weighted 0%.

The Rio markers were designed to help members of the DAC prepare communication material and reports to the 1992 Rio Conventions on climate change, biodiversity and desertification by identifying activities that were relevant to the Convention in development assistance. The OECD DAC Rio Markers for Climate Handbook provides an example of an early and broadly applied approach to constructing a taxonomy for the purposes of development co-operation on climate mitigation, climate adaptation, biodiversity, and desertification.

Source: OECD (2015).

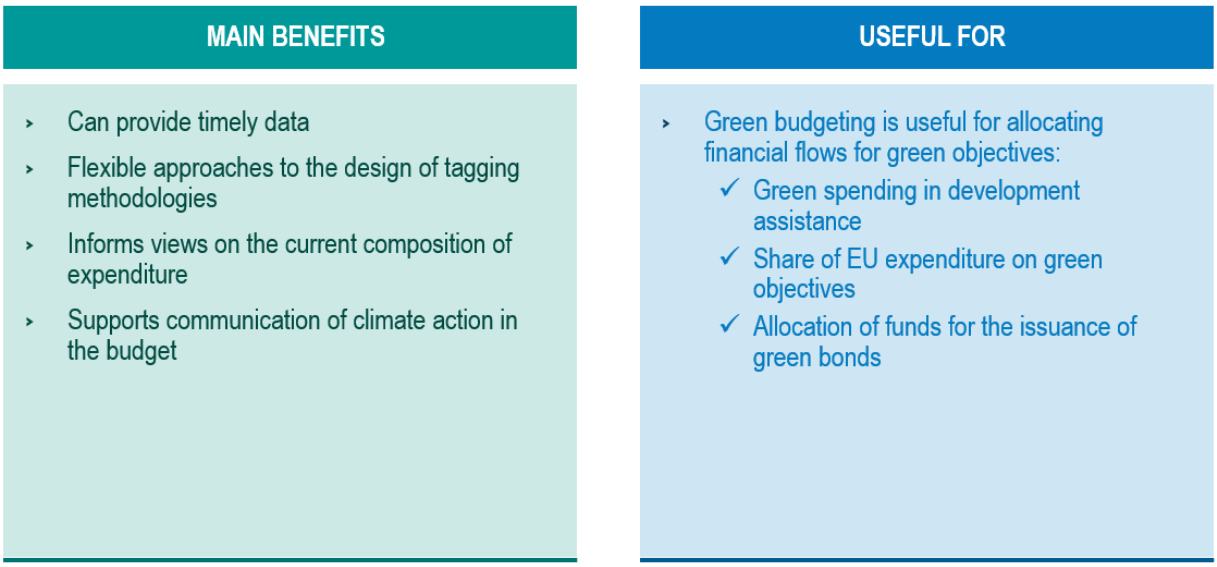
1.1. Main benefits of green budget tagging

Green budget tagging generates data that serves as a proxy for the expected result of a budget initiative by showing the allocation of relevant expenditure (or revenue). It serves the initial purpose for which it was created, which is to track expenditure which have climate/green effects, even when these are not the primary purpose of the expenditure. It can also provide a quantification of expenditure with both positive and negative effect if the taxonomy used also covers negative effects. The main benefits of green budget tagging are the following (

Figure 3):

- **Can provide timely data**: Data produced by green budget tagging relates to the current budget, and if it is produced during budget formulation, it can be used to provide information about budget allocations. Alternative sources, such as the System of National Accounts typically incur an 18–24-month delay and is therefore less useful for decision making.
- **Flexible approach**: While different institutions have developed guidelines for implementing budget tagging (see for example: OECD, 2021[27]), each country develops its own tagging methodology, and is free to change it and improve it as needed. Green budget tagging therefore fits each country's needs.
- **Transparency**: green budget tagging provides a stocktake of the composition of expenditure, and if the exercise is done regularly, and the methodology is consistent, it can provide information on the change of the composition of spending.
- **Communication**: Reports on green budget tagging can help communicate the government's credentials for climate action.

Figure 3. Main benefits and usefulness of green budget tagging



1.2. Main limitations of green budget tagging

6. Countries which have implemented green budgeting have reported a number of challenges and limitations, in particular its lack of usefulness for decision making and budget management (Figure 4). The main challenges related to the quality of green budget tagging are:

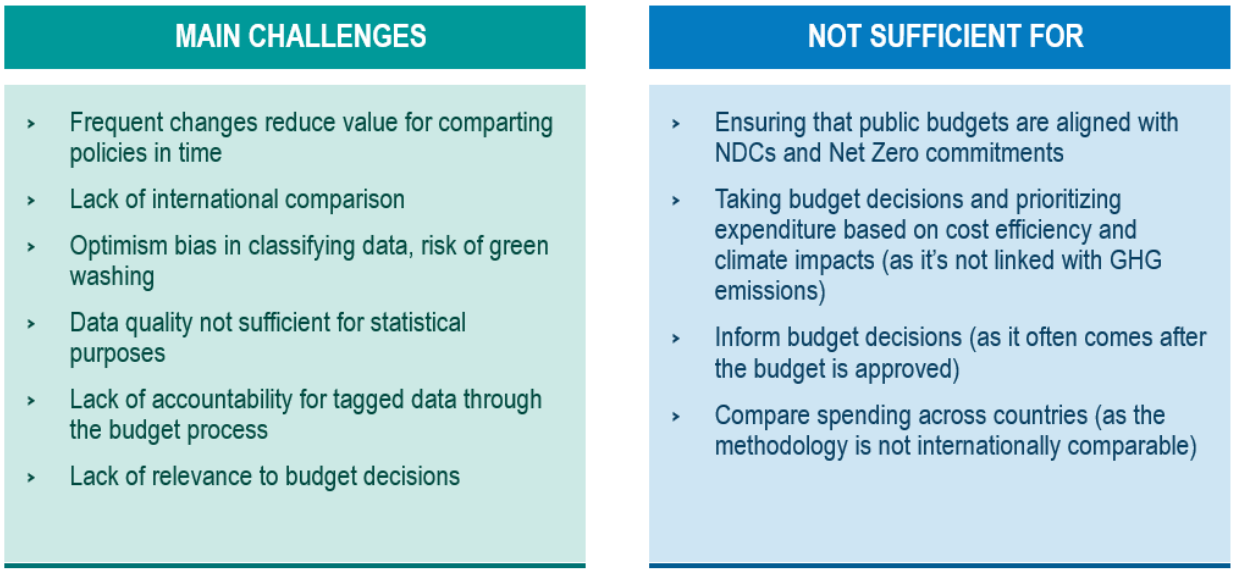
- **Frequent changes**: The drawback of having a flexible instrument is that it may lack consistency across time. As the green budget tagging methodology is not yet mature, most countries tend to revise it frequently, which reduces the value for comparing government spending on climate/green objectives in time.
- **Optimism bias**: Green budgeting is often presented as an instrument to minimise misleading or false information (i.e. green washing) about government's actions for climate and the environment. However, it sometimes generates the opposite result, making public expenditure look greener than it is. For example, in 2022, the European Court of Auditors found that climate spending in the 2014-2020 EU budget was not as high as reported (13% instead of 20%) (European Court of Auditors, 2022[2]). The Court re-classified some spending as not relevant to climate action, in particular in the area of agriculture.
- **Data quality insufficient for statistical purposes**: As tagging methodology is not linked to emissions or any observable indicator, it must rely on judgement in the application of the methodology. For example, some expenditure items may have both positive and negative impacts, or may have negative impacts in the short term and positive ones in the long term (or the opposite), and therefore require a judgment on how to tag them. This reliance on judgment and potential lack of consistency means that the tagged data does not meet the standards required of statistical data by national statistical offices.
- **Lack of homogeneity of data**: Green budget tagging aims to include public expenditure on all green objectives (most frequently: climate change mitigation, climate change adaptation and natural risk prevention, water resource management, circular economy, pollution abatement and biodiversity and sustainable land use). However, adding up spending on such different objectives reduces the homogeneity and usefulness of the data produced.

- **Lack of accountability for tagged data**: Green budget tagging methodology is not applied to the budget proposals and decisions in the same way as it is applied when expenses are incurred, or when financial reporting occurs at the end of the budget period. This lack of consistency reduces accountability for the information provided during the budget decision-making period.

7. The main limitations in terms of usefulness of this instrument are:

- **Lack of coverage**: Climate-related expenditure covers only a small proportion of total expenditure in a budget. On average, only around 10% of budget expenditure is categorised as relevant (positive or negative) to climate and environmental objectives.
- **Lack of relevance for budget decisions** when timelines are not aligned. In many countries, budget tagging is carried out after the budget has been submitted or approved, which reduces its value for budget discussions and arbitrages.
- **Lack of relevance to influence climate strategy decisions:** Governance structures are often not aligned: working groups, departments and ministries produce and use different sets of information. This reduces the usefulness of budget tagging as a tool to align budget and climate strategies.
- **Insufficient to ensure budgets are aligned with commitments**: Green budget tagging does not determine whether a budget submission should be included in a budget, but rather identifies a characteristic of the expenditure. The initiatives that are estimated to have the greatest impact on reducing emissions are included in emission reduction plans and national adaptation plans, while budget choices are informed by expected outcomes, costs, risk and accountability.
- **Insufficient to prioritise expenditure**: Green budget tagging does not provide information about the intended results in terms of emissions reduced or green objectives achieved. It therefore does not support prioritisation of expenditure based on their cost efficiency (as could be assessed by estimating abatement costs) or climate impact.
- **Inappropriate for international comparison**: As there is not an internationally agreed methodology for implementing green budget tagging, the national information produced cannot be used for international comparisons. National green budget tagging frameworks differ in the inclusion and classification of expenditures, as well as the weights applied to the expenditures.

Figure 4. Main challenges and limitations of green budget tagging



1.3. Possible improvements for green budget tagging

8. Given the shortcomings, green budget tagging practices would benefit from:

- Expanding the coverage when identifying relevant expenditure.
- Improving quality assurance mechanisms.
- Improving the quality and timeliness of the data.
- Ensuring timelines for preparing green budget reports are aligned with general budget process, so that the information produced by tagging can be used in the budget decision process.
- Aligning governance structures and responsibilities for green budget tagging and general budget process, and avoid creating parallel working groups which do not interact with existing structures.

9. A possible development that is relevant to improving tagging relates to the statistical Classification of Functions of Government Expenditure (COFOG) (Box 3). If COFOG statistical information could adequately capture environmental expenditure, this might improve the coverage of expenditure that is relevant to climate change objectives and enable comparisons between the budget expenditure (*ex-ante* data) and the statistical information (*ex-post* data).

Box 3. Proposal for a new integrated approach to the classification of government functions

The Classification of Functions of Government Expenditure (COFOG) is an international standard classification that organises public government expenditure into functional categories of interest to policymakers. It classifies public spending according to the objectives or the motivation. COFOG classifies expenditures according to the principle of mutually exclusive categories, and therefore does not deal well with issues which have multiple purposes or significant impacts on other policy domains.

This is why the COFOG is currently being updated, to integrate the standards provided by the current classification system with the flexibility provided by budget tagging efforts

In 2023, the OECD commenced work on proposing a new integrated approach for the COFOG, based on the new Classification of Environmental Protection Activities elaborated by Eurostat. The proposal consists of introducing a double entry classification system (as a matrix, with an extended or double-entry classification structure, including principal purpose and secondary purpose), and adopting a satellite account approach to analyse environmental expenditure. This would be similar to tagging activities according to consistent international categories and then reclassifying according to policy areas.

Source: (Pizarro, 2023[3]).

2 Next generation green budgeting instruments

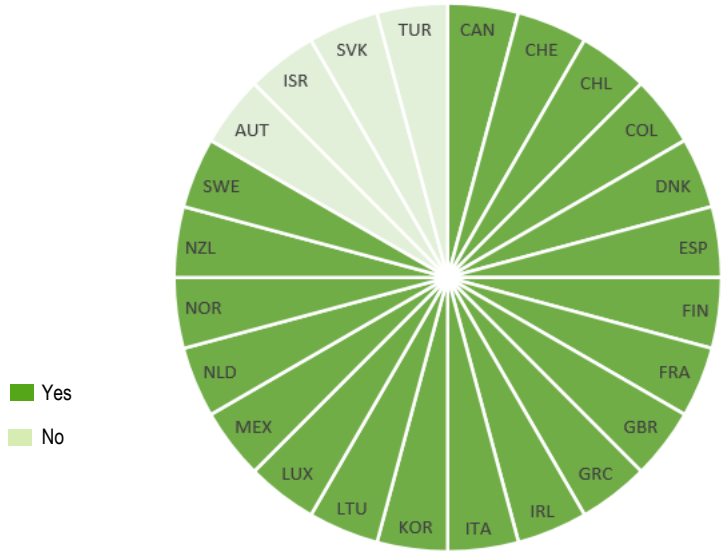
2.1. Focusing on climate objectives and measuring impacts

10. OECD countries have set targets on Net Zero Emissions (NZE) and prepared Nationally Determined Contributions (NDCs). A large share of the effort will be borne by the private sector, and not all public policies to achieve these targets have a budgetary impact. Still, there will be a need to implement public policies with budgetary impact to achieve the targets. It is therefore important to develop models to assess impact of policies on emissions, to estimate the cost of the policies needed to reach these commitments and develop tools for integrating these results into budget decision-making process.

National climate strategies, climate action plans and budgets

11. The 2022 OECD Survey of Green Budgeting Practices in OECD countries showed that most OECD countries have national climate or environmental strategy, as well as a Net Zero Emissions strategy (Figure 5) (OECD, 2024[4]). In many cases, the national climate act or supra-national institutions require governments to submit national action plans (Box 4). However, to date, few countries are linking their NZE strategies and climate action plans with their annual (and multi-annual when relevant) budgets.

Figure 5. OECD Countries which have a Net Zero Emissions Strategy



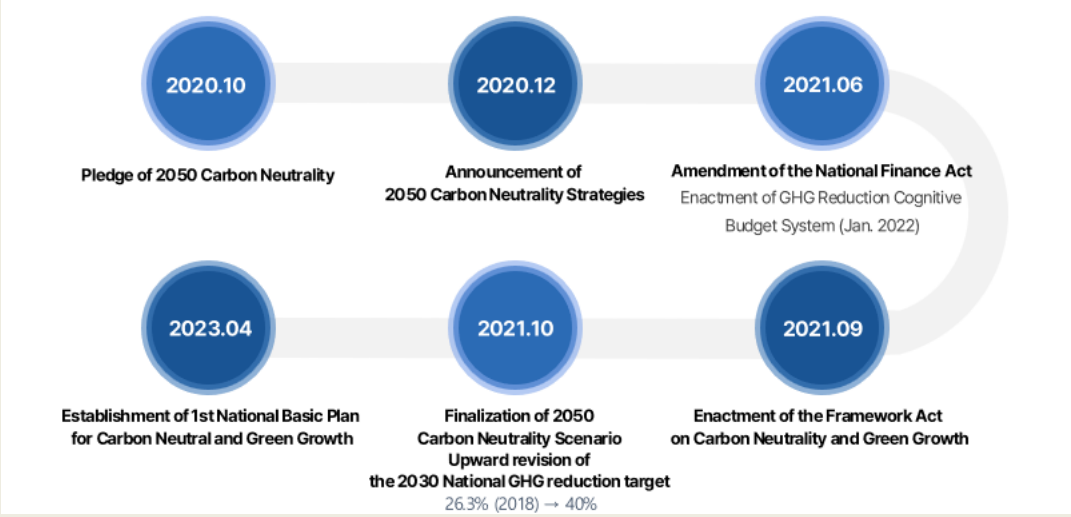
Note: Question 6: Do you have a net zero emissions strategy? 24 countries answered.
Source: OECD Survey on Green Budgeting Practices, 2022.

Box 4. From NZE commitments to climate action plans in Korea and Sweden

Korea

In 2020, Korea announced its intention to reach net zero by 2050. In the same year, the government announced its strategic roadmap to reach that goal. In 2021, Korea amended the National Finance Law, enacted a Framework Law on Carbon Neutrality to lay legal foundations for Korean green budgeting. In 2021, Korea also committed to further reductions in GHG emissions, setting a reduction target of 40% instead of 26% previously. In 2023, Korea established a high-level national plan towards net zero, which lays the foundation for the country's vision of becoming a carbon neutral country (Figure 6).

Figure 6. Korea's path to carbon neutrality



Source: Korean Environment Corporation.

Sweden

Sweden's Climate Act (2018) states that each new government must, no later than in the year following general parliamentary elections, present a climate policy action plan for the coming term in office. The Climate Act establishes that the Government's climate policy must be based on the climate targets and specifies how the implementation is to be carried out. The Act states that the Government shall:

- Present a climate report in its Budget Bill each year.
- Draw up a climate policy action plan every fourth year to describe how the climate targets are to be achieved.
- Make sure that climate policy goals and budget policy goals work together.

The long-term target for Sweden is zero net GHG emissions by 2045 at the latest. The Climate Act sets milestone intermediary targets for reaching this objective: by 2020, emission should be 40% lower than in 1990, 63% lower by 2030 and 75% lower by 2040.

Sweden also created a Climate Policy Council, to monitor governments' plans and their implementation, and ensure that Governments' policies are in line with climate goals. The Council consists of members with high scientific competence in the fields of climate, climate policy, economics, social sciences and behavioural sciences. The Climate Policy Council must submit a progress report to the government every year. In addition, the Council also assesses each new government's climate action plan.

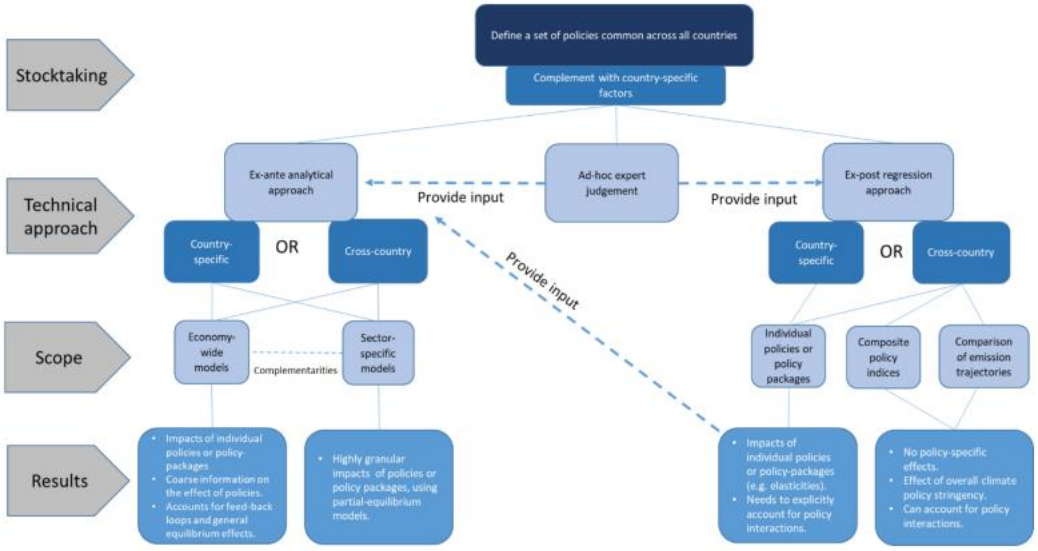
Source (Swedish Climate Policy Council, 2023[5]).

Assessing impact of budget proposals on GHG emissions

12. Improving the linkages between public budgets with climate objectives and commitments requires having the capacity to understand and measure the impact of policies on climate objectives. However, understanding the impacts of different policies on emissions is not straightforward, and developing these tools requires efforts in modelling. Developing a model implies deciding upon a number of elements: What types of emissions should be considered (only CO_2, all GHG emissions)? At what jurisdictional level should the evaluation be carried out (supranational, national, subnational)? How to deal with overlapping policies? How to choose the baseline year?

13. There are two broad approaches for assessing emission reductions from policy packages: *ex-ante* analytical approaches, and *ex-post* regression approaches. In all cases, some degree of expert judgment is required to ensure the most suitable analytical representation and parameter choices, and assess and interpret modelling results (Figure 7). A necessary first step to develop and use these models is to have a database of carbon mitigation approaches and climate actions and policies (Box 5).

Figure 7. Approaches to assessing emissions reductions from policy packages



Source: OECD (2023), Options for assessing and comparing climate change mitigation policies across countries ECO/WKP(2023/2).

Box 5. OECD databases of carbon mitigation approaches and climate actions and policies

International Programme for Action on Climate (IPAC) and the Climate Action Monitor

The OECD International Programme for Action on Climate (IPAC) supports country progress towards net-zero greenhouse gas (GHG) emissions and a more resilient economy by 2050. Through regular tracking, policy evaluation and feedback on results and best practices, IPAC helps countries strengthen and co-ordinate their climate action.

The Climate Action Monitor is the annual flagship publication of IPAC. It provides a synthesis of climate action and progress towards net-zero targets for 51 OECD and OECD partner countries. It presents a summary of information on greenhouse gas emissions, an assessment of climate-related hazards, and key trends in climate action. Directed towards policymakers and practitioners, the findings confirm, as COP28 gets underway, that without increased ambition and a significant increase in national climate action, countries will not be able to meet the net-zero challenge.

IPAC also produces a Climate Action Dashboard, which features key indicators that provide an at-a-glance view of country actions and progress towards climate objectives and trajectories toward net zero.

Source: (OECD, 2024[6])

Climate Actions and Policies Measurement Framework (CAPMF)

There are major gaps in the measurement of the adoption and stringency of countries' climate actions and policies, notably in a manner coherent across countries, time, sectors and instrument types. The climate actions and policies measurement framework (CAPMF) aims to fill this gap. It is a structured and harmonised climate mitigation policy database that informs about countries' climate action.

The CAPMF comprises 128 policy variables, grouped into 56 policy instruments and other climate actions, covering the 52 countries participating in IPAC and the period 2000-2020. The CAPMF is the most comprehensive internationally harmonised climate-related policy database currently available.

Results indicate that IPAC countries strengthened their climate action between 2000 and 2020 in terms of both policy adoption and policy stringency, although individual countries progressed at different paces. Policy mixes in many countries changed from cross-sectoral to a more sectoral focus and from non-market to market-based approaches. Importantly, results suggest a positive relationship between stronger climate action and greater emissions reductions but further analysis is needed to fully assess policy effectiveness.

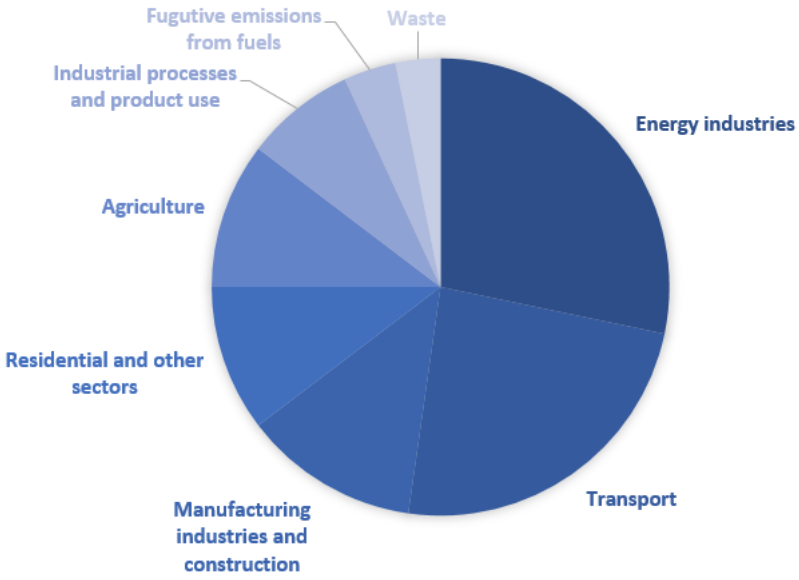
14. On average, five sectors are responsible for more than 80% of GHG emissions in OECD countries (Figure 8): energy industries, transport, manufacturing and construction, residential and agriculture. Climate change strategies identify the distribution of emissions by sector in the economy and the data helps to identify initiatives that are most likely to reduce emissions in each sector. The identification of initiatives are not budget proposals, but they help identify the sectors and the likely reforms that will have the greatest impact in reducing emissions and making progress on climate objectives.

15. The distribution of emissions in an economy, as illustrated in Figure 8 does not show the distribution between public and private sectors, but the estimated composition of emitting activities in each sector can inform the design of budget initiatives that would reduce emissions. In the case of energy industries, it may result in a strategy on increasing renewable energy sources and the government actions that would be necessary. For the industrial sectors, it may result in changes to research, development and innovation initiatives in emission-intensive operations, such as cement or steel manufacturing. Each example illustrates the focus on high-emitting sectors and activities, relative to a generalised approach of considering all expenditure, as experiences from OECD countries have shown that many areas of

expenditure are not relevant to climate policy targets, for instance, public sector salaries and transfer expenses.

Figure 8. GHG emissions by source

OECD total, %, 2021



Source: (OECD, 2021[7]).

16. One way of ensuring budgets is aligned with climate objectives is to embed an assessment of the climate impact of new expenditure in the budget submissions documents. For example in 2023, Korea introduced a GHG Reduction Cognitive Budgeting System, which aims to analyse the impact of national budgets on GHG reduction, reflect the findings on budget preparation, and evaluate whether the budgets have been properly executed and the objectives reached. (Box 6).

Box 6. Embedding climate and nature in budget proposals in Korea

In 2023, Korea introduced a GHG Reduction Cognitive Budgeting System. In this system, budget proposals must include the expected effects on GHG reduction. GHG reduction cognitive budget statement of accounts must also be produced. GHG reduction cognitive budget proposals must go through a specific review process. Timeline for submitting these budget proposals is the same as the regular government budget process. GHG reduction projects must go through the proposal submission process if the project specifically aims at reducing GHG emissions, or if they have strong effect on GHG emissions, even if this is not their primary purpose.

After the selection process of GHG reduction projects, these are classified into 10 sectors. These 10 sectors are identical to those in the National Basic Plan for Carbon Neutrality and Green Growth. The basic plan specifies the reduction targets by sector, and outlines the necessary policies needed to achieve these. The GHG cognitive budget helps monitoring how budget proposals support the Basic Plan.

Budget proposals are categorised into three types of projects, based on the GHG reduction effects. Projects with quantifiable reductions are classified into quantitative projects while those with less quantifiable reduction effects are categorised as qualitative, or research and development projects.

Budget proposals must follow several templates. The first template consists of the overall summary. Each ministry must submit a summary including the Ministry's reduction template. Then Ministries must submit a specific template for each budget proposal. These templates describe the project, the expected benefits, the GHG reduction effects and performance objectives.

GHG reduction is defined as the difference between GHG emission levels *ex-ante* and *ex-post*.

In the two first years of implementation, the number of projects reached 294, of which about half are R&D projects. In the 2024 budget, KRW 10.9 trillion out of the total KRW 657 trillion budget (about 1.5%) is used for GHG reduction projects. This system helps to manage not only the projects which have immediate reduction effects, but also the projects which require sustained investments and will contribute to GHG reductions in the future. The GHG cognitive budget allows to classify these projects into different categories. The GHG cognitive budget also helps forecast expected annual GHG reduction effects for each project, and understand the chronological patterns in the project budget size, by fiscal year or by sector.

Source: Korea Environment Corporation.

17. The ability to estimate GHG emissions for specific activities is becoming increasing accessible as governments and international organisations develop guidelines, templates and calculators for this purpose (Box 7). As these resources develop, it becomes easier for budgets proposals to include the estimated GHG emissions impact alongside other performance indicators. The use of indicators that are directly relevant and attributable to the budget proposals is more informative than tagged data, as the estimated change in emissions enables assessments of how the budget is contributing to governmental targets on emissions.

Box 7. Tools to assess impact of policies on GHG emissions

The OECD recently published a scoping note presenting a high-level overview of the main approaches to, and challenges faced when, calculating product-level carbon intensity metrics, including those applicable to collecting and verifying information across the supply chain. This will lead to a wider report to provide a foundation for developing basic principles and considerations to support the widespread calculation and use of carbon intensity metrics globally (OECD, 2024[8]).

The Greenhous Gas Protocol develops and provides tools to enable companies, countries and cities to carry out comprehensive and reliable inventories of their GHG emissions, to help them track progress towards their climate goals. These include a Mitigation Goal Standard Calculation Tool and a Policy and Action Standard Calculation Tool for countries and cities.

The Mitigation Goal Standard Calculation Tool includes a goal assessment framework which consists of 8 steps:

- Designing a mitigation goal
- Estimating base year of baseline scenario emissions
- Accounting for the land sector
- Calculating allowable emissions in the target year(s)
- Assessing progress during the goal period
- Assessing goal achievement

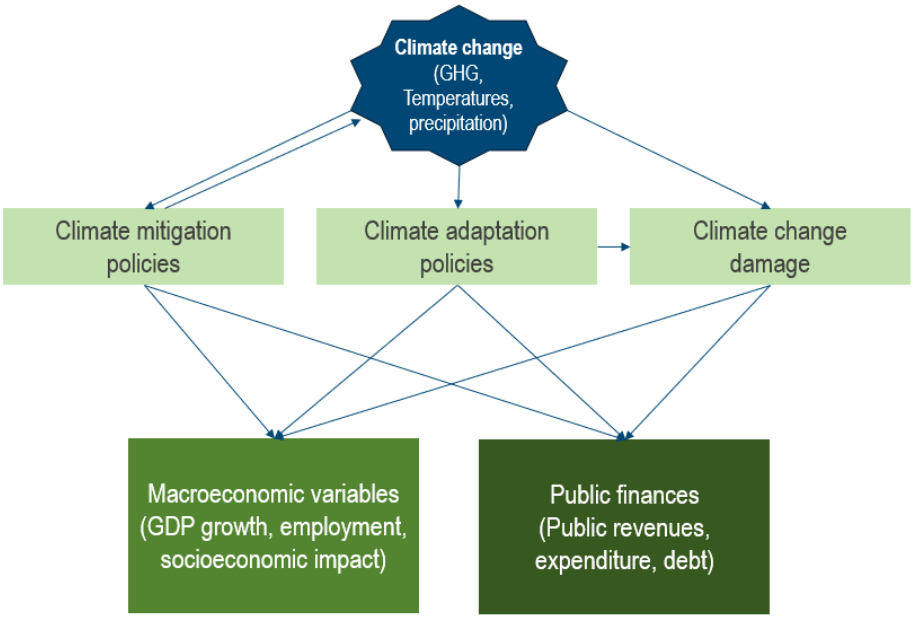
- Verification
- Reporting

Source: (World Resources Institute, 2024[9]).

2.2. Understanding the multi-dimensional links between climate change, climate policies, public finances and budgets

18. The first key element for linking budgets to climate and climate policy consists of understanding and assessing the impact of climate on public finances. Climate affects public finances through two main channels: a direct effect (public spending on climate policies, impact of climate tax reforms on public revenues) and an indirect effect (impact of macroeconomic climate-induced changes such as GDP growth, employment, productivity on public finances). Climate impact on macroeconomic variables and public finances can also be classified in three categories: impact of climate change (damages, catastrophic expenditure), impact of climate mitigation policies, and impact of climate adaptation policies (Figure 9).

Figure 9. Modelling impact of climate on public finances



19. Research and modelling on all these elements are growing fast, with countries, international organisations, universities, and think tanks working on different elements. This body of work is difficult to navigate, as models focus on different variables including sectors, and time horizons, make different assumptions on policy choices and temperature scenarios. A growing number of OECD countries is developing such models and using them to carry out assessments of the impact of climate change and/or climate change policies on macroeconomic variables (such as GDP growth or employment) and public finances (in particular public revenues or public debt). This section offers a brief overview of recent frameworks and experiences in modelling climate and climate policies and assessing their impact on public finances in OECD countries.

Modelling macroeconomic impact of climate policies

20. Climate mitigation policies also have macroeconomic impact through the effects of carbon taxes (direct effects), or indirectly by generating compliance costs with regulatory requirements. The Canadian Office of the Parliamentary Budget Officer has recently published a report assessing the impacts of the government's plan to exceed the 2030 reduction target for Canada's GHG emissions under the Paris Agreement (Box 8).

Box 8. Assessing macroeconomic impact of climate mitigation policies in Canada

In 2021, the Canadian Office of the Parliamentary Budget Office published a report analysing the impact of the policies necessary to reach government's objective on GDP growth. It finds a negative effect on GDP of 1.4% in 2030 compared to a no-change policy reference scenario. This analysis is broken down by economic sector (electricity, oil and gas, heavy industry, transportation, agriculture and fishing, buildings, waste and others) as well as the impact on labour and labour income. Oil and gas and transportation are the two sectors where the effects on activity and employment are expected to be the largest (and negative) **(Canada Parliament Budget Office, 2021[10])**.

21. Estimates in the United Kingdom show that each degree of warming requires an additional 0.3% of GDP per year in public spending on adaptation and damage (Office for Budget Responsibility, 2021[11]). However, macroeconomic and fiscal implications of climate adaptation policies is less developed than the other two areas (mitigation and damage). More efforts would be needed to be carried out to understand the costs and the benefits of investing in climate adaptation.

Using models to assess the impact of policy choices on emissions and public finances

22. The most sophisticated models allow policy makers to estimate the effects of alternative policy scenarios on GHG emissions, as well as socioeconomic factors and the impact on public finances (direct expenditures and indirect effects through changes in government revenues). For example, Denmark recently used its GreenREFORM model to assess the possible effects of different models of green tax reform on non-energy-related emissions from agriculture and forestry (Box 9). The model allows to estimate the GHG emission impact of the policy, its socioeconomic cost (measured in DKK, Danish Krones per tonne of CO_2 emissions avoided), the cost for the sector (measured in billion DKK) and the total cost for public finances (public revenues increases or decreases, in billion DKK).

Box 9. Application of Danish GreenREFORM to assess possible tax reform

Denmark is well known for having one of the most encompassing models for assessing the economic and climate effects of climate policies, GreenREFORM. The GreenREFORM initiative in Denmark started in 2017, to provide an assessment of the Climate and environmental effect of economic policies as well as the economic effects of climate and environmental policies (OECD, 2021[12]). The model was used for the first time in 2024 by the Expert Group for a Green Tax Reform in their final report that focuses on non-energy-related emissions from agriculture and forestry.

The analysis compared the effects of a CO_2 emissions tax on livestock and fertiliser on the CO_2 emissions of the sector and calculates a socioeconomic cost (shadow price) taking into account the economic consequences for the sector, the tax revenue generated and the changes in land prices, including subsidies for afforestation. It also analysed the impact of the tax reform on employment, production levels, and food prices.

The report analyses the impact of the tax reform on GHG emissions and on three key variables: public finances (revenues and expenditure), socioeconomic cost, cost for the sector under three different scenarios. A pure tax reform, and two scenarios where the tax reform would be accompanied with public subsidies for supporting farmers adopt new technologies to reduce GHG emissions.

Source: (Expert Group for Green Tax Reform, 2024[13])

2.3. Costing policies on climate commitments

23. As countries have committed to achieving Net Zero Emissions by 2050 (or earlier), and regularly prepare Nationally Determined Contributions (NDCs), it is essential for ministries of finance to assess the potential effect on public finances of the policies which would be necessary for reaching these commitments. In this regard, the Coalition of Finance Ministers for Climate Action is calling for a greater involvement of Ministries of Finance in the design and financing of the next round of NDCs.

24. Estimating the public expenditure implications of transition policies is challenging, as there are large uncertainties on the types of policies that policymakers will implement, their costs or their impact on GHG emissions. Data availability is also a constraint. However, countries, such as Ireland and Switzerland, have attempted to estimate these costs (Box 10).

25. Estimations of the costs of climate change mitigation policies are high, however, these need to be balanced with the costs of inaction, i.e. the cost of damages caused by climate change if mitigation measures are not successful in limiting global warming. There is a general consensus from the analysis that the economic costs of climate change mitigation will be significantly lower in the long-term than the costs of inaction and unchecked climate change.

Box 10. Country experiences in estimating the cost of climate change on public finances

Ireland

In 2023, the Irish Fiscal Advisory Council prepared a special study for their Long-Term Sustainability Report on the impact of climate change on Ireland's public finances.

The report considers three ways in which climate will affect public finances, and builds on existing models developed for each of these elements:

1. **Transition costs**, which are broken down into **revenue-side impact** and **public spending** to support transition.

   Public spending impact of transition is estimated using a general equilibrium model (TIMES-Ireland Model) and assuming that climate mitigation targets are met in a "least-cost" approach. Different scenarios are considered, varying assumptions such as speed of technological development and technological adoption.

   Impact on revenues draws on modelling carried out by the department of Finance, who estimated the potential loss of revenues out to 2030 from implementing the *Climate Action Plan 2023*. In a no-policy change scenario, adopting the Climate Action Plan would lead to a significant reduction in tax revenues (mainly due to the electrification of Ireland's stock of vehicles and key taxes related to emissions start falling).

2. **Physical risks**, which estimate costs related to extreme weather events.

3. **Compliance costs** in case Ireland does not meet its targets and commitments.

Ireland has committed to reducing GHG emissions by 51% by 2030, compared to 2018 levels, and to net zero emissions by 2050. The Irish Fiscal Advisory Council report finds that the largest fiscal impacts will be in terms of transition costs.

Table 1. Estimated impact of climate change on public finances in Ireland

	Per annum from 2026 to 2030	In the long run (2031 to 2050)
Transition costs – Loss of tax revenues	0.9% GNI (€2.5 billion)	1.6% GNI (€4.4 billion)
Transition costs – public spending	0.6 to 1.1% of GNI (€1.6 to 3 billion)	0.4 to 0.7% GNI
Fiscal Risks extreme weather events	Historically, were about 0.1% of GNI every seven years. Expected to reach 0.2% of GNI every three years	
Compliance cost for not achieving target	€0.35 billion annually	0.2% GNI (€0.7 billion)

Source: (Cassey and Carroll, 2023[14]).

Switzerland

In 2024, the Federal Department of Finance carried out its first long-term impact of climate change mitigation measures to achieve the net-zero target on Switzerland's public finances. The 2024 Fiscal Sustainability Report shows the magnitude of the additional burden that the required climate mitigation measures will impose on public finances between 2021 and 2060. The report estimates impact of climate policy on the structure of revenues and expenditures, and how it will affect budgetary balance and the debt ratio, for the federal government, the cantons, the communes and the public social security funds (Federal Department of Finance of Switzerland, 2024[15]). It does not estimate however the costs of climate change itself and the cost of adaptation measures, due to excessive uncertainties and data gaps.

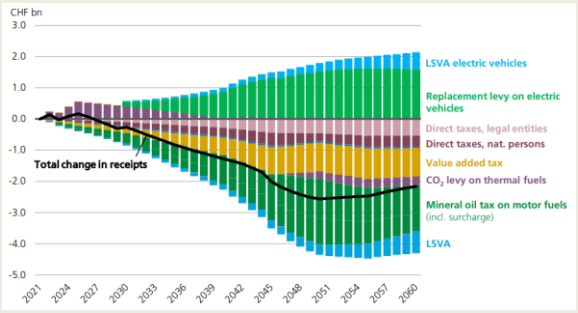
The starting point for the analysis was identifying the receipts and expenditure which would be affected by climate mitigation measures. The interesting approach in Switzerland is providing this analysis for all levels of government (federal, cantons, communes) and social security funds. It considers both direct impacts (such as declining receipts from mineral oil tax and the CO_2 levy on thermal fuels, along with subsidies) and indirect impacts (through impact of mitigation policies on GDP growth, consumption patterns or wages). Results show that indirect impacts are larger than the direct impacts, and federal government is particularly exposed, as well as social security funds (through changes in labour income and therefore contributions).

This pilot study reveals that climate mitigation measures will lead to lower receipts and expenditure for public finances every year until 2060 (Figure 10). By 2060, climate mitigation measures will lead to around CHF 1 billion (about EUR 1 billion) lower expenditure for the federal government than in the reference scenario. This is due to lower federal contributions to the social security system and lower transfers to cantons (as shared-tax revenues decrease). Still, decreases in revenues outweigh decreases in expenditure, thus leading to a debt ratio between 8.4% and 11% higher.

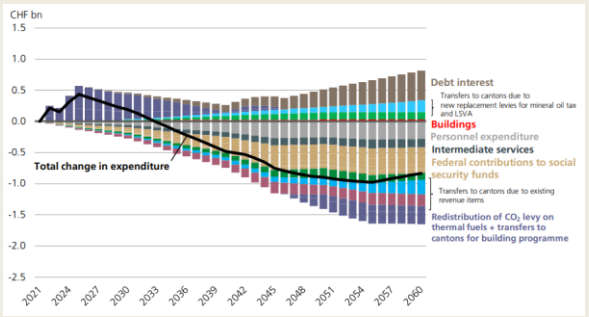
Figure 10. Impact of climate mitigation measures on the Confederation's receipts and expenditures

Compared with the reference scenario (in CHF billion at 2021 prices)

Development of revenues



Development of expenditure



Source: Federal Department of Finance of Switzerland, 2024[29].

3 Conclusion and next steps

26. This paper has shown that green budgeting practices are evolving fast, and countries are experimenting with different instruments to strengthen the ways public budgets can help governments to make progress toward national climate targets and international commitments. The experiences from OECD countries have shown that it is necessary to understand the effects of climate change policies on public finances and budgets in order to provide greater assurance that budget initiatives are able to be implemented and produce the intended results within the timeframes set for climate targets.

27. This paper has also identified areas where further work continues to take place to strengthen the results that can be achieved by focusing on the things that matter most in national emissions strategies and the largest emitting sectors in economies to inform budget assessment and prioritisation processes. The adoption of more advanced ways to assess budget proposals, such as through modelling the estimated impact on emissions from budget proposals demonstrates the complexity involved when assessing the proposals. It also demonstrates the urgency that ministries of finance are giving to climate change to help reduce emissions as projections of global temperatures continue to increase relative to international commitments and the consequences of delayed action risk bring greater fiscal cost.

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