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Assessing the fiscal policy impact of the climate transition

Abstract

The transition to net zero emissions by 2050 requires substantial efforts from European governments, which is expected to have an enormous impact on the public finances. Without appropriate assessment, the transition could further pose significant fiscal risks. This paper takes stock of the experiences from national independent fiscal institutions (IFIs) with the assessment of climate transition measures based on a survey of 27 European IFIs. It finds the majority of national IFIs are concerned about the impact of the climate transition on the public finances. Nevertheless, many national IFIs and governments have not conducted comprehensive assessments of their climate transition measures. The few national IFIs that have experience in assessing climate transition measures have been confronted with several challenges in assessing both the direct and indirect impacts of the transition. These included inadequate or insufficient analysis by governments and specialist agencies, a lack of reliable data and macro-economic models, and overall uncertainty about feedback effects and climate risks.

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Executive Summary

European countries have not only set themselves the ambitious goal to reach net zero emissions by 2050 but also many intermediate targets along the way. On the one hand, the climate transition measures necessary to achieve the net zero goal are likely to require a wide range of policy commitments from governments leading to additional spending or a loss of revenue. The amounts required are currently still uncertain. On the other hand, a lack of ambition concerning climate transition measures entails significant macroeconomic and fiscal risks. Nevertheless, relatively little has been done thus far to assess the potentially large fiscal risks of the climate transition. This paper takes stock of the assessments of climate transition measures undertaken by national IFIs based on a survey of 27 national IFIs conducted in January 2022.

Climate transition measures are defined as policies to reduce net greenhouse gas (GHG) emissions, not including measures that address actual climate events which are not part of the scope of this paper. Climate transition measures can impact public finances in many ways. This paper considers three main channels. The first two channels are direct: taxation and spending measures can be used to achieve climate transition impact goals. There is a first-round impact from the measures themselves, and a second-round impact from induced changes in the behaviour of economic agents (businesses and households) and a change of the economic structure that can both further impact revenues or spending. The third channel is indirect: regulatory and other changes can have second-round impacts on the public finances as the behaviour of economic actors or structures change in response to new regulatory requirements.

While urgent action is required to tackle climate change, climate transition measures nonetheless pose potential risks to the public finances. The climate transition will likely require a significant and heavily front-loaded increase in public spending, which if not offset by additional revenue sources or other measures could lead to a deterioration of the overall fiscal position. The medium- to long-term fiscal risks cover the dangers to public finances mainly through feedback effects on economic growth, contraction or the complete erosion of tax bases and a potential realisation of contingent liabilities. An unbalanced fiscal policy mix and a disorderly transition could lead to substantially higher total costs.

Based on a new survey of national IFIs conducted in the context of this paper, the national IFIs are indeed concerned about the impact of current spending, public investments and off-balance sheet financing involved with climate transition measures. Comprehensive fiscal risks analysis can help governments strengthen the resilience of their public finances and optimise climate transition measures. Nevertheless, only about one-third of the governments of the countries covered by the surveyed IFIs have assessed the fiscal impact of the climate transition efforts required over the coming years to achieve the ambitious climate goal of net zero by 2050.

About one-quarter of the surveyed national IFIs have assessed the fiscal impact of the climate transition measures to some degree. Additionally, more than one-third of the national IFIs have the intention to assess climate transition measures in the near future. In their assessments, national IFIs face many challenges, including a lack of internal expertise, inadequate or insufficient analysis by governments and specialist agencies, a lack of reliable data and economic models, and general uncertainty about feedback effects and climate risks.

This paper looks in detail at the assessments of climate transition measures undertaken by the UK's OBR and the Dutch CPB, which are among the most developed by national IFIs. The main takeaways based on their experiences, are that regular assessments of climate and economic effects of (overall) climate

transition measures, considering various scenarios when there are large uncertainties, and cooperation between IFIs and other specialist institutions, positively contribute to the overall quality of assessments.

National IFIs thus call on governments to develop and publish comprehensive independent assessments covering the potential impact of climate transition measures on the public finances, thus enhancing overall transparency. Cost estimates of transition measures are extremely important for economic and fiscal effects, therefore, multiple independent cost assessments should be easily available for IFIs. Well-established, independent and easily accessible assessments on the effect of EU policies on GHG emissions for individual countries would also be very helpful for IFIs. Moreover, national IFIs indicate that they can benefit from increased and better cooperation with other institutes with proven expertise on climate change, as well as an exchange of best practices.

1 Introduction

More than 130 countries across the globe have committed themselves to the Paris Agreement to reach net zero emissions by 2050. Many governments have pledged at both national and international level to adopt a wide range of measures to decarbonise the economy. These policies to facilitate the transition to a low-carbon, more resource-efficient and sustainable economy constitute climate transition measures.

However, these climate transition measures require substantial funding. The amounts required are highly uncertain and are likely to substantially vary across countries. The IMF (2021) estimates that to align infrastructure with the zero emission target, governments will have to spend an additional investment of around 2 % of GDP per annum over the next decade. These private and public investments are driven primarily by the large one-off costs of transitioning to low-carbon technology and the need to construct a new infrastructure network to accommodate it. While the bulk of infrastructure investments may come from the private sector, the public sector has a catalytic role to play.

Aside from public investment, governments may also implement a range of other policy measures to facilitate the transition to a low-carbon economy. These measures can include taxes, spending measures and regulations aiming at decreasing the emission of greenhouse gases (GHG), green subsidies or adaptation measures. Considering their size, the measures are projected to have a substantial impact on fiscal sustainability, and therefore warrant appropriate assessment (OECD, 2021). However, countries are often unable to perform the usual cost-benefit assessment for these measures due to a lack of information on the climate transition, the unprecedented nature and scale of the transition and consequently high uncertainty surrounding the impact of the transition, particularly around behavioural and technological changes.

Most European countries are yet to carry out a comprehensive assessment of the fiscal impact of the climate transition. In fact, only about one-third of the national governments (8[1] out of 25[2] surveyed countries) have assessed the fiscal impact of the climate transition efforts required to achieve climate goals. In the remaining countries[3], some have assessed individual and standalone initiatives qualitatively, but no official overall assessment of the fiscal impact of climate transition was carried out. In those countries where governments have carried out an assessment of the climate transition's impact on public finances, most measures assessed were related to expenditures such as green subsidies, support for electric vehicles and home energy efficiency. Only in a few countries were revenue measures such as carbon taxes or emission trading assessed.

Implementing climate transition measures without an assessment of its potential fiscal, social and economic impact increases the risk that there could be unanticipated fiscal pressures in both the short and long-term, as well as potentially weakening the focus on ensuring that overall costs are managed through sound choices concerning the mix of policy instruments.

A comprehensive assessment of the fiscal impact of the climate transition measures is deemed very important by the independent fiscal institutions (IFIs) overseeing the robustness of national fiscal policies. Today, national IFIs have little oversight over the climate transition measures due to a lack of transparency from their governments. Governments often do not share details on policy measures, nor

[1] CZ, DK, EE, HR, NL, SE, SI, UK.
[2] AT, BE, BG, CY, CZ, DK, DE, EE, ES, FI, FR, HR, HU, IE, IT, LT, LV, LU, MT, NL, PT, RO, SE, SI, SK, UK.
[3] AT, BE, BG, CY, DE, ES, FI, FR, HU, IE, IT, LT, LV, LU, MT, PT, RO, SK.

on cost estimations. For example, only half of the countries (four[4] out of eight[5]) that assessed the climate measures being planned or undertaken provided detailed modelling and projections to national IFIs. Moreover, the information is generated by models, which are often inconsistent and based on unrealistic assumptions.

Against this background, this paper aims to enhance the understanding on the status-quo in the assessments of climate transition measures made by national IFIs. The paper will therefore first outline the transmission channels of the climate transition's impact on public finances and fiscal risks in Chapter 2. This is followed by an overview of the current practices in assessing the policy impact of climate transition of national governments and IFIs in Chapter 3. Followed by a discussion of the climate transition measure assessment performed by two leading IFIs in Chapter 4. Finally, the conclusions and policy recommendations are drawn in Chapter 5.

[4] NL, SE, SI, UK.
[5] CZ, DK, EE, HR, NL, SE, SI, UK.

2 Impact of the climate transition on the public finances

The climate transition measures impact the public finances both directly and indirectly. This chapter first provides an overview of the transmission channels as well as the potential risks that the measures might have for the public finances.

2.1 Climate transition measures: the main transmission channels

The impact of the climate transition on public finances primarily stems from policies to reduce net carbon emissions, rather than costs that will arise from both higher temperatures and sea levels and more frequent severe weather events[6]. There are many specific channels through which the climate transition measures can impact general government expenditures and revenues in the short-, medium- and long-run. This section identifies and characterises the key transmission channels (see Figure 1).

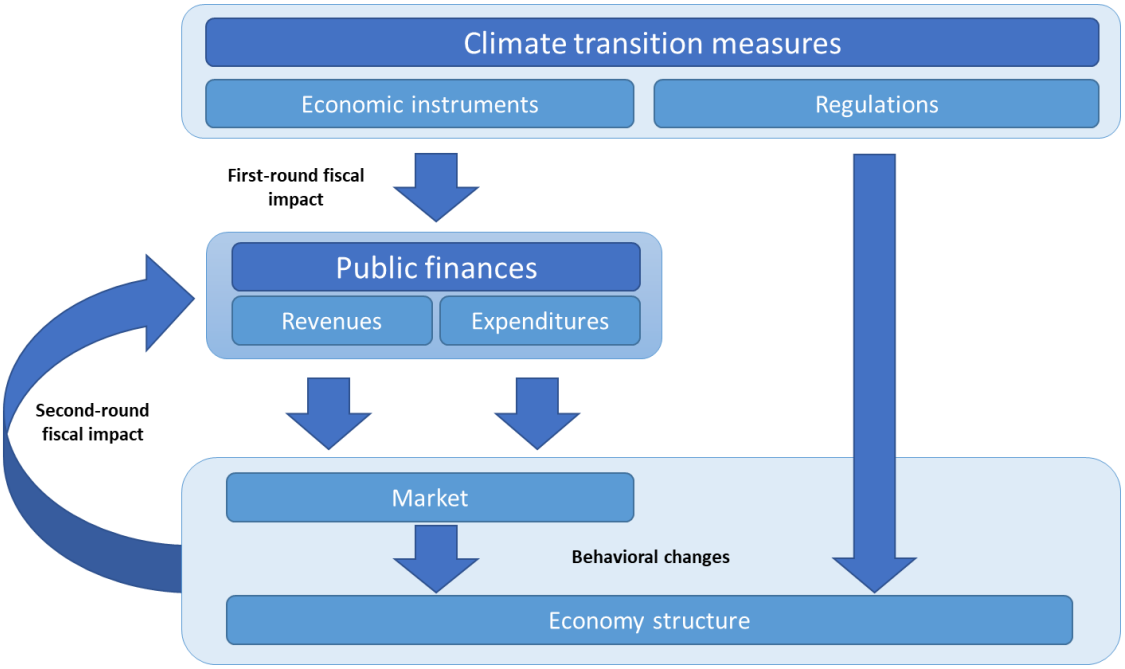
Climate transition measures can take the form of economic instruments such as taxes, subsidies or feed-in tariffs, as well as regulations such as energy efficiency standards targeting predominantly energy-related GHG emissions or bans on carbon-intensive technologies (EEA, 2021).

- Economic instruments are policy measures that impact the economy by targeting market costs and/or prices (EC, 2021A) or providing subsidies and investment to induce changes in emissions. These often directly affect public finances (i.e. first round impact). By changing market costs/prices, economic actors are likely to change their behaviour. This modifies the structure of the economy, which might change the impact on public finances (i.e. second round impact). For example, carbon taxes make alternative production technologies, such as carbon capture and storage or the electrification of industrial processes economically viable. This switch in production technology will increase overall production costs for firms but will decrease carbon emissions and carbon tax revenues.
- Regulations specify the behaviour authorities expect from economic actors. These can be more or less proscriptive but ultimately only have an indirect impact on the public finances (i.e. second round impact). For example, a ban on fossil fuelled cars in city centres is likely to reduce the pollution and improve public health, reducing government costs for healthcare. Moreover, taxes levied on fossil fuels may decrease due to shorter distances driven but additional support may be needed to ensure fossil-free cars are affordable for low-income households.

The interaction between economic instruments, regulations and public finances follow three broad channels.

[6] In the long run, the climate transition could potentially impact public finances through decreasing or amplifying the negative consequences of climate change depending on the effectiveness of the policy effort (NGFS, 2020). Nevertheless, there is huge uncertainty surrounding the impact of climate transition measures on climate change itself. These climate change consequences on public finances are thus outside the scope of this paper.

Figure 1. Transmission channels of the climate transition on public balances



Source: Network of EU IFIs (2022).

First, the **revenue channel** covers the impact from the economic instruments that primarily affect public revenues. The measures can subsequently increase or decrease the revenues.

For example, a government may decide to encourage a reduction in GHG emissions by setting a price on carbon (i.e. a carbon tax) (see also Box 1). Carbon taxes are widely regarded as one of the most effective measures to reduce GHG emissions. The EU uses the Emissions Trading System (ETS) to cover many of the main emitting sectors, with most permits initially allocated rather than auctioned, leaving room for further pricing; therefore, about half of the EU's Member States have also implemented a carbon tax (13 out of 27)[7]. The first-round impact of a carbon tax is a direct increase in public revenues (OECD, 2021). In the second-round, production costs are likely to rise due to higher taxes or switching to alternative production technologies (e.g. carbon capture and storage or the electrification of industrial processes), which are likely to be passed down to clients[8] or to force firms to move production to countries with less stringent regulations or taxes. The persistent rise in consumer prices can harm the output growth in the long-run and carries risks to financial stability (ECB, 2022). The higher prices incentivise clients to procure fewer products generally or fewer carbon-intensive products specifically. The greater the success of a carbon tax in reducing the emissions, the greater the extent that revenues from the carbon tax will decline. A successful carbon tax will therefore only provide a temporary boost to public finances, albeit one that is likely to coincide with the greatest demand for public investment in the climate transition.

In turn, there are also climate transition measures that reduce tax revenues directly through, for instance, tax reductions for those companies that invest in specific green technologies. For example, in the Netherlands, companies that invest in environmentally-friendly assets are allowed to deduct some of their capital costs from their profit subject to corporate income tax (OECD, 2020). Although it does

[7] As of June 2021 DK, EE, ES, FI, FR, IE, LV, LU, NL, PL, PT, SI and SE have a carbon tax in place (Tax Foundation, 2021). Additionally, Austria has decided to implement a carbon tax after the deadline of June 2021.
[8] The higher prices could pose upside risks to medium-term inflation, which is sometimes also referred to as 'green-flation'.

not directly lead to a reduction in GHG emissions, this measure can influence the direction of innovation and may be effective in complementing carbon taxes to achieve an optimal policy mix, avoiding an excessive reliance on carbon taxes (Acemoglu et al., 2012). This would contribute to a reduction of public revenues in the first-round, as a portion of the tax revenues will not be received. However, if the investments lead to a less energy-intensive production process (e.g. less use of energy), it might reduce the costs, increase profits and corporate income tax revenues in the second round.

Nevertheless, tax incentives for households often fail to substantially reduce GHG emissions and result in high implicit abatement costs. For example, research in Norway has shown that tax incentives for households often incentivise the latter to purchase an electric vehicle in addition to cars already owned, rather than replacing them, leading to only a limited reduction of GHG emissions (Camara et al. 2021).

Box 1. The impact of an increase in the carbon allowance price on Estonian public finances

Climate transition measures in Estonia are largely focused on reducing GHG emission through a phase out of oil production. One of the main mechanisms through which the climate transition affects the Estonian economy and public finances is the EU ETS carbon allowance price. Its increase has had a large impact on the oil shale sector. The main source of electricity in Estonia is the direct burning of oil shale.

The carbon allowance price hikes are likely to reduce Estonian GHG emissions but they will also have a substantial direct impact on the Estonian economy and, indirectly, Estonia's public finances. Oil extraction and production, as well as electricity production, accounted for 2.1 % of the added value and 0.95 % of employment in the mid-2010s (Bank of Estonia, 2021).

The introduction of high carbon prices made the production of electricity from oil shale less economical. Hence, electricity output decreased 54 % in 2019 and oil shale mining decreased 24 % in 2019 (Statistics Estonia, 2020; Eesti Energia et al., 2020). Therefore, the profits and dividends of the state-owned mining companies, as well as employment in the oil shale sector, decreased sharply.

The government finances are affected directly and indirectly by lower revenues and higher expenses. The government is losing corporate income tax revenues as well as most of the dividend payments from the state-owned energy companies. In turn, the government must increase its capital and current spending. Public investments in connection with the climate transition are expected to increase in the coming years. For example, in April 2020, the Estonian government already spent EUR 125 million on a capital increase of Eesti Energia. Additionally, the government will have to spend more on unemployment benefits and support the local economy in the northeast of the country where the oil shale industry is concentrated to create alternative economic activity. This should lead to lower additional costs in the medium to long-term.

The impact on the government deficit will very much depend on how much of those investments will be co-financed by the European Union. Additionally, at least in the short run, this impact will depend on the additional revenues from carbon allowance auctions. The Ministry of Finance forecasts EUR 634 million of revenues in 2021-2025 from carbon allowance auctions, of which EU rules require at least 50 % to be spent on measures to reduce GHG emissions. However, this forecast is likely to be heavily revised as soon as the total supply allowances are tightened to meet the EU's environmental policy objectives.

In the long-term the impact of the climate transition on Estonian public finances will largely depend on how the energy mix changes (and to what extent the gap in the energy supply is filled by imported energy sources). For example, Eesti Energia plans to stop producing electricity from oil shale in 2030 and replace oil shale in power stations with alternative fuels, such as wood waste. The company will also

keep investing in wind farms in Estonia, Finland and Lithuania, as well as in solar farms in Poland. This increases Estonia's reliance on imported energy.

Estonia achieves its climate objectives so far with seemingly limited additional national climate measures. For example, relative to 1990, GHG emissions have already decreased by 64%; the share of renewable energy was above target in 2020 (32%, the target being 25%).

Second, the **expenditure channel** covers the impact from economic instruments that primarily affect public expenditures. This channel follows a similar path as the revenue channel. Public expenditures can increase or decrease due to the climate transition measures. For example, by aiming to stimulate a reduction in GHG emissions, governments may phase out subsidies that are directed towards polluting industries. The production and consumption of fossil fuels are heavily subsidised around the world, although typically more modestly in the EU, with explicit subsidies corresponding to USD 0.45 trillion in 2020 (about EUR 0.4 trillion) (Parry et al., 2021). The reduction or elimination of these subsidies would reduce these public expenditures in the first-round. The higher fossil fuel costs could reduce or cease some economic activities, increasing unemployment and related benefit payments as a second-round impact, until the structure of economic activity shifts and employment moves to more low-emissions activities.

In turn, governments can also increase expenditures to reduce GHG emissions. For example, national governments may increase public investment in infrastructure to produce electricity from sources that generate fewer GHG emissions, such as wind, solar and nuclear sources. All EU Member States have some green investment policies in place. The levels of climate-related public investments are likely to further increase due to the Next Generation EU (NGEU) programme (EIB, 2021). These measures reduce the GHG emissions but also increase public expenditures substantially as a first-round impact (OECD, 2021). As many of the alternative energy sources require a high initial investment and lower variable costs, the initial investment might lead to lower costs in the second round. The extent to which higher carbon transition investment poses a fiscal risk depends on how much it displaces carbon-intensive investment within existing plans rather than requiring higher levels of total investment.

Third, the **regulatory channel** is different from the economic instrument=driven revenue and expenditure channels as it in principle does not have a direct impact on the public finances. These measures impact the structure of the economy through legislative proscriptions, such as standards, bans, etc., with one example being a ban on purchasing new internal combustion engine vehicles. In the first round this measure does not have an impact on government revenues or expenditure. Nevertheless, it affects the behaviour of economic actors as demand is restricted by a ban on new internal combustion engine vehicles, which then leads to a change in supply. This could lead to car manufacturers or sellers sustaining some losses in the short-term result in some unemployment. It would also affect more broadly the availability of transportation in the economy. Nevertheless, in the second round, the measure could ultimately stimulate investment in research and innovation, contributing to stronger economic growth, a more solid corporate tax base and consequently, higher public revenues. As internal combustion engine vehicles are banned and phased out, there would be a reduction of revenues collected from taxes levied on petrol and diesel purchases, which may be partially or fully offset by taxation received on substituting transportation purchases.

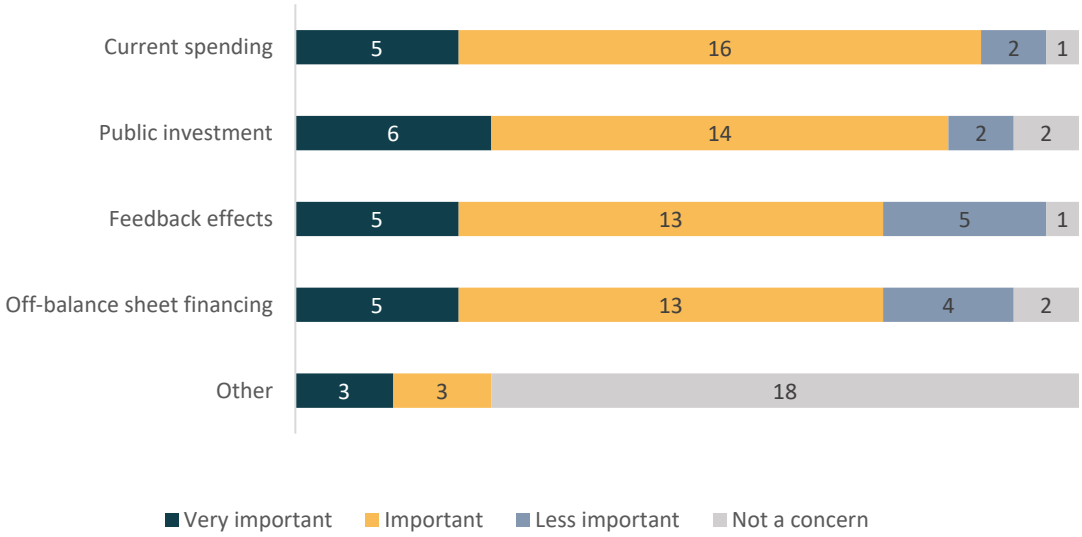
In practice, climate transition measures are likely to cover both economic instruments and regulatory changes.

2.2 The risks posed by the climate transition

The climate transition measures create significant risks to the public finances. A fiscal risk is considered a factor that leads to deviations of fiscal outcomes from expectations or forecasts made during the budget formulation (IMF, 2018). Materialisation records of the fiscal risks over the past 25 years show that fiscal shocks can be substantial and usually have an adverse impact on the public finances (IMF, 2018). The climate transition measures can, through the channels described above, expose public finances to short-, medium- and long-term fiscal risks.

The national IFIs are concerned in general about the risks that climate transition measures pose to the public finances. Almost all (24) national IFIs[9] surveyed expressed concerns about the fiscal risks related to the climate transition measures adopted in their countries as part of a survey conducted for this paper in January 2022 (see Figure 2). National IFIs perceive risks around current spending, public investment needs, feedback effects and use of off-balance sheet financing as important risks (around half of IFIs) or very important risks (around a quarter of IFIs). These concerns could lead to deviations between public budgets and debt ratios forecasted and subsequent targets in the short- and medium-term.

Figure 2. IFIs' concerns over the sources of the risks climate transition poses to public finances



Note: Respondents were asked 'How important are the following concerns over the impact of the climate transition on the public finances to your IFI? Please rate the concerns from 1 (not at all a concern) to 5 (very important concern)'. Categories 3 (moderately important) and 4 (important) are combined and presented as 'important' in the figure. Some 24 out of 27 surveyed IFIs have responded.
Source: Network of EU IFIs (2022).

2.2.1 Short- and medium-term fiscal risks

Some fiscal risks from the climate transition measures may materialise within the next five years. This essentially means that public budgets and/or debt ratios would deviate from current short- and medium-term forecasts when transition measures are rolled out. Fiscal risks in the short- and medium-

[9] AT, BG, CY, CZ, DE, DK, ES, FI, FR, HR, HU, IE, IT, LT, LV, MT, NL CPB, NL RVS, PT, RO, SE, SI IMAD, SI SFC, SK.

term should arise primarily through the first-round fiscal impact. As a first-round fiscal impact is incurred almost immediately, any unexpected developments in the composition of the public finances (excessive spending or revenue losses) could cause a deterioration of the fiscal outcomes compared to expectations. The reverse - reduced spending and revenue gains - are less common, though possible. Some second round effects could be triggered in the short run, depending on the magnitude and composition of the transition measures; additionally, political economy conditions and the quality of implementation can have short run consequences for public finances.

In the short- and medium-term, unexpected developments in the composition of public finances could arise primarily due to the unbalanced policy mix and disorderly climate transition, as the macroeconomic effects of transition measures are uncertain. For example, when the expenditure measures are not appropriately offset by the revenue measures or spending adjustments elsewhere, this can eventually lead to a deviation of the public budgets from the originally envisaged levels, as well as potential non-compliance with fiscal rules (OECD, 2021). In turn, when the change to the revenue side is balanced to the change on the expenditure side, the overall policy change will be fiscally neutral, at least in the short-term, but the required fiscal consolidation thereafter may then incur other costs.

In the same vein, a disorderly climate transition could cause fiscal outcomes to deviate significantly from short- and medium-term forecasts. In many countries, there is currently no political consensus about the policies needed for implementing the climate transition. This creates the risk of an economically damaging and disorderly transition, which could be passed down to economic agents (businesses and households) and lead to action that is late, disruptive, sudden and/or unanticipated. This would then affect policy commitments, financial incentives, regulations, and immediate needs. This could mechanically increase its cost for public finance as well as important costs being overlooked or ignored resulting in excessive current spending and a loss of public revenues. Political economy pressures may also lead to the overall portfolio of measures being skewed towards politically attractive choices. This would then lead to a higher overall economic and budgetary cost of the transition. A delay in taking action could also raise overall costs.

Fiscal risks due to unbalanced climate-related current spending are the largest concern for national IFIs. The large majority of the national IFIs warn that to achieve the climate goals, current (21[10] out of 24 national IFIs) and capital (20[11] out of 24 national IFIs) public spending needs to substantially increase. Moreover, this public spending is projected to be heavily frontloaded. The national IFIs are concerned that public revenues, even including additional carbon tax revenues, will not offset the additional public spending required to achieve net zero emissions by 2050. This might deteriorate public balances compared to expectations.

2.2.2 Long-term fiscal risks

Long-term fiscal risks cover the deviations between fiscal outcomes and projections for a period beyond five years. These risks could include both further direct tax/spending pressures, but second-round impacts of the climate transition are likely to become more important as these are often indirect and delayed as behaviours and structures change. There are many factors that could cause a deviation in public balances and debt in the long run, also including the impact on productivity and underlying growth.

The climate transition measures are likely to require a substantial increase in public spending, for example in investment, which risks contributing to an increase of public debt and borrowing costs for

[10] AT, BG, CY, CZ, DE, ES, FI, FR, HU, IE, IT, LT, LV, MT, NL CPB, NL RVS, PT, RO, SI IMAD, SI SFC, SK.
[11] AT, BG, CY, CZ, DE, ES, HU, IE, IT, LT, LV, MT, NL CPB, NL RVS, PT, RO, SE, SI IMAD, SI SFC, SK.

high-debt countries. A rise in the interest rate could then lead to a crowding out of investments in other sectors of the economy (Pisani-Ferry, 2021). This could potentially harm the economic growth in the long-term (i.e. a feedback effect). A drop in potential output and higher borrowing costs would mechanically add to public debt ratios leading to significant deviations from forecasts over the long-term, damaging fiscal sustainability. The magnitude of the public investments required to achieve the climate goals is a concern for the vast majority of national IFIs in terms of feedback effects and related fiscal risks (18[12] out of 24 national IFIs). Public spending may also increase to subsidise investment by households and companies in line with the climate transition or to compensate for losses due to transition measures. National IFIs warn that especially in energy-intensive converging economies, such as Czechia for example, there could be potential crowding out of other forms of public investment (e.g. infrastructure) that is important to increase the stock of capital, labour productivity and technological development. This could substantially slow down economic growth.

Another source of long-term fiscal risks may arise from any increased use of off-balance sheet financing for the climate transition measures. Given the scale of investment needs, governments could turn to finance the climate transition using financing instruments that do not qualify as public debt, such as contingent liabilities. The contingent liabilities can entail substantial immediate and/or ongoing costs to the government and lead to a deviation of fiscal outcomes from the forecasts. For example, reluctant to increase on balance sheet expenditures, governments may use tools such as loan guarantees to help households and companies finance their investments in low emission equipment. Part of these guarantees might be called in the future, should households and companies default on these loans. This could lead to an unexpected deterioration of fiscal outcomes and endanger fiscal sustainability. The off-balance sheet financing is a concern for about two-thirds of the national IFIs (17[13] out of 24). This is one of the reasons for national IFIs to call on governments to strengthen fiscal transparency.

Moreover, some climate transition measures could also lead to the erosion or dilution of tax bases through the second-round impact on the public revenues. For example, some transition measures are aiming to reduce the use of fossil fuels, reducing public revenues taken from excise taxes on petrol and diesel if they are successful. Other measures reduce taxes or publics revenues for certain purchases, such as fossil free cars, low consumption construction and building renovations. If not substituted by other revenue sources, this could lower potential output, leading to a deterioration of public balances and higher public debt levels. Additionally, the erosion or dilution of tax bases could lead to 'pollution havens' – jurisdictions with lower environmental standards – and drive production away from EU countries towards such pollution havens (Poelhekke & van der Ploeg, 2012). The erosion of tax bases due to climate transition measures is an important concern to fewer IFIs.

The ability of governments to mitigate fiscal risks depends largely on the quality of available information about the impact of policy measures. Comprehensive fiscal risks analysis can help the government strengthen the resilience of public finances and optimise the fiscal policy response in the case of risk occurrence.

[12] BG, CY, CZ, DE, ES, FI, FR, HU, IE, IT, LT, MT, NL RVS, PT, RO, SI IMAD, SI SFC, SK.
[13] BG, CY, CZ, DE, FI, FR, HU, IE, LT, LV, MT, NL CPB, NL RVS, PT, RO, SI IMAD, SI SFC, SK.

3 Current IFI practices when assessing the policy impact of the climate transition

The current practices in assessing the impact of climate transition measures vary across national IFIs. This chapter first provides an overview of the current state of these assessments.

3.1 National IFIs and assessing the impact of climate transition measures

About one-quarter of the national IFIs have assessed the budgetary impact of the climate transition efforts required to achieve the climate goals to a certain extent (7[14] out of 27 national IFIs). Five of the national IFIs undertook their assessment of climate transition measures as part of a wider assessment or costing, whereas CPB in the Netherlands and OBR in the UK carried out a stand-alone assessment (see Chapter 4 for a more detailed discussion of these assessments).

Most IFIs assessed aggregate policies rather than individual policy measures. The measures considered primarily included carbon taxes, emission trading and green subsidies. One IFI assessed emission trading as a subset of a carbon tax. Moreover, national IFIs also assessed some other measures, such as the resource costs of industrial decarbonisation and negative emissions and a tax on single-use plastic.

In general, national IFIs used simple methodologies to assess the first-round impacts of economic instruments. Only the CPB and OBR have relied on economic models factoring in the second-round impact through feedback effects.

Additionally, 11 IFIs[15] have the intention to start assessing the fiscal impact of the climate transition.

3.2 Challenges faced by IFIs when assessing climate transition measures

National IFIs face many challenges in assessing the impact of climate transition measures on public finances (see Figure 3).

The most important challenge that IFIs face is the *lack of expert staff*: nearly all of the surveyed national IFIs (23[16] out of 27 national IFIs) note that a comprehensive assessment of the climate transition measures requires specific expertise. National IFIs face two key constraints when trying to hire additional expert staff, including budget constraints and an overall lack of experts specialising on climate issues. Many have noted this issue is not limited only to national IFIs, but also to other national and international organisations. Moreover, some national IFIs note that there is little to no sharing culture among climate scientists and economists within their governments and public agencies.

Another important challenge is the *inadequate or insufficient analysis* by the government and/or specialist agencies. In many countries, there is no comprehensive analysis of the climate transition prepared by national governments. The climate transition plans are mostly very general in nature and

[14] DE, DK, ES, IE, NL CPB, NL RVS, UK.
[15] AT, CY, CZ, FI, IT, LV, PT, SK, SI IMAD, SI SFC, SE.
[16] AT, BE, BU, CY, CZ, DE, ES, FI NAO, FR, HR, HU, IE, IT, LT, LV, MT, NL CPB, NL RVS, PT, RO, SI IMAD, SI SFC, SK.

do not include economic or fiscal costs or projected benefits of adopted measures. This hampers national IFIs in their assessments of the fiscal impact of climate transition measures and creates larger uncertainties when undertaking regular macroeconomic forecasting exercises, which is the primary activity of most national IFIs.

In the same vein a *lack of reliable economic data on the climate transition impact* was deemed as an important challenge by most national IFIs (22 out of 27)[17]. As the relationship between climate transition measures and the economy is always evolving, multidirectional and non-linear, granular and timely data is key for assessing the fiscal impact with greater accuracy. Nevertheless, in many countries, data and analyses on the effects of climate transition measures are often vague and available only on a one-off basis without regular updates.

A large majority of the national IFIs deemed a *lack of sound economic models* as an important challenge (22 out of 27)[18]. According to the national IFIs, economic models to reflect the fiscal impact of climate transition measures are still under development. Moreover, where models are in place, they are often too simplistic, and do not consider sectoral or second round impacts. As well as this, some IFIs have noted that even when sound economic models are available, the interpretation of the results varies drastically between models, especially with regard to the effects of the climate transition measures on GDP growth. Standard macroeconomic model will - by default usage - conclude that an additional investment will increase GDP, while transition investment aims primarily at replacing depreciated capital. In turn, the results from CGE models indicate that these climate investments require more factor input to produce the same amount of output with reduced or no GHG emissions. Hence, a CGE model will – by default usage – conclude that climate investment will reduce GDP growth because climate policy puts restrictions on production, while they aim to maintain production levels in spite of these restrictions. Most CGE models do not take into account positive feedback from national climate policies in the context of a global transition towards a low carbon economy or possible productivity gains.

Most national IFIs also deemed *uncertainty about feedback effects and climate risks* important challenges (22[19] and 18[20] out of 27 respectively). With regard to the feedback effects. the national IFIs note that not all transmission channels are clearly specified. Climate change and the transition to a net zero carbon economy will increasingly impact macroeconomic indicators, such as real economic activity, output, employment, interest rates, investment and productivity, however it is currently unclear what the repercussions will be. Moreover, the current calibration of models may not be able to precisely assess feedback effects or second round impacts. Finally, the counterfactual scenario, one without a transition policy, is surrounded by uncertainty, as climate change itself could reduce productivity and affect public finances.

Other important challenges include, but are not limited to, the *narrowness of national IFIs' mandates*, which often do not explicitly include the assessment of the climate transition's impact, as this impact will not materialize into the timeframe of the latest budget law, programming law or stability programme. Additionally, some national IFIs deem the current assessments biased. Some countries focus excessively on assessing whether climate policies will be sufficient to reach the emissions targets, but without also evaluating the overall economic impact. In addition, some countries excessively focus on the temperature-to-productivity effects and national position relative to the temperature 'sweet spot', rather than referring to readily available current policy forecasts for national emissions.

[17] AT, BU, CY, CZ, DK, ES, FI NAO, FR, HR, HU, IE, IT, LT, LV, MT, NL RVS, PT, RO, SE, SI IMAD, SI SFC, SK.
[18] BE, BU, CY, CZ, DK, FI NAO, FR, HR, HU, IE, IT, LT, LV, MT, NL CPB, NL RVS, PT, RO, SE, SI IMAD, SI SFC, SK.
[19] AT, BU, CY, CZ, DE, ES, FI NAO, FR, HU, IE, IT, LT, LV, MT, NL CPB, NL RVS, PT, RO, SE, SI IMAD, SI SFC, SK.
[20] AT, BU, CY, ES, FI NAO, FR, HU, IE, IT, LT, LV, NL CPB, NL RVS, PT, RO, SE, SI IMAD, SK.

Figure 3. Challenges IFIs face when assessing the fiscal impact of the climate transition

Note: Respondents were asked 'How important are the following challenges for your IFI in the assessment of the possible impact of the climate transition on the public finances? Please rate the concerns from 1 (not at all a concern) to 5 (very important concern)'. Categories 3 (moderately important) and 4 (important) are combined and presented as 'important' in the figure. 26 out of 27 surveyed national IFIs have responded.

Source: Network of EU IFIs (2022).

3.3 Good practices for assessing the impact of climate transition measures

The good practices identified by the national IFIs relate predominantly to fostering collaboration and using appropriate tools to assess the fiscal impact of the climate transition. The collaboration with other institutes is primarily important to cover the climate science related aspects, which is an area outside of IFIs' usual expertise. Additionally, even a simple analysis based on basic assumptions can be very useful to 'start the conversation', but the assumptions need to be transparent so they can be refined later on.

Using a suite of economic models to account for a wide range of factors is essential for appropriately capturing feedback effects. Integrated Assessment models, as well as CGE models, macroeconomic models and climate models, provide a good starting point, but need to be further developed, as well as more realistic and rich scenarios. Moreover, factoring in the global aspect of climate measures within the economic models would allow for a detailed understanding of the interconnectedness between all territories of the world economy. Moreover, climate transition risks also have a financial stability impact that needs to be considered by the models. Climate transition risks lead to a gradual revaluation of the assets and value of companies operating in so-called 'dirty' sectors in favour of those operating in 'clean' sectors.

4 Assessing the budgetary impact of the climate transition: the cases of the Netherlands and the UK

The CPB in the Netherlands and the OBR in the UK are two national independent fiscal institutions (IFIs) that work on the climate transition. Building on fiscal risks assessments carried out by CPB, in cooperation with the Netherlands Environmental Assessment Agency (PBL) and OBR in the UK, this chapter showcases a solid practical example of assessing the budgetary impact of the climate transition and highlights the various aspects of climate policy that should be considered when carrying out such a climate risk assessment.

4.1 Assessing the Dutch Climate Agreement of 2019

The Dutch Climate Agreement was assessed in 2019 by the CPB and PBL on ex-ante effects on climate, cost, budgetary and income effects. This analysis can be seen as part of a long-standing tradition in the Netherlands for ex-ante assessment of policy packages.[21] This 2019-package consists of climate measures as proposed by the Rutte III Cabinet and builds upon a draft Climate Pact from late 2018 which was coordinated by the so-called 'Climate Council'.[22]

4.1.1 Dutch Climate Agreement

The Climate Agreement assessment in practice covered a detailed analysis of 130 individual measures. The judicial and practical feasibility of these measures were briefly assessed. All effects are presented in comparison to a baseline scenario (i.e. counterfactual). Households and businesses will be affected by changes in policy measures from both the Climate Agreement and earlier introduced policies on climate and energy by the Rutte III Cabinet. The latter policies are included in the baseline scenario but are not included in the reference scenario (see Figure 4). Effects will be presented in comparison to both the reference and baseline scenarios. PBL focused on assessing the effects on greenhouse gas emissions (CO_2 equivalent emissions) and 'national costs' or 'factor costs' (i.e. costs without production and consumption subsidies and taxes). CPB assessed the first-round effects on government expenditures (i.e. without macro-economic feedbacks) and financial burden for households and firms. GDP or second round economic effects were also briefly discussed.

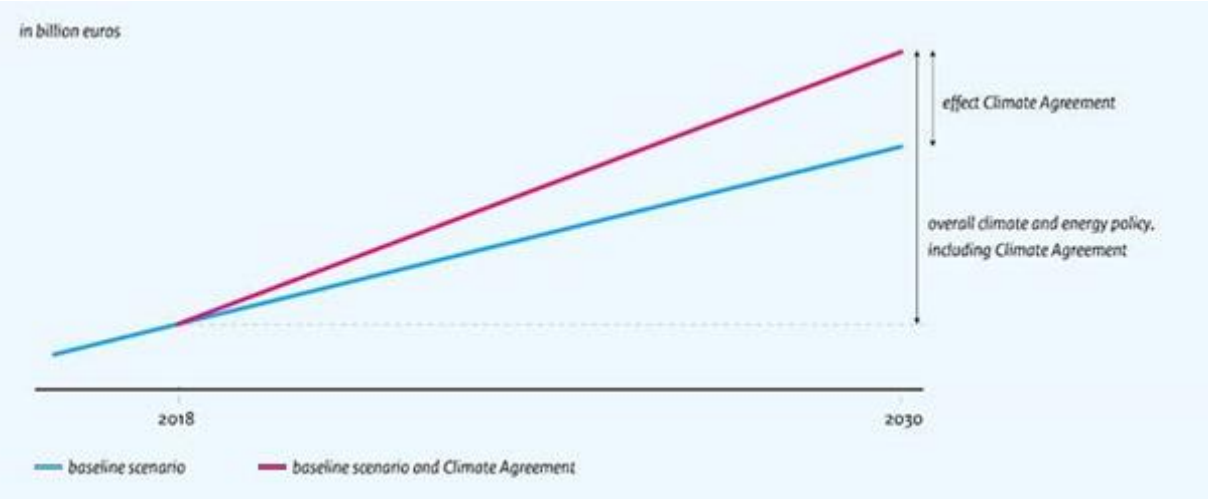
The main ambition of the Climate Agreement is to reduce GHG emissions by 49 % by the year 2030 compared to 1990 levels. According to the PBL's 2019 assessment, the implementation of the Climate Agreement and earlier proposed policy measures would lower Dutch GHG emissions in 2030 by 43 % to 48 % in comparison with 1990 GHG emissions. The corresponding annual national or factor costs were EUR 0.8 – 1.7 billion in 2030 (see Table 1)[23]. The reported bandwidth in costs results from price and costs uncertainties.

[21] Since 1986, an important traditional element of the *ex-ante* assessment of policy packages is the analysis of political party election manifestos ahead of Dutch general elections.

[22] This coordinating consulting body consisted of chairpersons of specific sectoral counsels (i.e. electricity, industry, buildings, mobility, agriculture and land use), co-governments and non-governmental organisations (NGOs).

[23] A related assessment is annually repeated by PBL. The latest assessment (PBL, 2021) expects a decrease in emissions of between 38 % and 48 % based upon adopted and proposed policies which were officially made public and were sufficiently concrete by 1 May 2021. This was a substantial improvement over the 2020 assessment which indicated a reduction of 30-40 % in 2030. The reported bandwidth results from several uncertainties, such as imported or exported electricity, economic growth and general weather conditions.

Figure 4. A stylised representation of the Climate Agreement and baseline scenario ('total cost effect')



Source: CPB (2019A).

Public expenditure on overall climate and energy policy will increase by EUR 3.9 billion in 2030 or about 0.5 % as expressed in 2021 GDP (see Table 1). This spending mainly includes the governmental Sustainable Energy Transition Scheme (SDE+/++). Other costs involve, among others, pilot projects on hydrogen, an investment subsidy for renewable energy and the feedback of revenues from the heavy vehicle tax to the mobility and transport sector.

The financial burden for households, firms and foreign companies consists of the Economic and Monetary Union (EMU)-relevant fiscal burden and non-EMU relevant cost increases. The fiscal burden increase of EUR 4.6 billion for households and firms is mainly due to an increase in energy related tax to finance the SDE+/++ subsidy scheme, the increase in the financial burden related to energy tax, and the abolition of the net metering scheme. The increase in the financial burden on other countries is due to air travel tax.

The Climate Agreement involves several policy measures such as obligations, restrictions and mandatory standardisations. The so-called non-EMU-related burden will increase costs for businesses (EUR 1.3 billion) and households (EUR 0.3 billion) for a total of EUR 1.6 billion in 2030. Examples are the costs of new additional power grids that will be transferred on to households and businesses through grid tariffs. The carbon tax for industry is expected to trigger business investments in emissions reduction. The Climate Agreement also includes the costs of removing natural gas connections and costs for required energy performance standards.

Table 1. Budgetary impact (expenditures and EMU related fiscal burden) and non-EMU related burden

	Baseline + Climate agreement	Climate Agreement
Expenditures:	(EUR billion in 2030 at 2018 price level)	
Total EMU relevant expenditures	**3.9**	**1.9**
Financial burden:		
Total EMU related fiscal burden	**4.6**	**0.3**
- Households	1.8	-0.9
- firms	2.6	1.1
- foreign countries	0.2	0.1
Total non-EMU related burden or cost increase	**1.6**	**1.2**
- households	0.3	0.3
- firms	1.3	0.9
National or factor cost (PBL, 2019)	**0.8-1.7**	

Source: CPB (2019A).

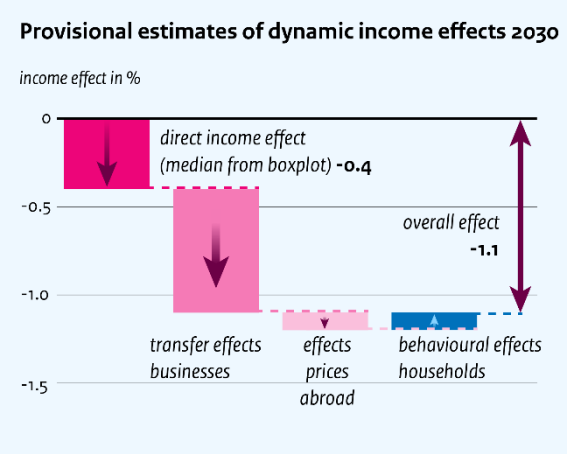
The distributive or income effects of all these pricing and regulatory measures are a very important aspect of public policymaking. Presenting these effects involves many hard to assess effects, meaning that results should be carefully interpreted. Two income effects were presented: direct and delayed income effects. For different income groups direct income effects are presented (see Annex I). The negative impact on lower incomes will be greater than on higher incomes up to 2030. This representation assumed that all proposed policy measures were fully implemented at the same time and a so-called static purchasing power definition was used. This, for example, assumes that policy does not lead to changes in energy consumption or car ownership.

Overall climate and energy policy up to and including 2030, on average, will lead to a cumulative negative income effect of 0.4 %, compared to 2018. Almost two thirds of this decrease is due to current climate and energy policy. The further increase in Sustainable Energy Surcharge (ODE) tax up to 2030 and no indexation of the reduction in energy tax are the causes of the negative impact on income up to 2030. The new policy set out in the Climate Agreement will lead to a positive income effect of 0.3 % in 2030, compared to 2018.

These income effects up to 2030 provide no prediction of the actual effects on overall household income. An important element of Dutch policymaking is that these income effects are assessed every year for the upcoming year. Hence, future income policy measures can, and probably will, mitigate the negative income effects for low (or probably all) income groups. CPB also annually assesses the income effects, GDP and governmental budget forecasts. For example, for 2021 the income effect of the Climate Agreement was positive for all income groups.

Subsequently, a tentative calculation was made concerning the delayed impact on income. Businesses, both domestic and foreign, will try to pass some of the cost increases on to their customers, and households will adjust their purchasing behaviour accordingly. Because it is difficult to estimate the impact on the various income groups, a general calculation was made to provide a tentative picture of the total across all groups (see Figure 5). Given the magnitude of the delayed effects and the uncertainty, this dynamic approach calls for additional research.

Figure 5. Income effects, Baseline and Climate Agreement up to and including 2030



Note: The income effects include the provisional delayed impact of transfer effects from domestic and foreign firms and the behavioural effects of households.

Source: CPB (2019A).

The GDP effects (second round effects) of overall climate and energy policy (including the Climate Agreement) were assessed by a Computable General Equilibrium (CGE) model that explicitly allows for endogenous growth due to climate policies. This policy will reduce GDP by more than 0.5 %. The total impact of current policy and the Climate Agreement includes an increase in the financial burden that tempers growth, but also includes higher levels of expenditure that partly offset this effect again. Due to the financial burden on firms and households, consumption and production decisions are adjusted (with the aim of reducing CO_2 emissions), businesses will adjust their production process, and ultimately labour productivity will be structurally reduced. Overall, climate and energy policy involves transition effects, but, in the longer term, the employment effects will be marginal. The relocation of energy-intensive industries is expected to remain limited up to 2030.

4.1.2 An attempt to assess the fiscal sustainability of climate costs up to 2060

The fiscal sustainability of the Dutch government has been assessed every five years since 2000. In its latest report, CPB (2019C) assessed the fiscal sustainability of the Dutch government given so-called 'constant arrangements'. The central question is whether future generations can enjoy the same social security and the same public services as is the case today, without having to raise taxes. The same social security, public services and taxes are defined as 'constant arrangements'.

An attempt to assess the costs of climate change and the costs of policy measures for climate adaptation and climate mitigation was carried out. An economic argument of the effect of climate costs on GDP and its subsequent impact on fiscal sustainability was developed based upon economic argumentation, the use of quantitative results from the literature, and *ad-hoc* analyses with economic models available at CPB.

The analysis is restricted to the effects of climate change on fiscal sustainability up to 2060. Although still a long way off, the climate change horizon extends considerably further. The consequences for biodiversity, public health, migration flows and the financial sector are also not taken into account. The outcomes – including the estimates reported below by the CPB – are subject to uncertainty, in particular about the probability and impact of extreme scenarios. The possibility of negative consequences appears to be greater than the probability of positive effects of the same magnitude.

In brief, the analysis showed that - based on 2019 expectations - climate change and well-designed climate measures have a limited impact on the sustainability of public finances. It is therefore possible to pursue climate policy without affecting the sustainability of public finances. There are likely to be negative consequences for GDP that could amount to a few percentage points in 2050[24].

Three climate costs were assessed.

First, the consequences of global climate change for GDP in the Netherlands are expected to be negative but limited in the period up to 2060. This analysis was based on assessments within the literature: OECD (2015), Tol (2018) and Kahn et al. (2019). Negative GDP effects for the Netherlands are assessed to be several tenths of a percentage point in 2060. Negative GDP effects in 2100 of up to about 1.5 % were found for the largest temperature increases. Larger negative consequences can be expected especially for developing countries. These GDP effects translate to very small effects on annual GDP growth and therefore on labour productivity and wages. The fiscal sustainability effect of this labour productivity effect was assessed by the CPB GAMMA model (Tilburg et al., 2019) and found to be limited.

Second, budgetary costs of climate adaptation: a small and likely declining percentage of GDP up to 2060. According to the Dutch climate adaptation programme (Deltacommissaris, 2018), the annual costs for the central government until 2050 will amount to approximately EUR 1.5 billion, equivalent to 0.16 % of GDP in 2025 and 0.13 % of GDP in 2050. These costs are based upon a scenario with a sea level rise in the Netherlands up to one metre in 2100. Measures for climate adaptation are intended – given a certain level of climate change – to protect the Netherlands for mandated legal safety norm (e.g. once every 10 000 years) against the consequences of high water (from the sea and rivers), to guarantee sufficient freshwater and to ensure associated spatial adjustments. Deltares (2018) assesses the effect of a higher rise in sea levels with a scenario that has a medium sea level rise of two metres in 2100. The additional expenditure on climate adaptation, due to an accelerated sea level rise appears limited until 2060. Towards 2100 and beyond, Deltares (2018) states that it is important for the Netherlands to closely monitor the breakdown and melting of Antarctica and the resulting sea level rise due to the potentially major consequences. This can lead to considerably higher climate adaptation costs[25].

Third, the economic costs of climate transition: a negative effect of more than 0.5 % of GDP in 2030, rising to possibly a few percentage points of GDP in 2050. The GDP effects of the Dutch Climate Agreement in 2030 was assessed to be more than 0.5 % of GDP. For more stringent emissions targets (in the context of a 2°C scenario), CPB (2017a and 2017b) finds that the effects for Europe can be limited to 2.5 % of GDP in 2050, depending on the cost development of techniques and the breadth of the chosen energy portfolio. Similarly, to the previously mentioned GDP effect, this translates to very small annual GDP growth effects, small effects on productivity and wages increases and a small effect on fiscal sustainability.

4.1.3 Annual assessments

Future assessments of new climate packages are expected. Following current Dutch custom, PBL and CPB assess the effects of policies which have been officially made public every year and are sufficiently concrete in relation to, among others, the CO_2-equivalent and budgetary and income effects. The targeted 49 % reduction may land within the possible 2030 reduction bandwidth if a number of

[24] Climate policy naturally has an independent goal and other types of non-financial benefits. It entails broader benefits, such as health and biodiversity gains, especially for future generations and not just in the Netherlands. Important to note that in 2021, the IPCC (2021) presented a new assessment of climate change due to greenhouse gasses. Hence, these results have not been taken into account.

[25] The Dutch climate adaptation policy is aimed at keeping the probability of a natural disaster, such as flooding, more or less the same, regardless of the actual level of climate change recorded (Bos and Zwaneveld, 2017).

measures from the Climate Agreement currently on the agenda are worked out in detail and on time. In 2020, Dutch GHG emissions were reduced 26 % compared to 1990. This concerns, among others, standardisation for non-residential buildings, natural gas-free neighbourhoods, an incentive for zero emission heavy duty vehicles, an additional investment subsidy for low-emission animal housing with a corresponding tightening of standards and climate measures of EUR 6.8 billion (in total), recently published in the 2022 National Budget Memorandum.

4.1.4 Fit for 55

The contribution of the recent European climate proposals from 'Fit for 55' to future emission reductions in the Netherlands is difficult to assess. For example, the tightening of the current EU Emissions Trading Scheme (EU ETS I) aims for a 61 % reduction in 2030 compared to 2005. The newly proposed EU ETS for road transport and the building sector (EU ETS II) aims for a 43 % reduction. If policy remains unchanged, this tightening will lead to the number of ETS allowances reaching zero by 2040 (EU ETS I) and 2043 (EU ETS II). Although these are EU-wide targets, they will help to reduce emissions in the Netherlands by, among others, the increase of the price of CO_2-allowances. The same holds for the recent rise of gas and electricity prices. As part of the 'Fit for 55' package, the European Commission proposes to increase the Dutch effort sharing regulation (ESR) reduction target for 2030 from 36 % to 48 %, compared to 2005 levels. This means in particular that, by 2030, emissions from the ESR sectors need to be reduced by a further 15 Mt CO_2 equivalent, by 2030, on top of the current target. The current ESR target of 36 % is within reach given the current policies being enacted.

A recent analysis by CPB and PBL of the political parties' election manifestos may provide a first glimpse of the cost to reach - for example - a 55 % reduction in 2030. Five political parties presented a package that obtains about a 55 % CO_2-equivalent reduction (52 %-63 % reduction) in 2030 compared to 1990. Climate policies were only a part of these very broad packages which also included measures with respect to social security, healthcare, education, international cooperation, security, accessibility and defence. The climate and environment related annual expenditures of these packages in the period 2022-2025 increases between EUR 0.7 and 6.9 billion. Total climate and environmental related annual EMU-related fiscal burden increases in the period 2022-2025 between EUR 4.3 and 8.6 billion. Total non-EMU related burdens were not reported. The annual national or factor costs of the packages as assessed by PBL was between EUR 5.5 and 7.9 billion in 2030.

4.1.5 Main takeaways

- The targeted 49 % reduction of GHG emissions for the Netherlands may land within the possible 2030 reduction bandwidth if a number of additional measures are worked out in detail and on time. Future EU policies (e.g. both EU ETS systems) should help emissions reductions in the coming decades in the Netherlands.
- An annual assessment of climate and economic effects of (overall) policy measures is important for tracking progress and to factor in the high uncertainty, as well as a rapidly changing economy and policies.
- Balanced purchasing power effects are very important for the acceptance of the climate transition package. Balanced effects are reached by taking additional compensating purchasing power measures.
- A first attempt of assessing the effect of climate costs up to 2060 shows limited impact on GDP growth and fiscal sustainability.

4.2 The OBR's fiscal risk assessment

The OBR (UK Office for Budget Responsibility) has prepared biennial fiscal risks reports (FRR) since 2015. In 2017 and 2019, the report took an 'encyclopaedic' approach. In 2021, the FRR focused on three large or potentially catastrophic risks to the British economy: Covid-19, climate change and the cost of public debt. The UK's GHG emissions in 2020 were 50 % below 1990 levels (UK DBEIS, 2022).

4.2.1 2021 Fiscal Risk Report

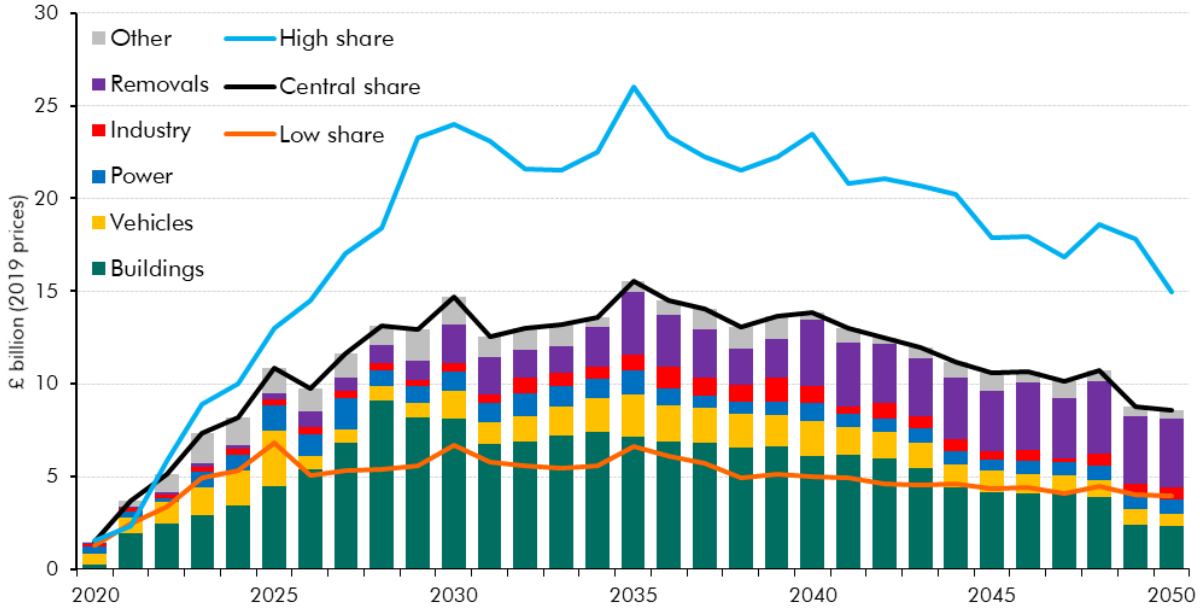
To assess the fiscal risks of climate change the OBR has collaborated with a number of institutions in the UK[26]. In particular, the analysis was developed using scenarios for the whole economy's costs and savings from decarbonisation published by the UK's Climate Change Committee (CCC), and scenarios for the economic implications of decarbonisation prepared by the Bank of England in concert with the Network for Greening the Financial System.

The FRR draws on these various scenarios and its own assumptions about their fiscal consequences in order to assess the risks and costs to achieve net zero GHG emissions by 2050. These costs and risks were compared against a purely hypothetical 'no climate change' baseline embodied by the OBR's existing long-term economic determinants rather than a 'current policy' baseline incorporating the economic consequences of significant further global warming. The baseline scenario combined the CCC's 'balanced net zero pathway' with the Bank of England's 'early action' scenario. Baseline net investment was assumed to be constant in terms of overall GDP share after 2025-26 and the current budget was assumed to be kept in balance. Each net zero scenario calculated first-round effects on public spending, the loss in emissions-sensitive revenues and additional carbon tax revenues due to transition policies, and second-round effects on non-climate-related receipts and public spending due to the effects on GDP growth, and finally the debt interest consequences of any differences in borrowing. Different variants explored how the costs for the public sector varied depending on the extent that the public sector will take on the costs of decarbonisation, ranging from just covering the expenses for its own assets (low share) to covering the maximum costs the public sector might plausibly incur (high share).

Under the baseline scenario, assuming that the public sector takes a moderate central share of the costs, the spending on the transition to net zero ramps up through the 2020s, stabilises at a high level in the 2030s, and then falls back in the 2040s (see Figure 6). Nearly half of the public costs originate from the decarbonisation of buildings, making it the main category of costs.

[26] HM Treasury, the Bank of England, the Climate Change Committee (CCC), the Department of Business Energy and Industrial Strategy, and other government departments.

Figure 6. Estimated costs to the public sector from the transition to net zero GHG emissions

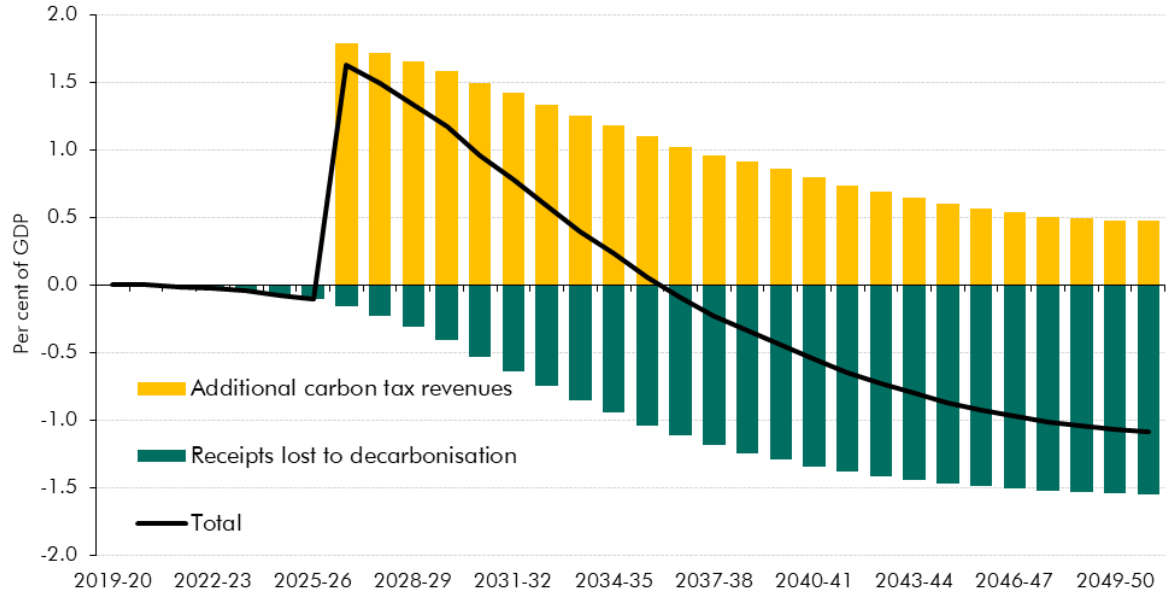


Note: To illustrate the range of outcomes that might be consistent with the CCC's projection for costs to the whole economy, high and low public spending variants for each assumption were produced. UK GDP in 2019 was GBP 2.3 trillion (ONS, 2022).

Source: OBR 2021.

The public spending costs of the climate transition have a less significant impact on fiscal sustainability than the changes that may occur to tax revenues. However, the net effect varies across time and across scenarios, reflecting different assumptions about offsetting gains from taxing carbon more heavily and losses from revenues on emissions-intensive activities. In the long term, and in the absence of offsetting policy changes, the climate transition will erode the tax base permanently – in particular due to the loss of revenue associated with petrol and diesel use in motoring. In the baseline scenario, the additional carbon tax revenues and reduction in receipts due to decarbonisation delivers initially a net increase in revenue in 2026-27 (1.6 % of GDP), which gradually decreases afterwards to a net decrease in revenues after 2035-36 , eventually reaching 1.1 % of GDP in 2050-51 (see Figure 7). This conclusion is particularly sensitive to the extent to which coverage of carbon taxes is expanded and the tax rate that is imposed.

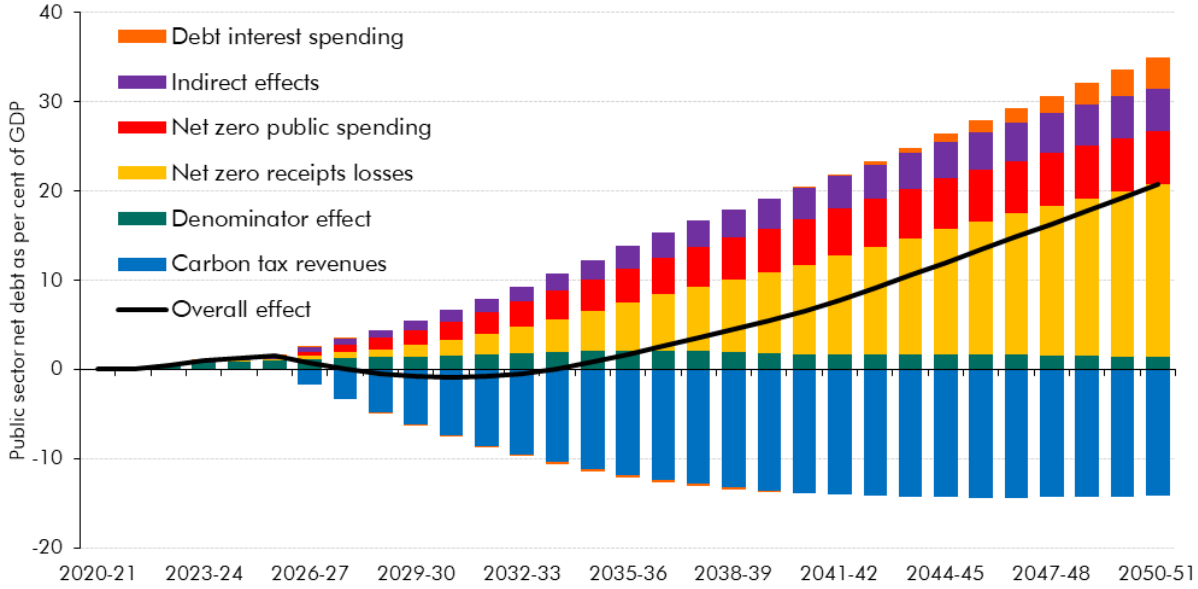
Figure 7. Net revenues gains/losses from the decarbonisation process



Source: OBR 2021.

Together, the higher public costs and lower public revenues pose a longer-term risk to public finances in the UK due to the increase in public debt that the OBR concluded was 'significant but not exceptional' (see Figure 8). The climate transition in the UK could lead to a 20 % increase in public sector net debt under the baseline scenario (relative to the hypothetical counterfactual).

Figure 8. Net debt impact of reaching net zero

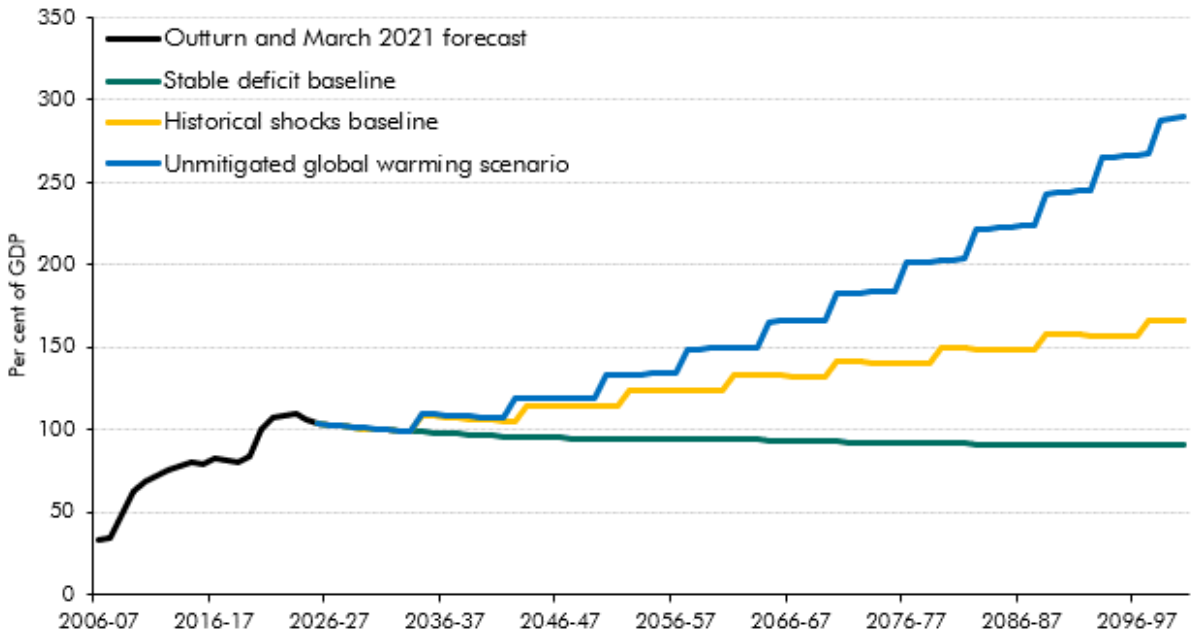


Note: the chart details the difference between the early action scenario of climate transition from the baseline debt-to-GDP scenario where net investment was assumed constant at its 2025-26 level as a share of GDP and current budget was assumed to be held in balance. 'Indirect effects' refer to the second-round effects on non-climate-related expenditure and revenues.

Source: OBR (2021).

In addition, the OBR analysis also shows that the impact of unmitigated global warming on the public finances is likely to be much more substantial for the UK than costs associated with decarbonisation. To illustrate this, the OBR has constructed the path of public sector net debt under three different scenarios (see Figure 9) based on broad-brush assumptions: First, the stable deficit baseline scenario depicts a no-policy change scenario that considers that climate change does not exist, the economy continued to function as it is and all other long-term fiscal pressures are accommodated without placing any upward pressure on debt. This would lead to a gradual, albeit small, reduction of the public sector net debt over next 80 years. Second, the historical shocks baseline scenario assumes that conventional fiscal risks would lead debt to ratchet higher over time in accordance with patterns similar to those that have been experienced historically (such as being hit by a recession roughly once per decade). This would lead to approximate public sector losses of 10 % of GDP every 9 years and around 70 % of GDP increase in public sector net debt over the next 80 years. Third, the unmitigated global warning scenario illustrates what could happen if global warming continues unabated, leading to more frequent and more costly economic shocks alongside progressively larger adaptation costs. This would lead to public sector net debt more than doubling over the next 80 years, which implies large risks to macroeconomic and financial stability in the UK. These are stylised scenarios that assume no offsetting fiscal tightening in the face of rising debt, but they show the potential fiscal costs of unmitigated global warming and thus the potential benefits of getting to net zero.

Figure 9. Public sector net debt development in the long-run under 3 scenarios



Source: ONS, OBR (2021).

4.2.2 Main takeaways

- The fiscal costs of transiting to net zero GHG emissions in the UK are likely to be significant but not exceptional when compared to other pressures such as an ageing population.
- Revenue measures have a larger impact on the public finances in the long-term, with a loss of existing carbon-based motoring taxes being amongst the largest fiscal costs. While public expenditures are easier to assess, particular attention should be paid to revenue measures (especially carbon taxes) as their tax base will erode in the long term if they are successful.

- There are fiscal benefits from acting sooner, for instance taxing all emissions at higher rates would lower the total fiscal cost of the climate transition over the long-run. A delayed and disorderly climate transition is particularly risky due to higher economic and fiscal costs.
- Cooperation is needed between national IFIs and other specialist institutions, including those with expertise in data and modelling. The UK's report was only possible thanks to NGFS/Bank and CCC inputs. Given the overall lack of expert staff in the field, it is important to foster cooperation and knowledge exchange.
- There is still lots of scope to refine inputs and assumptions in future forecasts and scenarios. But there is considerable value in developing and publishing relatively simple scenarios that can be refined over time, rather than delaying in pursuit of modelling perfection and other analyses.
- The high uncertainty scenario analysis is the most appropriate tool to assess the fiscal impact of the climate transition. Even though scenarios are not forecasts, they can provide a helpful benchmark for comparison and guide policymaking towards a more effective and efficient climate transition. Given the lack of a counterfactual, it is useful to construct a scenario that does not consider the climate transition measures. This puts the measures into perspective and could be also used to efficiently communicate with the general public. Once this is embedded, it will be more useful when considering the incremental effects of new measures relative to a current-policy counterfactual.

5 Conclusions and recommendations

Governments around the globe are committed to reaching net zero GHG emissions by 2050. The climate transition measures to reach this ambitious objective are expected to have a substantial impact on public finances in the short, medium and long-term. Most countries will need to increase current public spending and public and private investment to finance the climate transition. In turn, some public revenue sources may be lost in the long-term, especially due to the gradual reduction in fossil fuel usage. The climate transition poses significant, though not exceptional, risks to fiscal sustainability in the long-run.

Noting these potentially significant risks, it is important that the climate transition measures are timely, well-targeted and cost-efficient. Disorderly or delayed actions could increase the total public cost of the climate transition and produce negative spill-over effects on the remainder of the economy. The majority of national IFIs are concerned about the potential impact of the climate transition on public spending, investments and the off-balance sheet financing involved.

Regular and continuous assessment of the climate transition's impact on public finances could contribute to a cost-efficient climate transition. Regularly assessing measures that aim to facilitate the climate transition can contribute to the optimisation of the policy package, allowing for the right balance between GHG emissions reduction, public finances, and other impacts. Moreover, to obtain a full understanding of the potential impact to the public finances, the assessment should cover all measures being implemented or planned, instead of cherry-picking individual ones. Similarly, the assessment should cover both first-round and second-round transmission effects. Assessing not only the first-round direct impact on the public finances, but also the second-round indirect impact is especially important for understanding the medium and long-term fiscal consequences.

Given high uncertainty surrounding technological advances and behavioural changes, multi-scenario analysis would be the most suitable tool to assess the fiscal impact of climate transition measures. The scenario-analysis will allow for the assessment of the impact under various conditions and assumptions against a 'business as usual' (i.e. counterfactual) scenario. Furthermore, it is important to disclose detailed assumptions behind each of the scenarios. As evidenced by the estimated difference between the potential impact of climate change on the UK's long-term fiscal sustainability ('significant but not exceptional') and that of the Netherlands (limited), the results can vary depending on the underlying assumptions and modelling used.

Cost estimates for transition measures are very important for understanding the economic and fiscal effects of the climate transition. Preferably, multiple independent cost assessments should be easily available to IFIs. The Estonian example further shows that EU-wide policies may have a strong effect on national GHG emissions. Hence, a well-established, independent and easily accessible assessment of the impact of EU GHG emission policies on individual countries may be of great help for IFIs.

Overall, assessments of the fiscal impact of the climate transition measures are still in their infancy and would benefit from the independent expertise of specialist agencies. This would require expanding the mandate of some national IFIs, which are currently not allowed to conduct these assessments. Nevertheless, about half of the surveyed IFIs are already or planning to carry out assessments on individual or all climate transition measures. The main challenges for national IFIs are to obtain expert staff with experience in assessing climate transition measures. The most advanced IFIs in this domain (CPB and OBR) have formed collaborations with other institutions to help fill this void. Governments need to provide more detailed information on the measures to facilitate effective and accurate assessments. Finally, the national IFIs can further benefit from the exchange of best practices.

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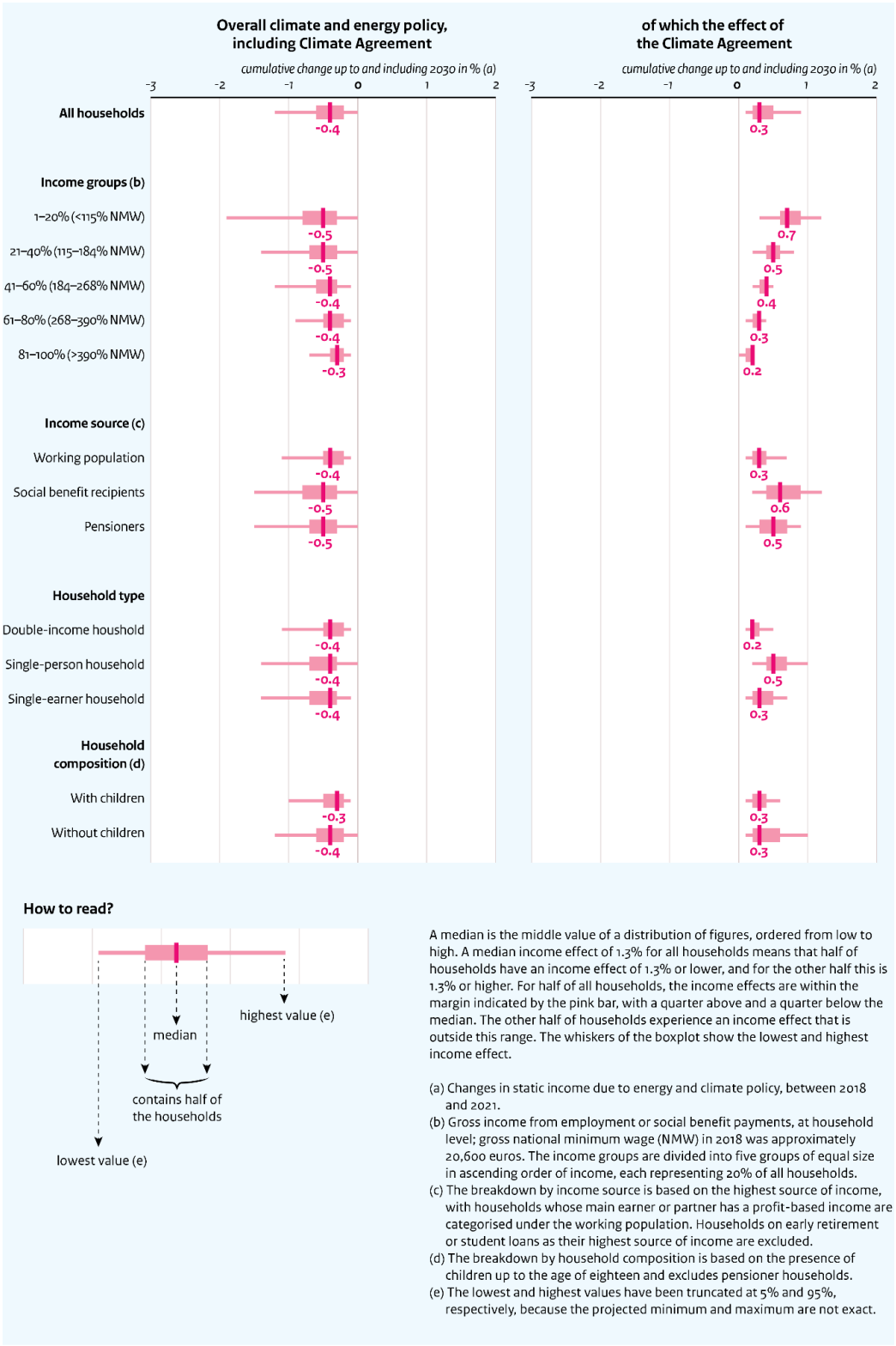
Annex I. Dutch Climate Agreement income effects, incl. and excl. current climate and energy policy up to and including 2030



Source: CPB (2021).

The Network of EU Independent Fiscal Institutions

The Network is composed of 30 Independent Fiscal Institutions representing 25 EU countries and the UK. It is a voluntary and inclusive institution, open to all independent fiscal oversight bodies operating in the EU. It provides a platform to exchange views, expertise and pool resources in areas of common concern. The Network supports the efforts to review and reinforce the EU fiscal framework, seeking to better exploit the synergies between rules and institutions, as well as between different levels of administration whilst respecting the principle of subsidiarity and enhancing local ownership and accountability.

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