SustainaWeekly

Scoring the impact of climate risks on sectors

- **Economist:** **Climate change and policies to mitigate it will impact 1) business revenue and costs 2) the value of assets and liabilities and 3) the availability and cost of capital. We score the impact that different physical and transition risks will have on 20 business sectors as well as the potential impact of price and non-price based policy measures.**

- **Strategist:** **The ECB has recently disclosed data on climate-related indicators. From a first glance, we see that investment funds seem to have the largest financed emissions and also the largest weighted average carbon intensity, but banks have the largest carbon footprint. The data also still has several limitations and must therefore be treated with care.**

- **Sector:** **Commercial vehicles account for almost half of the emissions of the mobility sector so will be a key part of the transition. For commercial vehicles to meet emission reduction targets there are three main challenges: the range and freight challenge, refuelling infrastructure challenge and the charging infrastructure challenge.**

- **ESG in figures:** **In a regular section of our weekly, we present a chart book on some of the key indicators for ESG financing and the energy transition.**

In this edition of the SustainaWeekly, we first provide a summary score of the impact that physical and transition risks will have on 20 sectors of the Dutch economy as well as taking a closer look at the impact of mitigation policies by the government. We then go on to assess the recently disclosed ECB data on climate-related indicators at the euro area level. These indicators will help policy makers to assess climate risks, and to better understand challenges and opportunities around the climate transition. Finally, we analyse the transition for commercial vehicles. For the sector to meet emission reduction targets there are three main challenges: the range and freight challenge, the refuelling infrastructure challenge and the charging infrastructure challenge.

Enjoy the read and, as always, let us know if you have any feedback!

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Impact of climate risks spans across multiple sectors

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- **Climate change and policies to mitigate it will impact 1) business revenue and costs 2) the value of assets and liabilities and 3) the availability and cost of capital**
- **We score the impact that different physical and transition risks will have on 20 business sectors in Netherlands**
- **Governments are using a variety of price and non-price based policy measures to facilitate the transition**
- **Overall, in our view, having an up-to-date understanding of all technological developments in the sector (national and international) and in policy and regulations will become more crucial**

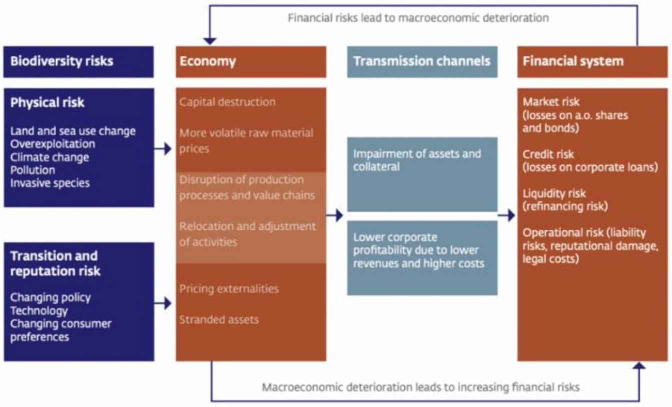
Climate change and the policies to mitigate it have a major impact on virtually all sectors of the Dutch economy. It is no surprise that decarbonisation is gaining importance in many companies, both to reduce emissions as well as to manage policy-related risks to their businesses. It helps to have insight into the extent to which climate risks affect the business activities of companies in sectors. It is good for strategic decision-making and it increases ultimately financial resilience. In this note we provide a summary score of the impact that physical and transition risks will have on 20 sectors of the Dutch economy. Next to that, we take a closer look at transition shocks and in particular, we focus on mitigation policies by the government.

Impact of climate risks

Climate-related risks are uncertain and nonlinear. They are divided into two types: physical and transition climate risks. Physical risks involve acute events (such as floods, heat waves and drought) and chronic events (such as sea level rise, higher temperature and increased rainfall). Despite the fact that some of these risks are predictable to some extent (particularly with the chronic risks), there will be continuous uncertainty with each risk type about location, frequency and ultimate severity of those events. For transition risks, that uncertainty is fuelled in particular by changes in government policies, technological developments, shifts in consumer preferences and confidence.

For businesses, these risks have implications for revenues and costs, as well as for the value of assets and liabilities, and/or the availability and cost of capital. Floods, heat waves and droughts cause damage to real estate and infrastructure. In addition, they disrupt supply chains in many sectors. Mitigation policies – such as carbon prices – can make certain activities uneconomical. On the other hand, climate risks also bring opportunities to sectors. For example, it causes companies to try to mitigate the effects of climate change or to adapt to the new reality. This can be done by using resources more efficiently, by cost savings, by using low-emission energy sources, building more flexibility in the supply chain, by developing new products and services, but also, for example, adopting and developing innovative decarbonization techniques.

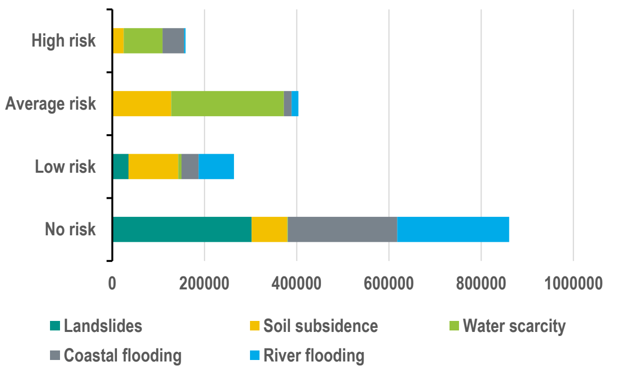
Climate risks and financial implications



Source: DNB

Exposure portfolios Dutch financial institutions

potential exposure at risk (PEAR) for physical risks in mln euro



Source: DNB, ABN AMRO Group Economics

Note: The PEAR refers to all risk exposures, regardless of the intensity or likelihood of the natural disaster. The PEAR provides an indication of the total amount exposed to certain natural disasters in 2020.

Supervisors of financial institutions have attached great importance to assessing the climate risks in their portfolios. And the good news is that financial institutions can proactively reflect the financial consequences of climate risks in both the short and long term with increasing accuracy. Thus, the challenges posed by climate risks are becoming better understood, especially what the impact is on different sectors. For regulators, this information is crucial. On the basis of this information, they can assess the risks in a more adequate way, better ensure the resilience of the financial system and adjust their policies accordingly if and when required.

Incidentally, the sector approach is traditionally used. This approach is a good starting point and provides a solid foundation, especially for transition risks. This is because the impact of government policies, technological advances and shifts in consumer preferences have effects primarily at the sector level. Every company in every sector faces these transition risks in one way or another sooner or later. However, the high variability of the ultimate impact of the climate risks can differ significantly between companies within sectors.

Government climate-related policies aim to mitigate climate change by accelerating the transition of the economy towards net zero emissions. This can be done, for example, by making the emissions trading system more stringent, by introducing or by raising the carbon tax, by adjusting subsidies to encourage low-carbon measures or discourage use of fossil fuel. As technological developments accelerate, companies' existing plant and machinery may become obsolete faster or the use of energy sources may become more expensive due to, for example, stricter efficiency standards. To remain competitive, companies must therefore adapt. Finally, consumer and investor climate sentiment also affects business activities. For example, an increase in the need for climate-friendly variants could result in a shift to more climate-friendly transportation, production and energy use.

For physical climate risks, the emphasis is somewhat different. These risks primarily involve the location of business operations as well as of suppliers. It manifests itself primarily in damage and disruption to production facilities, datacentres, warehouses and other business facilities of companies, as well as through their supply chains. Nevertheless, even here a meaningful assessment of the overall risk can be made at the sector level. Sufficient information is available on the distribution of companies across the Netherlands, for example, and flood risks – which are particularly important for the Netherlands - by area are well mapped. Using the combination of this information, a reasonable estimate can be made of the impact at the sector level.

Ultimately, both physical and transition risks inflict economic damage on businesses in sectors. The physical risks mainly damage buildings, establishments, infrastructure. They also affects productivity and labour availability. But they can also involve write-downs of bonds and shares of companies whose properties or processes are exposed to the physical effects of climate change. Transition risk usually also involves write-downs of investments in and loans to businesses or write-downs in real estate holdings. Incidentally, higher transition risk also means that companies have to build higher financial buffers for their assets. On balance, climate risks affect an organization's future financial position, the impact of which on assets, sales, costs and thus profits are very important to monitor. In any case, it is clear that climate change affects all economic sectors in one way or another, but there are differences by sector

The physical impacts of climate-related shocks and the transition to a low-carbon economy not only affect the financial situation of companies, they also shape the strategic decisions companies make. These strategic decisions should increase the financial resilience of companies as much as possible. To make informed decisions about future operations in relation to climate risks, we have mapped the net impact of these climate risks by sector.

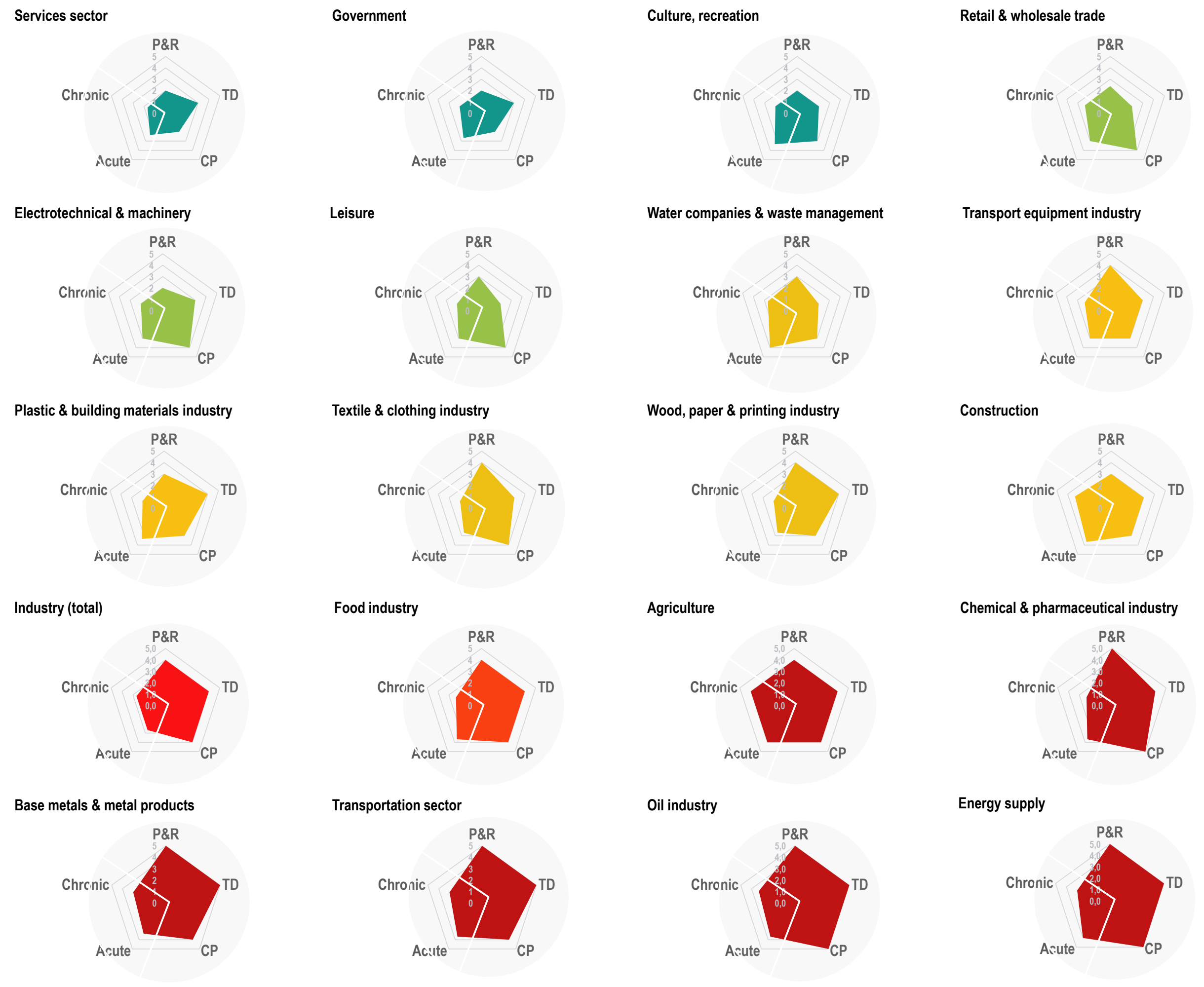
We plot the impact of physical and transition risks by sector on five pillars, where two pillars ("chronic" and "acute") relate to physical risks. The three remaining pillars relate to transition risks, namely the impact of changes in government policy ('P&R'), technological developments ('TD') and shifts in consumer preferences and confidence ('CP'). The government has a number of price and non-price based tools to hand. An overview of the results is presented in the circle figures for 20 sectors. The smaller the coloured area in these figures, the lower the impact on activities in the sectors will ultimately be. The colours run from dark green (very low impact) to dark red (very high impact).

For the assessment of the acute physical risk impact, we were able to form a reasonable assessment based on existing data (mainly the distribution of companies across regions and the probability of flood risk in those regions). There are no exact data and data available per sector for shocks such as 'drought', 'heat waves' and 'extreme weather' (such as storms). Chronic physical risks have a lower score than acute physical risks in most sectors. The most important input for making the scores with regard to 'Policy & Regulations' (under transition risk) is the sector's dependence on the use of fossil fuels. For the other two pillars under transition risk ('technology development' and 'consumer preferences'), the scores are partly based on our own research, including, for example, the publication 'Decarbonisation strategies in Dutch sectors' (see here). Over time, more data will become available with which we can further improve our analysis of climate risks and the impact on sectors. Therefore, these first results that we present in this article are subject to change.

Immediately it can be seen from the overview with the preliminary results that seven sectors (excluding the "Industry (total)" sector) have a high to very high impact and six have a low to very low impact. Six sectors face an average impact of climate risks.

Net impact on business activities of climate risks in Dutch sectors

(scores range from 1 (inner ring) to 5 (outer ring), where 1 = very low impact on business activities and 5 = very high impact)

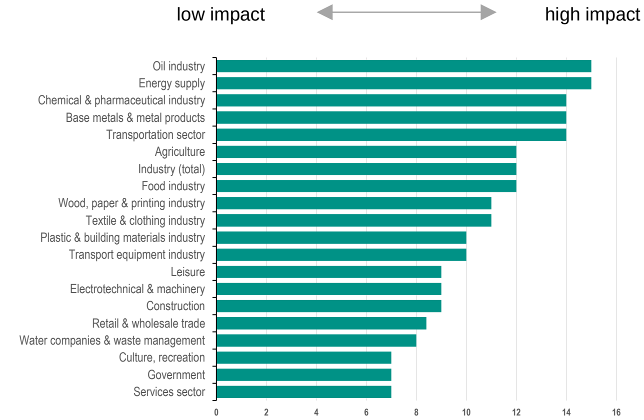


Source: ABN AMRO Group Economics
P&R = Policy & Regulations; TD = Technology Development; CP = Consumer Preferences; The pillars P&R, TD & CP all relate to transition climate risks. Chronic and Acute climate risks relate to physical climate risks.

No sector escapes the physical effects of climate-related events. Here, acute shocks tend to have the greatest impact. Such shocks almost directly affect business activity in sectors more closely linked to weather events. Broadly speaking, these include sectors such as agriculture, construction, water utilities, healthcare, transportation and those heavily dependent on tourism. But the impact is also relatively high on sectors such as energy supply and the petroleum industry. For example, physical shocks directly affect the electricity system: from generation potential to transmission and distribution networks. And in the petroleum industry, it will mainly affect infrastructure (e.g. pipelines) or damage to terminals (which are often close to the coast). In the case of transition risks, those sectors that are more heavily dependent on the use of fossil fuels in the production process are particularly hard hit. This particularly involves many subsectors of industry, but also includes energy supply and the transport sector.

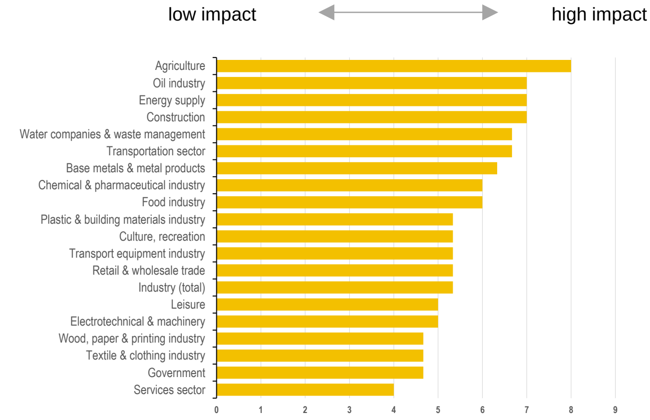
As we noted earlier, no sector will be spared in climate-related shocks. An acute or chronic climate shock also affects many employees of companies personally and thus directly ensures that the productivity of many companies is also affected. Yet there are some sectors whose resilience to climate risks is relatively better. These are mainly commercial and non-commercial (government) services.

Impact transition risk per sector



Source: ABN AMRO Group Economics

Impact physical risk per sector



Source: ABN AMRO Group Economics

Unpacking transition risks

In the analysis so far we have considered three types of transition risks - consumer preferences, technological developments and government policies and regulations. In this section we take a closer look at transition shocks and in particular, we focus on mitigation policies by the government.

We focus on government policy for three reasons. First, transition shocks driven by policy are expected to have a larger impact on the business operations in almost all the sectors that we have considered in this analysis (see chart above) compared with physical and other transition risks. Second, government policy is an immediate risk. The net zero ambition is fully embedded in the policy agenda in the EU and that comes alongside stringent interim emission reduction targets for 2030. By contrast, the physical effects of climate change are expected to emerge meaningfully over a longer period.

Governments have implemented and announced a wide variety of price and non-price measures to achieve the interim target and net zero. Of these, price-based measures such as carbon taxes have taken centre stage in policy analysis because the additional cost imposed on emissions from the tax fits neatly into a narrative that frames emissions as a negative externality that needs to be appropriately priced. Economic theory, in fact, suggests that a carbon price is the most efficient tool when the market fails to price GHG emissions. A price on emissions is efficient because the government does not need to know the technology options available to industry or for that matter consumer preferences. A carbon price allows the market to identify the least costly path for reducing GHG emissions and there is the added benefit that the revenue from the tax can be used by governments to lower debt levels, compensate less well-off households or to eliminate distortionary taxes such as labour taxes. That is the theory.

The reality is that carbon taxes are politically difficult to implement because the tax is visible and the burden tends to fall disproportionately on the less well off. As a result, governments rely heavily on non-price abatement measures such as regulations and planning. Also, carbon taxes are not always appropriate. They work best in sectors where substitution of product/technology is possible.

A good example of multiple abatement measures is the energy supply sector which includes power generation and distribution sectors. Governments have used price-based measures such as developing carbon emission trading markets (ETS) and introducing carbon taxes and feed-in tariffs, but also non-price measures such as regulation that, for example, compels a substitution to wind or solar power, as well as planning. Renewable energy requires a wide distribution network that links existing networks across municipal and national boundaries. Establishing these links requires agreements, planning and investment by government. Another example is town planning that aims to reduce private car usage by providing affordable and convenient public transport. All these are examples of policy intervention where the market on its own fails to internalise the costs of emissions. Indeed, the theoretical justification for non-price measures is the existence of multiple market failures in the economy.

The note later in this publication on commercial vehicles outlines the different price measures and regulations imposed on the sector by the EU and the Dutch government to facilitate the transition. The mobility sector, which includes commercial and non-commercial vehicles, is required to reduce emissions by a-third by 2030 compared with 2020 levels. The sector is a good example of multiple market failures that include technological challenges as well as infrastructure bottlenecks. Government policy aims to address these failures by encouraging new demand for EVs and hydrogen-powered vehicles with price measures and regulation and at the same time addressing the infrastructure bottlenecks with regulation and planning. The table below highlights some of the policy initiatives that are specific to this sector.

Examples of government policies for the mobility and energy supply sectors

	Price-based measures		Non price-based measures	
	Carbon price and feed-in subsidy	**Feebates**	**Planning**	**Regulation**
Examples for the Mobility sector	New EU ETS for the road transport from 2027	Feebates: subsidy for EVs alongside high tax on ICEVs	EU policy Target date 2030 -Hydrogen refuelling stations every 200kms -Charging stations every 60kms for trucks over 3.5 tonnes	EU policy Target date 2030 -45% emission reduction for new heavy-duty vehicles; -Zero emissions for all new city buses
Examples for the Energy Supply Sector	Feed-in subsidy for renewable energy generators		EU interconnection target. Each country should have the infrastructure to export 15% of the installed electricity production capacity	Coal generation eliminated by 2022 (France), 2024 (UK), 2030 (Netherlands).
Impact	Carbon tax raises the cost of production / consumption whereas feed-in tariff lowers the cost of production / consumption.	Feebates: carrot and stick approach. Unlike carbon tax, feebates have a small impact on government revenues	New infrastructure for road transport and electricity distribution (especially renewable electricity because of intermittency).	Regulation provides a clear medium term target for the sector which is helpful for planning

Source: ABN AMRO Group Economics

Conclusion

All-in-all, physical and transition risks have many impacts on operations, with transition risks typically having a higher impact than physical risks. Governments will deploy a plethora of price and non-price measures and the impact of these and other transition and physical shocks can vary significantly. Companies would do well to identify the potential impact of these risks. Differences by industry and company can be significant. Some organizations are much more resilient to change due to climate-related risks than others. Moreover, from an investment perspective, it is important for companies to have an indication of the potential climate-related impacts on their assets, especially those with long lives and clear policy guidance helps the planning process. Having an up-to-date understanding of all technological developments in the sector (national and international) and regulation will become more crucial.

New ECB climate-related data must be assessed with care; several limitations remain

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- **The ECB has recently disclosed data on climate-related indicators**
- **From a first glance, we see that investment funds seem to have the largest financed emissions and also the largest weighted average carbon intensity…**
- **…However, banks have the largest carbon footprint**
- **It is therefore hard to draw conclusions in terms of financial institution's exposure to transition risks**
- **The ECB data also still has several limitations and must therefore be treated with care**

The ECB has recently disclosed data on climate-related indicators at the euro area level (see here). These indicators will help policy makers to assess climate risks, and to better understand challenges and opportunities around the climate transition. However, the data still involves several limitations, which mean that, at this stage, the data is published as experimental statistics and should be used/interpreted with caution.

The recently disclosed data includes indicators across three different areas: (i) sustainable finance; (ii) carbon emissions financed by financial institutions; and (iii) physical risks. Below, we focus on the indicators for carbon emissions and intensity of the securities and loan portfolios of financial institutions, which also includes information on the financial sector's exposure to counterparties with carbon-intensive business models. These indicators are mainly related to risks stemming from the climate transition.

How are indicators calculated

Before digging into preliminary conclusions that can be drawn from the ECB's data, we focus first on how the main indicators are calculated. This will help to understand why different indicators may also yield different conclusions (more on this below).

$$Financed\ emissions\ (FE) = \sum\left(\frac{investment\ into\ company\ i}{total\ assets\ of\ company\ i} * company\ i\ GHG\ emissions\right)$$

$$Carbon\ footprint\ (CFP) = \frac{FE}{total\ portfolio\ value}$$

$$Carbon\ intensity\ (CI) = \frac{FE}{\sum\left(\frac{investment\ into\ company\ i}{total\ assets\ of\ company\ i} * revenues\ of\ company\ i\right)}$$

$$Weighted\ average\ carbon\ intensity\ (WACI) = \sum\left(\frac{investment\ into\ company\ i}{total\ portfolio\ value} * \frac{company\ i\ GHG\ emissions}{revenues\ of\ company\ i}\right)$$

FE is given in tons of CO2, while CFP, WACI and CI are all given in tons of CO2 per EUR million. The ECB data involves financial institutions within the Euro area, which includes credit institutions, non-MMF investment funds and insurance corporations and pension funds. Data will be updated on an annual basis (revision may occur every six months). Data sources include: SHSS, CSDB, RIAD, ISS and Refinitiv. Issuer's Scope 1 and Scope 2 emissions as reported by companies disclosing such information.

From the indicators above, we can already assess that FE is mostly an indicator of absolute emissions (how much of the company's total emissions can be attributed to the financed institution financing it). On the other hand, CI and WACI are mostly intensity indicators, which means that these refer to not absolute emissions, but rather how these emissions compare to the company's revenues. Specifically looking at CI, this indicator represents a financial institution's share of emissions (that is, proportional to the investment into the company), relative to its share of a company's revenues. On the other hand, WACI focuses on how much weight a company's emission intensity has in the financial institution's portfolio. Hence, while CI takes into account only the share of emission intensity, WACI puts that into perspective by weighting that share across the financial institution's portfolio value. The same is true for CFP, which is also takes into account the portfolio value. However, contrary to WACI, CFP uses as numerator the company's absolute emissions.

All in all, FE and CI are indicators of how much a financial institution's contributes to a company's emissions, representing therefore indicators of how the financial sector contributes to the financing of high emitting economic activities. On the other hand, WACI and CFP are better indicators of a financial institution's exposure to transition risks, as they take into account the financial institution's portfolio value.

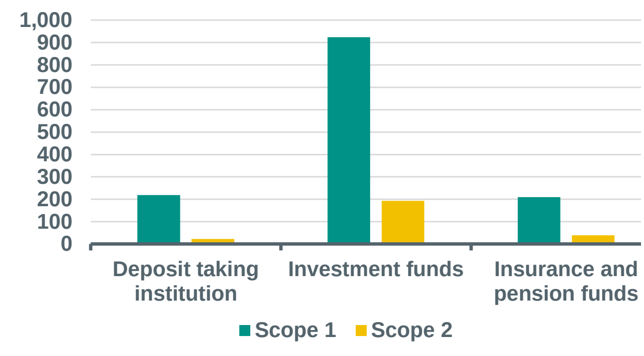
Below we have summarized a few of the key conclusions we can draw from the ECB's data.

Investment funds have the largest financed emissions…

We start with the FE indicator. As shown in the chart below (left), clearly, investment funds have the largest absolute carbon footprint (that is, they account for the largest financed emissions) in comparison to other financial institutions (both in terms of scope 1 and scope 2 emissions). This does make sense, as investment funds also have the largest portfolios. This seems to be consistent across different asset classes, as both on the debt but also equity side, investment funds have the largest FE compared to other financial institutions (see chart below on the right side). It is therefore fair to assume that investment funds, due to their large portfolios, have been the largest contributors to the financing of high carbon emission activities.

Investment funds have the largest financed emissions

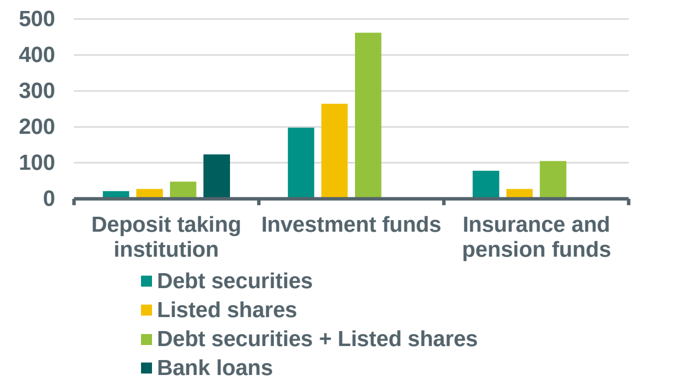
Million tons of CO2, Euro area



Source: ECB, ABN AMRO Group Economics. Note: data refers to the sum of FE. Conclusions are still valid when looking at averages. Data for year 2020. Includes the euro-area combined data.

…Which is both on the equity and debt side

Scope 1 emissions, K tons of CO2



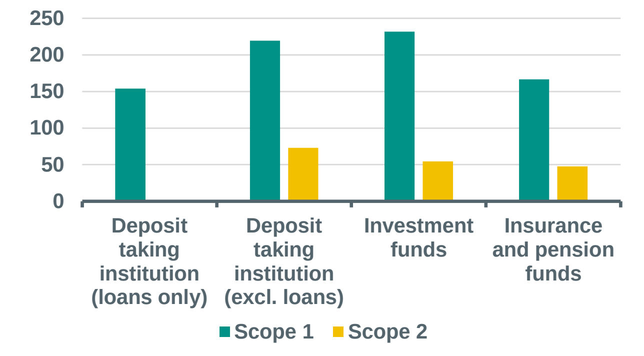
Source: ECB, ABN AMRO Group Economics. Note: data refers to the sum of FE including only scope 1 emissions. Conclusions are still valid when looking at scope 2 emissions. Data for year 2020.

…And finance the most carbon intensive companies, according to the WACI indicator

We take the analysis further by then evaluating the WACI. As we previously stated, WACI is a better indicator for exposure to transition risks, as it takes into account the size of a financial institution's portfolio. As depicted in the chart below (left), the WACI is also higher for investment funds. Furthermore, banks' loan portfolios have the smallest WACI (and therefore the smallest exposure to transition risk), in comparison to other financial institutions.

Investment funds more exposed to transition risk

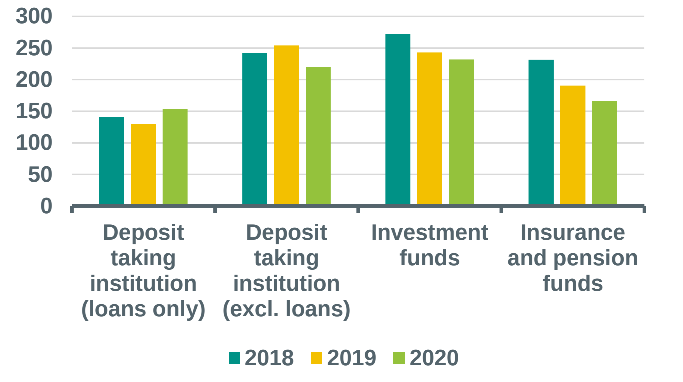
tons of CO2 per EURm, Euro area



Source: ECB, ABN AMRO Group Economics. Note: data refers to the average of WACI. Data for year 2020.

…But average WACI has decreased sharply over the years

tons of CO2 per EURm, Euro area



Source: ECB, ABN AMRO Group Economics. Note: data refers to the average of WACI. Data refers to scope 1 emissions only.

Moreover, as shown in the chart on the previous page (right side), the WACI for investment funds has decreased significantly over the years despite its still relatively high number. In absolute terms, the WACI from investment funds went from 273 tons of CO2 per EUR mn in 2018, to 232 in 2020. From a relatively perspective, however, the largest decrease came from insurance and pension funds, where WACI has decreased by a whopping 28% between 2018 to 2020. That makes sense, as insurance firms are significantly exposed to not only physical but also transition risks (which can cause losses in asset values) and have, therefore, an intrinsic motivation to reduce this exposure.

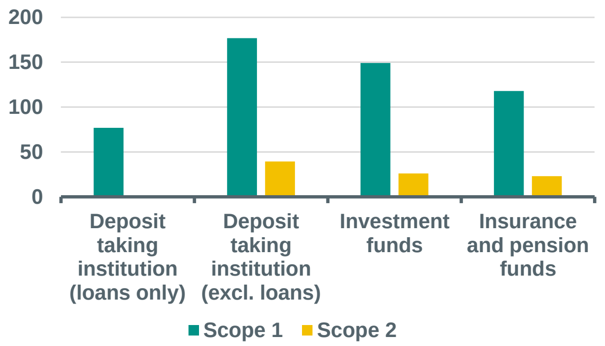
However, banks have the largest CFP

We move our analysis to the CFP indicator and from this perspective, we get to different conclusions. While deposit taking institutions (that is, banks), have the second highest WACI (behind investment funds), they have the highest CFP (see chart below). Hence, from a carbon footprint perspective, the banking sector seems to have the highest exposure to transition risks. This is however, not the case when looking exclusively at the banks' loan portfolios. These still have (as is the case when measured by WACI) the smallest carbon footprint. These results are a bit puzzling, as this would imply that the biggest (transition) risk for banks stems from their investment portfolio, rather than their loan portfolio. While the majority of the banks' investments may be directed towards 'safer' assets such as government / SSA bonds, this would imply that the small share that invests into corporates is overweight into carbon intensive companies.

The difference in conclusions drawn when taking into account CFP or WACI mainly relies on the fact that the former takes into account total assets of the company being financed, while this is not the case with WACI. Hence, a situation where a company's assets decreases, while revenues and emissions remain equal (for example, due to a decrease in cash to pay down debt), would result in an increase of CFP, but not of WACI. It is therefore hard to draw meaningful conclusions around exposure to transition risks (more on this below).

Banks invest in the most carbon intensive companies

tons of CO2 per EURm, Euro area



Source: ECB, ABN AMRO Group Economics. Note: data refers to the average of WACI. Data for year 2020.

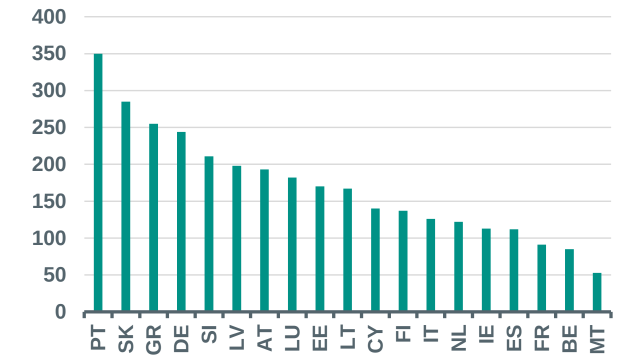
Some countries have a consistently high WACI, regardless of the type of Financial Institution

The data of the ECB is also published on a country level. We compare country differences by first zooming into the WACI indicator. From the chart on the next page (right side), we see that banks' located in Estonia, Slovakia and Austria have the largest WACI when looking exclusively at their securities portfolios (that is, excluding loans). On the other hand, as shown in the chart on the left, loan portfolio of banks located in Portugal, Slovakia and Greece show the largest WACI. The lack of consistency of WACIs from different types of portfolios across European countries indicates that there does not seem to be a strong correlation between the countries' emissions/location, and their corresponding WACI. For example, Germany is a country that has high absolute emissions, low/average emissions per capita, but a very high loan portfolio WACI, while at the same time having one of the lowest WACIs for their securities portfolios. It is therefore likely that WACIs are more correlated with the financial institution's individual (green) ambitions, rather than its location.

Nevertheless, when looking at the WACI from financial institutions' portfolio of securities, there seems to be a consistency across financial institutions. With exception of a few countries (such as Lithuania, Latvia and Estonia), a WACI is high or low regardless of the type of financial institution. For example, Belgium, Germany and the Netherlands all have the lowest WACI across all different type of financial institutions.

Portugal has the highest WACI for loans

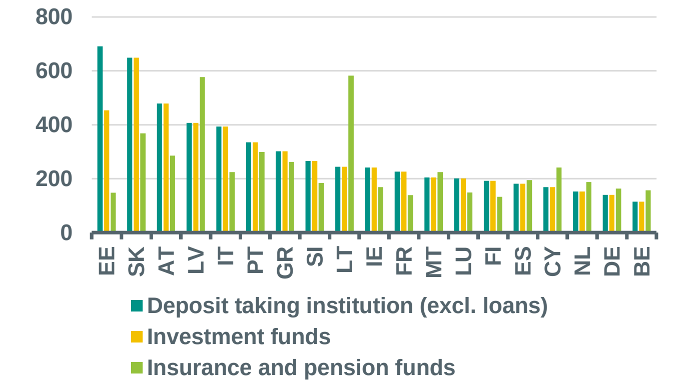
tons of CO2 per EURm



Source: ECB, ABN AMRO Group Economics. Note: data refers to the average of WACI. Data for year 2020. Data includes only scope 1 emissions.

WACI is high in certain countries regardless of type of FI

tons of CO2 per EURm



Source: ECB, ABN AMRO Group Economics. Note: data refers to the average of WACI. Data for year 2020. Data includes only scope 1 emissions.

Different conclusions to be drawn dependent on the indicator…

Overall, it seems that different ECB indicators yield different conclusions. As we previously stated, both WACI and CFP are used as indicators for financial institution's exposure to transition risks. However, WACI and CFP are not always consistent, which means that sometimes a certain financial institution may have a high WACI, but a low CFP (or vice versa). It is therefore hard to see how WACI and CFP correlate with each other, which ultimately makes it hard to actually access exposure to transition risk. It would have therefore been easier to assess and process the ECB data if also individual data sets would have been made available. For example, company's revenues, assets, emissions, as well as financial institutions' portfolio values (all on an aggregate basis). This would have allowed for a better assessment in terms of to what extent are WACI and CFP inconsistent due to for example it being driven by the company's assets.

…And data sets must be assessed taking into account limitations

Finally, the aforementioned information must be treated with care, given the limitations of the dataset. Firstly, the ECB discloses that the average coverage of total outstanding nominal amount with balance sheet and emission information represents only around 47% for the euro area across the years (2018, 2019 and 2020). Secondly, emissions also need to be read taken into account that they do not fully represent the entire universe. Owing to a lack of source data, emissions for firms outside of the EU ETS are imputed using the number of employees at sector level when available. Overall, the average share of imputed emissions for the euro area is 49%.

Finally, there might be an overlap between scope 1 and 2 emissions. For example, a firm's scope 2 emissions might represent another firm's scope 2. This would result in double counting. With that in mind, we have also hereby presented the emissions data separately (we have not accounted scope 1 and 2 together). However, the use of indicators involving scope 1 and 2 data separately might also yield different conclusions. It is therefore hard to draw conclusions and properly assess the new climate-related data by the ECB. The central bank is however aware of these limitations, and it aims to get into discussions with relevant stakeholders about how to improve the quality of the data. As such, the disclosure of climate-related data by the ECB is a clear sign of how committed it is to improve data availability on climate, and to ultimately use if efficiently in order to address issues such as climate change.

The GHG reduction challenge for commercial vehicles

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- **Commercial vehicles account for 46% of the GHG emissions of the mobility sector so they need to contribute their share to reduce emissions**
- **The targets are very clear for buses, vans and state-owned vehicles. The new proposed targets for heavy duty vehicles are ambitious if approved.**
- **For commercial vehicles to meet emission reduction targets there are three main challenges: the range and freight challenge, refuelling infrastructure challenge and the charging infrastructure challenge**

Introduction

The Netherlands has set the goal to reduce emissions of greenhouse gasses (GHG) by at least 55% (with policy aimed at 60%) by 2030 and to be net zero in 2050. The mobility sector accounted for 18% of the total greenhouse gas emissions in 2021. To reduce GHG emissions by the mobility sector the government has set ambitious targets for this sector. The sector specific target for mobility is to reduce GHG emissions from 31 Megaton in 2021 to 21 Megaton in 2030 or a reduction of 10 Megaton. Road transport is the biggest emitter in the mobility sector. It is responsible for around 85% of the total emissions of the mobility sector. Passenger cars account for 50% of emissions of the mobility sector. Commercial vehicles account for 46% of the GHG emissions. The contribution of passenger cars was already discussed in our Sustainaweekly of 6 February. Commercial vehicles also need to contribute their share to reduce emissions. In this report we focus on commercial vehicles.

We start with providing a brief overview of the different types of commercial vehicle and how many there are on the road. We then go on to provide more detail about the Dutch government policy and the EU policy to reduce emissions in the sector. Finally, we assess the numerous challenges commercial vehicles face to reduce emissions.

Shares of GHG emissions mobility

In % and Mton

	Emissions GHG in %	GHG end 2021 in Mton
Cars	50%	15.4
Heavy duty	20%	6.2
Light duty	12%	3.7
Buses, motors and motor cycles	3%	0.9
Contruction traffic, mobile tools & machinery	11%	3.4
Shipping NL & fishery	4%	1.2
Mobility total	**100%**	**30.8**

Source: CBS, ABN AMRO Group Economics

…and the needed reduction

In Mton

	Reduction GHG 2030	Missions GHG 2030 Mton
Cars	-5.0	10.4
Heavy duty	-2.0	4.2
Light duty	-1.2	2.5
Buses, motors and motor cycles	-0.3	0.6
Contruction traffic, mobile tools & machir	-1.1	2.3
Shipping NL & fishery	-0.4	0.8
Mobility total	**-10.0**	**20.8**

Source: CBS, ABN AMRO Group Economics

Commercial vehicles

Commercial vehicles consist of light-duty vehicles (LDV), medium-duty vehicles (MDV), heavy-duty vehicles (HDV), buses and construction traffic.

At the end of 2019, the global fleet of cars stood at 1.083 billion, while the fleet of commercial vehicles stood at 406 million (source www.wardsauto.com). These commercial vehicles mainly have internal combustion engines that use fossil fuels. At the end of 2021 the total stock of electric trucks stood at 66,000, representing of just 0.1% of the fleet. According to the IEA, the fleet of electric buses was 670,000 at the end of 2021 or 4% of the global bus fleet.

In the EU, in 2021 there were 29.5 million light-commercial vehicles (up to 3.5 tonnes) on the road and 6.4 million medium and heavy commercial vehicles and 714.000 busses. In the Netherlands there were around 158,000 trucks, 1.06 million vans and 9,316 busses on the road in 2021 (ACEA). Heavy duty vehicles are responsible for 28% of the CO2 emissions from road transport in the EU, but they are only 2% of the vehicles (FT).

Policy to reduce emissions from mobility

In this section we discuss the emission targets and policy announced by the Dutch government and the European Commission (EC) to reduce emissions for the mobility sector. We start with the Netherlands followed by that of the EC.

The Netherlands

The government target for the mobility sector is to reduce greenhouse gas emissions to 21 Megaton in 2030, this means a reduction of 10 Megaton. Every sub-category needs to contribute its share. The largest share is for personal cars. We focussed on this in the Sustainaweekly of 6 February. In this report we focus on commercial vehicles. Heavy duty trucks emit around 6.2 Megaton and need to reduce 2 Megaton by 2030. Light duty vehicles/vans emit around 3.7 Megaton and need to reduce 1.2 Megaton by 2030. Buses account for 0.9 Megaton emissions and need to reduce at least 0.3 Megaton (see tables above). The government has set clear policy targets for personal cars, busses and vehicles used by the government. Moreover there are also rules concerning city logistics. Below we set out an overview of the targets in place.

Climate deal 2019 and Climate nota 2022 the Netherlands

	Targets Climate deal 2019 and Climate nota 2022	Possible effect in Mton
2025	All new buses used for public transportation are zero-emission	
	And they use regional produced renewable energy	
	Transportation of people that have a limitation to move only on zero-emission vehicles	
	City logistics: In 30 to 40 municipalities middelsized zero-emission zones for trucks and vans	-1.0
	European Clean Vehicles Directive	-0.4
2030	All new cars zero emissions	-4.2
	8 bln less work related kilometres by car	
	Zero emission transport: all public transportation buses (approximately 5,248)	-0.5
	Zero emission transport: all construction traffic (including vans), mobile tools and machinery	-0.4
	Expectation is that there are 115.000 zero emission vans	-0.4
	Expectation is that there are 5.000 zero-emission/plug-in hybride trucks	-0.2
	30% reduction in CO2 emissions from hinterland and continental transport by 2030	-1.9
	Total expected reduction in Mton by 2030 based on Climate policy	**-9.0**

Source: Climate Deal, Climate nota 2022, CE Delft, ABN AMRO Economisch Bureau

From 2025, all new buses used in public transportations should be zero-emission buses and they must use regional produced renewable energy. From 2030 all buses used in public transportation should be zero-emission buses. In addition, all vehicles used by the state should be zero emission as well in 2030. In 2019, the European Clean vehicles directive (CVD) was adopted and in 2021 this directive was implemented in the Netherlands as the 'Regeling bevordering schone wegvoertuigen' (Pianoo, 2021b). The regulation obliges government agencies to tender a minimum percentage of clean vehicles in European tenders for vehicles and transport services. All modes of road transport are covered by the regulation. This regulation is forecast to reduce emissions by 0.4 Mton in 2025 (source CE Delft). Finally, there are also new developments on city logistics. In 2025, in the Netherlands, 30 to 40 municipalities have zero emissions zones for trucks and vans. The expected CO2 reduction of this measure is 1 Megaton (Klimaatnota 2022). If we take the announced policy into account the Netherlands could be able to reduce 9 Megaton GHG in 2030 (see table above).

The European Commission

The European Commission has also targets and policy in place to reduce emissions from road mobility (see table below).

On 22 December 2022, the European Council and Parliament agreed to create a new, separate emissions trading system for the buildings and road transport sector and fuels for additional sectors, in order to ensure cost-efficient emissions reductions in these sectors that have been difficult to decarbonise so far. The new system will apply to distributors that supply fuels to the buildings, road transport and certain other sectors. The co-legislators agreed that the system will start in 2027. The linear reduction factor is 5.43% from 2028. So from 2028 the number of allowances will decrease by 5.43%. On top of that they will auction upfront in 2027 30% of the total volume of the number of allowances to secure a smooth transition path. In case the energy prices will be exceptionally high, the start of the new ETS will be delayed until 2028. Once the system has started if the price of allowances exceeds € 45 over a certain period of time, additional allowances will be released increasing the supply on the market.

Climate policy EU on road mobility

In red the proposed ambitions on 14 Feb 2023

	EU Climate policy mobility
2025	By end 2025 recharging stations every 60 km on main roads for cars/trucks < 3,5 tonnes
2027	ETS for buildings and road transport sector will start
2030	New cars -37.5% CO2 emissions
	55% CO2 emission reduction taget for new cars compared to 2021 levels
	50% for new vans by 2030 compared to 2021 levels
	16 countries (incl the Netherlands) have target of 30% zero-emission truck and bus sales
	By end 2030 recharging stations every 60 km on main roads for trucks above 3,5 tonnes
	By end 2030 hydrogen refuelling stations at least every 200km on main roads
	Proposed 14 Feb 2023: 45% emissions reductions new HDV
	Proposed 14 Feb 2023: City buses zero emissions
2035	100% CO2 emission reduction target for both new cars and vans by 2035
	Proposed 14 Feb 2023: 65% emissions reductions new HDV
2040	16 countries (incl the Netherlands) have target of 100% zero-emission truck and bus sales
	Proposed 14 Feb 2023: 90% emissions reductions new HDV

Source: EC, ABN AMRO Economisch Bureau

On 14 February 2023, the European Commission proposed ambitious new CO2 emissions targets for new heavy-duty vehicles (HDV) from 2030 onwards compared to 2019 levels. The proposed targets for new HDV are as follow: 45% emissions reductions from 2030, 65% emissions reductions from 2035 and 90% emissions reductions from 2040. So HDV should from 2030 on emit 45% less CO2 emissions compared to 2019 levels. Emissions in the HDV sector have been increasing year-on-year since 2014 (except 2020). Especially in the freight sector emissions are increasing rapidly. These vehicles run for 99% on ICE largely fuelled by diesel. City busses will have to be zero emissions by 2030 according to the plans (source **European Commission**).

For commercial vehicles to meet emission reduction targets there are three main challenges: the range and freight challenge, refuelling infrastructure challenge and the charging infrastructure challenge. Below we discuss these issues in more detail.

Range and freight challenge

There are several ways to reduce emissions from vehicles. First, a larger share of the vehicle fleet being made up of zero-emission vehicles. Second, using fossil free biofuel and renewables instead of fossil fuels in internal combustion engines. Third, a combination of both. In this section we focus on viable options for zero-emission vehicles. This can be either a battery electric vehicle or a fuel cell battery electric vehicle. For shorter ranges battery-electric vehicles are a good solution. However for longer ranges and/or transporting heavy cargo, battery electric vehicles may not be up to the challenge. This is because the longer the range, the larger and the heavier the battery would need to be, given the current state of technology. This will increase load for the commercial vehicle.

Currently **battery electric trucks** on the market have a range up to 300 km with an average weight of 30 tonnes. According to Eurostat statistics, around 45% of all goods transported by road in Europe travel less than 300 km. 33% of trucks cover daily distances of 500 km or less. In Europe, drivers are legally required to stop for a break after a maximum of four and a half hours, and in reality, will typically have a break after 3-4 hours. Since the distance covered in this time will be less than 300 km, there is the possibility to charge the truck during the driver’s break. So for most of the freight in the EU, the current battery electric trucks on the market are up to the challenge. It is expected that the range of the electric trucks available will increase to 500 km in the coming years. The key factor for an electric truck is being able to have charging opportunities readily available in its schedule. A strategically placed charger – ideally at a location and time when the vehicle must stop anyway – would have a significant impact on a truck’s range. However grid congestion might be a limitation for such infrastructure at scale in a short time scale.

An alternative may be a **fuel cell battery electric** commercial vehicle. This vehicle has proton-exchange membrane fuel cell that uses compressed hydrogen as a fuel and converts it into electricity. Hydrogen pressured at 350 bar (H35) bar is for heavy-duty vehicles and at 700 bar (H70) for light duty vehicles. The refuelling time and energy density of hydrogen is close to that of diesel that is currently used. A fuel-cell heavy truck would weigh more than a diesel one, but a battery-electric one would weigh much more than either of those. The volume of the hydrogen tanks is significant, but you don’t have your diesel tanks and the large engine is replaced by a fuel cell

Refuelling infrastructure challenge

There are several ways to refuel or charge a zero emission commercial vehicle. We start with refuelling a fuel cell battery electric commercial vehicle. This vehicle is refuelled at a hydrogen refuelling station or HRS. Light-duty fuel-cell vehicles have a 5-minute fuelling rate for filling 4 to 6 kilograms (or 8.8 pounds to 13.2) of onboard storage of hydrogen at about 1 kilogram per minute. 1 kg of hydrogen will allow you to travel 97 to 100 km. .At that 10-minute rate, Class A fuel-cell trucks (very large truck) would have enough hydrogen fuel stored to travel within a 1,100- to 1,600-km range (source **hydrogen-central.com**).

At the end of 2021, about 730 HRSs were dispensing fuel at 350 and/or 700 bars to 880 heavy-duty trucks, 3,600 medium-duty trucks, 4,700 buses and around 42,000 cars (source IEA). Over 4,600 HRSs would need to be installed by 2030 in the NZE Scenario to support the growing fleet of heavy-duty fuel cell trucks, assuming an average nameplate capacity of over 2.5 tonnes per day (source IEA). At the end of 2022, 814 hydrogen refuelling stations were in operation worldwide. Concrete plans are already in place for 315 additional refuelling station locations. Europe had 254 hydrogen stations at year end, 105 of which are in Germany. France is still second in Europe with 44 operating stations, followed by the UK (source **hydrogen-central.com**). The Netherlands has 10-15 HRSs depending on the sources (RVO indicates 10 and **glpautogas.info** indicates 15).

The costs to build a Hydrogen Refuelling Station depends on how the hydrogen is delivered (gas, liquid or produced onsite). The former is the cheapest HRS while the latter is the most expensive one. The exact costs vary widely. The lead-time is often several years.

Charging infrastructure challenge

Ways of charging

For battery electric commercial vehicles there are four ways of charging: wired stationary charging infrastructure (depot, destination or public), battery swapping, overhead catenary charging and wireless in-road charging.

Stationary charging involves charging a vehicle at home, at the office or at the depot. This can be overnight or a moment that the vehicles is not used. The charging infrastructure for battery electric trucks differs from the charging infrastructure (with sufficient grid capacity) of electric cars. These options range from slow alternating current (AC) charging with power below (kW) to fast 150-350 (kilowatt DC) and ultra-fast direct current fast charging with power up to multiple MW (750kW-3 MW DC) (source **the ICCT**). The estimated charging time of fast and ultrafast is around 30 minutes. Trucks need to have larger parking spaces.

The second way of charging is battery swapping. Battery swapping technology is a system where the drained battery is taken out of the vehicle and is replaced with a fully charged battery from the battery swapping station. This minimizes the charging time and the costs of the electric vehicle could be lower (battery is a large component of the costs of a vehicle) as the battery could be part of a service agreement. So the fleet owner would only pay for the vehicle body without the battery. Battery swapping could be offered under a battery-as-a-service (BaaS) business model. There are challenges to battery swapping. First, batteries for electric vehicles are currently not standardized. They vary in shape and size and packed in the truck in different ways. Second, there needs to be a large battery inventory, a backup for each vehicle. Third, the costs to set up a battery swapping station are high. One advantage is that the battery can be charged off-peak

The third way of charging is overhead catenary charging. Overhead catenary charging allows trucks to charge while driving with electricity flowing through a pantograph connected to an overhead contact line. This technology is complementary to wired stationary charging technology, as the goal is not to electrify the entire road network. As of 2022, this technology is still at an early stage; however, several pilot projects have already been conducted, mostly in Europe and North America (source **the ICCT**).

A fourth way of charging is wireless in-road charging. This works by transferring electricity from magnetic coils embedded in the road to receiving coils fitted to electric vehicles. Michigan is expected to operate the first electrified roadway in 2023. The roadway's coil segments transmit power to an EV undercarriage-mounted receiver via magnetic resonance induction as the EV moves or is parked directly above the coils. A power-management unit located either underground or above-ground near the roadside will transfer the energy from the electric grid to the roadway's copper-coil infrastructure. Both the battery size and the number of receivers connected to an EV influence the charging time. Larger vehicles can support multiple receivers (source **SAE**

International). But there are some challenges such as high costs to set it up, the need of technical standardization and unification of operational standards of vehicles and the impacts of radiation from high-energy wireless charging on humans and animals is currently unclear (Liu et al., 2021). Because these major challenges are to date unaddressed, wireless in-road charging is still at a very early demonstration stage and is not in commercial use (source the ICCT).

A more general consideration is that a commercial vehicle needs to be able to charge when it is connected to a charging source. For example, a vehicle could fail to connect to a charger. So chargers, batteries and electric trucks need to communicate. Interoperability regarding chargers and software means the ability to operate any software and any charging and energy hardware with each other because they are standard conforming; that is, they are compliant to publicly available technical standards published by standardization organizations (source truckinginfo.com).

Energy implications

The energy implications from e-mobility are substantial. According to European EV Charging Infrastructure Masterplan electricity demand created by EV charging (public and non-public) is likely to increase from 9 TWh in 2021 to 165 TWh in 2030. This 165 TWh represents 6% of the expected EU-27 electricity consumption in 2030. The total of 165 TWh can be split into 113 TWh for cars, 23 TWh for light commercial vehicles, 26 TWh for trucks and 3 TWh for busses.

There have also been studies for the Netherlands. Netbeheer has done a study on the electricity needs for e-mobility under four different scenarios. In these different scenarios the electricity needed for e-mobility ranged from 27.5 TWh to 33.2 TWh. These numbers include all forms of mobility. E-mobility is most likely concentrated in road transport. This report was published in April 2021 so they don't include the Fit-55 targets (source Het energiesysteem van de toekomst). According to a study of Elaadnl (2022) the Netherlands needs an additional 16.7 TWh of electricity to accommodate the electric van and truck fleets by 2050 (15% of the current national consumption). This is based on a charging strategy of mostly through overnight depot charging (85% of the fleet demand) but also including public charging (15% of the fleet demand). To meet this considerably higher energy demand there needs to be large investments into the infrastructure. The Dutch government has set aside 22bn euro for infrastructure (hydrogen, heating, charging infrastructure) in the Coalition Agreement for the coming 10 years. A research paper and a report from Netbeheer show that the investment needs are substantially more.

Investments needed to support for e-mobility

According to European EV Charging Infrastructure Masterplan for EU27 approximately 280 bn euro needs to be invested by 2030 in installing charging points (hardware and labor), upgrading the power grid and building the capacity for renewable energy production for EV charging. Meanwhile, a total investment of approximately 1,000 bn euro by 2050 in infrastructure is needed. This includes public and non-public charging points. To support the development of e-mobility and the rollout of electric vehicle charging infrastructure (EVCI), grid reinforcements will be necessary before connecting the chargers to the electricity networks.

The whole electricity network consists of transmission and distribution. The first is carrying high voltage electricity from power plant to a sub-station. The latter is carrying medium- and low-voltage electricity from substations to end consumers. Only the distribution systems are likely to be upgraded due to e-mobility. The most common upgrades will be transformer upgrades, modifications and network extensions at low-voltage grid, which is where the slow chargers will be connected. This is where peak power issues will be most critical and the largest congestion is expected. The expected cumulative investment into grid upgrades for EV between 2021 and 2030 have been calculated as 41 bn euro, 11% of the total annual investments of 363 bn euro in distribution system operator. The total of 363 bn euro includes investments into generic updates, electrification of buildings and houses, renewable energy generation systems and electrification of mobility. 75% of the investments (around 30 bn) are related to the upgrades of lines and transformers. The remaining 25% of investments are related to public fast chargers connected to the medium-voltage grid (source European EV Charging Infrastructure Masterplan).

The lead time and costs for cables and substations depend on the type of cable and the type of station. The lead time could be 1 to 7 seven years according to Netbeheer Nederland (source Basisdocument over energie infrastructuur oktober 2019). For example the low voltage cable has a lead time of 6 months to 1 year and medium to low voltage station also has the same lead time. According to Netbeheer 12,000-15,000 stations need to be expanded, 8,000-12,000 stations need to be added and 61,000-83,000 km of cables need to be added. This depends on the different scenarios. Most of that expansion and additions in stations are medium to low voltage stations. Roughly half of these are low voltage cables and half medium voltage cables (source **Het energiesysteem van de toekomst**). This report is from April 2021 so the numbers have not been updated yet considering the Fit-55 targets.

Nationale Agenda Laadinfrastructuur (NAL) has indicated that the logistics sector in the Netherlands needs to consider 625 mln euro of investments by 2030 to have the charging infrastructure on own premises. These are the capital expenditures. The operational costs for the charging infrastructure amount to 1.1 bn euro until 2030. A look ahead to 2050 shows that in that case an investment of 5.2 bn euro will be required for the charging infrastructure, with associated operational costs of an estimated 7.8 bn euro. (source **NAL**).

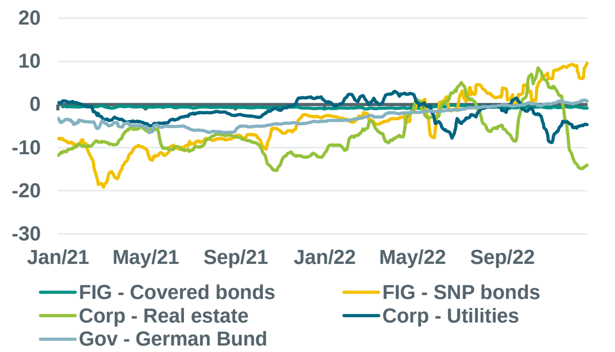
Conclusion

The Netherlands has an ambitious target to reduce the emissions of greenhouse gasses from mobility from 31 Megaton in 2021 to 21 Megaton in 2030. The contribution of passenger cars was already discussed in our Sustainaweekly of 6 February. Commercial vehicles also need to contribute their share to reduce emissions. The targets are very clear for buses, vans and state-owned vehicles. The new proposed targets for heavy duty vehicles are ambitious if approved. There are numerous challenges to reduce emissions by commercial vehicles. These are related to the range of a battery electric vehicle, the refuelling infrastructure and the charging infrastructure including technology and grid adjustments. Therefore reaching the ambitious Dutch and European targets may prove to be difficult. It is a chicken egg story. Without the infrastructure commercial vehicles will not be able to reduce the needed emissions.

ESG in figures

ABN AMRO Secondary Greenium Indicator

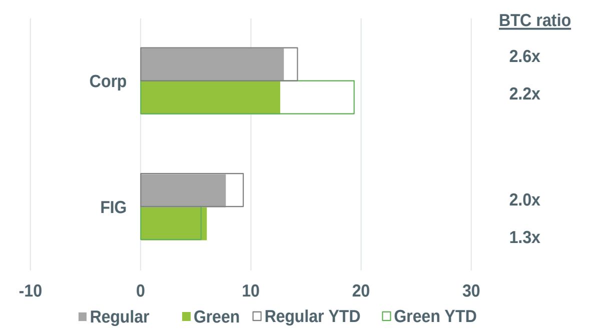
Delta (green I-spread – regular I-spread)



Note: Secondary Greenium indicator for Corp and FIG considers at least five pairs of bonds from the same issuer and same maturity year (except for Corp real estate, where only 3 pairs were identified). German Bund takes into account the 2030s and 2031s green and regular bonds. Delta refers to the 5-day moving average between green and regular I-spread. Source: Bloomberg, ABN AMRO Group Economics

ABN AMRO Weekly Primary Greenium Indicator

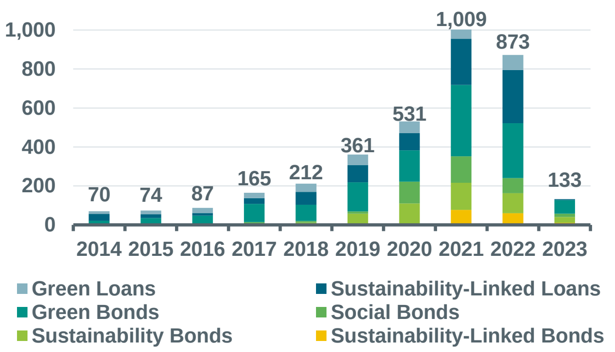
NIP in bps



Note: Data until 10-2-23. BTC = Bid-to-cover orderbook ratio. Source: Bloomberg, ABN AMRO Group Economics

Sustainable debt market overview

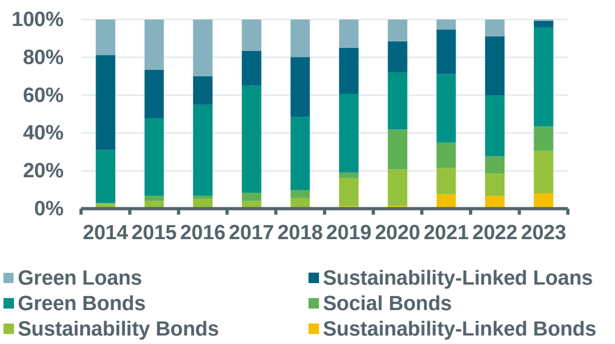
EUR bn



Source: Bloomberg, ABN AMRO Group Economics

Breakdown of sustainable debt by type

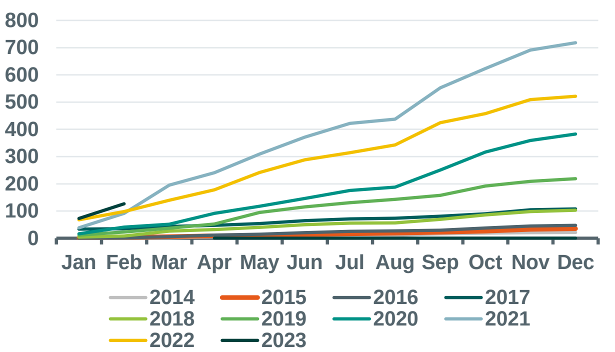
% of total



Source: Bloomberg, ABN AMRO Group Economics

YTD ESG bond issuance

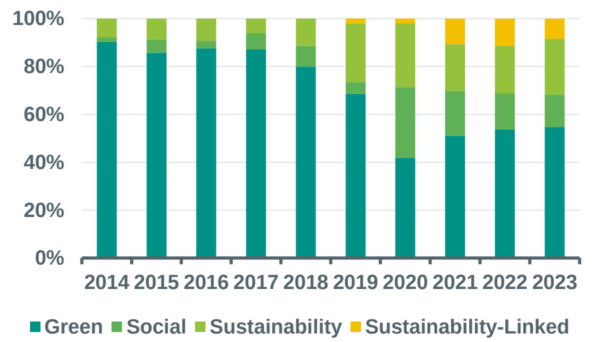
EUR bn (cumulative)



Source: Bloomberg, ABN AMRO Group Economics

Breakdown of ESG bond issuance by type

% of total

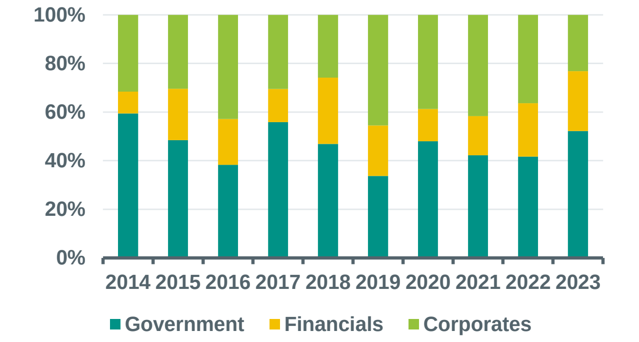


Source: Bloomberg, ABN AMRO Group Economics

Figures hereby presented take into account only issuances larger than EUR 250m and in the following currencies: EUR, USD and GBP.

Breakdown of ESG bond issuance by sector

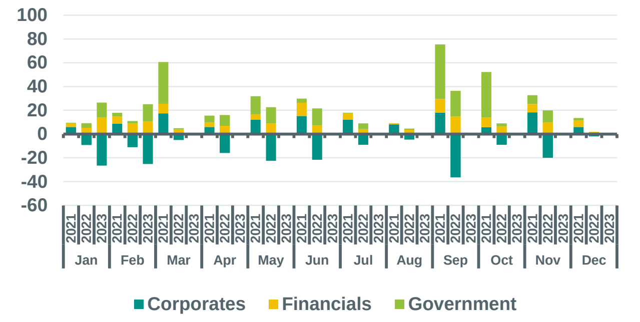
% of total



Source: Bloomberg, ABN AMRO Group Economics

Breakdown of ESG bond issuance by country

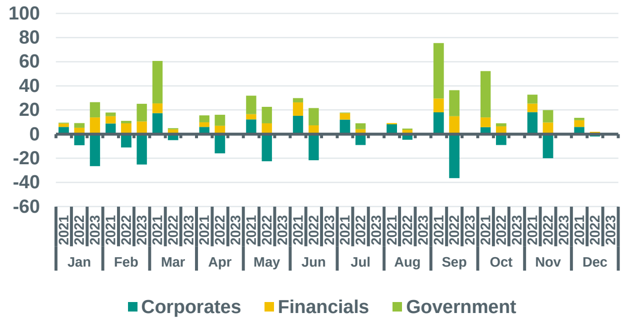
% of total



Source: Bloomberg, ABN AMRO Group Economics

Monthly Green Bonds issuance by sector

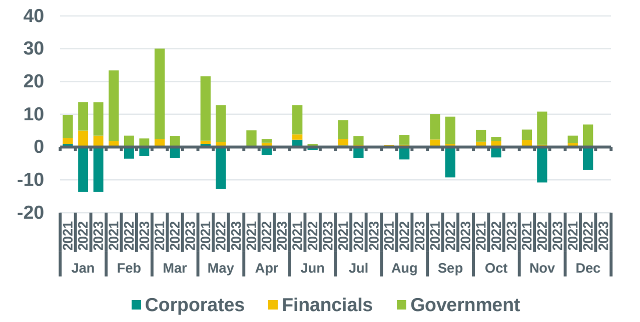
EUR bn



Source: Bloomberg, ABN AMRO Group Economics

Monthly Social Bonds issuance by sector

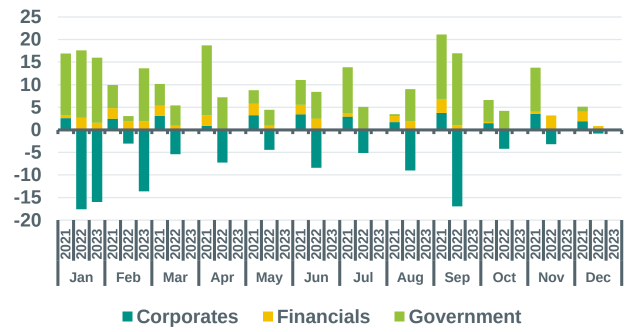
EUR bn



Source: Bloomberg, ABN AMRO Group Economics

Monthly Sustainability Bonds issuance by sector

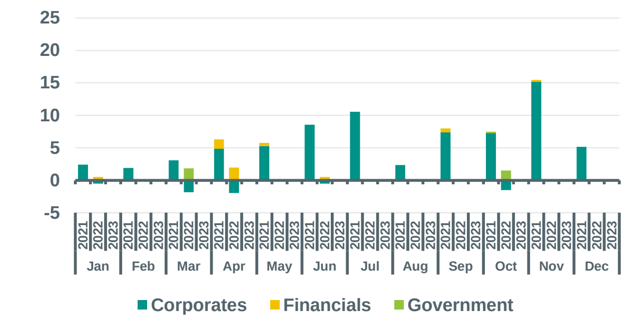
EUR bn



Source: Bloomberg, ABN AMRO Group Economics

Monthly Sust.-Linked Bonds issuance by sector

EUR bn



Source: Bloomberg, ABN AMRO Group Economics

Figures hereby presented take into account only issuances larger than EUR 250m and in the following currencies: EUR, USD and GBP.

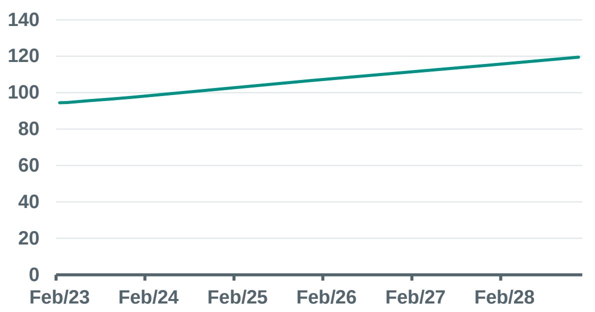
Carbon contract current prices (EU Allowance)

EUR/MT

Source: Bloomberg, ABN AMRO Group Economics

Carbon contract future prices (EU Allowance)

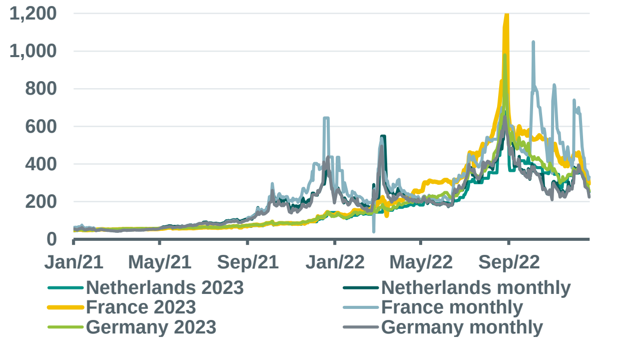
EUR/MT



Source: Bloomberg, ABN AMRO Group Economics

Electricity power prices (monthly & cal+1 contracts)

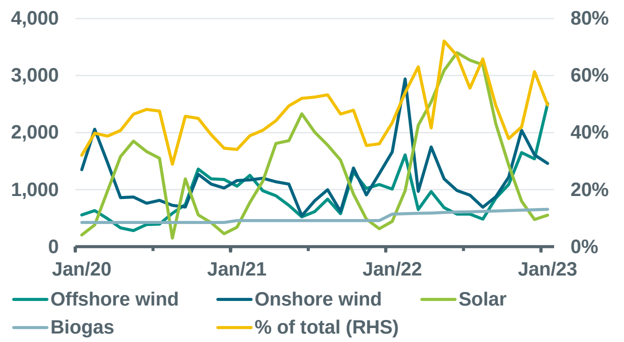
EUR/MWh



Source: Bloomberg, ABN AMRO Group Economics. Note: 2023 contracts refer to cal+1

Electricity generation from renewable sources (NL)

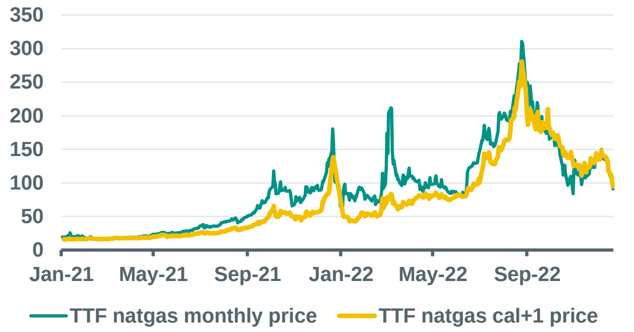
GW % of total



Source: Energieopwek (Klimaat-akkoord), ABN AMRO Group Economics

TTF Natgas prices

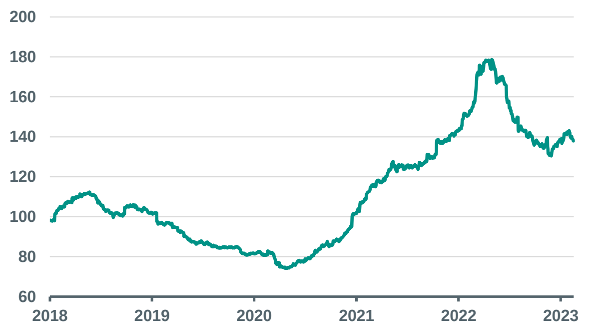
EUR/MWh



Source: Bloomberg, ABN AMRO Group Economics

Transition Commodities Price Index

Index (Jan. 2018=100)



Note: Average price trend of 'transition' commodities, such as: corn, sugar, aluminium, copper, nickel, zinc, cobalt, lead, lithium, manganese, gallium, indium, tellurium, steel, steel scrap, chromium, vanadium, molybdenum, silver and titanium. Source: Refinitiv, ABN AMRO Group Economics

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