

3

Sweden's Emissions and Climate Policy in an International Context

OSCAR WIDERBERG, KARIN BÄCKSTRAND, JENS MARQUARDT, AND NAGHMEH
NASIRITOUSI

3.1 Introduction

Sweden's climate policies are intertwined with international events and politics. As a small, export-dependent country, Sweden's climate policies are shaped by developments in other countries. At the same time, Sweden has a legacy of leading by example globally and in the European Union (EU). By influencing the EU to tighten its climate and energy policies and by being an active member of various international climate coalitions and initiatives, Sweden has positioned itself as an active player in the EU and global climate politics. This chapter explores whether Sweden's historical image as an international climate leader still holds up and whether it continues to influence and be influenced by the international context.

Reducing greenhouse gas (GHG) emissions from energy-intensive industries such as cement, steel, and aluminum, for instance, is heavily dependent on the efficacy of the European Green Deal (EGD), the EU's emissions trading scheme (EU ETS), the EU's climate and energy policy, and intergovernmental climate coalitions, such as the Industrial Transition Group (LeadIT). Consequently, whether Sweden will be able to achieve its goal of becoming a fossil-free welfare state by 2045 is predicated on the success of policies, instruments, and events outside its direct sphere of influence. Historically, Sweden's GHG emissions, energy, and climate policy have been heavily influenced by international events (such as the oil crises) and institutions (SCPC, 2022). While there has been a significant reduction in GHG emissions since the peak in 1970, this is largely a result of unintentional actions rather than regulation and policy targeting climate change (Elander et al., 2022; Lindmark and Andersson, 2010; SCPC, 2023).

Against this backdrop, this chapter examines Sweden's emissions trends and the evolution of climate policy from an international perspective by focusing on its role and interdependent relationship with climate action in the EU and with international climate coalitions. The first section describes and compares Sweden's

national emissions profile, energy mix, and national GHG emission reductions in the period until the adoption of the 2015 Paris Agreement and the 2017 Climate Policy Framework, which are discussed in Chapter 4. The second and third sections examine the interaction between Sweden's and the EU's climate governance, as well as various international climate coalitions and initiatives beyond the United Nations Framework Convention on Climate Change (UNFCCC). The final section critically reflects on Sweden's image as a global frontrunner, as it struggles with high consumption-based emissions, as well as emissions from the transport sector and energy-intensive industries.

3.2 Greenhouse Gas Emission Trends in Sweden

Sweden's GHG emissions have significantly decreased after peaking in the 1970s. The most significant emission reductions took place after the oil crises in the 1970s before the UNFCCC was adopted in 1992. Figure 3.1 presents Sweden's emission pathway compared to the two largest emitters in the world, China and the USA, as well as the EU and Germany. The figure shows territorial emissions, that is, emissions that occur within a country's territorial borders, including exports but

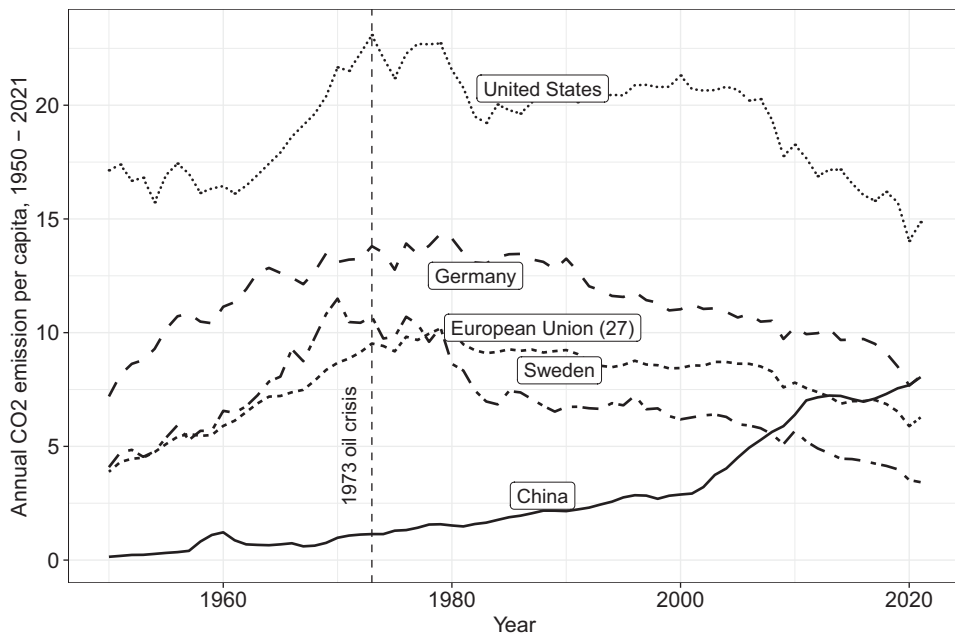


Figure 3.1 Territorial CO₂ emission per capita (excluding land use), 1950–2021 (own calculations based on Our World in Data, 2023a)

excluding imports, and are weighted by population using per capita emissions (GHG/capita) to enable comparison between economies of different sizes. The figure shows how Sweden has followed a similar downward trend in GHG emissions in line with other major industrial countries and regions in the Global North such as the USA and the EU, albeit at a faster pace than Germany, for example. Lindmark and Andersson (2010, p. 2) note that between the peak of emissions (derived from domestic economic activities) in the 1970s and the late 1980s, Sweden achieved a 40 percent reduction in emissions. The reduction rate flattened out significantly in the subsequent years and, between the early 1990s and up to 2005, only achieved a 5 percent reduction in emissions.

The steep decline in emissions during the 1970s and 1980s is attributable to the policies and programs which were triggered by international events, notably the oil crises in the 1970s, which started with an OPEC oil embargo, sending oil prices skyrocketing by around 300 percent, shifting the focus of Swedish energy policy toward reducing dependence on fossil-fuel imports by improving energy efficiency and energy conversion in district heating systems. The policy changes, partly due to concerns about energy security, would have implications for Sweden's GHG emissions long into the future. Lindmark and Andersson call it "unintentional climate policy" and attribute the pre-1990s emission reductions to the major gains that were made in energy efficiency (mainly in industry and housing), energy substitution (investments in hydropower, nuclear energy, and district heating), and the structural changes (notably fiscal policy) that were made to reduce Sweden's dependency on energy imports (Lindmark and Andersson, 2010). Furthermore, the economic crisis in the early 1990s spurred another set of important reforms that were more directly geared toward the environment and climate (see also Chapter 9 on crises). In 1991, Sweden was one of the first countries in the world to introduce a carbon tax, as well as a range of environmental taxes that directly impacted the energy sector. For instance, a tax of SEK 30.00 per kilo was levied on sulfur dioxide emissions from coal and peat in combination with a tax on the sulfur content in oil. A CO₂ tax of SEK 0.25 per kilo was introduced in 1991 and was subsequently increased in 1992. Industry and manufacturing received significant exemptions, which were gradually reduced until being completely removed in 2010 for industries covered by the EU ETS (Färe et al., 2016). The COVID-19 pandemic also precipitated a record-breaking reduction in GHG emissions. The Swedish Environment Protection Agency (SEPA) reported a 9 percent reduction between 2019 and 2020, primarily from the industry and transport sectors, as car traffic and domestic flights, as well as demand for iron and steel, fell rapidly. Most of the GHG emission reductions were temporary as they rebounded in years after the pandemic (SEPA, 2021, p. 11).

Figure 3.2 shows how GHG emissions in Sweden have continuously declined across the economy over the past 30 years. Sweden reduced its territorial emissions from just over 70 million tons in 1990 to 47.8 million tons of CO₂ equivalents in 2021, representing more than a 30 percent reduction over 30 years (SEPA, 2023a). If the steep decline following the COVID-19 pandemic is included, Sweden reduced its GHG emissions by 33 percent between 1990 and 2021. Between 1990 and 2020, the largest emission reductions were made between 2003 and 2014, primarily due to the expansion of district heating systems, reduced use of fossil fuels for heating of buildings, and increased use of biofuels in industry (SEPA, 2021).

Sweden has also been effective in reducing its territorial emissions compared to other countries. It “decoupled” its economic growth (in GDP) from CO₂ emissions (in absolute terms) as early as 1996 (Andersson and Lövin, 2015) and has consistently been among the countries with the lowest GHG emissions per GDP in the EU (EEA, 2016), which, in turn, has the lowest CO₂ emissions intensity of GDP of major economies such as China, USA, India, and Japan (IEA, 2023).

As will be further examined in Chapter 4, despite the rapid reduction in emissions from the peak in the 1970s, Sweden is not on track to reach its goals. The

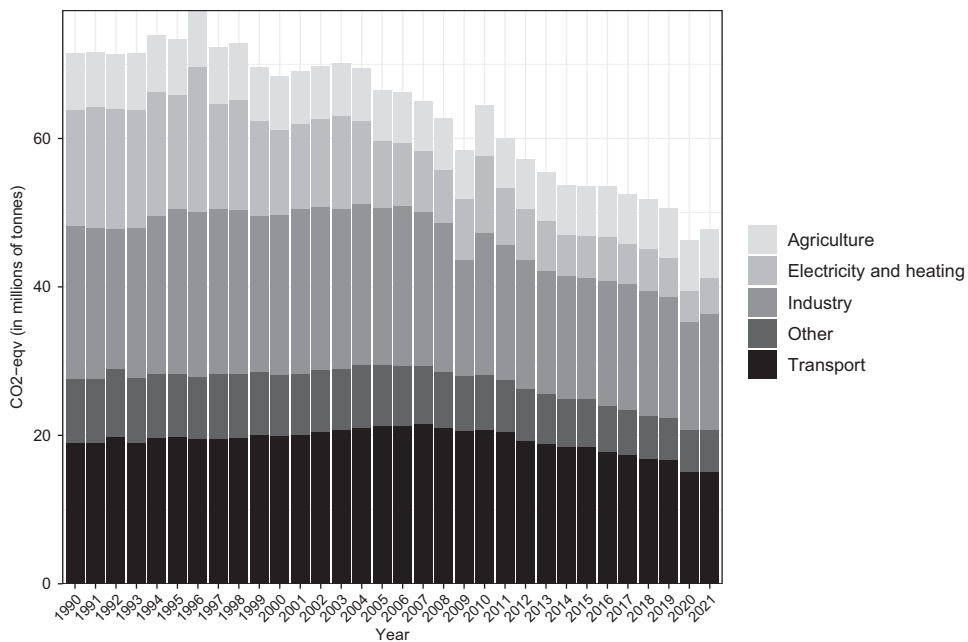


Figure 3.2 Swedish GHG emissions per sector, 1990–2021 (own calculations based on SEPA, 2023b)

overarching climate target as part of Sweden's Climate Policy Framework (see also Chapter 4) is to achieve net-zero emissions by 2045 and negative emissions thereafter. More specifically, the framework states that Sweden must have lowered its emissions in the non-trading sector (i.e., emissions that are not part of the EU ETS) by 85 percent by 2045 compared to 1990, and the remaining 15 percent of emissions reductions should be derived from supplementary measures, for instance offsetting in other countries. Such measures can also be used for negative emissions beyond 2045 and include the uptake of carbon from natural sinks such as forests, emissions reductions outside Swedish borders, as well as bioenergy with carbon capture and storage, also called "BECCS" or "Bio-CCS." Sweden also has separate interim targets for 2030 of 63 percent emission reductions compared to 1990, and a 75 percent reduction by 2040, of which 8 percent and 2 percent, respectively, should be derived from supplementary measures. There is also a national interim target for 2030 for the domestic transport sector, in which emissions should be 70 percent less compared to 2010. This sectoral target has no equivalent in EU legislation, and it has been questioned on the grounds of cost-effectiveness (Nilsson, 2023). As early as 2021, the Swedish Climate Policy Council (SCPC) projected that the current pace of reduction would not be sufficient to reach the 2045 target of carbon neutrality as it would have to exceed the period with the most rapid reduction thus far (2 percent annual reduction between 2005 and 2014) by a factor of three in order to reach the 6 percent annual reduction in emissions needed, including supplementary measures, or 10 percent without such measures (SCPC, 2021). In both SEPA's (2023a) background report to the government's climate action plan and the 2023 report of the SCPC, the Swedish government was advised to accelerate emission reductions to close the implementation gap of 9–12 million tons, not least in the transport and agricultural sectors. In some sectors of the economy, the pace of emission reductions needs to accelerate even more in order to radically break with current consumption and production patterns. In the transport sector, for instance, emission reductions from 1990 up until the present time could have been much greater if more fuel-efficient cars and trucks had been used and the emission reduction obligation scheme for blending petrol with biofuels had been introduced at an earlier stage (SCPC, 2021). However, as will be discussed further in Chapter 4, in July 2023, the Swedish government proposed changing the abovementioned obligation to decrease biofuel blending in diesel and petrol to a minimum level and subsequently abolish the law (Swedish Government, 2023). The decarbonization of the transport sector is a very slow process and is a long way from the target of a 70 percent reduction by 2030 compared to 2020 levels (Haikola and Anshelm, 2023; Niskanen et al., 2023). However, the number and size of vehicles on the roads have increased over the same period. Swedish people increasingly choose to drive large, heavy, and fuel-intensive vehicles such as SUVs at the

expense of smaller and more efficient vehicles. Journalists at the Swedish National Broadcasting Agency (SVT) calculated that in the mid-1990s, 1 in 5 cars weighed less than 1 ton; in 2020, that figure had decreased to 1 in 50 (SVT, 2020). The European Environmental Agency (EEA) has confirmed this picture, reporting that in 2018, the heaviest cars in Europe were in Sweden and Luxembourg (EEA, 2022). Consequently, emissions from the Swedish car and truck fleet will need to be reduced by 8 percent annually if the 2030 target for domestic transport is to be reached.

3.3 Implications of the EU's Climate and Energy Policy for Sweden's Decarbonization

Sweden's climate policy and pathway to decarbonization is closely intertwined with climate and energy policy in the EU, which has been significantly strengthened with a European Climate Law (EU, 2021), as well as strengthened climate targets for 2030, 2040, and 2050, respectively. In this section, we outline how developments in the EU's climate legislation impact the prospects for Sweden to achieve its national climate targets. Moreover, Sweden held the EU Presidency EU for six months between January and June 2023 when the final elements of the Fit for 55 climate package were being negotiated as part of the EGD (European Commission, 2019). As noted in several reports by the Swedish Climate Policy Council (2023), the SEPA (2023a), and the Expert Group on Public Economics (Nilsson, 2023), the European Climate Law, the Fit for 55 package, and the upcoming 2040 climate and energy framework represent an unprecedented climate and energy legislation reform package in terms of scope and ambition. The EU climate targets for 2030 and 2050 have been strengthened and backed up by an expanded EU ETS and requirements to increase the uptake of carbon in forests and on land. It comprises more stringent climate targets, a new EU ETS to include transport and buildings, as well as new policy instruments such as the Carbon Border Adjustment Mechanism (Nilsson, 2023; SCPC, 2023). The EU's climate legislation has been significantly tightened, and in certain aspects, it will have greater demands than the Swedish national climate targets for 2030, 2040, and 2045, respectively, which are at risk of becoming outdated (*ibid.*). For instance, the LULUCF regulation means that Sweden must increase its net carbon storage in landscapes and wood products and impose a national carbon removal target – which Sweden lacks and which is not one of its national goals (Nilsson, 2023). Sweden's strengthened EU commitment to increase net storage by an equivalent of 4 million tons by 2030 compared to 2016–2018 levels is regarded as being difficult to reach (SEPA, 2023a). Consequently, Sweden's national climate goals and ambition are lagging behind, not least the sectoral goal of transport. This is amplified by the Conservative

government's proposed rollback of climate legislation, such as the emission reduction obligation scheme for biofuel blending of petrol and diesel (Swedish Government, 2023), which is predicted to lead to an increase in emissions (SEPA, 2023a). Consequently, in some areas, the EU's goals are more stringent than Sweden's own goals. The EU's allocation of emissions cuts under the Emission Sharing Regulation (ESR) for Sweden for 2030 corresponds to a 50 percent reduction in emissions compared to 2005, which is less than the national goal of 63 percent. However, the commitment within ESR comprises an emission budget for the entire period from 2021 to 2030, which means an annual allocation of an amount of emissions until 2030. In contrast, Swedish national targets specifically apply to 2030, 2040, and 2045, respectively. In the next section, the interlinkage between Sweden's and the EU's instruments, notably the EU ETS, is discussed.

3.3.1 EU Climate Policy and the Role of Sweden

The EU is a pioneer in the adoption of the first supranational climate policy, yet it is still the third largest GHG emitter in the world after China and the USA. The EGD, launched by the European Commission in 2019 with the goal of making the EU the first climate-neutral continent in the world by 2050, represents the EU's attempt to achieve a green transformation in line with the Paris Agreement and the most recent report by the Intergovernmental Panel on Climate Change (IPCC, 2023). Following the Paris Agreement in 2015, the EU laid the foundation for comprehensive reform toward transformation to carbon neutrality, a reduction of GHG, resource efficiency, biodiversity protection, green energy transition, and circular economy through the EGD. The EGD is key to the EU's goal of transforming Europe into a climate-neutral continent by 2050 (enshrined in binding European Climate Law), including a focus on a just transition (Rosamond and Dupont, 2021). The implementation of the EGD has entered a new phase and faces new challenges (Gheuens and Oberthür, 2021). It has become a centerpiece for implementing the Paris Agreement while also achieving decarbonization and societal transformation to sustainability in line with the 2030 Agenda and the SDGs. The adoption of the European Climate Law in 2021 made the EU's climate targets legally binding. In order to align European Climate Law with the 2030 and 2050 ambition, in July 2021, the European Commission (EC) proposed the Fit for 55 package, a series of legislations that were finally adopted in June 2023. As a mid-term intermediary step toward climate neutrality, the Fit for 55 package increases the 2030 climate ambition with the aim of reducing emissions by at least 55 percent by 2030 compared to 1990. Furthermore, the European Scientific Advisory Board on Climate Change, which was established in 2021 as a new institution to monitor the progress of the EU's climate targets, proposed emission reductions of 90–95 percent

compared to 1990 to achieve the 2040 goal and align it with the 1.5°C target (ESABCC, 2023). The EU has revised its climate, energy, and transport-related legislation under the Fit for 55 package, which was proposed by the European Commission in July 2021. The package contains a series of legislations to realize the mid- and long-term climate targets, such as a reformed EU ETS, ESR, land use, land-use change, and forestry (LULUCF) regulation, and a Carbon Border Adjustment Mechanism (Oberthür et al., 2023).

The EU has long been considered a global climate leader (Parker et al., 2017; Parker and Karlsson, 2010). EU leadership was key to securing the Kyoto Protocol's entry into force after the USA refused to participate and the EU's role as a broker to build coalitions with the high-ambition countries was central to the design of the Paris Agreement (Bäckstrand and Elgström, 2013). Since the adoption of the Paris Agreement, the EU has emerged as a geopolitical actor forced to navigate a landscape of shifting power dynamics and interest coalitions (Rosamond and Dupont, 2021). The EU's leadership is also reflected by a continuous stream of new and sometimes innovative and ambitious climate and energy policies and legislation (Rayner and Jordan, 2016). The EU's climate governance has made significant advancements through several climate and energy packages with policy instruments such as EU ETS, energy efficiency directives, the Effort-Sharing Regulation, and so on (Oberthür and Von Homeyer, 2023). The EU adopted several packages for climate and energy policy between 2008 and 2022 (Bäckstrand, 2022). In the early 2000s, the EU adopted its first climate policies with directives on energy efficiency and renewable energy. One important milestone is the EU ETS – the world's first carbon emission trading system established in 2005 – which has been reformed, expanded, and strengthened in several rounds. The EU ETS originally aimed to reduce GHG emissions from energy-intensive industries and power plants and covers around 40 percent of the EU's total GHG emissions and around 10,000 power and manufacturing plants.

After the outbreak of the COVID-19 pandemic in February 2020, the EU decided in June 2020 that the EGD should be at the center of its recovery policy and long-term budget. The EU then integrated its recovery policy with the decarbonization efforts and the broader sustainability transformation. The EU's transformation to carbon neutrality is increasingly viewed as an opportunity to strengthen its global competitiveness, job growth and digitalization, and green recovery after the COVID-19 pandemic. The year 2020 was designated a “super environmental year” for the EU, which had far-reaching climate legislation as part of the EGD proposed in 2019 by the incoming European Commission chairs of Ursula von der Leyen and Frans Timmermans. However, the COVID-19 pandemic caused a health crisis coupled with an economic crisis, which has been compared to the recession in the 1930s. Despite initial pressure from some EU member states to abandon the EGD in order to prioritize saving jobs, the EU remained committed to achieving a just and sustainable

transition toward carbon neutrality by 2050, which culminated in June 2023 in the adoption of the Fit for 55 package.

Sweden's decarbonization efforts – in coalition with other countries and in relation to EU institutions and member states – have shaped the entire efforts of the EU to achieve its climate targets. As part of the EU since 1995, Sweden has historically been active in lobbying for more ambitious climate and energy policy in the European context. It has been a driving force in tightening the EU ETS, which has accelerated the phasing out of coal power in European countries (Bäckstrand, 2022). Sweden held the EU Presidency over three turbulent years: in 2001, when the USA withdrew from the Kyoto Protocol; in 2009, when the Copenhagen Accord was struck at COP15, and then in 2023, during the Russian war against Ukraine and the resulting energy and economic crisis. In the spring of 2023, Sweden held the EU Presidency during an exceptionally difficult period when Russia escalated its war against Ukraine, the energy crisis, and ahead of the first global stocktake of the Paris Agreement at the 28th Conference of Parties (COP28) in 2023.

While Sweden may be able to take credit for some of the ambitious climate policies of the EU, it has also played a blocking role on individual policy issues. A case in point is the discussions on the EU taxonomy. In order to mobilize funds for the green transition, the EU has developed an instrument – the EU taxonomy – to identify and steer toward sustainable and climate-friendly investments. To be classified as environmentally sustainable, an economic activity must contribute to at least one of the six established environmental objectives in the green taxonomy, while not causing material harm to any other objectives. The EU taxonomy covers sectors such as agricultural, fishery, forestry, electricity, transport, waste, buildings, and manufacturing that are responsible for 80 percent of GHG emissions in the EU. A bone of contention for Sweden concerns the EU forestry strategy and EU taxonomy, which aim to promote sustainable forestry and biodiversity. Member states such as Sweden, which have a major forest industry, argue that forests fall largely under national jurisdiction. The Swedish government has criticized the EU proposal for a green taxonomy for being too detailed and for not adapting itself to the different national and local conditions, such as the Swedish forest sector. The most severe criticism from the Swedish government and the forest industry in Sweden concerns the LULUCF regulation, which is regarded as not being aligned with Swedish forest management.

3.3.2 The Interconnection of Sweden's Climate Policy with the EU's Policy Instruments

The EU's climate policies are of direct relevance for Sweden as some 35–40 percent of Swedish emissions are covered by one of the EU's most important instruments to

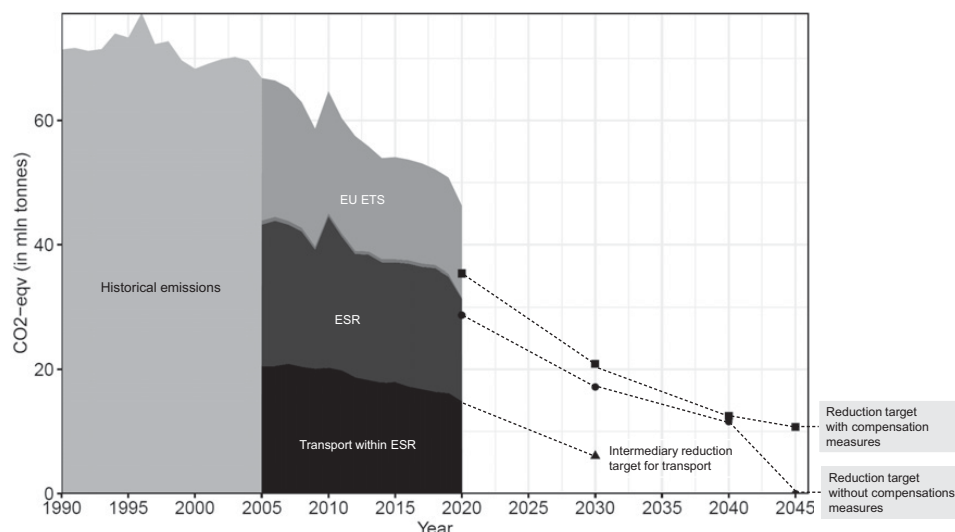


Figure 3.3 Swedish GHG emissions part of the EU ETS, 2005–2021 (data from SEPA)

reduce emissions – the EU ETS (see Figure 3.3). The EU ETS targets industry emissions from energy-intensive industries that operate in Sweden, such as the aluminum and paper industries and oil refineries, 500 aviation companies, and, from 2024, around 1,500 shipping companies. From 2027, a new EU ETS system will include emissions from road transport, the building sector, and parts of the industrial sector. The Swedish climate targets for 2030 and 2040 include emissions from industry covered by EU ETS, contradicting EU legislation, which states that these should be dealt with by the EU-wide trading sectors (Nilsson 2023). Finally, the transport sector target excludes emissions from domestic flights, as aviation is covered by the EU ETS.

In the trading (EU ETS) sectors – broadly divided into industry, energy, and heat production – GHG emissions in Sweden decreased by 27 percent from 1990 to 2020, with a major reduction of 12 percent from 2019 to 2020, primarily related to reduced economic activity as a result of the COVID-19 pandemic. Most emission reductions in the trading sectors are from energy and heat production due to the increased use of waste and biofuels at the expense of fossil fuels. Consequently, Sweden's ability to reduce its GHG emissions from important basic industries, often located in rural areas with scarce populations, hinges on the success of the EU ETS in designing and negotiating an effective emissions trading scheme that incentivizes corporations to innovate and reduce their emissions. The expanded and reformed EU ETS – as part of the Fit for 55 package – will limit the granting of new emission allowances, which

will also be prohibited from 2039. Under the ESR, each member state is allocated an annual emissions quota that gradually decreases. The total allocation for all member states in 2030 corresponds to a 40 percent reduction in GHG emissions compared to 2030. For non-trading sectors (e.g., transport, building, and agriculture), the EU has set goals for its members under the ESR. The goals are based on GDP per capita, and for Sweden, the ESR allocation translates into a target of 50 percent reduction of GHG emissions for the period 2021 to 2030 compared to 2005 levels. This is currently slightly less demanding than the Swedish national goal, which is 63 percent. Unlike the EU ETS – where the EU is responsible for the negotiation and implementation of the instrument – the ESR leaves it up to the member states to design and implement policies. Such policies could include changes to modes of transport, retrofitting buildings, and changes to agricultural practices, that is, instruments that are customized to the emissions profiles of the individual countries. For Sweden, the lion's share of non-ETS emissions is derived from transport and, to a lesser extent, agriculture (see Figure 3.3). Because of the difficulty of reducing emissions from the agricultural sector, emissions from the transport sector should decrease by 40 or 50 percent between 2021 and 2030 to fulfill the targets allocated under the ESR for Sweden (Nilsson, 2023; SEPA, 2023a). During 2022 and 2023, there was a weakening of policies regarding emissions from the transport sector, for instance biofuel blending. In the report by the Swedish Environmental Protection Agency (SEPA, 2023a), which provides input for the 2nd Climate Policy Action Plan in 2023, emissions are expected to increase in the near future because of the weaker climate legislation in Sweden (SEPA, 2023a).

Going forward, emission reductions from Swedish industry remain an issue as they would have to outperform themselves compared to previous years. In the non-trading sectors, emission reductions are around 36 percent less compared to 1990, with a major reduction (–6.4 percent) from 2019 to 2020 due to COVID-19 (see Figure 3.3). The major reduction in emissions from 2019 to 2020 puts Sweden on a path to reach its interim targets for the non-trading sectors, assuming supplementary measures are used to their fullest potential. However, it is clear that Sweden's overall ambition to become fossil free by 2045 is contingent on how well the EU ETS manages to address emissions from the industrial sector and electricity production, which creates a strong incentive for trying to influence European climate policy toward achieving more ambitious goals and targets.

3.4 Sweden's Role in International Climate Collaboration and Clubs: Beyond the EU

While EU climate and energy legislation is arguably an important part of emission reduction efforts in Sweden, governance and collaboration at the international level

also play an important role regarding Sweden's climate policy. Sweden has historically taken a proactive and ambitious stance in global climate negotiations. For example, the Kyoto Protocol to the UNFCCC, adopted in 1997, introduced emissions trading as one of three flexible mechanisms for reducing GHG emissions from, in particular, industry and energy production. The Swedish government lobbied hard for an ambitious climate policy during the first commitment period of the protocol, which started in 2008 and ended in 2012. Perhaps due to its 30-year experience of the consequences of "unintentional" climate policy, as previously discussed, Sweden adopted a "higher than needed" commitment during the first period of the Protocol. While Sweden was allowed to increase its emissions by 4 percent from 2008 to 2012 compared to 1990 levels, in 2002 it decided to reduce its emissions and did not exceed 96 percent as a mean value from 2008 to 2012 compared to the 1990 level, without using any supplementary measures, such as buying emission credits on the international market. This has led some observers to call Sweden a "theoretical anomaly" since it does not adhere to the conventional wisdom associated with theories of international relations and negotiation (notably "social dilemmas" and "tragedy of the commons") in which countries are expected to strive to do the bare minimum required for cooperation (Zannakis, 2009, p. 9). In the following section, however, we focus on how Sweden engages in international climate initiatives to pursue its interests, complementing the international negotiations under the UNFCCC.

At the international level, Sweden is represented by the EU at international negotiations on climate change under the auspices of the UNFCCC. However, this has not prevented Sweden from joining various climate coalitions and initiatives. For example, Sweden joined the High Ambition Coalition at COP21 in Paris in 2015 – an informal coalition that has been described as an important force for ensuring a successful outcome in Paris (Brun, 2016). Sweden has also been active in pushing for stronger climate action through a number of initiatives outside the UNFCCC. While the UNFCCC negotiations are often slow and arrive at agreements that cover the lowest common denominator, the proliferation of climate coalitions and initiatives has been strong in recent years (Falkner et al., 2022). These types of groupings seek to push other countries to adopt more ambitious climate goals and actions in different ways. They are typically started by a few countries that have made a domestic commitment in a particular issue area, and then these countries work to encourage other countries to join the initiative.

Sweden is involved in many such initiatives, often as a founding member. In addition, many Swedish non-state and sub-state actors are involved in transnational climate initiatives, including various municipal and city networks. There are also a range of multi-stakeholder initiatives, often led by states in partnership with non-state actors. An analysis of participation in such climate coalitions and initiatives

can provide an indication of issue areas that Sweden prioritizes internationally and insights into Sweden's climate policy in an international context. In what follows, initiatives that focus on different aspects of climate action in which Sweden participates will be highlighted. The aim is not to provide an exhaustive list of climate coalitions and initiatives in which Sweden participates but rather to provide examples of different issue areas that Sweden works with at the international level to provide insights into fields that Sweden seeks to take the lead in or influence.

First, as a pioneer of carbon pricing, Sweden has been involved in sharing best practices and has joined several initiatives with the aim of spreading carbon pricing policies internationally. For instance, Sweden is involved in the Carbon Pricing Leadership Coalition (CPLC, 2019; Wettestad et al., 2021) and the Coalition of Finance Ministers for Climate Action. While the aims and functions of these two initiatives differ, they both promote the spread of carbon pricing as an effective tool for climate mitigation. Since Sweden has used carbon pricing since the 1990s through such climate initiatives, it can use its experience for knowledge exchange in support of actors who wish to introduce carbon pricing (Dominioni, 2022).

Second, due to Sweden's history of industrial innovation, it has been involved in climate initiatives aimed at industrial transformation and technological innovation. Most notably, at the UN Secretary General's Climate Action Summit in September 2019, Sweden and India, in cooperation with the World Economic Forum, launched the Leadership Group for Industry Transition (LeadIT). The initiative gathers countries and companies that work toward decarbonizing energy-intensive industries with the aim to achieve net-zero carbon emissions by 2050 and involves public-private collaboration and knowledge exchange (Johnson et al., 2021).

Third, in the field of clean energy, Sweden participates in several climate initiatives, such as the Clean Energy Ministerial and Mission Innovation, which seeks to advance clean energy technologies (Tosun et al., 2023). As part of the Clean Energy Ministerial, Sweden is leading one initiative and one campaign: the Super-efficient Equipment and Appliance Deployment Initiative and the Power System Flexibility Campaign. Sweden is also a member of the Friends of Fossil Fuel Subsidy Reform – an informal group of non-G20 countries that seeks to encourage other countries to phase out inefficient fossil-fuel subsidies in order to decarbonize the energy sector (Skovgaard and Van Asselt, 2018). At COP26 in Glasgow in 2021, Sweden also joined the Beyond Oil & Gas Alliance, which gathers actors seeking to facilitate a managed phase-out of oil and gas production. Given that Sweden has minimal fossil-fuel energy resources, joining the Beyond Oil and Gas Alliance can be seen as a symbolic move to put pressure on other countries (Abnett and Jacobsen, 2021).

Fourth, in the field of finance, Sweden has been involved in pushing for several initiatives that seek to channel finance flows away from high-carbon sectors and into

low-carbon sectors. For instance, through the Fourth Swedish National Pension Fund, Sweden co-founded the Portfolio Decarbonization Coalition, which works to mobilize financial markets to support economic decarbonization (Andersson et al., 2016).

Finally, Sweden was one of the founders of the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC), which is a partnership between governments and other actors working to reduce short-lived climate pollutants, such as methane and hydrofluorocarbons (Unger and Thielges, 2021). Sweden supports many other coalitions and initiatives that seek cooperation between countries and non-state and subnational actors on decarbonization, such as the 2050 Pathways Platform, which supports actors in their development of long-term decarbonization strategies through the sharing of knowledge and best practices.

This overview of Sweden's involvement in climate coalitions and initiatives highlights its willingness to engage with state and non-state partners globally to advance climate action. However, such initiatives are non-binding and voluntary, and the effects of this engagement can therefore be difficult to gauge. Nevertheless, through sharing information and best practices in cooperation with a multitude of actors, Sweden works to spread its approach to decarbonization to other countries. This is in line with the literature on climate leaders and the way they work to encourage their supporters to adopt similar approaches to climate governance (Wurzel et al., 2019). However, it also demonstrates that Sweden tends to join initiatives that can play to its strengths, that is, where the domestic agenda is already geared toward a particular issue. Notably absent are coalitions or initiatives that would require any meaningful changes in how Sweden conducts its domestic climate policies in politically contested fields such as forestry or consumption. Hence, Sweden forms or joins coalitions where it can act as a leader to influence and support like-minded countries to adopt similar policies, such as carbon pricing or industrial decarbonization. In other words, Sweden seeks to influence issues where it can strengthen its international competitiveness or where it can be portrayed as a leader, building on its image as a global frontrunner.

3.5 Sweden's Frontrunner Role: Three Cautionary Tales

As the preceding sections in this chapter have demonstrated, Sweden has made substantial progress over time in terms of reducing its national GHG emissions. However, while Sweden's decarbonization since the 1970s has outperformed many other industrialized countries, there are at least three cautionary tales to be told when scrutinizing Sweden's progressive climate politics. In the following, we briefly problematize issues of (a) performance and leadership; (b) consumption-based versus production-based emissions; and (c) global climate footprint to put Sweden's efforts in an international perspective.

3.5.1 Performance and Leadership: Past Successes versus Future Uncertainties

Despite its significant reduction in emissions since the 1970s, as well as reaching the 2020 interim emission target, the 2022 SCPC concludes that the pace of the transition is too slow (SCPC, 2022). The main message of the 2023 SCPC report was that the government has lost momentum and has been outpaced by the EU in its efforts to decarbonize. Moreover, GHG emissions were at risk of increasing, not least in the transport sector, due to a weakening of the law on the legal obligation to blend biofuel in petrol and diesel. Given the weakening of climate policy and declining emission reduction rates, the question is where further emission reductions should come from and how, especially after Sweden benefitted from large emission reductions due to massive infrastructure investments and regulatory action in the 1970s, creating large energy efficiency gains and fuel substitution. Industry and aviation emissions largely fall under the EU ETS. Hence, the emissions trading scheme needs to incentivize energy-intensive industries sufficiently to reduce their emissions in line with the Swedish 2045 target. Consequently, Sweden needs to ensure that the ambition level and design of the EU ETS are in line with its targets. The state has also relied on voluntary governance and orchestration through collaborative governance, such as Fossil Free Sweden (FFS), to create pathways for each sector to reduce their emissions in collaboration with corporations, generally with the aim of developing new and implementing existing low-carbon technologies. The state also engages in other public-private initiatives, such as HYBRIT, in which the partly state-owned companies SSAB, Vattenfall, and LKAB jointly work toward achieving a fossil-free steel industry through technological innovation, primarily using hydrogen power. For non-trading sectors, notably transport and agriculture, Sweden is more directly in control of the policy instruments and emissions, yet in both cases, the challenges loom large. CO₂ emissions from the agricultural sector have only been reduced by some 13 percent from 1990 to 2021 compared to the 30 percent reduction in the same period over the entire economy. The proportion of agricultural emissions from total emissions has increased from around 11 percent in 1990 to 14 percent in 2021 (data from the Swedish Environmental Assessment Agency on GHG emissions). In the reference scenarios for 2045 that the government has presented, agriculture-related emissions are expected to decline by 15 percent compared with 2020 levels, assuming the rate of efficiency gains and land abandonment is maintained (SEPA and SBA, 2022), meaning greater productivity gains would have to be made in the coming 25 years compared to the past 35 years, which is significant. Since 1990, the number of Swedish cows, for instance, has been reduced from some 500,000 to 300,000, while milk production increased by 50 percent in the same period (*ibid*). Similarly, for domestic transport, CO₂ emissions have been reduced by some 15 percent from

1990 to 2021 compared to 30 percent in the whole economy, and its proportion of total emissions has increased from 27 to 31 percent (calculations made using data from the Swedish Environmental Assessment Agency on GHG emissions). Future reductions must therefore come from sectors in which Sweden has relatively large control¹ but have a moderate track record in addressing emissions.

3.5.2 Accounting: Production-versus Consumption-Based Emissions

Swedish emissions reductions are generally calculated based on production and exclude consumption-based emissions. This is important because Swedish emission reductions over the past 50 years have coincided with a transition in the global economy in terms of where manufacturing takes place, as well as a transition in import and export patterns. Large segments of the manufacturing sector – from toys to telephones – have moved away from highly industrialized countries such as Sweden toward countries in transition and in the Global South, primarily China. Instead of Sweden producing and consuming goods domestically, it has become heavily reliant on the import of goods from low-income countries. Manufacturing is often associated with CO₂ emissions, which is reflected in global emission patterns as China has overtaken the USA as the world's largest emitter. Figure 3.4 demonstrates the difference between consumption-based emissions and production-based emissions in four countries, including Sweden, and the EU-27 average. The data show that Sweden clearly has the largest discrepancy between consumption- and production-based emissions and that the trend is largely stable. While the USA, for instance, has seen a less dramatic reduction in emissions compared to Sweden, the discrepancy between production- and consumption-based emissions is much smaller in the former than in the latter. China's negative delta shows that it has higher production-based emissions per capita than consumption-based emissions, corroborating the narrative of the country as being the factory of the world.

In the event that there was a growing discrepancy difference between consumption- and production-based emissions, Sweden risks further outsourcing its emissions to other parts of the world by importing carbon-intensive goods.

A move from production- to consumption-based emission accounting methods could accommodate changes in global manufacturing patterns, particularly on a per capita basis. For Sweden, using a consumption-based accounting method might reveal the consequences of being a rich, high-consumption society and nuance the image of Sweden as a climate champion. As will be further discussed in Chapter 4, Sweden's consumption-based emissions are calculated annually by Statistics

¹ The EU's Common Agriculture Program (CAP), which primarily allocates subsidies for the agriculture industry, also comprises climate goals and instruments, hence Sweden's influence is also affected by decision-making in the EU (SEPA and SBA, 2022).

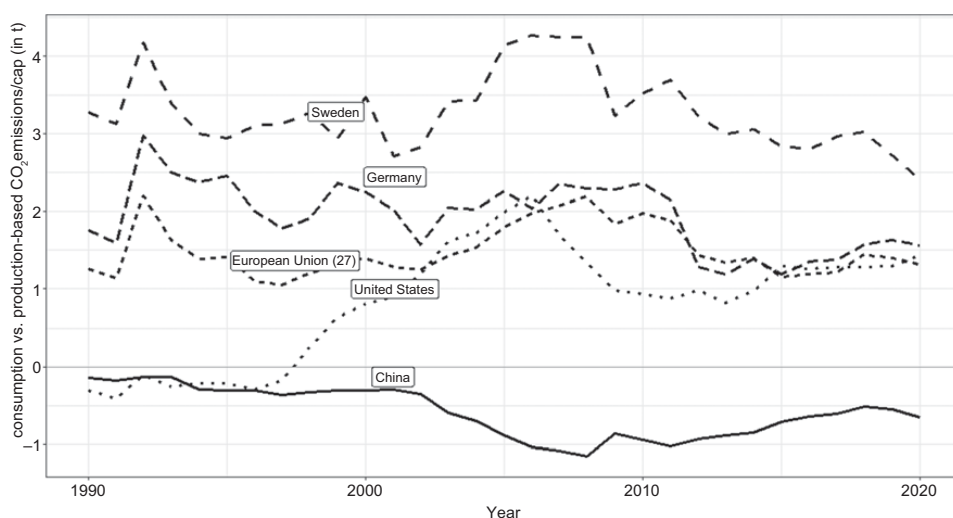


Figure 3.4 Difference between consumption- and production-based CO₂ emission (in tons), 1990–2020 (own calculations based on Our World in Data, 2023b)

Sweden (SCB). In 2020, there were around 79 million tons of CO₂ equivalents, compared to around 48 million tons of production-based emissions the same year (SEPA, 2023c). Consumption-based emissions decreased between 2008 and 2020 by around 27 percent, partly due to COVID-19. To further reduce consumption-based emissions, Sweden was the first country in the world to propose a consumption-based emissions target through an investigative government commission on carbon footprints. Sweden's cross-party parliamentary Environmental Targets Committee proposed a new national climate target for Sweden's consumption-based emissions, as well as a new goal for the climate benefits of Sweden's exports (SOU, 2022). The proposal for a new national goal was based on the idea that Sweden should have a negative global climate footprint by 2045, which could be achieved by having climate targets for (a) territorial emissions, (b) consumption-based emissions, and (c) the climate benefits of exports (SOU, 2022, p. 29).

3.5.3 Reproducibility: Should Other Countries Emulate Sweden's Climate Policies?

In 2022, Earth Overshoot Day, meaning the day that humanity has used all biological resources that the Earth regenerates in a year, fell on July 28, 2022 (Earth Overshoot Day, 2023). If everyone on Earth lived and consumed in the same way as Swedish people, this day would have happened much sooner, on April 3, 2022 (ibid.). Calculating Earth Overshoot Days and similar metrics (e.g., water,

land, or carbon footprints) is not an exact science and entails the daunting exercise of tracing a product's long and often complex supply chain, including its various components during the production, use, and disposal phase, and calculating the amount of GHG emissions released into the atmosphere during the process (cf. Peters, 2010). Still, the results of various carbon footprinting exercises highlight an important caveat in the narrative of Sweden as a frontrunner in the transformation to a fossil-free welfare state, namely the impact of its citizens' consumption patterns on carbon emissions outside Sweden, as well as other forms of environmental and social impacts from extractive and manufacturing industries. According to the Global Footprint Network, Sweden ranks high in terms of its per capita ecological footprint (20/185) 2023, translating into 15.5 acres per person (Global Footprint Network, 2023). To live within the earth's boundaries, it would be necessary to use 1.6 global hectares, meaning that the Swedish population uses nearly four times the resources it should (*ibid.*). In terms of carbon emissions, Sweden accounts for 0.29 percent of global emissions but for only 0.13 percent of the global population. If everyone were to live and consume like the Swedish population, the Paris Agreement would not be achieved if negative externalities are taken into account (Dawkins et al., 2019). Sweden can therefore be regarded as a frontrunner among high-income countries that can push industrialized countries to go further, but it should not be perceived as a global role model and that model cannot be easily replicated in other parts of the world.

3.6 Conclusion

In this chapter, we have demonstrated that Sweden has been successful in significantly reducing its GHG emissions since the 1970s, in particular from industry and district heating, and as a corollary of the oil crises in the 1970s. However, during the past 20 years, its emission reduction rate has declined, with the exception of 2020, due to the COVID-19 pandemic (SCPC, 2023, 2022). Swedish emission reductions are a result of visionary and ambitious public policy and investments, often related and responding to external and internal shocks unrelated to climate change and deliberate climate policy. Moreover, the transition toward decarbonization has been facilitated by Sweden's virtually fossil-free electricity production due to hydropower, nuclear power, and renewable energy. Over the past 50 years, Sweden has established itself as a global frontrunner and has adopted ambitious climate goals and laws for the future. However, this chapter also highlights important challenges for the road ahead and suggests that some caution and nuance are warranted regarding the perception of Sweden as a frontrunner. Public agencies such as the SEPA and the SCPC argue that the EU has now taken over Sweden's leadership role through the recently adopted Fit

for 55 package with strengthened climate targets, which in certain areas exceed Swedish national climate goals in ambition and scope. First, Swedish climate policy across several domains – mainly the base industry – is deeply interconnected with the EU's climate law, legislation, and instruments under the new Fit for 55 package, which includes a reformed EU ETS, stricter ESR regulation, and national targets for net storage in the LULUCF regulation. Consequently, given the EU's strengthened climate legislation, Sweden's ability to achieve the 2045 net-zero emissions largely rests on accelerating its emission reductions in the transport sector, land use, and forestry sector, as well as the agricultural sector. Second, in the non-trading sector covered by the Swedish ESR allocation (e.g., transport and agriculture), the Swedish record on reducing emissions is less impressive. Domestic transport emissions need to be reduced by 50 percent compared to 2021 to achieve the 2030 transport sector target. This is hampered by Sweden's large and heavy car fleet, which offsets the gains made in fuel efficiency and electrification. Moreover, the incumbent conservative government has pledged to change the law requiring biofuel blending in petrol and diesel to a minimum EU requirement. Agriculture emissions have followed a similar pattern and reductions are much slower. This begs the question as to whether the low-hanging fruits have been picked and those that are hard to reach have been left behind. Third, Sweden's emission reductions are partly a result of global changes in production, where the burden of emissions is placed on lower-income countries and countries in transition. A study of Swedish consumption-based emissions and its carbon and ecological footprint suggests that, in the unlikely event that the national emission targets are achieved under the current accounting rules, this may be at the expense of the ability of other countries to decarbonize, in particular in the Global South. Thus, this chapter has attempted to nuance the portrayal of Sweden as a global climate leader. While the country has come relatively far in reducing its emissions compared to other advanced industrialized states, Sweden has had favorable conditions because of an early phase down of fossil fuels in reaction to the oil crises in the 1970s and decarbonized electricity production with hydropower, nuclear power, and renewables (wind power, solar power, and bio energy). This highlights the important role of political decisions in driving change. This chapter also highlights how Sweden both influences and is influenced by the global context. While Sweden seeks to lead in some areas, such as the sharing of best practices on carbon pricing, it has played more of a delaying role and has been a veto player in the regulation on land use and forestry and the EU's nature restoration negotiations. The chapter thereby contributes to a better understanding of multilevel governance in the EU and international climate cooperation and shows the EU's close interactions with domestic politics in Sweden.

References

- Abnett, K., and Jacobsen, S. (2021). Denmark, Costa Rica seek alliance to speed up the end of oil and gas. Reuters.
- Andersson, M., and Lövin, I. (2015). Sweden: Decoupling GDP growth from CO₂ emissions is possible. *The World Bank*.
- Andersson, M., Bolton, P., and Samama, F. (2016). Governance and climate change: A success story in mobilizing investor support for corporate responses to climate change. *Journal of Applied Corporate Finance*, 28, 29–33.
- Bäckstrand, K. (2022). Towards a Climate-Neutral Union by 2050? The European green deal, climate law, and green recovery. In *Routes to a Resilient European Union: Interdisciplinary European Studies*, Cham: Springer, pp. 39–61.
- Bäckstrand, K., and Elgström, O. (2013). The EU's role in climate change negotiations: From leader to "leaditor." *Journal of European Public Policy*, 20, 1369–1386.
- Brun, A. (2016). Conference diplomacy: The making of the Paris Agreement. *Politics and Governance*, 4, 115–123.
- CPLC. (2019). Report of the high-level commission on carbon pricing and competitiveness. Carbon Pricing Leadership Coalition, Washington, USA.
- Dawkins, E., Moran, D., Palm, V., Wood, R., and Björk, I. (2019). The Swedish footprint: A multi-model comparison. *Journal of Cleaner Production*, 209, 1578–1592.
- Dominioni, G. (2022). Pricing carbon effectively: A pathway for higher climate change ambition. *Climate Policy*, 22, 897–905.
- Earth Overshoot Day. (2023). Country Overshoot Days 2023. Earth Overshoot Day. www.overshootday.org/newsroom/country-overshoot-days.
- EEA. (2022). CO₂ performance of new passenger cars in Europe. www.eea.europa.eu/ims/co2-performance-of-new-passenger.
- EEA. (2016). Trend and projections in Sweden 2016: Tracking progress towards EU member states' climate and energy targets. European Environment Agency, Copenhagen, DK.
- Elander, I., Granberg, M., and Montin, S. (2022). Governance and planning in a "perfect storm": Securitising climate change, migration and Covid-19 in Sweden. *Progress in Planning*, 164, 100634.
- ESABCC. (2023). Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050 (No. TH-03-23-229-EN-N). European Scientific Advisory Board on Climate Change, Copenhagen, DK.
- EU. (2021). European climate law (No. 2021/1119). European Union, Brussels, Belgium.
- Falkner, R., Nasiritousi, N., and Reischl, G. (2022). Climate clubs: Politically feasible and desirable? *Climate Policy*, 22, 480–487.
- Färe, R., Grosskopf, S., Lundgren, T., Marklund, P.-O., and Zhou, W. (2016). *The Impact of Climate Policy on Environmental and Economic Performance: Evidence from Sweden*, London: Routledge.
- Gheuens, J., and Oberthür, S. (2021). EU climate and energy policy: How myopic is it? *Politics and Governance*, 9, 337–347.
- Global Footprint Network. (2023). Open data platform. https://data.footprintnetwork.org/?_ga=2.170047840.1933881662.1679992465-1673428826.1679992465#.
- Haikola, S., and Anshelm, J. (2023). A tale of two crises: The emergence of an eco-Keynesian coalition in Swedish transport decarbonisation discourse. *Environment and Planning C: Politics and Space*, 41(4), 787–807.
- IEA. (2023). CO₂ emissions intensity of GDP, 1990–2021. IEA. www.iea.org/data-and-statistics/charts/co2-emissions-intensity-of-gdp-1990-2021.

- IPCC. (2023). Climate change 2023. *AR6 Synthesis Report*. Intergovernmental Panel on Climate Change (IPCC).
- Johnson, O. W., Mete, G., Sanchez, F., Shawoo, Z., and Talebian, S. (2021). Toward climate-neutral heavy industry: An analysis of industry transition roadmaps. *Applied Sciences*, 11, 5375.
- Lindmark, M., and Andersson, L. F. (2010). Unintentional climate policy: Swedish experiences of carbon dioxide emissions and economic growth 1950–2005. *CERE Working Paper No. 2010*, 14.
- Nilsson, M. (2023). Temperaturhöjning i klimatpolitiken – en ESO-rapport om EU:s nya lagstiftning i svensk kontext (No. 2023:7). Expert Group on Public Economics, Stockholm, Sweden.
- Niskanen, J., Anshelm, J., and Haikola, S. (2023). A new discourse coalition in the Swedish transport infrastructure debate 2016–2021. *Transportation Research Part D: Transport and Environment*, 116, 103611.
- Oberthür, S., and Von Homeyer, I. (2023). From emissions trading to the European Green Deal: The evolution of the climate policy mix and climate policy integration in the EU. *Journal of European Public Policy*, 30, 445–468.
- Oberthür, S., Moore, B., von Homeyer, I., et al. (2023). Towards an EU climate governance framework to deliver on the European Green Deal. Policy Report, February 2023. GreenDeal-NET.
- Our World in Data. (2023a). Per capita CO₂ emissions. *Our World in Data*. ourworldindata.org/grapher/co-emissions-per-capita.
- Our World in Data. (2023b). Consumption-based CO₂ emissions. *Our World in Data*. <https://ourworldindata.org/grapher/consumption-co2-emissions>.
- Parker, C. F., and Karlsson, C. (2010). Climate change and the European Union's leadership moment: An inconvenient truth? *Journal of Common Market Studies*, 48, 923–943.
- Parker, C. F., Karlsson, C., and Hjerpe, M. (2017). Assessing the European Union's global climate change leadership: From Copenhagen to the Paris agreement. *Journal of European Integration*, 39, 239–252.
- Peters, G. P. (2010). Carbon footprints and embodied carbon at multiple scales. *Current Opinion in Environmental Sustainability*, 2, 245–250.
- Rayner, T., and Jordan, A. (2016). Climate change policy in the European Union. *Oxford Research Encyclopedia of Climate Science*.
- Rosamond, J., and Dupont, C. (2021). The European Council, the Council, and the European Green Deal. *Politics and Governance*, 9, 348–359.
- SCPC. (2021). Annual report of the Swedish Climate Policy Council 2021.
- SCPC. (2022). Annual report of the Swedish Climate Policy Council 2022.
- SCPC. (2023). Annual report of the Swedish Climate Policy Council 2023.
- SEPA. (2023a). *Underlag till regeringens kommande klimathandlingsplan och klimatredovisning* (Skrivelse No. NV-08102-22), Stockholm: Swedish Environmental Protection Agency.
- SEPA. (2023b). Sveriges utsläpp och upptag av växthusgaser. www.naturvardsverket.se/data-och-statistik/klimat/sveriges-utslapp-och-upptag-av-vaxthusgaser.
- SEPA. (2023c). Konsumtionsbaserade utsläpp av växthusgaser i Sverige och andra länder. www.naturvardsverket.se/data-och-statistik/konsumtion/vaxthusgaser-konsumtions-baserade-utslapp-i-sverige-och-andra-lander
- SEPA. (2021). *Fördjupad analys av den svenska klimatomställningen 2021* (No. 7014), Stockholm: Swedish Environmental Protection Agency.
- SEPA, SBA. (2022). *Jordbrukssektorns klimatomställning* (No. 7060), Stockholm: Swedish Environmental Protection Agency & Swedish Board of Agriculture.

- Skovgaard, J., and Van Asselt, H. (2018). *The Politics of Fossil Fuel Subsidies and Their Reform*, Cambridge: Cambridge University Press.
- SOU. (2022). *Sveriges globala klimatavtryck* (2022:15). *Statens offentliga utredningar* SOU, Stockholm: Swedish Parliamentary Records.
- SVT. (2020). Allt fler stora SUV-bilar – hotar klimatmålen. SVT Nyheter.
- Swedish Government. (2023). Sänkning av reduktionsplikten för bensin och diesel (Promemoria). Stockholm, Sweden.
- Tosun, J., Heinz-Fischer, C., and Luo, R. (2023). Who takes the lead? A disaggregate analysis of the EU's engagement in the clean energy ministerial and mission innovation. *Journal of Cleaner Production*, 382, 135240.
- Unger, C., and Thielges, S. (2021). Preparing the playing field: Climate club governance of the G20, Climate and Clean Air Coalition, and Under2 Coalition. *Climatic Change*, 167, 41.
- Wettestad, J., Gulbrandsen, L. H., and Andresen, S. (2021). Calling in the heavyweights: Why the world bank established the carbon pricing leadership coalition, and what it might achieve. *International Studies Perspectives*, 22, 201–217.
- Wurzel, R. K., Liefferink, D., and Torney, D. (2019). Pioneers, leaders and followers in multilevel and polycentric climate governance. *Environmental Politics*, 28, 1–21.
- Zannakis, M. (2009). *Climate Policy as a Window of Opportunity: Sweden and Global Climate Change*. Dissertation, Department of Political Science, Gothenburg University.