

Politics and Governance of Sweden's Transformation toward a Fossil-Free Welfare State

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4.1 Introduction

Why has Sweden – celebrated as a pioneering green state – hitherto only achieved a transition of certain sectors far from the goal of becoming a fossil-free welfare state by 2045? This chapter examines how the state governs toward achieving decarbonization by taking stock of Sweden's progress toward implementing its 2045 target of net-zero emissions and identifying the major carbon lock-ins. As illustrated by the analytical framework in Chapter 2, the state can engage sub-state and non-state actors directly and indirectly through different relations or modes of governance, such as regulation and orchestration. This chapter focuses on Sweden's national strategies and modes of governance to achieve decarbonization and overcome carbon lock-ins through *institutional*, *economic*, *technological*, and *behavioral* transformation. Sweden's decarbonization is closely intertwined with the EU's climate and energy regulation as discussed in Chapter 3. However, national policies are crucial if Sweden is to achieve decarbonization of the transport, energy, and agricultural sectors and comply with its commitment under the EU's Effort Sharing Regulation (ESR). We examine the role of the state in collaborative governance, as well as the mix between hard (regulation) and soft modes of governance (orchestration) to achieve decarbonization in Sweden. Deep decarbonization requires intervention across all sectors and is therefore a more complex governance challenge requiring an integrated analysis of policy, the public, and politicians (Jordan et al., 2022). The COVID-19 pandemic, the Russian war against Ukraine, the energy security crisis, and the recession pose additional challenges for Sweden to accelerate decarbonization.

The main focus of this chapter is on the time frame after 2015 up until 2023, covering the implementation of the Paris Agreement after the adoption of the 2017 Climate Policy Framework. This covers a period in which three different government constellations were in power. From October 2014 to November 2021, there

was a coalition government between the Social Democrats and the Green Party (hereafter referred to as the “Social Democratic-Green government”); from November 2021 to October 2022, there was a Social Democratic government; and after the national election in 2022, a coalition was formed between the Moderate Party, the Christian Democrats, and the Liberal party, supported by the populist Sweden Democrats (hereafter referred to as the “Liberal-Conservative government”).

At the 21st Conference of Parties (COP21) 2015 in Paris, Sweden declared its aim to be the first fossil-free welfare state in the world. For many years, the Swedish government has viewed itself as a champion of collaborative climate governance. For instance, it established Fossil Free Sweden (FFS) – a multi-stakeholder platform comprising around 500 companies, cities, county boards, trade unions, and civil society actors aiming to achieve decarbonization. Sweden is known for its green industrial innovation (production of fossil-free steel), as well as its civil society activism (Greta Thunberg and Fridays for Future (FFF)).

However, in Sweden, like in many other countries, there is a disjuncture between the radical goals of large-scale decarbonization and existing political institutions, legislation, and policies. While the country has been heralded as one of the most advanced green states in the world, according to the Swedish Climate Policy Council (SCPC, 2023), it is not on track to curb its greenhouse gas (GHG) emissions to reach its interim and long-term goals. On the contrary, emissions are expected to increase in 2024 by around 10 percent as the Liberal-Conservative government has lowered the legal requirements of biofuel blending of gasoline and diesel in cars, blaming the economic recession and rising fuel costs (SCPC, 2024; SEPA, 2023b). In September 2023, the government confirmed that the GHG emissions are expected to increase up to 10 million tons for the first time in 20 years. Hence, the national and EU climate targets for 2030, 2040, and 2045 are likely not to be reached (Government Bill 2023/24:1, 2023, p. 16). The failure to reach midterm goals was confirmed in December 2023, when the government presented its four-year Climate Policy Action Plan (Skr. 2023/24:59, n.d.).

This chapter focuses on state-led transformation with the aim to critically examine Sweden’s progress toward its overarching goal to become the first fossil-free welfare state in the world with net-zero emissions by 2045. We have noted that Sweden’s path to decarbonization – like many other countries – resembles more of an incremental transition in certain sectors than a wholesale transformation to a fossil-free society. We evaluate the attempts by the Swedish state to decarbonize by governance and steering by asking the following research questions: How does the state strike a balance between regulation and orchestration to accelerate institutional, technological, economic, and behavioral transformation? How does the state balance the different strategies of transformation? What are the obstacles or carbon

lock-ins that prevent deep decarbonization in Sweden? We argue that Sweden predominantly governs through technological and economic transformation at the expense of behavioral and institutional transformation, increasingly relies on orchestration rather than regulation, and does not sufficiently tackle systemic carbon lock-ins.

In order to achieve large-scale or deep decarbonization, the state needs to steer toward institutional, economic, technological, and behavioral transformation. These multiple transformations overlap with what Scoones and colleagues (2015) frame as the four strategies of green transformation (state-led, marketized, technocentric, and citizen-led). Their focus is on both top-down (state-led) and bottom-up green transformation (civil society), whereas this chapter focuses on how the state governs to achieve large-scale decarbonization. By examining the state's strategies, governance modes, and prevailing carbon lock-ins in tandem, we analyze the institutional, regulatory, and policy context of collaborative climate governance in Sweden. As indicated by the latest report by IPCC (2023), the scale, urgency, scope, and size of decarbonization require the simultaneous employment of the four state-led transformations along with a balanced mix of regulation and orchestration.

The second section outlines Sweden's Climate Policy Framework and the discrepancy between the ambitious vision to become a fossil-free welfare state and the limited progress in reducing GHG emissions, not least in the transport and agricultural sectors. The third section summarizes the general strategies and governance modes that the state employs to accelerate institutional, economic, technological, and behavioral transformation and to overcome the different carbon lock-ins. The fourth section maps how Sweden governs – through regulation and orchestration – by highlighting key national legislation, policy tools, and voluntary instruments to accelerate transformation. The fifth section outlines the institutional, technological, and behavioral carbon lock-ins that are preventing deep decarbonization.

4.2 Ambitious Goals of Decarbonization versus Incremental Transition

Sweden has been heralded as an early pioneer and a green state (Bäckstrand and Kronsell, 2015; Lundqvist, 2004) and is regarded as being at the forefront of environmental and climate governance, together with the other Nordic countries. For a more extensive discussion on the role of the green state, see Chapters 1 and 2. Sweden's history as an environmental frontrunner dates back to the establishment of the first environmental protection agency in the world in 1967, achieving fossil-free electricity production, a long tradition of cross-party consensus in climate policy (Karlsson, 2021), robust public support of strong climate action in cross-country comparisons (Falk, 2022), early adoption of one of the world's most stringent carbon taxes, and a technological frontrunner in the production of

fossil-free steel. Yet there is a gap between the far-reaching visions and imaginaries of large-scale transformation to a fossil-free society among politicians and the realities of slow and incremental change (Marquardt and Nasiritousi, 2022).

As illustrated in Figure 4.1, Sweden’s overarching goal is to have net-zero emissions by 2045 and thereafter achieve negative emissions (Government bill

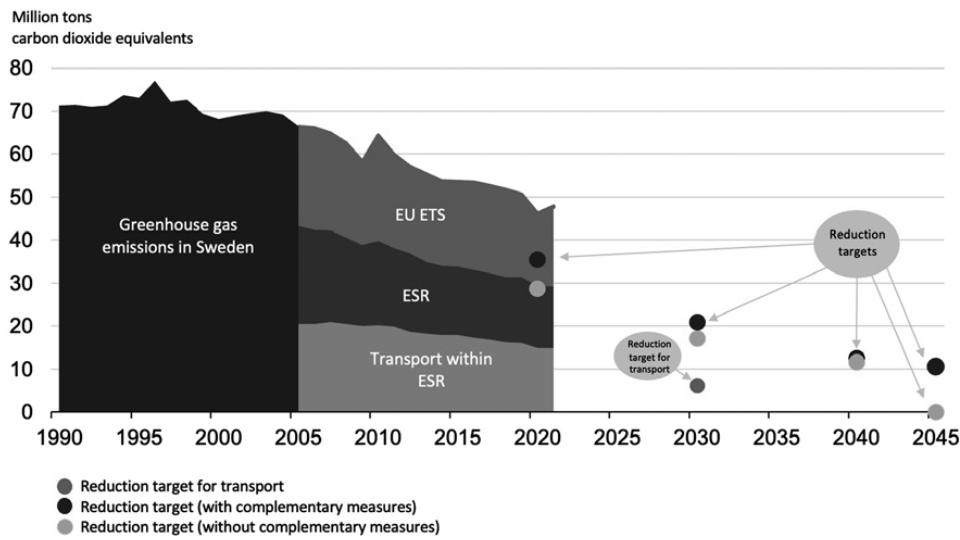


Figure 4.1 Sweden’s national climate targets and emissions
Source: Swedish Environmental Protection Agency (2023b)

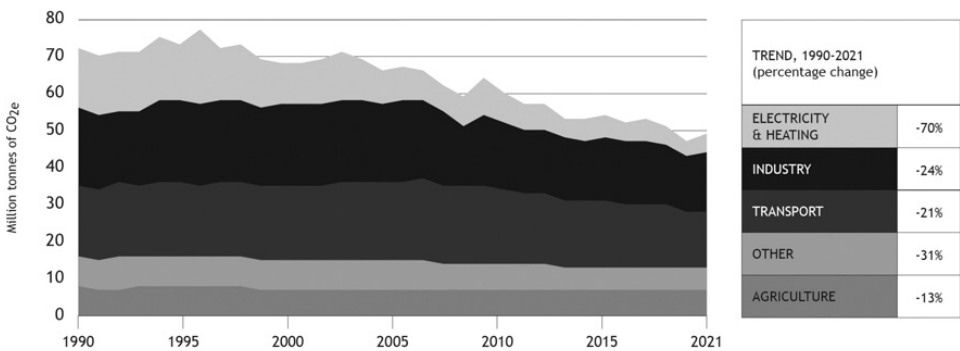


Figure 4.2 Sweden’s GHG emissions by sector (1990–2021)
Data in million tons of carbon dioxide equivalent (CO₂e). The other sector includes emissions from industrial machinery, product use, and waste management.
Source: SCPC (2023)

2016/17: 146). Around 39 percent of GHG emissions are covered by the EU ETS, while the remaining emissions are under the ESR. The net-zero target of 2045 is among the most ambitious in the world (Oberthür et al., 2023). This means that GHG emissions from Swedish territory should be at least 85 percent lower compared to emissions in 1990. Carbon capture and storage (CCS) of CO₂ from fossil fuels can be used as a measure if no alternative measure exists. Emissions from fuels from international aviation and maritime transport are not included in the national target, nor are emissions and removals from land use, land use change, and forestry (LULUCF). The overall 2045 target is complemented by three interim goals – 2020, 2030, and 2040. These goals apply to emissions outside the EU ETS in the ESR sector. By 2020, emissions in Sweden are supposed to be 40 percent lower compared to 1990, by 2030, 63 percent lower, and by 2040, 75 percent lower. A maximum of 2 percent of the reduction in emissions can be achieved through three supplementary measures: (a) increased net removal of carbon dioxide (CO₂) in forests and land, (b) verified emission reductions from investment in other countries, and (c) capture and storage of biogenic carbon dioxide (BECCS). The Swedish Parliament decided on a separate sectoral target for GHG emissions from domestic transport (excluding domestic aviation), which are supposed to be reduced by at least 70 percent by 2030 compared to 2010.

The national climate legislation of 2002 and 2009 contained national climate goals which were more ambitious than Sweden's obligations under the first and second commitment periods of the Kyoto Protocol and EU climate and energy legislation. In 2017, Sweden adopted the Climate Policy Framework, comprising interim and long-term climate targets, a Climate Act (SFS, 2017:720), and the Swedish Climate Policy Council (SCPC). Swedish territorial emissions have decreased every year, except during the recovery from the financial crisis in 2009 and after the COVID-19 pandemic. Overall, the conditions for reaching net-zero emissions by 2045 have improved compared to the period before the Climate Policy Framework was in place (SEPA, 2023b). By using supplementary measures and because of the pandemic, Sweden has reached the 2020 target. However, Sweden's emission reductions are staggeringly slow and are below what is required to achieve the agreed targets. The SCPC has argued in seven consecutive annual reports that the current policies and governance mechanisms are not sufficient to reach the 2030, 2040, and 2045 targets. In its latest report (SCPC 2024), the assessment is that the government does not live up to the requirements of the Climate Act by disregarding the interim targets for 2030 with increased emissions as a consequence. Sweden is not on track to reach its 2030 targets, not least because emissions in the transport sector need to be halved over the next seven years (Haikola and Anshelm, 2023; Niskanen et al., 2023; SEPA, 2023b). In 2021, territorial GHG emissions were 47.8 million tons of carbon dioxide equivalent

(CO₂e). Thirty one percent of emissions are from domestic transport, 34 percent from industry, 15 percent from agriculture, and the remaining emissions are from electricity and heating (8 percent), non-road machinery such as tractors, snowmobiles, and lawn mowers (6 percent), and other sources (6 percent). Sweden reduced its territorial GHG emissions by 37 percent between 1990 and 2022 but needs a further reduction of 75 percent by 2045 (see Figure 4.1). The latest statistics from the SEPA show that GHG emissions in Sweden decreased by 5.3 percent between 2021 and 2022.¹ These reductions are mainly due to the increased rates of required biofuel blending in gasoline and diesel, the electrification of road transport, and a reduction in emissions from the mining industry. In order to reach the 2045 target of net-zero emissions, annual emissions reductions have to be accelerated by 8 to 10 percent. According to several experts, Sweden's GHG reduction commitment is far from what is required to comply with the Paris Agreement (Anderson et al., 2020). While the pandemic brought emissions down in 2020, Sweden missed the opportunity to embark on a green recovery (Gottenhuber et al., 2023; SCPC, 2021). The COVID-19 pandemic led to a temporary reduction in CO₂ emissions by 7 percent in 2020, but since 2021, emissions have returned to pre-pandemic levels and even increased due to the economic recovery of the industrial sector (SEPA, 2023b, p. 66).

4.3 State-Led Transformations

Decarbonization is likely to take place in various technological, institutional, behavioral, industrial, and societal systems (Seto et al., 2016; Unruh, 2002). In this chapter, we identify four state-led strategies for transformation: institutional, economic, technological, and behavioral. As examined in Chapter 2, the governance of decarbonization involves both top-down and hierarchical steering (regulation) and bottom-up governance (orchestration). The state plays a key role in managing transformation across multiple levels of decision-making and facilitating horizontal coordination between institutions and public agencies. It uses its power and political authority to either regulate or orchestrate the institutional, economic, technological, and behavioral transformation.

Institutional transformation concerns the institutions that regulate how society is governed and how political decisions are made. Economic transformation refers to how production is organized and how markets are regulated and designed, for example the degree of privatization, decarbonization of the economy, and free trade. Technological transformation includes the technologies and infrastructure that make up societies, for example, energy mix and grid, transport infrastructure, and housing standards. Behavioral transformation entails the social norms, habits,

¹ <https://www.naturvardsverket.se/data-och-statistik/klimat/sveriges-utslapp-och-upptag-av-vaxthusgaser/>

and behaviors that influence the actions of individual citizens (Doyle, 2005, p. 60; Seto et al., 2016). These transformative pathways are closely interlinked. For instance, economic or market-led transformation to decarbonize the economy is linked to behavioral transformation involving changed incentive structures through taxes and subsidies to shift to more sustainable consumption. Institutional transformation in terms of reforming leadership, governance, implementation mechanisms and decision-making procedures may affect the pace of technological transformation. And technological transformation, such as digitalization, can spur behavioral change in terms of changed mobility and consumption patterns.

Each transformation strategy is associated with carbon lock-ins, that is, structural obstacles for transformation. Table 4.1 summarizes the state's strategies for transformation, governance modes (regulation and orchestration), and carbon lock-ins associated with each transformative pathway. To achieve deep decarbonization, the state needs to combine strategies of transformation: institutional reform to integrate climate targets across all sectors; govern the behavior and lifestyles of individuals and consumers; stimulate investments in green industrialization; increase carbon pricing and taxation; and subsidize technological innovation in fossil-free steel, CCS, and renewables.

The state employs different strategies for transformation to achieve decarbonization (summarized in Table 4.1). As elaborated in Chapter 2, the state also uses two *governance modes* – regulation and orchestration – to achieve decarbonization. Regulation includes legal, economic, and administrative instruments such as permits, taxes, fees, and subsidies. Orchestration is associated with new modes of governance (Bäckstrand et al., 2010) that use voluntary means, such as information campaigns, public-private collaboration, and self-regulation.

To accelerate *institutional transformation*, the state employs different strategies such as the reform of governance, regulatory, legal, and institutional frameworks, including enacting climate laws, strengthening implementation, as well as oversight and organizational reform of government offices (Paterson et al., 2022).

Economic transformation entails decarbonizing the economy by de-coupling economic growth from GHG emissions using market-based instruments. Business and industry actors, as well as entrepreneurs, rely on state and regulatory intervention in order to transform to carbon neutrality or a circular economy. The state plays a central role in promoting green growth, green industrialization, and green economy (Fiorino, 2018). Regulation is central, such as putting a price on carbon and stimulating new forms of financialization and commodification in the carbon economy.

In the *technological transformation*, the role of the state is to provide support for policies across multiple sectors that can stimulate the growth of low-carbon, green, and renewable energy technologies, CCS, and geo-engineering technologies

Table 4.1 *Strategies of transformation, governance modes, and carbon lock-ins*

Transformative pathways	Institutional transformation	Technological transformation	Economic transformation	Behavioral transformation
Strategies of transformation	Reform institutions to create, implement, and monitor decarbonization	Stimulate technological innovation and dissemination	“Greening” the economy by putting a price on emissions	Stimulate climate-friendly consumption patterns, individual lifestyles, and mobility patterns
Governance mode: Regulation	Climate laws, climate budgets, climate policy councils, permit application processes	Standard-setting, banning or subsidizing technologies	Taxes Emissions trading schemes	Financial incentives for climate-friendly consumption/disincentive programs
Governance mode: Orchestration	Multi-stakeholder platforms or partnerships Government committees	Investment funds, knowledge sharing	Labeling schemes Committees for circular economy	Information campaign
Carbon lock-ins	Institutional lock-in stems from the impact of past decisions on the design of current institutions and decision-making processes	Technological lock-in is related to carbon-intensive infrastructure that is challenging or costly to change	Economic lock-in is a combination of the three lock-ins. It stems from the path dependency associated with economic capital and globalization, for example the design of economic systems, subsidies, and so on	Behavioral lock-in stems from the notion that social norms, habits, and behavior are challenging to change

(Scoones et al., 2015, p. 11). The state also has a crucial role to play in supporting the development of infrastructure, public transport, digitalization, electrification, and research and development of fossil-free technologies. The rise of green industrial policies around the world, as well as the Inflation Reduction Act and the European Green Deal (Allan et al., 2021), signify the crucial role of the state in accelerating technological transformation and promoting green industrialization and decarbonization.

Behavioral transformation entails state-led action to transform consumption patterns, individual lifestyles, and mobility patterns in a climate-friendly direction. States are increasingly governing and steering citizens' lifestyles, behavioral change, and consumption patterns. The subsidization of public transport, electric cars, and cycling, installation of solar panels on private properties, promotion of green consumerism and climate-friendly lifestyles are all examples of measures aimed at promoting behavioral transformation. The success of behavioral transformation is dependent on public legitimacy and citizens' support of climate action. Politicians are reluctant to adopt stringent measures for GHG emission control if public support for societal decarbonization is low.

Due to the scale and pace of the required transformation, as well as the prevailing power and institutional structures, none of these strategies alone are likely to decarbonize society. Rather, a fully decarbonized society depends on multiple transformations that will interact, overlap, and sometimes conflict (Scoones et al., 2015, p. 20). As discussed in Chapter 2, *carbon lock-in* is defined as the inertia of institutions, technologies, and behavior – by themselves or together – constraining the rate of systemic transformation to a low-carbon or fossil-free society. In this chapter, we conceive of economic lock-in as a combination of the other lock-ins. Escaping carbon lock-in will require significant and large-scale investments, reforms, and legislation to unlock entrenched patterns of decision-making and norms and behavior. Central to the different carbon lock-ins is short-termism, which is a key feature of political systems, not least liberal democracies, when politicians need to secure re-election and citizens prioritize the near-term benefits such as employment and tax reduction rather than the long-term public good, such as curbing climate change. Hence, democracies face challenges in overcoming carbon lock-ins in and achieving deep, rapid, and system-wide decarbonization. Economic crises and recession also risk amplifying carbon lock-ins. The rise of populism and nationalism (Lockwood, 2018), protest and voter apathy, veto players, and the double representation of fossil fuel interests (Mildenberger, 2020) are challenges that have led to a decline in climate policy ambitions and rollbacks and/or a weakening of climate legislation. Politicians use climate policy delay (Lamb et al., 2020) to postpone policy interventions that aim to accelerate decarbonization.

4.4 Governing Decarbonization in Sweden: Institutional, Economic, Technological, and Behavioral Transformation

Table 4.2 highlights a selection of key national regulation and orchestration efforts – current and proposed legislation, policies, institutional reform, and voluntary measures – to achieve transformation in all four dimensions. The list is not exhaustive due to the sheer volume of multiple sectoral and cross-sectoral policies, regulatory and voluntary instruments targeting industry, transport, agriculture, forestry, infrastructure, and so on.² We focus on national measures and do not include EU climate regulation, which affects Sweden’s decarbonization as detailed in Chapter 3. Ninety percent of GHG emissions emanating from industry, electricity, and heating are regulated by EU ETS (SEPA, 2023b). Overall, Sweden has used a policy mix of regulatory instruments such as prohibition, standards, and legislation for urban and spatial planning. This has been combined with general economic instruments such as taxes, fees, technology support, and investment grants. Following the Paris Agreement, there was an increase in orchestration efforts and voluntary measures, such as FFS and various national delegations and strategies in the fields of circular economy, electrification, sustainable cities, and technologies such as CCS and hydrogen. Moreover, Sweden has a long-standing tradition of launching parliamentary cross-party public committees in contested areas such as consumption-based emissions, negative emissions technologies, and climate law reform.

As discussed in Chapter 3, Sweden cut its emissions by more than half between 1970 and 2010, partly due to the decarbonization of domestic heating systems (Lindmark and Andersson, 2010). As a response to the oil crises of the 1970s, GHG emissions have been reduced by the rapid expansion of district heating networks (through the increased use of biofuels and waste fuels), a shift from oil-fired boilers in domestic heating to electric heating including heat pumps, fuel shifts in industry, and fossil-free electricity generation based on hydro and nuclear power. Thus, previous national decisions to expand district heating, public transport, and fossil-free electricity generation can explain most of the emissions reductions since 1990. Among the member states of the International Energy Agency, Sweden has the lowest proportion of fossil fuels in its primary energy supply. Yet, to reach the long-term objective of net-zero emissions by 2045, the pace of emissions reductions must accelerate in energy-intensive industries. Transformation of industrial sectors is needed, such as steel, cement, mining and minerals, pulp and paper, and refineries (SEPA, 2023b).

² A list of legislation, economic instruments, and voluntary agreements is available in the Government Offices of Sweden (2023a).

Table 4.2 *Examples of strategies of transformation, governance modes and carbon lock-ins in Sweden*

Transformative pathways	Institutional transformation	Technological transformation	Economic transformation	Behavioral transformation
Strategies of transformation	Reform institutions to create, implement, and oversee decarbonization	Stimulate technological innovation and dissemination	“Greening” the economy by putting a price on emissions	Stimulate climate-friendly consumption patterns, individual lifestyles, and mobility patterns
Governance mode: regulation	Climate Policy Framework Climate Act Climate Policy Council	The climate leap The industry leap Support for wind and solar power Energy declarations building Climate declaration buildings	Carbon tax Energy tax Emission reduction obligation scheme for biofuel blending Green credits Corporate sustainability reporting	Bonusmalus system for cars Aviation tax
Governance mode: orchestration	Fossil Free Sweden (FFS) Climate Collegium	Training programs for low-energy buildings National electrification strategy Electrification Council	Delegation for Circular Economy Strategy for sustainable bioeconomy	National goal for consumption-based emissions Strategy for sustainable consumption National cycling strategy Energy and climate advice for households

Table 4.2 (cont.)

Transformative pathways	Institutional transformation	Technological transformation	Economic transformation	Behavioral transformation
Carbon lock-ins	Lack of coherence and mainstreaming of climate policy Lack of uptake of FFS roadmaps, and so on. Lack of policies	Power transmission and grid, transportation Slow environmental permit processes Obstacles to electrification and a circular economy Lack of goal on carbon removal Skills and recruitment gap	Economic lock-in is a combination of the three lock-ins	Lack of popular support for car and fuel restrictions Lack of regulation targeting consumption The strongest level of support is for the transition to be financed with taxes, whereas there is low level of support for the state to borrow

4.4.1 Institutional Transformation

Reforming institutions and decision-making processes is central to achieving decarbonization. Sweden's first national climate policy was adopted in the late 1980s, and its first national climate strategy was adopted in 1991 (Elander et al., 2022; Zannakis, 2009). In 1999, the Swedish Parliament adopted the environmental objectives system comprising 15 environmental quality objectives (a 16th objective was subsequently added). One of the objectives is *Reduced Climate Impact*, which aligns Sweden's climate action with the goals of the UNFCCC to prevent dangerous anthropocentric interference with the climate system.

Regulation: In 2017, the Climate Policy Framework was adopted by the Swedish Parliament. It was modeled on the UK's Climate Change Commission, which was established in 2008. All parties agreed to the legislative framework, with the exception of the Sweden Democrats. The framework was an outcome of the parliamentary Environmental Objectives Committee, tasked with preparing the adoption of long-term environmental goals between 2010 and 2016. The Swedish Climate Act entered into force in January 2018 as part of the Climate Policy Framework, which also comprises the interim and long-term climate targets and the SCPC. The latter is an independent expert body, comprising members with scientific expertise across fields of climate science, economics, political science, and behavioral science, and was set up to review the government's climate and decarbonization policy. The SCPC is tasked with evaluating (a) the government's progress toward achieving the climate targets, (b) the impacts of proposed and agreed policy, (c) how the climate targets can be achieved in a cost-effective manner, and (d) the knowledge basis and the models upon which the government develops its policy. Furthermore, the SCPC ought to foster a dialogue among societal actors and the public on climate policy and decarbonization. The Climate Act has been criticized for being weak and ineffective as it does not contain any enforcement provisions, excludes climate adaptation, and fails to address or incentivize the business community to take any action. Moreover, the Act contains no climate targets; rather, interim and long-term targets are decided by the majority in the Swedish Parliament. Critics argued that this could water down the goals depending on the parliamentary majority and ruling party holding governmental power (Romson and Forsbacka, 2020). In sum, the Climate Act represents more of a general policy framework than a legal act containing substantive policy.

Under the Climate Act, the government must submit an annual climate report to the parliament. Every fourth year, following a regular parliamentary election, the government must submit a four-year climate policy action plan. The first plan was submitted to the parliament as a government bill on December 18, 2019, by the Social Democratic-Green government (Government Bill 2019/20: 65). The second

plan was submitted in December 2023 by the current Liberal-Conservative government (Skr. 2023/24:59, n.d.). The content of the plan is determined by the Climate Act and requires information on Sweden's territorial and EU commitments, historical GHG emissions, projected emissions, the impact of emission reduction measures, and proposed emission reductions. After the plan has been submitted to the parliament, the SCPC is tasked with assessing it. This assessment should be submitted within three months of the release date of the plan. The 2019 plan contains around 143 proposed actions, legislative measures, and policies in different sectors, as well as cross-sectoral proposals.

Orchestration: Sweden's orchestration effort has targeted various sectors such as industry, transport, and agriculture (Nasiritousi and Grimm, 2022). The government's main orchestration mechanism is the FFS initiative, which was launched in 2016 after COP21 in Paris to make tangible proposals to the government on how to accelerate the decarbonization of key sectors. FFS is a multi-stakeholder platform supported by a national coordinator appointed by the government (Marquardt and Nasiritousi, 2022).³ Its aim is to create a platform for dialogue on how to achieve decarbonization through close collaboration between the government, non-state, and sub-state actors; facilitate participation in international climate action; and communicate with the public and stakeholders (The Government Offices of Sweden, 2016). The role of the government's national coordinator is to initiate, facilitate, and stimulate collaboration around ambitions to reach net-zero emissions, as well as to develop good practices and examples among the different actors. FFS has increased its membership from 170 to 500 companies, municipalities, regions, and civil society organizations that sign up for the initiative by submitting a written declaration. FFS has been extended by the government on several occasions and will run until December 2024 (The Government Offices of Sweden, 2022).

The government is calling for different business sectors to compile their roadmaps for decarbonization, while also increasing their "fossil-free competitiveness." As of September 2023, FFS has submitted 22 roadmaps for fossil-free competitiveness to the government (FFS, 2022). They include sectors such as steel, cement, concrete, gasoline and fossil fuels, building and construction, aviation, forestry, mining and minerals, heating, and transport. These roadmaps cover more than 70 percent of the total GHG emissions in Sweden. For instance, the steel industry accounts for around 11 percent of Swedish GHG emissions. FFS has published an update, follow-up, and implementation of the roadmaps (FFS, 2022). The national coordinator has repeatedly argued that there is no contradiction between growth and reduced GHG emissions for the Swedish business sector and that industrial

³ Svante Axelsson, who was previously Secretary-General of Sweden's largest NGO – Swedish Society for Conservation of Nature (SSCN) – has been national coordinator of FFS since 2016.

decarbonization is a prerequisite for the modern welfare state. The government primarily relies on soft steering and orchestration with regard to the industrial roadmaps for fossil-free competitiveness. In the roadmaps, the industrial sectors themselves frequently propose policies to facilitate and accelerate decarbonization. Yet the roadmaps were given very little attention in both the governments' four year Climate Policy Action Plans, and there is a lack of systematic follow-up and implementation of the roadmaps on the part of government. In 2021, FFS itself for the first time followed up the roadmaps (FFS, 2021). The goal was not to rate the progress of the roadmaps but rather to identify the measures taken by the industrial actors to achieve the net-zero target.

Following recommendations by the SCPC, the Social Democratic-Green government established a Climate Collegium for implementing the Climate Policy Framework. It was modeled on climate cabinets in other countries and set up to elevate climate change to a top priority in the government offices and across ministries. The Climate Collegium has the prime minister as chairperson and has representatives from finance, industry, climate infrastructure ministries, and so on. The aim was to create a more coherent policy, integrating climate change across all ministries to transform the way in which the government offices operated. As discussed in Section 5, the Climate Collegium has gradually been phased out starting in 2022.

4.4.2 Technological Transformation

State-led efforts to accelerate technological transformation in the industrial and transport sectors represent a cornerstone in Sweden's decarbonization and climate policy (Hildingsson et al., 2018). The Swedish welfare state has co-evolved with the development of the forestry, mining, steel, and cement industries. However, this has also led to increased emissions. For instance, the steel industry accounts for 10 percent of Sweden's total GHG emissions (SCPC, 2023, p. 124). The efforts to produce fossil-free steel and the ongoing green industrialization in Northern Sweden illustrate strong eco-modernist imaginaries of establishing a permanent world exhibition of industrial decarbonization showcasing fossil-free steel in Sweden (Brodén Gyberg and Lövbrand, 2022). These imaginaries rest on ideas of climate policy such as industrial policy, technological leapfrogging, and the green industrial revolution in the North. In the coming decades, it is expected that investments in fossil-free steel in the Norrland region will amount to SEK 1,000 billion (SCPC, 2023, p. 116). Furthermore, as demonstrated in Chapter 3, Sweden has assumed a global role in the Leadership Group for Industry Transition (LeadIT) bringing together countries and companies to achieve net-zero emissions from heavy industry by 2050.

Regulation: Numerous policy measures are aimed at the technological transformation of the transport and industrial sectors, for instance the emission obligation reduction scheme for biofuel blending, subsidies for industrial transition and fossil-free steel, battery, and hydrogen production, as well as climate investments in charging infrastructure. Several major government programs have been launched to stimulate the technological transformation of the transport, industrial, and energy sectors. Two significant investment grants are the Climate Leap and the Industry Leap. The Climate Leap (also called “Local Climate Investment Program”) was introduced in 2015 for local climate investment covering all sectors outside the EU ETS. Examples of eligible projects are charging infrastructure for electric vehicles, biogas production and processing plants, the expansion of small district heating networks, and cycling infrastructure. Between 2015 and 2023, the SEPA approved over 5,000 investments amounting to SEK 13.5 billion, with 80 percent of the investments granted to companies (SEPA, 2023a). The SEPA estimates that the Climate Leap has generated around 9,400 full-time jobs since its inception.

The Industry Leap is a government program to scale up the development of technology and processes to reduce GHG emissions in the Swedish industrial sector, particularly heavy industries. It was established in 2018, will run until 2029, and is managed by the Swedish Energy Agency (SEA). It finances research, testing, pilot, and demonstration projects for investments in measures and technologies to reduce emissions or achieve negative emissions, such as BECCS. The Industry Leap targets industries with process-related emissions, as well as research institutes and universities. In 2020, the government budget was SEK 600 million annually for the program, and in 2022, the financial support scheme was broadened and extended to more than SEK 900 million. Between 2023 and 2025, funding for the Industry Leap is expected to be SEK 5.2 billion (SEPA, 2023a, p. 13) and is partly financed by the EU’s Recovery and Resilience Facility (RFF) as part of the EU green recovery program. Hydrogen Breakthrough Ironmaking Technology (HYBRIT) is a flagship project partly funded by the Industry Leap and was launched by the companies SSAB, LKAB, and Vattenfall to advance technical solutions to reduce carbon emissions from steel production. The aim of the project is to transform coal-intensive ore-based steel making into hydrogen-based technology. In 2018, the construction of a pilot plant for fossil-free steel production in Luleå started with financial support from the Industry Leap. The goal is to provide technical solutions for producing fossil-free steel by 2035. If successful, HYBRIT has the potential to reduce Swedish CO₂ emissions by 10 percent (The Government Offices of Sweden, 2023a).

Funding for projects for bio-CCS, biogas, climate bonus for heavy goods vehicles, and charging infrastructure for electric vehicles has also been introduced. Altogether, in 2022, the Swedish government allocated more than SEK 16 billion

for different subsidies and grants to accelerate the technological transformation and decarbonization of the industrial, transport, and agricultural sectors. However, revenues for the carbon tax (SEK 21.4 billion) and EU ETS (SEK 3 billion) exceeded subsidies for the decarbonization of industry (SEPA, 2023a, p. 140).

The promotion of wind power is key to accelerating renewable energy production. Since 2004, both terrestrial and marine areas have been designated sites of national interest for wind power and correspond to 1.5 percent of Sweden's land mass. Moreover, since 2018, municipalities have become eligible for funding to build wind power plants. Subsidies for households to install solar panels were introduced in 2009, with a budget of SEK 4.5 billion from 2016 to 2021. From January 2023, subsidies for installation costs for solar panels for private households were increased from 15 to 20 percent (SCPC, 2023, p. 49). These investment grants aim to transform the energy sector and support the commercial development of solar technology, incentivizing different actors to install solar panels and connect to the electricity grid.

There was a weakening of climate legislation during the first year of the Liberal-Conservative government, notably in the proposed phaseout of the emission reduction obligation scheme for biofuel blending. The distributional aspects of climate change impacts are being increasingly heightened with increased calls for a just transition in civil society and trade unions. This will put greater pressure on the government to address questions about redistribution. The government's first Climate Policy Action Plan (2019–2023) contained very few concrete policy proposals regarding a just transition, with the exception of increased electrification, access to renewables, and charging infrastructure (Fischer et al., 2023).

Orchestration: Several initiatives to scale up electrification and fossil-free technologies were established by the government after COP21. The electrification strategy was presented in September 2022 by the Electrification Commission. The purpose of the strategy was to speed up electrification of the transport sector by applying different technologies, including hydrogen technology. Almost SEK 70 million was allocated to implement the electrification strategy between 2022 and 2024. A Council for Electrification was subsequently established in June 2022 comprising representatives of industry, academia, and public agencies (SCPC, 2023, p. 45). The Council provides recommendations on how to develop the electrification strategy and electricity grid.

Under the auspices of the SEA, a national CCS center has been established to promote the implementation of CCS and BECCS and help remove the legal, technical, and economic barriers to CCS technology (The Government Offices of Sweden, 2023a). For bio-CCS, a budget framework of SEK 36 billion has been allocated to the period from 2026 to 2046. In 2021, a national strategy for

sustainable wind power expansion was jointly developed by the SEPA and the SEA to plan for the regional distribution of onshore wind power (The Government Offices of Sweden, 2023a).

Since 2020, the SEA has been responsible for a training and capacity-building program for low energy consumption targeting different stakeholders such as architects, engineers, installers, and teachers in upper secondary schools.

4.4.3 *Economic Transformation*

Both the first and second Climate Policy Action Plan reflect a long legacy of using market instruments to reduce emissions and decarbonize the economy, promote a circular economy, and decouple GHG emissions from economic growth. The state-led strategies for economic transformation are firmly based on win-win transformative strategies, fossil-free competitiveness, green growth strategies, green economy, and greening capitalism. It is notable that low- or post-growth scenarios are absent in the governing strategies for economic transformation.

Regulation: Steering through regulation and market-based instruments such as taxes and support systems has been central to Sweden's decarbonization at both the national and the EU level. EU ETS, discussed in Chapter 3, is one of the most significant economic mechanisms for reducing GHG emissions. Furthermore, the Swedish proposal to annulate emission permits under the negotiation of the reform of EU ETS led to the annulation of 2.4 billion, which is 45 times Sweden's annual territorial emissions (Government Bill 2019/20: 65., 2019).

Turning to national market instruments, there is a plethora of policies to accelerate the economic transformation. Carbon and energy taxes have been the most important national instruments to cut emissions. In 1991, Sweden was one of the first countries in the world to introduce a carbon tax, which applies to the carbon content of fuel in sectors outside the EU ETS. The tax has been raised gradually from SEK 0.25/kg in 1991 to SEK 1.2/kg in 2021 (The Government Offices of Sweden, 2023a, p. 58). However, diesel used in the agricultural and forestry sectors has been exempt from the carbon tax.

Energy taxes on gasoline and diesel for heating and electricity have a long legacy in Sweden and were introduced as early as the 1920s. While the aim of the tax is primarily to generate revenue, it is increasingly used to steer energy use toward energy efficiency, renewable energy, and achieving climate targets. The tax rates have been adjusted to take into account changes in the consumer price index regarding inflation. However, in the wake of Russia's invasion of Ukraine and rising fuel costs, in May 2022, the energy tax on gasoline and diesel was lowered.

In September 2023, the government announced that it would lower the energy and carbon tax on gasoline and diesel to bring it in line with the EU's minimal level.

Several instruments are targeting the transport sector, such as the emission reduction obligation scheme for biofuel blending, which was adopted in 2018. This is an obligation on gasoline and diesel suppliers to reduce life-cycle CO₂ emissions by gradually blending them with sustainable biofuels. Due to increasing fuel costs in 2022, the Social Democratic-Green government halted the level of required biofuel blending. The Liberal-Conservative government announced its plans to lower the required biofuel blending to the EU's minimal level or phase it out completely (Swedish Government, 2023). The SEPA has projected that GHG emissions will increase, making it hard to achieve the domestic transport goal by 2030 and thereby Sweden's overall ESR obligation (SEPA, 2023b). However, in their response to the proposal, most public agencies, business actors, and NGOs are critical about phasing out biofuel blending, and it is unclear how the policy will develop in the coming years.

Green credit guarantees were introduced in 2021 to promote industrial decarbonization. The Swedish National Debt Office was tasked by the Social Democratic-Green government to provide state guarantees for large green investments to cover up to 80 percent of loans in the amount of SEK 500 million and allocated SEK 80 billion until 2024 for green credits. The Liberal-Conservative government announced it would increase green credits to SEK 400 billion, designated for investments in nuclear power (SCPC, 2023, p. 4).

Since 2016, major corporations are obliged to comply with regulations for sustainability reporting, including information on a company's positions, earnings, and the impact of their operations on the environment.

Orchestration: In order to transform production and consumption patterns toward a circular economy, the Swedish Delegation for Circular Economy was established in 2018 (Skr. 2017/18:230) to promote a resource-effective economy, recycling, and water management. Placed in the SEPA, the delegation is a multi-stakeholder advisory body to the government with the aim of encouraging businesses to transform the economy and identify obstacles to the realization of a circular economy. This was followed by a strategy for a circular economy, as well as two action plans aimed at reducing the use of materials and their adverse effect on the environment (The Government Offices of Sweden, 2020).

Linked to a circular economy, the government launched a public committee in 2022 to develop a national sustainable bioeconomy strategy. The committee will develop proposals to enhance biofuels and biomass in forestry in order to increase employment, food supply, and international competitiveness, as well as to reduce vulnerability. The final report from the committee is expected in the fall of 2023.

4.4.4 Behavioral Transformation

To achieve behavioral transformation, public support and democratic legitimacy of societal decarbonization are essential. The scale and urgency of deep decarbonization require public legitimacy and public policies that address the distributional aspects of climate change impacts in order to secure a just transition. The need for legitimacy and public trust has been emphasized in all SCPC reports. In the SEPA's background report to the government's Climate Policy Action Plan, public legitimacy is highlighted as one of the most important cross-sectoral factors for successful societal decarbonization.

Furthermore, politicians need electoral support for far-reaching policy interventions, which could become more challenging in an age of increasing populism and voter apathy and where war, security threats, and economic recession compete with the climate crisis. Sweden offers certain favorable conditions for behavioral transformation. The country has a historical legacy of a consensus-oriented political culture that actively involves different societal actors in the decision-making process. New legislation is prepared by referrals in which NGOs, businesses, trade unions, universities, and so on are invited to offer written comments and statements of opinion. The broad political consensus is illustrated by the cross-party Environmental Goals Committee, which, in 2016, proposed the Climate Policy Framework that was agreed by all parties, with the exception of the Sweden Democrats.

The SEPA regularly measures the attitudes of the Swedish public to climate change. In 2021, 93 percent of the surveyed citizens stated that they think that Sweden will be negatively affected by climate change and 80 percent said that Sweden can do something to halt climate change (SEPA, 2021). In addition, in a cross-country comparison, public support for climate action is strong in Sweden. According to a survey by the European Investment Bank in 2021,⁴ 76 percent of Swedish citizens are in favor of government measures that impose restrictions on people's behavior and 70 percent are willing to consume less by, for instance, not flying. These findings on public attitudes to climate change in Sweden are consistent with the results from the annual survey of 2021 conducted by the Society, Opinion and Media (SOM) Institute at Gothenburg University commissioned by the SCPC (Falk, 2022). There is generally high support among the public for the Swedish climate targets: 50 percent of citizens state that the Swedish climate goals are sufficient, 23 percent of citizens state that they are not sufficient and 25 percent of citizens regard them as too ambitious. However, support for the state borrowing money to fund climate mitigation is low (12 percent). The most popular proposals

⁴ <https://www.eib.org/en/press/all/2021-386-76-of-swedish-people-in-favour-of-stricter-government-measures-imposing-behavioural-changes-to-address-the-climate-emergency>

for reducing GHG emissions are to invest in more research (87 percent) and in public transport, walking, and cycle paths. The least popular proposals are various vehicle fuel restrictions or regulations banning fossil fuel vehicles. In particular, there is low public support for the ban on the sale of gasoline and diesel cars (33 percent). However, the proposal to ban short-haul domestic flights garners public support as 61 percent of citizens think it is a very good or fairly good proposal. While there is broad support for many measures to reduce GHG emissions, Swedish citizens rank problems related to health care, crime, unemployment, and the integration of migrants as greater societal challenges than climate change.

Regulation: A few regulatory instruments have targeted citizens' consumption behavior such as subsidies for e-bikes, reduced value-added tax for the repair of bicycles, footwear, and leather products, and a climate bonus (bonus-malus system) for cars (SOU 2022:15, p. 310). A bonus-malus system for new light-duty vehicles was in place between 2018 and 2022. Vehicles with low CO₂ emissions qualified for a subsidy (bonus) at purchase while high-CO₂-emitting vehicles were subject to an increased vehicle tax (malus). The system was strengthened in 2021 when a subsidy of SEK 70,000 was given to buyers of vehicles with zero emissions, such as electric cars. The system was abolished in November 2022 by the Liberal-Conservative government. A tax on air travel from Swedish airports for all commercial flights was introduced in 2018 to reduce the climate impact of aviation.

Orchestration: A number of voluntary instruments have been directed at achieving behavioral transformation. The implementation of the 2030 Agenda and the Sustainable Development Goals (SDG) 12 on Responsible Consumption and Production has contributed to an increased focus on consumption. In 2016, the government adopted a strategy for sustainable consumption, with instruments linked to several areas, such as climate-smart consumption, sharing economy, climate, and environmental certification, effective resource use, sustainability reporting by companies, sustainable food, housing, and transport patterns, as well as the phasing out of harmful chemicals. However, the strategy has not been followed up since 2020.

Consumption-based emissions are higher than territorial emissions in Sweden. Since 2019, the climate impacts of Swedish consumption have been compiled by Statistics Sweden (SCB) as part of the official government statistics. Consumption-based emissions encompass emissions from domestic consumption and consumption from imports. A methodological challenge is that consumption-based emissions are based on models rather than on actual measured emissions. This means that the statistics for emissions in other countries as a result of Sweden's imports are subject to a greater degree of uncertainty compared to the statistics for the territorial emissions reported to the UNFCCC and the EU. Given its importance, a challenge

of decarbonization in Sweden has been the lack of regulations to reduce emissions from consumption. Around 63 percent of consumption-based emissions stem from abroad, that is, when a product is manufactured in another country and then consumed in Sweden. Compared to 2008, Swedish consumption-based emissions have decreased by 27 percent. While emissions have steadily decreased, the largest reduction in a single year was achieved during the financial crisis of 2008 and during the COVID-19 pandemic in 2020. The most significant change in public norms and behavior was not precipitated by policies but by the pandemic, which led to a temporary reduction in emissions from households by 10 percent between 2019 and 2020 (SCPC, 2021). However, in 2021, emissions increased as a result of the economic recovery. During the pandemic year of 2020, Sweden's consumption-based emissions were 79 million tons of CO₂e, of which around 48 million tons were from households.

Sweden was the first country in the world to propose a national goal for reducing consumption-based emissions. This is probably the most far-reaching proposal directed at consumption and behavioral transformation. In the first Climate Policy Action Plan (Government Bill 2019/20: 65.), the government proposed a parliamentary committee to develop a national target for consumption-based emissions to take into account emissions originating in exports. In 2020, a cross-party parliamentary investigatory committee was tasked with proposing such a national target and to examine the feasibility of including it in the national reporting. In 2022, in the final report – *Sweden's global climate footprint* – all eight political parties agreed that Sweden should include consumption-based emissions as part of its national climate target and Climate Policy Framework (SOU 2022:15). The proposed goal was for Sweden to have a negative global footprint by 2045. This meant that emissions arising from Sweden's consumption in other countries should be net zero by 2045. The committee was influenced by a report from Chalmers University of Technology, which claimed that in order to comply with the Paris Agreement, consumption must be transformed and reduced (Larsson et al., 2022). However, the parliamentary committee's recommendations are yet to be adopted, and details on how to account for Sweden's exports and emissions for shipping and aviation need to be clarified. The report has been submitted for referral and consultation among environmental NGOs, the business sector, public agencies, universities, and municipalities (Government Memorandum, 2022). The final report is expected to be published in 2024. Several NGOs such as the SSCN, Swedish Consumers, Oxfam, and the Swedish Commercial Employees Union have urged the government to adopt the consumption goal in the second Climate Policy Action Plan (Lexén et al., 2023).

Another initiative aimed at changing behavior is a national cycle strategy adopted in 2016 with the goal of promoting and increasing safe cycling, as well

as enhancing cycling and cycle-friendly infrastructure in urban planning. The government allocated SEK 100 million to this cause for the period from 2016 to 2017. Climate and energy advisors have been available in Swedish municipalities since 1998 to assist households with questions on heating, energy costs, energy efficiency, and government grants. These advisors answer questions free of charge in various languages. The program has been scaled up and is funded by the SEA. In 2022, the government initiated a program to increase skills and competence for the climate transition with an annual budget of SEK 100 million from 2022 to 2024. The state-funded education aims to increase key skills and provide the new labor market with green jobs required for a decarbonized society.

4.5 Carbon Lock-Ins

This section will outline the major hurdles to decarbonization in Sweden, which we frame as institutional, technological, and behavioral carbon lock-ins.⁵ The various carbon lock-ins are perpetuated by conflicts between different goals, interests, and sectors. The state has a crucial role in managing trade-offs and conflicts between goals related to climate change, biodiversity, land use, forestry, renewable energy, and so on (SCPC, 2023). It will not be possible to achieve decarbonization without addressing carbon lock-ins, and the state can play a significant role in eliminating them. However, the state can also maintain and perpetuate these lock-ins. To overcome carbon lock-ins, cross-sectoral reforms are needed, for example integrating climate policy across policy areas, securing a long-term perspective, and ensuring public legitimacy of decarbonization (SEPA, 2023b).

4.5.1 Institutional Lock-In

The absence of adequate policies and long-term institutional reform represents a major institutional lock-in. There are two forms of institutional carbon lock-ins – an absence of adequate policies on the one hand and insufficient policy coherence and steering on the other. Several assessments by SEPA (2023b), SCPC (2023; 2024), the Swedish Agency for Public Management (2022), and FFS (2022) have argued that there is lack of sufficient government steering and policies to achieve decarbonization in Sweden.

There is also no long-term perspective and insufficient prioritization and coordination in the government's steering of the 13 public agencies that work on climate change. First, the government's steering needs to be more coherent and fit for the

⁵ As illustrated in Table 4.2, we conceive the economic lock-in as a combination of the institutional, behavioral, and technological lock-in. For instance, the lack of legislation for green road tax reform is the combination of institutional, economic, and behavioral lock-ins.

purpose of achieving the climate targets (the Swedish Agency for Public Management, 2022, p. 11). The government is perpetuating institutional carbon lock-in through short-term time horizons and changing policies between election cycles. This can be exemplified by the abolishment of the bonus-malus system for private cars and the proposed phaseout of the emission reduction obligation scheme for gasoline and diesel by the Liberal-Conservative government in 2022. Second, the government has a limited overview of the climate policy measures undertaken by different public agencies and how these affect the prospects of achieving the climate targets. Third, the government's steering to increase coordination and collaboration between different public agencies to achieve the climate targets lacks transparency and is insufficient. Fourth, the government does not always require public agencies to conduct an impact assessment on agreed policy measures to ensure that they are cost-effective in terms of reducing GHG emissions. All relevant public agencies should be given a mandate to deliver policy measures that contribute to the achievement of the climate targets, that is, "climate-proof" proposed and agreed policies. The relevant authorities lack the capacity to assess and monitor the impact of policy and legislation in order to achieve the climate targets. Fifth, the government should not leave it up to public agencies to address difficult goal conflicts and trade-offs, which is inherently a political question of prioritization. Sixth, the Climate Policy Action Plan needs to guide the work of the government and public agencies on climate mitigation. The current plan does not assess the impact of the planned decisions and implemented policy measures in the same way it assesses the impact of the government's budgetary policy and fiscal framework. The plan lacks clear lines of responsibilities, division of labor, milestones, and impact assessments of each decision and policy proposal. One of the problems is that the primary responsibility for producing the first plan was given to the Ministry of the Environment and SEPA, while other ministries and public agencies played a more passive role. This has been partly rectified in the second Climate Policy Action Plan (2024–2027), which involves several public agencies (SCPC, 2023).

As discussed in the previous section, the Climate Collegium, which was established in the Government Offices in 2020, has been phased out. When the Social Democratic government was formed and Magdalena Andersson was elected prime minister in November 2021, the Climate Collegium meetings were canceled and were not resumed when the Liberal-Conservative government came to power. Thus, the present government lacks a coordination function and unit for climate policy assessment, which is essential for a cross-sectoral issue such as climate change.

According to the SCPC (2020) report, the existing and proposed policy measures in the first Climate Policy Action Plan are not sufficient to achieve the net-zero target. Because of the lack and inadequacy of policies targeting GHG emissions

reductions, the climate targets beyond 2020 are not likely to be achieved. The current plan could potentially reduce emissions by 1–1.5 million tons by 2023 compared to having no plan at all. This corresponds to 2.3 percent of total emissions in Sweden (SCPC, 2020, p. 5). According to the SCPC, the plan does not meet the legislative requirements of the Climate Act as it lacks a coherent impact assessment of the policy proposals and agreed policies and does not specify how the policies impact GHG emissions. Most of the 143 policy proposals comprise planned investigatory committees and public inquiries (SCPC, 2023). While public inquiries for legislative reform may be necessary, the pace of decarbonization to reduce emissions is too slow.

Policy and regulatory reform are lacking in areas such as Central Bank law and taxation. Furthermore, climate policy is largely limited to the revenue area of natural resources and environment in the budget instead of permeating all revenue areas. Furthermore, governmental policies in several areas have been weakened. The Liberal-Conservative government's planned phaseout of the emission reduction obligation scheme for biofuel blending in gasoline and diesel will make it difficult to reduce emissions from transport and machinery and achieve Sweden's commitment under the ESR.

The lack of policy coherence constitutes a central institutional lock-in. Despite the adoption of the Climate Policy Framework calling for climate policy integration and mainstreaming in all sectors, climate change has not been integrated across all relevant policy areas. Few societal goals with regard to transport, tourism, industry, housing, and forestry have been reformulated to align with the targets of the Climate Policy Framework. For instance, the climate targets do not guide or form a key part of transport and infrastructure planning (SCPC, 2023), and no decisions have been made about a climate-aligned Environmental Code, which is a prerequisite for more efficient environmental permit processes. There has been no proposal for comprehensive road tax reform. In October 2022, the Liberal-Conservative government replaced the Ministry of Environment and Climate with the Ministry of Climate and Enterprise. Climate, energy, commerce, and innovation are core issues at the new Ministry, as well as nuclear energy and the circular economy. Contrary to the recommendations of the SCPC, the annual climate report by the government was presented as a sub-annex to the governmental budget bill for Category 20, which relates to the revenue area of "General Environment and Nature Conservation." Thus, climate and decarbonization policies are still primarily treated as part of environmental policy instead of a cross-cutting field aimed at informing all policy domains to promote policy integration and climate mainstreaming.

As discussed in Chapter 3, Swedish climate targets are increasingly lagging behind the EU's climate targets (Nilsson, 2023; SCPC, 2024; SEPA, 2023b). For instance, Sweden has no national goal of net carbon storage equivalent to 4 million

tons, which is required by the EU's LULUCF regulation. Thus, it is necessary to strengthen Swedish climate policy in order to comply with the EU's Fit for 55 package. The Liberal-Conservative government has called for a public committee to examine how the achievement of Sweden's national climate targets is affected by the EU's climate legislation (The Government Offices of Sweden, 2023b).

4.5.2 Technological Lock-In

According to the SCPC and the SEPA, Sweden's green industrialization policies need to be ramped up. Several interrelated carbon locks-ins are hampering technological transformation, such as long permit processes, the slow pace of electrification, the lack of guidelines on public procurement, insufficient educational and training skills, and recruitment for the green transition, as well as a lack of circular solutions (FFS, 2021). This creates bottlenecks in power transmission and grid infrastructure and electrification. The pace of GHG emissions reductions needs to be accelerated, which means eliminating the various obstacles to climate-friendly investments. The limited green recovery in Sweden following the COVID-19 pandemic has perpetuated institutional, technological, and behavioral lock-ins. A report by the SCPC (2021) on the progress of the green recovery indicates that Sweden is lagging behind. Only 10 percent of the pandemic rescue packages were allocated to green and climate investments compared to a number of other EU member states, which allocated more than 30 percent of total pandemic spending to climate and clean energy measures.

First, long, unpredictable, and inefficient permit processes contribute to technological lock-in by jeopardizing major green industrial investments in a fossil-free energy system and the transport and manufacturing sectors. Such processes also hamper the implementation of the FFS roadmaps for fossil-free competitiveness (FFS, 2021; SEPA, 2023b). For instance, between 2014 and 2019, one-third of all permit applications for wind farms were rejected. The expansion of wind power has also been blocked by a range of societal stakeholders, such as municipalities, the Swedish Armed Forces, environmental NGOs, Saami communities, and individual citizens. While there are legitimate grounds to appeal, this is a challenge given that the rate of electrification needs to be accelerated. The Liberal-Conservative government has commissioned an investigation to review the legislation to increase the effectiveness of the permit processes and the scope of environmental impact assessment in the Swedish Environmental Code.

Secondly, a related technological lock-in is the obstacle to electrification of the industry and transport sectors. Electrification of the whole of Sweden is essential if industries are to become fossil-free. Sweden needs to roughly double its electricity production by 2045 to enable the level of electrification needed for deep

decarbonization. Without a secure electricity supply, a national grid, and charging infrastructure, industries and individuals will not risk making long-term investments. For instance, fast-charging stations for cars, buses, and trucks will need to be established across Sweden's 20 regions and 290 municipalities. This is linked to a need for a comprehensive reform of road taxation, including proposals to differentiate charges based on emissions, the technology, and road usage. However, despite recommendations from the SCPC since 2019, the government has not prepared any green tax reform. Moreover, the Liberal-Conservative government has reduced funding for railroad infrastructure by transferring SEK 750 million from investments in railroads to highways and roads (SCPC, 2023).

A third lock-in is the lack of education, training, and recruitment required for new green jobs as part of the industrial decarbonization. The government's coordinator for green industrial projects in the North has estimated that 100,000 people will be needed over the next 15 years to meet the demands of nationwide decarbonization (FFS, 2021, p. 11). Education at all levels – upper secondary school, university, and vocational – is needed in order to acquire expertise in hydrogen technology, battery technology, and electrification. Moreover, the skills gap is not limited to engineers and technicians but also to experts in sustainability reporting, climate law, and circularity. A plethora of skills are needed to match the pace and scale of decarbonization. Also, training and recruitment of more women are critical as industrial projects for the green transition in Northern Sweden are still heavily male-dominated.

A fourth carbon lock-in, which can be conceived as both a technological and an economic lock-in, is the lack of circular solutions. According to FFS (2021), Sweden is not at the forefront of developing circular and resource-efficient materials. Due to Sweden's intensive raw material economy, annual per capita material consumption is almost twice as high in Sweden compared to other EU countries (Hagainitativet, 2023). High costs are associated with the re-use of materials such as plastics, as well as a lack of regulation to incentivize circularity and resource efficiency.

Finally, the slow pace of green and fossil-free public procurement is both a technological and an economic lock-in. The Swedish economy generates around SEK 800 billion from tax revenues for public spending. Thus, green and fossil-free procurement is a significant tool in the decarbonization of the construction, building, transport, and cement sectors. The government has no clear guidelines on how to raise ambition for the green procurement of road and rail construction. However, legislation is being drafted to ensure that considering climate change impacts becomes a legal requirement in public procurement (SEPA, 2023b, p. 199).

There are long lead times between the decisions of investment grants to actual payments (SEPA, 2023b, p. 146). This will slow down industrial decarbonization

(Löfgren and Rootzen, 2021). The cost of fossil-free steel production represents a barrier to the production of fossil-free steel, as illustrated by the HYBRIT project. The prevalence of fossil subsidies has also halted the green recovery and represents a major carbon lock-in (Gottenhuber et al., 2023; SCPC, 2021).

4.5.3 Behavioral Lock-In

A behavioral carbon lock-in prevails due to the resilience of norms, consumption behavior, and lifestyles associated with GHG emissions. The Liberal-Conservative government acknowledges the significance of public acceptance to secure the legitimacy of decarbonization through inclusion and participation of civil society and societal stakeholders in the decision-making process (The Government Offices of Sweden, 2023a). Sweden is a society with a strong sense of consensus and compromise coupled with a high level of trust in institutions and a low level of corruption. Overall, Sweden's climate goals and policies enjoy public support, even though Sweden has one of the highest carbon tax rates in the world. As previously discussed, the behavioral changes resulting from the COVID-19 pandemic did not prove to be long-lasting. Behavioral lock-in is a challenge due to the political developments since the adoption of the Swedish Climate Policy Framework. Climate change is not as high on the public agenda compared to war, security threats, North Atlantic Treaty Organization (NATO) membership, crime, and immigration. The rise of authoritarian populism triggered by Brexit and the election of Donald Trump as US president in 2016 has increased polarization, mistrust in science, as well as climate skeptic narratives and perceived inequalities between urban and rural areas. This has been partly fueled by the success of the Sweden Democrats, which became the second largest party after the Social Democrats in the 2022 elections.

4.6 Conclusion

With its authority and capacity to garner collective action, provide public goods, ensure distribution of resources, and secure public support and the participation of stakeholders, Sweden – as an advanced democratic welfare state – is uniquely equipped to achieve deep decarbonization. By combining and accelerating institutional, technological, economic, and behavioral transformation, Sweden is a most likely successful case for large-scale societal decarbonization. This means, for instance, harnessing market and technological innovation toward achieving carbon neutrality, reforming institutional and political leadership for climate policy reform, and enabling climate-friendly consumption behavior and lifestyles.

Historically, Sweden was an early adopter of the ambitious goal of becoming the first fossil-free welfare state in the world. However, in practice, Sweden is far from achieving its climate target of net-zero emissions by 2045 given the slow pace of annual emission reductions of 1–2 percent instead of the 8–10 percent required. In the period 2024–2026, emissions are expected to increase according to the current government's most recent Climate Policy Action Plan. Sweden is not steering, governing, and regulating sufficiently to achieve the mid- and long-term climate targets of the Climate Policy Framework. According to the 2024 report by the SCPC, the government's climate plan does not fulfill the requirements of the Climate Act and leads to a risky path for Sweden's decarbonization. Moreover, it lacks political leadership and long-term institutional reform in the transport, taxation, finance, land use, and agricultural sectors. The decarbonization of Sweden represents more incremental transitions in certain sectors rather than a wholesale transformation to a fossil-free society. While the implementation gap to achieving the 2045 net-zero target has decreased since the adoption of the 2017 Climate Policy Framework, the 2030 and 2040 targets will not be achieved with the current and planned policy measures. Several public agencies have stated that Sweden does not have the necessary legislation, policy measures, and regulation in place to significantly reduce emissions by 2030. The only exception is the 2020 target, which was partly achieved as a result of reduced emissions due to the COVID-19 pandemic.

Since 2015, in its policy mix, Sweden has increasingly relied on orchestration, as well as soft and voluntary modes of governance. This is illustrated by multi-stakeholder initiatives such as FFS, the Electrification Council, the Delegations for Circular Economy and Sustainable Cities, as well as numerous strategies and roadmaps for sustainable consumption and the bioeconomy. The weakening of climate legislation is attributable to the Social Democratic government and was reinforced by the Liberal-Conservative government, which admits that GHG emissions are likely to increase. In this vein, Sweden is on a path toward “dangerous incrementalism” (Allan, 2019).

Furthermore, Sweden's national climate goals and policy are increasingly being outpaced by the EU's ambitious climate package Fit for 55, which is becoming increasingly more stringent than Swedish legislation. Thus, Sweden is an example of a welfare state that has not managed to decouple itself from GHG emissions, except in a few sectors such as district heating and electricity production in which large emission reductions were accomplished in the 1970s. With the current institutional frameworks and adopted and planned policies, neither the long-term 2045 net-zero target nor the 2030 target of a 55 percent reduction under the EU's climate legislation will be achieved.

Political developments, such as the rise of right-wing populism, narratives about climate policy delay, climate skepticism, and increasing calls to abandon

the national climate goals, will impact Sweden's prospects of achieving decarbonization. The ideological profile of the parties in power has shifted from the Social Democratic-Green government (backed by the Liberal and Center Party) to the Liberal-Conservative government, which won the elections in 2022 and relied on the Sweden Democrats to achieve a parliamentary majority. During the first year of the Liberal-Conservative government, there was a weakening of policies and institutional reforms, and the Liberal-Conservative government has been under pressure from the Sweden Democrats to roll back climate legislation. Sweden was an early pioneer of economic transformation as it was one of the first states in the world to adopt a carbon tax and decouple economic growth from emissions. However, Sweden is lagging behind the EU in transforming to a circular economy.

Technological transformation is primarily envisaged through a green industrial revolution in Northern Sweden that manifests in technological innovations such as the production of fossil-free steel, sustainable biofuels, BECCS, battery technology, and wind farms. The process of decarbonization is conceived as sectoral transition epitomized in 22 roadmaps for fossil-free competitiveness developed by the industries that are members of FFS. Hence, the outcome is incremental transition rather than structural change to achieve deep decarbonization. Institutional transformation and long-term policy reforms are either weak or absent in the government's first Climate Policy Action Plan (2019–2023). Industrial transition is only one aspect of the deep decarbonization that is required and needs to be complemented by the decarbonization of consumption and the economy.

Behavioral transformation, such as far-reaching proposals for a national goal for consumption-based emissions, is limited to the recommendations of parliamentary committees and in voluntary national strategies and delegations. The COVID-19 pandemic caused a temporary decline in GHG emissions in Sweden and a change toward more climate-friendly behavior. However, an opportunity was missed to scale up green and fossil-free investments as part of the large COVID-19 pandemic rescue packages to accelerate the green recovery.

This chapter has shown the promises and pitfalls of the way in which the Swedish state governs and steers large-scale decarbonization. In order to accelerate deep system-wide decarbonization along all four transformative pathways, regulation and orchestration need to be scaled up significantly in order to achieve the mid- and long-term climate targets. The roadblocks to decarbonization, such as institutional, technological, and behavioral carbon lock-ins, need to be systematically addressed. In other words, politics is at the heart of the challenge to unlock transformation. It is therefore essential to study interactions between state and non-state actors to understand the path toward decarbonization.

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