SWEDISH CLIMATE POLICY COUNCIL

Klimat politiska rådet

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Report of the Swedish Climate Policy Council

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Foreword

The pace of the global climate transition is too slow. The Paris Agreement entered into force in 2016, but since then, neither emission trends nor countries' commitments have been in line with the agreed targets. A large portion of the emissions budget has already been exhausted, and emissions must now be reduced more rapidly. In Sweden, too, the transition must accelerate if we are to achieve our climate goals. At the same time, geopolitical developments are hampering international cooperation and risk drawing governments' attention away from climate change to other acute crises and threats.

Yet there are several positive signs. Over 100 countries – which together represent 90% of the global economy, 88% of all greenhouse gas emissions and 85% of the global population – have set targets for net-zero emissions. At the COP26 climate conference in Glasgow, outstanding elements of the Paris Agreement were finalised, and new voluntary agreements on deforestation and methane emissions were concluded. The EU's 2050 target of net-zero emissions has been complemented by an interim target of reducing greenhouse gas emissions by at least 55% by 2030 and a comprehensive reform agenda under the EU's Green Deal. The willingness of industry and the financial sector to invest in renewable energy and zero-emissions transport and industrial processes is growing in Sweden and around the world.

As required by the Climate Act, the government that will take office after the autumn parliamentary elections must present a climate policy action plan for the next term. An overwhelming majority of the Swedish parliament supports the Climate Act and climate goals. Whatever the makeup of the next government, it will have to ask itself not whether the climate transition can accelerate, but how. There is no time to lose. After the current plan, only six action plans remain before Sweden is expected to reach net-zero greenhouse gas emissions.

In this fourth annual evaluation of the Swedish government's policies relating to climate goals, the Swedish Climate Policy Council aims to show how the next climate action plan can be made clearer in order to accelerate the climate transition in Sweden.

The Climate Policy Council would like to express its sincere thanks to the more than 100 organisations, researchers, experts and other stakeholders who contributed to this report. The conclusions and recommendations presented here are the Climate Policy Council's own.

Stockholm, March 2022

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Content

Summary

In its Sixth Assessment Report, the UN Intergovernmental Panel on Climate Change (IPCC) states that global warming has now reached 1.1°C, with tangible effects in several regions of the world. Warming could reach 1.5°C as early as the 2030s, which would further increase risks to ecosystems and humans. Instead of greenhouse gas emissions starting a rapid decline, as would be needed to achieve the goals of the Paris Agreement, they have continued to rise.

Opportunities to accelerate

Greater emission reductions are also needed in Sweden. Sweden has good opportunities to achieve this, and Sweden can and should be at the forefront of accelerating progress towards a fossil-free society. In its 2021 report, the Swedish Climate Policy Council noted that the climate transition has reached a new level of maturity. In more and more applications, renewable energy now costs less than fossil-fuel energy sources; business and industry are seeing ever-more opportunities in green competitiveness; there is broad public support for the transition; and a stronger institutional framework exists for the climate at the national, European and global levels.

The past year has reinforced this picture in many ways. The EU is working on a reform agenda for implementing the Green Deal and achieving its climate goals, its biggest legislative package ever. There is increased activity by business and industry, particularly in northern Sweden, which has some of Europe's largest industrial investments in clean energy sources and industrial processes. Over 100 countries have set targets for net-zero emissions, and at the UN's 2021 climate change conference in Glasgow, new agreements were concluded that improve the chances of achieving the goals of the Paris Agreement.

But there are also obvious challenges. War in Europe, geopolitical uncertainties, the decline of democracy and weakened international cooperation risk hampering global collaboration, necessary political decisions and key investments. Major fluctuations in energy prices are putting pressure on companies and individuals alike, which risks weakening support for the climate transition. The parliamentary situation in Sweden is making long-term decisions and collective responsibility difficult.

The path to net-zero emissions is largely already known

Although no one knows exactly what the path to net-zero emissions will look like, we can identify areas that will be pivotal for the transition. Four key areas are cited repeatedly in both Swedish and international studies, with some variations:

- More efficient use of energy and resources;
- Zero-emissions electrification;
- Biomass from forestry and agriculture;
- Carbon Capture and Storage.

The vast majority of individual measures that are bringing us closer to net-zero emissions fall into those four key areas. Although they involve shifts in technology, they are also about changing institutions, business models and behaviours.

The visualisation tool Panorama, which the Climate Policy Council has developed in collaboration with the Swedish Environmental Protection Agency and the Swedish Energy Agency, contains one possible target scenario in which these four key areas collectively contribute to achieving net-zero

emissions by 2045. Although the major features can be assumed to be quite robust, this is just one of several possible scenarios. In practice, the size and content of the contributions will depend both on technological and economic developments, and on the choice of policy strategies and instruments. The four key areas should not be viewed as isolated from one another, but through a systems perspective. There are many linkages among them – for example, in terms of the role that forests play in the natural uptake of carbon dioxide and in biomass production.

Policy plays a key role

Phasing out all fossil fuels and reducing greenhouse gas emissions to net-zero represents a major shift in society. We use the phrase "climate transition" to denote that shift. The climate transition is a transformation – from an economy driven by fossil fuels, to one that no longer contributes to global warming, but lays a foundation for sustained prosperity and sustainable welfare.

The world has undergone major transformations in the past, such as industrialisation and the digitalisation taking place right now. Common features of the climate transition are its grounding in joint political decisions, a sense of urgency, the need for broad adoption, and an understanding of the global ramifications of action (or inaction). The UN Framework Convention on Climate Change and the Paris Agreement set out a common overarching goal, while the actions to achieve it are implemented mainly through domestic policies in countries around the world. EU Member States have a joint contribution under the Paris Agreement. With the reforms now underway in the EU, more policy decisions relevant to achieving the climate goals will be taken jointly than before.

Policies play a crucial role in the climate transition, not only in supporting the necessary advances in technology and pricing of greenhouse gas emissions, but in facilitating and supporting behavioural change and building legitimacy for the climate transition across society. In order to achieve the transformation to a net-zero-carbon society, it is crucial that the goals and transition have broad public support, and that the policies pursued are perceived as legitimate and fair to citizens. Policy is more than laws, rules and budget items. It is about leadership in many forms: formulating common goals, ensuring broad participation, and conveying the path towards those goals understandably and with urgency.

The Swedish Government's leadership needs to be strengthened

Although the climate transition has momentum in Sweden, many policies must be strengthened in order to accelerate the transition and achieve the climate goals. This is especially true of how the Government utilises its agencies.

The four key areas cut across all areas of society, illustrating the need for policies to be coordinated between different levels, policy areas, ministries and government agencies. The Ministerial Working Group has improved conditions for internal coordination of policies for achieving the climate goals. However, there is no corresponding coordination mechanism covering Sweden's central government agencies. The Climate Policy Council's analysis indicates that the agencies see a need for better coordination among ministries and consistent management from the Government Offices. The analysis also shows that government agencies do not generally perceive the climate goals and Sweden's Climate Act as prioritised by the Government.

The current governance, including the climate policy action plan and the Ministerial Working Group on Climate Policy, cannot yet be said to constitute the common strategic framework that many government agencies would like to see and need in order to take more proactive, innovative steps as drivers in the climate transition. A number of government agency representatives are

therefore calling for a more clearly defined responsibility, long-term remits, and resources for skills development and implementation. In the Climate Policy Council's assessment, there is an untapped potential in the Government's leadership to improve goal achievement.

The next climate policy action plan must be a plan for acceleration

As required by the Climate Act, the government that takes office after the autumn parliamentary elections must present a climate policy action plan for its upcoming term. An overwhelming majority of the Parliament (Riksdag) currently supports the Climate Act and the climate goals. The broad political consensus in the Parliament is one of Sweden's greatest assets in its ongoing climate transition. All parties involved share a responsibility to nurture and build on this common foundation. Whatever the makeup of the next government, the question it will face is not whether the climate transition will accelerate, but how.

There is no time to lose. After the current plan, only six action plans remain before Sweden is expected to reach net-zero greenhouse gas emissions. Emissions have fallen by about a third since 1990. The remaining two-thirds need to be eliminated between now and 2045, so emissions need to be reduced faster. The next climate policy action plan must be a plan for acceleration – of efforts to reduce near-term emissions and thus reach the 2030 targets, and of strategic efforts that must be implemented now to enable continued emissions reductions beyond 2030.

Recommendations

Based on its analyses for this and previous reports, the Climate Policy Council presents five recommendations concerning the direction and content of the next climate policy action plan. They are formulated as five overarching priorities, with concrete examples and some broader points, as well as links to the four key areas.

RECOMMENDATION

Improve governance of government agencies and coordination between different policy areas and decision-making levels.

The climate policy framework aims to inform the Government and Parliament across all policy areas, but the stated ambition has not yet had a sufficient impact on the Government's leadership.

- Conduct a review of the societal goals most relevant to the climate transition.
- Strengthen the coordination of government agencies' contributions to the climate transition.
- Give a standing remit to relevant government agencies to contribute to the climate policy action plan.
- Introduce a clear administrative responsibility for resource efficiency and the circular economy.

RECOMMENDATION

Strengthen goals and policy instruments in key areas.

The Climate Policy Council's follow-up on the current climate policy action plan has identified several vital individual initiatives and study commissions. However, more sweeping reforms are being implemented at a slow pace. The analysis of key areas in the transition shows a number of sub-areas where policy needs to be strengthened.

- Strengthen governance to achieve a transport-efficient society.
- Make policy instruments for energy efficiency more stringent.
- Create a clearer roadmap and strive for greater consensus on the role of forests and agriculture in climate policy.
- Raise the level of ambition from fossil-fuel-free to climate-neutral agriculture.

RECOMMENDATION

Create better conditions for investments that contribute to achieving the climate goals.

It is crucial for the climate transition that both public and private investments focus on zero-carbon solutions and do not lock society into a continued dependence on fossil fuels. This requires policy to steer public investment in the right direction and to provide favourable conditions for private investment that will lead to a fossil-free future.

- Ensure that the fiscal framework does not get in the way of the necessary climate investments.
- Reform the tax system with a view to reducing climate impact and boosting resource efficiency.
- Ensure that the ambitions for faster and more efficient permitting processes have an effect.
- Review electricity grid regulation and the regulations for Svenska kraftnät, the authority responsible for Sweden's transmission system for electricity.
- Expand financing opportunities for investments that mean negative emissions.
- Create workable systems for sharing risk with private investors.
- Use public procurement to create markets for new technologies.

RECOMMENDATION

Implement a broad knowledge and upskilling initiative for the climate transition.

An climate transition requires new knowledge and skills across a variety of areas and levels in the society. This applies to specific occupational skills in growing industries – in particular, around electrification – as well as transition expertise in central government agencies. Expanding knowledge more broadly is also important to strengthen support for and drive the climate transition.

- Boost the skills and capacity of government agencies and ministries.
- Develop a dialogue with higher education institutions around supplying skills for the climate transition.
- Increase opportunities and resources for vocational education and training and continuing professional development in areas critical to the transition.
- Use public education and other resources to boost knowledge about the climate transition more broadly.

RECOMMENDATION

Take proactive, coordinated and decisive action in the EU.

The Swedish Government and government agencies must have sufficient capacity to actively influence and implement decisions within the EU. This involves coordinating national policies with the EU's new goals and policy instruments and implementing all new EU directives in a timely and effective manner through legislation in Sweden legislation. Swedish companies, regions and municipalities also need a solid foundation for leveraging the opportunities that EU cooperation offers for the climate transition – for example, through various funds and investment aid. In addition, the Swedish Presidency of the EU in the first half of 2023 presents a special challenge and opportunity to contribute to the implementation of the EU's climate ambitions through the Green Deal.

- Ensure that the Government Offices and relevant agencies have sufficient capacity to influence and implement the EU's green reform agenda.
- Prepare and utilise the Swedish Presidency to push for reforms that provide the foundations achieving the EU's climate goals.
- Work to scale down the emissions pathways within the EU's current and future emissions trading systems quickly enough for the EU to successfully reach net-zero emissions by 2050.

Part I

Current emission trends and policies

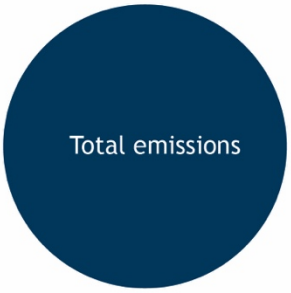
1 Climate targets and emission trends

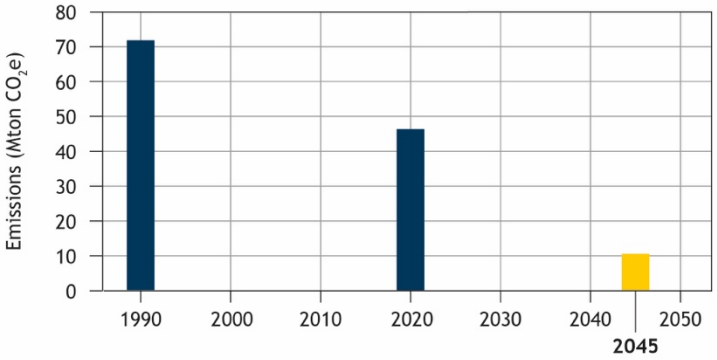
This chapter presents the various targets in the Swedish climate framework and greenhouse gas emissions trends from 1990 to 2020. Emission trends are reported both in total and by sector.

1.1 By 2045, Sweden must reach net-zero greenhouse gas emissions

The overarching goal of the climate policy framework is that by 2045, Sweden should have no net greenhouse gas emissions, and thereafter, it should have negative emissions. The Parliament (Riksdag) has set a target for emissions within Sweden's borders to be at least 85% lower in 2045 than they were in 1990. After that, so-called supplementary measures will make total emissions negative. These can include an increased net removal of carbon dioxide in forests and soils, verified emission reductions through investments in other countries, or bioenergy with carbon capture and storage (BECCS). Achieving negative net emissions beyond 2045 would require that the supplementary measures exceed any remaining greenhouse gas emissions in the country.

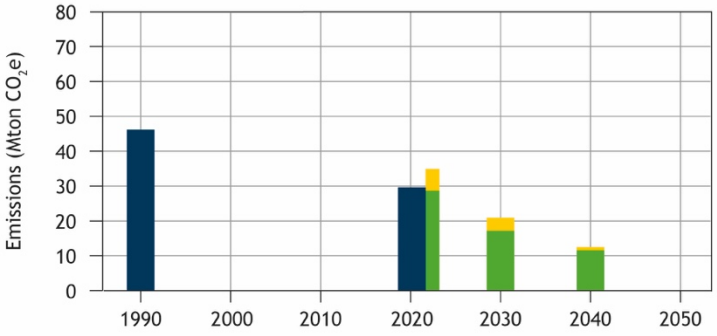
The overall goal for 2045 applies to Sweden's total greenhouse gas emissions. Those emissions can be divided into two parts: those covered by the EU Emissions Trading System (EU ETS), and those not covered by the EU ETS. The climate policy framework sets three interim targets for emissions not included in the EU ETS, for 2020, 2030 and 2040. In addition, there is another 2030 interim target for domestic transport. Emissions under the EU ETS are included in the 2045 net-zero emissions target, but there are no national interim targets for them. Instead, any targets are determined by the framework of the EU ETS. The targets of the climate policy framework are summarised in Figure 1 below.





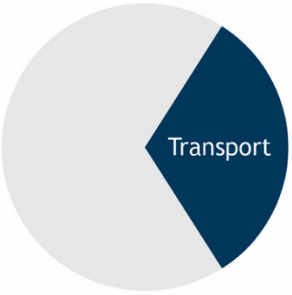
Total emissions targets:

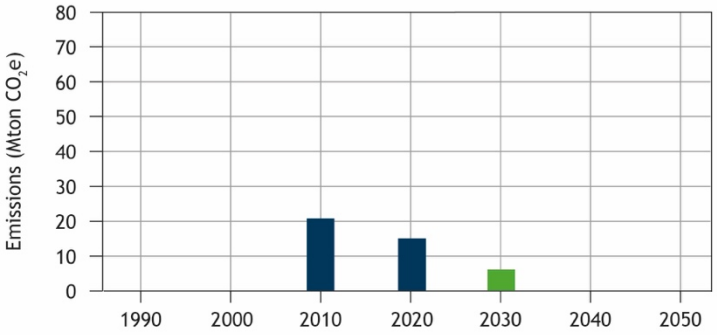
Zero net emissions by 2045. Emissions must be at least 85% lower than in 1990.
15% may be compensated by supplementary measures. Negative emissions thereafter.



Interim targets for emissions outside the EU ETS:

- By 2020, emissions should have been 40% lower than in 1990.
  A maximum of 13% could take place through flexible mechanisms. This interim target has been met.
- By 2030, emissions must be 63% lower than in 1990. A maximum of 8% can take place through supplementary measures.
- By 2040, emissions must be 75% lower than in 1990. A maximum of 2% can take place through supplementary measures.





Interim targets for the transport sector

By 2030, emissions for domestic transport (excluding domestic aviation included in the EU ETS) must at least 70% lower than in 2010.

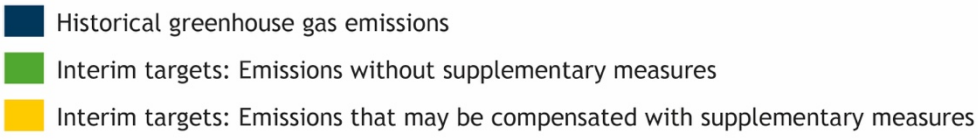


Figure 1: Targets in the Swedish climate policy framework. Emission trends from 1990 to 2020.
Source: Swedish Environmental Protection Agency[1]

1.2 Large emission reductions are needed to achieve the targets

Total greenhouse gas emissions within Sweden's borders (territorial emissions) were just over 46 million tonnes of carbon dioxide equivalent (Mt CO_2e) in 2020,[a] 35% lower than in 1990.[1] It is these emissions that are covered by the targets in the climate policy framework, so the Climate Policy Council focuses on these emissions in this assessment of the Government's policy.

Consumption-based emissions

Another way to calculate emissions is to calculate consumption-based emissions. These are emissions associated with the consumption of goods and services, regardless of where the emissions occur. Emissions from exported products are thus removed from consumption-based emissions, and emissions from imported goods and services are added. Total consumption-based emissions in Sweden are greater than territorial emissions: about 93 Mt CO_2e (2019), compared with 46 Mt CO_2e (2020). However, consumption-based emissions have also decreased over time. Emissions were about 16% lower in 2020 than in 2008, which was the first year such emissions were reported.[2]

Although there are currently no set targets for consumption-based emissions, the All-Party Committee on Environmental Objectives is tasked with presenting a comprehensive strategy to reduce the climate impact of consumption.[3]

Figure 2 shows the trend for territorial emissions. Emissions have decreased gradually since the early 2000s, except in 2010, when emissions increased as a result of a rapid economic recovery following the financial crisis. A large part of the decrease since 1990 can be attributed to the reduced use of fossil fuels for electricity and heat production. Even in the transport sector, where passenger cars dominate emissions, the transition to biofuels and more efficient vehicles has helped reduce emissions. Emissions from industry and non-road mobile machinery show a similar trend, thanks to improved efficiency and a shift from fossil fuels to renewable energy sources and electricity.

Sweden's total greenhouse gas emissions were 8.9% lower in 2020 than in 2019. This was a record reduction, but it was largely due to temporary effects mainly related to the Covid-19 pandemic. This makes it difficult to make sense of the underlying emission trends based on the latest emissions statistics. The Climate Policy Council has stated in previous reports that emissions in Sweden have decreased too slowly in recent years to be in line with the climate goals.

[a] The latest available official statistics on greenhouse gas emissions are for 2020.

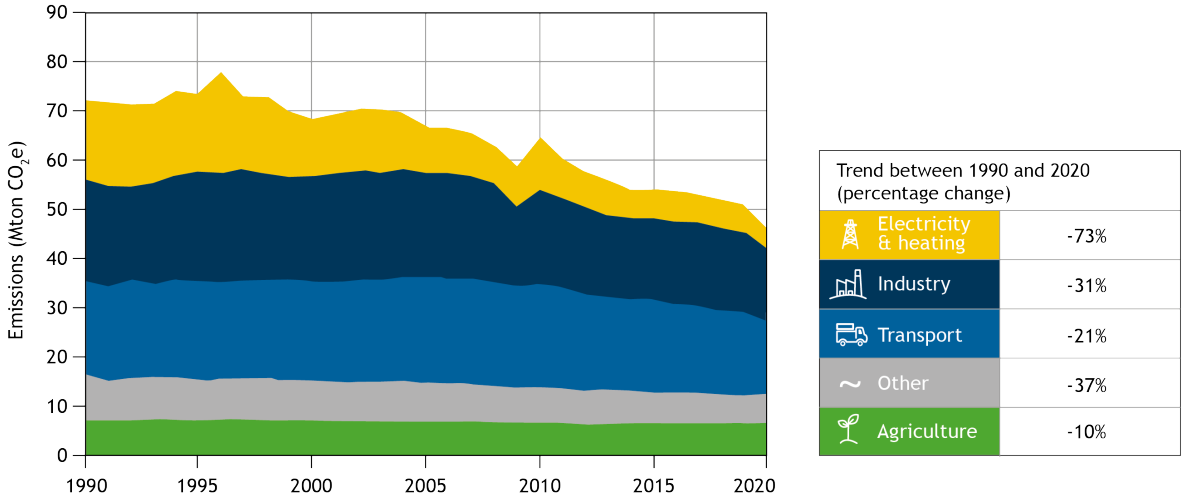


Figure 2: Sweden's greenhouse gas emissions by sector, 1990–2020, in million tonnes of CO_2 equivalent. "Other" includes emissions from solvents, fluorinated greenhouse gases, non-road mobile machinery and waste management.

Source: Swedish Environmental Protection Agency[1]

Emission trends for 2019–2020 by sector

This section describes emission trends between 2019 and 2020 in more detail. The description is based on the classifications in the climate policy framework, meaning emissions included in the EU ETS and emissions outside the EU ETS. The numbers come from the Swedish Environmental Protection Agency, which is responsible for statistics on greenhouse gas emissions. Figure 3 shows the proportion of emissions in different sectors covered by the EU ETS. Simply put, some emissions from different sources are covered by the EU ETS, while others are not. For example, larger industrial installations, electricity and district heating generation, and commercial aviation within the EU are covered. Non-ETS sectors include other types of transport, agriculture, and emissions from sources such as solvents, non-road mobile machinery and waste.

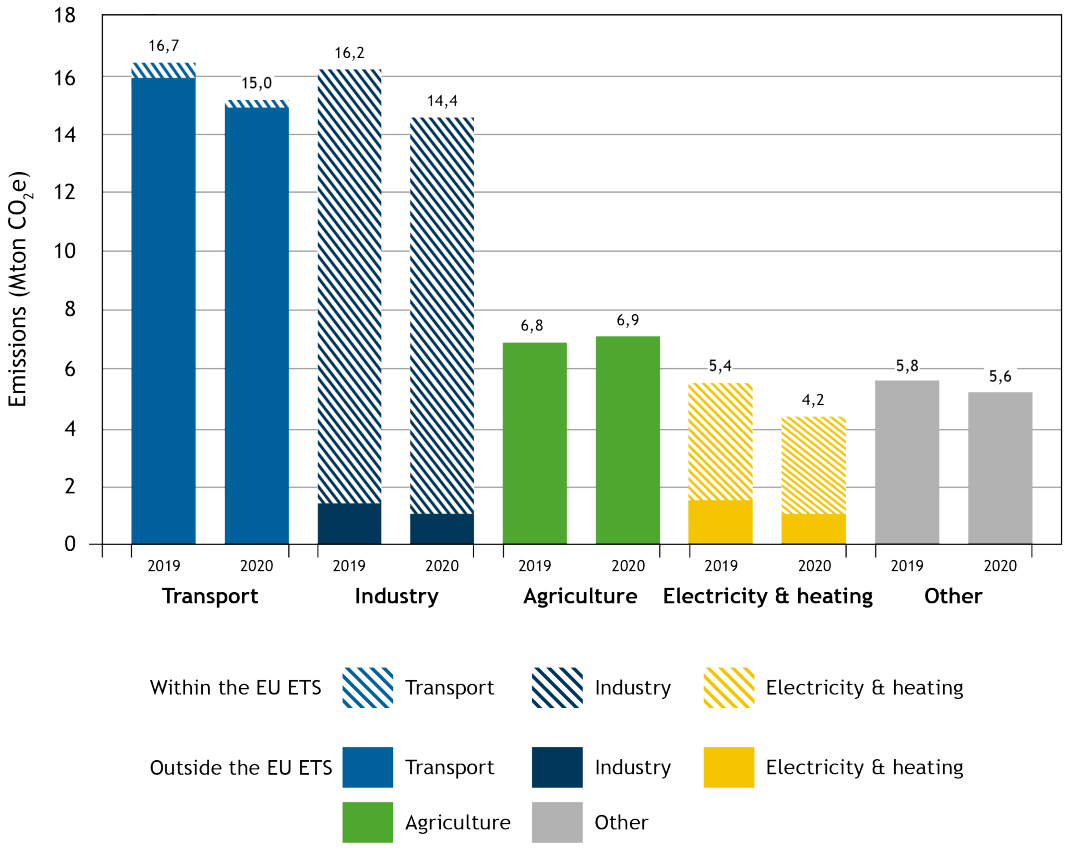


Figure 3: Sweden's territorial greenhouse gas emissions in 2020, by sector. The striped area of the bars indicates emissions included in the EU emissions trading scheme. Other emissions include emissions from solvents, non-road mobile machinery and waste.

Source: Swedish Environmental Protection Agency[1,4]

In 2020, total emissions outside the EU ETS were 29.6 Mt CO_2e. This means that Sweden reached its 2020 interim target for those emissions – a 40% reduction from 1990 levels. The target was achieved by applying flexible mechanisms (measures contributing to emission reductions in other countries) corresponding to 0.9 Mt CO_2e.

Emissions from EU ETS activities were 13.5% lower in 2020 than in 2019. Sweden's greenhouse gas emissions from the installations covered by emissions trading make up about one-third of total territorial emissions. Since the system was introduced in 2005, emissions from these installations have decreased by a total of 27.3%.[b]

Greenhouse gas emissions from electricity and district heating production included in the EU ETS were 3.2 Mt CO_2e in 2020, a 19% decrease from the previous year. This is largely explained by a record-low use of fossil fuels due to the phasing out of coal-fired plants, resulting in sustained emission reductions, but also to a reduced use of natural gas and peat.

Industrial emissions account for about one-third of Sweden's total greenhouse gas emissions and 81% of emissions under the EU ETS. Those emissions were 10% lower in 2020 than in 2019. The main reason was reduced demand for iron and steel, as well as for products from refineries.

[b] This reduction does not include aviation. With aviation included, the decrease is 28.6%.

Non-ETS emissions in 2020 were 6.2% lower than in 2019. This can largely be explained by reduced emissions from transport during the Covid-19 pandemic. Transport emissions were 9.6% lower in 2020 than in 2019, mainly due to fewer passenger car journeys and domestic flights. However, it is possible that with Covid-19 restrictions lifted, emissions will increase again.

Emissions for 2020 among the indicative emission pathways

The climate policy framework provides for what are known as indicative emission pathways, which aim to facilitate the monitoring of non-ETS emission trends for the 2030 and 2040 interim targets. These pathways are defined as a linear reduction from actual 2015 emission levels to each interim target, with a higher pathway if supplementary measures are used and a lower pathway without the use of supplementary measures. The fact that emissions are above the indicative levels in a single year does not mean that the targets will not be met, but that emissions will have to be reduced more quickly in later years. According to the climate policy framework, the Government must present an analysis and, if necessary, tighten policy if emissions exceed the indicative pathway.[5]

Between 2015 and 2016, Sweden's emissions were below the level that includes supplementary measures, but above the level without supplementary measures. Since then, emissions have also been above the level that includes supplementary measures. As a result of the temporary emission reductions in 2020, emissions once again fell between the two indicative emission pathways.

Emission trend estimates in 2021

2020 was an unforgettable year, with major emission reductions both in Sweden and the world that were brought on by the restrictions and recommendations imposed by governments and authorities to mitigate the spread of Covid-19. Both business travel and leisure travel declined, and other behaviours also changed significantly. Official emissions statistics are produced by the Swedish Environmental Protection Agency in December and refer to the previous year's emissions. In addition, the Climate Policy Council has made its own trend estimates based on fuel supply statistics.[6,7] These estimates indicate that total greenhouse gas emissions from fossil fuels in 2021 remained roughly unchanged from 2020 levels. According to the Swedish Transport Administration, traffic related work increased in 2021.[8] However, emissions from domestic transport decreased by 0.3% as biofuel blending increased.

These estimates are preliminary, but they confirm the picture that the large reduction in emissions that occurred in 2020 was, for the most part, an effect of pandemic restrictions. Since 2021 was also marked by the pandemic, it is not yet possible to grasp the final impact of recovery and assess whether emissions are at risk of increasing in 2022.

2 Assessment of the Government's climate report

Under Section 4 of the Climate Act, the Government must provide an annual climate report to Parliament.[9] The report must contain:

- A description of emission trends;
- The major climate policy decisions during the year and what these decisions can mean for emission trends;
- An assessment of the need for further actions, and when and how decisions on such actions can be taken.

In this chapter, the Climate Policy Council reviews the 2021 climate report in relation to the requirements of the act and proposes improvements to the climate report.

2.1 Climate report fulfils the requirements of the act

The Climate Policy Council has reviewed the Government's 2021 climate report, and concludes that it complies with the requirements of the Climate Act. The Government reports on emission trends up to and including 2019 and preliminary available emissions statistics for 2020. In some cases, the report includes possible explanations for changes in emissions. Furthermore, the Government presents quantitative and qualitative impact assessments of decisions taken from 1 January through 1 July 2021. The Swedish Environmental Protection Agency's background for the climate report shows how the calculations were carried out and what assumptions are behind them. For some of the reforms proposed in its Budget Bill for 2022, the Government reports an estimated effect on emissions. Finally, the Government notes that further measures are needed to achieve the climate goals beyond 2020. The Government has therefore tasked several of its agencies with developing proposals for further measures, which can serve as input to the next climate policy action plan (see section 3.4).

2.2 Transparency in climate reporting should be strengthened

Even though the climate report fulfils the requirements of the act, reporting can be developed further. The Climate Policy Council proposes four improvements:

Present the climate report at the same level as the financial plan

The Climate Policy Council reiterates its previous recommendation: The climate report should be presented at the same level as the financial plan, since the climate issue touches upon all policy areas.

As in the previous year, the 2021 climate report was presented as a sub-annex to the budget bill's annex for expenditure area 20, "General environment and nature conservation". This is despite the Climate Policy Council's previous statement that it can lead to the perception that climate goal attainment still primarily lies within the realm of environmental policy, and is not something that should inform overall policy. In its climate report, the Government lists notifications in the Budget Bill for 2022 from a total of nine different budget areas. This also underscores that the climate report belongs at the financial plan level.

Include impact assessments for proposals in the budget bill

The Climate Policy Council has previously recommended that the Government include assessments of the impact on the chances of achieving the climate targets in all government inquiries. Impact assessments should therefore be included in the regulatory framework for impact assessments, namely the Committees Ordinance. If this were the case, all policy-making input from government inquiries and agencies would contain qualitative or quantitative impact assessments. Such impact assessments are a prerequisite for the Government and Parliament to be able to assess how different decisions can affect the likelihood of achieving the climate policy goals.

The impact assessment in the climate report mainly concerns decisions already taken. The proposals presented in the budget bill concurrently with the climate report are at times accompanied by an overall impact assessment of emission reductions. The Government writes that it intends to revisit the situation with more detailed impact calculations for the proposals included in the Budget Bill for 2022.

As the Climate Policy Council has stated earlier, the impact assessments do not necessarily mean that specific emission reductions or the cost per tonne of reduced emissions must be quantified. In some cases, this is neither possible nor effective (such as for upskilling interventions and investments in pilot plants). The Climate Policy Council would like to remind the Government that the impact assessment can also be qualitative and indicate how a decision affects the chances of achieving the climate targets.

Report all emissions-impacting decisions for a specified period

The climate report mentions a decision made in 2021 that has a negative impact on emissions – namely, to pause GDP indexation of petrol and diesel taxes. If decisions that reduce the chances of achieving climate goals were also presented consistently, this would increase the ability to assess the impact of the Government's overall policy.

Furthermore, it is difficult for readers to understand what time periods are referred to in the decisions listed in the 2021 report, because different time periods are used in different parts. The report uses three different time periods for decisions (six months, full year, and one and a half years), which makes it difficult to understand the whole. In order to clarify the timeframe of the report, we propose that only one period of time be chosen for the information reported.

Systematically follow up on the climate policy action plan

There is a lack of systematic follow-up on actions in the climate policy action plan. The 2021 climate report provides a one-page overview of the implementation of the action plan. In some sections, the Government notes actions for achieving the climate targets that have been decided and announced, but these efforts are not linked to the climate policy action plan, even though they will guide the Government's work.

3 Follow-up on the Government's climate policy action plan

Under Section 5 of the Climate Act, each new government must, no later than the year after general parliamentary elections, present a climate policy action plan for its term in office. The action plan must include the government's planned climate policy actions during the term and a description of how the government believes those actions will affect the likelihood of achieving the climate targets.

By 2045, a total of seven action plans should be presented within the climate policy framework, and each must help to reduce greenhouse gas emissions and improve opportunities to achieve the climate targets (see Figure 4). As noted, in addition to the 2045 target of net-zero emissions, there are interim targets for 2030 and 2040 for non-ETS emissions. There is an interim target for transport sector emissions as well (see Figure 1 for a more detailed description of interim targets).

Since last year's review of the implementation of the action plan, a new prime minister has taken office, with a new government. Since the new government has not announced a revised climate policy action plan, the Climate Policy Council assumes that the 2019 plan will stand. In this chapter, the Council follows up on how the Government has implemented the first climate policy action plan. In particular, it highlights the actions carried out overall and the actions that remain.

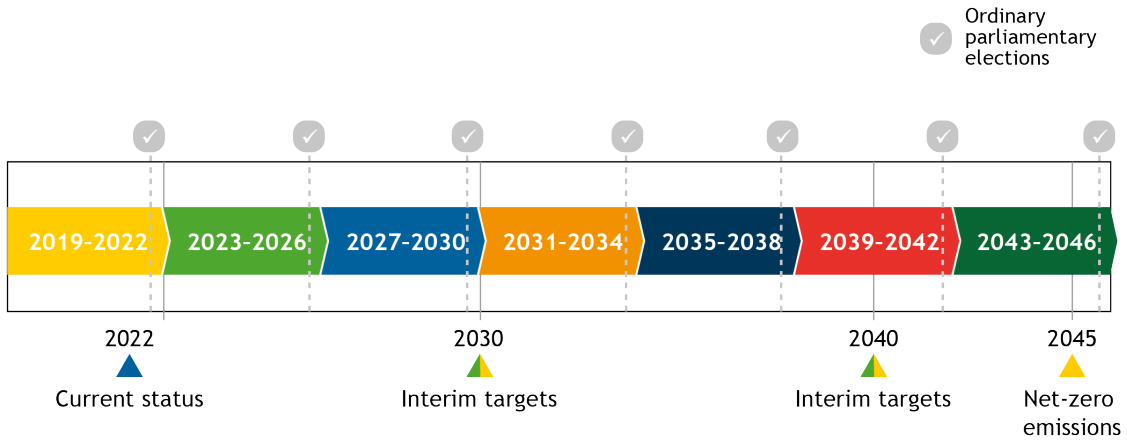


Figure 4: Schematic diagram of climate policy action plans, general parliamentary elections and climate targets through 2046. See Figure 1 for an explanation of the climate targets. The yellow part of the triangles represents supplementary measures, while green represents without additional measures.

3.1 Lack of clarity and transparency in implementation

The first action plan was presented in December 2019. It expressed a wide range of ambitions, priorities and planned actions across many different sectors, from the local to the global level. The Government Offices summarised the action plan in a memorandum listing 132 planned actions.

In its 2021 climate report, the Government expands on its description of how it will implement the action plan. However, it is not possible to ascertain what remains to be done during its term in office, or how much of the plan has already been implemented. The intention of the climate policy

framework was to approach climate policy with a long-term mindset, continuity, clarity and transparency. In its bill, the Government wrote: "A law describing the Government's climate policy efforts in a concrete and clear way also enables everyone to access information about how this work will take place. The opportunity increases to consult the regulatory framework and understand how efforts are developing and which actions should be taken next." A review of roughly 100 press releases about actions directly related to the plan shows that the Government only refers to the action plan about 10 times. There is also no compilation on the Government's website or any information about the plan's implementation, apart from the overall view provided in the climate report. The general public's awareness that a coherent plan for climate policy actions actually exists is hampered by this lack of information and transparency.

The 2020 Climate Policy Council report, which focused on the climate policy action plan, contained an overall assessment that the action plan was ambitious and broad, with many legitimate initiatives, but that it was also vague in terms of implementation details and expected effects on emissions. This made it difficult to determine to what extent and how the plan would help improve the chances of achieving the climate targets. In some cases, it is difficult to assess the extent to which the plan's goals – for example, that Sweden should push to tighten EU emissions trading – have been achieved, how active the Government has been, or what role the Government has played in any changes. Other actions listed in the plan are more specific, such as planned inquiries, government commissions, or planned decisions on new or updated policy instruments.

Overall, based on the Government's own communications, it is not possible to assess how much of the action plan has actually been implemented, or how it has affected emissions and the likelihood of achieving the targets so far. This means there is a lack of transparency and clarity around the Government's efforts to achieve the climate targets. The Climate Policy Council believes that the Government should systematically use available communication channels, such as press releases, when it takes initiatives that relate to the action plan.

3.2 Several major efforts are completed

The vast majority of the more specific efforts listed in the action plan are deemed by the Climate Policy Council to have been completed. The Government has initiated inquiries and named government commissions. It has also decided on policy instruments or plans for decisions on policy instruments in Parliament during 2022. This is a positive development. In last year's review, more than a third of the policy instrument proposals were not yet prepared for a decision. Similarly, decisions on inquiries and government commissions have largely already been made.

Appendix 1 presents all Government actions in 2021 that are relevant to the climate. Many of the actions are linked to items in the plan, but additional actions have also been carried out under this administration. Among those other measures are the establishment of a ministerial working group and the introduction of green credit guarantees.[c] [10]

The action plan includes both relatively defined measures (such as changes in the rules for the fringe benefit bike) and measures of a broader nature (such as a tax reform, or reform of societal goals). Therefore, the Climate Policy Council has followed up the Government's priorities in the plan's implementation using qualitative methods. The follow-up is reported here. Some examples of significant actions with a broad-based impacts nature are highlighted.

[c] Credit guarantees for green investments will be increased from 15 billion to 50 billion SEK in 2022. Credit guarantees can be given for industry investments in which the principal of the guaranteed loan totals at least 500 million SEK. The guarantee can cover a maximum of 80% of the guaranteed loan and have a maximum maturity of 15 years.

Green Industry Leap bolstered

The Green Industry Leap will be enhanced in 2022. The Government is increasing the budget by 50% over what was stated in the climate policy action plan: Slightly over 900 million SEK is earmarked for 2022, whereas the plan called for 600 million SEK per year. The aim is for the industrial sector to strengthen its capacity to make the necessary investments in decarbonisation. Within the framework of the Green Industry Leap, there are also investments in technologies that can lead to negative emissions.

Continued cancellation of annual emission allocations

The Government continues to cancel annual emission allocations (AEAs),[d] in line with the climate policy action plan. These involve 4.6 million AEAs under the Kyoto Protocol, which Sweden acquired through climate actions in developing countries delivered in 2019. The Government is now cancelling them, instead of reselling or crediting them to reach Sweden's national climate objectives. The Government has also decided that the entire annual surplus of AEAs under the EU's effort-sharing decision will be cancelled. The decision applies to the 2018 surplus, which included nearly 5.8 million AEAs. Sweden is the only country that has cancelled its AEA surpluses for all years under the 2013 effort-sharing decision. In recent years, France and the UK have also cancelled surpluses.

Travel allowance reform submitted for decision by Parliament

The action plan calls for a distance-based, mode-independent travel allowance to be introduced. As early as 2017, a study commission was appointed and tasked with proposing how the deduction scheme for travelling between one's residence and workplace should be revised. Its aim is to encourage travel with low greenhouse gas emissions and air pollution, while making the travel deduction easier to apply, administer and verify. A report was submitted to the Government in July 2019 that proposed abolishing the travel allowance in its current form and replacing it with a distance-based, mode-neutral tax reduction for longer business trips.[12] Just over two years later, in October 2021, the Government submitted the memorandum "Tax relief for business travel – a simpler and vehicle-neutral regulatory framework".[13] According to the Government's list of legislative proposals for spring 2022, a corresponding bill will be submitted to Parliament on 12 April 2022.

Final phase-out year for fossil fuels and new fossil-fuel-driven cars investigated – but no parliamentary proposals

In its action plan, the Government declared that an inquiry would be conducted to propose a year for phasing out fossil fuels in Sweden, analyse the conditions for introducing a national ban on sales of new petrol and diesel cars and vans, and investigate how to achieve an EU ban on new petrol and diesel car and van sales and the phase-out of fossil fuels in the EU.[e] An inquiry with this mandate was appointed in December 2019, and its report was submitted to the Government in June 2021.[14] The mandate aligns with previous recommendations from the Climate Policy Council.

[d] An annual emission allocation (AEA) is equivalent to one tonne of CO_2.

[e] In the January Agreement, a policy agreement among the Social Democrats, the Green Party, the Liberals and the Centre Party from January 2019, the corresponding wording is: "From 2030, sales of new petrol and diesel cars and vans will no longer be allowed. (Inquiry appointed in 2019. Requires the approval of the European Commission. New legislation will be adopted during the term in office). The Government will pursue a corresponding ban throughout the European Union. A year for the complete phase-out of fossil fuels will be investigated (in the same inquiry as before)."

The inquiry suggests the following:

- Fossil fuels in domestic transport and non-road mobile machinery in Sweden must be phased out by 2040. The phase-out year should be a parliamentary interim target.
- By 2030, the only new passenger cars sold should be zero-emission vehicles (ZEVs). Parliament should also set this target. The inquiry finds that a target set by Parliament can send a valuable, clear signal to manufacturers and consumers and serve as an input for national governance.
- At the EU level, the inquiry advocates taking forward a phase-in of ZEVs throughout the EU through its regulation on the CO_2 emission performance of new cars and vans.[15] According to the report, Sweden should work towards including zero-emission requirements for passenger cars in regulations by 2030 or as soon as possible thereafter, but no later than 2035. In practice, a zero-emission requirement means that passenger cars with internal combustion engines will be phased out in new car sales throughout the EU.

The results of the inquiry have been referred for consultation, and a majority of the reviewing bodies have endorsed the inquiry's proposals or endorsed them with remarks.[16] However, the Government's list of legislative proposals for spring 2022 does not contain a proposal based on the inquiry.

Public procurement using environmental requirements

The action plan states that the National Agency for Public Procurement will be tasked with submitting proposals for public procurement actions. The goal here is for public procurement processes to do more to achieve the climate policy framework goals, so that procurement efforts that provide the greatest value for money can be prioritised. The national procurement strategy already contains seven targets, one of which addresses environmentally responsible public procurement, including climate and energy perspectives.[17] The National Agency for Public Procurement has identified the areas of public procurement with the greatest climate impact:

- Transport;
- Food production;
- Services covering the operation of businesses and facilities;
- Construction contracts.

In 2020, the National Agency for Public Procurement, together with the National Board of Housing, Building and Planning, was tasked with promoting reduced climate impact in the procurement of construction, civil engineering, and real estate contracts. Construction and buildings account for about one-fifth of Sweden's territorial greenhouse gas emissions. The mission was intended to complement existing sustainability requirements in the national procurement strategy. These two agencies were to develop sustainability criteria and other methodological support in order to set higher standards for reducing environmental and climate impact during procurement.

The task was completed in December 2021. In summary, the two agencies state that comprehensive, systemic changes must be implemented in order to achieve the goal of lowering construction and building emissions through procurement.[18] In practice, this means that the expertise needed to leverage public procurement as a strategic tool for achieving the climate goals requires significant strengthening among clients as well as contractors. In addition, industry players have to develop greater coherence around terms and conditions, formats and standards, and make greater use of digital infrastructure. The report also stresses the importance of making innovation

more of an integral perspective in the procurement process. A major hurdle is the need to provide information to all target groups in the industry.

For 2022, the Government is appropriating 15 million SEK to the National Agency for Public Procurement to boost its current support. This funding also aims to enhance and deepen both basic and advanced guidance for the long term across all areas of purchasing and procurement and to cover dissemination and communication activities.[19]

3.3 Climate issues are not integrated in all relevant policy areas

The Government's climate policy action plan does not require approval by Parliament. However, the Government chose to put forward its action plan as a bill in December 2019.[20] The action plan contained only one section, section 10.1 on the integration of climate in all relevant policy areas, that called for a parliamentary decision. The Parliament decided to approve section 10.1, which makes three commitments to integrate climate issues in overall policy:

- All relevant legislation must be reviewed for the climate policy framework to have an impact.
- During the next review of each of the societal goals, the Government will, if necessary, reformulate them to achieve compatibility with the climate targets.
- The regulatory framework must be clarified so that impact assessments of the effects of climate change are conducted in the relevant policy areas.

The following sections examine actions under the three commitments in section 10.1 of the action plan, then highlight other cross-sectoral actions in the plan that have not yet been implemented.

No proposal yet for a climate-aligned Environmental Code

In the climate policy action plan, the Government states that it is important to review the integration of the climate issue in legislation and, if necessary, make adjustments to align it with the climate policy targets.

When the action plan was presented to Parliament, the Government presented an inquiry directive with the task of reviewing the Environmental Code. The inquiry would do the following:

- Make proposals on how to adapt the Environmental Code in order to provide an effective tool for achieving the climate targets.
- Identify other legislation that might be relevant for achieving the climate targets.
- Explain how the legislation is relevant to the likelihood of achieving the climate targets.
- Determine priorities based on assessments of the legislation's ability to contribute the largest, most cost-effective emission reductions for achieving the climate targets.

The inquiry, called the Climate Law Inquiry, presented its first interim report in March 2021 on how the Environmental Code should integrate climate change issues.[21] The report was released for consultation, and a response was received in October 2021.

However, the Government does not include any proposals from the Climate Law Inquiry's interim report on its list of legislative proposals for the spring of 2022. The Climate Law Inquiry will be finalised on 22 May 2022. No bill regarding the proposals from the Climate Law Inquiry is thus likely to be presented prior to the parliamentary elections.

No societal goals have been reformulated to align with the climate targets

The next item in the section of the climate policy action plan adopted by Parliament concerns the societal goals.[f] The Government has not presented any proposals for reformulating the societal goals in light of the climate targets since the climate policy action plan was presented in 2019. The targets for tourism policy and total defence were reformulated in 2021, but no bill makes any mention of the connection to the climate policy goals or reference to the goals of the climate policy action plan.[22] [23] The same was true when Parliament set a new target for export and investment promotion in foreign trade.[24] The new target highlights sustainability, but not the climate explicitly.

Societal goals are binding parliamentary targets for the policy areas, and they usually apply over more than one administration. In its climate policy action plan, the Government writes that "a review of each societal goal is a natural next step in the integration of the climate targets in the goals for each policy area. Better coordination between the climate targets and other societal goals can reduce the risk of conflict and enable synergies. Climate and environmental issues must continue to be integrated in the efforts of all policy areas and sectors and at all levels of society. In order for this to be done effectively, the goals decided by Parliament for each policy area should, if necessary, be reformulated during the next review of each goal to align with the climate goals."

Section 3 of the Climate Act also clarifies that the climate policy goals and budget policy goals must work together. According to Section 3 of the Budget Act, the Government must report in the budget bill the results of activities achieved in relation to the goals decided by Parliament. In the action plan, the Government announces that it intends to get back to Parliament at a later stage with proposals for new goal formulations in each policy area.

Because there is no overview of the societal goals, it is more difficult to follow up on this item in the action plan. However, the societal goals can be found in the budget bill under each expenditure area. A first step would be to increase transparency and make these goals easily accessible to citizens. The action plan highlights transport policy, industrial policy, agriculture and forestry policy, and housing policy as examples of policy areas in which societal goals involve synergies as well as conflicts with the climate targets. It would therefore be desirable for the Government to review the extent to which these are compatible with the climate targets. The Swedish National Audit Office has also commented that the Government has not been clear enough about how the climate targets should be coordinated with other societal goals.[25] The Climate Policy Council notes that, for example, the current business policy goals lack sustainability or climate considerations.

No clarification of the regulatory framework for impact assessments

The Government has not yet decided on any change to either the Committees Ordinance or the Ordinance on Regulatory Impact Assessment. The Climate Policy Council considers this to be remarkable for an issue which the government has prioritised and which lies entirely within the Government's control.

The Government states in the climate policy action plan that a starting point for integrating climate considerations in all relevant policy areas is that the consequences of greenhouse gas emissions are analysed and included in policy-making inputs. The Climate Policy Council agrees, and in its annual reports has repeatedly called attention to the importance of inputs for governmental policy, including implications for achieving the climate targets (see also section 2.2). In the climate policy action plan, the Government announced that the proposal from the All-Party Committee on

[f] Both binding parliamentary targets and binding government targets exist. The climate action plan refers to the binding parliamentary targets.

Environmental Objectives for an impact assessment that takes climate impacts into account will be included in the Committees Ordinance and the Ordinance on Regulatory Impact Assessment. According to the action plan, a review of the Committees Ordinance had begun before the action plan was presented.

No comprehensive tax reform has been implemented

The Government has not taken concrete steps to bring about tax reform during its term in office. Overall, the Climate Policy Council considers that parts of a green tax reform have been implemented, but not to an extent that can be considered impactful.

The last comprehensive tax reform in Sweden was carried out in the early 1990s, and a discussion about the need for a new tax reform has been underway for several years. In the action plan (section 10.2, page 52), the Government writes: "A comprehensive tax reform should be implemented that should, among other things, contribute to achieving climate and environmental goals. The share of environmental taxes in tax revenues should increase. An impactful green tax reform should be implemented, with higher environmental taxes in exchange for lower taxes on labour and business."

The Government has implemented several taxation changes during its term in office, some of which are relevant to the climate, such as tightening of the bonus–malus system, a tax reduction for green technology installations, the introduction of a waste incineration tax, and tax breaks for employer-provided bicycle benefits. However, these are not broad-based enough to constitute a comprehensive tax reform.

The climate policy action plan does not define how large a green tax reform must be to be considered impactful. The 2019 January Agreement also contains wording on a green tax reform.[g] [26] The target of the January Agreement was set at 15 billion SEK. The Government has previously communicated that it considers that it has implemented a green tax reform on the order of 10 billion SEK. The reduced carbon tax on petrol and diesel, which was decided by Parliament against the Government's budget bill (see Table 1, Chapter 6), entails a tax reform of roughly 2.5 billion SEK in the direction opposite of a green tax reform.

The Expert Group on Public Economics (ESO) is an independent committee under the Ministry of Finance tasked with providing input on socio-economic and fiscal policy decisions. In 2020, ESO presented a proposal for a new tax reform.[27] Among other topics, this proposal highlights environmental taxes as crucial components of a strategy for a sustainable transformation while simultaneously raising a warning flag. A large-scale tax reform is not compatible with fiscal neutrality, since green taxes eventually erode their own tax base. The more successful they are as environmental taxes, the lower the revenue they provide over time. The Swedish Fiscal Policy Council, a state agency tasked with conducting an independent review of the Government's fiscal policy, has also published a special study on a new tax reform.[28] The Fiscal Policy Council underscores that calls for a tax reform have been heard from various sources, and it also makes reference to the January Agreement, which contained a point on tax reform.

[g] The January Agreement is the policy agreement concluded among the Social Democrats, the Green Party, the Liberals and the Centre Party in January 2019. The agreement consists of 73 points. Point 4 refers to tax reform and point 5 to a green tax reform.

Insufficient preparation for a reform of road transport taxation

The Government has appointed an inquiry into environmental control systems for road freight transport.[29] A final report will be submitted on 31 March 2022. As regards light commercial vehicles, no preparatory work has begun on reformed taxation.

In the climate policy action plan, the Government writes that a reform of road transport taxation should be prepared. The reform must be grounded in increased electrification and the use of autonomous vehicles, while promoting regional fairness. Since 2019, the Climate Policy Council has stressed the importance of starting work on reforming road transport taxation. This will take time and, as the pace of electrification ramps up, will become a necessity.

According to the principles for transport policy, transport must bear its socio-economic costs. This means that external costs generated by transport (in the form of health effects, environmental damage, accidents, road wear and more) must be internalised in road transport taxation. There is broad political consensus behind this principle, but today's taxes are not designed in a way that entails full internalisation.[30] Addressing the weaknesses in transport taxation and successfully contributing to the climate policy goals will require more sweeping reforms.

Climate targets not central to transport infrastructure planning

The Government's ambition to make climate targets a central point of departure for transport infrastructure planning does not yet appear to have brought about specific changes to the process, or to traffic planning in general.

The climate policy action plan states that the transport sector's evolution is one of the essential factors influencing greenhouse gas emission trends from the transport sector for 2030 and 2045. The Government adds that "transport infrastructure planning is a vital tool for achieving transport policy goals, including the interim target for domestic transport, and can contribute to achieving the long-term climate target for 2045. The climate targets are a central starting point for future government planning of transport infrastructure. Input for infrastructure planning should thus demonstrate how policy instruments and other measures aimed at reducing transport's climate impact are expected to affect demand for transport, and how different investments in transport infrastructure affect the potential to achieve our climate targets."

The Climate Policy Council and several government agencies and research projects have indicated the need to change transport planning in order to direct government investments in transport towards a more transport-efficient society that has lower emissions.[31-35] The Swedish Transport Administration itself has underscored the need for a highly developed planning process that more tightly integrates transport planning than the current plan does. In its Budget Bill for 2022, the Government took a step in this direction by making the 2030 climate target for domestic transport also an interim target within the transport policy objectives.

In last year's report, the Climate Policy Council criticised the fact that the orientation document from the Swedish Transport Administration which preceded the infrastructure bill provided relatively great scope for the climate targets, but the transport administration assumed that the targets would essentially be achieved through measures other than through transport and community planning.[35-39] However, a broad consultation opinion did not share the Swedish Transport Administration's view. Neither the result of the collaborative agency project SOFT nor the Swedish Transport Administration's previous proposal for reformed planning seems to have made any major impact on the orientation document.[40 41]

The Climate Policy Council recommended that the Government recast the infrastructure bill because the transport administration's orientation document should not form the basis for such a major long-term decision, especially considering that the consultation showed considerable disagreement among government agencies. Yet the Government has not recast the bill. The Government presented an infrastructure bill in the spring of 2021, and Parliament approved the bill's fiscal framework in the summer of 2021. Based on the bill, the Swedish Transport Administration has developed a proposal for a national infrastructure plan for the period 2022–2033, which was submitted to the Government in November 2021. At the same time, the proposed plan was released for external review. The national infrastructure plan is therefore based on the assumption that it essentially cannot provide measures for achieving the climate targets. This plan will steer investments in transport infrastructure for at least half the period remaining until 2045, when the transport sector is to have achieved zero greenhouse gas emissions.

During the spring of 2022, the Government is expected to take a decision on the content of the plan. It is worrying that another planning period is at risk of elapsing without transport planning being significantly aligned with the intentions of the climate policy framework.

In its 2022 appropriation directions, the Government issued a separate mandate to the Swedish Transport Administration to report on different types of measures that can affect transport demand and choice of transport modes (step 1 measures) or involve using existing infrastructure more efficiently (step 2 measures). The focus of the mandate is to analyse which of these measures can be financed using funds from the national transport infrastructure plan and from the county plans for regional transport infrastructure, as well as which cannot be financed in this way, and why. Taxes are exempted from the mandate. The mandate must be carried out in dialogue with the regions and the Swedish Association of Local Authorities and Regions and must be reported by 21 January 2023.[42] The Climate Law Inquiry has announced that its final report will include a legislative review of measures for a more transport-efficient society.

3.4 Input for the next action plan is developed

The next action plan, according to the Climate Act, will be submitted to Parliament the year after the general parliamentary elections. This means that the next government must present its climate policy action plan by December 2023. In April 2021, in order to enable the next government to develop a well-grounded action plan, the Government issued a coordination mandate to three state agencies to produce background input containing proposed measures.

- The agency Transport Analysis has been assigned coordination responsibility for the transport sector's transformation.
- The County Administrative Board of Uppsala has coordination responsibility for regional and local transformation.
- The Swedish Agency for Growth Policy Analysis has coordination responsibility for the business sector's transformation.

The outcomes of the mandate must be reported to the Government on 15 September 2022 and at the same time sent out for review. Responses must be received by 15 December 2022. Current forecasts and current emissions statistics must be delivered by the Swedish Environmental Protection Agency by 15 March 2023.

In other words, policy input containing proposals will be in place around the same time as the parliamentary elections and the formation of the new government. The rapid development of a new action plan will allow more time to implement the plan under the next administration.

4 EU policy for achieving the climate targets

After EU Member States agreed on the goal to make Europe the world's first carbon-neutral continent, a climate law with stricter interim targets for 2030 was decided in April 2021. The European Commission then presented a highly comprehensive reform agenda with the aim of achieving the stricter targets. It is said to be the EU's biggest legislative package ever.

The new reform package, called "Fit for 55", or the "55% package", imposes substantially more and stricter targets on EU Member States as well as proposals for more common EU-wide instruments, in particular new trading systems for transport and buildings.

The EU's most prominent role in climate policy has so far been to set common goals for the EU, sometimes broken down into targets for Member States. The states themselves are primarily responsible for designing policy instruments to achieve the targets, with one notable exception: the EU ETS. The EU has also taken joint decisions on product standards in the common market, such as vehicle emission standards and rules for a common electricity market.

Negotiations on the various parts of the Fit for 55 package will take place among EU Member States, the European Commission and the European Parliament throughout 2022 and almost certainly into the Swedish EU Presidency in the first half of 2023. To a large extent, the package involves updating and tightening current legislation, strategies and goals. It is too early to assess the outcome of this whole process, but the EU will surely play a much greater role in the future than it does now in determining the political conditions for Sweden's climate transition. The EU's reform process and its leading global role in achieving the Paris Agreement goals provide an opportunity for Sweden to make a more substantial contribution to the global climate transition. An earlier example of this was Sweden's proactive participation in the EU ETS reform.

4.1 Raised ambition levels propel a green reform wave

In April 2021, the EU adopted a new climate law requiring a 55% reduction in its net greenhouse gas emissions by 2030 compared with 1990 levels. This is a tightening of the previous target of 40% by 2030. The goal is a so-called net target, meaning that both emissions and removals are included. By 2050, the EU must have achieved climate neutrality and then have negative emissions.

Back in 2019, the EU laid the foundations for comprehensive reforms within climate change, energy, biodiversity, resource efficiency and circular economy through the Green Deal, its comprehensive sustainable development strategy. The Green Deal aims to transform the EU into a competitive, resource-efficient economy that produces no net greenhouse gas emissions by 2050 and that decouples economic growth from increased resource consumption.

As the starting point, all EU actions and policies should help the EU to achieve the Paris Agreement goals and to make it the world's first climate-neutral continent by 2050. The tightened emission targets formed the basis of the EU's updated nationally determined contribution, which was submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) at the end of 2020.

In June 2020, the EU decided that the Green Deal should guide recovery policy (and the long-term budget) following the post-pandemic crisis. Its aim is to steer towards both rapid economic recovery and green growth, and thus a more sustainable, resilient Europe. The new Climate Law, which forms the core of the Green Deal, will make the EU's climate targets legally binding. Below

are several components of the Fit for 55 package that the Climate Policy Council believes will be highly relevant for Sweden's climate transition.

EU ETS to be tightened

The European Commission proposes to tighten the overall target for the trading sectors from 43% to 61% lower emissions by 2030 (from the current reduction factor of 2.2% to 4.2% per year). This will be accomplished through a combination of a one-time reduction and a steeper linear reduction factor. It is proposed that the ratio between free allocation and auctioning remain unchanged, but the free allocation is to be reduced through tougher benchmarks and free allocation terms. The proposal also recommends the inclusion of maritime transport in the EU ETS.

At the same time, the European Commission is proposing a new, parallel ETS for the road transport and building sectors, even if these sectors remain within the effort-sharing regulation (ESR). The ESR target is proposed to be tightened from a 30% to a 40% reduction in emissions by 2030.[43.44]

The EU ETS encompasses approximately 13,000 major industrial and energy installations across the EU. This represents about 45% of total greenhouse gas emissions in the EU. Emissions in the trading system depend on the total number of allowances allocated to operators in the system. The number of allowances decreases over time, creating incentives for operators to reduce their use of energy from fossil fuels. In addition to the trading system, the ESR covers emissions outside the trading system.

Renewable energy directive tightened

The European Commission's proposal for a review of the Renewable Energy Directive includes raising the EU's 2030 target for its share of renewable energy from 32% to 40%. The interim targets for the heating/cooling and transport sectors will be adjusted upwards. Furthermore, measures to promote hydrogen in the transport and industrial sectors are proposed, as are measures to promote energy system integration and increased cooperation among Member States on renewable energy production. The proposal also requires national grid operators and grid owners to provide real-time data on their share of renewable energy and climate performance. Stricter sustainability requirements and improved bioenergy reporting are also included in the proposal. For example, biomass for bioenergy should not be extracted from forests with high natural value, and biofuel grants must not be given for parts of trees that can instead be used as sawlogs (according to the "cascade principle"). Reporting on sustainability criteria for solid biofuels is also being tightened. For example, simplified verification of the fuel's origin for countries with national regulations is being removed.

A new border adjustment mechanism

A new border tax known as the carbon border adjustment mechanism is being proposed for goods imported to the EU for enterprises exposed to competition. Imported goods will be taxed based on their carbon footprint. The idea is that by setting a price on imports of carbon-intensive goods, the mechanism will promote competitive neutrality among companies within and outside the EU, thereby reducing the risk of potential carbon leakage from the EU. The carbon price applies only to EU imports, and no discounts are proposed for European exports, since this would go against World Trade Organization (WTO) rules.

A decision by the EU is scheduled for the spring of 2022. The proposal entails a transitional phase during 2023–2025 in order to enable full implementation starting in 2026. This mechanism intends to replace the free allocation of emission allowances to industries facing competition. An incremental phase-out of the free allocation is proposed for 2035. Initially, five sectors will be covered: cement, iron and steel, aluminium, electricity and fertilisers.

Revision of the Energy Taxation Directive

Taxation of energy products and electricity plays a key role in climate and energy policies. The current Energy Tax Directive is no longer compatible with the EU's climate goals and must therefore be revised and aligned with energy and climate policies.

The proposal will broaden the tax base by providing a tax exemption or reduction for more types of fuel, such as renewable electricity, electricity produced in some combined heat and power plants, renewable hydrogen, and advanced biofuels and biogas. In parallel, the number of exemptions will be reduced for fossil fuel consumption.

Other regulations currently under review are the EU's state aid rules. As a result of the review, the European Commission has a new proposal stating that at least 20% of national tax levels must be levied for the aid to be considered proportionate in the event of a tax reduction. This could have implications for the practical application of the Energy Tax Directive – for example, in exempting certain fuels. The proposal can also affect how the tax is differentiated between households and industry in the future. Several previous attempts to update the Energy Tax Directive since its passage in 2003 have failed.

Revision of the LULUCF Regulation

The land use, land-use change and forestry (LULUCF) sector is included in the EU's new climate targets.

The proposal sets a new target for annual net removal of greenhouse gases from land use and forestry during 2026–2030. Within a national distribution of the EU's net removals, it is proposed that Sweden receive a commitment of approximately 47 million tonnes annually. From 2031, an expansion of the LULCF sector is proposed in order to include other emissions from agriculture with the aim of achieving climate neutrality in LULCF activities by 2035. Measures that can increase net removals include afforestation, increased carbon sequestration in agricultural and forest lands, growth-enhancing measures or reduced logging levels in forests, and an increased use of more long-lasting wood products.

Tightened Energy Efficiency Directive

The Energy Efficiency Directive, last revised in 2018, requires Member States to set indicative national energy efficiency targets to enable the EU to reach its overarching goal of reducing energy consumption by 32.5% by 2030 compared with the baseline forecast for that same year. For the period 2021–2030, each EU country must draw up a 10-year integrated national energy and climate plan outlining how it intends to achieve its energy efficiency targets for 2030.

The EU is now proposing to raise the reduction target for primary and final energy use to 39% and 36%, respectively, by 2030. The proposal also calls for each Member State to set its indicative national contributions, stricter energy efficiency requirements for the public sector and the heating/cooling sectors, increased protection against energy poverty, and changes to the

requirements for energy management systems and energy audits for companies. The European Commission estimates that with these new targets, Member States will need to more than double their rate of efficiency improvements, from 0.8% per year under the previous target, to 1.5% by 2030.

Revision of the Directive on the Deployment of Alternative Fuels Infrastructure

The European Commission is proposing a revision of the Directive on the Deployment of Alternative Fuels Infrastructure. The overall aim of the proposal is to provide an accessible, usable alternative fuel infrastructure across the EU. A special focus is placed on increasing the capabilities to use electric vehicles throughout the Union. The proposal therefore includes binding targets for Member States to expand public charging infrastructure along road networks. They must secure enough publicly available recharging stations with sufficient power relative to the number of rechargeable light- and heavy-duty vehicles in traffic. The proposal also prescribes specific power supply requirements for the recharging points, with increasing requirements over time. Recharging prices should be clear, reasonable, transparent, comparable and non-discriminatory. Recharging points must be equipped with smart power meters. The proposal also includes binding targets for the expansion of hydrogen refuelling points and liquefied natural gas (LNG) bunkering infrastructure for ships by 2025.

In addition, the proposed new directive contains more far-reaching and specific requirements for Member States regarding access to onshore power in ports and electricity for parked aircraft. The current requirement remains for Member States to develop national action plans and report progress to the European Commission. The Commission estimates that by 2050, the total investment and operating costs of user-friendly infrastructure in the EU will be slightly over 60 billion EUR. The majority of this cost will be for infrastructure along the road network, with roughly 6 billion EUR for maritime infrastructure and 1 billion EUR for airports. Investment from both private and public operators will be needed, but over time public investment should be reduced.

4.2 The EU's forestry strategy and taxonomy are key for Sweden

The European Green Deal is larger than the Fit for 55 package, and it contains additional proposals for tougher policies. Two key policy issues that are particularly relevant to Sweden are the EU's forest strategy and green taxonomy.

Revision of EU forest strategy

Part of the Green Deal, the EU forest strategy builds on the EU biodiversity strategy for 2030 and the Fit for 55 package. The biodiversity strategy sets out a vision and concrete actions for increasing the quantity and quality of forests in the EU and strengthening their protection, restoration and resilience.

The forest strategy is now being revised, and the proposed actions will increase carbon sequestration through enhanced sinks and stocks, thus contributing to climate change mitigation. The strategy also commits to strictly protecting primary and old-growth forests, restoring degraded forests and ensuring that they are managed sustainably. The goal is to preserve the vital ecosystem services that forests provide and on which society depends. The new forest strategy emphasises the

need to keep the use of woody biomass within sustainability boundaries and encourages resource-efficient wood use in line with the cascade principle.[h]

The new forest strategy proposes developing payment schemes for forest owners and managers for providing alternative ecosystem services – for example, by keeping parts of their forests intact. Among others, the new common agricultural policy (CAP) provides the opportunity to offer more targeted support to foresters and to the sustainable development of forests. The new forest strategy announces a new legislative proposal to step up forest monitoring, reporting and data collection in the EU. Harmonised EU data collection, combined with strategic planning at the member state level, will provide a comprehensive picture of the status, the evolution and the outlook envisioned for forests in the EU.

The EU's green taxonomy

In order for the EU to meet its climate and Green Deal targets, investments must be directed towards more sustainable projects and activities. To achieve this, investors, companies and policy-makers need to be able to identify and compare investments based on common definitions of what is considered environmentally sustainable. The EU has therefore created a new classification system for sustainable economic activities called the EU taxonomy. In order for an activity to be classified as environmentally sustainable, it must:

- Contribute substantially to one or more of six established environmental objectives;
- Not cause significant harm to any of the other objectives;
- Meet certain minimum sustainability requirements.

What constitutes a "substantial contribution" and "significant harm" for different economic activities must be made more granular through so-called calibrated technical screening criteria and determined by the European Commission in delegated acts to the Regulation. The seven macro sectors covered by the taxonomy are:

- Agriculture, forestry and fishing;
- Manufacturing;
- Electricity, gas, steam and air conditioning supply;
- Water, sewerage, waste and remediation;
- Transportation and storage;
- Information and communication technology (ICT);
- Buildings.

The idea is for the taxonomy to form the basis for future standards and labelling of sustainable financial products. Standards and labelling, in turn, should lead to greater transparency in companies and their operations. The sectors covered in the taxonomy are estimated to represent around 40% of listed companies and 80% of direct emissions in the EU.

[h] The cascade principle specifies a priority order for the use of raw materials to achieve resource efficiency. For example, wood should first be used to make products having the most valuable purpose possible, and then recycled or reused and, finally, used for energy as a last resort.

4.3 The Government is supportive with a few exceptions

Sweden has generally been in favour of the raised ambitions and higher targets in Fit for 55. The Government also takes a cautiously positive approach to key policy proposals, such as the new trading system and carbon border adjustment mechanism.

On the other hand, the Government has been critical of what it perceives as unnecessary detailed regulation at the EU level. In the Government's view, detailed regulation increases socio-economic costs, and it risks becoming poorly adapted to shifting local conditions. The clearest criticism from the Swedish Government has been directed at the proposals concerning forests in the LULUCF regulation, the forest strategy and the EU taxonomy. The Government considers that the proposals have not been adapted for Nordic forestry and, on the contrary, make it difficult for Sweden to achieve the climate targets, as it takes an unbalanced view of the forest's different roles in the climate transition. In this context, it can be noted that the EU's climate goals, with specific LULUCF targets, are designed differently than the Swedish ones, which may have an impact on Sweden's forest and climate policies, although it is still too early to say how.

The Swedish Government maintains its fundamental critical stance on expanding the EU budget, which is reflected in the fact that Sweden is among the countries that are against increasing EU-wide funding to address the climate transition's social consequences. The Government believes that this should essentially be a matter of domestic policy.

While the negotiations are underway, and in parallel with national impact assessments, the current proposals are constantly evolving, as are the positions of Member States. In preparing this report, the Climate Policy Council has not further analysed the Swedish Government's positions in the negotiations or how its actions affect the chances of achieving the climate targets. Some individual issues are addressed in Part II of this report.

Part II

Transition policy for achieving the climate targets

5 The role of policy in the climate transition

Reducing greenhouse gas emissions to net zero represents a major shift in society – a transformation.[i] In this report, we use the phrase "climate transition" to describe that transformation, one that shifts from a reliance on fossil fuels to a decarbonised society that limits global warming to 1.5°C, as envisioned in the Paris Agreement, and has the potential to create sustainable prosperity and well-being.

Several transitions earlier in history have had the same transformative nature, although they have not been as extensive and rapid. Some examples of transformations are the shift from an agricultural society based on bioenergy to an industrial society based on fossil fuels, Sweden's evolution from being a society with significant inequality to a modern welfare nation, and the digitalisation that is currently taking place.

The transformation to a decarbonised world has been taking place for a long time. The large-scale development of wind and solar power we see today is the result of initiatives that began several decades ago. Heating in Sweden has gone from about 80% using energy from fossil fuels in the early 1970s to about 90% clean energy today.[45] From the beginning, this trend was driven by reasons other than fighting climate change. Instead, it was about reducing vulnerability, geopolitics, human health and industrial competitiveness. Today, climate change affects us directly in different ways, so we need to adapt communities to the new conditions while shifting away from fossil fuel use. The climate transition is interlinked with other societal goals, including strong ties to the UN's 2030 Agenda and Sustainable Development Goals, as well as other transformative changes, such as digitalisation. Different goals can conflict, so we must prioritise. Still, there is potential for crucial synergies that can accelerate the transformation.

The climate transition has some special features:

- It has a long-term target based on science and political agreements, such as the Paris accord. The climate transition is thus not primarily driven by spontaneous advances in technology or social and economic changes, but by conscious, normative positions. We desire a transition based on certain premises, such as the need to end our use of fossil fuels.[j]
- It has a specified time frame based on the Paris Agreement. UN member states have agreed to keep global warming well below 2°C and, if possible, no more than 1.5°C. By historical standards, the timeframe is extremely tight time. The transition to our current dependence on energy from fossil fuels continued for more than 100 years, and now about three decades remain to put an end to it.
- The consequences of acting or not acting are global, shared by everyone, and they involve both short-term and long-term impacts. The long-term costs associated with global warming are easily underestimated. The incentives for individual actors will be significantly weaker than during the Covid-19 pandemic, for example, when local actions quickly brought about local effects.

[i] In the chapters that follow, the Climate Policy Council uses as its starting point the analytical framework that forms the theoretical and methodological basis for the Council's understanding of a climate transition and how the Government's overall policy should be evaluated based on our mandate. The framework is based on a broad analysis from many different scientific disciplines and summarises our understanding of what an effective transition policy should consider. It is updated regularly. We do not repeat these starting points in this report, but we note that Chapter 5 is based on the Climate Policy Council's overall assessment. The Climate Policy Council's 2020 Report provides an in-depth description of the framework, starting points and related references.

[j] The changes needed for such a targeted transition throughout society require clear strategic direction – an established idea in innovation and transitions research.

5.1 The interplay of global and national politics

Global policy lacks global or supranational authority; instead, policy-making power lies with individual sovereign states. Those states have the power to make global agreements and establish global institutions through international negotiations thanks to the principle of consensus.

The Kyoto Protocol under the UNFCCC contains jointly agreed, time-bound emission reduction targets for the industrialised countries that have ratified the agreement. Ahead of the Copenhagen Conference of the Parties in 2009 (COP15), the goal was to decide on a new, globally binding intergovernmental agreement to replace the Kyoto Protocol beyond 2021. Instead, the summit resulted in the Copenhagen Agreement, which was based on countries' voluntary pledges for national emission reductions. This bottom-up approach resurfaced in later summits and laid the groundwork for the 2015 Paris Agreement. The Paris Agreement sets out a shared overarching goal of limiting global warming to well below 2°C through voluntary national climate commitments called nationally determined contributions (NDCs). Decisions were also taken concerning rules for transparency and a mechanism for recurring evaluations and updates to these NDCs. Since the Paris Agreement, the ambition has also been to rally stakeholders other than the UN member states, such as companies, regions and cities, in various ways, especially through the annual climate summits.[46] This is the basis of the Paris Agreement, which global cooperation around climate change now rests on.

The member nations are, and remain, key players in the global fight against climate change. This does not mean that their national climate policies are national in a narrow sense. On the contrary, their goals and efforts contribute to the common global will to change. The EU brings together all of its Member States' NDCs in a joint submission to the UN. Therefore, Sweden does not submit its own national climate plan to the UN. As stated in Chapter 4, more and more climate policy instruments are now being developed at the European level.

There is no review of whether the goals and strategies of different countries are sufficient, but instead each state decides on its own commitments. However, like the UN's climate change convention, the Paris Agreement contains a fundamental principle of "common but differentiated responsibilities and respective capabilities, in the light of different national circumstances", meaning that responsibility and commitments should differ depending on each country's own situation. In the context of the first five-year audit of national commitments in 2021, many countries raised their targets and levels of ambition to achieve them. Almost all major emitters have now set different types of net-zero targets, including China and India. The different targets are not always comparable, and the amount of emissions over time also partly depends on how fast and when emissions decline between current levels and net zero. It is not always clear how quickly this will happen. Overall, the commitments are still insufficient to keep the global temperature rise to a maximum of 1.5°C or well below 2°C, and implementation is uncertain.[k] An important result of the UN's annual climate change conference in 2021 (COP26 in Glasgow) was to call on member states to update and raise their ambition levels more quickly, ahead of the 2022 climate conference, COP27, which will be held in Egypt.

In conclusion, the global climate transition essentially depends on nationally determined goals and policies for achieving them, and although overall ambitions have increased recently, they are not

[k] According to the UNFCCC Secretariat's summary of NDCs received as of October 2021, they hardly suffice to keep the temperature increase below 2°C. Estimates by the International Energy Agency (IEA), which adds other commitments and agreements in connection with the Glasgow conference in November, are somewhat more optimistic and suggest that if all this is realised, the temperature rise could be kept below 2°C.

yet sufficient for achieving the Paris Agreement's goals. The transition must accelerate significantly in the coming years.[47]

5.2 Policy has to address conflicts of interest and lay the foundation

Major transformations in society are complex, dynamic processes that take place in interaction and competition among many stakeholders, interests, institutions and ideas. Climate change is no exception. Indeed, the complexity is particularly high, because it involves considering the interests of local communities as well as global interests. In addition, the climate transition affects current and future generations as well as nature itself, which has inherent value. Although a successful climate transition will ultimately benefit society as a whole, we can expect both winners and losers during the transition. Through the structural transformation of society and the economy, some activities, technologies and industries will become obsolete and eventually cease to exist, while others will benefit and expand, and some new ones will emerge.

Policy plays a central role in addressing such conflicts of interest. It is the task of policy to create the foundation for citizens and organisations to bring about change, by adapting institutions and legislation. In the climate transition, the role of policy becomes especially clear, since the transition is driven by political objectives translated into policy measures. Politicians must formulate a vision of a zero-carbon world and lead the way towards that vision with balanced, fact-based regulations, legislation, funding and institutional reforms.

Pricing greenhouse gas emissions

Multi-level policy-making – domestically, within the EU and globally – is important for addressing the dilemma of collective action posed by climate change, namely the choice between acting in short-term self-interest versus the longer-term common good. From an economic perspective, the dilemma of collective action can lead to a "tragedy of the commons", when a collective good everyone has free access to – such as air – risks being overused. The environmental impact becomes a "negative externality" that is not visible in the price of a litre of petrol or a barrel of oil. Putting a price on this environmental impact – for example, through taxes or emission allowances – becomes a way for a state to become a co-owner of the public asset. The cost of disrupting the climate comes at a price and creates incentives to avoid environmental impact.

Such fundamental economic policy instruments are vital tools in the climate transition. They can act as common signals that drive developments in a specific direction, without the policy regulation of individual stakeholders and choices. The Swedish carbon tax, which has been in existence since 1991 and has been incrementally increased since then, is a good example of such a policy instrument. In particular, it has helped to phase out fossil fuels for heating. Another example is the European emissions trading system, the EU ETS.

With the bottom-up approach of global cooperation on the climate transition, it is less likely that a global price for greenhouse gas emissions would come about through a single decision from above. Rather, global carbon pricing is likely to develop primarily from the bottom up, as is happening in more and more countries. Positive examples of carbon taxation can be shared, and national emissions trading schemes can be linked. An example of bottom-up dissemination of instruments is Germany's feed-in tariffs for solar electricity, by which solar power producers obtain financially advantageous, long-term agreements. What began in a handful of cities then spread to about 40 and eventually to the federal level, and from there to many other countries.

A broad policy portfolio for technological innovation

There are other ways that policy can address the collective dilemma or manage public assets. States can, for example, issue bans or impose regulations, standards or other kinds of incentives.[l] But a single measure, such as putting a price on greenhouse gas emissions, is not enough to single-handedly accelerate the climate transition. Other instruments are also needed. The reasons are twofold: There are other obstacles to the transition than distorted price relationships, and in practice it can be difficult to put a sufficiently high price on emissions.

One obstacle is that the climate transition requires new technologies and a radical change to multiple technological systems, not just incremental progress. Generic economic instruments rarely create sufficient incentives to achieve such technological developments. The risks to investments are high, and there are "positive externalities": investors take all the risks, but still do not reap the full benefits if the investment succeeds, because the value of new knowledge and new markets will also benefit others. This leads to underinvestment by the private sector, from a societal perspective. For a new technology to become financially competitive, learning and sufficiently large-scale production are needed, which can take several decades to develop. This is an example of what is known as path dependence and technology lock-in. The new technology is less competitive not because it has less potential, but because it has had fewer resources and time to develop. Such barriers are often specific to a particular sector or technology, which justifies targeted policy interventions. In order to achieve sufficient learning, support for both research and development, and market-creating measures are often needed. Such targeted interventions for technologies with much potential can have a huge climate impact at low cost.

Path dependence is not just about production costs. Technologies and industries are essentially always embedded in a variety of institutions, both formal (laws and established organisations) and informal (norms and attitudes). This means that old technologies and approaches benefit from existing institutions. The transition is therefore not only about new technologies, but just as much about old ones. The "systems" such as stakeholder networks and institutions that already exist and those that need to be built are essentially technology-specific, which in turn requires targeted instruments and other policy interventions in addition to generic instruments.

All in all, this means that many carefully considered policy instruments are needed along with carbon pricing and funding for research and development and early markets. Such instruments can include training that builds new skills or enables behavioural change, infrastructure investment, capital supply, and the formation of stakeholder networks and new partnerships.

[l] Economic and political science research has found that common assets can often be managed effectively by the users themselves, or by cooperatives or associations, though such solutions are difficult to apply to the climate system on a global scale.

Changes in behaviour and norms

The climate transition is far from merely a technical or economic issue. It requires private companies, public organisations, families and individuals to behave and take action in different ways than before. Policies must facilitate and stimulate such behavioural changes towards more climate-friendly consumption and mobility.

Behavioural change has a special role in a wealthy country such as Sweden, where an energy- and resource-intensive way of life is par for the course. Behavioural changes can involve choosing to walk or ride a bike instead of taking the car, lowering the indoor temperature, or choosing a plant-based diet. They can also involve companies replacing their vehicle fleet or starting to use materials more efficiently. The adoption of recycling, reduced smoking, digital music listening and, not least, the experience of the Covid-19 pandemic all show that behaviours can change dramatically in a relatively short time. Behavioural changes are not distinctly separate from new technologies: Major changes can entail choosing to use available carbon-free and emission-free solutions, as well as reducing emissions from old technologies for as long as they remain in circulation.

People generally start with their own goals in their behavioural choices. Their actions can be driven by the desire for their own well-being or to maximise their own profits, time-wise or money-wise. However, the goal linked most intimately to climate-related behavioural choices is the desire to do the right thing, to act morally. This desire has proven to be a robust foundation for lasting behavioural change. But how far the changes can go also depends on the degree of acceptance of the policy interventions that intend to alter a particular behaviour.

These insights underscore that price is just one of several dimensions of climate policy and simultaneously highlight two other key perspectives on political leadership in the climate transition:

- The normative role of policy should not be underestimated, and neither should the importance of a lively debate about what is right and proper and what is desirable. Long-term, broad-based climate targets help to underscore this moral obligation and thus to motivate and mobilise all stakeholders to take action for the common good.
- Policies must be designed, justified and defended so as to be perceived as legitimate, relevant and fair and gain broad acceptance throughout society. This involves promoting dialogue with and enabling the participation of citizens, businesses and civil society in transitional processes, as well as dealing with real problems, such as compensating or supporting those who are negatively affected by the transition or climate policy. In addition, policies must explain, communicate and justify the efforts being made to prevent pushback.

5.3 The transition has a tailwind, but there is still resistance

In its 2021 report, the Climate Policy Council stated that the climate transition had reached a new level of maturity. In many ways, the conditions now are better than they were just a decade ago. Renewable energy is often more competitive than older fossil-fuel energy technologies. More and more business sector players understand the potential of the transition. Public opinion across all age groups and nearly all countries expresses broad support for the climate transition.[48,49] The world's countries have agreed on common climate goals, and there are more robust institutional frameworks for a nationwide, Europe-wide and worldwide transition.

The Swedish Environmental Protection Agency's updated 2045 target scenarios indicate that Sweden can achieve its long-term climate targets faster than previously assessed in the scenarios

that served as policy-making input for the climate policy goals. The Swedish EPA notes that there are available measures that can help us reach the targets, and that the conditions for the transition have improved over the past five years. The options for action have multiplied and are available in more sectors, and in several cases, costs have fallen faster than expected.[50]

Because of this trend, an increasing number of countries view climate change policy and national contributions to the Paris Agreement as an investment in future competitiveness in a post-fossil-fuel economy where resource efficiency is expected to be a decisive advantage.

While there is growing interest from many to get involved and invest in the climate transition, the changes are creating pushback. Demands for behavioural change can be perceived as threats to people's own lifestyles and identities. Some jobs and perhaps entire professions are disappearing, while the new jobs being created require completely different skill sets. Higher carbon prices will lead to sustained price increases on products that many people use on a daily basis, and extensive changes to major technological systems, such as the electricity system, can lead to temporary bottlenecks and price fluctuations. Furthermore, shifts in global value chains and resource scarcity can create new geopolitical conflicts that, in turn, risk hampering global cooperation.

In addition, the impact of climate change on ecosystems and communities is increasingly evident, even in Sweden. A changing climate increases vulnerability in several sectors, requiring a more complex risk analysis. A society with net-zero emissions must be adapted to climatic changes that have already occurred and to the changes ahead. Sweden's national strategy for climate adaptation is based on an indicative principle that measures and efforts to reduce climate impact should be mutually supporting.[51]

Transforming society is no small matter. The combination of positive new opportunities and drivers together with transition problems and counterforces will require overall policy strategies that can navigate towards the long-term goals. Synergies with the other Sustainable Development Goals in the 2030 Agenda need to be leveraged as far as possible.

5.4 Criteria for impactful transition policies

The above discussion shows that policies driving the climate transition encompass many dimensions, decision-making processes and policy instruments. These are concrete instruments that intend to directly influence stakeholders in the transition. The instruments are often divided into categories. Traditionally these include administrative regulations (bans, standards), economic instruments (environmental taxes, emissions trading) and information (consumer labelling, advice). They also involve leadership and broader institutional aspects, such as whether policy can successfully formulate goals that create a common understanding and direction, or how a stable, long-term playbook can be combined with openness to innovation and learning. Policies for driving the climate transition must continuously evaluate the most effective mix of the state's enabling and governing roles.[m]

There is a growing body of scientific literature in several research fields and disciplines that describes how effective policies can be designed, as well as the effects of different measures and policy instruments. In previous reports, the Climate Policy Council has highlighted seven criteria that are essential for policy to enable an economically, environmentally and socially sustainable

[m] In its 2020 report, the Climate Policy Council describes various governance strategies, which include the state's role in driving stakeholder collaboration in the climate transition.

climate transition. These are summarised in Figure 5.[n] The criteria should not be viewed as a comprehensive list, but rather as a summary of key considerations that the research highlights.

Figure 5: Seven criteria for impactful policies for climate change.

The theme of this year's report is the need to accelerate the transition in Sweden. In light of this, some of these criteria appear to be particularly relevant to the policy instruments that must be decided and bring about the desired effect:

- Overall target attainment: Even if policies are considered cost-effective or viable, they are not effective if they do not produce the intended results and the climate targets are not achieved within the specified timeframes.
- Coherence and coordination: The steering of climate transition policies must be coherent and coordinated, both horizontally among different policy areas, and vertically across the global, national, regional, and local levels.

Horizontal coordination involves the need to integrate the climate transition across all policy areas, including economic policy, education policy, agricultural policy and security policy. Actions in different areas must support and not undermine one another. This is also an important purpose of the Climate Act. As mentioned in Chapter 3, the Climate Act points in particular to the importance of integrating climate and budgetary policies. The budget process is a central governance instrument for the state's activities, together with the legislation and steering of public agencies.

Vertical coordination is about the need for national policies to function well with policies at the regional and local levels, while also harmonising with EU policies and contributing to global cooperation and the global high-level climate goals.

[n] See, for example, the Climate Policy Council's 2020 report, p.33, or klimatpolitiskaradet.se.

An accelerated transition to a decarbonised society can simply not be accomplished through top-down centralised regulation, but must come from the bottom up, from multiple stakeholders. It will be important to create common goals and make it easier for different stakeholders to take their own initiatives so they can contribute to the whole. If all greenhouse gas emissions are to be reduced to zero, then all relevant stakeholders must be involved, and every contribution is needed.

Acceleration also requires a sharp focus on the direction and objectives of policy and the importance of a long-term playbook. It is a matter of the legitimacy and credibility of policies and the importance of increasing opportunities over time to gain broad acceptance among citizens of the policies pursued. Creating incentives for increased investments in the climate transition from both the public and the private sectors is also essential.

6 The Government's leadership of the transition

Chapter 5 describes the nature of the climate transition and policy prerequisites for achieving net-zero greenhouse gas emissions. Policy should explicitly steer towards a decarbonised society. This requires the coordination of climate policy efforts and integration in all relevant policy areas, which Parliament has also noted in its decisions on the climate policy action plan. Section 10.1 of the plan states that the Government should step up its efforts to integrate climate across all relevant policy areas.

To achieve this, climate targets and the efforts to achieve them must inform political processes, such as the budget process, the legislative process, the Government's leadership, and the Government's work in the EU. This is necessary for enabling stable, long-term policy decisions and ensuring that all components of overall policy accelerate, and not hinder, the climate transition. A transformative change such as the climate transition requires long-term policy reforms as well as effective, fit-for-purpose organisation of the state administration and government agencies.

In this chapter, the Climate Policy Council highlights the Government's budget, communication and internal governance based on the need for a transformative perspective. The chapter concludes with an in-depth analysis of the Government's steering of its agencies.

6.1 An uncertain budget process and sluggish for major reforms

Sweden's state budget for 2022 totals just over 1100 billion SEK, of which 75 billion SEK is new or increased expenditure compared with 2021. This means that the 2022 budget, as in the previous year, represents an unusually large budget increase. Below is an account of how the climate transition is described in the Government's Budget Bill for 2022.

The first chapter in the budget bill is called the Financial Plan. It describes the Government's focus on economic policy and all new and upcoming measures in a table and descriptions of reforms. Six overarching reform areas are highlighted, the first being "The pace of climate transition must increase." Under the heading for the climate transition are initiatives that address industry, transport infrastructure, and the circular economy. The Financial Plan also contains boxes with in-depth information, such as one entitled "Great potential in a green economic transition". There, the Government describes the investment requirements and gains, including job creation, that will be achieved due to Sweden's pledge to become the first fossil-fuel-free welfare state. Investments under the heading "The pace of climate transition must increase" provide for slightly less than 11 billion, or about 15% of the additional expenditure.

The budget is divided into different expenditure areas (EAs), and each chapter describes the policy linked to an area. The word "climate" appears to varying degrees in these chapters. More than half of the expenditure areas mention the climate.[o] EA 20 (general environmental protection and nature conservation) stands out in that "climate" occurs more times than in other expenditure areas (excluding the annex on climate reporting). After EA 20, the expenditure area for international development cooperation is the area that mentions the climate the most times.

During 2021, the Climate Policy Council reviewed the Government's policy and lists in Appendix 1 roughly 100 measures that are relevant for Sweden to achieve the climate targets. Chapter 7 of this

[o] Passages that use the word "climate" in a sense other than relevant to the climate targets were removed from this analysis.

report highlights examples of actions during the year that relate to resource efficiency, electrification, biomass use, and carbon capture and storage (CCS).

In the Climate Policy Council's assessment, the greatest shortcoming in the policy pursued is not what is being done, but that significant efforts still remain – actions that the Government itself announced in its climate policy action plan (see Chapter 3) or actions that the Council has highlighted in previous recommendations. Larger and more sweeping reforms are needed, although more limited changes, such as a new deduction for green technology installations, are contributing to the transition.

The situation in Parliament impedes key long-term reforms

Normally, Parliament approves the Government's draft budget bill, but in recent years this has not been the case. In a few cases, the opposition has agreed on a budget alternative that has won a majority in Parliament, thus defeating the Government's proposal. In the autumn of 2021, the Christian Democrats (KD), the Moderates (M) and the Sweden Democrats (SD) each submitted a budget motion with their own shadow budgets, which they adjusted and compiled into a joint proposal. It was this proposal, henceforth called Parliament's decision, that was approved. Below we discuss the changes between the Government's budget and Parliament's decision that we consider relevant to the climate targets.

The vast majority of the government expenditure of 1137 billion SEK is distributed in exactly the same way in the two budget proposals. Parliament's decision entails reductions or rejections of Government proposals amounting to slightly under 9 billion SEK. Instead, Parliament provided other budget measures totalling just under 8 billion SEK.

Just short of 40% of the 9 billion SEK that Parliament rejected in the Government's budget proposal relates to measures that can be considered relevant to the climate targets. The Climate Policy Council lists below the changes it considers relevant for climate policy in Parliament's decision on government spending for 2022, compared with the Government's proposal.

Table 1: Changes relevant to climate policy in Parliament's budget decision for 2022 compared with the Government's proposal.

	Million SEK	Total
Improves the chances of achieving the climate targets		**5**
Increased long-term ambition for BECCS. Administrative support for Swedish Energy Agency.	5	
Unclear net effect on chances of achieving the climate targets		**-2 005**
No to increases in appropriations for forest protection	-2 005	
Weakens the chances of achieving the climate targets		**-1 536**
No increase to country administrative boards for energy and climate transision at local and regional levels	-80	
Abolsihed appropriations for energy-efficient apartment complexes	-1 256	
No to investment in the energy efficiency of industrt	-100	
No to increases in appropriations for the business sector's transition	-100	

It is clear from Table 1 that actions for improving energy and resource efficiency are deprioritised relative to the Government's proposal and to current policies. In addition to spending cuts, Parliament also rejected the Government's proposal for increasing the deduction on the repair and reuse of personal property, a proposal that aimed to encourage a more circular economy. The Climate Policy Council has not made any assessment of whether the Government's proposed investments for energy or resource efficiency were well designed or effective, but Parliament did not decide on any alternative measures. Instead, Parliament's decided budget meant increasing long-term ambitions for BECCS (see section 7.4); this is reflected in the Swedish Energy Agency's extra appropriation of 5 million SEK in administrative funding for preparation purposes.

As regards government revenue, Parliament's most high-profile decision was a fuel tax reduction of 2.4 billion SEK compared with the Government's proposal.

The Finance Committee notes that Parliament's approved budget reduces or removes certain appropriations that are part of Sweden's recovery plan within the framework of the EU's Recovery and Resilience Facility.[52] This means that the Government needs to present an amended plan in which other measures are included. In order for Sweden to gain full access to its allocated share of the funding, at least 37% of actions in the recovery plan must meet the EU's criteria for green measures, and it is not yet clear how the revised plan will manage to reach this level.

6.2 Ministerial working group on climate policy can be better leveraged

The coordinated implementation of the climate policy framework was given a boost when the Government appointed a ministerial working group on climate policy, led by the Prime Minister. In addition to the Prime Minister, the working group consists of seven ministers for areas that the Government deems crucial to Sweden's ability to achieve the climate targets. However, it is unclear on what grounds the Government has made that assessment. The composition of the ministerial working group has changed several times without clear reasons why one ministerial portfolio was discontinued and replaced by another. The working group has the potential to create broader oversight and ownership around implementing the Government's climate policy action plan and to enable overall policy to lead to climate target attainment. The working group could ensure that strategies and decisions in different policy areas do not work at cross-purposes, but instead reinforce the potential to achieve the targets. The Climate Policy Council welcomes the appointment of the ministerial working group on climate policy.

It took five months before the working group convened for the first time. It has since held quarterly meetings, where different themes from the climate policy action plan were discussed. In its 2021 climate report, the Government announced that the group of state secretaries assisting the ministerial working group is driving implementation and follow-up on the action plan. The Climate Policy Council considers that the establishment of the ministerial working group has boosted the potential for implementing the climate policy action plan.

- Responsibility for implementing the action plan has been expanded from the Ministry of the Environment to the ministerial working group (and the Prime Minister), who in turn should improve the prerequisites for a comprehensive policy. Broad responsibility can also promote synergies and reduce conflicting goals, given that the Prime Minister and other ministers prioritise the efforts.
- Implementation of the climate policy action plan will be organised and prioritised thanks to continuous follow-up by the ministerial working group on climate policy.

- Resources including a group of state secretaries and two employed officials are assigned to the working group for implementation and follow-up on the action plan.

However, stakeholders outside the government claim that they still struggle to understand whether and how the ministerial working group will make a difference in the Government's efforts. In addition to the themes discussed and frequency of group meetings, the working group does not report on its efforts.

Furthermore, the ministerial working group is not being utilised to communicate a coherent policy for accelerating the transition to becoming the world's first fossil-fuel-free welfare state. In this respect, the Climate Policy Council finds that there is untapped potential. The working group could be used in external communications to signal that climate change is not just relevant to environmental policy but concerns overall policy for the transition. Unified, clear external messaging would likely also increase the ability to implement and further develop integrated policies.

In conclusion, the Climate Policy Council finds that the model of a ministerial working group led by the Prime Minister strengthens and broadens the responsibility and implementation of a comprehensive policy for achieving the climate targets – assuming that the Prime Minister prioritises the issue. The Council therefore believes that the working group should be maintained under future administrations. However, the potential of the working group is not being fully exploited. Although internal coordination has been improved, the Climate Act or the climate policy action plan do not yet have the same weight in the Government's work as do the Budget Act and budget process. The working group could also be leveraged to externally communicate the structure and implementation of the climate policy action plan.

6.3 Steering of government agencies is weak and unclear

Our public agencies are a crucial resource for the Government in both formulating and implementing policies. The Climate Policy Council has carried out a special analysis of the Government's steering of its agencies, based on the Council's mandate to evaluate overall policy for achieving the climate targets.

Because of the way Sweden's state administration is organised, a significant part of governmental efforts around climate change is performed by government agencies. The Government Agency Ordinance clarifies the responsibilities, tasks and quorum of government agencies and their role in respect to the Government.[53] The framework for the direction, purpose and goals of an agency is determined on an ongoing basis by the Government in the form of ordinances containing instructions, appropriation directions and special mandates. The instructions determine the overall mandate responsibility and how the agency's activities should be organised. Instructions are given with a longer time perspective in mind and are revised as needed. Many years often pass between revisions. The last thorough revision of the instructions was done in 2007 and covered the majority of all agencies. About 200 received revised instructions. The annual appropriation directions outline appropriations and financial powers as well as conditions for use of the appropriations during the fiscal year. The directions can also contain targets and reporting requirements.

The Government Agency Ordinance states that the work of the agencies must be carried out cost-effectively and reliably with regard to applicable law and with a high degree of target attainment. Government agencies must also develop their operations regularly, including through cooperation with other agencies and stakeholders, thereby leveraging the benefits that can be gained for individuals and for the state as a whole. Furthermore, each agency must follow events and

circumstances taking place outside the agency that are relevant to its activities. The agencies are thus given great freedom in shaping their operations to fulfil the Government's intentions. A key principle for administrative policy is that the Government must not control how an agency should apply a law or decide on an individual matter related to the exercise of public authority.

Governance includes, in addition to laws, the formal written instructions, appropriation directions and special mandates given to agencies, as well as ongoing dialogue between the Government Offices and the agencies. It is important to include this dialogue in the analysis, since it clarifies and gives expression to the written instructions, among other purposes.

The Climate Policy Council's review of the Government's leadership includes a quantitative and a qualitative analysis.[p] In the quantitative analysis, we calculated how many times the word "climate" appears in all appropriation directions (during the period 2003–2022) and instructions (during 1988–2021).[q] This is to get an idea of the extent to which administrations include the climate perspective in their formal governance of agencies, and whether and how it has changed over time.[r]

In the qualitative analysis, we reviewed the governance of 10 agencies that are central to the climate transition: the National Board of Housing, Building and Planning; the Swedish Energy Market Inspectorate; the Swedish Energy Agency; the Swedish Board of Agriculture; the Swedish Environmental Protection Agency; the Swedish Forest Agency; the Swedish Agency for Growth Policy Analysis; the Swedish Agency for Economic and Regional Growth; the Swedish Transport Administration; and Vinnova –Sweden's innovation agency.[s] We have analysed the impact of the Climate Act and climate objectives on the agencies' broad governance and the extent to which the selected agencies, through written and dialogue-based governance, were given the necessary tools to achieve the climate targets. In addition, the Climate Policy Council examined whether and how the agencies have taken their own initiatives to adapt their efforts based on the Climate Act and the climate policy goals.

The climate policy framework is not a priority in the steering of agencies

The overall analysis shows that neither the climate targets nor the Climate Act are, or are perceived as, priorities in the formal or informal governance of the agencies. Our qualitative analysis finds that a large majority of the agencies' instructions, appropriation directions and mandates have no references to the climate policy framework or climate targets. In many cases, however, these policy documents refer to different aspects of the environmental objectives and sustainability.

The word "sustainability" appears in many policy documents, and in some cases sustainability has had a major impact in the agencies' work. But there are no clear priorities on how the different aspects of sustainability should be weighed against one another in each agency's mission. Government officials also often hold different views on whether the climate targets can and should be interpreted as a subset of the more general sustainability goals. Most people think that the ambition to achieve the climate targets is adversely affected by the unclear prioritisation and

[p] The studies were carried out in collaboration with Chalmers University of Technology (the quantitative data analysis) and Sweco and RISE Research Institutes of Sweden (the qualitative study). They can be downloaded as background reports from the Climate Policy Council's website.

[q] When the word "climate" did not relate to the climate goals, it was removed. Examples would be business environment, work climate, innovation climate.

[r] In total, all appropriation directions and instructions for each selected period of time are covered in the survey. The time span for the appropriation directions (2003–2021) was selected based on access to directions published online in the state register on the National Financial Management Authority's website. As for the time span of the instructions (1988–2021), 1988 was chosen as the starting year because an unusual number of instructions were revised that particular year. Our assessment is that the probability of the word "climate" being used frequently in written governance before the 1990s is low. The instructions were taken from the Government's legal database.

[s] The method used was document studies and interviews with officials at the agencies and in the Government Offices. The selection of agencies should reflect a representation of different policy areas yet be highly relevant to the climate transition.

governance. The exceptions are the Swedish Environmental Protection Agency and the Swedish Energy Agency, which indicate that the climate policy framework has led to changes in internal governance at these agencies that, in turn, prompted them to try and reach the climate targets. This is somewhat paradoxical, since one of the objectives of the Climate Act is for climate change to inform all policy areas and for climate transition policies to not be restricted to environmental policy.

The Climate Policy Council's quantitative analysis finds that appropriation directions containing many mentions of "climate" are concentrated to a handful of agencies.[t] Three agencies stand out with significantly more climate references compared with the remaining 200 agencies. They are the Swedish Energy Agency, the Swedish Environmental Protection Agency, and the Swedish Meteorological and Hydrological Institute (SMHI). The Climate Policy Council notes that for many years (2010–2020), the Swedish Transport Administration had only a few or no references to the climate in its appropriation directions. Furthermore, it can also be noted that the number of agencies whose appropriation directions mention the climate has increased over time. In 2003, the climate was mentioned in only 14 out of more than 200 appropriation directions to the agencies. By the time we get to 2021, the corresponding figure is 34, and by 2022, more than 180 agencies received appropriation directions that referred to the climate. The number of agencies with climate references has thus increased over time, although in 2022 there was a break in the trend. Upon closer analysis, a certain generic language runs through the directions, stating that the agencies should reduce their climate impact from business travel and that funds for training that promotes the climate transition should be given to the country's higher education institutions.

The review of all government instructions given during the period 1988–2021 reveals that 21 out of more than 200 instructions explicitly refer to the climate (see Table 2). Here, too, this is clearly concentrated in a few agencies. The three agencies that stood out regarding occurrences of "climate" in their appropriation directions are also among those with the most occurrences of the word in their instructions. Agencies that are pivotal for the climate transition, such as the Swedish Transport Administration and the Swedish Forest Agency, are not on the list of agencies that have a climate references in their instructions.

[t] Appendix 2 contains data on the 30 agencies that received appropriation directions with the most climate references between 2003 and 2022. Complete data for all agencies are available on the Climate Policy Council's website.

Tabell 2: Instructions that explicitly mention climate.

Source: Swedish Government's legal database

Government agency	Number of mentions of "climate"	From year
Swedish Climate Policy Council	21	2017
Swedish Meteorological and Hydrological Institute	20	2009
Government Offices	12	1996
Swedish Energy Agency	9	2014
Swedish Environmental Protection Agency	3	2012
County Administrative Boards	2	2017
Swedish Geotechnical Institute	2	2009
Swedish National Institute of Economic Research	2	2007
Swedish Transport Agency	1	2008
Swedish Civil Aviation Administration	1	2007
National Board of Housing, Building and Planning	1	2012
National Board of Trade	1	2007
Swedish National Food Agency	1	2009
Swedish Polar Research Secretariat	1	2007
Nordic Africa Institute	1	2021
Swedish Agency for Economic and Regional Growth	1	2009
Swedish Space Agency	1	2007
Swedish Institute for Building Research	1	1988
Board of the Swedish International Development Cooperation Agency (Sida)	1	2010
Swedish Institute	1	2015
Svenska Kraftnät	1	2007
Approx. 200 other agencies	0	-

Overall, the analysis indicates that the climate perspective may have been given more scope in appropriation directions and instructions to certain agencies in recent years, yet still relatively few agencies. The Climate Policy Council can therefore conclude that formal governance is generally to a minimal extent informed by clear references to the climate targets and climate policy framework in relation to agency mandates.

Conflicting goals between the Government's core mandates and climate targets

Many appropriation directions and specific mandates of the 10 agencies reviewed more closely are linked to the climate policy framework, but what the agencies are to achieve is often vaguely formulated. Wording such as "contribute to" and "strive to" is common. Within the Government Offices, that is considered relatively strong language, but several agency officials perceive this type of wording as providing weak guidance. This results in ambiguity about how the agencies should meet the climate targets, how they should interact with one another, and what synergies they can achieve. Several agencies find it difficult to understand their contribution in a broader perspective.

When the climate targets are mentioned, it is common for government officials to experience conflicting goals between an agency's core mandate and the climate targets, since there is no clear prioritisation of the climate issue. There are also conflicts between climate targets and goals for environmental objectives (biodiversity), industry, accessibility, production, culture and land use. The agencies have different capabilities for resolving such conflicts on their own, and they state that it is difficult to prioritise among the various goals. The ambiguity of prioritisation limits the agencies' ability to take forceful action on the climate issue and risks slowing the pace of transition.

The more clearly the government prioritises mandates related to the climate transition, the greater the scope agencies will have to take the initiative to drive climate efforts forward – for example, through improved collaboration with other agencies or dialogues with the Government Offices. Conversely, the more the goals conflict with an agency's core mandate, the more difficult it will be for the agency to take the initiative. In addition, several agencies state that the budget available for their own initiatives in the organisation (not budget earmarked in the appropriation) is shrinking, as new unfunded government mandates are given during the year. This makes it difficult to plan and provide scope for developing innovative initiatives. Potential support can be found in the national 2030 Agenda efforts, where it is stated that agencies must be innovative and bold in order for Sweden to achieve the Sustainable Development Goals.[54] Officials in the Government Offices point to the 2030 Agenda as a potential opening for public agencies to prioritise and take steps to explore their own ideas and initiatives within the scope of their activities and thus be more proactive towards the Government Offices.

Coordinated policies and strengthened governance for accelerating the climate transition

The Climate Policy Council notes that the coordination and governance within the Government Offices and among agencies around achieving the climate targets is too weak. This applies to both the Government's internal work processes and its steering of the agencies. An accelerating pace of transition, as highlighted in Chapter 5, will make trade-offs and synergies more tangible. Policy needs to address this more clearly in order to push through reforms and govern the agencies effectively. Both the current and future administrations are responsible for providing stable, long-term decisions and playbooks in order to ensure that overall policy accelerates, and does not slow down, the climate transition.

The Climate Policy Council believes that the appointment of the ministerial working group on climate policy has probably helped to drive better coordination within the Government and the Government Offices. Several agencies believe that intra-agency collaboration functions relatively well, but they nevertheless see a great need for improved coordination among different policy areas. The Government and the ministerial working group face continuing challenges here. For example, some underscore the problem of overlapping or competing government mandates as something that creates inefficiencies. The agencies are calling for enhanced inter-ministerial

coordination and coordination between the Government Offices and the agencies, as well as clearer and strengthened governance from the Government Offices. This would bolster efficiency and improve the delegation of tasks between and within the agencies.

Several Government representatives believe that the Government should more clearly identify the relevant agencies' responsibilities with regard to the climate policy framework, preferably in the agencies' instructions. This would clarify mandates and expectations and limit the instability of too many short-term government mandates. Responsibilities must also be followed up in the annual follow-up on the agencies' work. This requires allocated resources including the right experts, sufficient capacity and time. Temporary mandates significantly hamper the agencies' ability to build up skills for the climate transition.

The Climate Policy Council notes that the climate targets are not a priority in the formal steering of the agencies. The issue is a weak priority in general, as well as in relation to the agencies' other mandates. It does not create incentives for them to pursue an innovative, vigorous implementation of policies that help to accelerate the climate transition. Drivers for changes in current norms and practices are thus not supported, and conditions for ensuring acceptance of policy priorities among citizens, organised interest groups and businesses are not improved.

Swedish climate policy largely avoids goals and strategies at the sector level. One observation is that this choice makes it more difficult for the agencies to know how much of the target attainment is expected within their respective activities.

Although the idea of the climate policy action plan as the hub and engine that drives policy implementation to meet the climate targets is a good one, much remains to be done to seriously accelerate the transition. The ministerial working group on climate policy continues to face hurdles in coordinating policies between the ministries and policy areas. There is also no coordinating institution at the agency level. The current governance, including the action plan and the ministerial working group, cannot therefore yet be said to represent the common strategic framework that many agencies are requesting and need in order to be more proactive and innovative as drivers in the climate transition. In the Climate Policy Council's assessment, there is untapped potential in the Government's governance for better and more effective target attainment.

7 Four key areas for achieving the climate targets

The climate transition as we have described it in Chapter 5 must take place through parallel, interconnected changes in technology, business models, behaviours, regulations, knowledge, culture and values. These changes involve different stakeholders across all levels of society – local, regional, national and global – in interdependent relationships. The actions of citizens and consumers in their everyday lives are also part of the climate transition.[55]

Of course, it is not possible to say exactly which solutions will take us to zero emissions. But it is possible to identify with great certainty a few major cross-sectoral areas that will be crucial for bringing us closer. In both Swedish and international studies, four areas are cited repeatedly, with some variations: a more efficient energy and resource use, emissions-free electrification, biomass from forestry and agriculture, and carbon capture and storage.[56,57,58]

Figure 7 shows a rough estimate of the amount of emission reductions that each key area can provide. The goal is net-zero greenhouse gas emissions in Sweden by 2045.

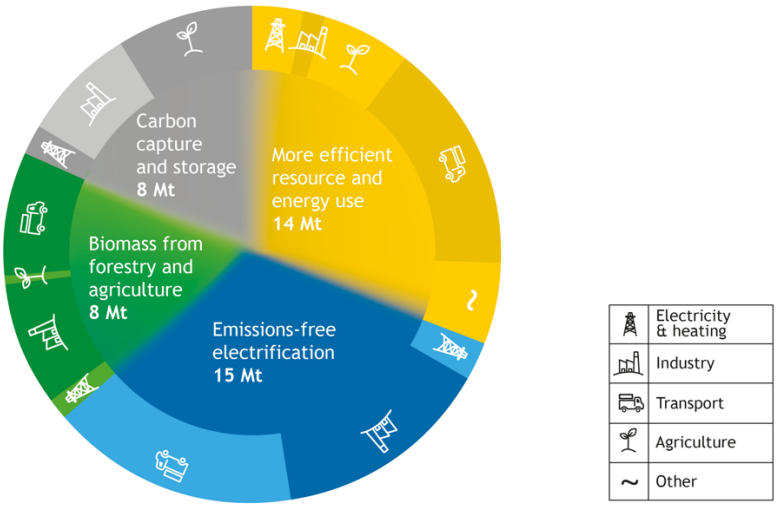


Figure 6: Four key areas for achieving the climate targets.
Source: Panorama and own analysis

The estimates shown in the figure are called the Panorama scenario. They are taken from the online analysis and visualisation tool Panorama, which the Climate Policy Council runs in collaboration with the Swedish Environmental Protection Agency and the Swedish Energy Agency. Panorama uses the latest official emissions statistics. It contains 75 different known measures (called "transition elements"), with an estimate of how much each measure can be expected to contribute to reaching net-zero emissions by 2045. For 50 of these transition elements, indicator diagrams are presented showing the trend needed over time to achieve the estimated emission reductions, as well as the progress to date. For all measures together, the tool presents only a static picture of expected contributions to a possible target of net-zero emissions by 2045.

In Panorama, there are no underlying assumptions about either growth or ongoing streamlining in the different activities during the time period. The expected contribution of each action is not the

same as its technical potential (which is often significantly larger and overlaps with other measures), but rather reflects a reasonableness assessment, including economic and political factors as well as expected contributions from other measures. These assessments, in turn, are based on scenarios and reports from a variety of sources, mainly government inquiries and reports. The aim is to provide an understandable, up-to-date and balanced estimate of how different measures can help achieve net-zero greenhouse gas emissions in Sweden by 2045. The result is a balanced target scenario with inputs from government agencies, researchers and other stakeholders.

In this report, the measures contained in Panorama have been categorised under the four key areas. This shows that measures *already* exist that can take us to net-zero emissions by 2045, and that they are largely in the four key areas. The aim is *not* to show results or exact percentages for how the climate transition will actually take place. That is not possible.

The orders of magnitude illustrated are estimates based on one of several possible target-based scenarios for Sweden's path to net-zero emissions. The Panorama scenario is thus a target scenario, and it differs from many other agencies' scenarios, which usually estimate future trends using models based on policy instruments and other factors that affect the trends.

However, the Panorama scenario is very similar to other target scenarios for Sweden's transition that have been produced in recent years.[50,56,58–60] Although a great deal can already be said about how net-zero emissions can be achieved, the exact pathway is unlikely to precisely match any of these scenarios. What that pathway will look like depends on technological, economic and social developments, political decisions, attitudes and values. The path forward will also be significantly affected by factors beyond Sweden's borders.

The estimates in Panorama represent material that is regularly updated and evolving, with new statistics, assumptions, assessments, policy instruments and other data.[u] The illustrations in this report are based on current estimates as of 1 January 2022.

Policy plays a crucial role in realising the potential of the four key areas. Neither the Panorama scenario nor any other scenario for reaching net-zero emissions will be realised without significant policy measures leading up to 2045. Even when the scenarios are based on known solutions and measures, in many cases these solutions are not yet mature, economically competitive, or ready to scale up. There is a need for the continued evolution of technology and institutions, as well as changes in activities and behaviours. Policies must support the necessary advances in technology and facilitate and support behavioural changes throughout society.

The Climate Policy Council is highlighting the four key areas for the climate transition in this assessment of government policies because we consider it essential for preparing the next climate policy action plan. The sections below briefly present the four key areas, the opportunities and challenges that policies must address in each, and the gaps in current policies that need to be filled in order to realise the opportunities and accelerate the climate transition to the pace needed to achieve the climate targets.

7.1 More efficient use of energy and resources

To achieve the climate targets, society must use energy and materials much more efficiently than it does today. A substantial increase in energy and resource efficiency, including through more

[u] In reality, the individual measures (transition elements) in Panorama will also provide emission reductions of different sizes over different time periods, which Panorama presents even though this report only indicates an estimated reduction in emissions by 2045. For example, biofuels are likely to continue to make a relatively large contribution in road transport over the next decade, then decline in favour of electrification.

circular material flows, is a vital recurring element in the global scenarios that aim to achieve the Paris Agreement's climate goals.[v]

In the Panorama scenario, a more efficient energy and resource use is expected to account for slightly more than a quarter of all emission reductions to reach net-zero by 2045. Figure 8 illustrates five components of a more efficient energy and resource use: smarter heating systems, increased recycling, more plant-based food production, a transport-efficient society, and improved waste management.

The greatest direct effect on Sweden's greenhouse gas emissions occurs in the transport sector, through more efficient vehicles and a more transport-efficient society.[40w] Domestic transport and non-road mobile machinery account for about half of direct emission reductions.

In terms of electricity use and heating, Sweden differs somewhat from the global landscape. The potential to reduce greenhouse gas emissions through more efficient electricity use is less in Sweden. The share of fossil fuels in power generation and heating is so small that reduced use of electricity or heat has only a small direct effect on emissions. The expected emission reductions from electricity and heat mainly involve reducing the combustion of fossil-fuel waste, mainly plastics, through reduced use and increased recycling (see Figure 8). Other measures include replacing fossil-fuel-based plastics with bio-based materials (see section 7.3), capturing carbon from waste incineration plants (see section 7.4), allowing heat pumps to replace remaining fossil-fuel heating for properties, and using waste heat in district heating networks to a greater extent.

The Panorama scenario also contains a number of measures in the agriculture sector that can be classified as more efficient use of resources, such as a more efficient use of manure and reduced waste. The remaining direct emission reductions in this key area involve product use and waste management.

[v] For example, the IEA's report on a climate-neutral energy sector for 2050 assumes that energy intensity (energy consumption per unit of GDP) will decrease by an average of 4.2% annually in 2020–2030, compared with 1.6% annually during the period 2010–2020 MAPP.
[w] "A more transport-efficient society" here refers to a society with reduced traffic from energy-intensive modes of transport, such as passenger cars, trucks and aircraft. This can be accomplished by shifting to more energy-efficient means of transport; streamlining or shortening trips (for example, through density or mixed-use buildings), or completely avoiding trips (for example, through online meetings and new work practices and consumption choices). The conditions for achieving this are best within and between cities and urban areas.

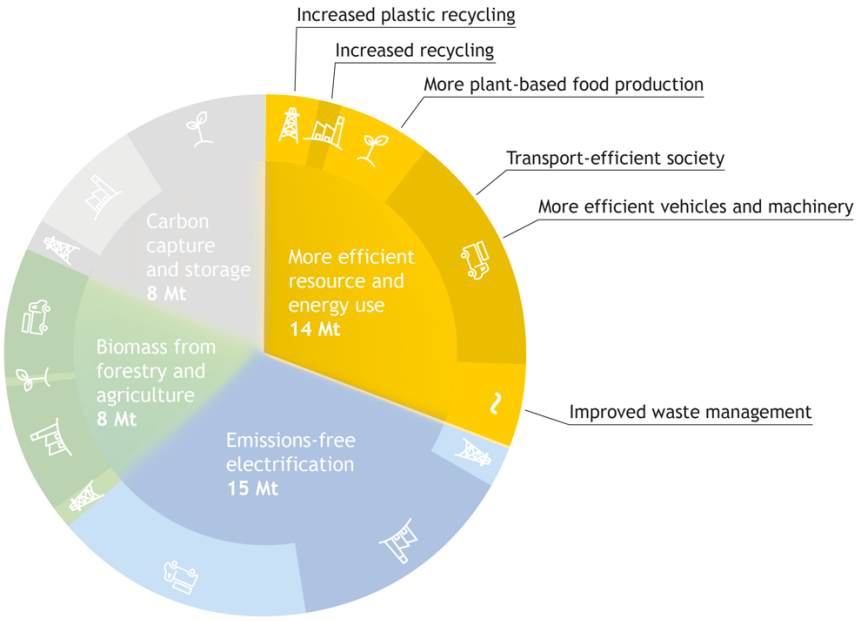


Figure 7 More efficient use of resources and energy in different sectors, with examples of possible solutions.
Source: Panorama and own analysis

A more efficient use of energy and resources also plays a significant indirect role, since it is an enabler for other key areas. More efficient vehicles or well-insulated buildings can, for example, reduce the need for bioenergy or electricity. A more efficient, flexible use of electricity and heat is crucial for managing balance in the power grid and enabling cost-effective, zero-carbon electrification on a large scale (see section 7.2 on electrification.) While other measures involve the use of resources such as energy, raw materials, capital and land to varying degrees, efficiency frees up resources. This can mean savings for individual operators and less pressure on other key areas.

A more efficient use of materials, such as through the transition to more circular material flows, also shows great potential to reduce the climate footprint from consumption and investments in Sweden. On the other hand, the Panorama scenario does not show any significant effects of this on territorial emissions. For example, reducing the use of Swedish steel, or increasing the share of scrap-based steel, does not necessarily reduce production in Swedish steel mills, which are niche producers in a global market.[x]

A more efficient use of Swedish electricity can similarly help reduce power generation based on fossil fuels in the European electricity market, but this is also not visible in the Panorama scenario for net-zero emissions in Sweden.

An additional indirect effect not visible in the scenario is that the scale-up of brand-new technical systems (such as electrified transport) will require the efficient use of materials and circular material flows. Otherwise production bottlenecks might be created, slowing progress. The efficient use of materials and circular material flows also enable long-term sustainable systems.

In conclusion, a more efficient use of energy and resources is a cornerstone of the climate transition. Although the largest and most important effects are not visible in the Panorama

[x] The incremental streamlining of existing processes in industry is also not visible in the Panorama scenario, which, on the other hand, does not reflect any growth, but is simply based on current industrial production.

scenario for territorial emissions, this key area in the scenario accounts for more than a quarter of the emission reductions to reach net-zero in Sweden by 2045. In addition, it reduces pressures on the other key areas, thus contributing indirectly to further emission reductions, and also contributes to emission reductions outside Sweden's borders and to securing access to the material resources needed in the transition.

Challenges in more efficient energy and resource use

Fundamentally, increased energy and resource efficiency has a powerful economic rationale. There are also many synergies with other societal goals, such as increased supply security and economic efficiency, as well as links to many of the Sustainable Development Goals in Agenda 2030. However, there are challenges and obstacles that work against a more efficient use of resources. Increased energy and resource efficiency includes virtually all emission sectors, an array of stakeholders, and different types of energy and materials, each with its own particular challenges. Some common features are as follows:

- There are technical challenges, especially with regard to material flows. Both product design and other technologies must be developed for longer life cycles, increased reuse, upgrades and recycling. This applies in particular to the use of plastics in thousands of different variants and applications.
- The economic challenges are also greatest when it comes to streamlining the use of materials. The fundamental problem is that market prices for raw materials and materials in the global economy generally do not reflect the socio-economic costs of material use.[61.62] As regards energy, national instruments such as energy and carbon taxes, as well as European emissions trading, provide stronger incentives to reduce their use. However, there has long been inertia in the electricity market, and as a result electricity prices have not reflected limited power capacity.
- The main challenges in achieving a more efficient use of energy and resources are probably institutional. This applies to various formal regulations, such as waste legislation, building codes and industry standards, which are not designed for a more efficient or circular use of resources and can even be at odds with this goal. To a large extent, this also applies to informal barriers, such as habitual consumer behaviours, established business models, community planning practices, or organised interest groups that preserve legacy resource-intensive solutions and discourage more efficient alternatives.

The drive to make cities more transport-efficient illustrates all three types of challenges. Many types of lock-ins in existing infrastructure, vehicle fleets, travel habits and behaviours, as well as major investment requirements in alternative modes of transport, hinder the realisation of this huge efficiency potential.

In general, a resource-efficient society also requires an efficient flow of information and interaction among many stakeholders and different sectors of society. Digitalisation has the potential to contribute significantly to a more efficient use of existing resources in society. Tangible examples of this include online platforms for personal transport services, freight logistics, accommodation, office space and product reuse.

At the same time, the economic benefits of a more efficient use of energy and resources pose a challenge from a climate perspective. If an efficiency measure reduces costs in any area, this frees up the financial means to consume more, possibly of something else which, in the worst case, could have a greater climate impact. Such so-called rebound effects are important to consider, both when estimating realistic potentials, and when designing policy interventions. For example,

investment support for energy efficiency designed to overcome economic and institutional barriers risks leading to greater rebound effects than a general increase in energy taxes, as the latter make all energy use more expensive, even for alternative consumption. On the other hand, it is not certain that a general energy tax would address the specific challenges with the same precision and at a similar same long-term cost to society.

Current policies for a more efficient use of energy and resources

Policies in this key area span a wide range of areas, and the situation varies in terms of energy efficiency policies compared with policies that affect the use of other resources, such as materials.

More efficient energy use

Policies and regulations for energy management or more efficient energy use have been around at least since the first oil crisis in the mid-1970s. This has been an established policy area both in Sweden and in the EU. There are decided policy objectives and instruments, established institutions, public statistics, and a broad base of experiences and knowledge. However, the driving forces have shifted over time. These have often involved reduced import dependency and increased supply security.

Although climate considerations have helped to put energy efficiency higher on the agenda, especially at the EU level, it seems to have been somewhat overlooked in the Swedish climate policy discussions of recent years. We can see this in the current climate policy action plan, in which energy efficiency is not a main theme except in relation to transport.

Energy statistics also indicate that energy efficiency in Sweden is progressing weakly. The European Commission believes that Member States need to improve energy efficiency (in end use) by 1.5% per year until 2030 in order to achieve the new European climate and energy targets. For comparison, Sweden improved its energy efficiency rate by about 0.5% per year in the period 2005–2018, based on estimates by the European Environment Agency (EEA).[63]

Various instruments for more efficient energy use have been used in different periods: standards and regulations (for example, building codes), information campaigns and energy advice to both public and private organisations, economic instruments such as energy and carbon taxes, or investment support. In comparative studies of measures for reducing climate impact, energy efficiency measures are often ranked as the most cost-effective, even directly cost saving. However, it is more difficult to both design and evaluate impactful and cost-effective policies to stimulate efficiency measures than, for example, to stimulate expanded power generation. This is partly due to the large number of stakeholders, high transaction costs (such as knowledge needs per kilowatt hour saved), complex incentive structures, cultural factors and rebound effects. Though norms and standards can be useful instruments, they must be designed in a way that does not limit the innovation needed for transformative change.

Energy efficiency is the concern of many government agencies. The Swedish Energy Agency has an overall coordinating role, and since 2010 has been leading the Energy Efficiency Council, whose task is to advise and improve government cooperation and transparency on energy efficiency. However, the Energy Efficiency Council has a limited mandate and appears to be, above all, a platform for networking and information exchange among the relevant agencies. The Swedish Energy Agency has assessed that the policies now decided are not enough to achieve Sweden's 2030 target of a 50% more efficient use of energy compared with 2005.[64] In addition, the tightened targets at the EU level included in the European Commission's proposal for an updated Energy

Efficiency Directive would represent a significant increase in level of ambition relative to the current Swedish target.[y]

When the goal of reducing energy use was decided, the Swedish Energy Agency was tasked with developing sectoral strategies for energy efficiency. The agency, in cooperation with other stakeholders, has produced five such strategies. In its latest report to the Government, the Swedish Energy Agency assessed that efforts must be boosted with financial support, especially regarding collaboration platforms, implementation of measures and knowledge-enhancing measures.[64]

In 2021, the Government took the initiative to tighten policies for more efficient energy use. Among other actions, it appointed an inquiry into a quota system for energy efficiency, known as white certificates, and in the 2022 Budget Bill, it proposed a reintroduction of support for energy efficiency in industry, known as "Energisteget" ("Energy Step"). However, Parliament rejected the latter proposal, as well as the proposal for investments in energy efficiency in apartment buildings. Parliament's budget decision did not entail replacing these proposals with any other measures to stimulate increased energy efficiency.

The instruments used for energy efficiency in buildings, such as building codes and energy declarations, have so far not been used to consider the power perspective, even though it is a growing challenge for a resource-efficient electricity system (see section 7.2 on electrification).

More efficient material use

National policies for a more efficient use of materials are a highly complex challenge. They involve many operations and activities that are interwoven in global material flows[z] with widely varying functions, volumes and effects on the environment and sustainability.

There is no established policy area here either, and Sweden lacks political targets for resource efficiency in material use.[å] Nor is there any clear regulatory responsibility. The government agencies working in the area are mainly focused on waste issues or on the use of domestic raw materials such as soil, forests, minerals and water. Their work does not consider the user perspective, or broader issues of an efficient and more circular use of resources. However, the environmental objectives include interim targets for certain relevant sub-areas: the recycling and reuse of construction waste, municipal waste and packaging, and targets for reducing food waste.

Better statistics and indicators are also needed in order to assess how resource efficiency is progressing. According to comparative statistics from the European Environment Agency, Sweden's resource productivity is slightly lower than the EU average. This can, at least in part, be explained by Sweden's comparatively large share of commodity-intensive heavy industries. Perhaps more remarkable is that Sweden's resource productivity only increased by about 7% during the period 2000–2017, significantly less than the EU Member State average of 39%.[65,66]

The strong ties between resource use and the global sustainability challenge – not least climate impact – has in recent years put resource efficiency high on the international agenda, within the Organisation for Economic Co-operation and Development (OECD), the UN and its International Resource Panel and the World Economic Forum as well as in the EU, often in terms of a desire for a more circular economy. Several countries have pioneered comprehensive strategies

[y] Sweden's target is actually a goal for reduced energy intensity – to use half as much energy per krona of GDP. The EU's targets are developed relative to an adopted base scenario and set an objective for energy use in absolute terms. The targets are thus not directly comparable, but within reasonable assumptions regarding GDP development, etc., the EU's targets are stronger than Sweden's.
[z] These include biomass, raw materials based on fossil fuel energy, as well as metallic and non-metallic minerals.
[å] The generation goal in the environmental objectives system is a generally expressed goal for the "wise management of natural resources" and that "ecocycles are resource-efficient", but there are no specific goals or clarifications.

for resource efficiency or a circular economy, among them the Netherlands,[67] Finland,[68] Germany[69] and Japan.[70]

In 2020, the Government decided on a circular economy strategy, and in early 2021, on an initial action plan. However, the action plan consists mainly of a compilation of existing government policies and ongoing initiatives – a total of just over 100 points – not new initiatives. Both the strategy and action plan have been developed in the Government Offices and not in any process involving Parliament or government agencies or stakeholders. The work has been led by the Ministry of the Environment. Since 2018, a circular economy delegation has been in place, associated with the Swedish Agency for Economic and Regional Growth, and thus the Ministry of Enterprise and Innovation. However, the delegation has had no explicit role in drawing up the Government's strategy or action plan. The Government has declared that "follow-up on the strategy and action plan will be presented in the budget bill in the same way as the follow-up on national environmental objectives." The reason is that they also aim to achieve the national environmental objectives. In the Budget Bill for 2022, this follow-up was limited to stating that "a large number of measures have been decided, but it is too early to assess the impact that they have had", and that the current policy is not sufficient for achieving the generational[ä] goal.[71]

Increased producer responsibility for certain packaging and product groups was developed in the early 1990s and remains perhaps the clearest example of a policy for a more efficient, circular use of resources. Product standards are difficult for EU Member States to set at the national level. They are developed primarily at the EU level for the entire common market – for example, through the Eco-Design Directive.

In 2017, the circular economy inquiry submitted proposals for strategic direction, as well as several proposals aimed at increasing the utilisation rate and reuse of consumer products.[72] The inquiry has been reviewed, but the Government has so far only proceeded with some of the inquiry's recommendations, such as smaller sections of the proposed tax deductions for reuse and repair. Some of these proposals, in turn, have been rejected by Parliament.

Resource-efficient transport

Policy instruments are available for governing vehicles and engines, in particular at the EU level, through progressively tighter requirements for manufacturers of new road vehicles. Under the Fit for 55 package, the European Commission has proposed revised requirements that allow only zero-emission cars to be sold from 2035. For aviation and shipping, certain international requirements exist, but they are not as rigorous. Although it is difficult for an individual country to make direct demands on vehicle manufacturers, the Swedish bonus–malus system is an example of a national policy instrument that helps to push towards more efficient road vehicles.

The Climate Policy Council has previously pointed out that both the policy objectives and the instruments for stimulating a more transport-efficient society are weak.[ö] The efficiency of the transport system, which is most important for territorial emissions, is also progressing sluggishly and, according to some indicators, has even declined over the last decade,[73] especially with regard to freight transport. The share of passenger trips in cities that involve walking, cycling or public transport is increasing only slowly, and it decreased during the pandemic year 2020. The energy

[ä] The generation goal states that "the overall goal of environmental policy is to hand over to the next generation a society in which the major environmental problems have been solved, without increasing environmental and health problems outside Sweden's borders."
[ö] Both the current urban traffic target and the so-called urban environment agreements are weak compared with their counterparts in countries such as Norway.

efficiency of new vehicles with internal combustion engines is improving, but not fast enough to offset higher traffic volumes.

Transportation received greater attention in the Government's climate policy action plan, but it is difficult to see that these governance signals have yet made a clear difference (see Chapter 3, as well as the Climate Policy Council's 2019 report). When the Government developed its infrastructure bill, it emerged that there was a lack of consensus on the development of the transport system and what tools can and should be used to achieve the climate targets.[76] Consensus is lacking among central government agencies, as well as between the Swedish Transport Administration and county administrative boards, regions and municipalities.

A recent review from the OECD highlighted the potential for curbing climate impacts by redesigning and changing the use of transport systems.[77] Current Swedish transport planning and other policy instruments at the state, regional and local levels seem insufficient for driving developments in this direction.[78] The apparent lack of consensus among the Government's own agencies reinforces this picture (see Chapter 6).

Energy and carbon taxes on fuels, as well as cost increases resulting from the reduction obligation, are driving up the marginal price of road transport that uses internal combustion engines. So far, this price level has not been sufficient to reverse the trend. Car traffic is growing overall, even in urban areas, where viable alternatives abound. The challenge of reversing the trend not only concerns vehicles' direct emissions, but the constant expansion of space-intensive, climate-impacting infrastructure spurred by increasing car traffic in urban areas, which in turn creates lock-ins in inefficient transport systems.

Through new company car rules and proposals to change travel deductions, the Government has taken steps to limit previous subsidies for passenger cars and driving. The Government has introduced instruments to increase the competitiveness of rail transport, but congestion on the tracks constitutes an increasingly intrusive physical limit for shifting traffic to the railroads. Many individual decisions have been taken in recent years. Although the Government has adopted a strategy for freight transport and an action plan for decarbonised transport, few concrete steps have been taken towards major reforms, such as the investigation of a new tax system for road traffic or the introduction of stricter urban transport targets (see Chapter 3).

Reduced plastic waste in electricity and heat generation

The total annual volume of plastic waste in Sweden continues to rise, and stood at about 1.7 million tonnes in 2019. About three-quarters of this figure goes to energy recovery or fuel. Less than 10% of plastic waste goes towards recycling.[79–80]

Unless emissions from incinerating fossil-fuel waste, mainly plastics, will be managed solely through carbon capture, a policy is needed that changes upstream material flows, through reduced volumes, a shift to bio-based materials and increased reuse or recycling.

Producer responsibility has increased source separation, but it has not sufficed in its current form to have a major upstream impact through design for reuse or recycling or by affecting demand for recycled materials. Although there is an incineration tax on waste, several assessments have indicated that it has little or no effect on greenhouse gas emissions from waste incineration.

The Government introduced a tax on plastic carrier bags in 2020, and certain bans and requirements were introduced in January 2022 on single-use plastics in cutlery and food packaging. However, these measures are mainly aimed at reducing plastic litter in nature.

The Government has issued several broader mandates related to sustainable plastic use, and the Swedish Environmental Protection Agency presented a roadmap for sustainable plastic use in 2021. The Government has announced an action plan for plastics for 2022.

Resource-efficient agriculture

Current policy on the climate impact of agriculture focuses on fossil-fuel-free agriculture, but the biggest emissions by far from the agricultural sector do not come from fossil fuels and do not consist of carbon dioxide, but rather methane and nitrous oxide from land and animal husbandry. Current policy lacks targets or a clear goal for reducing these emissions, which in 2020 accounted for 15% of Sweden's total greenhouse gas emissions. The instruments available mainly involve advice and information to farmers as well as consumers. Emissions from the agricultural sector have remained unchanged for some time.

Other efficiency opportunities

In other emission sectors, including waste management, solvents and product use, policies are in place that are gradually – yet relatively slowly – lowering emissions. The Swedish Environmental Protection Agency estimates that current policy instruments will bring these emissions close to zero as early as 2045.[50]

There are significantly more areas where a more efficient use of resources and a more circular economy can sharply reduce the total climate impact, such as a more efficient, less emission-intensive use of materials in the construction sector, or different sharing schemes for vehicles and facilities. Policy is relatively undeveloped in these areas, and such measures have been assumed in the Panorama scenario to have relatively small effects on territorial emissions within Sweden.

Summary of policies for a more efficient use of energy and resources

Overall, it can be concluded that energy efficiency is a mature policy area. However, this area has been somewhat overlooked in Sweden in recent years, since much of the debate focuses on the supply of new electricity or biofuels. The EU's energy efficiency targets are more ambitious than Swedish ones, and current policies are not enough to achieve the goals. The Government's governance of the relevant agencies does not seem to be based on a common systems view of energy efficiency and power balancing.

Policies for broader resource efficiency are more undeveloped. As for a more efficient material use and the circular economy, there is no clear regulatory responsibility. Several policy initiatives have been taken, but stakeholders still lack a coherent direction and clear priorities. Incentives to reduce fossil-fuel waste headed for incineration are insufficient.

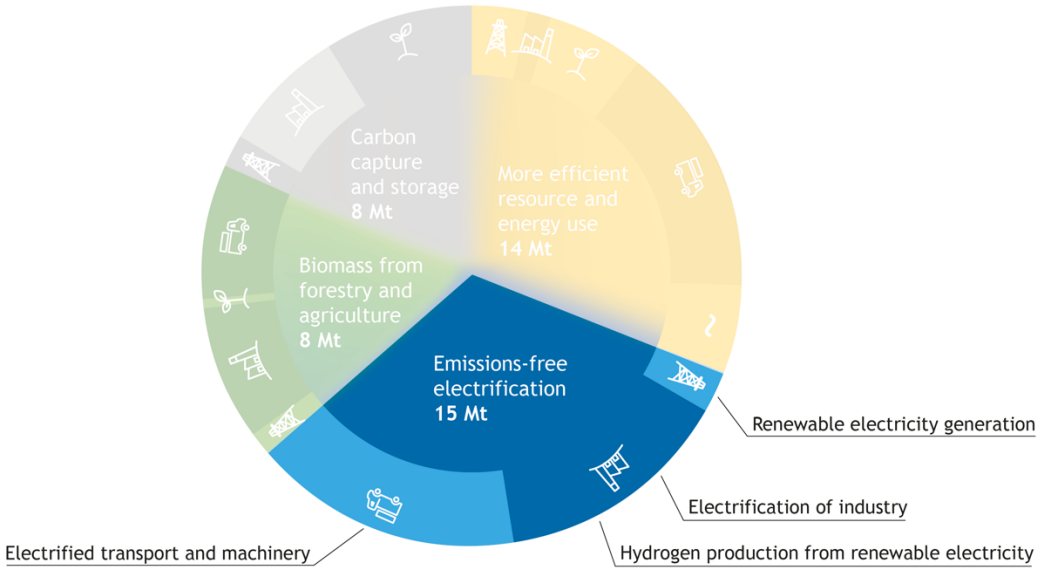
In the transport sector, different views clearly exist among the government agencies, as well as between the Swedish Transport Administration and the regions and municipalities, in terms of opportunities and instruments for pursuing a more transport-efficient society. This is an area where the Government needs to provide clearer direction.

7.2 Emissions-free electrification

An electrification process was underway throughout the 20th century in which electricity grew in importance as an energy carrier in an increasing number of applications, particularly in Sweden, where per capita electricity consumption is now among the highest in the world. In parallel, electricity generation over time has transitioned from using a high percentage of fossil fuels in the first half of the 20th century to nearly emissions-free today. Hydropower, nuclear power, wind power, bioenergy and solar power together accounted for more than 98% of electricity generation in Sweden in 2020.

Emissions-free electricity can be used to reduce greenhouse gas emissions in several ways. In the transport sector, electricity in the form of electric motors can replace petrol or diesel engines, and industry can switch to arc furnaces, a type of electric furnace used to melt metals. Electricity can also indirectly replace fossil-fuel energy sources and raw materials through the production of electrofuels. The simplest electrofuel is hydrogen, which is produced through the electrolysis of water. Hydrogen can replace coal in certain industrial processes, such as in steelmaking, serve as energy storage in vehicles and help balance supply and demand in the electricity system. More complex electrofuels, such as methanol or ammonia, can be produced through reactions between hydrogen and other substances, such as carbon monoxide and nitrogen.

In the Panorama scenario, electrification represents about one-third of all emission reductions to zero emissions by 2045, or 15 million tonnes. Two sectors each account for roughly half of those emissions: transport and non-road mobile machinery, and industry, as illustrated in Figure 9. The electricity and heating sector accounts for a smaller share.



Figur 8: Contribution of emissions-free electrification to emission reductions in different sectors, with examples of possible solutions.

Source: Panorama and own analysis

The fundamental driver behind the new global wave of electrification is the dramatic decline in the cost of electricity from renewable energy sources such as wind and solar. Since 2010 alone, the cost of solar electricity has fallen by about 85%, and wind power by about 50%.[81] At the same time, the cost of storing electricity in batteries has also fallen rapidly, by almost 90% since 2010.[82] Hydrogen

technology is under rapid development as well, though it has not yet taken off in the same way as solar, wind and batteries. Thanks to this rapid technological development, renewable electricity is currently cheaper than electricity from new nuclear power, coal power or gas power. In several cases, renewable electricity is starting to be cheaper per unit of energy than fossil fuels themselves, creating incentives to electrify even more processes.

With large-scale electrification comes increased demand for electricity that needs to be met with efficiency improvements, increased production and more robust grids. The amount of electricity consumption in the coming decades depends on a wide range of factors that are difficult to estimate today. According to estimates by the Swedish Energy Agency,[83] large-scale electrification will result in an electricity use of around 230 TWh by 2050, compared with today's 140 TWh. Other estimates point to even larger increases. Energy companies estimate that in a high-level scenario, the use could be 240-310 TWh by 2045.[84] This is considering that the use of electricity has remained largely unchanged for the past 30 years.

We should remember that previous scenarios in history greatly overestimated future demand for electricity, and that more efficient use has compensated for increased activity. [aa] [85] [86]As described in section 7.1, efficiency should be a key strategy going forward as well.[87] [bb] Smart system solutions that integrate energy flows for electricity, heat and transport are crucial to achieving sustainable and resource-efficient electrification.

Over the past two years, Sweden has had annual net electricity exports of around 25 TWh, corresponding to about 15% of total production. A few days per year, there are net imports from neighbouring countries. Despite the large surplus, high demand from surrounding countries and some limitations in transmission capacity within Sweden, combined with undeveloped local production and storage, mean that in some periods, electricity prices are still high, especially in southern Sweden.

Sweden is well positioned to take the lead in pursuing emissions-free electrification. Added to this is the availability of renewable energy resources, industrial expertise and capacity, and several Swedish companies' early initiatives in this direction. As more and more countries and companies set climate targets, as the EU's collective climate policy is tightened, and as international agreements are developed, the demand for products with a low climate impact is growing throughout the value chain. This can bring new businesses and industrial operations to Sweden, with both economic growth and increased demand for electricity as a result.

Challenges in emissions-free electrification

Although there is much to suggest the adoption of rapid, broad electrification in several sectors, challenges and obstacles can slow the pace of the climate transition and limit the contribution of electrification.

Technical challenges

Today's electricity systems are not designed for a more complex environment with a greater share of renewable, weather-dependent and partly distributed electricity generation; sharply increased, yet not fully planned electricity consumption; or new large-scale industries. The pace of technology

[aa] For example, the state's Energy Committee assessed in its 1967 report that electricity use in 2000 would be between 350 and 500 TWh. Actual consumption that year was 129 TWh.

[bb] The European Commission's proposal for a revised Energy Efficiency Directive calls for the guiding principle of "efficiency first" to be legally binding.

development must continue in terms of control, storage and transmission, for developing new solutions, and for rapidly commercialising solutions that have only been tested on a smaller scale. This applies to smart grid technologies in particular, with improved capacity to control electricity production, storage and consumption.

The direct electrification of the transport sector accounts for a relatively small part of the expected increase in demand in the scenarios above. Indirect electrification, and the role of hydrogen in particular, is the decisive factor in how much future demand for electricity will increase.[56] This is mainly due to expected demand from process industries, but also because hydrogen production involves huge energy losses. Improved technology and efficient system solutions for the production and use of hydrogen, where residual flows are utilised and synergies are leveraged, are thus a key development area for large-scale electrification.

Batteries that use raw materials with fewer resource constraints and environmental impact are another key area for technology development, including reuse and recycling systems.

Infrastructure for the electrification of vehicle fleets is still underdeveloped. For passenger cars, the issue is mainly a lack of access to fast charging in parts of the country and "home charging" for residents of apartment buildings. For heavy traffic, several systems and technologies are under development (batteries, electric roads, hydrogen), and important choices remain to be made.

As far as electricity generation is concerned, the technical challenges are minor. Wind power is now a mature technology that continues to evolve in phases. But increased investment does not automatically mean more wind turbines. Instead, much of the additional production capacity will come from gradually replacing today's wind turbines with new, more efficient installations on existing sites, which will further reduce costs.[83] Following the expansion of onshore wind power, a phase of expansion of large offshore wind farms is expected that will be sited relatively far out at sea, with more predictable wind conditions and greater capacity. In late 2021, Svenska Kraftnät received applications to build offshore wind farms for a combined 500 TWh, or more than three times Sweden's annual electricity consumption.[88] New technologies are being developed for floating wind turbines that can be used at great depths, potentially offering even greater electricity generation capacity.

Electricity generation via solar cells is growing exponentially across the world, including in Sweden, which can quickly drive up the relative contribution of solar power in the electricity mix.[cc] [89] With this growing global market, new types of solar cells and solutions are constantly being developed. Investments in new nuclear power plants have been allowed in Sweden since 2009, and could become a reality in the latter part of the period leading up to 2045. But the costs of nuclear power cannot compare with those of renewable electricity generation. Much technological development remains for new types of nuclear power, so it is difficult to assess the technological and economic potential. However, the transition does not depend on the long-term prospects of nuclear power or the ability to overcome technical obstacles along the way. With the right instruments, renewable energy sources can be expanded in the near future to a sufficient extent to meet the increasingly aggressive electrification plans of industry and the transport sector.

Economic challenges

Major investments are needed to expand and modernise electricity networks, even if local electricity generation, energy storage and adapted electricity consumption will also improve the

[cc] In 2021, electricity generation from solar cells in Sweden was estimated to have reached 1 TWh for the first time, more than 40% higher than in 2020.

chances of balancing supply and consumption in space and time. Similarly, investments in new electricity generation are needed to both meet increased demand and replace ageing production facilities. This means that annual investments in the energy industry need to be stepped up. A study from Northern European Energy Perspective (NEPP) estimates that just over half of the total investments in the period leading up to 2050 will have to go towards production, and just under half towards electricity grids.[90]

Investments are also needed in other sectors, such as charging infrastructure, electrified industrial processes and the production, storage and transfer of hydrogen. Here, the estimated investment volumes are even more uncertain and changing relatively quickly. It is no longer a given that clean energy options cost more than current fossil-fuel technologies. For example, the purchase cost of electric passenger cars is expected to be on par with conventional petrol or diesel cars within a few years, and operating costs, lower.

In general, electrification in the transport sector is increasingly being driven by inherent cost advantages, while in most cases new industrial processes still entail higher costs. For example, fossil-fuel-free steel is estimated to be 20–30% more expensive to manufacture than conventional steel.[dd] [91] Since in many applications, materials like steel make up a small percentage of the cost of the final product, such as a car, the cost increase in a finished consumer product often remains low. In some markets, materials with a low carbon footprint can provide a competitive advantage, because the willingness to pay compensates for a higher price tag. In the longer term, learning and economies of scale are expected to drive down costs even for these new fossil-fuel-free processes still under development.

Institutional challenges

Investing in new technologies always brings an increased risk, even though new emissions-free solutions can increasingly compete with old solutions based on fossil fuels, and renewable energy keeps operating costs low. The risks are both technical and economic. But there are also institutional risks and risks related to uncertainties around future policies.

Investments in electricity generation, storage and electricity networks in particular usually take a long time to implement, and they are not occurring at the pace needed to reach the climate targets. The pace of electrification is being slowed by time-consuming and sometimes unpredictable permitting processes. A clear example is the process for new power grid concessions (permits) which, including appeals, can take many years from the time an electric utility company submits its application. The expertise and capacity of the agencies involved – for example, the various county administrative boards – can vary.

The provision on municipal opinions in the Environmental Code, often referred to as the municipal veto, enables municipalities to deny permits for large-scale wind farms requiring a permit. Decisions cannot be appealed and do not require justification, and there are no decision criteria or time limits for the process. This creates additional uncertainty in the permitting process. The provision was introduced along with relaxed requirements for detailed plans and the removal of building permits, and it aimed to streamline the permitting process while restricting the municipalities' influence over land use in the municipality. Evaluations indicate that the aim of the reform has not been achieved.[92] In June 2021 the Government received the inquiry report for a legally certain review for wind farms, with proposals for amended rules, such as a special law on municipal siting notices for wind farms that require a permit.[93]

[dd] According to estimates from the Hybrit project, their steel will be 20–30% more expensive than conventional steel.

There are significant conflicting goals and conflicts of interest surrounding the expansion of onshore wind farms in particular. Resistance from local communities where projects are planned, from municipalities, private individuals, organisations and the Swedish Armed Forces, poses significant obstacles, and it has resulted in the rejection of a substantial number of applications for building onshore wind farms.[94] [ee] As the expansion of solar and wind farms, both on land and at sea, is expected to accelerate, these conflicts risk intensifying and could become a crucial obstacle to electrification. The inquiry into a legally certain review of wind farms proposed that the state should introduce statutory rules for financial compensation to the municipality or the local community for wind farm installations.

Another challenge is that the current regulation of regional and local electricity networks, which is based on an operator's perspective of relatively stable infrastructure, is not well suited for a rapid period of transition.

Several professions that play key roles in electrification already face a mounting skills shortage. The energy industry has a huge recruitment need and is facing a large wave of retirements. For example, Statistics Sweden's long-range forecasts for the 2030s indicate a clear shortage of engineers in energy, electronics, automation and computer science.[95] But the need for expertise also applies in economic and market issues, law, behavioural science, resource management and other fields.

Current policies on emissions-free electrification

The overall goal of energy policy is to reconcile security of supply, competitiveness and environmental sustainability. In addition, Parliament has decided on a target of 100% renewable electricity generation for 2040.[96] [ff]

Several government agencies play vital roles in implementing government policies to achieve these goals, not least the Swedish Energy Agency and the Swedish Energy Markets Inspectorate. Decisions at the EU level increasingly affect Swedish energy policy, and electricity system policy in particular. Sweden's electricity system is also directly linked to those in neighbouring countries, through a common northern European market for electricity trade. Developments in all these countries affect Sweden, too, in terms of political decisions and investments in production capacity and transmission capacity. At the same time, electricity is being generated by more and smaller producers, and digital technologies for managing consumption and storage are becoming available from new players. All this greatly affects the prerequisites for national policy.

Energy taxes and carbon taxes are a major foundation for policy. These taxes are used to steer away from fossil fuels towards electricity produced using renewable sources. This lays an essential foundation for reducing emissions everywhere, and in a cost-effective manner. Similarly, the EU's emissions trading scheme (EU ETS) creates incentives to phase out fossil fuels in the trading sectors. Now that the European Commission has proposed a separate trading system for emissions from transport and heating, this pressure at the European level is expected to intensify and decarbonisation to accelerate.

The electrical system is the basis for electrification. Following the expansion of hydropower and nuclear power, the third wave of emissions-free electrification, thus far mainly onshore wind power, has been driven by an electricity certificate system. This economic assistance has been

[ee] One-third of all applications are rejected, according to the Swedish Energy Agency's survey of wind farms that were reviewed for permits during the period 2014–2019. According to a summary report from the Swedish Wind Energy Association, less than half of all applications are granted approval, and the number of granted permits decreased drastically during the period.
[ff] This is a target, not a cut-off date that prohibits nuclear power, nor does it involve closing down nuclear power plants through political decisions, according to the Government's bill and the broad agreement reached in 2016 by a large majority in Parliament. The Moderates and the Christian Democrats later announced that they no longer supported the agreement.

available to producers of renewable electricity in Sweden since 2003. However, the need for production support has waned as technologies have matured and costs have fallen. The Government has decided that no new electricity certificates will be awarded for production facilities put into operation after 2021, and the electricity certificate system will be completely abolished by 2035. Private individuals who want to invest in small-scale, renewable electricity production can still receive assistance, through previous investment support for solar cells and, since January 2021, through a tax reduction for green technology.

In 2021, the Government implemented or took decisions that strengthen the expansion of both production capacity and electricity networks. Among these decisions are an extended tax exemption for self-generation of electricity, a new mandate to Svenska Kraftnät to expand the national transmission grid to areas within Sweden's maritime territory, and a broadening of the Climate Leap to also include biogas plants for electricity generation. In 2021, the Government presented a bill for modern permitting processes for electricity networks, with the aim of making it easier to expand the grid in Sweden and for making permitting procedures less of an administrative burden.[97] The bill was passed by Parliament.

In addition to energy and carbon taxes, a broad set of transport sector policies have implications for the electrification rate. Under a differentiated vehicle tax known as the bonus–malus system, new environmentally friendly vehicles with relatively low CO_2 emissions get a rebate (bonus) while vehicles with relatively high CO_2 emissions are levied higher taxes (malus) during the first three years. The bonus–malus system does not apply to heavy goods traffic. The Government bolstered this policy instrument in 2021 by injecting an additional 550 million SEK for climate bonus vehicles for 2022, tightening regulations, and increasing the malus fee. This especially benefits electric vehicles with very low emissions, as does the reduction in preferential taxation for green cars and the EU emission requirements for both light and heavy vehicles. For heavy vehicles environmentally differentiated road charges also steer towards vehicles with lower CO_2 emissions.

The expansion of charging infrastructure is a key prerequisite for electrifying vehicle fleets. Several support schemes aimed at picking up the pace of expansion are in place, such as the Climate Leap, targeted aid for private individuals who want to install a charging station at home, and government aid for quick charging at public charging stations within "white spots" on the charging infrastructure map, where such public charging stations are otherwise not being built. In 2021, the Government tasked the Swedish Energy Agency, in cooperation with the National Board of Housing, Building and Planning, with proposing measures to improve access to charging at home, especially for residents of apartment blocks and those who use street parking.

For industry, a number of policy instruments and other policy measures are in place that affect the electrification rate. Publicly funded research and development projects are the source of new knowledge and development: several of the national research programmes and strategic innovation programmes as well as energy research funded by the Swedish Energy Agency. Access to sustainably produced batteries is enhanced in the long term through investments in research and a strategy for a sustainable battery chain. The Green Industry Leap provides funding for research, feasibility studies, pilot and demonstration projects, detailed design studies and investments that can contribute to the industry's transformation, not least electrification. It has increased in scope and broadened over time.

On 3 February 2022, the Government approved an electrification strategy with the aim of accelerating progress and improving coordination among various initiatives for emissions-free electrification.[98] The strategy describes 67 different measures in 12e areas that indicate the direction of the Government's continued work. The Government states that it intends to give Svenska

Kraftnät a clearer role to pursue development of the electricity system as needs arise. This measure includes more proactive efforts around national network planning. The strategy also announces an action programme for charging infrastructure and tank infrastructure as well as an upcoming district heating and cogeneration strategy.

On the same day, the Government announced its intention to establish an electrification council with representatives from the public sector, private industry and other stakeholders in order to support the successful implementation of the strategy. The Electrification Commission has existed since 2020 with a similar composition, and is tasked with accelerating the electrification of heavy road transport and the transport sector as a whole.

As tasked by the Government, the Swedish Energy Agency presented in November 2021 a proposal for a national strategy for the role of hydrogen and other electrofuels in the Swedish energy system.

Summary of emissions-free electrification policies

In summary, current policies include a substantial number of targeted policy instruments and several comprehensive measures that can be expected to drive electrification and meet the obstacles and challenges identified. The initiatives that have already been decided or are underway must be implemented in a quick, coordinated and decisive manner. More reforms will be needed. For example, the Government has declared a high level of ambition in streamlining and speeding up various permitting processes, but the results are not yet clear.

All ongoing initiatives and new policies, together with the significant number of relevant public and other stakeholders, place great demands on coordination and a clear shared roadmap. Coordination among ministries and government agencies must be enhanced (see also Chapter 6). The Electrification Commission, the recently presented electrification strategy, and the future Electrification Council can hopefully create a more solid foundation in this respect, and for other obstacles to electrification to be managed more effectively.

In the overall assessment of the Climate Policy Council, the most obvious shortcomings of current policies involve institutional barriers. The policies being pursued are not commensurate with the scale and speed of the changes required. This is true, for example, of how the Government has steered its agencies, capacity and instruments for securing acceptance and managing conflicts of interest, and the skills and resource needs both at the agencies and in society at large.

7.3 Biomass from forestry and agriculture

Sweden has good biomass assets from agriculture and, above all, forestry. This biomass can be used to reduce climate impact because it can replace carbon-intensive fossil-fuel products or energy. Biofuels can replace fossil fuels, wood can replace concrete in buildings, or bio-based alternatives can replace fossil-fuel-based plastics, with lower greenhouse gas emissions as a result over a given period.

In principle, most fossil-fuel products and processes can be replaced by bio-based alternatives. The climate benefits of such substitutions depend, for example, on different assumptions about time perspectives, which bio-raw material is used, how it was produced, which products are replaced, and how long they are used and possibly recirculated. Products with a longer lifespan, such as buildings made of wood, generally bring greater climate benefits than when raw materials are used

for short-lived products or as fuel. Therefore, it is better to use residual flows from forestry and agriculture as fuel.

Such a substitution has been ongoing for decades in Sweden, which has made a substantial contribution to reducing emissions of fossil-fuel-driven greenhouse gases since the early 1970s. The vast majority of that contribution has been the replacement of fossil fuels with bio-based fuels such as logging residues and forestry by-products. At the same time, this has turned bioenergy into Sweden's single largest source of energy. Most of the use takes place in the forest industry and in heating and combined heating and power (CHP) plants.

In the Panorama scenario, the increased use of biomass for substituting fossil fuels and materials will reduce Sweden's greenhouse gas emissions by just under 10 million tonnes by 2045 (see Figure 10). The greatest total emission reductions are expected to occur in industry. But in the short term, by 2030, bioenergy is expected to play a growing role in the transport sector. With the increase in electrification, the use of biofuels for road transport is then expected to gradually decrease again. For shipping and aviation, battery-based electrification using today's technology is limited to certain purposes, such as smaller boats and ships, shorter ferry routes and smaller aircraft operating along shorter routes. Even if there is a rapid development of hydrogen and other electro-fuels, biofuel use is likely to remain longer in these modes of transport than in road passenger transport.

The emission reduction indicated for electricity and heat originates from an increased use of bio-based plastics, which is expected to reduce the incineration of fossil-fuel-based plastic waste.

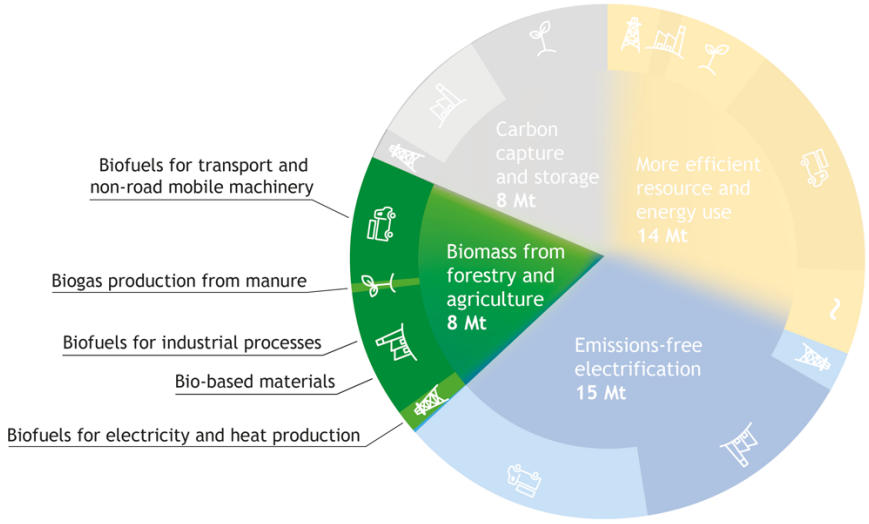


Figure 9: Contribution to emission reductions from forestry and agriculture in different sectors, with examples of possible solutions.

Source: Panorama and own analysis

The physical gross potential for the use of biomass in Sweden is significant. At the same time, forests in particular are an essential carbon sink, helping reduce net emissions through their uptake of carbon dioxide from the atmosphere. There are opportunities to further promote these removals. The carbon stocks of agricultural land can also be increased through reduced tillage, for example. Section 7.4 provides more details. Forest carbon sinks and biomass from agricultural land as substitutes for fossil-fuel-intensive materials and energy are not mutually exclusive, but specific trade-offs and choices need to be made.

From a climate change perspective, biomass should be used where it brings the greatest climate benefit. However, forests and agriculture provide several major values in addition to climate benefits. Food security, for example, is a strategic issue. The economic value of forestry and agriculture is also high. The forest industry accounts for about 10% of employment, exports, turnover and added value from Swedish industry. The net export value from the forest industry is the same as all manufacturing industries combined, because the raw materials are domestic and imports are minimal. Other industries that rely on the forest and the land include tourism and reindeer herding. Additional high values that rely on the forest and agricultural landscape are water supply, biodiversity, recreation, and natural and cultural heritage. Thoughtful priorities, instruments and management practices are required to take into account the different values. There is currently no accepted definition of what constitutes sustainable use.

It is worth remembering in this context that until now, the volume of deforestation in Sweden has not primarily been driven by bioenergy demand, but by demand from the paper and pulp industry and sawmills. In an accelerating climate transition, new technologies, consumption patterns and innovations can influence how much of the available biomass is utilised for different purposes.

Challenges for biomass from forestry and agriculture

The technology for producing electricity and heat from biomass is mature and has long been used on a large scale in Sweden. The major technical challenges that lie ahead mainly revolve around the development of more advanced biofuels, materials and other products that can maximise value creation and climate benefits from biomass.

The physical potential for bioenergy is limited compared with solar or wind power. In Sweden, however, it is relatively great due to a low population density and large forest areas. The use of bioenergy has tripled in Sweden over the past 40 years, and totalled 145 TWh in 2019.[45] Achieving the emission reductions set out in the Panorama scenario would require 167 TWh of bioenergy. (The Panorama scenario does not address the question of how great the access to biomass is.) This is slightly more than current levels, but significantly less than in some other assessments and scenarios presented in recent years.[99] [gg] This is because the Panorama scenario places greater emphasis on efficiency and electrification, which reduces the need for bioenergy.

Global demand for biomass is expected to rise, partly because of the climate transition. As competition for raw biomaterials increases and prices rise, these materials will be directed towards sectors that have few or no emissions-free alternatives and thus the greatest willingness to pay. By 2030, the road transport sector will likely see the greatest increase in demand. After that, its use might increase in other segments, such as for aviation biofuels and renewable raw materials for the chemical industry.

While electrification and efficiency can release biomass from transport and heating, for example, various forms of bio-based materials can be expected to become increasingly important in the continued transition, replacing fossil-fuel-based plastics in particular.

A resource-efficient use of Sweden's biomass resource base requires major investments in modern biorefineries, and thus significant financial risk. Since demand from different markets is expected to shift over time, the risk can be reduced if production facilities are not made dependent on a specific product.

[gg] In Fossil-Free Sweden's bioenergy strategy, the total gross demand for 2045 is estimated to be 241 TWh, which exceeds the potential of 185 TWh that in the same report is deemed possible to withdraw in Sweden. The strategy involves different ways of meeting supply and demand in a sustainable way.

Unlike other sectors, the transport sector imports the majority of biofuels. The exception is biogas, which is largely produced domestically. As the world changes, increased demand might drive up prices and limit the availability of sustainably produced biofuels in Sweden.

The multidimensional values described above have played a part in an increasingly intense debate about how the potential of Swedish forests should be leveraged and different benefits balanced. Conflicts around forests and soil are increasing to some extent in Sweden, and to an even greater extent in the EU, which might affect how much biomass will be available for bio-based materials and bioenergy in the future. There is no clear policy direction yet on how to address those conflicts.

Current biomass policy from forestry and agriculture

Historically, the country's forests and agriculture have served as sources of energy, food and construction materials. Forestry in particular has been a central part of Sweden's industrial development throughout the 20th century, spurring economic growth and employment in large parts of the country. The economic and industrial perspective has therefore come to dominate forestry and agricultural policy.

Ambitions – from politicians, civil society, the general public and, increasingly, industry – to protect other values have gradually led to a broader set of goals and means. Today, forestry policy is governed by two overarching objectives: a production target and an environmental target. The environmental target primarily addresses biodiversity, but it also includes protecting the cultural, aesthetic and social value of forests.

The Swedish Forest Agency is the managing authority tasked with balancing forestry policy objectives and striving to achieve them. The Swedish Board of Agriculture is the managing authority for agriculture.

After about three years of work, the Government decided in 2018 on a long-term forest strategy for Sweden, a national forest programme.[100] The programme sets out objectives for five focus areas that will help achieve the programme's vision: "The forest, our green gold, will help to provide jobs and sustainable growth throughout the country and to develop a growing bioeconomy." The first of the five focus areas is "sustainable forestry with increased climate benefits".

The current policy is comparatively robust in several areas in terms of stimulating the use of bioenergy. The carbon tax, exemptions from the energy tax on biofuels and, later, the EU ETS, have been key drivers in all sectors.

In the transport sector, the reduction obligation has replaced the energy and carbon taxes as the most essential instrument for promoting biofuels. The robust instruments for increased use have so far been insufficient for stimulating any significant domestic production of biofuels, but have rather boosted imports, first of ethanol and later of biodiesel. This is partly because the instruments are perceived as short-term and unpredictable. The evolution of the reduction obligation over the coming years has long been uncertain, and the Government's decision only applied for the next year. The tax exemption on high-blend biofuels has in turn relied on time-bound, short-term decisions on exemptions from the EU's state aid rules.

The Government announced in February 2022 that it intends to submit an application for a tax exemption on high-blend liquid biofuels for an additional 10 years after the current state aid approval expires on 31 December 2022. The Government believes that the European Commission's revised environmental support guidelines have increased Sweden's chances of

retaining the current tax exemption in the longer term. As an alternative, the Government previously considered a proposal to include clean, high-blend liquid biofuels in the reduction obligation for petrol and diesel starting in 2023. Several reviewing bodies fear that this option would lead to large, short-term cost increases for operators who have already switched to clean or high-blend biofuels, especially public transport operators.

As far as heating is concerned, energy and carbon taxes have been the most important instruments for phasing out nearly all fossil fuels, which have been partly replaced by biofuels. This applies to both large-scale use in district heating plants, and smaller-scale property-related heating. In some periods, the taxes have been supplemented by investment grants for both district heating companies and property owners, as well as for municipal energy and climate advice. The low share of fossil fuels for heating in Sweden is almost unique among the world's industrialised countries.

The heating market is local, whereas the electricity market is Nordic or northern European, partly explaining why electricity generation has been virtually exempt from carbon taxes. Instead, as regards electricity generation, the certificate system for renewable electricity has helped to increase the competitiveness of bio-based cogeneration. Over time, the EU ETS has also contributed.

As for the high energy use of bioenergy in industry, it has made sense economically for the forest industry to replace energy from fossil fuels with its own forest residues, even though the policy instruments have been weaker than those in the heating sector. The traditional forestry industry, refineries and chemical industries are looking to biorefineries to produce fuels, chemicals and materials. The Green Industry Leap exists to support the development of new, clean solutions in industry, and the newly introduced green credit guarantees show the potential to facilitate financing of the major investments needed.

To increase the production of biofuels from agriculture, a support scheme is available for biogas production from manure. The scheme offers dual environmental and climate benefits by enabling biofuel to replace methane emissions while serving as a substitute for energy from fossil fuels. The support is partly funded through the EU's rural development programme. Investments in biogas plants for vehicle fuel or electricity generation can also be supported through the Climate Leap.

The EU has long signalled that it is not appropriate to provide assistance for producing biofuels from food and feed crops. The EU has incrementally stepped up the sustainability requirements for biofuels, and Sweden's legislation was also adapted to these requirements in 2019.[101]

Compared with bioenergy, the policy instruments are weaker in terms of substituting materials that use fossil fuels, such as replacing concrete in buildings or replacing fossil-fuel-based plastics with bio-based materials. Despite Sweden's huge forest resources, for quite some time, only small houses were built with wood. Until the mid-1990s, building regulations did not allow wooden multi-storey buildings. The share of wooden multi-storey buildings has held steady, at around 10%, since the beginning of the 2000s. However, in recent years there has been more interest and new investment in the industrial construction of multi-storey buildings in wood.[102] Several innovation and development efforts have been made at the national and local levels. Thanks to the new climate declaration for buildings, construction companies must report the climate impact of new buildings.

Summary of biomass policy from forestry and agriculture

All in all, policies have historically built a solid foundation for bioenergy use in Sweden, primarily concerning the use of residues in relatively unprocessed form in district heating and industry. Over

time, the use of biofuels has also increased in the transport sector, though mainly through imports of ethanol and more recently biodiesel. The long-term direction has been clear and has gained broad support.

Progress is now entering a different phase, towards producing more highly processed fuels, chemicals and materials for global markets instead of primarily for the local heating market.

Yet legislative proposals in the EU are somewhat at odds with current Swedish policy, and discussions have become more intense about the forest as a carbon sink as well as its role in biodiversity, creating uncertainty around the future roadmap. The Government has also been announcing a bioeconomy strategy for quite some time, but it has been delayed several times, apparently in part due to opposing interests. The national forest programme does not seem to have created the clarity that was intended. This fundamental uncertainty is a significant obstacle to biomass contributing in a balanced, resource-efficient way to the continued climate transition.

Agriculture, on the other hand, has often been side-lined in discussions about the climate transition, despite the fact that the sector accounts for about 15% of total greenhouse gas emissions and there is significant potential to expand carbon sinks. There is currently no clear policy on whether and how to limit these emissions or how investments for carbon sinks should be funded. In the target scenarios from the All-Party Committee on Environmental Objectives that served as input for the current climate targets, supplementary measures are adopted to compensate for a large proportion of current emissions from agriculture.

7.4 Carbon capture and storage

There is great potential for reducing greenhouse gas emissions in several sectors. In some cases, however, these measures are not enough to completely phase out all climate emissions by 2045. In addition, the Swedish net-zero emissions target, like the global scenarios for achieving the Paris Agreement goals, includes achieving significant net negative emissions in the second half of the 21st century. Therefore, in addition to the other key areas, measures are also needed to capture and store carbon dioxide, including existing and continuous carbon uptake in natural carbon sinks in forests and agricultural land. Such measures are often divided into two categories:

1) Carbon capture and storage (CCS) from the burning of fossil fuels, which can reduce emissions in industrial processes, for example, in which it is difficult to substitute electrification or biofuels (but does not result in negative emissions).

2) Solutions that generate negative emissions and thus have the potential to be included in supplementary measures, technical measures such as CCS linked to biogenic emissions (BECCS) and enhanced natural sinks through increased carbon uptake in forests and soils, including agriculture.

Both these categories are combined into one key area, although they serve different functions in the climate transition and their effects are noted in different ways in greenhouse gas statistics. CCS technically works the same way regardless of the fuel used, but in the case of fossil fuels it is a way to avoid releasing new fossil carbon into the atmosphere. BECCS, on the other hand, can reduce the carbon content in the atmosphere over time, provided that corresponding amounts of biomass are generated and incinerated.

In the Panorama scenario we expect a contribution from CCS in industrial processes where electrification or other measures are difficult to achieve, mainly in the cement industry and, to a lesser extent, in refineries and the steel industry. In addition, measures in the second category are

available as supplementary measures. The size of that contribution, just under 4 million tonnes CO_2e, has simply been determined by the size of emissions for which we currently lack sufficient emission reduction measures, particularly in agriculture. The potential is significantly greater and can be used to reach negative emissions. The Panorama scenario stops at net-zero emissions.

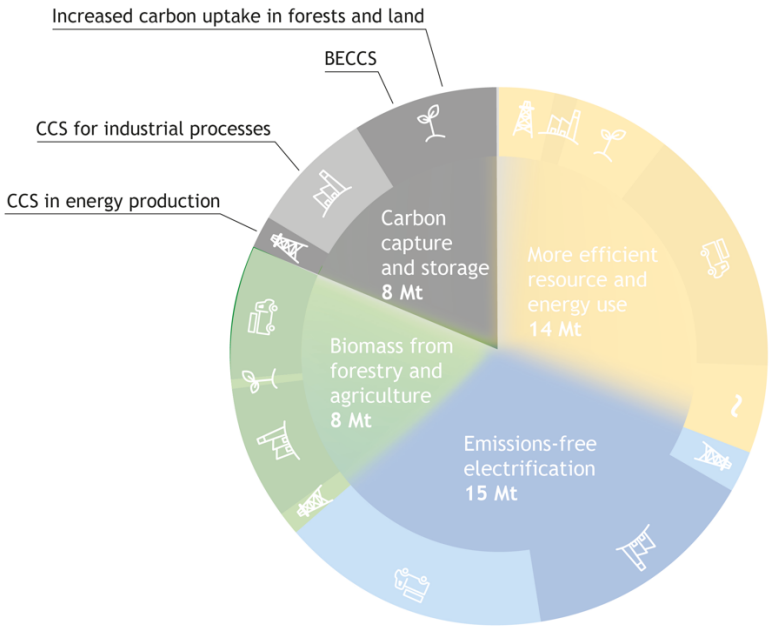


Figure 10: Carbon capture and storage in different sectors, with examples of possible solutions.
Source: Panorama and own analysis

In a Swedish context, BECCS and measures for increasing carbon sinks in forests and land have been identified as the actions that show the most long-term potential for negative emissions.

The climate policy roadmap assesses the realisable Swedish potential for BECCS at 10 million tonnes of CO_2 per year, with a technical potential of nearly 20 million tonnes.[103] The greatest potential lies in the paper and pulp industry, which accounts for the majority of biogenic point-source emissions, followed by the energy sector, with incineration of forest residues and biogenic waste. The Swedish Energy Agency has estimated that the potential for 2030 is close to 6 million tonnes.

Swedish forest land has long served as a stable carbon sink, absorbing just under 38 million tonnes of CO_2 per year over the past decade; this is because forest growth has been greater than withdrawals.[1] As a result, Sweden's forests constitute a large stockpile of carbon and a continued net carbon sink as long as forest growth continues to exceed felling.

The climate policy roadmap inquiry submitted some proposals for increasing carbon storage on agricultural land, but not for increased uptake in the forests. The inquiry concluded that there is potential to increase carbon sinks in forests – for example, through measures that increase growth, measures for greater environmental considerations in forestry, and the exclusion of larger areas of productive forest land from timber production. If forest land is excluded from timber production, it also contributes to other environmental objectives, such as the environmental quality objective "sustainable forests". The inquiry also noted that it is important to secure existing carbon stocks in the biomass and soil, since ongoing climate change brings a greater risk of damage from storms, droughts, insect attacks and fires.

Other measures that can help to lower net emissions include biochar, carbon capture and utilisation (CCU), and other solutions that often have greater uncertainties, which means that their realisable sustainable potential is difficult to assess.

Challenges for carbon capture and storage

Increasing carbon sequestration on agricultural land and carbon sinks in forests across the whole landscape is possible, but it requires common forest and agricultural practices. Alternatives do exist, but they must be promoted through actions such as policy advice and modified or new policy instruments and forms of compensation. It is also important to design reporting and follow-up systems to enable an evaluation of the effects of such instruments.

Carbon capture in the form of CCS is a well-known and mature technology. But it is not yet used as a climate measure for capturing and storing carbon dioxide on a large scale. And for carbon capture to gain a foothold, improved transport infrastructure, large-scale storage and a review of relevant regulations and agreements are all needed.

CCS in Sweden is not considered relevant in the near future, and the Swedish Geological Survey (SGU) estimates the lead time from application to commissioning of a large-scale Swedish geological carbon storage facility to be 18–24 years. Within the next 20 years, storage will thus be needed in another country. The Norwegian Northern Lights project, with a planned storage capacity of 1.5 million tonnes per year starting in 2024, has progressed significantly. The Norwegian government is working to ensure that Norway can store carbon dioxide from other countries on a large scale, and it has shown interest in collaborating with Sweden.

The fact that CCS technologies have not yet been used on a large scale means that there is still uncertainty over the long-term costs. The technology requires major long-term investments in removals, transport and storage. Carbon capture is best suited for larger point sources, such as industrial plants in sectors such as energy, pulp, concrete and cement.

The costs of completely new decarbonised industrial processes are currently often higher than for established technologies based on fossil fuels. However, the new technologies might become more cost-effective in the long term as knowledge is built and as use gains traction (see the section on electrification). On the other hand, CCS by definition always entails an additional cost compared with non-CCS production. Some form of long-term financial incentive is needed. In the case of fossil CCS, the EU ETS and carbon tax act as basic incentives in the same way as for other emission reduction measures. Some form of additional policy instruments will be needed for BECCS and for measures promoting increased natural uptake in forests and land, in order to create financial incentives for individual operators.

The separation cost for larger pulp and paper plants and CHP plants with favourable siting is assessed in the climate policy roadmap at 400–600 SEK per tonne. The inquiry estimates that carbon capture at Swedish plants totalling a minimum of 10 million tonnes can take place at a cost of less than 800 SEK per tonne. Added to capture are costs for transport and storage of 250–500 SEK per tonne. In 2021, the Swedish Energy Agency engaged in dialogue with operators who performed site-specific and plant-specific cost estimates for CCS. Taken together, the results of these studies suggest slightly higher total costs, averaging 1,000–1,200 SEK per tonne. For some operators, the total cost estimates are nearly 2,000 SEK per tonne.[hh] In January 2022, the price of allowances in the EU ETS rose to levels approaching 1,000 SEK per tonne.

[hh] The difference compared with estimates in the climate policy roadmap inquiry is mainly due to higher estimated costs for transport and storage.

There are currently no developed regulations for ensuring that the entire chain, from emissions transport from the source to carbon storage elsewhere, can work. What role the state will play in building this infrastructure is not clear.

International conventions also constitute legal obstacles. At present, storage in the Baltic Sea is not allowed as a result of the CCS Directive and the Helsinki Convention, and depending on how Sweden implements the so-called offshore directive.[103]

In Germany, for example, there is considerable local opposition to carbon storage, which became a significant setback to developing early pilot projects.

Current policies for carbon capture and storage

Under the climate policy framework, at least 85% of the 2045 target must be achieved through domestic emission reductions, while up to 15% can be met through supplementary measures. Supplementary measures can be applied towards target attainment in accordance with international rules. The climate policy roadmap inquiry presents several possible supplementary measures. The main options highlighted are:

- Capture, transport and storage of biogenic carbon dioxide, BECCS;
- Enhanced carbon sinks in forests and land;
- Verified emission reductions in other countries.

There are no specific targets for supplementary measures in Sweden. The climate policy roadmap inquiry has proposed targets of at least 3.7 million tonnes of CO_2 per year by 2030 and 10.7 million tonnes per year by 2045. These targets would be subordinate to the climate objectives and thus not included as intermediate targets within the environmental objectives system, but they would stimulate progress by serving as benchmarks for the stakeholders involved.

The Paris Agreement contains mechanisms for cooperation among countries that aim to produce greater emission reductions than is possible within each country using its own resources. Emissions reduction trading is governed by Article 6 of the Paris Agreement. Countries can thus trade emission allowances through collaboration under Article 6. The aim of such cooperation is to enable the cost-effective reduction of global emissions where they make the most impact. Collaborations are thus expected to lead to further emission reductions, as countries choose to invest their cost savings in increased climate ambition. However, there is also a risk that emission reductions will not be effective. At COP26 in November 2021, an agreement was reached on the principles for applying Article 6. However, the technical aspects of the mechanism remain to be designed.

CCS and BECCS

Since 2021, the Swedish Energy Agency has acted as a national centre for promoting the effective application of CCS in Sweden. Its mission involves planning and driving the coordination and promotion of CCS in Sweden and enabling the export of captured carbon dioxide from Swedish plants – for example, to Norway. The Swedish Energy Agency will carry this out in dialogue with businesses, industrial sectors, other government agencies and the Government Offices.

As of 2021, the Green Industry Leap can finance applications of CCS, such as feasibility studies, research, pilot and demonstration projects, and investments for measures that contribute to negative emissions through the capture, transport and geological storage of carbon of biogenic or fossil origin removed from the atmosphere.

In December 2021, the Government decided to introduce so-called reverse auctions as operational assistance for BECCS. The first auction is scheduled for the end of 2022. Sweden is thus the first country in the world to announce government funding for BECCS. In a reverse auction, operators bid on how much carbon dioxide they can capture and store and at what price. The operator who can deliver BECCS at the lowest price wins the tender and receives the funding. The support is proposed to cover 100% of the costs of capture, transport and storage over the 15-year term.

In the budget decided by Parliament for 2022, the Swedish Energy Agency received a certain increase in administrative resources with the task of "preparing for an increased use of BECCS and for reviewing how CCS in general can be implemented in Sweden". The Swedish Energy Agency was also authorised to enter into agreements of 30 billion SEK between 2026 and 2046 in order to capture and store "up to" 2 million tonnes of CO_2 annually through BECCS.

Uptake in forests and agricultural land

The land use, land-use change and forestry (LULUCF) sector includes removals and emissions from land, including biomass. Removals can take place in growing forests, while emissions can occur through degradation processes in forests, arable land and drained wetlands, or through clear-cutting. Swedish policy contains relatively few specific measures for stimulating carbon uptake and storage, although forest policy generally aims to preserve and sustainably manage Swedish forest stocks. One example is the aid introduced in 2021 for rewetting drained peatlands. The latest environmental economic report by the National Institute of Economic Research suggests that there is a need for national policy instruments in order to increase carbon storage in the forests.[104,105]

Several policy instruments and funding measures are also available under the rural development programme that can promote reduced emissions and increased uptake in the land use sector. However, these instruments were introduced for other purposes, such as preserving and strengthening biodiversity and improving water quality and nutrient content in soils.

The Swedish Forest Agency, together with the Swedish Board of Agriculture, has an ongoing strategic mandate to plan for increasing carbon sinks and contribute to supplementary measures in the climate policy framework. The forest agency also has a mandate within the framework of the national forest programme to develop new forest impact assessments together with the Swedish University of Agricultural Sciences. This mission includes investigating how carbon sinks are affected by reducing felling.

Unlike Sweden's targets, the EU's climate targets for 2030 contain a specific target for carbon removals in the LULUCF sector. As part of the EU's Fit for 55 package, work is ongoing on the Commission's proposal for a review of the LULUCF Regulation. It calls for a new target for annual net removals of greenhouse gases from land use and forestry during 2026–2030. The European Commission proposes that the EU's common sinks and reservoirs should absorb 310 million tonnes of CO_2 equivalent by 2030. Of this, a maximum of 225 million tonnes can be used to meet the 55% target for net emission reductions compared with 1990. The target is distributed among the Member States in absolute terms, and for Sweden means that the carbon sink should be at least 47.3 million tonnes by 2030, the most of all EU countries.

Under the current LULUCF Regulation, Member States, including Sweden, are already required to maintain natural carbon sinks.[106] Only certain carbon removals in excess of the reference levels decided may be counted as supplementary measures in the ESR sector.

From 2031, it is also proposed that the LULUCF sector include emissions from agriculture with the aim of achieving climate neutrality for the EU in this expanded land sector by 2035.

The EU's forest strategy is part of its Green Deal and is now being negotiated in parallel with Fit for 55. For example, the strategy proposes developing payment schemes for forest owners and managers for providing alternative ecosystem services – for example, by keeping parts of their forests intact. Furthermore, a legislative proposal is being put forward to intensify monitoring, reporting and data collection in the forest sector in the EU.

All these proposals may place new demands on broader Swedish climate policy and forest policy in particular.

Summary of carbon uptake and storage policies

Overall, policies for stimulating the uptake and storage of carbon dioxide are still undeveloped, regarding both CCS and increased natural carbon sinks. The Government has started to implement some of the proposals from the climate policy roadmap inquiry, especially in terms of creating incentives for BECCS. However, the Government has not taken a position on the overall mission of the inquiry and proposals for a national strategy for supplementary measures, including targets for these measures. For the operators involved, there is still significant uncertainty about the Government's direction and long-term ambition in this area, which also makes investment difficult.

As regards the natural carbon sinks in forests and land, several of the proposals now being discussed in the EU are not well harmonised with current Swedish policy. However, it is too early to determine what changes might be needed at national level.

The uncertainty and lack of consensus around the use of biomass described in section 7.3 is reflected in the corresponding uncertainty regarding the future role of forests as a carbon sink.

The agreement reached in Glasgow on Article 6 of the Paris Agreement will oblige the Government to also formulate a Swedish position regarding possible cooperation on emission reduction measures with other countries.

7.5 Key areas for transition face challenges across the board

This section has described the climate transition in terms of four key areas that, together, encompass a wide range of specific measures and changes. In the Panorama scenario, these account for more than 95% of all emission reductions down to net-zero emissions.[ii]

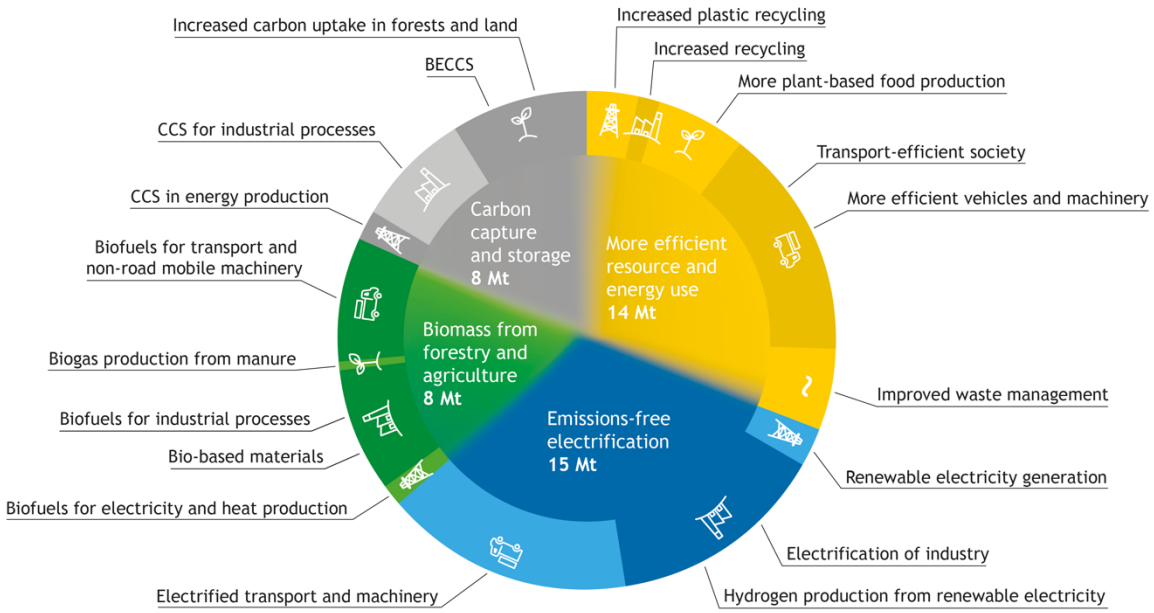


Figure 11: Four key areas for achieving net-zero greenhouse gas emissions. The emission sectors appear in the various key areas. The explanatory texts show how the reduction itself can take place.

Source: Panorama and own analysis

The four key areas have different features and fulfil different functions in the transition. There are also many links between the four key areas, and the distribution among them will shift as knowledge, technology and society at large evolve over time. Resource efficiency, including more circular material flows, is an example of a very broad concept that covers virtually all activities in society. Electrification, on the other hand, involves more specific solutions. The use of biomass from forestry and agriculture has limitations, and there are interdependencies concerning the role of forests in capturing and storing carbon dioxide. A more efficient resource use reduces volumes and resource demand in other key areas.

The description of challenges and obstacles in the four key areas reveals several recurring themes. Tough institutional challenges are persistent. In almost all areas, challenges exist that require better coordination between various policy areas and agencies, as well as enhanced collaboration with other stakeholders. The cross-sectoral nature of key areas underlines the need for a more streamlined governance of the agencies, as discussed in Chapter 6.

In several areas, there is a need for major investment in fossil-free, resource-efficient solutions. Although the need for additional investment is not necessarily large compared with reinvestment in conventional technology, it is clear that substantial investment flows must be redirected. This requires the right prerequisites – for example, in terms of permitting processes and upskilling for many stakeholders. Rapidly changing skill needs, which can result in a skills gap in specific

[ii] The remaining 5% relates, for example, to feed additives and other agricultural measures and to the substitution of climate-impacting solvents.

professions, represents another persistent challenge in the face of realising the opportunities in the four key areas.[107,108]

It is also clear that the national policies pursued to date vary in terms of driving the transition in different key areas and different sectors. The review also presents specific examples where the reforms now being discussed in the EU will have a major impact on the continued transition.

In the next chapter, the Climate Policy Council presents a number of overarching recommendations for how policy can address the shortcomings highlighted in this report and address the obstacles and challenges identified in key transition areas.

8 Recommendations

This report finds that the conditions for achieving the climate goals have improved in several ways. We note positive trends in several areas, especially with regard to industry's transition, even if they are not yet visible in the emissions statistics, which are still dominated by the one-off effects of the pandemic. Overall policy must be enhanced in order to more vigorously and unambiguously support the climate transition, create incentives for key investments, and address existing challenges in the key areas of the climate transition. Although the current climate policy action plan has marked a step in the right direction, the Climate Policy Council's follow-up shows that implementation of more comprehensive reforms has been slow.

After this autumn's Swedish parliamentary elections, a new government will take office, which, according to the requirements of the Climate Act, must present a climate policy action plan for its term in office. An overwhelming majority of the Swedish Parliament supports the Climate Act and climate goals. Regardless of which government takes office, it will face the question of not *whether,* but *how* Sweden's climate transition will accelerate. In this respect, there is no time to lose. After the current plan, only six action plans remain before Sweden should have reached net-zero greenhouse gas emissions. The next climate policy action plan must be a plan for acceleration.

Predictability in policy is vital for reducing risks and promoting opportunities for all stakeholders involved in a comprehensive, long-term climate transition. A primary objective of the climate policy framework is to avoid flip-flopping after every election. Broad political consensus in Parliament is one of Sweden's greatest assets in the continued climate transition. All parties involved shoulder a responsibility to nurture and build on our common foundation.

The Swedish climate policy framework does not contain, as many other countries' plans do, any long-term strategic documents besides the inquiries and the bill that served as an input for Parliament's decision on the climate policy framework in 2017. This means that the Government's action plans need a strategic, long-term perspective that must be updated in each plan as knowledge grows and lessons are learned from previous policies and broader developments. The action plan must include measures that can help reduce emissions in the near term, so that the 2030 targets can be reached, as well as strategic initiatives that must take place now to maintain emission reductions beyond 2030.

Based on its analyses for this and previous reports, the Climate Policy Council presents five overarching recommendations concerning the direction and content of the next climate policy action plan. They are formulated as five priorities, which are crystallised and exemplified in a number of points of a broader nature and which also link to one or more of the four key areas.

RECOMMENDATION

Improve governance of government agencies and coordination between different policy areas and decision-making levels.

The climate policy framework aims to inform overall policy. Actions and governance signals must be consistent and coordinated between different levels and policy areas. This is especially true for state agency governance, the Government's most fundamental tool for implementing its policies. Our overall view is that the Government's internal coordination has improved with the formation of the ministerial working group on climate policy, but that much remains to be done to enable the climate policy framework to make a successful impact on government operations. The Climate Act's ambition that climate targets inform all aspects of government policy is not yet visible in the Government's leadership in the same systematic way as in the Budget Act.

The four key areas of the climate transition are cross-sectoral, underscoring the importance of consistent, coordinated governance among different policy areas, ministries and government agencies. There are also shortcomings in vertical coordination among different policy-making levels. Municipalities and regions play a central role in key parts of the climate transition, in particular urban planning, buildings and transport. Several reports have pointed to shortcomings in the coordination of infrastructure planning between, for example, the Swedish Transport Administration and the municipalities.

- **Conduct a review of the societal goals most relevant to the climate transition.**
  The current climate policy action plan states that the Government, during reviews of societal goals, will ensure that the targets are reformulated, if necessary, to make them compatible with the climate targets. This ambition should be translated into action and pursued. Conflicting goals can be analysed, for example, within the framework of a well-developed governance model.
- **Strengthen the coordination of government agencies to contribute to the climate transition.**
  The Government's ministerial working group on climate policy aims to strengthen internal governance in the Government Offices. There is no corresponding coordination function for the agencies. This can be created either by giving a coordinating mandate to an existing agency, making changes to the agency's organisational structure, or creating a coordination function with a strong, clear mandate.
- **Give a standing remit to relevant government agencies to contribute to the climate policy action plan.**
  The Government should more clearly identify the responsibilities of relevant agencies within the climate policy framework, preferably in their government instructions. The climate policy action plan is an important part of the institutional framework and should not be developed based on temporary mandates. It should be part of the instructions for the relevant agencies to follow up on the climate transition, identify efforts to achieve zero emissions, and provide proposals to the action plan within their remits and responsibilities. As a good springboard for accomplishing this, the relevant agencies, such as the Swedish Board of Agriculture, the Swedish Energy Agency and the Swedish

Transport Administration, could analyse obstacles and develop strategic plans for zero emissions in their respective areas.

Introduce a clear administrative responsibility for resource efficiency and the circular economy.

Policies must be strengthened in terms of a more efficient use of natural resources other than energy raw materials, especially in terms of objectives, governance and leadership. A clear regulatory responsibility for resource efficiency and circular economy should be developed.

RECOMMENDATION

Strengthen goals and policy instruments in key areas.

The Government has carried out many significant individual efforts and appointed relevant inquiries and set government mandates. On the other hand, the implementation of more sweeping reforms, such as setting an end date for the sale of fossil fuels or reforming the taxation of road traffic, has been sluggish.

Based on the analysis of key areas for the climate transition, it is possible to identify a number of sub-areas in which the goals, institutions or policy instruments must be tightened. In some cases a clear political objective is lacking, while in other cases there is progress, but the pace needs to be stepped up.

Some of these key areas have garnered much attention in recent years, in research, in the public debate and in the policies pursued. This is particularly true of electrification and the role of biomass in the transition. Other components have tended to become side-lined, not least the policy for a more efficient use of energy and resources. Discussions on the electricity system and biomass, for example, have often had a sharp focus on supply rather than on reduced consumption, which risks making the transition more difficult and costly than necessary.

The policy for stimulating so-called supplementary measures, or negative emissions, is a relatively new area that remains undeveloped. This must be strengthened in order for Sweden to achieve significant negative emissions in the long term.

Sweden's climate targets, with the exception of the sector target for domestic transport, are formulated at a high level. A basic idea here has been to avoid sub-optimisation and micromanagement, and thus also achieve cost efficiencies. The next interim targets are now close to a decade away. There are good reasons for this, but this also means that the targets can easily seem abstract and distant to stakeholders in society. When it comes to leadership in complex systems like the global climate transition, the function of the targets is not only, or even primarily, to act as a measurable end point.

A common, appealing and understandable picture of the targets could bring all stakeholders together around a shared future direction, and thus mobilise the climate transition. This suggests that, in some cases, policies should formulate interim targets, levels of ambition, or some kind of target overview in the different areas. The targets do not need to be emissions targets, but can be underlying goals for the climate transition. Several parallel development processes are required to achieve the overall goal. To speed their development, various forms of interim targets can be helpful.

For example, consider the agricultural sector. As other emissions decrease, the sector will account for a growing share of Sweden's total greenhouse gas emissions, unless there is a stated goal for this area beyond an expected shift away from energy based on fossil fuels. Only 2% of emissions recorded in the statistics for agriculture consist of carbon dioxide of fossil-fuel origin. The climate impact of agriculture comes mainly from other greenhouse gases linked to land use and animal husbandry.

As for the role of biomass and forests in the climate transition, the overall targets are unclear. The EU's Fit for 55 package contains certain proposals in this area that challenge current Swedish policy.

Below, we summarise the areas requiring strengthened goals and policy instruments.

- **Strengthen governance to achieve a transport-efficient society.**
  Electrification, more efficient internal combustion engines and biofuels do not suffice if we are to achieve the climate targets for domestic transport. The instruments for a more transport-efficient society also need to be strengthened. The current urban traffic target is too weak, and state agencies do not collaborate effectively with one another or with the regions and local agencies. The local regions must be given more tools to steer towards increased transport efficiency.

- **Make policy instruments for energy efficiency more stringent.**
  Current policy does not suffice for reaching Sweden's energy efficiency target for 2030. Energy efficiency in the Swedish economy is progressing more slowly than the EU average. In addition, the targets discussed in Fit for 55 are more ambitious than Sweden's current national targets and require faster efficiency improvements than those that have taken place in recent years. Efficiency efforts should be bolstered and prioritised. A unilateral emphasis on electricity supply risks creating more friction among different interest groups across much of the country and deepening divisions and polarisation among groups.

- **Create a clearer roadmap and strive for greater consensus on the role of forests and agriculture in climate policy.**
  Forests have played a huge part in Sweden's climate transition to date by serving as a substitute for materials and energy from fossil fuels and through carbon storage. The continuing climate transition involves new requirements as well as opportunities as more goals are included in the equation. Decisions at the EU level will also have an impact on national policies. Sweden needs a clearer roadmap and a holistic view of the role of forests and agriculture in the ongoing transition. We need the bioeconomy strategy that the Government has been announcing for several years now.

- **Raise the level of ambition from fossil-fuel-free to climate-neutral agriculture.**
  The current climate policy action plan is aimed at fossil-fuel-free agriculture, but only a fraction of emissions from the agricultural sector comes from fossil fuels. We need a strategy for agriculture's climate impact that covers all greenhouse gases and aims for climate-neutral agriculture moving forward. Supplementary measures might be needed to compensate for emissions from the agricultural sector that cannot be completely eliminated.

RECOMMENDATION

Create better conditions for investments that contribute to achieving the climate goals.

Swedish policy, with its early introduction of a relatively high carbon tax, and the gradual tightening of the EU ETS are key positive examples of how general economic policy instruments can function for a cost-effective climate transition. More specific instruments that are still comparatively general, such as the certificate system for renewable electricity generation, complement this picture. This success must be nurtured, so an essential policy task is to maintain a sufficiently high price on emissions to avoid slowing the transition or driving up the use of fossil fuels in new areas.

Nevertheless, there are obstacles to making the necessary investments in fossil-fuel-free solutions quickly enough and to a sufficient extent. Such solutions are more complex than the price of emissions. The Climate Policy Council's review of the key areas highlights the challenges, such as lock-ins to existing infrastructure, remaining cost disadvantages for certain fossil-fuel-free alternatives, and different types of risks. A particular risk is that there could be changes in policy, not only in the near term but under future administrations, and this can influence investment decisions made today.

In Chapter 5 on the role of policy in the climate transition, we stated that general instruments must be complemented by other policy measures, such as creating early markets for immature technologies and systems. Such markets can be created by reducing the price of subsidies, through price tariffs and tax deductions like the green technology tax deduction, through quota systems like the renewable electricity generation certificates, and through the reverse auctions now planned for BECCS.

When it comes to risk management, the Government itself highlights its relatively extensive investment in green credit guarantees. The demand for these guarantees initially appears to have been high, and the Government this year increased the planned volume. However, it is still too early to assess how these credit guarantees will work in practice. One shortcoming is that the current system is limited to major investments by large companies, with a minimum of 500 million SEK.

Several other countries have chosen to give the state a greater role by creating publicly funded green investment banks. The creation of a dedicated institution for financing the climate transition provides the opportunity to mobilise the necessary skills in sustainable finance, something that could both simplify and accelerate the transition. Credit granting for the transition requires a solid understanding of several fields combined, such as financing, business and banking; the national and international landscape for the business sector; and technology and business models for the climate transition.

Different forms of lending are needed, with varying degrees of risk-sharing between the public and the private sector, terms of maturity, flexibility and loan size. A specialised investment bank for the climate transition would have the potential to adapt lending to current conditions and needs, as well as to ensure that the funding actually complements private financing instead of replacing it.

This reduces the risk of crowding out effects, and it also helps to prevent private operators from taking undue risks because they know that any losses will be covered by the state.

Several other countries have national investment banks that also act as receiving banks for European Investment Bank lending. Sweden lacks one, possibly having limited Swedish investments in general. A Swedish investment bank would enable small and medium-size enterprises (SMEs) to receive European funding. Such a Swedish institution could also coordinate financing with international investment banks, which would also improve opportunities for large companies with extensive financing and loan requirements.

It is crucial for the climate transition that both public and private investments focus on zero-carbon solutions and do not lock society into a continued dependence on fossil fuels. This place demands on policy to both direct public investments in the right way and to lay a solid foundation for private investments that lead to a future without fossil fuels.

- **Ensure that the fiscal framework does not get in the way of the necessary climate investments.**
  In its 2021 report, the Climate Policy Council proposed bringing forward the review of the fiscal framework and including an analysis of the importance of the climate targets. The Climate Policy Council welcomes the fact that the Minister of Finance at the time and the current Prime Minister have opened the door to such an early review.[109] The review should ensure that the fiscal framework does not become an obstacle to implementing the necessary climate investments now that will lower costs for future generations. Such a review should consider the question of distinguishing between short-term consumption and long-term, climate-related investments in the state budget.

- **Reform the tax system with a view to reducing climate impact and boosting resource efficiency.**
  The current climate policy action plan's objectives of 15 billion SEK for a green tax reform and a sweeping tax reform will not be met under the current administration. Reduced climate impact and increased resource efficiency need to be guiding principles for tax policy and for the potential major tax reform that has been discussed repeatedly. Part of such a reform should be to start investigating changes in road traffic taxation based on mileage, vehicles, and time and place, in line with previous recommendations from the Climate Policy Council.

- **Ensure that efforts to make permitting processes faster and more efficient have an effect.**
  In addition to the regulatory reviews that have been carried out and announced, it is important to enhance skills and increase resources both the companies seeking permits, and at the environmental review authorities (Land and Environment Courts and the county administrative boards). This will set the course for constructive negotiations between government agencies and businesses and is thus an important way to achieve more efficient and faster processes. There is also a need to clarify how the Environmental Code's legal rules will be interpreted in individual cases, which should also prompt quicker decisions due to fewer appeals, for example.

- **Review electricity grid regulation and the regulations for Svenska kraftnät, the authority responsible for Sweden's electricity transmission system.**
  Historically the regulation of electricity networks has taken the operator's perspective, even though we are now in the midst of a new, intensified phase of development with other requirements, such as for smart connected infrastructure. It is essential that the

regulation of the electricity network and the Government's mandate to Svenska kraftnät be adapted to meet the need for renewal and investment for the climate transition.

- **Expand financing opportunities for investments that achieve negative emissions.** Sweden has general policy instruments that create incentives to reduce the use of fossil-fuel energy and lower CO_2 emissions. However, these instruments do not offer an incentive to capture carbon dioxide and attain negative emissions. The Government's decision to allocate resources for reverse auctions to stimulate BECCS is an example of creating incentives for negative emissions. Another example is subsidies for rewetting drained wetlands. Similar efforts need to be expanded under the next administration.

- **Create workable systems for sharing risk with private investors.** The Government should evaluate the ongoing impact of the green credit guarantees it recently introduced. In parallel, the Government should investigate the formation of a publicly funded investment bank for the climate transition. The opportunities for SMEs should also be taken into account.

- **Use public procurement to create markets for new technologies.** Public procurement in Sweden is worth around 800 billion SEK annually. The Government has taken initiatives regarding guidance and information to ensure that public procurement broadly contributes more to achieving the climate targets. In several key areas, functional and innovation-oriented procurement should also be leveraged more aggressively to contribute to innovation and early markets for solutions that show high potential to achieve zero emissions.

RECOMMENDATION

Implement a broad knowledge and upskilling initiative for the climate transition.

An accelerated climate transition requires new knowledge and skills across a variety of areas and levels in society. This applies to everything from specific professional skills to the need for public outreach and education to improve people's understanding of, and participation in, the climate transition.

The climate transition requires knowledge and skills, from scores of stakeholders across nearly all areas, to take decisions that contribute to the high-level common goals. Similarly, this means that government agencies and ministries need to better understand society's transition and have the skills needed to lead and carry out change work in addition to their more traditional government functions.

The analysis of the four key areas shows the need for extensive industrial development and transformation, which will demand new skills and, in some cases, plenty of labour.

In its Budget Bill for 2022, the Government allocated funds for learning and education to promote the climate transition. This was followed up in the appropriation directions to higher education institutions (HEIs) with new funding and language on investing in lifelong learning and education that promotes the climate transition. The Climate Policy Council sees this as a first step in what needs to be a strategic dialogue between the Government and HEIs for securing long-term skills for the climate transition.

- **Boost the skills and capacity of government agencies and ministries.**
  A broad skill set and bolstered human and financial resources are needed for analyses and work on implementing transition policies in collaboration with other stakeholders.
- **Develop a dialogue with higher education institutions around supplying skills for the climate transition**
  The lead time for revamping courses at HEIs is very long. Therefore, good foresight is needed. This hurdle should be overcome in an interplay between transition policy and HEIs' own processes in order to integrate the skill needs of the climate transition with higher education and research. The Climate Policy Council proposes that society's long-term needs for skills for the climate transition be given a prominent position in the dialogue between HEIs and ministries.
- **Increase opportunities and resources for vocational education and training and continuing professional development in areas critical to the transition**
  Other vocational training and courses outside HEIs must also be improved and further developed.
- **Use public education and other resources to boost knowledge about the climate transition more broadly**
  Citizen surveys show that Swedes show strong support for the climate transition. However, many lack factual knowledge on topics such as emission trends, targets, opportunities and challenges. The public sector bears a great responsibility for ensuring that all available information reaches different target groups. Sweden should be able to

build on its long tradition of lifelong learning in the form of public education, primarily through civil society organisations, at a time of new major changes in society.

RECOMMENDATION

Take proactive, coordinated, and decisive action in the EU.

The follow-up decisions of the EU Climate Act and the Green Deal, in particular the Fit for 55 package, will make their mark on the Swedish climate policy agenda under the next administration and impact the policy's design for a long time to come. The proposals for new trading systems for transport and buildings, as well as all the proposals that affect land use and forestry in various ways, are examples of EU reforms with potentially major significance for national policies.

The EU's comprehensive and rapid reform agenda requires the Swedish government and its agencies to have sufficient capacity to do the following:

- Actively influence decisions in the EU to drive a sustainable climate transition.
- Coordinate national policies with the EU's new goals and instruments, and implement all new EU directives in a timely, effective manner in Swedish legislation.
- Ensure that Sweden and Swedish companies, regions and municipalities are given a good foundation to leverage the opportunities offered by EU cooperation, for example through various funds and investment support.

The Government and Parliament must ensure that Sweden's comparatively small ministry organisations and relevant agencies have sufficient capacity to properly complete all these tasks.

A Presidency in the EU always entails a great effort on the part of the Government Offices along with a special opportunity for Sweden to influence the EU's development. This will apply very much to Sweden's Presidency in the spring of 2023. It is likely that some of the most difficult negotiation issues on the Fit for 55 package will remain on the agenda when Sweden takes over the Presidency while the EU faces other internal and external challenges, in particular the effects of Russia's invasion of Ukraine in February 2022.

Overall, the Climate Policy Council believes that Sweden must participate in a strategic, coordinated and active way in EU processes in order to achieve the climate targets. The Government should actively utilise the Presidency to drive the EU's climate agenda forward.

There are also specific issues of particular importance that will be decided at the EU level during the next government's term in office. This applies, not least, to the EU ETS and the proposed new trading systems.

- **Ensure that the Government Offices and relevant agencies have sufficient capacity to influence the development of and implement the EU's green reform agenda.**
- **Prepare and utilise the Swedish Presidency to push for reforms that provide the conditions for achieving the EU's climate goals.**
- **Work to scale down the emission pathways within the EU's current and future emissions trading systems quickly enough for the EU to successfully reach net-zero emissions by 2050.**

Glossary

2030 Agenda: An agenda adopted by UN member states, containing 17 Sustainable Development Goals (SDGs).

BECCS: Bioenergy with carbon capture and storage – technologies for capturing and storing carbon from biomass combustion.

Carbon dioxide (CO2) equivalent: A unit of measure that expresses the climate impact from emissions of different greenhouse gases by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

CCS: Carbon capture and storage. Technologies for capturing and storing carbon from emissions from incineration plants, power plants, process industries, etc.

Climate neutrality: When greenhouse gas emissions are net zero, either because there are zero emissions, or because greenhouse gas emissions and removals are equal.

Climate policy: A policy which, in whole or in part, has a stated aim to reduce society's climate impact.

COP: Conference of the Parties. Regularly scheduled conferences where representatives of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) meet and take decisions.

Electrofuels: A generic name for carbon-containing fuels produced using electricity as the main source of energy. The simplest electrofuel is hydrogen gas, which is produced through the electrolysis of water. Hydrogen can also be combined with carbon or nitrogen atoms for other electrofuels. Sometimes the term is reserved for carbon-containing fuels where the carbon atoms are captured from the air, sea or industrial processes.

ESR: Effort-sharing regulation, a division of responsibilities. Sometimes called the non-trading sector. Includes emissions from sectors not covered by the EU ETS, such as emissions from transport, agriculture and industrial machinery.

EU ETS: EU Emissions Trading System. Includes emissions from industries, incineration plants and civil aviation.

Flexible mechanisms: The name of the programmes under the Kyoto Protocol which allow emissions trading: emissions trading, the Clean Development Mechanism (CDM) and Joint Implementation (JI).

Fossil-fuel independence: When the use of fossil fuels, such as coal, natural gas or oil, is zero – for example, in a particular sector or in a country.

Greenhouse gas emissions: Emissions of gases that contribute to climate change, including carbon dioxide, methane, nitrous oxide and fluorinated gases.

IPCC: Intergovernmental Panel on Climate Change, the UN's climate panel. An intergovernmental organisation established in 1988 by two UN agencies, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). The IPCC aims to provide the world with the current science on climate change, its consequences and possible solutions.

Kyoto Protocol: An international agreement from 1997 under the UNFCCC for reducing greenhouse gas emissions. The first commitment period was 2008–2012 and the second period was 2013–2020. Initiatives under the Kyoto Protocol will be completed in 2022.

LULUCF: Land use, land-use change and forestry. This corresponds to emissions and removals in cropland, forests, grassland and managed wetlands. Covered within the EU by the LULUCF Regulation.

NDC: Nationally determined contribution. Forms the basis of the Paris Agreement for the Parties' contributions to emission reductions, but can also include climate adaptation and funding.

Net-zero emissions: The balancing of greenhouse gas emissions with their removal (see also climate neutrality).

Negative emissions: Removal of carbon dioxide from the atmosphere through measures such as reforestation, afforestation or BECCS.

OECD: Organisation for Economic Co-operation and Development. An international body for cooperation around issues of democracy and a market economy, primarily between governments in industrialised countries.

Paris Agreement: A global climate agreement agreed at COP21 in Paris in 2015. Among other things, it states that global warming should be kept well below 2°C, and preferably below 1.5°C, above pre-industrial levels. Nationally determined contributions (NDCs) are an important component of the Paris Agreement.

Reduction obligation: Instruments requiring fuel suppliers to reduce greenhouse gas emissions from petrol and diesel by a specific percentage each year, through increased blending of biofuels.

Renewable fuels: Fuels produced from renewable raw materials. Some examples are ethanol, biogas and biodiesel.

Supplementary measures: Within the climate framework, these are additional measures that may be used to compensate for remaining emissions. Examples of supplementary measures include increased carbon sinks, BECCS, and investments in emission-reduction measures in other countries. Within the Swedish climate framework, interim targets may be achieved with a limited amount of supplementary measures. After 2045, supplementary measures must exceed emissions.

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Appendix 1
Government actions in 2021 that are relevant to the climate transition

Heading	Description
Home charging of electric vehicles	Mandate to the Swedish Energy Agency to propose measures for improving access to charging at home. Collaboration between the National Board of Housing, Building and Planning and Lantmäteriet (Swedish land registration authority). The Swedish Energy Agency submits action proposals.
National Export Credits Guarantee Board – adaptation of lending	New in the appropriation directions to the National Export Credits Guarantee Board ("EKN"): • EKN, in consultation with AB Svenska Exportkredit (SEK), will in the future report on how to align credit granting with the Paris Agreement and not create lock-ins in fossil-fuel dependence. • EKN will examine the possibilities to issue guarantees to environmental and climate investments in Sweden that can promote the climate transition in cases where these are directly or indirectly linked to Swedish exports. • Within the framework of bodies such as the EU and the OECD, Sweden will highlight how the international and European regulatory frameworks for export credits and other public trade financing will contribute to achieving the sustainable development goals and the fulfilment of the Paris Agreement.
Circular economy	An action plan for the circular economy containing 100 actions.
Managing excavation residues	Mandate to the Swedish Environmental Protection Agency to review the management of excavation residues in order to contribute to a non-toxic circular economy. The hope is to be able to reduce new extraction of material. The current rules are unclear and are interpreted differently by different municipalities. The review is to report back by 1 June 2022.
Territorial transition plans	Mandate to the Swedish Agency for Economic and Regional Growth to develop territorial transition plans for Västra Götaland County that focus on refineries and the chemical industry, as well as for Västerbotten County with a focus on the metal industry.
Transmission network in Swedish maritime territory	Change in instruction: Swedish Kraftnät will be tasked with expanding the national transmission grid to areas within Sweden's maritime territory.
National hydrogen strategy	Mandate to the Swedish Energy Agency to develop proposals for a comprehensive strategy for hydrogen and the role of electrofuels in the

	Swedish energy system, including ammonia. This was presented in November 2021.
Support for battery development	Mandate to the Swedish Energy Agency to provide 238 SEK million in funding to Northvolt AB for the development of battery cells and expansion of an electrification campus for battery research in Västerås. The funding is linked to the participation of Sweden and the battery company in the European project EuBatIn (European Battery Innovation), which is an "important project of common European interest", or IPCEI.
Registration of non-road mobile machinery	Mandate to the Swedish Transport Agency to analyse the conditions for developing registries for industrial machinery. The aim is to create opportunities to better control greenhouse gas emissions from such machinery and air pollutants.
Tightened bonus–malus system	Strengthened climate bonus for vehicles with low emissions and a stricter limit on what counts as low emissions.
Cancellation of annual emission allocations	Cancellation of annual emission allocations that reduce the scope for emissions by approximately 10.5 million tonnes of CO_2 equivalent.
Information initiative – Sustainable consumption	Mandate to the Swedish Consumer Agency on information initiatives around sustainable consumption. Collaboration with stakeholders who wish to share and further develop information about environmentally sustainable consumption.
Innovation-critical metals and minerals	An inquiry that will look at the review processes and regulations in order to secure a sustainable supply of innovation-critical metals and minerals.
EU taxonomy	Minister for Energy Anders Ygeman, together with officials from nine other EU countries, has indicated that they do not support the proposal to introduce additional requirements for bioenergy in the EU taxonomy.
National strategy for sustainable regional development	A national strategy for sustainable regional development across the country during 2021–2030. The strategy sets the long-term direction of regional development policy and intends to support the transition to sustainable development across all Swedish regions.
Reduction obligation for air travel	Requirements for biofuel blending during refuelling of aviation fuel in Sweden.
Extraction of minerals and metals from secondary resources	Mandate to investigate mining waste and the potential during extraction of minerals and metals from secondary mineral resources. Joint mission for the Geological Survey of Sweden, which is receiving 21 million SEK, and the Swedish Environmental Protection Agency, which is receiving 4 million SEK.
Input for the next climate policy action plan	Mandate to a dozen agencies tasking them with developing proposals for actions to include in the next climate policy action plan.
National public transport ticketing system	30 million SEK in 2021 to begin efforts to introduce a national ticketing system for public transport.

Expanded solar power	An addition to the solar cell subsidy of 260 million SEK.
Tax exemption for liquid biofuels	Application to the European Commission and approval by the EU. The tax exemption decision is valid for one year.
Increased carbon sink	Mandate to the Swedish Forest Agency and Swedish Board of Agriculture to strategically plan efforts to increase carbon sinks. The agencies will strategically plan the work and further develop methods to reduce withdrawals of greenhouse gases from agricultural and forestry's organogenic soils and increase carbon storage in arable land and pastures. This will contribute to negative greenhouse gas emissions and can contribute to supplementary measures in the climate policy framework. The mandate provides 1.5 million SEK in funding to each agency for 2021 and for 2022.
Permitting processes	The Swedish National Courts Administration and county administrative boards must report on their respective mandates to develop e-services for permit applications by 1 December 2021.
Climate-oriented standardisation	The National Board of Trade is tasked with forming an advisory body to promote innovative, climate-oriented standardisation. At the same time, Sweden's innovation agency, Vinnova, is tasked with announcing funding calls linked to the business sector's climate transition. The mandates are a result of the partnership programme for climate-neutral industry, the National Innovation Council, the export and investment strategy, the circular economy strategy and the climate policy action plan.
Digitalisation programme	Mandate to Vinnova, the Agency for Digital Government, the Swedish Post and Telecom Authority and the Swedish Research Council to propose a programme for spearheading Sweden's digital structural transformation. The agencies are tasked with finding formats for close collaboration among industry, higher education institutions and government agencies in areas such as applied research, test beds, infrastructure, skills supply and digital administration.
Funds for sustainable agriculture	Funds for sustainable agriculture (2023–2027): 28.5 billion SEK (5.7 billion SEK per programme year), which is an increase of about half a billion SEK per year over the budget for the rural development programme's transitional year 2021 and 2022 in BP21.
Exemption for waste tax	Inquiry into more exemptions for a waste tax and waste incineration tax.
Climate bonus cars – injection of funds	Contribution of 550 million SEK for climate bonus cars for 2022. Previous restrictions for companies to access the entire climate bonus for cars have been removed.
Clearer environmental assessments in the Planning and Building Act	Clearer provisions were introduced in the Planning and Building Act for requirements assessments and environmental assessments.

Take-off and landing fees based on climate impact	The Government can stipulate that some airports must take into account environmental and climate-adjusted impacts when creating their take-off and landing fees. The amendment applies to airports covered by the Law on Airport Charges, which are the largest airports in the country: Stockholm Arlanda and Göteborg Landvetter. The fees are differentiated based on the environmental and climate impacts of an aircraft or a flight.
Innovation procurement	Mandate to Vinnova, the Swedish Public Procurement Authority and the Swedish Patent and Registration Office to take efforts to increase the real-world impact and commercialisation of research and innovation. 38 million SEK in 2021 and 2022, and 23 million SEK in 2023 and 2024, respectively. The public sector spends nearly 800 billion SEK per year on procurement, and has broad scope to leverage innovation procurement as a strategic tool for enabling and demanding completely or partially new solutions that benefit society.
Support for public transport	An additional 1 billion SEK for maintaining public transport capacity during the Covid-19 pandemic. The Budget Bill for 2021 already contained 2 billion SEK for public transport.
Extension of climate declaration for buildings	Mandate to National Board of Housing, Building and Planning on the climate impact of buildings and extended climate declarations. The Board is tasked with investigating whether thresholds can be introduced and whether the application of the declarations can be expanded.
Lower costs for gas car owners	Mandate to the Swedish Transport Agency to investigate measures for having owners of gas cars pay the same price as other car owners during inspection.
Bill: Infrastructure plan	Bill: Future infrastructure – sustainable investments throughout Sweden. New investments in road and railway maintenance. 876 billion SEK for the period 2022–2033. The proposals in the bill lay the foundation for the upcoming national plan for transport infrastructure. A decision on a new national plan is scheduled for 2022. Work on the infrastructure bill is based on point 28 of the January Agreement.
Circular economy in the construction sector	The National Board of Housing, Building and Planning will develop efforts to transition the construction sector to a circular economy. 10 million SEK annually through 2024 will be set aside.
Protection of high nature values	Funding for protecting high nature values will be increased by a total of 2.39 billion SEK in 2022. The Swedish Environmental Protection Agency and the county administrative boards can decide whether nature reserves and landowners can receive compensation.
Enumeration of taxes	The tax on chemicals in certain electronics and on waste incineration are proposed to be enumerated using a flat-rate supplement of 2 percentage points each year in addition to the consumer price index (CPI) recalculation.

Tax reduction for investments in inventories	Stimulation of companies that are making green investments. Companies can obtain a tax reduction for energy-efficient refrigerators or trucks with less emissions.
Reduced VAT on repairs	VAT on repairs to bicycles with a pedal or cranking device, shoes, leather goods, clothing and household linen was reduced in 2017 from 25% to 12%. The Government is proposing another reduction, from 12% to 6%.
Upskilling funds for the climate	Government-funded upskilling for the climate aim to promote the business sector's climate transition and the shift to a circular economy. This skills boost can help reduce unemployment and enable the development of circular, climate-smart solutions. The investment totals 100 million SEK for 2022.
Reintroduction of Energisteget (deleted by Parliament)	Proposal of 100 million SEK annually during 2022–2026 to resume support for energy efficiency in industry, the so-called "Energy Step". The initiative includes investments and design support for industrial companies. However, the proposal was rejected by Parliament.
Improved consultation process for environmental permits	Mandate to the county administrative boards to develop methods and forms of collaboration to promote an efficient consultation process for environmental permits. Vinnova will support the county administrative boards in their work with regulatory and policy development.
Funds for road maintenance	Investment in road maintenance: In addition to an additional 265.5 million SEK from the sweeping infrastructure bill, an extra 750 million SEK will be provided through an additional investment in infrastructure with a focus on the dense road network in rural areas.
Climate premium for non-road mobile machinery	Increased climate premium for non-road mobile machinery: 10 million SEK in 2022.
Sustainable construction	Mandate to the National Board of Housing, Building and Planning to establish and manage an information centre for sustainable construction, with a focus on energy-efficient renovation.
Circular, fossil-fuel-free public procurement	15 million SEK in 2022 to the National Agency for Public Procurement to strengthen general and advanced guidance throughout the purchasing and procurement process and to undertake related dissemination and communication activities.
Expanded Climate Leap	Biogas plants for electricity generation should be able to receive investment support from the Climate Leap.
Analysis of biofuel needs	Mandate to the Swedish Energy Agency to determine whether the percentage of sustainable biofuels in petrol, diesel and kerosene has to be changed in relation to electrification and fuel trends for Sweden to reach the climate targets.

Reduced climate impact from government business trips	Mandate to the government agencies to continue reducing their climate impact from business trips taken by government employees. The agencies must present follow-up goals for 2025 relative to 2019. The goals should address how travel can take place in a way that minimises environmental and climate impacts.
Guidance for environmental permit review and environmental assessment processes	Mandate to the Swedish Environmental Protection Agency, county administrative boards and Swedish National Courts Administration to review the development of government-wide guidance for the environmental permit review and environmental assessment processes. Results to be reported back by 30 June 2022.
Circular, fossil-fuel-free plastic use	The Swedish Environmental Protection Agency will analyse suitable types of plastics for different uses in order to achieve circular flows and reduce climate impact.
Airport congestion pricing	Mandate to the Swedish Transport Agency to analyse the possibilities of introducing congestion charges, such as differentiated landing fees.
Infrastructure investment in northern Sweden	Due to the substantial industrial investments in Norrbotten and Västerbotten, the Swedish Transport Administration will investigate bringing forward decided infrastructure investments. The Swedish Transport Administration will also investigate any infrastructure deficiencies and bottlenecks that could arise because of the extensive establishments currently underway and planned.
Quota obligation system (white certificates)	Inquiry tasked with proposing a quota obligation system for energy efficiency (so-called white certificates). The purpose of white certificates is to create a market-based, cost-effective policy instrument that accelerates energy efficiency in Sweden, helps to achieve the energy and climate policy goals, and facilitates rapid and smart electrification at a reasonable cost to society.
Targets to increase the share of cycling	Mandate to the Swedish National Road and Transport Research Institute (VTI) to develop proposals for targets to increase cycling. The purpose is to promote bicycle use within all age groups and socio-economic groups.
New direction for the strategic innovation programmes towards a transformative transition and sustainable development	Mandate to the Swedish Energy Agency, Formas and Vinnova to enhance the strategic innovation programmes. The aim is to make a more specific contribution to a transformative transition, resource efficiency and sustainability in order to increase real-world impact and the global competitiveness of Swedish companies.
Establishment of a forest damage centre	The Swedish University of Agricultural Sciences is receiving 30 million SEK to establish a national centre on forest damage. Climate change is expected to drive up the extent and cost of forest damage. The forest damage centre will serve as a hub for expertise on combatting damage caused to forests by fires, storms, game grazing and pest pressure.
Broadened eco-bonus	Increased funding (100 million SEK each year during 2022–2024) for maritime transport, rail transport and freight transport that takes place with more than one mode of transport. The funds will also go towards

	measures that streamline goods transhipment and stimulate new transport solutions.
Environmental compensation	Additional funding of 150 million SEK for environmental compensation for the transition of freight transport
Increased and safer cycling	Mandate to the Swedish Transport Agency to investigate a series of traffic rules for bicycles, with the aim of promoting accessibility without compromising road safety.
Transport sector electrification – knowledge building and pilot projects	Mandate to the Swedish National Road and Transport Research Institute (VTI) to promote knowledge building. This also includes implementing pilot projects and developing models for driving electrification of the transport sector.
Gas cars – green cars in public procurement	Gas cars will continue to be considered as green cars in public procurement. The definition of climate bonus cars and green cars has changed to align with the same CO2 requirements as what are defined as clean light-duty vehicles in the EU directive that Sweden will implement.
Reduced rail fares due to the pandemic	1.37 billion SEK to reduce the impact of the pandemic on the finances of railway operators.
Electrification of the transport sector	Mandate to Transport Analysis, the Swedish Energy Agency, the Swedish Transport Agency, the Swedish National Board of Housing, Building and Planning, and the Swedish Environmental Protection Agency on transport electrification. Traffic Analysis is tasked with analysing possible incentives for increasing the use of both shore power for when ships are docked and charging power for batteries for electric operation in ports. This agency must also analyse the conditions for having more fully electric or partly electric vessels in Sweden. Another task for Traffic Analysis is to produce an analysis of the electric vehicle fleet, including a current situation description and analysis of regional distribution, and a description of possible trends up to 2030 in terms of technical characteristics. The Swedish Energy Agency is tasked with analysing and proposing how climate premiums can be designed to stimulate the market introduction of electric aircraft. Within the scope of its mandate, the Swedish Transport Agency must report on how it is preparing itself for Sweden to become a country of manufacture for electric aircraft. The National Board of Housing, Building and Planning is tasked with presenting its assessment of how the expansion of charging infrastructure for road and sea transport can affect its mandate responsibilities, for example in terms of the need for regulatory changes and updated guidance for spatial planning and buildings. The Swedish Environmental Protection Agency must also submit an analysis of the environmental effects of transport electrification.

Electrification of heavy transport	The Electrification Commission presents an action plan to enable electric transport along major roads, with a focus on heavy transport.
Maintenance of railways	Increased funding for railway maintenance of 1 billion SEK in 2022.
Increased cycling	The urban environment agreements, with a special focus on cycling, will be reinforced by 200 million SEK in 2022.
Reduced environmental impact of single-use plastics	(1) Requirements for sellers of fast food and beverages in single-use packaging to also offer a multi-use option. The new rules will not be introduced until 2024, giving businesses time to implement the change. Mandate to the Swedish National Food Agency and the Swedish Environmental Protection Agency to develop guidance and routines to enable businesses to comply with the multi-use option requirements. (2) New littering fee introduced – funds distributed to the municipalities. (3) PET beverage bottles must contain at least 25% recycled plastic by 2025, and all plastic beverage bottles must contain at least 30% recycled plastic by 2030.
Increased funding for the transition of the Swedish Maritime Administration's own fleet to end its use of fossil fuels	The Swedish Maritime Administration will receive an increased appropriation of 45 million SEK annually from 2022 to 2024, followed by 6 million SEK annually until further notice.
Introduction of carbon offsetting for shipping	The Swedish Maritime Administration will receive 300 million SEK annually in 2023 and 2024 in revenue from carbon offsets. This will strengthen the agency's finances and reduce the price pressure on shipping lane fees.
Swedish Transport Administration's loan framework expanded to enable investments in new locomotives and wagons	The Swedish Transport Administration's loan framework will be expanded to enable investments in new locomotives and wagons.
Green Industry Leap strengthened	The Green Industry Leap initiative will receive 217 million SEK in 2022, for a total of 909 million SEK.
Introduction of reverse auction schemes for BECCS support	A first reverse auction is planned for 2022 in which operators who can deliver the service at the lowest price win the tender. The first payment will be made in 2026. The Government is also allocating 10 million SEK annually during 2022–2025 for the establishment and administration of a reverse auctioning scheme.
Industrial collaboration projects	Increased financial investment in industrial collaboration projects for a green digital transformation. (IPCEI). Investment of 100 million SEK in 2022, and an estimated additional 70 million SEK in 2023 and 2024 for industrial collaboration projects for a green, digital transformation.

A boost for a green, digital transition	To drive efforts forward for a green digital transition, the Government proposes to provide an additional 92 million SEK to the Swedish Agency for Economic and Regional Growth.
Green credits	2022: Increased guarantee framework (from 15 to 50 billion SEK for 2022) for credit guarantees for green investments. Credit guarantees can be given for industry investments in which the principal of the guaranteed loan totals at least 500 million SEK. The guarantee can cover a maximum of 80% of the guaranteed loan and have a maximum maturity of 15 years.
Council for Sustainable Cities	An extended mandate to the Council for Sustainable Cities (2 million SEK per year)
Built environment in Norrbotten and Västerbotten	Funding of 15 million SEK for 2022, which will then be stepped up to 40 million SEK annually up to 2030.
More streamlined permit reviews	Strengthening administrative appropriations to the Swedish Environmental Protection Agency, county administrative boards and the Swedish courts by a total of 28 million SEK in 2022.
A well-developed electricity market and faster permitting processes	Appropriation to the Swedish Energy Markets Inspectorate will increase by 40 million SEK for 2022, followed by 35 million SEK annually in 2023 and 2024.
Biogas support	To increase the production of biogas and boost producers' competitiveness, the Government proposes an investment of 1.9 billion SEK during 2022–2024. The Government wishes to set aside 500 million SEK for 2022. In 2023 and 2024, 700 million SEK per year will be provided for the same purpose. It is proposed that this investment continue until 2040, with a review in 2024.
Strengthened Climate Leap	The appropriation will increase by 800 million SEK in 2022 and then increase by more than twice as much in 2023. In 2024, the planned increase is more than 3 billion SEK.
Climate premium for electric buses	Resetting of the electric bus premium to 20% of the purchase price. The electric bus premium was introduced in 2016 to promote the introduction of electric buses on the market. The increase in the electric bus premium totals 1.1 billion SEK for 2022.
Climate premium for green trucks and electric non-road mobile machinery	Increased support for environmentally friendly trucks and electrified industrial machinery of 200 million SEK in 2022. This is more than double compared with 2021 levels.
Reduced environmental impact of single-use plastics	(1) Requirements for sellers of fast food and beverages in single-use packaging to also offer a multi-use option. The new rules will not be introduced until 2024, giving businesses time to implement the change. Mandate to the Swedish National Food Agency and the Swedish Environmental Protection Agency to develop guidance and routines to enable businesses to comply with the multi-use option requirements. (2) New littering fee introduced – funds distributed to the municipalities. (3)

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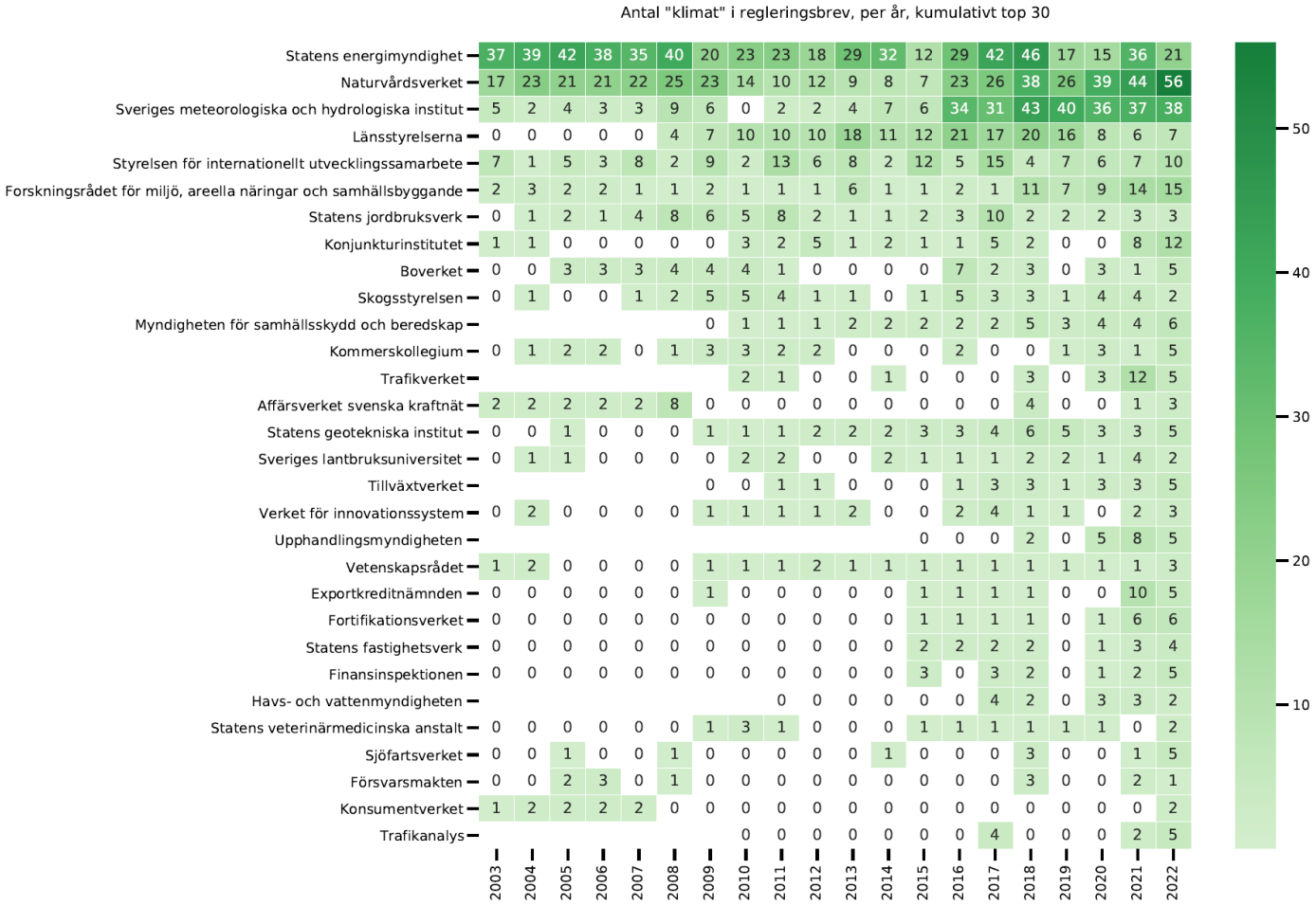
Strengthened Climate Leap	The appropriation will increase by 800 million SEK in 2022 and then increase by more than twice as much in 2023. In 2024, the planned increase is more than 3 billion SEK.

Appendix 2 Occurrences of the word “climate” in appropriation directions

A quantitative analysis of the occurrence of “climate” in appropriation directions for the period 2003–2022. Below are the 30 agencies with the most mentions during that period. The number in the box indicates climate references in that year’s appropriation directions to the agency.

The complete list is available on the Climate Policy Council’s website.



The Swedish Climate Policy Council's remit

On 15 June 2017, the Parliament adopted a climate policy framework for Sweden by a large majority.
The purpose of the framework is to highlight the need for a societal transition in order to achieve the climate targets, to involve all policy areas and stakeholders in this transition, and to continuously keep the Parliament up to date on the progress of these efforts.[185]

The climate policy framework contains three parts:

- The long-term goals for Swedish climate policy;
- A planning and follow-up system in which the Government reports to the Parliament on the progress of the transition; and
- The Swedish Climate Policy Council.

Parts of the framework are regulated in a Climate Act, which entered into force on 1 January 2018. The Climate Policy Council was formed on that same day.

The Climate Policy Council is an independent, interdisciplinary expert body tasked with evaluating how well the Government's overall policy is aligned with the climate goals established by the Parliament and the Government. The council's remit underscores the broad nature of the climate issue. Our remit is not to examine any particular area that has been specifically defined as climate policy, but rather to examine the Government's overall policies – in other words, all policy areas and how they are collectively aligned with the climate targets.

Within the framework of the overarching mandate, the council shall, according to the Government's remit, do the following:

- Evaluate whether the focus of different relevant policy areas contributes to or counteracts the potential to achieve the climate goals.
- Highlight the effects of agreed, proposed instruments from a broad societal perspective.
- Identify policy areas that require further action.
- Analyse how to achieve targets, both short- and long-term, in a cost-effective way.
- Evaluate the bases and models on which the Government builds its policy.
- Foster more debate in society on climate policy.

According to the Climate Act, for its part the Government must provide a climate report to the Parliament every year in the budget bill. The report should describe emissions trends, major climate policy decisions during the past year, and an assessment of what additional measures may be needed. Every four years (the year after ordinary parliamentary elections) the Government must also present a climate policy action plan to the Parliament. The action plan must contain a more detailed description of the outcome of the climate policy pursued to date. Additionally, it must state the Government's plans during the electoral period, including how decisions in various areas are judged to affect the potential to achieve the climate goals and what additional decisions may be needed to achieve the national and global climate objectives.

By the last day in March of each year, the Climate Policy Council must submit a report to the Government. The report must contain the council's assessment of progress on the climate efforts and emission trends as well as an assessment of the alignment of government policies with the climate goals.[186] For the years the Government presents its action plan, the Climate Policy Council must submit a report to the Government evaluating the plan within three months of its publication.

The Climate Act's obligations on the Government, together with the Climate Policy Council's reports, thus form a comprehensive planning and follow-up system. In addition to this, many government agencies contribute to follow-up and planning, and they provide decision-support documentation on the effects of agreed, implemented policies.