

SWEDISH CLIMATE POLICY COUNCIL

Klimat
politiska
rådet

2020

Report of the Swedish Climate Policy Council



Foreword

2019 was an eventful year for climate issues, both abroad and in Sweden, with high activity in many areas but also conflicting trends.

The EU's Member States agreed on the goal to make Europe the first climate-neutral continent by 2050, and several countries around the world have set targets of net-zero emissions. The year was strongly marked by public engagement with climate change. Large-scale demonstrations and climate strikes, led by Greta Thunberg and other students, received much attention.

At the same time, several countries have seen protests against reduced fossil-fuel subsidies, and politicians are campaigning to protect fossil-fuel industries. Key decisions were not taken at the UN's climate summit, COP25, in December because of deep-rooted differences among the countries. In November, the United States formally announced to the United Nations that it intended to withdraw from the Paris Agreement.

It is too early to determine the impact of this growing, yet fragmented commitment to reduce climate risk, but clearly policy-makers face increased pressure, both politically and from the business sector. In addition, global greenhouse gas emissions continue to rise and were higher in 2019 than ever before.

In Sweden, too, activity on climate change has increased, both in regions and municipalities, as well as in business and civil society. To date, 18 business sectors have presented roadmaps for fossil-free competitiveness. In December 2019, the Government submitted its first Climate policy action plan to Parliament, in accordance with the requirements of the Climate Act.

2020 is an important year for climate policy, both globally and nationally. The UN Member States will present new national climate plans with enhanced ambitions for COP26; the EU is poised to implement the European Green Deal; and in Sweden, the Government is tasked with turning more than 100 items in the Climate policy action plan into concrete actions.

This report is the Climate Policy Council's annual assessment of the Government's overall work to achieve Sweden's climate targets. It includes an update of developments in Sweden over the past year and an assessment of the Government's Climate policy action plan, as required of the Council under our terms of reference.

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

Stockholm, March 2020

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Summary

Sweden's overarching climate target is to reach net-zero emissions of greenhouse gases by 2045, followed by negative emissions. This long-term goal is complemented by several interim targets. The climate targets and the Climate Act, together with the Swedish Climate Policy Council, constitute Sweden's climate policy framework, which entered into force on 1 January 2018 after being adopted by a broad majority in the Swedish Parliament. The mission of the Swedish Climate Policy Council is to determine whether the Government's overall design of policies is compatible with the climate targets adopted by the Parliament and the Government.

Existing policies are not sufficient

At a time when emission reductions need to accelerate, they have slowed down. The biggest reductions in greenhouse gas emissions since 1990 occurred between 2003 and 2014, with an average annual reduction rate of just over 2 per cent. During the last four years (through 2018), the pace has slowed, and emissions have only fallen by less than 1 per cent per year on average.

Even before the current climate policy framework was established, Sweden had a 2020 interim target to reduce greenhouse gas emissions in sectors outside the EU emissions trading scheme by 40 per cent. This target will be achieved, but not solely through domestic emission reductions, which is the ambition of the current government. To some extent, so-called flexible mechanisms will be needed, by which Sweden invests in verified emission reduction projects in other countries.

The Government's 2019 climate report to Parliament mentions 14 policy decisions that entered into force during the past year. These are not sufficient for the Climate Policy Council to reconsider its view of the situation. The assessment from last year's report remains: The climate targets beyond 2020 will not be achieved if current conditions and existing policies continue.

Compared with the Government's first climate report in 2018, the latest report contains more assessments of what the decisions can mean for greenhouse gas emissions and the need for further actions. Nevertheless, the climate report cannot be said to meet the legislative requirements in this regard. In most cases, impact assessments are lacking. In the remaining cases, some form of impact assessment is presented, but there is no information on how they were conducted or what assumptions they were based on. The fact that the Government also uses different units and formats in its impact assessments makes it challenging to compare different initiatives, efficiency assessments, and the assessment of overall impact of the decisions presented.



ASSESSMENT OF EMISSIONS TRENDS AND CURRENT POLICIES

None of the goals in the climate policy framework beyond 2020 will be achieved if current conditions and existing policies continue.

Sweden will reach its interim target by 2020 with some use of flexible mechanisms.

The 2019 climate report does not meet the Climate Act's requirements for specifying how the decisions can impact greenhouse gas emissions.

The Government's climate policy action plan

According to the Climate Act, every four years (the year after the regular parliamentary elections) the Government must develop a climate policy action plan for the following four years. The first plan was submitted to Parliament as a bill on 18 December 2019. Only six action plans of this kind remain ahead of 2045. Each of them thus plays an important role.

Part of the Climate Policy Council's remit is the assessment of the Government's action plan. The Council's assessment is summarised in this report and contains overarching questions about the Government's leadership, governance and organisation of climate efforts as well as issues with specific policy instruments and their impact on emissions in different sectors.



OVERALL ASSESSMENT OF THE ACTION PLAN

The Climate Policy Council welcomes the Government's presentation of a broad action plan with initiatives in many different sectors, from the local to the international level.

The most serious shortcoming is that the Government does not report the extent to which agreed and announced efforts contribute to the achievement of the climate targets, in parts or altogether. The action plan thus does not comply with the requirements of the Climate Act in this regard. The efforts are also diffusely described throughout and lack timetables for implementation.

The fact that the Government does not present an assessment of the effects of the action plan on greenhouse gas emissions does not necessarily mean that the impact will be small. However, it is notable that the fundamental question of meeting targets does not receive any attention at all.

For new or revised instruments, the Government should seek to estimate the impact on greenhouse gas emission trends. For other efforts relating to leadership and governance, it makes less sense to try to quantify the impact on emissions. Depending on how leadership and governance efforts are implemented, they can still be important for longer-term emission reductions. For this type of efforts, the Government should be able to provide a qualitative discussion of the expected effects of the plan.

In the action plan, the Government points out that if Sweden is to effectively contribute to limiting global warming to 1.5 degrees, the emission curve needs to tilt steeply downward in the near

future. Against this background it is surprising that, in the view of the Council, the action plan includes very few actions that can provide significant additional emission reductions over the four-year period, compared with current policies. It is primarily a gradually strengthened emission reduction obligation^a that can lead to such emissions reductions. Announced investigations into enhanced or new instruments can only begin to have an effect during the next electoral period.

The Climate Policy Council's assessment is that the action plan can be expected to reduce emissions by an additional 1–1.5 million tonnes by 2023 compared with what would have been achieved without the action plan. This corresponds to 2–3 per cent of total greenhouse gas emissions in Sweden. If the ambitions of the plan were to be fully realized, including optimal interaction with other stakeholders and all efforts implemented in an effective manner, the plan could have a more significant long-term impact.

The Climate Policy Council welcomes the fact that the Government's action plan reports on how assessments are taken into account, as well as the actions it has adopted or planned actions in response to the recommendations of the 2019 Climate Policy Council report. This feedback is essential for the long-term functioning of the climate policy framework.



RECOMMENDATION

1. Make the Climate policy action plan more specific, so that it becomes a plan for action with responsibilities, deadlines and impact assessments for each initiative and for the plan as a whole. Follow up the plan annually in the Government's climate report.

Leadership and governance

The shortcomings of the Climate policy action plan reflect weaknesses in the Government's organisation, processes and leadership concerning climate policy. Government offices' normal procedures and current organisation appear to be insufficient to enable the Government to live up to the Climate Act's ambition to integrate climate issues in all policy areas and base efforts on the long-term, time-bound emission targets set by Parliament. The current regime, in which responsibility for producing the action plan primarily lies with the Ministry of the Environment, gives key ministries and authorities a more reactive role, thus limiting the impact of the climate goals. This also makes it more difficult to prioritise and to manage conflicts between different objectives.

The Climate Policy Council welcomes the Government's emphasis on the importance of collaboration throughout society in order to achieve the climate goals. This should involve all stakeholders, from the national to the regional and local levels.

As regards collaboration with the business sector, the action plan mentions the sectoral roadmaps for fossil-free competitiveness developed under the Fossil Free Sweden initiative. These roadmaps have the potential to play a major role in achieving Sweden's climate goals. It is thus surprising how

^a The emission reduction obligation, called the *Fuel Change*, puts an obligation on petrol and diesel suppliers to reduce carbon dioxide emissions from petrol and diesel, through increased biofuel blending.

little attention is given to the roadmaps when the Government describes its work over the next four years. The roadmaps now need to enter a new phase of implementation.

The Government's leadership and governance must be strengthened to drive the climate transition with sufficient force and speed.



RECOMMENDATIONS

2. Strengthen and broaden responsibility for the Government's climate policy efforts, preferably through a steering committee responsible for implementing the climate policy framework, with the Prime Minister as chairperson.
3. Give the relevant authorities a standing mandate to deliver proposals that contribute to attainment of the climate goals within the set time limits, including impact-assessed proposals for the climate action plan.
4. Strengthen the competence and capacity of the relevant authorities to assess and monitor the impact of policy efforts for achieving the climate goals in order to provide a solid foundation for continual learning and further policy developments.
5. Ensure that the climate policy framework and the Climate policy action plan have as strong and clear impact on the Government's work as the present budgetary policy and fiscal framework.
6. Translate the sectoral roadmaps for fossil-free competitiveness developed under the Fossil Free Sweden initiative into action plans for step-by-step implementation, follow-up and revision, jointly between the Government and each industrial sector.

Policy instruments

The conditions for achieving the climate transition differ by sector, which also places different demands on policies and instruments. The Council has conducted an analysis of how the action plan addresses opportunities and obstacles to the climate transition in four sectors that together account for over 80 per cent of Sweden's greenhouse gas emissions: road transport, industry, agriculture, and electricity and heat production.

Road transport

The Climate Policy Council presented 10 recommendations for fossil-free transport in its 2019 report. The Government is taking several steps in line with these recommendations, including the investigation of a deadline for the use of fossil fuels. But the lack of a timetable for the initiatives to achieve a transport-efficient society and electrification increases the risk that, because of the reduction obligation, the transition will nevertheless rest heavily on large volumes of imported biofuels. This will bring uncertainties both in terms of sustainability and the economy.


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RECOMMENDATIONS

7. Urgently establish a timetable for planned initiatives to achieve a more transport-efficient society and more rapid electrification, as well as for the domestic production of sustainable, renewable fuels, and allocate the necessary resources for implementation.
8. Immediately start investigating a new road traffic tax to enable the reform to be realised in pace with the rapid changes in the transport system and to be included in the comprehensive tax reform referred to by the Government.

Industry

The Council welcomes the Government's emphasis on strengthening the emissions trading system as the primary instrument for reducing industrial emissions. It is essential to reduce the total number of emission allowances in line with the EU's new 2050 climate neutrality target. However, additional instruments will be needed to stimulate technological development and innovation, to create the right conditions for sustainable investment, and to ensure that Sweden can reach its overall national emissions target by 2045. To this end, the roadmaps developed under the Fossil Free Sweden initiative can play a fundamental role, but they need to be more clearly linked to the Government's other efforts and instruments for the industrial sector.


 rec:

RECOMMENDATIONS

9. Prioritise continued public investments in fossil-free, competitive industrial processes that can reduce industrial greenhouse gas emissions.
10. Clarify how conditions and incentives should be created for the implementation and scaling up of carbon capture and storage, which, according to the current state of knowledge, seems to be needed for certain emissions and for reaching negative emissions (BECCS).

Agriculture

The action plan contains few and insufficient proposals for addressing a climate transition in agriculture, and the Government takes a defensive approach towards stakeholders in the sector.


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RECOMMENDATIONS

11. Do not stop at the goal of 'fossil-independent' agriculture, but devise a clearer plan to fully phase out fossil fuels and substantially reduce other greenhouse gas emissions from agriculture.

Electricity and heat production

Fossil-fuel emissions from electricity and heat production are comparatively low in Sweden because the largest energy sources are bioenergy, hydropower, nuclear power and wind. Close to half of the emissions come from the incineration of waste, primarily fossil-based plastics. The action plan stresses that these emissions represent the difficult remaining challenge to achieving zero greenhouse gas emissions from electricity and heat production. It also emphasises that this problem must be tackled with upstream efforts, such as the increased use of bio-based materials or chemical recycling of plastics. However, efforts presented in the action plan are not sufficiently concrete to allow for an assessment of their impact.

Cross-sectoral challenges

The Council's sectoral analysis identifies important cross-sectoral challenges to achieving the climate transition. For example, it is of fundamental importance for the entire global climate transition to achieve a more resource-efficient circular economy. A more efficient circular use of inputs and products reduces the need for other, costlier solutions.



RECOMMENDATIONS

12. **Develop policies to stimulate and support demand from households, businesses and the public sector for zero-emission, more resource-efficient goods and services across all sectors.**

In addition, three more specific challenges that are reflected in all sectors and should be addressed are:

- The electric power system requires additional development to enable electrification and thus replace fossil-based energy and fossil-dependent industrial processes;
- Demand for biofuels and bio-based materials is expected to increase, but sustainably produced biomass is a limited resource;
- Drawn-out and unpredictable licensing processes can slow down investments that are important for the climate transition.

The Government's action plan highlights these and other cross-sectoral issues and challenges for the climate transition. However, the plan refers only generally to investigations or new strategies, offering few substantial planned initiatives. Concrete content will be crucial to the impact of these initiatives. Speed is of the essence, as is clear leadership from the Government.

1. Existing policies are not sufficient



1. Existing policies are not sufficient

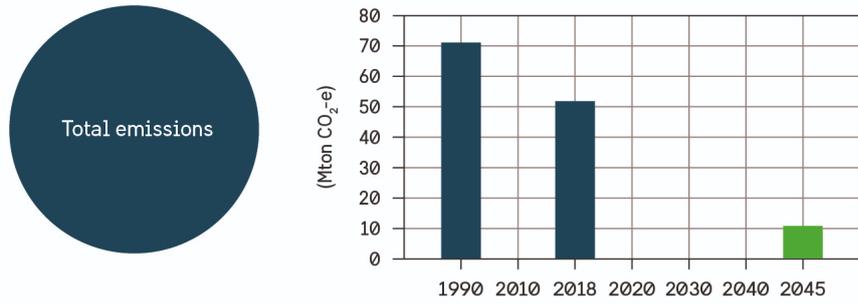
The overarching goal of the climate policy framework is that Sweden should not have any net greenhouse gas emissions by 2045, and thereafter, emissions should be negative. This means that, by 2045, emissions from Swedish territory should be at least 85 per cent lower than in 1990.^b The remaining 15 percentage points to the net-zero emissions target may be covered by so-called supplementary measures. The supplementary measures in use today address the increased net uptake of carbon dioxide in forests and soils, verified emission reductions through investments in other countries, and carbon capture and storage from the burning of biomass, so-called BECCS (bioenergy with carbon capture and storage). Sweden's negative emissions beyond 2045 mean that the supplementary measures must be greater than Sweden's remaining greenhouse gas emissions.¹

Sweden's total greenhouse gas emissions can be roughly divided into two parts: emissions that occur outside the EU Emissions Trading System (EU ETS),^c and emissions from activities included in the trading system. The emissions trading system covers installations in the production of electricity and district heating, the manufacturing industry and aircraft operators flying within the EU. Emissions outside the trading system come from domestic transport, agriculture, waste treatment, machinery, product use and heating of homes and premises as well as emissions from industry and from electricity and district heating production outside the EU ETS.

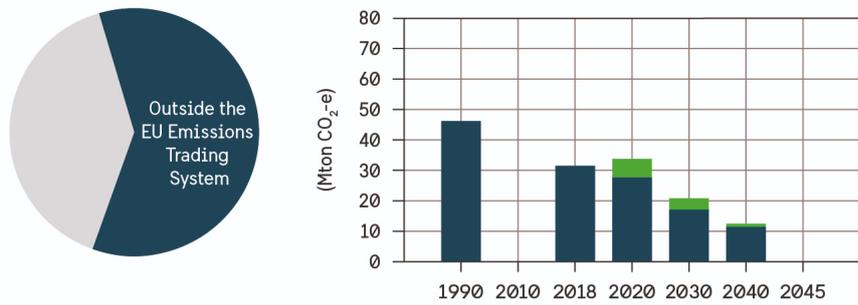
The climate policy framework includes a number of interim targets in addition to the overall 2045 target. While the 2045 target applies to Sweden's total emissions, the interim targets apply to a subset of emissions (see Figure 1). For emissions not included in the EU ETS, there are three interim targets set for 2020, 2030 and 2040. In addition, domestic transport has its own interim target for 2030.¹ Emissions within the trading system do not have their own interim target but are included in the 2045 net-zero emissions target. The targets of the climate policy framework are summarised in Figure 1 below.

^b The target does not cover emissions and removals in the land use, land use change and forestry (LULUCF) sector.

^c Emissions outside the EU ETS are covered by the EU Effort Sharing Regulation (ESR) and are sometimes referred to as the non-trading sector.

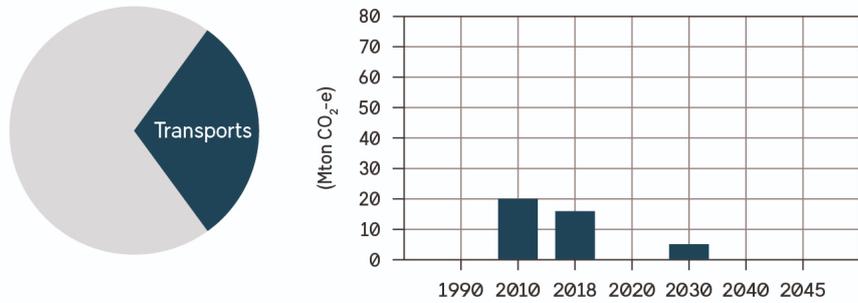


Net-zero emissions by 2045. Emissions should be at least 85% lower than 1990. 15% can be offset by supplementary measures. Negative emissions thereafter.



Interim emission targets outside the EU Emissions Trading System are as following:

- By 2020 all emissions should be 40% lower than 1990. Maximum 13% may be offset through flexible mechanisms.
- By 2030 all emissions should be 63% lower than 1990. Maximum 8% may be offset by complementary measures.
- 2040 all emissions should be 75% lower than 1990. Maximum 2% may be offset by complementary measures.



Interim targets for the transport sector:

By 2030 all emissions from domestic transports (excluding CO₂ from domestic aviation which is part of the EU ETS) should be 70% lower than year 2010.

- Greenhouse gas emissions (Mton CO₂-e)
- Emissions possible to offset by supplementary measures

Figure 1 The targets of the climate policy framework

According to the latest emission statistics, Sweden’s total greenhouse gas emissions decreased by 27 per cent between 1990 and 2018.^d The largest emission reductions occurred between 2003 and 2014, by an average of just over 2 per cent annually. Since then, the decline has slowed, and over the past four years, emissions have fallen by an average of barely 1 per cent annually.² Already in its 2019 report, the Climate Policy Council said that this pace is far too slow to align with climate policy targets. On average, Sweden’s greenhouse gas emissions will need to be reduced by between 6 and 10 per cent per year until 2045, with the lower rate being relevant if supplementary measures are fully utilised to achieve the 2045 target and the higher rate if emissions are to drop to zero.^e

Emissions in the trading system have remained relatively constant since 2014. In recent years, it is mainly emissions outside the EU ETS that have decreased.³ For these emissions, so-called indicative emission pathways exist under the climate framework to support follow-up of the interim targets by 2030 and 2040.^f Indicative emission pathways are defined as a linear reduction from the actual emission level in 2015 to the interim targets, with a higher pathway if supplementary measures are used and a lower pathway without the use of supplementary measures.^g In the bill containing the climate policy framework, the Government wrote that if “emissions exceed the indicative pathway, this will prompt an analysis and might entail the need for a tightening of climate policy”.¹

In 2017 and 2018, emissions outside the EU ETS were just under 1 million tonnes of carbon dioxide equivalent (CO₂e) above the lower indicative pathway³ (without supplementary measures). This is a marked deviation in the three years since 2015. If the trend continues on that deviation, the 2030 interim target without supplementary measures would be missed by nearly 5 million tonnes. While emissions for 2017 and 2018 were marginally above or just above the higher indicative emission pathway (with maximum use of supplementary measures), there is as yet no regulation or policy to bring about supplementary measures, so we believe that the higher pathway is not relevant for supporting follow-up. The Government should therefore propose additional instruments and other policy measures to bring emissions in line with the target pathway.

Since the Climate Policy Council’s last report in March 2019, no conclusive new knowledge of the long-term emission trend has been presented that alters our assessment of progress towards the target. Under the current conditions and adopted policies, neither the overall target for 2045 nor the interim targets for emissions outside the trading system, with the exception of the 2020 interim target or the interim target for domestic transport, can be achieved.

In recent years, more and more countries, regions, cities and organisations have adopted similar targets of net-zero emissions by the middle of the century. Examples of this are provided in the following fact box.

^d The latest emission statistics cover the years 1990 through 2018. The total emissions include emissions that occur within Sweden’s borders excluding LULUCF.

^e 6–10 per cent is the average reduction rate needed to achieve the 2045 target calculated based on 2018 emissions. The 2019 report indicated a corresponding reduction rate of 5–8 per cent, which applied from 2016 emissions.

^f There is no corresponding indicative pathway, either for emissions within the trading system or for the total Swedish greenhouse gas emissions.

^g The amount of emissions that may be offset by supplementary measures is equivalent to just under 4 million tonnes of carbon dioxide equivalent by 2030 and just under 1 million tonnes by 2040.

facts:

OTHER COUNTRIES WITH NET-ZERO EMISSIONS TARGETS

Targets for net-zero greenhouse gas emissions have been adopted by several countries, states, regions, cities and organisations around the world. In Europe, Sweden, Denmark, Finland, France, Iceland, Norway, Portugal, Switzerland and the United Kingdom have adopted such targets. In December 2019, 26 of the EU's 27 countries agreed on the target of a climate-neutral EU by 2050. The exception is Poland, which is not participating.

In addition to the European countries, Chile, Costa Rica, New Zealand, Fiji, the Marshall Islands and Uruguay have also set net-zero emissions targets. Other countries, such as Bhutan and the Republic of Suriname, have already achieved climate neutrality, according to their calculations. The adoption of net-zero emissions targets is under discussion in a number of additional countries. In the United States and Australia, which do not currently have such common targets, states and cities have chosen to lead the way.⁴

Precise target formulations differ between countries, as does the definition of what net-zero emissions or climate neutrality means in practice. The main difference concerns how land use uptake and emissions should be estimated, and how they should be credited. The year in which the target is to be reached varies between 2030 and 2050. Similarly, the targets have been introduced to varying degrees in national legislation, such as climate laws.

2. Do the climate report and climate policy action plan comply with the requirements of the Climate Act?



2. Do the climate report and climate policy action plan comply with the requirements of the Climate Act?

This chapter compiles the decisions taken in 2019 and presented in either the Government's climate report or the Climate policy action plan. These decisions are also considered in relation to the recommendations made by the Climate Policy Council in its 2019 report.

The Government's climate report

Under the Climate Act, the Government must submit an annual climate report to Parliament. As in 2018, the climate report for 2019 was presented as a sub-annex to the budget bill's annex for Category 20, General Environment and Nature Conservation.⁵ The Council noted in last year's report that this could be perceived as climate policy still being treated mainly as part of environmental policy, and not as something that should inform overall policy. We believe that the climate report should be presented as relevant to overall budget allocation, in the same way as the financial plan, since the climate issue touches upon all policy areas.

The content of the climate report is regulated in Section 4 of the Climate Act, and the 2019 edition meets these requirements better than in the previous report (Table 1).⁶ The main shortcoming of the climate report concerns the assessment of what various decisions may mean for greenhouse gas emission trends. The Government has reported the assessed effects of policies to a greater extent than before and, in a few cases, has also reported impact assessments of decisions that do not have an explicitly stated climate purpose. Although the latter is not a formal requirement, if it were to be done consistently, it would facilitate an assessment of the overall policy impact. However, information is often lacking on how impact assessments are made and what assumptions they are based on, or a discussion of assumptions. The Government uses data from different authorities and scenarios and uses different units and formats in its impact assessments. This makes it more difficult to compare different initiatives and assess the overall impact of the decisions presented.

This year's report does announce some new initiatives, although the Government mainly refers to the Climate policy action plan. In some cases, the Government has also presented decisions that undermine the climate targets.^h This is not explicitly required in the Climate Act, but if done consistently, it too would facilitate an assessment of the impact of the Government's overall policy. In addition to decisions taken in the past year, the report also discusses multiple past decisions, making it more difficult to assess what the Government has achieved since its latest report.

^h These include lower tax rates for petrol and diesel relative to what would have been called for based on increases in the CPI and GDP.

Table 1. The Climate Act's requirements on climate reporting and the Swedish Climate Policy Council's overall comment.

Green cells indicate that Climate Act requirements have been met and yellow cells that the requirements have been partially met.

Climate Act requirements	Climate Policy Council comments
Reporting of emission trends	The Government reports the historical emissions trend up to 2017 for the various climate targets and scenarios presented by the Swedish Environmental Protection Agency in March 2019, as well as additional analyses that include some planned policy instruments.
Reporting of major climate policy decisions during the year and what these decisions can mean for greenhouse gas emission trends	In some cases, the Government presents assessments of how decisions taken are expected to influence the emissions trend going forward. They are based on different scenarios and models and are presented in different units and formats, making it difficult to compare and assess the results.
Assessment of the need for further measures, and when and how decisions on such measures can be taken	In most cases, the Government refers to the forthcoming action plan for decisions on further measures.

Compilation of decisions taken in 2019

This section summarises the decisions presented in the climate report and is divided into three main areas: domestic transport, emissions covered by the EU Effort Sharing Regulation (ESR) and emissions covered by the EU emissions trading system (EU ETS). Only decisions taken in 2019 are reported.

Domestic transport

Since the previous climate report, the Government has taken seven decisions related to transport that are relevant for climate change. They are compiled in Table 2, together with information on when they enter into force, the nature of the decision, and whether the Government has reported any impact assessment. The Government does not provide a satisfactory impact assessment for any of the decisions. Additionally, two of the decisions (at the top of the table) undermine the chances of achieving the climate targets, while the others strengthen the chances. In addition to the decisions taken by the Government itself, it is worth mentioning that new EU rules came into force in 2019 regulating emissions from new passenger cars as well as light and heavy vehicles.

Table 2. Decisions taken in 2019 within domestic transport.

In the column 'Government presents an impact assessment', a 'No' indicates that an impact assessment is lacking and 'In part' that the impact assessment has been presented but is incomplete (page reference to climate report).

Area	Decision	Date effective	Type of decision	Government presents an impact assessment
Fossil-free and energy-efficient vehicles	Lower enumeration of the tax amounts for petrol and diesel (through 31 December 2019)	1 July 2019	Change in tax	In part (page 11)
	Reduction of the carbon tax on petrol and diesel relative to the rate corresponding to the increase in the CPI and GDP	1 January 2020	Change in tax	No
Renewable fuels and electrification	Funding for non-public charging infrastructure, such as housing associations	27 June 2019	New funding	No
	New fuel blend levels in 2019 and 2020	1 January 2019 and 1 January 2020	Change in blend levels	No
A transport-efficient society	Change in transport policy objectives	BP20	Changed target formulation	No
	Amendment to urban environmental agreements	1 April 2020	Change in existing funding	No
	Municipalities given greater opportunities to introduce environmental zones	1 January 2020	Change in rules for existing instruments	No

*BP20 refers to the 2020 Budget Bill.

Emissions outside the EU ETS

Since the previous climate report, the Government has taken four decisions concerning emissions from sectors outside the EU ETS that are covered by the EU Effort Sharing Regulation. These are compiled in Table 3. The Government does not provide satisfactory impact assessments for these, either.

In addition to national decisions, an international agreement regulating the use of hydrofluorocarbons (HFCs), a super greenhouse gas, entered into force in the past year.ⁱ

Table 3. Decisions taken in 2019 on emissions not covered by the EU ETS.

In the column 'Government reports impact assessment', a 'No' indicates that an impact assessment is lacking and 'In part' that the impact assessment has been presented but is incomplete (page reference to climate report).

Area	Decision	Date effective	Type of decision	Government reports impact assessment
Agriculture	Change in the Klimatklivet ('Climate Leap') programme that provides greater leeway for seeking funding support for measures that reduce agricultural greenhouse gas emissions	1 June 2019	Extension of funding	No
Industrial machinery	Abolished energy and carbon tax credits for diesel in the mining industry	2019	Change in tax	In part (page 18)
	Increased exemption from carbon tax for diesel in machinery, as well as in ships and certain boats in professional agricultural, forestry and aquaculture activities	1 July 2019	Change in tax	In part (page 18)
	Climate declaration for buildings from January 2022	2019	New requirement	In part (page 18)

ⁱ The Kigali Amendment to the Montreal Protocol.

Emissions included in the trading system

During the year, the Government took three decisions on emissions within the EU ETS, which are compiled in Table 4. In this area too, the Government has not provided a satisfactory impact assessment.

Table 4. Decisions taken in 2019 on emissions covered by the EU ETS.

In the column 'Government presents an impact assessment', a 'No' indicates that an impact assessment is lacking and 'In part' that the impact assessment has been presented but is incomplete (page reference to climate report).

Area	Decision	Date effective	Type of decision	Government presents an impact assessment
Industry	Strengthening the Industriklivet ('Industry Leap') programme	2020	Increased funding	No
	Amendment to Industriklivet to also include measures involving negative emissions	1 June 2019	Increased scope of existing funding	No
Electricity and district heating	Increased energy and carbon tax for cogeneration fuels	2020	Changed tax	In part (page 24)

EXAMPLES OF CLIMATE POLICY DECISIONS WITHIN AND OUTSIDE THE EU DURING THE YEAR

In 2019, 26 of the 27 EU Member States agreed on the target of a 'climate-neutral' EU by 2050. In the autumn of 2019, the European Commission presented a far-reaching package of measures in the form of a European Green Deal to achieve the target.⁷ The Commission promises a fair and socially equitable transition, a strategy for mobilising industry, and a major expansion of charging infrastructure for electric vehicles. In the energy sector, coal will be phased out, and renewable energy and energy efficiency will be prioritised. Proposals for a climate law setting a 2050 target are also to be presented.

In an international context, multiple initiatives have been launched to increase the chances of achieving the goals of the Paris Agreement. Sweden is taking part in several. Among other measures, Sweden is a member of the steering committee of the NDC Partnership, which supports developing countries in their implementation of their nationally determined contributions for fighting climate change. At the UN Climate Summit in New York on 23 September 2019, Sweden and India were collaborated to illustrate the potential for a climate transition in industry. The purpose of the summit was to raise the ambition level of parties to the UNFCCC with regard to their climate plans, and they were invited to showcase opportunities for a climate transition in different sectors.

In December 2019, COP25, the annual Conference of the Parties under the UNFCCC, was held in Madrid. The agenda included the goal of resolving the remaining technical issues of the Paris Agreement. One of the major issues was the formulation of Article 6, which addresses voluntary markets for emissions trading. However, this was not resolved but instead postponed to COP26, which was to be held in Glasgow in November 2020, but has now been postponed until 2021.

The Government's Climate policy action plan

Under the Climate Act, the Government must submit a climate policy action plan to Parliament the year after regular parliamentary elections. On 18 December 2019, as the first of its kind, the Climate policy action plan was submitted to Parliament as a bill.⁸ The contents of the action plan are determined by eight paragraphs of Section 5 of the Climate Act, which the Council comments on in Table 5.⁶

According to our terms of reference, the Climate Policy Council's assessment of the Government's Climate policy action plan⁹ is to be submitted within three months of the plan's publication. A detailed analysis and evaluation of the content of the plan is set out in Chapters 4 and 5 of this report. The Council's overall assessment of the plan is summarised in the following box.



OVERALL ASSESSMENT OF THE ACTION PLAN

The Climate Policy Council welcomes the Government's presentation of a broad action plan with initiatives in many different sectors, from local to international level.

The most serious shortcoming is that the Government does not report the extent to which agreed and announced initiatives, in parts or collectively, contribute to the achievement of the climate targets. As a result, the action plan does not comply with the requirements of the Climate Act in this regard. In addition, the efforts are also diffusely described throughout and lack timetables for implementation.

Table 5. The Climate Act's stipulation of the contents of the Climate policy action plan and the Council's overall comments.

Green cells indicate that Climate Act requirements have been met and red cells that the requirements have not been met.

Climate Act requirements	Climate Policy Council comments	
Sweden's commitments within and outside the EU	The Government presents Sweden's commitments under the UNFCCC, Agenda 2030, the EU and the Kigali Amendment to the Montreal Protocol.	
Historical greenhouse gas emissions data up to the last reported emission inventory	Emission data for the period 1990–2017 are presented. A broad outline of emissions for 2018 are also presented.	
Projected emission reductions	Scenarios reported in March 2019 are presented, as well as some additional analyses for instruments decided after July 2018.	
Outcome of the emission reduction measures taken	The Government does not report the outcome of individual measures taken.	
Planned emission reduction measures with an approximate indication of when these measures can take effect	The action plan contains over 100 actions, but few have deadlines.	

To what extent can announced and planned emission-reducing measures be expected to help achieve national and global climate targets?	Not available.	
To what extent do announced and planned measures in different spending areas affect the chances of achieving the national and global climate goals?	Not available.	
What additional measures or decisions may be needed to achieve the national and global climate goals?	Not available.	

The action plan is based on an update of the current state of knowledge on climate change according to the Intergovernmental Panel on Climate Change (IPCC). It then states emission trends at national, European and global levels; Sweden's commitments internationally and within the EU; the climate policy framework, and emissions trend scenarios. These statements meet the requirements in the first four paragraphs of Section 5 of the Climate Act.

Following the initial chapters, the Government presents more than 100 actions aimed at clarifying policy direction for the remainder of this electoral period. Three are proposals to Parliament to take a position on integrating climate policy into all policy areas. Of the remaining proposals, about half indicate an increase in ambition level, a focus, or that a review should take place. Some 20 remits will be given to public authorities, and six investigations are proposed. Roughly one-third of the plan involves cross-sectoral proposals; the rest of the proposals are divided by sector into buildings and construction, industry, electricity and district heating, waste, forestry and other land use, agriculture, machinery, transport and supplementary measures.

How has the Government addressed the Council's previous recommendations?

The Climate Policy Council submitted 16 recommendations in its previous report.¹⁰ Through the Government's 2020 budget bill and the Climate policy action plan, the Government has taken decisions in line with seven of these 16 recommendations (see Table 6).⁸

The Climate Policy Council welcomes the fact that, in an annex to the action plan, the Government explains how it takes assessments into account and how its decisions relate to the recommendations in the Climate Policy Council's 2019 report. This feedback is essential for the long-term functioning of the climate policy framework.

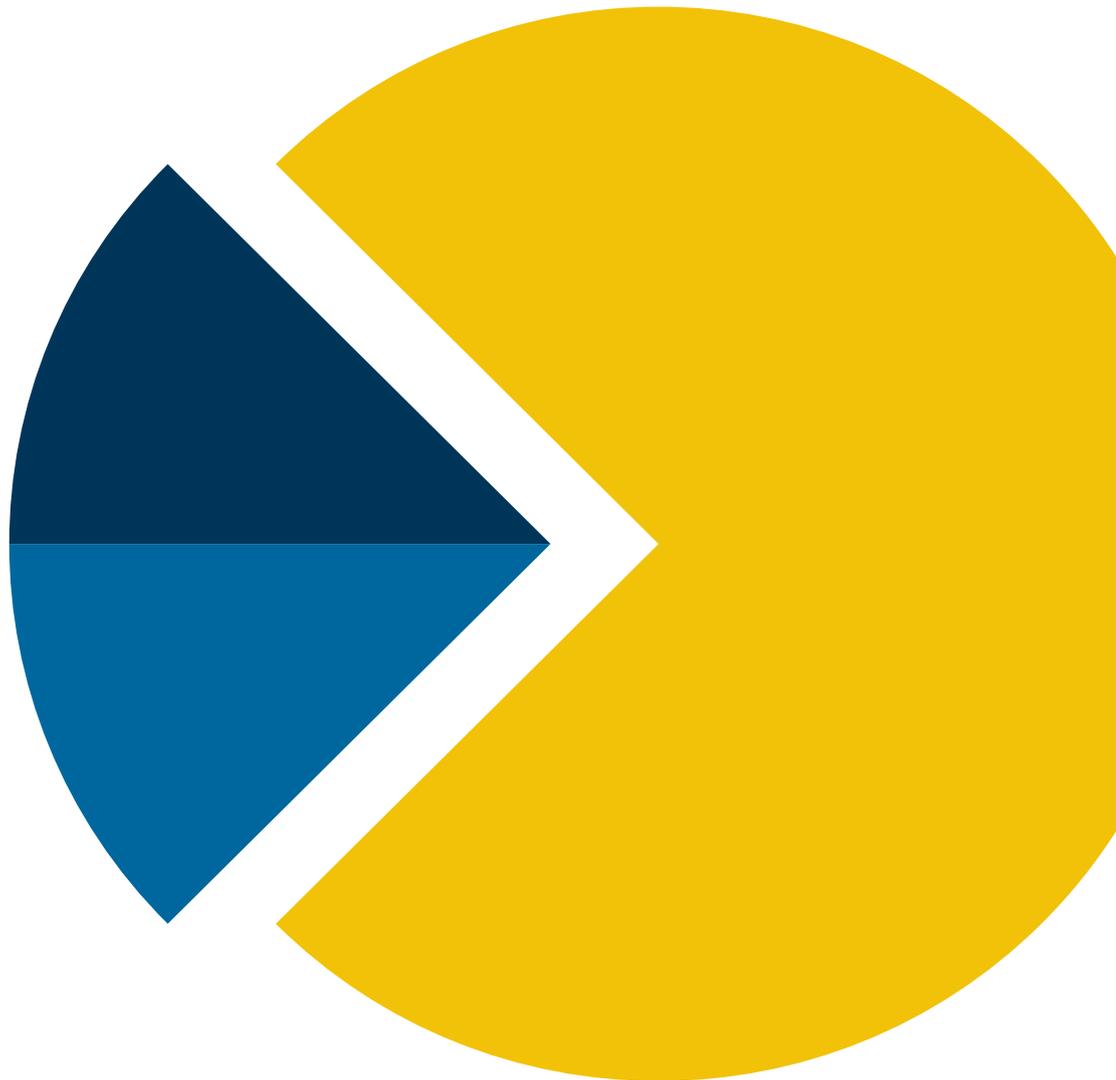
Table 6. Government decisions taken in 2019 in relation to previous recommendations from the Climate Policy Council.

In the column 'Decisions in 2019', yellow cells indicate decisions in line with the recommendation and grey cells indicate no decision, even if future initiatives are announced in the action plan.

Recommendation	Decisions in 2019
Clarify that net-zero emissions means zero emissions in most sectors.	Clarified in the action plan for the electricity and heating sector and the transport sector.
Include effects on climate targets in all impact assessments in public inquiries and government bills. New instruments should be preceded by follow-up and evaluation plans to ensure high climate benefit and cost-effectiveness.	A review has been initiated of the Regulatory Impact Assessment Regulation (2007:1244) and of the Committees Ordinance (1998:1474).
Stimulate broad engagement and increase coordination between different initiatives. All stakeholders are needed in the transition: the business sector, trade unions, municipalities, regions, academia, the public sector and civil society.	Some initiatives are announced in the action plan, mainly regarding the role of municipalities and regions, as well as some form of continuation of Fossil Free Sweden.
Eliminate the exemptions from carbon taxation that remain for non-trading activities.	The reduction in fuel taxes on diesel for mining machinery was abolished on 1 August 2019. Reductions remain mainly for agriculture and forestry.
Work proactively within the EU to tighten the trading system and use cost-effective national instruments to reduce emissions from Swedish installations within the system.	Sweden is working on tightening the EU ETS and has strengthened some national instruments – for example, by expanding Industriklivet.
Introduce legislation that gives the Government the right to examine the establishment of business activities that run counter to the potential to achieve the national climate objectives.	A commission of inquiry was appointed (Terms of reference 2019:101) that reviews relevant legislation for achieving the climate targets, such as the Environmental Code and permitting process.
Decide on a time-bound action plan to achieve fossil-free transport beyond the 2030 target.	The action plan announces several upcoming initiatives – in particular, an inquiry into a target year for phasing out fossil-based fuels.

Align the transport policy objectives with the climate targets.	The climate target for the transport sector has become an interim target for the impact goal in the transport policy objectives.	
Strengthen regulations and processes for urban planning that reduce car dependence.	The action plan announces a series of initiatives to increase transport efficiency.	
Take into account different conditions and offset negative redistributive policy effects – for example, between urban and rural areas.	General language in the action plan and an announcement of funding to ‘fill in the blanks’ in terms of charging capabilities for major roads.	
Prepare a reform of road traffic taxation grounded in increased electrification and the use of autonomous vehicles, while promoting regional fairness.	The action plan refers to a forthcoming broad tax reform and ambitions for green taxation.	
Stop subsidising car ownership, driving and parking.	The action plan announces initiatives on company car taxation, travel expense deduction and taxation of parking at workplaces.	
Strengthen municipal mandates and tools in order to promote fossil-free transport.	According to the action plan, the mandates and tools of municipalities are to be reviewed.	
Accelerate the electrification of road transport throughout Sweden.	The action plan announces a national strategy for electrification, an electrification commission, new funding for charging infrastructure and a review of home charging rules.	
Set a stop date for the sale of fossil fuels.	The action plan announces an inquiry to develop proposed deadlines for phasing out fossil fuels.	
Increase steering towards more climate-efficient vehicles.	Stricter rules for carbon dioxide values when calculating the vehicle tax from 2020. The Government announces a new premium for electric lorries and electric-powered machinery as well as a review of the bonus-malus system.	

3. An analytical framework for assessing the climate policy action plan



3. An analytical framework for assessing the Climate policy action plan

The Climate Policy Council's remit is to assess how the Government's 'overall policy' is compatible with the climate goals decided by Parliament and the Government. This chapter outlines the analytical framework that we have developedⁱ for the assessment. Annex 1 provides a more detailed description of the framework and methodology for assessing the overall policy. It also contains in-depth studies of the different parts of the analytical framework. We aim for the analytical framework to be transparent and useful, and to stimulate discussion and reflection among different stakeholders in society.

General points of departure

The transition from fossil-fuel dependence to independence and net-zero emissions represents a profound change of society as a whole. This transition must take place through parallel, interconnected changes in technologies, business models, behaviours, regulations, knowledge, culture and values. The changes involve different stakeholders at all levels of society – local, regional, national and global – in interdependent relationships.

Politics is part of the system that influences our actions, as it establishes a framework within which we can operate while formulating policies in interaction with society at large. Neither national nor regional or local decision-makers have complete control of the transition. For example, technological advancements in most sectors are largely determined by developments in other countries and by price changes in global markets. This does not mean that national policies have no impact, but political decisions taken in Sweden must relate to a variety of external factors in order to be impactful and effective.

Elements of the framework

The climate policy discussion often addresses instruments such as laws and regulations, or taxes and subsidies, which directly affect citizens and businesses. But policy outcomes also depend on other factors: the objectives formulated; how institutions, decision-making processes and organisations are structured and how they function, and what culture and leadership skills exist in public administration. Therefore, national policies in the analytical framework are divided into two dimensions that together capture a greater part of the overall policy: *instruments* and *governance and leadership* (see Figure 2). This distinction was already presented in the 2019 Report of the Climate Policy Council. This year's report further develops the approach by clarifying criteria for impactful leadership and impactful governance and by developing and applying a four-step analytical method for the impact assessment of policy instruments.

ⁱ The framework was developed in collaboration with the consulting firm Material Economics.

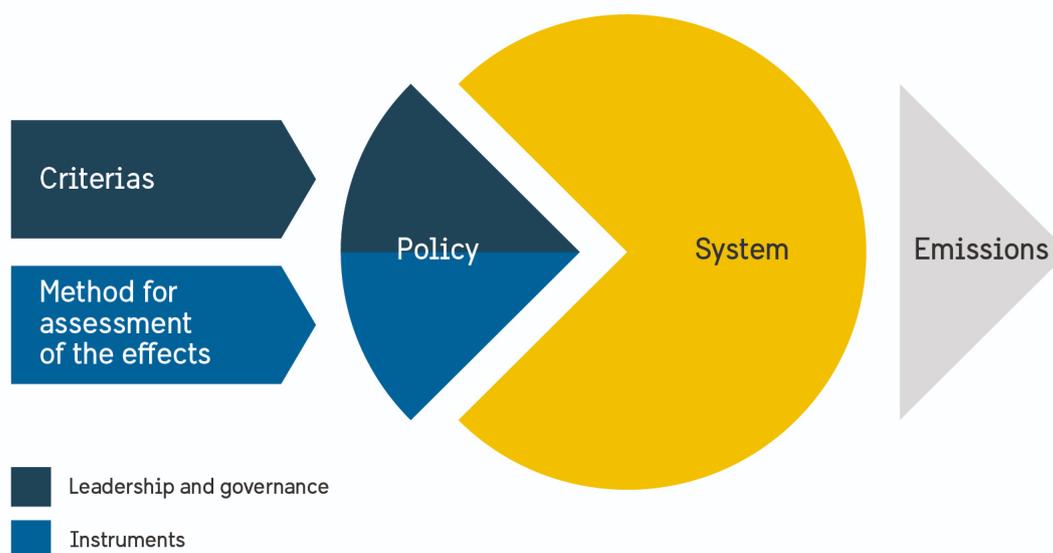


Figure 2 Analytical framework for assessing the Government's overall policy and Climate policy action plan

Criteria for assessing leadership and governance

Comprehensive research literature is available in different fields that identifies essential aspects of impactful climate change policy. Such aspects cannot always be linked to a specific number of tonnes of reduced emissions, but they must still be taken into account to enable the effectiveness and long-term viability of the policies.

Based on this literature and in dialogue with researchers from different disciplines, the Climate Policy Council has chosen to highlight a number of factors that research has shown to be essential for impactful policy:

- 1) Common goals and vision
- 2) Target attainment
- 3) Cost-effectiveness
- 4) Coordination, organisation and resources
- 5) Stakeholder collaboration
- 6) Long-term approach, learning and flexibility
- 7) Acceptance, legitimacy and interaction with other objectives.

These seven factors are used in this report as criteria for our assessment of the Government's Climate policy action plan (see Annex 1 for more detailed information on each criterion).

The list above does not cover all aspects of impactful policy for driving the climate transition. For example, differences in values must be reckoned with, which means that the view of what constitutes impactful policy can shift between different groups. In the continuing efforts to develop this assessment approach, the criteria are likely to be supplemented and adjusted as the understanding of the climate transition evolves.

Obstacles to the transition and impact assessment of instruments

In order to determine whether the pursued and planned policies are sufficient for achieving the climate targets, it is necessary to understand how policy instruments individually and collectively affect greenhouse gas emissions across different time horizons. There are several different methods and analytical tools for assessing individual instruments and their impact, each with its own strengths and weaknesses. All in all, these methods can provide important knowledge about how instruments should be designed in different situations. However, there is no established methodology for assessing the contribution of the overall policy towards achieving the climate targets. The analytical framework that we have developed includes a four-step method for assessing the overall impact of different instruments. This method is illustrated in Figure 3.

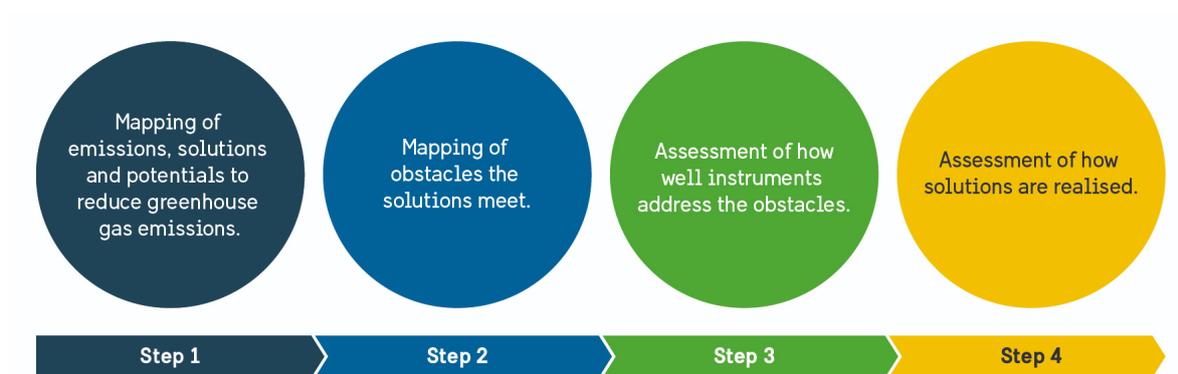


Figure 3 The Climate Policy Council's four-step approach for assessing the contribution of overall policy towards achieving the climate targets

In order to assess whether the climate targets are being achieved with current and announced policies, we begin with a survey of possible emission reduction solutions (new technologies, changed behaviours, etc.) in all sectors and their potential to reduce emissions (Step 1 in the figure above). This information is taken from Panorama, an open tool that visualizes the climate transition in Sweden and which the Climate Policy Council has developed together with the Swedish Environmental Protection Agency and Swedish Energy Agency.¹¹ In some cases, the solutions and potentials in Panorama have been supplemented with more specific or up-to-date information. This has been done in dialogue with researchers, government representatives, business stakeholders and other experts with a deep understanding of the climate transition in the different sectors.

Should these solutions be comprehensive and not face any obstacles, in principle there would be no need for new policy decisions to achieve the climate targets. However, our analysis shows that today's solutions face a variety of different obstacles – and in some cases, there are no solutions. The obstacles include traditional market failures,¹² but also administrative hurdles of various kinds, as well as obstacles related to habits, norms and other societal factors. Our assessment takes them all into account. Achieving the climate targets requires instruments that address these obstacles. For each of the solutions, Step 2 brings together the primary obstacles that are currently slowing down developments.

Next, Step 3 maps out whether instruments are available that address the obstacles slowing down the transition in different sectors. Finally, Step 4 shows an estimate of the percentage of each solution that will be realised by 2045, given the current conditions and established policies. The assessment in the final stage is made by weighing the results of previous assessments and by using selected dialogues with government experts and representatives in the sectors concerned.

Altogether, this provides a general picture of how well current and planned instruments are designed to enable the climate transition in the different sectors.

The following two chapters present the results of the application of this analytical framework to the Government's currently decided policies and to the Climate policy action plan. Chapter 4 provides an assessment of the Government's leadership and governance, and Chapter 5 provides an assessment of the instruments' design and impact.

4. Leadership and governance in the climate policy action plan



4. Leadership and governance in the Climate policy action plan

This chapter discusses whether and how the criteria for impactful policy (presented in the previous chapter) are presented in the Government's Climate policy action plan. On this basis, the Climate Policy Council has formulated six recommendations to the Government on leadership and governance in relation to the plan.



RECOMMENDATIONS

1. Make the Climate policy action plan more specific so that it becomes a plan for action with responsibilities, deadlines and impact assessments of each initiative and of the whole. Follow up the plan annually in the Government's climate report.
2. Strengthen and broaden responsibility for the Government's work on climate policy, preferably through a steering committee responsible for implementing the climate policy framework, with the Prime Minister as chairperson.
3. Give the relevant authorities a standing mandate to deliver proposals that contribute to attainment of the climate targets, including impact-tested proposals for the Climate policy action plan.
4. Strengthen the competence and capacity of the relevant authorities to assess and monitor the impact of policy efforts for achieving the climate targets, in order to provide a solid foundation for continual learning and further policy developments.
5. Ensure that the climate policy framework and the Climate policy action plan have as strong and clear an impact on the Government's work as the budgetary policy and fiscal framework.
6. Translate the sectoral roadmaps developed under the Fossil Free Sweden initiative into action plans for step-by-step implementation, follow-up and revision, jointly between the Government and each industrial sector.

Common goals and vision

Sweden intends to become the world's first fossil-free welfare state.¹³ That is the objective formulated by the Government. The Climate policy action plan refers to this objective, but there is no clear vision or narrative of what the future fossil-free welfare state should look like.

Linking the climate transition to other key global goals for welfare and prosperity increases the potential to anchor it with more stakeholders. The Government emphasises that 'an important role for Sweden in European and international cooperation is to push for a more rapid transition to fossil-fuel independence' and that a prerequisite for taking on such a role is that 'we show that the transition to fossil-fuel independence can go hand in hand with economic development and welfare'. The Government believes that this is also a way to contribute to Sweden's commitments under Agenda 2030 – to contribute to environmentally, socially and economically sustainable

development. The Government emphasises in the action plan that broad commitment and anchoring throughout society is important for achieving the goal of being the first fossil-free welfare state.

This goal has broad political support, which is confirmed by the broad parliamentary agreement on the climate policy framework, which set the overall target of net-zero emissions by 2045 as well as several interim targets. Even in society as a whole, much evidence points to the fact that most people view the climate transition as necessary and important. The Swedish Environmental Protection Agency's annual survey of public opinion on climate solutions¹⁴ reveals that almost 90 per cent of Swedes think it is important to put measures in place to fight climate change. More Swedes than before also believe that they themselves can do something to slow climate change.

The business sector shows growing support for the climate transition, as reflected in the roadmaps for fossil-free competitiveness that many industries have developed under the Fossil Free Sweden initiative.¹⁵ These industries together account for a large share of Sweden's greenhouse gas emissions. An increasingly strong economic policy dimension around fossil-fuel independence thus seems to have emerged as a potential international competitive advantage for meeting the demand for fossil-fuel-free products.

The overall goal of net-zero emissions is somewhat abstract, which may make it more difficult for stakeholders to interpret what the target means for their sector or for themselves. This also applies to the absence of sectoral objectives, except for domestic transport. From this perspective, it is good that, in line with the Council's recommendations in its 2019 report, the action plan makes it clear that the overall objective for the transport sector and the electricity and heating sector should be zero emissions by 2045.

Overall, the Climate Policy Council finds that there is now a workable target for the climate transition, embraced by citizens and stakeholders, but that a clear vision or narrative is also needed about the future fossil-free society and the way ahead. This is discussed in more detail in the section on acceptance and legitimacy.

Target attainment

The Government's action plan contains more than 100 initiatives during the electoral period, but it generally lacks assessments of the impact of decisions on greenhouse gas emissions. More often than not, it does not provide timetables for when a particular initiative is to be carried out or when announced reforms are expected to enter into force. Furthermore, there are no calculations or reasoning as to what cumulative effect the action plan can have on emission trends. The Government thus presents many initiatives, but no own opinion of the adequacy of the action plan or the effect of its implementation.

It is natural that in some cases the impact of the actions cannot be quantified in terms of greenhouse gas emission reductions. But the Government should have been able to make some sort of assessment of the action plan's impact, at least on developments in the near future. Following this action plan, only one and a half planning cycles remain to the 2030 interim targets.

On the other hand, a qualitative discussion would have been useful concerning the extent to which the action plan is expected to help achieve the climate targets and the contribution and interaction of the proposed initiatives. As regards the expected emission trends, the action plan refers to the Swedish Environmental Protection Agency's scenario calculations from March 2019 on the

emission reductions that were estimated to result from the policy at the time.¹⁶ However, the EPA's scenarios showed a significant gap between expected emission trends and the 2030 interim targets.

The Government does not assess the extent to which the action plan can close this gap or whether emissions outside the EU ETS can be expected to follow the indicative emission pathway up to 2030.^{k,l} The closest the Government comes to assessing the impact of planned policies is to present a complementary scenario from the EPA. The scenario includes a stricter reduction obligation in line with the indicative reduction rate of 40 per cent by 2030, as well as the EU's emission requirements for light- and heavy-duty vehicles decided in 2019. In this complementary scenario, emissions are reduced so they almost reach the agreed 2030 targets, provided that the scope for supplementary measures is utilised to the fullest. However, the Government does not discuss whether this is the expected impact of the action plan. The Climate Policy Council notes that building policies on this complementary scenario would carry high risks. This is mainly because it requires a near doubling of biofuel use as well as a maximum volume of supplementary measures. It is uncertain whether such a large number of supplementary measures can be implemented and taken into account, and no agreed policy currently exists for achieving this.

The lack of impact assessments in the action plan might be because the Government Offices and government agencies have not developed common established methods for impact assessment. The Government's remit to the Swedish Environmental Protection Agency to develop decision support for the Climate policy action plan did not include assessing the proposals or ensuring that they sufficed to close the emissions gap.¹⁷ There was therefore no decision support underlying the Government's work on the action plan.

The look back at progress on the 2020 target (Annex 2) also illustrates that the emission trend is a blunt instrument for assessing whether or not policies lead to target attainment. This is partly because official emission statistics are reported with a delay of at least one year, but more so because underlying, ongoing changes in technology choices or consumption, for example, can have a significantly longer delay before they fully show up in the emission data. Similar problems exist for future emission scenarios based on historical correlations and trend projections. This suggests that the Government and government agencies need additional measures and indicators in different parts of the economy to assess the impact of the pursued policy. This is especially true for sectors in which underlying factors can develop rapidly, such as changing habits among car buyers, which have a major impact on emissions from passenger cars.

The lack of impact assessments in the action plan illustrates the importance of the Government implementing the changes to the Committees Ordinance¹⁸ and the Ordinance on Regulatory Impact Assessment,¹⁹ as recommended by the Council in its 2019 report and now announced in the action plan. Impacts on the attainment of climate targets should be included in all impact assessments in relevant public inquiries and government remits.

In addition, the Government and its agencies must ensure the availability of expertise, capacity and uniform working methods to assess the impact of policies on greenhouse gas emissions. Such

^k A look back at the past in Annex 2 shows that the Government's 2009 climate policy bill contained a simple table of proposed measures to reach the 2020 interim target. However, emissions then decreased significantly faster than expected. The timing of these assessments was the same as the action plan now has ahead of the 2030 targets.

^l According to the climate framework, the indicative emission pathway is defined as a linear reduction from the actual emission level in 2015 to the proposed targets in 2030, 2040 and beyond 2045.

efforts must span the areas of responsibility of multiple agencies, whether organised as a collaborative function or carried out in an independent organisation.

The Government has therefore not provided an assessment of whether the presented action plan will lead to the achievement of the climate policy goals, so the action plan cannot be said to meet the requirements of the Climate Act in this regard. It is noteworthy that the fundamental issue of achieving policy goals does not receive any attention at all in the Government's action plan.

Cost-effectiveness

Society's resources should be allocated effectively for many different purposes. Cost-effectiveness is therefore an important criterion for ensuring that the long-term goal of net-zero emissions is achieved at the lowest possible cost to society.^{20,21} Policy proposals that make the climate transition unnecessarily costly for all or part of society risk eroding the measures' legitimacy. By seeking cost-effectiveness, the Government can take responsibility for the smart use of our common resources and thereby facilitate the transition.

In general, there is a fundamental ambition to make Swedish climate policy cost-effective, using general market-based instruments and avoiding specific sectoral objectives. However, there are deviations from the marginal cost principle of equally high marginal abatement costs for reducing greenhouse gases across different sectors – sometimes on purpose, for reasons such as international competition or redistribution effects. In some cases, such deviations can be reasonable and legitimate, while in others they are an indication that an instrument is not working as expected, and other measures would be more cost-effective.

Several reports^{22–25} have recently questioned the cost-effectiveness of Swedish climate policy, arguing that it is more expensive than it needs to be. Throughout most of these studies, the results are based on a theoretical model-based analysis in which the effect of a few instruments is analysed in a so-called economic equilibrium model (see the box below on cost-effectiveness assessment). This means that the analysis does not fully take into account the policy objectives and the overall cost-benefit profile of the instruments from different time perspectives. Ex-post studies also show that the costs of implemented climate actions have often been lower than expected based on the results of model analyses of the kind mentioned above²⁶ (see also Annex 2).

One example criticised for economic sub-optimisation is the ambitious interim target for domestic transport.^{22,23,27} A rapid decline in the transport sector by 2030 is a prerequisite for achieving the interim target for emissions outside the trading system. Although a sectoral target gives rise to different marginal costs in different sectors, leading to a deterioration in cost-effectiveness, a counter-argument is that a sectoral target can mobilise engagement, innovation and synergies in a sector that would need to rapidly shift to fossil-fuel independence even without that target.

The Government's action plan contains language on the importance of cost-effectiveness, but does not further discuss what this means, other than to highlight the importance of pricing greenhouse gas emissions through general instruments such as a carbon tax and emissions trading. There is also no consistent justification for deviations from the marginal cost principle. The Climate Policy Council believes that such clarifications would be desirable, both to assess whether the policies envisaged are fit for purpose and cost-effective and to better understand the Government's overarching idea of how to achieve the net-zero emissions target.

All in all, the Council believes that the discussion on the cost-effectiveness of climate policy would benefit from more perspectives, greater transparency about what is meant, and a closer connection to the multidimensional reality in which the policy should function in practice. Impact assessments should include developed methods for broadening the analysis of the obstacles and opportunities of the climate transition, as well as an assessment of the overall cost-effectiveness of the policy, and this should also be included in the enhanced impact assessment resource proposed in the above section on target attainment. This work should aim to take into account not only short-term costs, but the dynamic long-term effects and side benefits of greenhouse gas emission reduction measures, which can be significant.²⁸

facts:

COST-EFFECTIVENESS ASSESSMENT

Socio-economic effectiveness means that all of society's resources are used in an optimal way to achieve the greatest possible welfare for the entire population. In order for a political effort to be economically effective, it must be economically viable and cost-effective (the benefits outweigh the costs).

Assessing the socio-economic viability of the action requires that all costs and benefits be evaluated in monetary terms and then weighed against each other. As far as the climate transition is concerned, it is often difficult in practice to evaluate the benefits of one tonne of reduced emissions or a side benefit such as improved health in dollars and cents. Therefore, the more limited measure (socio-economic) of cost-effectiveness is normally analysed. The cost-effectiveness of climate policy interventions is assessed as costs per amount of emission reduction, i.e. the action that can provide some reduction in emissions at the lowest cost. Such a calculation does not provide guidance on how far-reaching the policy should be, but merely indicates the different costs of the alternatives for achieving a specific target. One can note, however, that there are challenges in determining cost-effectiveness in practice as well, since costs are incurred in multiple stages with different stakeholders, are distributed and change over time, and interact with other instruments and other global goals, etc.²⁹

Sometimes the concept of dynamic efficiency is used, which refers to the effects of a particular effort that arise in the second and third stages by, for example, stimulating technology development. Dynamic efficiency normally has to be assessed from a longer-term perspective.³⁰

Time is an essential factor when assessing the effectiveness of a policy. An emission reduction measure that is cost-effective in the short term could entail a lock-in to a particular technology that might not be able to achieve complete fossil-fuel independence. The next step to achieving the target could then require substantial new investments in completely different systems, with an expensive transition. Conversely, a measure that is expensive in the short term can sometimes facilitate cost-effective changes in the longer term. It is thus also important to consider the long-term impacts of various instruments and public interventions. Put another way, the policy needs to be not only cost-effective in the short term, but carefully planned strategically in relation to the long-term goal.³¹ Such trade-offs become critical when the long-term goal is to bring virtually all of society's emissions down to zero.

Stakeholder collaboration

Sweden is a country with a strong tradition of cooperation, a consensus culture and a high level of trust in public institutions. This proves to be a strength when major societal changes are to be implemented. The Government also stresses in its action plan that 'all sectors of society at all levels

(local, regional, national and international) need to contribute to sustainable, fossil-free development’.

The action plan contains a section on local and regional climate actions, with a focus on strengthening municipal and regional mandates and tools for reducing climate impact. This is essentially about involving and mobilising different levels of political decision-makers in the transition. However, the action plan does not highlight any broader interaction with additional stakeholders other than in general terms, except for the Fossil Free Sweden initiative.

Prior to the 2015 Paris Climate Change Conferences, the Government formulated the goal for Sweden to become one of the world’s first fossil-free welfare states and launched the Fossil Free Sweden initiative. The aim was to create a platform for dialogue and collaboration and for different stakeholders to draw attention to their efforts for a fossil-free Sweden. In 2016, a national coordinator and a cabinet were appointed to support the efforts together with Fossil Free Sweden. The Government thus took a definitive step to begin using stakeholder collaboration as a tool for achieving the climate targets.

Fossil Free Sweden today brings together over 400 stakeholders from business, municipalities, regions and other organisations. The most high-profile outcome of the initiative is that 18 industries have so far formulated roadmaps that stake out a path to zero emissions by 2045. These roadmaps contain industry stakeholders’ own commitments as well as identified needs for new or enhanced policy instruments. If the roadmaps are realised, they will make a strong contribution to Sweden’s target of net-zero emissions by 2045. The work on the fossil-free roadmaps was not specified in the Government’s directive to the coordinator – that approach has instead emerged from the ground up.

The measures presented in these roadmaps mainly concern electrification, switching to bioenergy and carbon capture, as well as energy efficiency and the use of new products and materials. According to a review produced on behalf of the Confederation of Swedish Enterprise, these measures combined could reduce industrial greenhouse gas emissions by 13 million tonnes, or 60–80 per cent, by 2045 compared with 2016.³² This corresponds to a quarter of Sweden’s total emissions. In a later assessment, the Swedish Environmental Protection Agency states that businesses’ intentions in the roadmaps could halve industrial emissions by 2045, a slightly more limited potential.²

The task assigned to the Fossil Free Sweden coordinator was extended through the end of 2020, and in conjunction with this, the activities that focused on process and working methods were evaluated.³³ The evaluation found that the initiative has contributed to a greater consensus and engagement among those involved in achieving the 2045 goal of fossil-fuel independence. Several participating organisations express that they see the next step – implementing the plans and actions – as the biggest and most important challenge.

Research and experience highlight a number of key criteria for the success and concrete outcomes of stakeholder collaboration. For one, the stakeholders must trust one another and the process. Other success factors are that all see themselves as partners in the efforts, have the resources and mandate to make commitments and live up to them, and see their own benefit in participating. The collaborative process must also have a clear purpose and leadership, contribute to learning, and provide feedback on the results to participants.^{34–37}

Fossil Free Sweden meets many of these criteria. The coordinator has created a narrative about a fossil-free, competitive business sector, and the stakeholders understand that they can benefit from it when the world shifts in the same direction. The work approach has been instructional. The participants have trusted the coordinator and the project team, and feel that the coordinator offers them a channel to the Government. All in all, the participants have so far perceived that they have benefited from their participation.

In several parts of the action plan, the Government refers to comments or requests that have been highlighted in Fossil Free Sweden's roadmaps. This suggests that the Government has listened to the opinions of the different sectors. However, the Government says nothing about how it wants to use the roadmaps or how the initiative should be developed further. The Government writes briefly that 'Fossil Free Sweden continues to strengthen civic commitment to the transition.' Since the Government has so strongly recognised the Fossil Free Sweden initiative, both in Sweden and abroad, it is surprising that the initiative commands so little attention when the Government describes its work over the next four years.

The Climate Policy Council's assessment is that Fossil Free Sweden's work on industry-specific roadmaps can become an important instrument for the Government in driving the climate transition. The dialogue-based approach has been well suited to industrial sectors with a limited number of players that lacked a clear picture at the outset of how the transition to zero emissions might take shape. Simply continuing the work as before is hardly enough to further 'strengthen civic commitment to the transition'. At the same time, the successful development of the roadmaps has raised the expectations on the Government. The roadmaps thus need to enter a new phase, implementation.

The Council believes that the Government must be clear about how the roadmaps' calls for political reforms and instruments will be addressed, who is responsible, and what participants can expect from the process moving forward. Similarly, it would be reasonable for the Government to demand that the business community live up to its own commitments. Clearer agreements could be drawn up around the roadmaps, including a common regime for periodic and systematic follow-up and revision, similar to national commitments under the Paris Agreement.

Further work on the roadmaps should be more closely linked to the Ministry of Enterprise and Industry's regular procedures for developing economic policy.^m The implementation of the roadmaps in the coming years – from both the Government's and the stakeholders' side – will be crucial to ensuring that Fossil Free Sweden contributes significantly to Sweden's climate transition.

Fossil Free Sweden's work has involved more than just stakeholders from the business sector – but also from municipalities, regions, trade unions and other organisations. However, this work has been less prominent and is not addressed in detail in the action plan.

^m Lessons should be drawn from past experiences with industry agreements, such as the work of the previous Circular Delegation on producer responsibility.

Coordination, organisation and resources

Horizontal coordination among policy areas

One of the aims of the climate policy framework is to integrate climate considerations into all policy areas. To do this, the Government presents some of the action plan's most specific actions. The Climate Policy Council considers this to be one of the plan's strengths.

In particular, the Government is putting forward the following measures for action by Parliament:

- A review of all relevant legislation to ensure the impact of the climate policy framework
- A gradual review of societal objectives to ensure they are compatible with the climate targets
- A regulatory change to ensure that impact assessments are conducted on climate impacts in the policy areas where they are relevant.

There are further initiatives in the action plan that can help to more closely integrate climate change in other policy areas, such as more coordinated building and transport planning.

The Government's work and the governance of their agencies also need to better reflect the climate framework's goal for integrating climate considerations in all policy areas. Today, the responsibility lies with the Minister for the Environment and Climate, despite the fact that the Ministry of the Environment actually oversees very few of the political issues that determine climate impacts. Critical issues fall under the Ministry of Enterprise and Industry, the Ministry of Infrastructure and the Ministry of Finance.

There is much to suggest that Government offices' procedures are not enough to drive the needed transition with sufficient force and speed. Someone needs to lead the efforts, but to promote an integrated approach, a group of selected ministers, for example, can be given special responsibility for implementing the climate policy framework. It is also conceivable that the Prime Minister's Office or the Ministry of Enterprise and Industry gain an expanded role, or a combination of similar changes. Several European governments have designed extraordinary solutions to accelerate the climate transition, as discussed in the fact box below.

A concrete example of the weak coordination between different policy areas is how the Climate policy action plan was prepared. Of all the available public authorities, only the Swedish Environmental Protection Agency was instructed to provide the Government with decision support, even though the plan will apply to how the Government's entire overall policy will achieve the climate targets during a four-year term, with consequences long into the future. Although the Swedish Environmental Protection Agency would 'if necessary' obtain decision support from several specified agencies,¹⁷ there was no broad mandate for different sectoral agencies to create their own initiatives and proposals for achieving the climate targets.

The complex Climate policy action plan has been handled as one of a series of projects in Government agencies, with procedural responsibility assigned to workers in the climate unit of the Environment Ministry. This means that other affected ministries' role is mainly reactive, proving feedback on proposed texts. Ministries representing other policy areas should be given a more proactive role in this process. Inspiration can be drawn from the tightly regulated budgetary process. Compared with the climate policy framework, the fiscal framework and Budget Act have been implemented through a broader and clearer responsibility and stronger governing processes

in Government offices and state agencies. Some lessons should also be learned from the Government's approach to integrating gender equality in all policy areas.⁴⁰

The Climate Policy Council believes that the Government should design a permanent system in which relevant agencies – which can vary over time – are tasked with regularly proposing decisions that help Sweden to reach its climate targets on time, including impact-assessed proposals for the Climate policy action plan.ⁿ

facts:

EXAMPLES OF HOW OTHER GOVERNMENTS ORGANISE CLIMATE EFFORTS

Denmark: In 2019, the Danish government formed a special standing ministerial group for a green transition. The group is headed by the climate and energy minister, and includes ministers for the environment, taxation, agriculture, transport, education and research, and economic affairs. The Prime Minister's closest associates are also involved in the group's work. The Danish government justified the decision like this: 'An ambitious green transition cannot be driven by individual green trade ministries. The group must ensure that green considerations are integrated across different policy areas and contribute to implementing the structural changes in society needed to achieve the government's climate goals.'³⁸

Germany: At the beginning of 2019, the German government was tasked with developing a new climate law and a strategy for reaching climate targets for 2030, with a special climate cabinet created within the government. Chancellor Angela Merkel herself became the formal chair, while the day-to-day tasks are carried out by the Ministry of the Environment together with the Chancellor's Office and the federal environment minister as acting chair. The other members include the ministers of finance, transport, agriculture, economic affairs and the interior, and the spokesperson for the government and the head of Merkel's cabinet.

The Netherlands: For some years now, the Netherlands has had a combined ministry of economic affairs and climate policy. This ministry works to promote a competitive business sector, to create space for innovation, and to increase the share of renewable energy in the country. It integrates economics and climate by building a good foundation for entrepreneurship, taking into account nature and the environment and encouraging cooperation between academia and business.³⁹

Coordination with budgetary policy

For decades to come, the climate transition will require a broad shift in investments away from those that generate emissions to those that help reduce emissions. This applies not only to private investment in new technologies, processes and new business models in many industrial sectors, but to infrastructure for electricity networks and fossil-free transport, for example.

The role of policy in relation to the investment needs of businesses is primarily to promote positive, stable conditions for investment in a fossil-free future. But policy should also promote the technology developments and scale-up that are needed but otherwise do not take place quickly enough. These include putting a price on carbon dioxide emissions and limiting the risks of private investment through predictable long-term policies and support for research, innovation and market

ⁿ This could, for example, be implemented as an amendment in the Ordinance on Climate Reporting (SFS 2014:1434), which is to be revised starting in 2020.

introduction. An important element of the Government's action plan is the explicit ambition to shorten and streamline permitting processes of various kinds so that environmental legislation does not work against itself by delaying investments needed for the climate transition.

As for infrastructure, the state has a greater role and virtually always a clear responsibility as regulator. In several cases, the state is also an owner, a trustee and an investor. This creates a clear link between the climate policy framework and the fiscal framework. The Climate Act also expressly states that 'the work must be conducted in a way that allows for climate and budgetary objectives to interact with each other'.

Sweden has a fiscal framework that includes a surplus target for the public sector, a ceiling on public expenditure, and a balanced budget requirement for municipalities and county councils. This was formulated after the financial crisis in the early 1990s, when Sweden was judged to have a comparatively weak budgetary process relative to other countries. The framework has fulfilled its function well in this respect, and Sweden currently has a low debt ratio and strong public finances.

However, the fact that Sweden and the world will shift to fossil-fuel independence over the course of several decades presents a unique challenge, and the question is whether the application of the climate policy framework, including the Budget Act, might need to be adapted. There are fundamental similarities between the fiscal and climate policy frameworks, in that both aim to avoid creating a huge debt for future generations. From this perspective, it is essential that the fiscal framework does not become an obstacle to necessary climate-related investments. If it does, it risks countering its purpose by effectively deferring a larger debt to future generations, by both increasing the direct costs of climate change and making the problem more expensive to solve.

Vertical coordination between different decision levels

The climate targets adopted in the context of the climate policy framework (see Chapter 1, Figure 1) are defined as interim targets of the environmental quality objective 'Reduced climate impact'. The environmental quality objective aims to stabilise the concentration of greenhouse gases in the atmosphere to a level at which human impact on the climate system does not become dangerous. It also makes a reference to the UN Framework Convention on Climate Change. The objective further states that 'Sweden, together with other countries, has a responsibility to achieve the global sustainable development goal.' All environmental quality objectives include the so-called generational goal, which also considers the global dimension by stating that we are to achieve Sweden's environmental objectives without causing increased environmental and health problems beyond Sweden's borders.⁴¹

The Government's action plan underscores that climate change is a global problem and that Sweden plays an important role in driving the transition through European and international collaboration. This means pushing ahead to increase the ambition level of global climate efforts and to ensure that EU regulations do not hinder Sweden's transition activities. The Government believes that Sweden's greatest opportunity to influence global developments is to show, through action, that it is possible to reconcile fossil-fuel independence with welfare, and that the transition can create a better country to live in. According to the Government, this gives Sweden 'a unique chance to influence global climate action far more than solely by reducing Swedish emissions. Sweden's ability to reduce global emissions consists of impact through action'.⁸ The action plan contains its own chapter detailing the Government's climate work within and outside the EU.

The Council had a dialogue with over 100 stakeholders about the action plan's contents, and several of them argued that the global perspective of the action plan was too weak or unclear. This underscores the need to constantly relate Swedish policy efforts to the global perspective and, as far as possible, coordinate national policy with European policy. At the same time, the global Paris Agreement relies mainly on nationally determined climate commitments that are gradually revised, collected and reconciled with the global goals.

The Government also highlights cooperation between the state and the regional and local levels. In its 2019 report, the Climate Policy Council recommended that the Government strengthen municipal mandates and tools in order to promote fossil-free transport. The Government has also taken decisions in this direction (see Table 6), and the action plan announces a broader review of the mandates and tools that municipalities and regions have at their disposal for reducing climate impact. In addition, the Government wishes to strengthen the environmental and climate perspectives in regional growth policy. We welcome this approach, but on this point, too, the action plan lacks sufficient clarity to allow us to assess what this could mean in practice.

A long-term approach, with learning and flexibility

A main objective of the climate policy framework with its broad political support is to create transparency, a long-term approach and predictability in policy. This, in turn, is important for reducing risks and promoting opportunities for all stakeholders involved.

Even before the framework came into being, an international comparison revealed that Swedish climate policy was characterised by relatively high continuity over time. The Government's Climate policy action plan largely preserves this continuity. It contains no policy ups and downs, and the Government has already anchored the action plan among several parties in Parliament. This continuity is fundamental for all stakeholders involved in Sweden's climate transition, not least for business conditions and competitiveness. From this perspective, it is a problem that the broad agreement on energy policy, which is also essential for the climate transition, has been called into question after only three years. This will lead to increased uncertainty about the potential for investments in fossil-free energy.

At the same time, developments abroad, new knowledge and changing circumstances mean that policies, including on climate change, also need to be flexible in order to achieve the established goals in a sustainable, cost-effective way. This requires continuous follow-up of the policy and a process for how lessons learned from follow-ups and assessments will help the policy evolve and increase target attainment. The sectors that have previously reduced their emissions significantly now have relatively little remaining potential, and emission reductions must accelerate in sectors that have previously remained flat or increased their emissions. This suggests that policy finds itself at a stage where learning, development and initiative are becoming even more vital. More robust follow-up functions (see the section on target attainment earlier in this chapter) can lead to a step-by-step strengthening and calibration of policies while progressing towards the long-term goals that remain firmly rooted.

Acceptance, legitimacy and interaction with other goals

Compared with other countries, Sweden has long been characterised by a high level of trust in public institutions and policies, and among citizens. Our long tradition of broad participation in

associations and civil society has worked to unify us. A culture of consensus and compromise has brought about a society with a high level of trust where people expect to comply with laws and norms.⁴² To this we can add low political corruption.⁴³ This has played a role in the comparatively high trust Swedes have in public and political institutions,⁴⁴ which manifests itself in high voter turnout,⁴⁵ among other things. Thanks to this trust, climate policy has thus far probably enjoyed clear support throughout the population¹⁴ even when, as an international comparison shows, it has been relatively interventionist through the use of measures such as a high carbon tax.

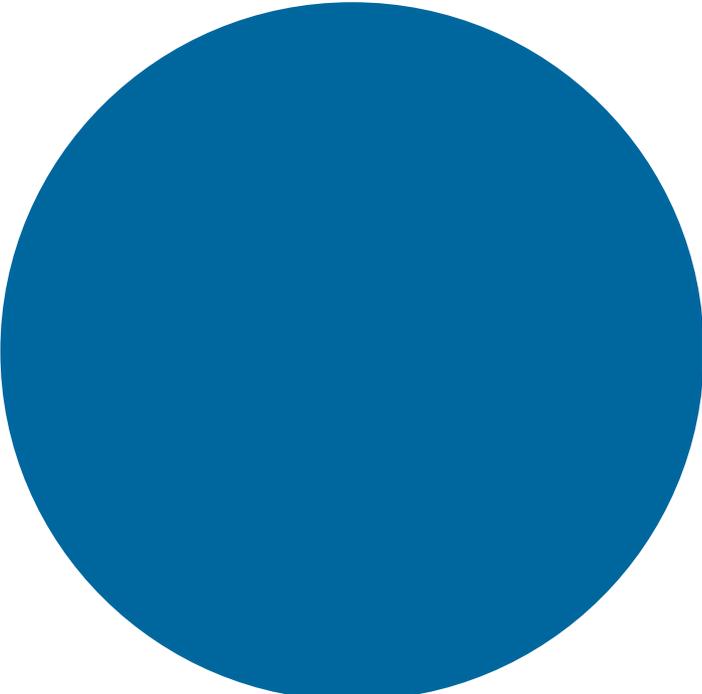
It is not a given that the broad support and acceptance of climate-motivated policy instruments will continue, mainly due to two reasons. First, major changes still need to be made to accelerate emission reductions going forward. Overall, the Swedish economy and Swedish industry can benefit from this transition, but it will lead to economic redistributions that will create winners and losers among companies, cities and citizens. Secondly, there are signs that trust in Swedish society is declining, even though it is still high, according to an international comparison.⁴⁶ The discussion is becoming more polarised, confidence in science is declining, and general faith in the future is weakening. Regardless of the actual state of affairs, there is a risk that perceived inequalities between urban and rural areas, for example, will increase,⁴⁷ as well as the feeling of insecurity.⁴⁸

The main factors influencing citizens' acceptance of a particular policy⁴⁹⁻⁵⁴ are:

- How fair it is perceived to be
- What people's fundamental values are
- How people think they are being affected by or are benefiting from the policy
- The perceived legitimacy of the process resulting in the policy
- How effective the policy is
- Confidence in policy-makers and those proposing the policy

This suggests that in the future the climate transition will place greater demands on government policies to be able to manage both real redistribution concerns and the feeling of threatening changes or perceived injustices. This is true even if climate policy has not yet contributed directly to any such problems or injustices.

The Government writes about acceptance, legitimacy and interaction with other goals in the action plan in similar terms as the Climate Policy Council did in its 2019 report. Among other topics, the Government points to the importance of broad commitment and anchoring throughout society in order to achieve the climate targets. The Government also writes that an inclusive climate policy must take into account the different conditions that are present in urban and rural areas, as well as across different income groups. As a specific example, it highlights increased accessibility, regardless of where one lives in Sweden, as a prerequisite for people's ability to participate in activities. Electrification, increased access to charging infrastructure and renewable fuels are highlighted as important components for the transition of rural areas. However, the action plan lacks a clear vision of society that can create confidence in the future and cohesion or a clear strategy that enables citizens and stakeholders to get involved in the transition to a fossil-free future (see also the section on target attainment earlier in the chapter).



5. Instruments in the climate policy action plan

5. Instruments in the Climate policy action plan

In this chapter, the Climate Policy Council presents its assessment of the actions contained in the Climate policy action plan that concern specific instruments and whether they can be expected to help achieve the climate policy goals. The action plan does not exist in a vacuum, however, but instead builds on the policies in place today. Our assessment thus covers existing policies as well, and we discuss whether, and to what extent, the action plan contributes to bringing Sweden closer to the 2045 target of net-zero emissions. The analysis uses the impact assessment methodology outlined in Chapter 3 and developed in Annex 1.

Steps 1 and 2 of the methodology identify possible emission reduction solutions (new technologies, behavioural changes, etc.) in all sectors and their potential to reduce emissions, as well as the main obstacles currently slowing down development. Next, Step 3 maps out whether instruments exist that address the obstacles slowing down the transition in different sectors. Finally, Step 4 contains an estimate of the proportion of each solution that can be realised by 2045, given current conditions and decided policies.

The impact assessment of the action plan focuses on road transport, industry, agriculture, and the electricity and heat production sectors. Combined, these account for about 80 per cent of greenhouse gas emissions in Sweden. Emissions in these sectors are not decreasing at the necessary rate. Several of the solutions that show potential for reducing emissions require a shift in major investments from technologies and infrastructure that drive emissions, to those that significantly curtail them. This resetting will take time, so it is important that efforts are accelerated. However, other sectors are no less important – all emissions must be reduced to zero.

The dynamics of the transition vary considerably between sectors, which has significance for policy-making. The transformation of the transport sector is an example of a complexity of a huge number of changes, both large and small, that directly affect virtually all companies and the daily lives of people everywhere. The industrial transition is also composed of many different specific solutions, but includes a few major technological shifts that are easier to overview and plan for. Furthermore, it mainly involves a limited number of industrial companies and other professional operators. In both sectors there are known solutions that have the technological potential to reduce emissions to near zero. The agricultural sector differs in this respect because there is a current knowledge gap around solutions that address many of the emissions, though promising development efforts are underway.^{55,56} In addition to sector-specific solutions and obstacles, several cross-sectoral challenges must be addressed.

Government policy needs to be designed in the context of this shifting dynamic. No single instrument exists that can manage all the obstacles – we need a combination of different instruments aimed at specific obstacles as well as broad strategies to address the cross-sectoral challenges.

It is vital for the Government to acknowledge the significance of broad economic instruments as fundamental drivers of the transition. These enable a stable playing field and create clear incentives for cost-effective improvements that can gradually reduce emissions in all sectors. At the same time, the potential increases for other instruments to have the intended effect.^{57,58}

The demand side is also significant, but it is taking too much of a backseat in the Government's action plan. The power and the will to change among millions of stakeholders in households, organisations and small businesses is not being optimally leveraged in the Government's overall policy.

How does the action plan address obstacles to the climate transition in key sectors?

Emissions from road transport

The transport of people and goods accounts for about one-third of Sweden's total greenhouse gas emissions, and more than 90 per cent of these come from road traffic. Passenger cars are the single largest source of emissions, but freight transport by road also generates significant emissions.

Solutions and obstacles^o

For passenger transport, according to Panorama's assessment,¹¹ the two solutions with the greatest potential for zero emissions by 2045 are electrification of the vehicle fleet and a more transport-efficient society through the use of public transit, for example. Together, these solutions represent the vast majority of the long-term emission reduction potential but require changes in demand patterns, standards and values.

In the shorter term leading up to 2030, much evidence suggests that more efficient internal combustion engines and increased volumes of renewable fuels^p together will account for a substantial part of the reduction of greenhouse gas emissions in the transport sector. After 2030, the volumes of renewable fuels should decrease as electric vehicles become increasingly competitive with cars that have internal combustion engines, and efforts to increase transport efficiency can have a greater impact. The actual volumes will depend on the growth of car traffic and the proportion of traffic that is electrified. The various solutions are thus strongly interconnected.

Emissions from road freight transport can be reduced using more or less the same solutions as in passenger transport. Electrification and increased fuel efficiency of vehicles also dominate here, but biofuels are likely to play a significant role in heavy traffic even beyond 2030. The transport efficiency of goods, too, shows potential for improvement through solutions such as smarter traffic planning, the transfer of goods from road to rail and transport by water, and increased fill rates.

Emission statistics separate out industrial machinery, which is used in industry, construction, and agriculture and forestry, among other industries. But when it comes to reducing emissions, the solutions are basically the same as for vehicles in the transport sector. Electrification, increased fuel efficiency of vehicles and renewable fuels will be crucial.

The solutions described above face several different obstacles. There are many, diverse stakeholders who are directly affected – from private individuals and small businesses to municipalities, regions and industrial corporations, as well as the many large and small companies that do the actual transporting. A major obstacle is that today's transport infrastructure, regulations

^o This analysis is based on Steps 1 and 2 of the impact assessment methodology presented in Chapter 3 and Annex 1.

^p This includes different types of biofuels as well as electrofuels, a generic term for synthetic fuels produced from electricity and water by electrolysis into hydrogen and oxygen. By 2030, most of the volumes will consist of biofuels, while electrofuels can be expected to make a greater impact after 2030.

and incentive structures (including existing instruments) are largely built around the car as a means of transport, making it difficult for other solutions to evolve quickly enough. Current urban planning is also hampering the emergence of new transport solutions for both people and goods, with slow emission reductions as a result. The availability of sustainably produced biofuels is a key obstacle, especially considering the 2030 target.

In addition to technical and financial challenges, there are obstacles related to values, norms and behaviours. There is great potential for emission reductions here through a combination of norm and behavioural changes, urban planning and infrastructure. However, it should be pointed out that there are significant differences between urban and rural areas in this respect, with urban areas offering more alternative means of transport, while rural areas must often rely solely on cars. But even in cities, many people clearly prefer their own car as a means of transport. It has proven difficult to scale up solutions aimed at increasing car-sharing. Walking, cycling and public transport are not always perceived as attractive options despite time savings, health benefits and lower costs.

Assessment of current policies and the action plan⁹

Several instruments are currently available that are likely to help realise some of the solutions above. Carbon and energy taxes are key instruments that steer us towards more efficient transport and a reduced share of fossil fuels. At the same time, the reduction obligation has largely taken over the role of the carbon tax as the main driver behind the increased use of renewable fuels. Exemption from the carbon tax remains a crucial policy instrument for clean or highly blended biofuels, such as biogas and E85.

The Climate Policy Council considers that existing policy instruments for the increased use of renewable fuels and more efficient vehicles are relatively strong, due to the reduction obligation and the EU emission requirements for passenger cars. On the other hand, the policy for greater electrification and, above all, for a transport-efficient society is comparatively weak. The majority of the obstacles to road transport are thus addressed in whole or in part by existing instruments, while a few are addressed to a small extent or not at all (see Figure 4).

The Council's 2019 assessment remains: Current instruments are not sufficient to reach the interim target of a 70 per cent reduction in emissions from domestic transport by 2030.

⁹ This analysis is based on Steps 3 and 4 of the impact assessment methodology presented in Chapter 3 and Annex 1.

Transports (15 Mton CO₂-e)

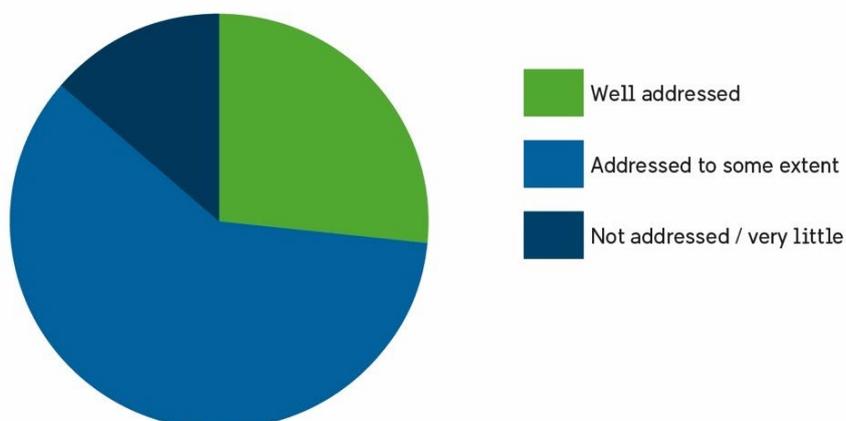


Figure 4 Assessment of how well existing instruments address obstacles to the shift to fossil-free road transport

In the action plan, the Government announces an inquiry to determine in what year fossil fuels should be fully phased out, in line with the Climate Policy Council's recommendation in its 2019 report. Such a decision would address the essence of the problem – fossil fuels – while being technology-neutral and providing clarity and greater predictability for all stakeholders, including private car owners. At an overall level, the Government is taking steps to better align transport policy objectives with climate objectives. If implemented, this would significantly improve the chances of achieving the climate targets (see the section on the action plan's impact later in this chapter).

In its 2019 report, the Climate Policy Council recommended that the Government begin preparing for a reform of road traffic taxation based on increased electrification and the use of autonomous vehicles, while promoting regional fairness. The Government links this issue to the goal of implementing a comprehensive tax reform and green tax, but does not specify concrete steps to start the extensive investigations that will inevitably be needed.

The action plan stresses the need for faster development of both electrification and a more transport-efficient society. The Government notes that there are significant risks in relying too much on large volumes of biofuels to achieve zero emissions in the transport sector. Nevertheless, the most concrete instrument proposal in the action plan relates specifically to biofuels, through a gradual reduction obligation. Without a sharp increase in domestic biofuel production, this will involve a large increase in net imports. This appears to be a risky development at a time when global competition for biofuels is increasing and there is an intensive debate on sustainability requirements and origin labelling. It is also noteworthy that a country with such good biomass resources would be a net importer of biofuels in the long term (see the section on cross-sectoral challenges).

One complication is that the Government has only set the reduction level through biofuel blending in petrol and diesel for one year. After that, there will be only the indicative reduction rate of 40 per cent by 2030.⁵⁹ The risk is that although the reduction obligation, as it stands, drives the continued increased consumption of biofuels, it does not, like the short-term tax exemptions for highly blended biofuels, provide sufficient predictability for stimulating investment in domestic production.

Current forecasts indicate that both supply and demand for rechargeable cars in different price ranges and segments will increase significantly in the coming years.^{60,61} This means that the expansion of charging infrastructure and electricity networks in general must be accelerated to be in line with the greater number of rechargeable cars in the vehicle fleet. In the action plan, the Government announces a review of bonus-malus in order to tighten governance and prevent near-new electric vehicles and other green cars from being quickly exported to other countries once the bonus has been paid out. The plan also includes actions aimed at ramping up the expansion of charging infrastructure, but they are presented at a general level, such as an electrification commission or a remit to different authorities, and lack a precise timetable.

There are solutions that existing instruments do not address at all, or only to a very limited extent, mainly in the category of transport-efficient society. The Climate Policy Council considers that there is significant potential for cost-effective measures in this area, as elaborated in our previous report. The action plan contains several actions for promoting a more transport-efficient society, but they are of a high-level nature and less specific.



RECOMMENDATIONS

Urgently establish a timetable for announced initiatives for a more transport-efficient society and more rapid electrification, as well as for Swedish production of sustainable, renewable fuels, and set aside the necessary resources for implementation.

Immediately start investigating a new road traffic tax, so that the reform can be realised in pace with the rapid changes in the transport system and be included in the comprehensive tax reform referred to by the Government.

Emissions from industry

Industry accounts for about a third of Sweden's emissions, of which iron and steel, minerals, chemical industries and refineries make up the vast majority. Emissions from industry include direct emissions from manufacturing processes, emissions from the use of fossil fuels, and so-called diffuse emissions, which involve various types of leakages. The majority of industry emissions come from a limited number of installations, although many smaller emitters must also be managed in order to reach zero emissions.

Solutions and obstacles

Changing industrial production in Sweden and reducing its greenhouse gas emissions can be done both by reducing and redirecting the emitting production, which leads to structural changes in the economy, and by reducing emissions per unit produced. Within the current industrial structure, the transition involves replacing energy and raw materials based on fossil fuels with electricity and

renewable materials using new technologies and processes, as well as making general efficiency improvements.

A notable example is Hybrit, a project jointly run by LKAB, SSAB and Vattenfall and funded by the Swedish Energy Agency, which aims to develop fossil-free steel production. This solution alone could reduce Sweden's total greenhouse gas emissions by about 10 per cent. This is a great opportunity, but it also involves a significant risk. Unless this solution is realised, there is currently no clear alternative with the equivalent potential. The electrified, chemical recycling of plastics is another example that shows great potential to reduce emissions from the chemical industry and from the incineration of waste.

In some cases, electrification, bio-based alternatives or other technologies do not reduce industrial emissions, and so carbon capture and storage (CCS) provides the remaining solution, unless production in emission-intensive industries simply decreases. Based on today's knowledge, CCS will play a major role mainly in the cement industry, but if solutions such as Hybrit or chemical recycling of plastics are not realised, it might become a necessary solution in several areas of industry. CCS technology imposes an additional cost per unit produced for industry and will not be competitive without subsidies or instruments that set a high-enough price on greenhouse gas emissions.²² The implementation of new production processes with low or no emissions can entail comparatively higher upfront costs, but it can potentially become competitive through continued development and production scale-up without financial support. CCS is also associated with significant uncertainties around the practical and policy possibilities of applying the technology to the extent that would be required to achieve zero emissions in industry.

For Sweden, one encouraging possibility is to use CCS for carbon dioxide from the combustion of biomass, known as BECCS, from sources such as district heating plants and the paper and pulp industry. Since BECCS contributes to negative emissions, this solution is one of the supplementary measures set out in the climate policy framework. BECCS can be used to compensate for other emissions and to achieve long-term negative emissions that can help to reduce carbon dioxide levels in the atmosphere. In the final report of the so-called climate policy pathway inquiry,⁶² the examiner estimates that BECCS has the potential to contribute a significant portion of the supplementary measures both by 2030 and in the longer term, at a cost estimated to be in line with the current carbon tax.

In conclusion, the obstacles to the industrial sector's transition involve the need for new technologies and innovation for replacing energy and materials based on the use of fossil fuels in various industrial processes. Major investments will be needed in new installations and infrastructure, in particular electricity networks, but also in CCS and hydrogen infrastructure, for which funding is currently uncertain. Government permitting processes and the conditions for making the necessary investments pose a particular challenge that is often highlighted by industry representatives. In the case of inputs, the potential obstacles are mainly safe access to large quantities of electricity at the right times and access to biomass. This is explored in the section on cross-sectoral challenges.

Assessment of current policies and action plan

Existing instruments in industry are mainly the EU Emissions Trading Scheme (EU ETS) and the energy and carbon taxes for the industrial sectors outside the EU ETS, called the non-trading sectors. Non-trading sectors are also affected by several less targeted instruments, such as Energistegat (The Energy Step), energy mapping and energy-efficiency networks.

The EU ETS and the energy and carbon taxes create a basic economic incentive for the transition, but are currently too weak to build momentum fast enough for the investments needed to achieve net-zero emissions. Our analysis thus shows that a large share of industry emissions are addressed by existing instruments to some extent, but that none of the key solutions that can reduce industry emissions to zero are addressed adequately (see Figure 5).

Industry (13 Mton CO₂-e)

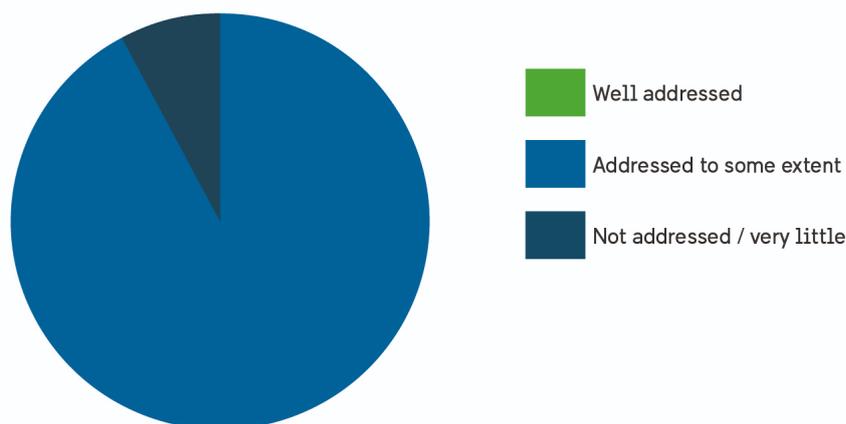


Figure 5 Assessment of how well existing instruments address obstacles to the transition of industry

For those solutions that require more profound changes, the EU ETS and the Swedish carbon tax must be supplemented by other targeted instruments that address the obstacles to investment in infrastructure (power grids, etc.) and new installations, as well as support innovation and technology development. In order to enable these large-scale investments, policies influencing the costs and revenues of industrial enterprises must be sufficiently long-term and robust.

A number of instruments are currently in place, as well as a few new initiatives in the action plan. Industriklivet (the ‘Industry Leap’) is an investment initiative for supporting industry’s transition to zero emissions through advances in technology. The Government has stepped up funding for the Industry Leap over the next few years and is announcing further efforts in the action plan to facilitate industry’s climate transition, such as a review of the Environmental Code, more effective environmental testing for some investments, a continuation of the strategic collaboration programmes, and a continuation of Fossil Free Sweden. However, there is no clear link between these different initiatives, and it is also unclear how the Government views its role in relation to the roadmaps for fossil-free competitiveness launched by the industrial sectors (see Chapter 4). This makes it difficult to assess the extent to which the action plan addresses important obstacles and thus promotes governance to achieve zero emissions in industry.

Stronger policy instruments are likely to be needed to compensate for the increased operating costs of industrial companies and contribute to technology development and transformative innovation on a large scale, including fossil-free industrial processes. BECCS is likely to be needed as one of

the tools to achieve negative emissions and for supplementary measures. Emissions trading or carbon taxation can provide a basic economic incentive for CCS that captures carbon from fossil-fuel processes, but not for BECCS. Therefore, well-developed instruments are needed to support BECCS, which is also proposed by the climate policy pathway inquiry.

There is a risk that policy for the industrial transition will focus too much on existing industry and underestimate the potential of, and not sufficiently support, dynamic industrial transformation. Experience shows that both demand and production structures are shifting in modern societies. This will certainly be the case in Sweden between 2020 and 2045. This will offer great opportunities in the transition which the action plan does not fully leverage. Policy should focus on steering this structural change as far as possible towards reduced emission-intensive production and the promotion of fossil-free production of goods and services. The action plan is largely based on existing business structures and demand patterns.



RECOMMENDATIONS

Prioritise continued public investments in fossil-free, competitive industrial processes that can reduce industrial greenhouse gas emissions.

Clarify how conditions and incentives should be created for the implementation and scaling up of carbon capture and storage, which, according to the current state of knowledge, seems to be needed for certain emissions and for reaching negative emissions (BECCS).

Emissions from agriculture

Agriculture accounts for about 13 per cent of Sweden's total greenhouse gas emissions. Emission sources include methane from animal digestion, methane and nitrous oxide from manure, as well as nitrous oxide and carbon dioxide from agricultural land. Fossil fuels are also used in agriculture, but emissions from these fuels are reported under machinery in the emissions statistics.

Solutions and obstacles

Agriculture stands out among the sectors mainly due to the limited knowledge about concrete solutions that can eliminate the sector's greenhouse gas emissions. The Climate Policy Council's analysis is based on potential assessments in Panorama and indicates that roughly two-thirds of existing agricultural emissions will remain in 2045, given current conditions and announced policies.

Based on the survey used for the analysis in this report (see Annex 1 for a more detailed description of the method), the solutions currently available mainly involve increasing the efficiency of cultivation and developing new types of manure, plants and feed that can reduce emissions from both the soil and animal digestion. Another possibility is to change the production mix in agriculture, replacing beef production in particular with chicken, fish or increased plant production. However, the net impact on global greenhouse gas emissions depends on whether consumption patterns change in parallel.

Along with limited knowledge about ways to reduce emissions, the main obstacle to a transition in agriculture is not knowing how much costs could increase due to new production methods. Small

margins in the production supply chain prevent the emergence of possible solutions and, in other cases, significantly delay developments. Key barriers to developing and streamlining plant breeding and cultivation systems include regulations and government procedures, as well as major investment needs in new plants and systems. In addition, people's habits and norms present obstacles in both the production and the consumer supply chain. Established structures and relationships between stakeholders can make it difficult for new farming practices and new products to take hold in the market.

Assessment of current policies and action plan

Because there is not enough knowledge about solutions that address a large share of agricultural emissions, other types of instruments are also needed, in particular ones that generate new knowledge and innovation and that can also impact demand from households and businesses.

Our analysis shows that existing instruments do not adequately address important obstacles to the transition for known solutions (see Figure 6). At present, there are few or no policy instruments in place that are expected to have a significant effect on emissions by 2045. While some instruments do exist, such as investment aid under the rural development programme, the advisory service Focus on nutrients, and Support for biogas production, they do not meet the challenge facing agriculture.

Agriculture (6 Mton CO₂-e)

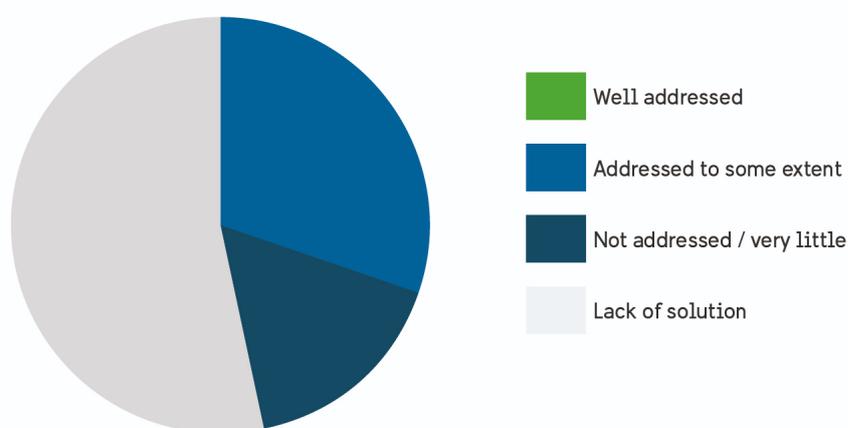


Figure 6 Assessment of how well current instruments address obstacles to the transition of agriculture

The action plan contains only three proposals aimed at contributing to the transition of agriculture. One is to develop the national plan that the EU already requires of Sweden for implementing the Common Agricultural Policy, and another is to continue efforts to reduce methane leakage from manure management. The third is the only real news: the Government has set up an inquiry on measures and instruments for 'fossil-independent' agriculture.⁶³ Yet the Government seems to be more defensive here than the sector itself. The Federation of Swedish Farmers has recently

adopted a sustainability programme that aims to phase out fossil fuels from agricultural value chains by 2035.⁵⁶ It is also unfortunate that the Government recently extended the reductions in carbon and energy taxes specifically applicable to agricultural and forestry machinery.⁶⁴

The primary emissions from agriculture in Sweden are not of fossil origin, but from biological processes in animal husbandry and agricultural land use. What this means is that the focus of the inquiry does not cover the substantial and difficult emission reductions that need to be made in greenhouse gases that are not due to fossil fuel use. Other stakeholders have recently presented reports focusing on the broader perspective of reducing total agricultural greenhouse gas emissions.^{55,65} Overall, the Council considers that the action plan does not have a significant impact on the obstacles to substantial emission reductions currently in place within agriculture.

It is worth pointing out that the action plan also contains proposals for increased carbon storage and reduced greenhouse gas emissions from organogenic soils. These are reported as forestry activities, but are also significant for agriculture. However, the emissions addressed by the proposals are accounted for in the sector known in climate reporting as LULUCF (land use, land-use change and forestry).

The Climate Policy Council already noted in last year's report that we lack knowledge about solutions that can adequately reduce greenhouse gas emissions from agriculture, and that supplementary measures are therefore likely to be needed in order to compensate for these emissions. Nevertheless, the aim should be to reduce agriculture's own climate impact as well.



RECOMMENDATIONS

Do not stop at the goal of 'fossil-independent' agriculture, but devise a plan to fully phase out fossil fuels and substantially reduce other greenhouse gas emissions from agriculture.

Emissions from electricity and heating

Emissions from electricity and district heating production account for about 8 per cent of greenhouse gas emissions in Sweden. Together with emissions from individual heating of homes and premises, electricity production and heating together account for 11 per cent of Sweden's emissions. This is a very small percentage compared with most other developed nations. Electricity generation and heating account for more than half of all greenhouse gas emissions for the EU as a whole.⁶⁶

Solutions and obstacles

Although district heating production has increased by around 50 per cent since 1990, emissions have decreased. This is due to a shift from the burning of fossil fuels (coal, natural gas and especially oil) to mainly biofuels, but also industrial waste heat and waste. At the same time, greenhouse gas emissions from individual properties have decreased significantly due to a shift from oil-fired boilers to district heating or heat pumps. For a long time, Swedish electricity production has been using a very small percentage of fossil fuels, since the biggest sources of

production are hydropower and nuclear power. In addition, there is a rapidly growing share of wind power and cogeneration that is mainly bio-based.

To achieve zero emissions in this sector, the remaining fossil fuels need to be phased out. This also applies to fossil-fuel-based waste, which largely consists of plastics, in combined heat and power (CHP) plants. Waste incineration currently accounts for almost half of greenhouse gas emissions from electricity and district heating production. However, it requires upstream efforts in the value chain, such as an increased use of bio-based raw materials and recycling of plastics, including chemical recycling. Today's chemical recycling solutions are not commercially mature, and high costs represent a tough obstacle. Technology must be developed and scaled up, and infrastructure and mechanisms for managing and collecting plastics must be developed and improved. Furthermore, some emissions cannot be managed through a reduced use of fossil-fuel-based plastics or circular material flows. With existing knowledge, CCS remains the choice for removing them in connection with the incineration of waste.

Fossil-free electricity and district heating are important enablers for the climate transition and link together several other sectors. Electricity can replace fossil fuels in transport and industry, for example, while district heating networks make it possible to use cogeneration and leverage waste-to-energy of various kinds.

Assessment of current policies and action plan

The current carbon and energy taxes will, by all accounts, be sufficient to phase out the last fossil fuels from the district heating of homes and premises. Together with the emissions trading scheme, they are also likely to be sufficient to fully phase out coal, oil and fossil-fuel gas from electricity and district heating production in favour of commonly known renewable alternatives. The tax increase on fossil fuels in CHP plants that came into force in 2019 will help accelerate this phase-out.⁶⁷ The obstacles to the transition are thus addressed adequately by existing instruments (Figure 7). This is not the case with fossil-fuel-based waste, which is a disposal problem. Waste landfilling is currently banned, so from this perspective it is good to be able to use the energy from waste incineration via a district heating network. However, these emissions also need to be phased out.

Electricity & heating (6 Mton CO₂-e)

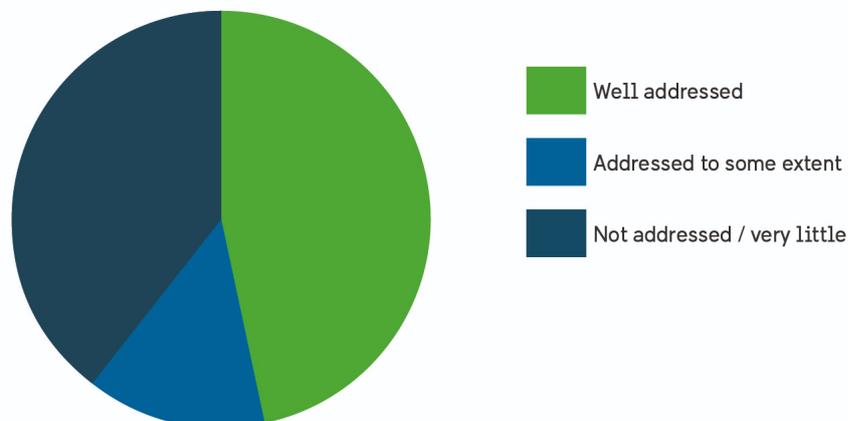


Figure 7 Assessment of how well existing instruments and the action plan address obstacles to the transition of electricity and heating production

The amount of plastic in society and in the waste that is incinerated continues to increase.⁶⁸ Existing policy instruments, particularly information and producer responsibility for packaging, are not creating the shift needed to reduce emissions. The recently reintroduced waste incineration tax is intended to create stronger incentives to phase out fossil-fuel waste, but the amount of such waste is something over which energy companies have limited control. Two public inquiries^{69,70} have found that the tax does not encourage attainment of the targets that justified its introduction, and the Swedish Environmental Protection Agency assessed in its decision support that the waste incineration tax has no effect on greenhouse gas emissions.¹⁶ There is no instrument for managing the transition obstacles for these emissions (Figure 7).

The action plan announces the development of a circular economy strategy with a view to increasing recycling and reducing fossil waste in general. It also announces an inquiry into increased taxes and bans on certain plastic items, and that existing funding for industry's climate transition can be used to help establish a waste plastic refinery. It is difficult to assess the impact of these interventions as long as they are not further specified.

Cross-sectoral challenges

The sector-based obstacle analysis shows that many challenges and conditions for the climate transition span several sectors.

For the global climate transition as a whole, it is necessary to increase resource efficiency throughout society and create a more circular economy.^{2, 71-73} By streamlining the use of energy and materials, the transition becomes less challenging, and larger emission reductions are possible in the near term.⁷² Development pathways that focus on a more efficient use of natural resources also

tend to have greater positive synergies with other societal goals, while reducing costs to society, than in other scenarios with a higher energy and resource use.^{2,74}

A more efficient use of resources takes place in an interaction between demand and production. The development of production methods, goods, services and business models is influenced by technology developments and by economic and policy instruments. It is also affected by changes in demand from millions of consumers and businesses, as is already happening with demand for things such as food, travel, clothing, materials and shared services. The large number of stakeholders represents a huge potential force for change, and if this force is not leveraged, Sweden's ambitious climate targets are hardly achievable. It is thus crucial that government policies provide maximum support for climate-positive actions by all stakeholders. This is something that they are not getting today. The Climate Policy Council welcomes actions in the action plan such as an announced circular economy strategy, increased impact of the climate policy framework in public procurement, and a tax credit for rental, secondhand and repair services. Nevertheless, we believe that these perspectives have not been given sufficient weight in the Government's action plan.

Measures for less fossil-fuel-intensive consumption and a more efficient, circular use of inputs and products do not always result in reduced territorial emissions within Sweden's borders. However, they can make a major contribution to reducing the total emissions tied to the Swedish economy and facilitate target attainment by reducing the need for other, costlier solutions. A clear example of the latter is actions that contribute to a transport-efficient society, thus reducing the volume of renewable fuels needed to achieve the climate targets. Increased resource efficiency in the construction sector can reduce the need for concrete and thus reduce emissions from cement production, even if the emission reduction does not necessarily occur in Swedish production plants.

Increased resource efficiency can contribute in several ways to reducing global climate impact. This can be done through direct emission-reducing effects, but also by innovating resource-efficient technologies and circular business models that can be exported and disseminated in global markets.

Another cross-sectoral issue is creating the conditions for the necessary investments in our fossil-fuel-free future. This can involve higher investment volumes for society as a whole, but first we need big capital flows in order to shift in a sustainable direction. Political challenges include changing the framework for the financial sector, limiting the risks of industrial investment in fossil-free alternatives, and reforming the regulatory framework for the state's own procurement and investments (see Chapter 4).



RECOMMENDATION

Develop policies to stimulate and support the demand from households, businesses and the public sector for zero-emission, more resource-efficient goods and services across all sectors.

The rest of this section addresses three more specific cross-sectoral challenges: electrification, biomass and permitting processes.

Electrification

Increasing the use of fossil-fuel-free electricity to replace fossil fuels is an important opportunity to reduce greenhouse gas emissions in industry, heat production and transport. Sweden has political consensus that it will have fossil-fuel-free electricity production, and the share of renewable electricity is now growing rapidly, mainly due to the high pace of development of wind power. Solar electricity is also growing rapidly, but from a low level.

The expansion of renewable electricity no longer depends on subsidies, and will result in electricity prices that are often lower than the price of fossil fuels. With the Swedish carbon tax, this applies not only to oil and gas, but also to coal. This provides opportunities to increase the use of electricity to replace fossil fuels and to produce hydrogen and other so-called electrofuels. Hydrogen can enable fossil-fuel-free steel production, or be used as a zero-emissions fuel in the transport sector or for small-scale cogeneration. Hydrogen thus has the potential to integrate the electricity, transport, industrial and heating sectors and replace many different fossil fuels. The production of electrofuels also provides opportunities to leverage variations in the production of electricity from wind power and thus balance the electricity system.

The direct use of electricity to replace fossil fuels requires the development and enhancement of power grids in order to deliver the right power at the right time to meet demand from transport and industry. In places where new industrial plants with a high demand for electricity will be established, the need for more robust power grids will be especially great, as well as in cities and along important transport routes where increased electrification of the vehicle fleet generates increased demand for electricity at specific times of the day.

An electricity system dominated by more decentralised, renewable production that cannot be planned in full imposes different requirements on the system than the current structure, which is centralised and hierarchical.⁷⁵ Variable costs are expected to decrease, while infrastructure costs will be higher, at least during the transition. The variability of production will also be higher, and electricity will be used in different ways than today. If the cost of fossil-fuel-free electricity production continues to fall, alternatives to fossil fuels will be able to increase, and the production and consumption of electricity will grow. This will justify significant investment in the power grids within the country and in connections to neighbouring countries. Such investments are taking place today but will need to increase even before 2030.

The power grid balance in Sweden is strong. Net exports of electricity in 2019 totalled 26 TWh, or 19 per cent of total electricity use, an increase of 50 per cent over 2018.⁷⁶ Therefore, a substantial expansion of production capacity will not be required for the next decade. In the period following 2030, however, investments in new production capacity will be needed to replace existing wind turbines and nuclear reactors that will have reached their estimated lifespan. This applies to plants equivalent to nearly 100 TWh that will need to be replaced at the same time as electricity use is expected to increase from approximately 140 TWh today to roughly 190 TWh by 2045.^{77,78}

The Climate Policy Council welcomes the Government's announcement in the action plan of several proposals aimed at accelerating electrification and a cohesive electrification commission. As soon as possible, proposals must be urgently converted into concrete decisions that create clarity and drive the transition in a sustainable direction.

Biomass

Replacing fossil fuels and materials with bio-based alternatives provides an opportunity for several sectors to significantly reduce emissions, in particular the transport sector and industry. This development is expected to lead to a large increase in demand for bio-based fuels. A compilation of the roadmaps for fossil-free competitiveness indicates that if all measures are implemented for replacing fossil fuels with bioenergy, demand for bioenergy would increase by 75 TWh. This represents an increase of about 50 per cent by 2045 compared with today's use of 143 TWh. This increase is split into 23 TWh for industry and 52 TWh for transport, of which road transport is estimated to account for 34 TWh.³²

The demand for bioenergy will, of course, change in many other ways over such a long period of time. For example, the use of bioenergy for district heating production might be reduced through more efficient systems and a warmer climate. Global demand will likely increase, and more cross-border bioenergy markets will be created.

The vast majority of bioenergy used in Sweden comes from forestry byproducts. In addition to energy purposes, forest biomass can be used to replace materials and chemicals currently produced from fossil-based raw materials, or to replace concrete as a building material. This type of demand for biomass is also expected to rise in the future. At the same time, Swedish forests represent a large carbon sink, so their management and care are critical for other values, such as biodiversity.

The situation in the transport sector is special because it relies heavily on imported biofuels. In Sweden, about 20 TWh of biofuels are currently used per year, of which about 85 per cent are imported. By 2030 a significant proportion of cars will still be powered by internal combustion engines, even if the electrification rate is high. If the volume of traffic continues to increase according to current forecasts, the Swedish Energy Agency estimates that we will need twice as much biofuel as today, roughly 40 TWh, to achieve the target of a 70 per cent reduction in emissions from the transport sector by 2030.^{59,79} Estimates of the potential for domestic production of sustainable biofuels suggest that it could increase from today's approximately 3 TWh to the equivalent of 10–30 TWh by 2030.^{10,80}

In the period leading up to 2030, not only Sweden will increase its use of biofuels, but also the rest of the EU. If the EU is to reach the common target of 14 per cent renewable fuels in the transport sector by 2030, biofuels on the order of 300 TWh will be needed.^{59,79} If Sweden's use increases to over 40 TWh, we would therefore account for more than one-tenth of the entire EU's total use. Rising demand from large countries and between sectors is likely to limit supply in practice and increase the price of sustainably produced biofuels.

There are thus both economic and sustainability risks in building the transport sector's climate transition on such large volumes of biofuels (see also the section above on transport emissions).

In the longer term, the use of biofuels for passenger cars is likely to decrease, as electrification becomes more and more widespread. This may make biofuels useful for sectors that lack other solutions or struggle to implement them. For example, biofuels could replace fossil fuels for heavy goods transport by road, air and sea.

All in all, questions about the use of sustainable biomass and strategic choices regarding the Swedish forest are important for Sweden's climate transition. In the action plan, the Government announces its intention to develop a bioeconomy strategy together with the green industries. The strategy intends to promote increased access to biomass and employment throughout the country

and create environmental and climate benefits. The Climate Policy Council welcomes this, but notes that the Government Statement of 2017 already announced the development of a strategy for the transition to a circular bio-based economy. The Government urgently needs to flesh out in detail what the bioeconomy strategy should contain and when work on it should be initiated.

Permitting processes

Many industries and individual companies, as well as municipalities, regions and other public-sector stakeholders, are facing investment decisions that will determine whether or not we achieve the climate targets. Resources will need to be redirected from investments that drive greenhouse gas emissions to those that reduce them. This ranges from fossil-free steel solutions to new infrastructure for a transport-efficient society and increased domestic production of sustainable biofuels.

Policies need to create the best possible conditions for sustainable investment to fall into place. One obstacle identified in the Council's analysis and in other contexts is that regulations and permitting processes around key investments are often time-consuming and unpredictable.^{15,81} A clear example is the permitting procedure for new power grid concessions, which, including appeals, take several years from the time a power company files an application. Market players point out that, in many cases, the current regime gives rise to unnecessary duplicate procedures, and the installation of electricity generation units or energy-using businesses must wait for a grid concession decision when all other licences are already in place.[†]

As described above, strengthening the power grids in some areas is crucial for both business development and the climate transition, but it risks taking too long. This predicament has been understood before. The so-called grid concession inquiry was established by the Government in 2018 to propose 'legislative changes that modernise, simplify and improve the power grid's regulatory framework'.⁸² In its final report, the inquiry presented a number of proposed changes to the regulatory framework on power grid concessions.⁸³ However, the proposals have been criticised for not resulting in a faster permitting process; on the contrary, parts of the process are expected to take longer, and the process become more complicated.[§]

In the action plan, the Government announces a new inquiry for achieving a more efficient and appropriate environmental review that enables critical investments and a faster transition to fossil-fuel independence. The government inquiry established to review relevant legislation for achieving Sweden's climate goals may also have an impact in this context. This applies to permitting processes under the Environmental Code. The Government notes in the committee terms of reference that businesses which contribute to achieving climate targets, but which have local environmental impacts, now find it difficult to get credit for the benefits they create.⁸⁴

The Climate Policy Council welcomes these inquiries and wishes to emphasise that they must bring about concrete changes in regulations and processes, so that these do not become an obstacle to key investments that enable the climate transition.

[†] Based on interviews with power grid and industry stakeholders.

[§] See specific opinions from the inquiry's experts Helene Mårtensson, Bengt Johansson and Ronald Liljegren, as well as Björn Galant.

The possible impact of the action plan in the short and the long term

In order to evaluate the Government's Climate policy action plan, the Council has assessed in this report how it addresses a number of overarching criteria for impactful policy as well as the extent to which the plan tackles critical obstacles in the major emissions sectors. These qualitative analyses give a picture of how the action plan can contribute to achieving the climate targets. However, they cannot provide a quantitative measure of the impact of the action plan on emission trends.

This section complements the Council's qualitative assessment with two different quantitative analyses of the impact of the action plan on greenhouse gas emissions in Sweden:

- An assessment of the action plan's short-term potential. This takes into account only those actions which are adequately described in concrete terms for calculating the impact and which can be expected to have an impact in the years covered by the action plan (through 2023).
- An assessment of the action plan's long-term potential. Here, the time perspective spans the entire period up to 2045. This assessment is based on the assumptions that the plan's ambitions are fully realised, including optimal interaction with other stakeholders, and that all actions will be implemented relatively quickly in an effective manner.

The action plan's short-term potential

In the action plan, the Government points out that 'if Sweden is to effectively limit global warming to 1.5 degrees and provide solutions for others to make the transition, the emission curve needs to tilt steeply downwards in the near future'. Against this background it is surprising that, according to the Council's assessment, of all the points in the action plan, very few can provide significant additional emission reductions in the plan's four years, compared with policies already announced. The reduction obligation for fuel provides by far the largest additional effect in the near future. This is not included in the action plan, although the plan states that 'successive increases in quota levels should be tightened for the period post-2020'. Assuming that this means that the reduction levels will follow the pathway proposed by the Swedish Energy Agency,⁵⁹ it will provide emission reductions of about 1 million tonnes during the last year of the action plan (2023).[†] Together with other initiatives concerning issues such as green vehicles, the action plan can be expected to help reduce transport sector emissions by about 1–1.5 million tonnes by 2023 relative to future developments without the action plan. This corresponds to 2–3 per cent of Sweden's total greenhouse gas emissions today.

In other sectors, there are no proposals for new or strengthened instruments that can make a significant impact on emission trends in the short term. The announced inquiries into enhanced or new instruments can be expected to take effect only after this electoral period.

The action plan's long-term potential

Many of the measures needed to reduce emissions to zero take a long time to implement. Political decisions must be taken now to prepare for important changes, even if they do not affect emissions until much later. The action plan contains several such efforts. Some are comparatively specific policy initiatives that must be investigated or mandated to public authorities. Other efforts

[†] Own estimate based on the Swedish Energy Agency's supplement to the 2019 control station for the reduction obligation⁵⁹ and the Swedish Environmental Protection Agency's decision support for the Government's Climate Policy Action Plan.¹⁶

involve developing broader strategies of various kinds. The content of the efforts and their leadership will be decisive to the outcome of such efforts, as will a timetable for implementing concrete measures.

To assess the long-term potential of the action plan, the Council has used the fourth step of the analytical methodology described in Chapter 3 and Annex 1, which aims to translate the qualitative assessments of policy instruments into quantitative estimates of the effects on emissions.

The assessment is based on assumptions that the plan's goals will be fully realised, including optimal interaction with other stakeholders, and that all efforts will be implemented relatively quickly in an effective manner. This is therefore not a forecast, but an estimate of the magnitude of the action plan's possible impact on emission trends if the measures envisaged can be fully implemented. The analytical method is still under development, so the results presented here should be considered preliminary.

Figure 8 summarises the Council's assessment of the impact of both the current policy and the additional policies in the action plan. Sweden's total emissions in 2018 were close to 52 million tonnes of carbon dioxide equivalent. The Council's impact assessment covers approximately 80 per cent of these emissions. The time perspective spans the entire period up until 2045.

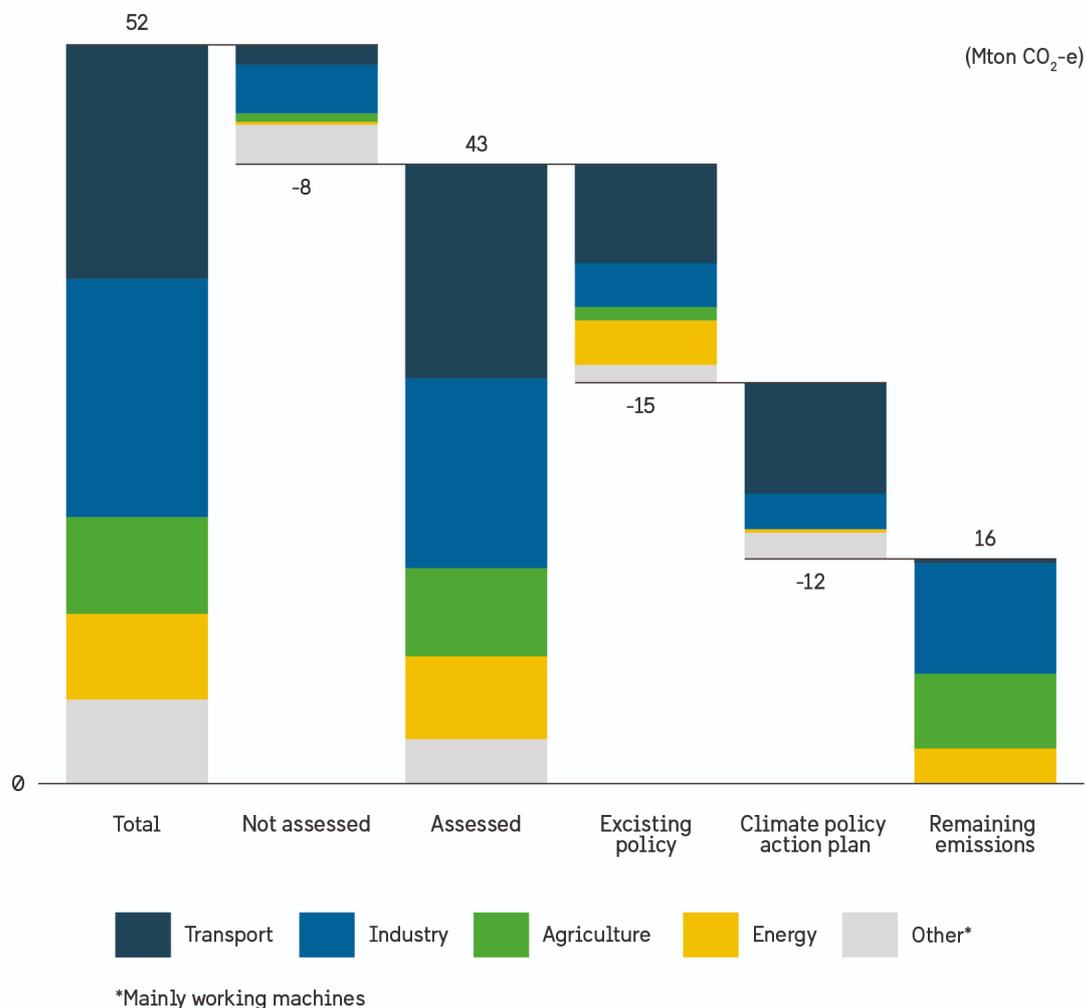


Figure 8 If all the proposals from the action plan are implemented, the long-term impact on greenhouse gas emissions could be significant, but not enough to achieve the long-term goal.

Established policy

The instruments that are already available could reduce emissions in the analysed sectors by about a third by 2045. This is based on the assumption that the reduction obligation for fuels will be gradually increased in line with the Swedish Energy Agency's proposal,^{59,79} which provides relatively large emission reductions from road transport by 2030. In the post-2030 period, emission reductions in the transport sector are mainly due to the increasing impact of electrification, while the overall volume of liquid fuels is reduced. Electrification is expected to be driven largely by commercial operators. Emissions from machinery are expected to follow a similar trend.

Even with existing policies, in particular the carbon tax and energy tax, the remaining fossil fuels for heating and electricity generation are expected to be phased out by 2045. Emission reductions in industry are limited, and agriculture remains at roughly today's level of emissions.

Additional effect of the Government's action plan

The estimated additional effect of the Government's Climate policy action plan is that emissions in the sectors analysed can be additionally reduced by nearly a third by 2045 if all actions are implemented effectively.

The largest additional emission reductions resulting from the action plan are in transport and industry. In the transport sector, we assume that the announced fossil fuel phase-out for domestic transport and machinery will take place well in advance of 2045. For this happen in practice, efforts for a more transport-efficient society must help to limit the expansion of road traffic, and electrification and sustainably produced fuels must achieve a significant impact even prior to 2030.

If the action plan's various strategies and instruments relevant to industry have the intended effect, we estimate that industry emissions would be roughly halved.^u On the other hand, the action plan is judged to have no significant effect on emissions from the agricultural sector,^v nor is it expected to contain sufficient measures to significantly reduce the amount of fossil-fuel waste used for incineration.

In conclusion, the Council's assessment is that roughly a third of emissions will remain in 2045 in the sectors included in the analysis, given the announced policies and the implementation of the action plan's proposals. Of the remaining emissions, about half are estimated to have known technical solutions for creating incentives to reduce emissions to zero with stronger instruments. The other half are emissions that require new technologies or changes in values and behaviours. This part of emissions is unlikely to be eliminated until the post-2030 period, or can be compensated by supplementary measures. This applies to emissions in the agricultural sector, among other areas.

If the overall impact of current policy plus the action plan were to be of the same magnitude for the emissions not included in the analysis, slightly more than 20 million tonnes of CO₂e will remain by 2045. To achieve the net-zero emissions target with a maximum utilisation of accompanying measures, emissions must not exceed 11 million tonnes. Thus, even with an optimal outcome for the action plan, an emissions gap of 10–20 million tonnes would remain, depending on the number of supplementary measures implemented.

^u This corresponds to approximately the same emission reduction result that the Swedish Environmental Protection Agency estimates if all the intentions in the industry's fossil-free competitiveness roadmaps are realised.¹⁶

^v The points relating to the agricultural sector in the action plan mainly address fuels and agricultural machinery, which are reported under the category of machinery and not agriculture in the emission statistics as well as in this analysis.

Glossary

Agenda 2030: 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 through zero emissions or when greenhouse gas emissions and greenhouse gas uptake are equal.

COP: Conference of the Parties. Regularly scheduled conferences where representatives of the Parties to the UNFCCC meet and take decisions.

Direct climate policy: Policies which, in whole or in part, have a stated aim to reduce society's climate impact.

E85: Motor fuel consisting of about 85 per cent ethanol and 15 per cent petrol in summer and 75 per cent ethanol and 25 per cent petrol in winter.

Electrofuels: A generic name for carbon-containing fuels produced using electricity as the main source of energy. The carbon atoms in the fuel come from carbon dioxide captured from sources like the air, the ocean or industrial processes, such as biofuel production.

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

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.

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

Fossil 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 greenhouse gases including carbon dioxide, methane, nitrous oxide and fluorinated gases.

Indirect climate policy: Policies that affect greenhouse gas emissions without emissions being an explicitly stated aim.

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. 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, now ongoing, is 2013–2020.

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.

Montreal Protocol: Part of the Vienna Convention, which has been developed within the UN system, this is an agreement to take measures that reduce emissions of ozone-depleting substances.

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

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

Net-zero emissions: The balancing of greenhouse gas emissions with their removal.

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, the agreement states that global warming should be kept well below 2 degrees Celsius, but preferably limited to 1.5 degrees, 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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Annex 1. Description of the analytical framework for policy evaluation

This annex describes the analytical framework developed and used by the Climate Policy Council in its work on this report. First, it presents the essential aspects of an effective and sustainable climate policy that were used as criteria to assess the Government's *leadership and governance*. Next, it presents the four-step approach used to analyse the impact of the policy's concrete *governance*. The analytical framework is outlined in Figure 1.

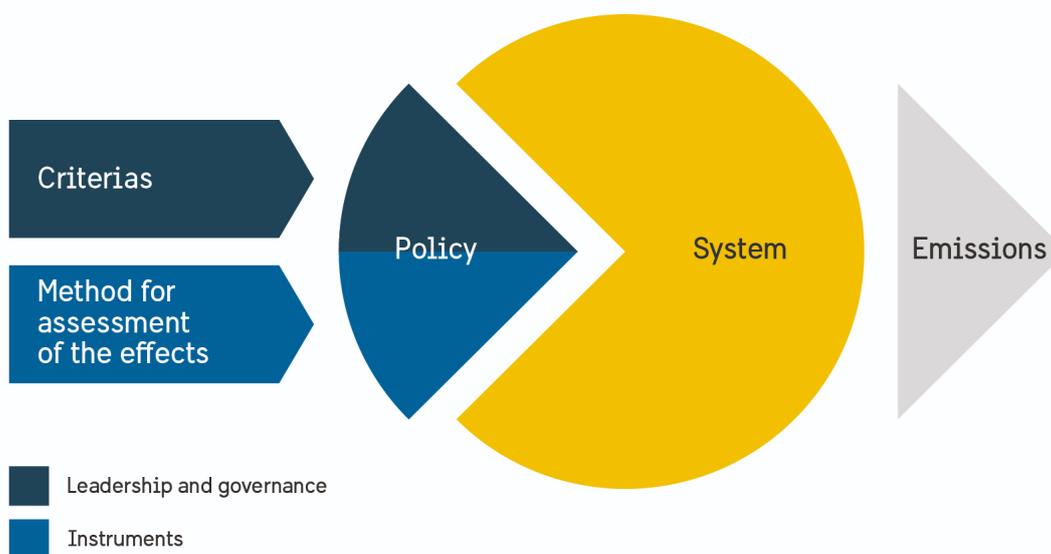


Figure 1 The Climate Policy Council's analytical framework for evaluating the Government's overall policy and Climate policy action plan.

Criteria for assessing leadership and governance

Research in recent decades has increased our understanding of the profound changes in the economy and society that are needed to curb climate change and achieve sustainable development, as well as an understanding of how similar historical transitions have taken place in the past.^{85,86} On the other hand, the research does not yet provide clear answers as to how policies should be designed to drive or direct a radical transformation of this kind.⁸⁷ Furthermore, the climate transition has special conditions and circumstances. To date, at least, it has been driven mainly by policy goals rather than technological and economic developments, and it needs to happen within a relatively short period of just a few decades. Views on the role of policy have evolved as our understanding of human environmental impact has deepened and the climate challenge has become clearer, as illustrated in Figure 2.

A large part of society's climate impact relates to basic needs, such as energy, food and mobility. The functions in society for meeting these needs are systems that have emerged over a long period

of time, in which economic, institutional, cultural and social factors are closely intertwined with the technologies used today. This leads to inertia and self-perpetuating processes that can create lock-ins in the current structure. However, if the systems begin to be disrupted, these processes may just as well become engines of powerful change.^{88–91}

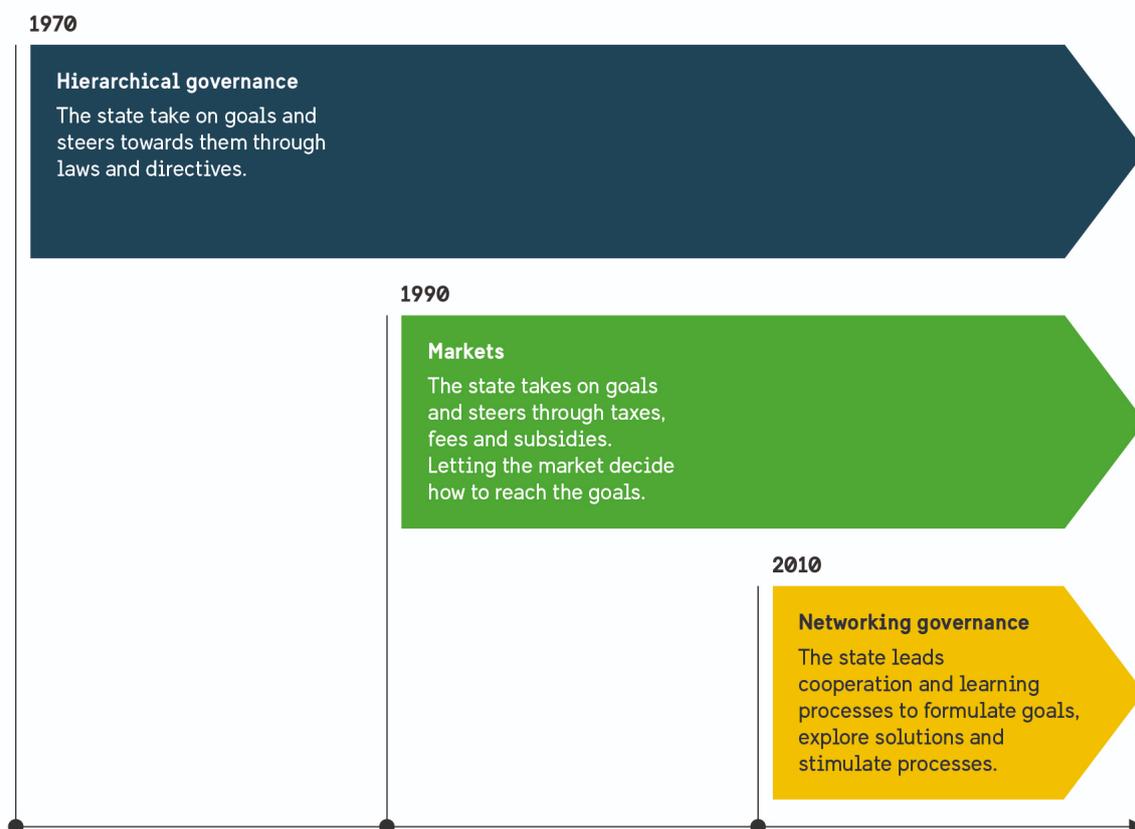


Figure 2 Different governance strategies have emerged and are currently used in combination^{92,93}

In the 1970s, environmental problems were perceived as specific and local, and the focus was on major point sources. At that time, the governance of binding regulations, laws, standards and environmental permits dominated, such as thresholds for emissions of environmental pollutants from individual industrial plants.

The 1990s saw increased insight into the complexity and cross-sectoral nature of environmental problems, and focus shifted to more diffuse emitters such as transport and product use. Such problems are more difficult to solve with central regulation and administrative decisions, so governance becomes less effective. This led to the ambition to integrate environmental considerations into different sectors, including energy, transport and agriculture.⁹⁴ Other mainly market-based instruments were developed, such as taxes, levies, emissions trading and extended producer responsibility. The idea was that market players would have more scope to choose for themselves the most cost-effective way of steering developments towards the environmental objectives set by the policy. It was during this period and in this spirit that climate policy was born, and the way of thinking that took shape still informs the discussion.

Climate policy instruments are often motivated from an economic perspective by so-called market failures, in which the market by itself does not create a socio-economically efficient allocation of resources. The most important market failure is that the cost of greenhouse gas emissions, for example, has no price on the market.^{8,12,16} The carbon tax and emissions trading are intended to include such external environmental costs in the price that companies and households have to pay. This gives market players incentives to reduce emissions themselves, and society's resources are used more efficiently. A price for carbon dioxide is the basis for effective climate policy, but it has proven difficult to implement in practice. Although carbon pricing has increased globally, only about 20 per cent of global emissions are covered by some form of carbon pricing at present. And of that 20 per cent, only 5 per cent is covered by a price at a level equivalent to what would be required to reach the Paris Agreement goals.⁹⁵

Policy-wise, it is therefore difficult to put a price on carbon or a price high enough to drive innovation and investment in climate-friendly technologies. There are also other market failures, such as insufficient incentives to develop new technologies or stakeholders' different access capabilities to information. In addition, individuals and stakeholders do not always take the financially rational decisions on which the dominant economic theory is based.⁹⁶⁻⁹⁹ This means that climate policy needs more types of instruments that can address other market failures but also strengthens the price signal from those instruments that put a price on greenhouse gas emissions. Economic instruments are important but not sufficient. Instead, they need to be complemented and integrated into a policy portfolio that, taken together, can drive the transition in a powerful and sustainable way.^{52,100-103} Furthermore, an effective policy mix must take into account different goals and policies (which can also conflict with each other) both in different sectors of society and at different levels. This is a challenge for decision-makers.¹⁰⁴

During the 21st century, the understanding of society's environmental impact has taken on a global perspective, and there is a growing understanding of the boundaries within which a sustainable economy and society must be developed. The clearest example of this is the change in the entire earth's climate brought about by greenhouse gas emissions. We also have a better understanding of how different environmental problems are interrelated and are linked to other challenges in society. This is reflected in more multidimensional targets, as expressed in the UN's 17 Sustainable Development Goals in Agenda 2030, adopted in 2015.

Complex and systemic challenges place new demands on policy, as does the fact that there is no global political authority able to make binding decisions.^{105,106} There is a growing recognition that there are more critical obstacles to the climate transition than the lack of a price on emissions in the market. Research has highlighted the role of the state in stimulating and facilitating different kinds of stakeholder collaboration, in addition to its role as legislator and regulator. This is also reflected in political practice, from the Paris Agreement at the global level to the EU and the policies of individual countries. The emphasis on collaboration and networks of various kinds is linked to the understanding of the climate transition from a systemic perspective.

The climate transition cannot rest solely on decisions taken from above by the Government and Parliament, nor on implementation by government authorities. Participation and engagement are required from all stakeholders: politics, industry, research organisations, civil society and individual citizens.⁸⁶ However, the Government and its agencies have an important role in offering platforms for collaboration among stakeholders and creating context and coordination among different initiatives, so-called network management. Research suggests that such collaboration has several

positive effects, such as strengthening trust among stakeholders, promoting greater acceptance and legitimacy for policy decisions, and enabling common learning and innovation.

However, initiating, stimulating and orchestrating stakeholder collaboration does not take away from the state its traditional key role of making laws or introducing economic instruments that help operators to make an optimal socio-economic contribution to the climate transition.^{86,87,107–109} Robust instruments, such as legislation, regulations and economic instruments that provide the right market incentives, are still required. Policies for driving the climate transition need to continuously evaluate the most effective mix of government roles as enabling and as governing.^{108,110} There is growing research literature in several different fields – innovation and transition research, policy analysis, environmental economics, evaluation theory, environmental psychology, research on complex adaptive systems, and so on – which highlights important considerations and trade-offs when designing effective policies. From this broad discussion, the Climate Policy Council has chosen to highlight seven criteria as essential in order for national policies to create the conditions for an economically, environmentally and socially sustainable climate transition (see Table 1). The criteria should not be viewed as a comprehensive and complete list of factors that create the conditions for the impact and sustainability of policies, but rather a summary of important considerations that the research highlights. The summary is based on a large amount of literature and on conversations with several research groups in Sweden (see specific references in Table 1).

Table 1. Criteria for an effective and sustainable climate transition policy.

Criteria	Effective policy
Common goals and vision	Policies should deliver a common view of goals that is firmly anchored among all stakeholders and a clear vision that creates momentum for long-term transition. This is an essential part of leadership in complex organisations and systems. ^{32,111–114}
Target attainment	Policies must be effective in achieving the climate targets set. It is not enough for the policy to be considered cost-effective or administratively operational if it does not lead to the target. ^{115,116}
Cost-effectiveness	Policies should aim to be cost-effective both in the short term and in relation to long-term strategic objectives. ³¹

<p>Coordination, organisation and resources</p>	<p>Policies must be coherent and coordinated, both between different levels (global, EU, national, regional, local) and between different sectors and policy areas. The state's organisation and resources must be designed and dimensioned to match the task.^{2,10,33,117,118}</p>
<p>Stakeholder collaboration</p>	<p>Policies should stimulate engagement and interaction among different stakeholders in combination with traditional instruments in order to achieve the goals set as effectively as possible.^{86,108,119,120}</p>
<p>A long-term approach, with learning and flexibility</p>	<p>Policies must be transparent, long-term and predictable in order to reduce the risks to the stakeholders involved while systematically evaluating and developing as lessons are learned and external changes take place.^{121,122}</p>
<p>Acceptance, legitimacy and interaction with other goals</p>	<p>Policies must gain acceptance and legitimacy from citizens. Accountability mechanisms must be in place. The aim should be to maximise synergies and limit conflicts with other societal objectives, such as employment, good health or fair distribution, summarised in the UN sustainable development goals and Agenda 2030.^{49,50,52-54,113,123-125}</p>

Instruments – Analysis of solutions, obstacles and the impact of instruments in four steps

The Climate Policy Council has begun to develop a methodology for analysing the solutions available to reduce greenhouse gas emissions, the factors that hinder the solutions, and the extent to which the instruments tackle these obstacles so that solutions can materialise. The method being developed has been used for the first time in preparing this report.

The method contains four steps. The first step identifies solutions for reducing emissions in different sectors and their potential. The second step is a survey of obstacles to realising the different solutions. The third step assesses how well existing instruments address identified obstacles. The fourth step assesses the extent of the instruments in realising the identified potentials. These steps are briefly shown in Figure 3.

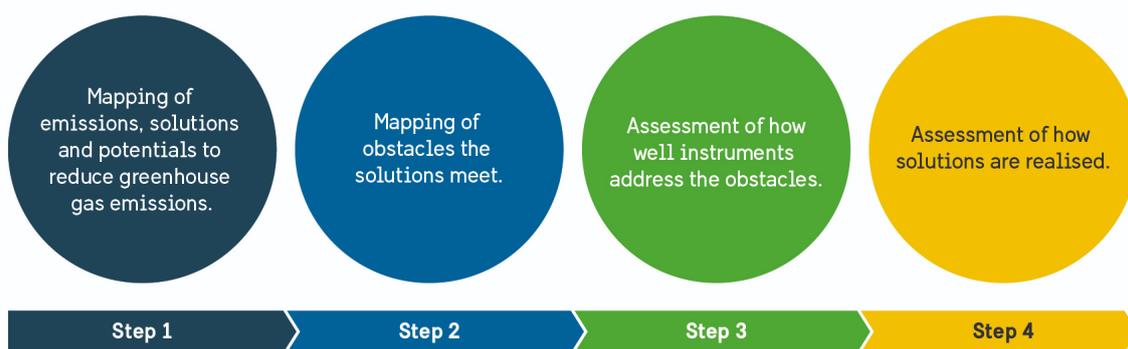


Figure 3 The Climate Policy Council’s four-step approach for assessing the contribution of the overall policy to achieving the climate targets

Step 1: Which solutions can reduce emissions to zero?

The climate transition consists of many changes in technology and processes, both big and small, that move away from fossil-fuel solutions towards fossil-free alternatives. There is a relatively good understanding of which solutions will dominate in the near future and, to some extent, also in the longer term. In some areas many options are available, while in other areas relatively few exist. A relatively small number of technology shifts are estimated to be able to achieve significant emission reductions, and it is difficult to see how the targets can be achieved if these do not come about. In parallel, they need to be complemented by additional technology shifts and behavioural changes if we are to completely reach net-zero emissions.

The first step identifies and describes the different solutions that can contribute to reducing emissions from each sector. These range from reducing transport demand or increasing plastics recycling, to reducing emissions from grazing animals or fossil-free steel production. For each of these solutions, the size of the emission reductions they can contribute to is estimated to be an ‘emission reduction potential’ in millions of tonnes of carbon dioxide equivalent.

The Climate Policy Council has chosen to build on the consolidated information on solutions and their emission reduction potential contained in the visualisation tool Panorama. This tool has been developed and is operated by the Climate Policy Council together with the Swedish Environmental Protection Agency and Swedish Energy Agency.¹¹ Panorama aims to give the user an overview of the current situation and the solutions available for reducing emissions and achieving the Swedish climate goals. The tool makes it possible to gather information on Sweden’s territorial greenhouse gas emissions by sector; the solutions identified to reduce emissions; and the potential of each solution on the development of each sector and on existing instruments. Information about emissions and existing instruments is based on the Swedish Environmental Protection Agency’s statistics, reports and other official sources. The solutions for reducing emissions and their potential, on the other hand, are estimates and come from various reports and data, mainly from government authorities and public inquiries. Panorama also illustrates the roadmaps developed under the Fossil Free Sweden initiative. Panorama should not be seen as a complete description of all instruments, possible solutions and their potentials. Panorama is updated in dialogue with researchers, government representatives and other experts in climate transition in the different sectors.

In some cases, the information in Panorama has been supplemented or updated for the Council's 2020 report. This applies, for example, to the transport sector, where the perspective in Panorama's current version is the interim 2030 target. The Climate Policy Council is also setting the perspective to 2045 for this sector, and that is why we have complemented this part.^w The potential for emission solutions is in relation to a scenario based on existing announced instruments, and where traffic and thus emissions are increasing. In this way, the potential of solutions (transport efficiency, electrification and biofuels) can be illustrated, which would not have been the case if we used the current level of emissions.

For the industrial sector, the information in Panorama has been supplemented by lessons learned from Material Economics' recent study on making EU's industries fossil-free by 2050.¹²⁶ For the industrial sector, the Council has chosen to partially include solutions for a more efficient use of resources at the user level, so as to not misrepresent the types of changes that the transition requires. On the other hand, the assumed potentials of measures relating to use rather than production is set low to illustrate that they do not clearly contribute to reducing emissions within Sweden's territory. For example, a more efficient use of concrete in Sweden does not necessarily lead to a reduction in emissions from concrete production in Sweden.

For the agricultural sector, the information in Panorama has been supplemented with up-to-date information, in dialogue with stakeholders and experts, to reflect the current efforts around roadmaps and climate-neutral agriculture.^{55,65}

Step 2: What obstacles do the solutions currently face?

The solutions identified in Step 1 face obstacles to the realisation of their full potential to varying degrees. By compiling results from previous studies, government reports and other analyses (including the sectors' own roadmaps for fossil-free competitiveness) and supplementing them with up-to-date, specific information from researchers and experts from professional organisations and companies, an Excel-based 'obstacle map' has been created (see Table 2).

The obstacles to climate transition solutions are of different nature and are not limited to market failures. A broader perspective also includes market and policy obstacles of various kinds as well as obstacles due to habits, norms and other societal factors.

Table 2. Obstacles that the transition faces.

Obstacles to the transition	Critical questions to answer	Examples from the transport sector
Technology development and innovation	What further developments are needed to replace the old system and reduce greenhouse gas emissions, from a purely technical standpoint?	The recyclability of batteries is currently low.

^w This has been done based on lessons learned from the 2019 report and a calculation model developed by the consultancy firm Material Economics on behalf of the Council.

Economy and competitiveness	Are new technologies and solutions more expensive or otherwise non-competitive?	Electric cars are currently more expensive to buy.
Inputs and production capacity	Is there a potential shortage of inputs or limitations on how quickly new production can scale up?	Availability of biofuels may be an obstacle in the future (especially Swedish-made biofuels).
Infrastructure	Is there a lack of infrastructure to scale up the use of new technologies and solutions?	Expansion of public transport needed to manage urbanisation, etc.
Regulations and government processes	Are existing regulations or government processes (e.g. permitting) slowing down the transition to new technologies?	Regulation by the European Community and others hinders the expansion of charging stations.
Investments and lock-in effects	Are major new investments required, or have previous investments (in old technology) a long lifespan?	Existing and planned urban environments limit opportunities for new solutions.
Norms and values	Will a norm shift and behavioural change be needed on the part of individuals or companies?	Carpooling, reduced travel and a switch to public transport require behavioural changes in individuals.

Part of the obstacle analysis involves identifying possible conflicting objectives and synergies between different solutions. One example is electric vehicles, which not only reduce the climate impact of transport but can have other benefits, such as reduced emissions of air pollutants and reduced noise. At the same time, rising demand for electric cars presents environmental and social challenges in terms of the production of vehicle batteries. Furthermore, electrification sharply reduces the marginal costs of transport, which risks leading to increased traffic, congestion and resource use.

Step 3: How well do existing instruments address solutions and obstacles to the transition in different sectors?

Step 3 of the method aims to describe whether and how well existing instruments address the obstacles identified in Step 2. This is done through a qualitative analysis in which key instruments that affect developments in the different sectors are first identified and then put on one of three levels based on how well they address the obstacles. These levels are:

- **Weak governance:** Existing instruments do not address, or address to a highly limited extent, the obstacles to the transition.

- **Moderate governance:** Existing instruments address obstacles to the transition to some extent (for example, through weak or moderate incentives).
- **Strong governance:** Existing instruments address the obstacles to the transition well, so the solution can be realised within a reasonable time range (for example, through mandatory measures or powerful financial incentives).

The rating is based on a weight-of-evidence determination of previous assessments and analyses, interviews with experts from different authorities and professional associations, and the Council's own analysis of these different decision support materials.

The result is an overview of how well the instruments meet the identified obstacles. Linking the rating to the emission reduction potentials in Step 1 can provide a rough estimate of how large and what emission reductions and solutions existing instruments address well, to some extent, or not at all.

Step 4: How much potential can be realised with existing instruments?

The final step in the framework is to assess the percentage of each solution potential that can be realised by 2045, given existing the established instruments. The aim of this step is not to accurately quantify the impact of the instruments on emissions, but rather to make a qualified estimate of the magnitude of the contribution of current instruments towards achieving the long-term climate goals. In this year's report, the analysis has been performed on existing instruments and, as far as possible, on the impact of the decisions presented in the Government's Climate policy action plan.

Once the impact of the existing policy and action plan has been excluded from the emissions to be reduced, emissions remain that must be addressed. These remaining emissions have been divided into those that must be prepared for today, but will only have an effect on emissions after 2030 due to long lead times, and others where the emission reduction can be realised before 2030.

Annex 2. A look back – The 2009 Climate Bill

The time span from the present up until the 2030 targets is the same as when the 2020 climate target was decided in 2009 with the bill ‘A coherent climate and energy policy’.¹²⁷ Looking back at the process preceding the decision on the target and subsequent developments may provide lessons which are particularly relevant in monitoring future climate targets. This retrospection is based on background reports prepared on behalf of the Climate Policy Council.^{128,129}

The process leading up to the 2020 climate target

When the new Alliance government took office in 2006, interest in the climate change issue began to grow in Swedish society. This was partly a result of several international events that attracted attention in Sweden, including the premiere of Al Gore’s film *An Inconvenient Truth* and the publication of the Stern Report in the United Kingdom. With the growing interest in environmental and climate change issues, the new government put the issues relatively high on the agenda and announced from the outset several initiatives to broaden and anchor climate efforts. A parliamentary committee was set up, the Climate Committee, which was tasked with reviewing Swedish climate policy and proposing new climate targets and an action plan for achieving them. This committee was based on documentation produced by the Swedish Energy Agency, Swedish Environmental Protection Agency, and Scientific Research Council for Climate Change appointed by the Government. As its starting point, the committee also used the European Commission’s analysis of new EU targets by 2020.

The Climate Committee resulted in proposals for national emission targets in both the short and the long term, as well as a relatively comprehensive action plan. The action plan contained several proposals in addition to those recommended by the Swedish Energy Agency and Swedish Environmental Protection Agency as well as quantified impact assessments of the proposals. However, there was disagreement over several of the proposals, and the committee submitted them for further consideration and further socio-economic impact assessment for the forthcoming climate bill. The disagreement concerned in particular the 2020 emissions target and the amount that could be achieved through verified emission reductions abroad, known as flexible mechanisms. Opposition parties advocated a higher domestic target for 2020, a 40 per cent reduction compared with 1990, while government parties preferred a lower target of 30 per cent excluding flexible mechanisms.

After the Climate Committee completed its work, the Government prepared the climate bill, which was presented to Parliament in 2008 together with an energy policy bill, both of which were adopted by a broad majority in 2009. ‘A Coherent Climate and Energy Policy’, as the bills came to be known, contain a national climate target for 2020, two energy policy objectives and action plans for how to achieve them. No long-term target was set, except for a vision of net-zero emissions by 2050.

The 2020 climate target represents a 40 per cent reduction in greenhouse gas emissions, or 20 million tonnes of carbon dioxide equivalent, compared with 1990. The target applies to emissions not included in the EU emissions trading scheme. A third of the reduction, equivalent to almost 7 million tonnes of carbon dioxide equivalent, may be achieved through flexible mechanisms. The current government aims to achieve the target solely through domestic emission reductions.⁵

However, a smaller number of flexible mechanisms are deemed necessary, since the latest emission development scenario suggests that flexible mechanisms equivalent to 1 million tonnes of CO₂e are needed to reach the target.

The quantification of the 2020 climate target was problematised by new EU-wide decisions taken when the climate bill was approved by Parliament. These decisions changed which sectors were considered part of the non-trading sector. For example, waste incineration plants and incineration emissions from facilities in the chemical, metal and mineral industries were moved to the commercial sector as of the third trading period (2013–2020). This affected the size of emissions in the base year 1990 and thus also the 40 per cent reduction by 2020. The 2020 climate target, which of course covers emissions outside the trading system, was not adapted to these changing circumstances and as a result the target measured in tonnes of CO₂e was less than what was first planned.

Emission trends

Once the climate bill was passed, it soon became apparent that emission reductions were taking place faster than predicted. In the years that followed, forecasts showed that the distance to the target decreased very quickly. With the full use of flexible mechanisms, the target was reached back in 2012.

One reason for the rapid reduction in emissions was the financial crisis of 2008. The resulting economic downturn contributed to a decrease in expected transport, mainly for heavy-duty vehicles but also for passenger cars. Emissions from heavy vehicles and freight transport were lower as demand and production decreased, and sales of new passenger cars decreased due to lower employment rates and household income.

The underlying forecast for the emissions trend was prepared by the Swedish Environmental Protection Agency and Swedish Energy Agency in 2007 and formed the basis for the Climate Committee's work. However, the forecast underestimated the reduction in emissions, particularly in domestic transport, self-heating of homes and premises, and from non-ETS industrial and energy supplies. One reason why the forecast overestimated emissions is that it was partly based on old data. In the heating sector, for example, the forecast was based on normal year-adjusted emissions^x that did not take into account an already changed Swedish climate in which heating demand had decreased. In addition, a start year was used a few years earlier (2004) which did not take into account the transition that was already taking place with the phasing-out of oil-fired boilers. A more up-to-date decision support basis, with the conditions that applied at the time, could have improved the forecast and demonstrated a limited need for further emission reductions in order to reach the target.

In domestic transport, the difference between projected and actual trend was largely due to a shift from petrol cars to diesel cars and an unexpected increase in biofuels. The share of diesel cars in new car sales increased from 20 per cent in 2005 to as much as 65 per cent in 2012. New research on the environmental impact of diesel cars and several scandals then appeared in which auto

^x In normal-year-adjusted emissions, weather effects (solar radiation, outdoor temperature, precipitation and wind conditions) are excluded from the outcome. For the period 1990–2014, the normal-year-adjusted values were on average 8 per cent higher than actual emissions. This is 2 per cent higher than actual total emissions.

manufacturers were accused of manipulating the electronics in diesel cars, prompting the percentage to fall again.

The 2007 assessment did not anticipate that biofuel use would go beyond the 10 per cent renewable fuel target by 2020 across the EU. In addition, the Swedish Energy Agency and Swedish Environmental Protection Agency's decision support had a rather restrictive approach to an excessive increase in biofuels and did not advocate an increased use in addition to EU targets, as long as technologies for the sustainable production of biofuels were not developed in large volumes in Sweden. As early as 2012 Sweden, achieved the EU's 2020 target of 10 per cent biofuels, and the share is now up to 20 per cent.

Of the instruments or tightening of instruments proposed by the Climate Committee, approximately half of the proposals have been implemented in whole or in part. The decisions that have made the greatest impact concern instruments for increased vehicle efficiency and the increased introduction of biofuels. The financial incentive for the latter has consisted of the exemption of biofuels from the carbon tax and parts of the energy tax. The scheme for reduction obligations has also been in place since 2018.

In 2007 the green car premium was introduced in the passenger car sector, leading to an unexpected increase in sales of new ethanol and diesel cars. Later, the premium was replaced by a five-year vehicle tax exemption for cars with carbon dioxide emissions below certain levels. In addition, green cars taxed as company cars for private use were subject to a specific reduction in the benefit value. Since such company cars account for a significant share of new cars in Sweden, the instruments were of great importance. The super-green car premium, later replaced by bonus malus, was introduced in 2012 and initially led to a relatively modest increase in sales of electric cars and plug-in hybrids. During the period 2018–2019, sales increased significantly, albeit from a low level.

Cost assessments

Several assessments were made of the future costs of the measures for achieving the proposed 2020 target, including by the Climate Committee and on behalf of the Confederation of Swedish Enterprise. Different analyses reported different cost levels. The marginal costs in assessments of technical abatement potentials were significantly lower than the corresponding marginal costs in the economic equilibrium model used for macroeconomic analyses. Furthermore, the costs of improving vehicle efficiency were assumed to be significantly higher than the costs of biofuel measures.

In the case of low-carbon passenger cars and light trucks, costs were estimated at approximately 30–40 Swedish cents per kilogram of carbon dioxide. Ex post assessments instead indicate socio-economic gains and revenues of approximately 45 cents per kilogram of carbon dioxide. One explanation is that the technology has been cheaper than expected and that the price of petrol has been higher.

As the price of biofuels varies according to the price of oil, petrol and diesel, it was difficult to make cost assessments in advance. The costs of different biofuel alternatives are also determined by demand trends over time. When analysing the costs ex post, the additional cost of biofuels compared with fossil fuels is estimated to represent an abatement cost of between 1.50 and 3 SEK

per kilogram of carbon dioxide for the low-blended fuels involved. This is relatively consistent with the estimates made before the target was decided.

There were few cost estimates for electric cars and plug-in hybrids in the period prior to the climate bill, but those reported assessed the costs as very high. Today, however, it is expected that the purchase price of electric cars will fall by 2025 in the EU to levels comparable to those with internal combustion engines, while the operating costs of electric cars are significantly lower.

Stalling reduction rate

In recent years, the rate of reduction in Sweden's territorial emissions has slowed, and between 2014 and 2018 emissions decreased by less than 1 per cent per year. Although it is difficult to isolate the effect of individual events and instruments, it is possible to highlight several factors that have influenced the slowdown.

One such factor is that sectors that previously experienced a high reduction rate have stagnated. This applies in particular to emissions from the heating of homes and premises, from the production of electricity and district heating, and from industry. It is likely that measures were already put in place which were relatively simple and inexpensive to implement, and which were able to achieve large emission reductions. In order to reduce emissions further, measures are now needed that might be costlier. Since the remaining emissions are low, the sectors will contribute less to further reductions.

Another factor behind the stalling reduction rate is the higher economic growth that has followed on the heels of the downturn of the financial crisis. Growth in the period 2014–2017 was almost twice as high as in the period 2005–2014, and the slowdown in the rate of emissions can be due to such cyclical effects. Further explanations include lower real fuel prices and a decrease in sales of diesel cars along with an increase in new petrol cars.