

# 2025

Climate Policy Council report



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# Foreword

This report is the Climate Policy Council's annual assessment of the Government's overall policy in relation to the climate goals decided by Parliament and the Government.

**Part I** is an evaluation of how the Government's policy has developed during 2024 and thus has a time limit. To put this assessment in context, the text begins with a brief review of current climate targets and emissions trends to date in relation to these targets. This is followed by a brief update on how EU climate policy has developed during 2024 and what this means for national policy in Sweden.

**Part II** contains the report's in-depth theme, which this year focuses on agriculture. In Sweden, the discussion on agriculture's climate transition has only just begun, and since 2019 the Climate Policy Council has recommended that the Government clarify agriculture's contribution to climate goals. This report assesses the current policy, examines how agriculture could contribute more to society's climate transition and how the policy needs to be developed to make this happen. We hope that it will contribute to a developed discussion and ultimately a policy that provides better conditions for Swedish agriculture to contribute to achieving the climate goals.

We would like to thank all the organisations, researchers, experts and practitioners who contributed to the report, including in our dialogue meetings with agricultural sector stakeholders in November 2024. These meetings alone were attended by over 30 representatives from business, research, Government and civil society. However, the conclusions and recommendations presented here are the Climate Policy Council's own.

## Stockholm, March 2025

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# Climate Policy Council and our mission

In June 2017, the Riksdag adopted a new climate policy framework for Sweden with a broad majority. The purpose of the framework is to ensure the long-term conditions for business and society to make the transition required for Sweden to achieve its climate goals. The framework creates order in climate policy and is a key component in Sweden's efforts to live up to the global Paris Agreement. The climate policy framework consists of three parts: the climate targets, the Climate Act and the Climate Policy Council. The Climate Act stipulates that the Government's climate policy work must be based on the long-term climate goal and sets out how the work is to be conducted.<sup>1</sup>

The Climate Policy Council is an independent multidisciplinary expert body. The Council has eight members with high scientific expertise in relevant fields and is supported by a secretariat of four staff. According to the Government's instructions, the Climate Policy Council's task is to "evaluate how the Government's overall policy is compatible with the climate goals decided by the Riksdag and the Government".<sup>2</sup>

Within the framework of its overall mission, the Climate Policy Council shall in particular

- assess whether the focus of different relevant policy areas contributes to or hinders the achievement of climate objectives
- highlight the effects of adopted and proposed policy instruments from a broad societal perspective
- identify policy areas where further action is needed
- analyse how to achieve the objectives in a cost-effective way, both in the short and long term
- evaluate the evidence and models on which the Government bases its policies
- contribute to an increased public debate on climate policy.

By the end of March each year, the Climate Policy Council must submit a report to the Government. The report must contain the Climate Policy Council's assessment of how climate work and emissions development are progressing and how the Government's policy is compatible with the climate objectives. Every four years, when the Government presents its climate policy action plan, the Climate Policy Council will assess the plan.

## International Climate Councils Network (ICCN) - a global network of national climate policy councils

Many countries have enacted national climate laws in recent years. At the same time, there is a growing number of established national climate councils with roles as reviewers of respective Government policies and/or as advisors to the Government. On the initiative of the Swedish Climate Policy Council and others, the International Climate Councils Network (ICCN, [climatecouncilsnetwork.org](https://climatecouncilsnetwork.org)) was established in 2021 to share experiences and learning between climate councils. ICCN currently has twenty-five members from all continents, has participated in the UN's annual climate conferences, COPs, and organises thematic seminars, among other things. Sweden also participates in the National Expert Council for Climate Adaptation.

In 2022, the European Advisory Board on Climate Change (ESABCC, [climate-advisory-board.europa.eu](https://climate-advisory-board.europa.eu)) was established as part of the EU Climate Law. The mission of the ESABCC is to provide independent advice to the EU institutions on how to anchor climate policy in science, as well as in the EU climate law and the EU's commitment under the Paris Agreement.

# Table of contents

Executive summary	7
Part I	14
Introduction to Part I	15
1 Climate targets – globally, in the EU and in Sweden	16
1.1 Global climate goals – Paris Agreement	16
1.2 EU climate targets and Sweden's commitments	17
1.3 Sweden's climate targets	18
1.4 Comparison between Sweden's national targets and EU commitments	21
1.5 Reporting and monitoring within the EU climate framework	22
2 Emissions trends – global, European and national	23
2.1 Global emissions trends	23
2.2 Emission trends in the EU	25
2.3 Emission trends in Sweden	25
3 Climate policy in the EU in 2024 and beyond	28
3.1 Climate neutrality and the implementation of the Fit for 55 package	29
3.2 EU policy instruments for the 2030 climate targets and beyond	30
3.3 EU climate policy developments	33
3.4 The Swedish Government's actions in the EU in 2024	35
3.5 The role of Member States in EU climate governance – opportunities and constraints	37
4 Government policy in 2024	39
4.1 Assessment of the fulfilment of Sweden's climate targets	39
4.2 Key policy areas for the climate transition	49
4.3 Key conditions for effective policy	61
5 The Government's climate report 2024	66
5.1 Improved climate accounting in 2024	66
5.2 Potential for increased transparency and quality in future climate accounts	67
5.3 Assessment of the Government's follow-up to the climate policy action plan	68
Part II	69
Introduction to Part II	70
6 Introduction to the climate impact of agriculture	71
6.1 Focus, boundaries and methodology of the analysis	71
6.2 Swedish agriculture today	72
6.3 Greenhouse gas emissions from agriculture	73
6.4 The relationship between climate change mitigation and other societal objectives	79
7 Potential for climate mitigation measures in agriculture	84
7.1 The efficiency and structure of the agriculture determine greenhouse gas emissions	84
7.2 Alternative scenarios for the future climate impact of agriculture	87
7.3 The scenarios in relation to other societal objectives	91

8	Evaluation of the agricultural climate transition policy	94
8.1	Agricultural policy and climate objectives	94
8.2	Current policies have led to marginal emission reductions	98
8.3	Obstacle analysis and policy response	99
8.4	The policy for the agriculture's transition is not effective	106
9	Recommendations for agriculture to further contribute to climate objectives	113
9.1	Develop the governance of the climate impact of agriculture	113
9.2	Participate actively in EU cooperation	115
9.3	Developing a national policy mix for reducing emissions	119
9.4	Prerequisites for effective climate policy instruments	124
	Glossary	126
	References	131
	Annex - Government initiatives in 2024	146

# Executive summary

## The climate situation is serious

Increasing levels of greenhouse gases in the atmosphere have thrown the Earth's climate system out of balance, resulting in rising global average temperatures. The last decade is the warmest observed to date. For the single year 2024, the global average temperature was 1.5 degrees above the pre-industrial average.

The negative impacts increase with each additional tenth of a degree of warming. While enhanced climate adaptation can mitigate some of these adverse effects, certain impacts are inevitable and potentially irreversible. This requires comprehensive, rapid and sustained emission reductions. Since the future climate is largely determined by accumulated carbon dioxide emissions, achieving interim emission reduction targets is essential.

The continuous rise in global emissions remains a cause of concern. However, there are encouraging trends, such as a significant decline in emissions within the EU and a slight decrease in the US in 2023. Although emissions continue to rise in emerging economies such as India and China, the overall rate of global emissions increase has slowed. There are indications that fossil fuel emissions may peak in the coming years, mainly due to reduced coal consumption and the continued strong growth in renewable energy. Many countries are developing policies to support the transition to fossil-free industries, although this progress has also faced economic and political setbacks over the past year.

The EU has initiated negotiations on a new climate target for 2040 to accelerate the transition. This target will form the basis for the EU's contribution to the Paris Agreement, under which parties this year are required to submit new commitments for 2035, providing an opportunity to enhance collective ambition. Sweden can contribute to increased global climate ambition by taking responsibility for its national climate impact, outlining a concrete pathway to net-zero emissions, and advocating for more ambitious action within the EU and internationally.

## Decide on new and strengthened policy measures to achieve Sweden's 2030 targets



### THE CLIMATE POLICY COUNCIL'S ASSESSMENT

The Swedish Government's current climate policies are insufficient to meet Sweden's climate targets and EU commitments for 2030. While some decisions and announced measures in 2024 represented steps in the right direction, they do not offset other decisions made during the mandate period that have led to increased emissions, particularly in the transport sector.

Sweden's greenhouse gas emissions *increased* in 2024 – a reversal of previous trends – primarily due to earlier political decisions, including reduced taxation on fossil fuels and reduced requirements for the blending of fossil-free fuels. Although the Government introduced new measures during the year, particularly changes to the biofuel mandate, which may partially compensate for the increase in emissions, emissions from sectors outside the EU Emission Trading System are not expected to return to 2023 levels until 2027.

The Government's plan to meet Sweden's EU commitment by 2030 – albeit with a narrow margin – relies on optimistic assumptions regarding developments in fuel consumption and electrification in the transport sector. The national emissions target for 2030 will not be achieved under current policies, nor will the target for domestic transport.

At the same time, the net uptake of greenhouse gases in forests and land has nearly halved since the early 2010s. This decline is driven by a combination of reduced forest growth, increased harvesting rates, and higher natural losses. Current trends indicate that, under current policies adopted, Sweden will not meet its binding EU commitment in the land-use sector, which in turn increases the demand for emission reductions in other sectors, particularly in the transport sector.

Overall, we conclude that the Government's policies are insufficient to achieve Sweden's climate targets and EU commitments by 2030. Consequently, our recommendations from the review of the government's action plan for this parliamentary term – presented in last year's report – remain valid.

Nearly two-thirds of the Government's term in office has now passed. The window of opportunity to make decisions that would enable Sweden to reach its 2030 targets is closing rapidly. The Government must utilize existing, practically available policy instruments and previously investigated proposals, particularly in the transport sector, non-road mobile machinery, and land-use carbon sequestration.



#### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Decide in 2025 on a package of measures to increase the net uptake of greenhouse gases in forests and soils. The report of the Environmental Objectives Committee is an important basis, but its proposals are insufficient to achieve Sweden's LULUCF commitment. Further and reinforced measures in the land use sector should be developed considering other environmental and social objectives.
- Decide in 2025 on measures to reduce emissions in the ESR sector. Stricter reduction obligations and higher taxes on fossil fuels are the measures that can contribute to the greatest emission reductions in the short term. This can be combined with distributional policies that share benefits and costs and protect vulnerable groups.
- The Government should aim to exceed Sweden's ESR commitment in order to transfer emission allowances to the LULUCF sector.

## Contribute proactively to the EU's leading role in global climate policy

In a growingly unstable global environment, we assess that maintaining ambitious climate targets and ensuring credible implementation by the EU are crucial for global climate cooperation as a whole and for the achievement of the Paris Agreement goals. EU Member States must both uphold and push the EU climate policy.

Based on recommendations from the European Scientific Advisory Board on Climate Change, the European Commission has recommended a new EU climate target of 90% net emission reductions by 2040 compared to 1990 levels. Achieving this goal requires, first, that EU Member States, including Sweden, take action to implement the Fit for 55 package with a view towards 2030. Second, EU Member States must jointly decide on the 2040 target and adopt a legislative framework to reach near-zero emissions across most sectors. The Swedish Government needs to demonstrate strong climate leadership and actively contribute to both efforts. A credible plan and consistent implementation of Sweden's EU commitments to 2030 are necessary to ensure that Sweden does not become an obstacle that slows down the EU in its climate-leading global role.

The Climate Policy Council welcomes the fact that, in autumn 2024, the Government formulated several Swedish positions regarding the legislative package to achieve the EU's 2040 target.

However, the Government should not use these positions as preconditions but should unequivocally support a European, science-based target at least in line with the Commission's recommendation.





## THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Uphold the integrity and implementation of the Fit for 55 package to ensure that the EU and Sweden meet their climate targets.
- Provide unconditional support for an ambitious and concrete climate target for 2040. Engage relevant authorities in a broad process to further develop proposals for EU legislation and policy instruments beyond 2030.

## Strengthen policies to reach net zero emissions by 2045

In 2024, the Government made several decisions aimed at improving the conditions for the continued climate transition towards 2045. These measures primarily concern various aspects of electrification, streamlining of permitting processes, and the early and broad implementation of the EU Emission Trading System 2 (ETS2). Early in 2025, the Swedish Energy Agency also completed the first auction for bioenergy with carbon capture and storage (bio-CCS).

However, certain parts of the climate policy remain inconsistent, particularly concerning the bio-fuel mandate, the Klimatklivet investment support scheme, and the regulatory conditions for fossil-free electricity production. Combined with prolonged processes for appointing inquiries, this lack of coherence creates uncertainty about the objectives and direction of the climate policy, undermining the conditions for actors seeking to invest in the climate transition. Greater alignment is needed between climate objectives and other key policy areas, including agriculture, forestry, transport, finance, and taxation.

The Climate Policy Council urges the Government to further develop policies to support the transition to a competitive fossil-free industry. This includes areas such as improving permitting processes, strengthening public infrastructure, securing access to skilled labor, supply and financing opportunities. The Government must also be prepared to share risks with municipalities and regions that bear significant transition costs associated with large-scale industrial establishments.

Over the past year, the Government has announced or adopted several decisions aimed at improving conditions for investments in fossil-free electricity production. In the wind power sector, reforms for onshore wind power have been announced, while at the same time, major decisions have moved in the opposite direction, such as the halt to new offshore wind power projects in the entire Baltic Sea, except in the Bothnian Bay.

The Government's strong focus on far-reaching state subsidies and special solutions for new nuclear power risks negatively impacting investments in other electricity generation technologies that could be established within the next 10–15 years, before new nuclear power can be operational. It may also deter investments in flexibility and energy storage, which will be necessary in a future electricity system, even with nuclear power. Additionally, large-scale public subsidies and risk-taking for new nuclear power constrains fiscal space for alternative climate investments and risk triggering a subsidy spiral, requiring substantial financial support for other types of power sources as well.

As in last year's report, the Climate Policy Council calls for a comprehensive impact assessment of various options to meet the growing demands of electrification while ensuring the climate targets are met. All types of power generation should be included, along with electricity grids and different forms of flexibility and storage solutions. The analysis must assess the effects on the Northern European electricity market, Sweden's energy security and competitiveness, as well as broader socio-economic and fiscal impacts under different policy pathways.

The transition of the transport sector needs to continue at an accelerating pace beyond 2030, achieving near-zero emissions well before 2045. Over the longer term, additional policy instruments can have an impact, and the Government needs to develop a broader and more robust toolbox to support fossil-free and resource-efficient transportation.



#### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Conduct a comprehensive impact analysis of different paths for Sweden's electrification as soon as possible, covering all fossil-free electricity generation technologies, grid flexibility, and energy storage solutions. At the same time, favorable conditions for new renewable electricity production must be rapidly restored.
- Continue developing policies to support the industrial climate transition, particularly by improving permitting processes, strengthening public infrastructure, securing access to skilled labor, and expanding financing opportunities.
- Adopt a package of measures to reduce emissions from the transport sector and non-road mobile machinery through accelerating electrification, an increased share of fossil-free fuels, and a more transport-efficient society. Strengthen existing policy instruments, consider previously assessed proposals, and draw lessons from other countries.

Another way to develop cost-effective net-zero emission policies is to involve sectors where transition policies are still underdeveloped – agriculture being a key example. Since 2019, the Climate Policy Council has recommended that the Government clarify the role of agriculture in contributing to Sweden's climate goals. The ambition of this year's thematic focus in the report is to contribute to a constructive discussion ahead of such a climate strategy for Swedish agriculture.

## This year's theme: Agriculture's contribution to the climate transition

Agriculture has a substantial impact on the climate and is also a sector directly affected by ongoing climate change. The impacts of climate change on agriculture will vary geographically, with implications for global and regional supply and trade. As emissions from other sectors decline, agriculture is expected to become the largest source of greenhouse gas emissions in Sweden and the EU by 2040.

Agriculture's climate impact must be addressed in the context of a wide range of other challenges. Agricultural methods and conditions are constantly evolving due to structural change, technological advancements and ongoing generational shifts, creating both opportunities and challenges. Conditions for agriculture vary across the EU and within Sweden, which affects profitability and opportunities

for climate change mitigation and adaptation. Moreover, agriculture affects other societal goals, such as food supply, biodiversity and other environmental objectives. The development of Swedish agriculture is largely governed by EU agricultural, environmental and climate policy.

Meeting these intertwined challenges requires adaptability and a holistic approach. The entire food supply chain in society faces a broader sustainability challenge, and the necessary changes will affect many actors. However, in this report we primarily focus on the role of agriculture itself in the climate transition.

## The climate impact of agriculture can be substantially reduced

Greenhouse gas emissions from agriculture mainly consist of methane and nitrous oxide, which originate from enteric fermentation and biological processes in the soil. This makes it difficult both to quantify emissions and to assess the impact of different measures. However, there is potential to reduce agriculture's climate impact through two main approaches:

- Measures that mainly affect *how* food is produced, aiming to reduce emissions per unit of food produced. These include more efficient use of plant nutrients and animal feed, as well as emission-reducing technologies such as fossil-free energy and methane-reducing feed additives.
- Measures that mainly affect *what* and *how* much is produced, such as reduced production of emission-intensive livestock products, re-wetting of drained organic soils and afforestation of agricultural land.

In this report, we have explored possible development pathways for Swedish agriculture. In our scenarios – all of which assume increased Swedish food production in terms of both energy and protein – agricultural emissions shift from the current 11.3 million tonnes of carbon dioxide equivalents to between 8.3 and 11.6 million tonnes, depending on what is produced and how it is produced. The lower end of this range represents a reduction of around 25% compared to 2023. These emission reductions can be achieved while maintaining or strengthening agriculture's contribution to other environmental objectives.

Greenhouse gas emissions from Swedish food consumption can be substantially reduced by switching towards less emission-intensive and often healthier foods. In our scenarios, the largest emission reductions come from changes in what is produced. To prevent such changes from merely leading to increased imports of emission-intensive foods, they need to be accompanied by dietary shifts in Sweden.

Research shows that the cost of several key emission reduction measures in agriculture is comparable to those in other sectors. We find that substantial and cost-effective climate measures in agriculture can be compatible with increased Swedish food production.

## Current policies do not encourage cost-effective climate measures



### THE CLIMATE POLICY COUNCIL'S ASSESSMENT

Current policies in Sweden and the EU have led to minor reductions in agriculture's climate impact and are expected to continue having a limited effect. There is a lack of clear goal and vision for agriculture's contribution to the climate transition, nor are there sufficient incentives for cost-effective climate measures.

A fundamental obstacle to strengthening agriculture's role in the climate transition is the lack of an agreed aim for how the sector should contribute. It remains unclear how much agriculture is expected to reduce its own emissions, and to what extent it should support the transition in other sectors, for example through increased biofuel production or carbon sequestration.

There are inconsistencies between agricultural and climate policies. For example, the Government's food strategy sets a general goal of increasing food production without addressing how this can be achieved within the framework of climate objectives.

Current agricultural policy in Sweden and the EU provide support for certain climate measures in agriculture, while other parts of the policies tend to preserve status quo. Overall, there is a lack of sufficient incentives for cost-effective climate measures in agriculture, as well as for investments in innovative farming methods that could reduce emission. Additionally, there is lack of incentives to increase demand for food with low climate emissions.

## Strengthened policies to increase agriculture's contribution to climate goals

Our analysis of agriculture's potential role in achieving climate targets leads to two conclusions.

- Measures within agriculture cannot compensate for inadequate policies in other sectors or provide quick and easy emission reductions in the short term.
- Clearer targets and concrete policy instruments are needed to enhance agriculture's contribution to the transition toward net-zero emissions by 2045.

The Government should harness the potential and momentum for transition within the agriculture and the food sectors, engaging representatives from of all parts of the food supply chain in efforts to advance climate action. Policies need to be developed to enable agriculture to reduce net emissions in both the short and long term. Below, the Climate Policy Council presents recommendations that we believe the Government should implement *before the end of the current mandate period*.

## Improved governance



### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Develop a vision and strategy for agriculture's climate transition in close collaboration with farmers, stakeholders across the entire food supply chain, civil society, researchers, and Government agencies. The strategy should provide stable and long-term conditions for the sector and be based on the latest knowledge about the potential of possible measures.
- Clarify how the goal of increased food production in the Government's food strategy can be achieved within the framework of the climate targets.

## An active role in EU co-operation



### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Advocate for the Common Agricultural Policy (CAP) reform to ensure cost-effective emission reductions. Assign relevant authorities to develop proposals aligned with this objective for the next program period.
- Continue to work towards immediate and mandatory inclusion of fossil fuel emissions from agriculture for all EU Member States in the upcoming EU Emissions Trading System (EU ETS 2).
- Promote the introduction of common and economically efficient climate policies at EU level to regulate methane and nitrous oxide emissions from agriculture, such as an emissions trading system.

## A national policy mix



### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Strengthen and improve support for climate measures in agriculture that are economically efficient from a societal perspective but not currently profitable at the farm level. Develop support schemes that also consider other societal objectives.
- Design risk-sharing mechanisms where the state takes part of the financial risk associated with major climate investments in agriculture.
- In the absence of an EU-level climate policy instrument, consider introducing a pricing mechanism for methane and nitrous oxide emissions from agriculture that takes farm profitability into account, for example, through a refunding scheme.
- Advocate for a rapid phase-out of tax reductions on fossil diesel. Compensate farmers appropriately to avoid negative impacts on agricultural profitability.
- Implement measures to shift demand toward climate friendly and healthy food products, such as enhanced information campaigns, differentiated value-added tax (VAT) and procurement of public meals.

## Enhanced capacity and resources



### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Assign relevant authorities to enhance their work on method development and data collection to quantify the impact of all climate measures in agriculture.
- Strengthen analytical capacity and cooperation between the Swedish Board of Agriculture, the Swedish Environmental Protection Agency and other relevant authorities involved in the agriculture's climate transition.
- Continue to support and further develop agricultural advisory services on climate measures and ensure that they reach farmers across the entire country.

# Part I

Climate targets, emission trends and politics



# Introduction to Part I

In 2024, new records were set for global greenhouse gas emissions, the concentration of greenhouse gases in the atmosphere and the average temperature of the Earth. The annual average temperature was for the first time more than 1.5 degrees above pre-industrial levels, the lower target level of the Paris Agreement. This is serious and therefore even greater efforts are now needed to reverse the trend and rapidly reduce greenhouse gas emissions to limit global warming.

However, efforts to reduce greenhouse gas emissions faced setbacks during the year. After difficult negotiations, the 29th Conference of the Parties to the UNFCCC in Baku (COP29) reached an agreement on climate finance to help countries seriously reduce their emissions. This agreement is considered by many as insufficient. The meeting also failed to reach agreements on raising the ambition of countries' climate plans for COP30 or on setting targets for phasing out fossil fuels. All in all, this makes it more difficult to reach the Paris Agreement's goal of net zero emissions.

In its latest follow-up report from 2024, the OECD notes that there is both an ambition gap, as the countries' commitments to reduce greenhouse gas emissions are not compatible with the temperature targets of the Paris Agreement, and an implementation gap, as climate policy itself provides insufficient conditions for achieving the targets<sup>1</sup>. At the global level, both higher ambitions and efforts are therefore required to achieve the climate targets. However, the new administration following the presidential election in the United States has led to a renewed decision to leave the Paris Agreement, and in Sweden political decisions have been made that mean we expect a sharp increase in emissions in 2024 according to as yet unreported official statistics. In addition, major investments in the climate transition have been put on hold or postponed.

At the same time, we have seen several positive trends over the year. At the global level, renewable energy is emerging rapidly and replacing traditional fossil fuels. If this trend continues, the world's greenhouse gas emissions could be reduced very soon<sup>2</sup>. The EU has also managed to maintain a steady course in a turbulent world even after the European Parliament elections and the arrival of the new European Commission, and has maintained the ambitions of its climate legislation to reach a net-zero target by 2050, both in the short and long term. Emissions in the EU have fallen sharply in recent times and especially in the last year. We believe it is important that efforts to achieve the EU's climate targets continue to be promoted in the future, as Europe and Sweden recover from difficult years of recession. The ambition should be for economic development to favor the climate transition, not the other way around.

**Part I** of this report describes and analyses the Government's overall policy in 2024 and how it has evolved in terms of its ability to meet the climate targets. **Chapter 1** describes the climate targets that need to be achieved. The targets are based on the global agreement in the Paris Agreement, where Sweden and the other EU Member States decided how we will jointly contribute to achieving the objectives of the Paris Agreement. **Chapter 2** summarises how emissions have developed in relation to these targets, at global, European and Swedish level.

The following chapters describe how policies have been developed in 2024 to ensure that further emission developments are in line with agreed targets. **Chapter 3** describes the policy at EU level. This is followed by the main chapter in the first part of the report, **Chapter 4**, which evaluates the Swedish Government's policy in relation to the climate targets over the past year. **Chapter 5** briefly comments on the Government's climate report to Parliament.

**Part II** of the report contains this year's thematic in-depth analysis of agriculture's potential to contribute to the climate transition. This is an extension of the Climate Policy Council's previous recommendations that the Government needs to develop policies in the agricultural sector.

# 1 Climate targets – globally, in the EU and in Sweden

This chapter presents the Swedish climate targets and their relation to the international context: the targets of the Paris Agreement and the EU's joint commitments to fulfil the global agreement.

## 1.1 Global climate goals – Paris Agreement

The Paris Agreement is an international climate agreement concluded during the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris in 2015 (COP21). The Paris Agreement aims to limit global temperature increases, increase our ability to adapt to the impacts of climate change, and address the damage and losses caused by climate change. This will be done within the framework of the work for sustainable development and to eradicate global poverty. The Paris Agreement also includes ambition to reorient the world's investment flows to support all these objectives.

The overarching temperature goal of the Paris Agreement is to "hold the increase in the global average temperature to well below 2°C above pre-industrial levels and make efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change"<sup>3</sup>.

However, the collective knowledge of the impacts of climate change is greater today than when the Paris Agreement was concluded. We therefore know that every tenth of a degree increase in average temperature above pre-industrial levels will have more severe impacts than previously thought. Moreover, global emissions have not yet started to decline. Recent reports therefore show that countries need to take strong action in the near term to limit the temperature increase and it will be practically impossible to reach 1.5 degrees unless further action is taken to substantially reduce emissions by 2030<sup>4, 5</sup>. Every tenth of a degree increase in temperature is important to prevent. To successfully limit warming to below 2 degrees. To achieve this, total greenhouse gas emissions need to be negative in the second half of this century. In other words, greenhouse gas emissions must be less than removals.

The Paris Agreement does not regulate in detail how global temperature targets should be translated into national or regional targets. It is up to each country to decide its own level of ambition, but each country's climate commitments should be as ambitious as possible based on its capacity. The Paris Agreement also states that high-income countries should take the lead in climate action by adopting ambitious emission targets to leave room for developing countries to make emissions.

All signatories to the Paris Agreement are required to submit a nationally determined climate plan (NDC) to the UN every five years. The aim is for countries to progressively update their climate plans, leading to progress over time. A climate plan must include targets for emission reductions that will be progressively tightened. The Paris Agreement does not allow countries to lower their ambitions. By early 2025, the next NDC will be submitted by countries, announcing climate plans until 2035. The EU will submit a joint climate plan summarising the national climate targets of EU Member States.

Every year, the UNFCCC secretariat publishes a report showing whether countries' climate plans are collectively sufficient to achieve the goals of the Paris Agreement. So far, countries' climate plans have not been sufficient to achieve the required emission reductions<sup>5</sup>. The latest update shows that ambition has increased slightly, but not enough.



## 1.2 EU climate targets and Sweden's commitments

In 2021, the EU adopted a common climate policy framework. The framework includes a climate law, a climate target and a scientific advisory body on climate change (ESABCC).

### The objectives of the Climate Change Act

The long-term objective of the Climate Change Act is to achieve a balance between emissions and removals of greenhouse gases (net zero emissions) by 2050. Thereafter, the goal is to aim for negative emissions.

The EU Climate Law also sets an interim target to reduce greenhouse gas emissions by at least 55 percent by 2030 compared to 1990<sup>a</sup>. These targets are to be achieved within the EU's borders.

Efforts to reduce emissions are being made under the EU Emissions Trading System (EU ETS), the Effort Sharing Regulation (ESR) and the Land Use, Land Use Change and Forestry Regulation (LULUCF). Both emission reductions and enhancement of removals (e.g. carbon sequestration in forests) are included in the climate target. However, they are regulated in different to keep the focus of Member States on reducing emissions.

The Climate Law requires the EU to adopt a new climate target for 2040. As for all parties to the Paris Agreement, the level of ambition will increase over time. The EU's 2040 climate target and the upcoming EU NDC will be negotiated in early 2025.

### EU Emissions Trading System

A large part of the emission reductions in the EU are managed within the EU Emissions Trading System (EU ETS). The existing Emissions Trading System (EU ETS 1) regulates emissions from activities that account for around 40 percent of the EU's total greenhouse gas emissions today: large industrial installations, electricity and heat production, and aviation within the EU<sup>b</sup>. The ETS sets the maximum level of emissions within the EU, and by 2030 emissions are to be reduced by 62 percent, compared to 2005<sup>6</sup>. Emissions trading is free, meaning that the EU does not allocate emission allowances between Member States. From 2027 onwards, an additional Emissions Trading System for road transport, heating and other fossil fuels (EU ETS 2) that are not included in the current EU ETS are introduced. A further description of the emissions included in EU ETS 2 is provided in section 2.3.

### The ESR and LULUCF regulations

EU Member States have the primary responsibility for reducing emissions not addressed under the existing Emissions Trading System (EU ETS 1), including emissions from transport, domestic heating and agriculture. This responsibility is regulated under the Effort Sharing Regulation (ESR). Adding up the Member States' commitments within the EU, emissions will need to be reduced by 40 percent by 2030, compared to 2005.

<sup>a</sup> In May 2023, the LULUCF Regulation was updated, effectively raising the EU's 2030 climate target from reducing net greenhouse gas emissions by 55 percent to 57 percent, compared to 1990 levels.

<sup>b</sup> International air traffic to and from the European Economic Area (EEA) is excluded from the EU ETS. Between 2024 and 2026, maritime transport within the EEA is also gradually included in the EU ETS.

In addition, EU Member States will need to increase their net removals of greenhouse gases in the land use sector (LULUCF), reaching a total of 310 million tonnes of removals in 2030, which is an increase in net removals of 42 million tonnes compared to the 2016-2018 reference period. The commitments are distributed based on the average net removals in the period 2016 to 2018 and the share of the total EU utilized land area<sup>6</sup>.

The commitments in the ESR are distributed primarily based on the economic conditions of the Member States where Sweden, together with Finland, Denmark, Luxembourg and Germany, has received the most ambitious commitment to reduce emissions in the ESR by 50 percent by 2030, compared to 2005<sup>7</sup>. Emissions in the ESR must be reduced according to an emissions budget allocated to each Member State for the entire period from 2021 to 2030<sup>7</sup>.

For the land use sector (LULUCF), the annual net removals from forests and land should be 4 million tonnes higher in 2030, compared to the average of the 2016-2018 reference period. The regulatory framework under the LULUCF Regulation is divided into two periods, 2021-2025 and 2026-2030. For the period 2021 to 2025, the sum of emissions for the different land accounting categories should not be greater than removals, according to the so-called "no-debit" rule. For 2026 to 2029, an uptake budget for Sweden is to be developed, based on a linear target path set in 2025.

### 1.3 Sweden's climate targets

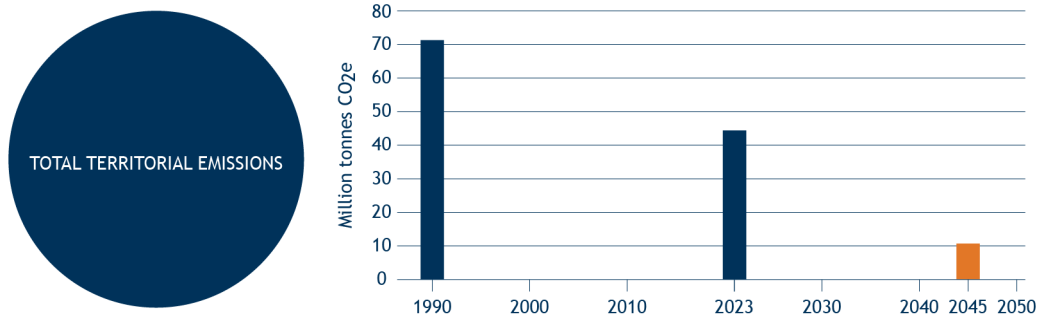
The long-term goal of the Swedish climate policy framework is for Sweden to have no net emissions of greenhouse gases by 2045, i.e. zero net emissions. After 2045, negative emissions will be achieved. The net zero target is specified so that emissions within Sweden's borders in 2045 will be at least 85 percent lower than in 1990. The emissions that may remain to achieve net zero can be offset with so-called supplementary measures.

The net zero target applies to territorial emissions of greenhouse gases, i.e. emissions within Sweden's borders. It does not include emissions from international shipping and aviation that are refuelled in Sweden but have a destination outside Sweden's borders.

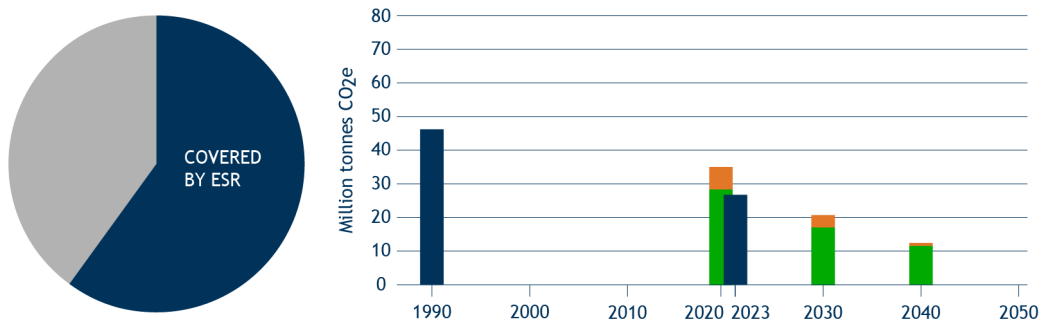
On the way to the net zero target in 2045, there are interim targets for 2030 and 2040. The interim targets apply to emissions covered by the Effort Sharing Regulation (ESR), i.e. emissions outside the existing Emissions Trading System (EU ETS 1). Before the current climate policy framework was adopted, there was a corresponding interim target for 2020, which Sweden achieved by a good margin.

There is an additional nationally agreed interim target for 2030 that applies to emissions from domestic transport. Domestic aviation included in the existing Emissions Trading System (EU ETS 1) is not covered by the interim target. All targets are illustrated in the different parts of Figure 1.

**Figure 1. Targets in the Swedish climate policy framework. Emission trends from 1990 to 2023.**

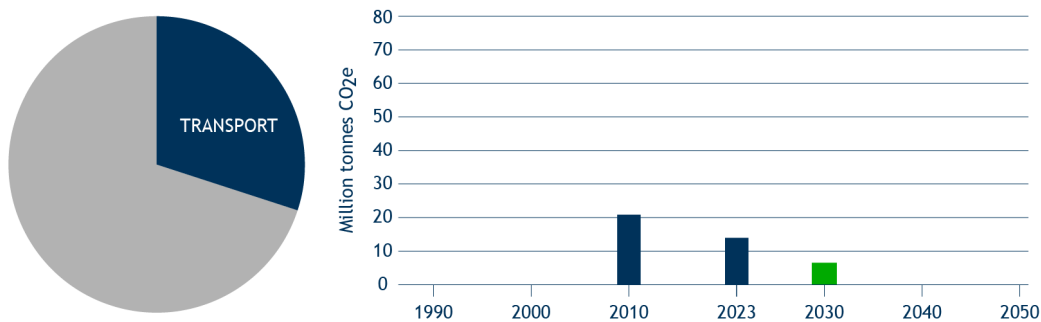


**Sweden will achieve zero net emissions by 2045.** This means that greenhouse gas emissions must be at least 85 percent lower in 2045 than in 1990. The remaining emissions can be offset with supplementary measures. After 2045, Sweden will have negative net emissions.



**Interim targets for emissions covered by Sweden’s commitment at EU level under the Effort Sharing Regulation (ESR)**

- By 2020, emissions would be 40 percent lower than in 1990. A maximum of 13 percent was to be achieved through climate investments in other countries. This interim target has been met.
- By 2030, emissions will be at least 63 percent lower than in 1990, of which a maximum of 8 percent of the reduction can be achieved through supplementary measures.
- By 2040, emissions are to be at least 75 percent lower than in 1990, of which no more than 2 percent of the reduction can be achieved through supplementary measures.



**The transport sector milestones**

By 2030, emissions from domestic transport (excluding CO2 emissions from domestic aviation) will be at least 70 percent lower than in 2010.

- GREENHOUSE GAS EMISSIONS
- INTERIM TARGET: EMISSIONS WITHOUT SUPPLEMENTARY TARGETS
- INTERIM TARGET: EMISSIONS THAT MAY BE COMPENSATED FOR WITH SUPPLEMENTARY MEASURES

Source: Swedish Environmental Protection Agency<sup>8</sup>.

## What are supplementary measures?

Sweden's climate targets (except for the interim target for domestic transport) are formulated in such a way that part of the target fulfilment can take place through so-called supplementary measures. Supplementary measures will probably be needed to compensate for emissions that are difficult or very costly to remove completely, such as certain diffuse emissions from industry and certain biological emissions from agriculture.

The supplementary measures that were known when the climate targets were decided in 2017, and which are mentioned in the proposal for the climate policy framework<sup>9</sup>, are

- increasing net greenhouse gas removals from forests and soils (part of the land use sector, LULUCF)
- capture, transport and storage of carbon dioxide of biogenic origin (often referred to as bio-CCS or BECCS)
- verified emission reductions through investments in other countries (regulated in Article 6 of the Paris Agreement)

The preparatory work for the climate policy framework states that other complementary measures may also be relevant in the long term. The 2020 crossroads report mentions, for example, that capturing greenhouse gases in the atmosphere through technical measures could be one such example<sup>10</sup>. For Sweden to have negative net emissions after 2045, the complementary measures must reduce emissions or absorb more greenhouse gases than the country emits in total.

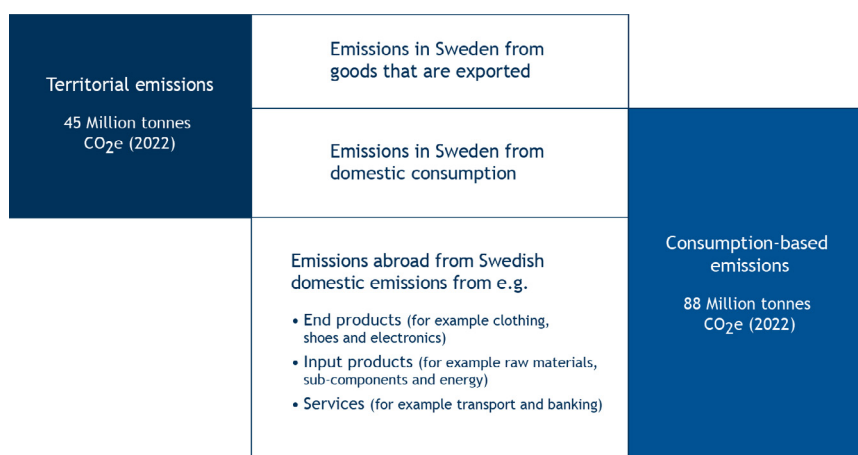
### FACT BOX 1. CONSUMPTION-BASED EMISSIONS

Sweden's climate target covers territorial emissions of greenhouse gases, i.e. emissions that occur within the country's borders. The reporting of these emissions is based on a calculation method that the countries of the world have jointly agreed to use under the United Nations Framework Convention on Climate Change (UNFCCC). This report focuses on territorial emissions.

Another way to calculate greenhouse gas emissions is through so-called consumption-based emissions, which show the total carbon footprint of a country and its population. Consumption-based emissions include all emissions from a country's consumption of goods and services, regardless of where they occur. Sweden's consumption-based emissions thus include both our domestic emissions and emissions that arise in other countries as a result of Swedish consumption.

Sweden's consumption-based greenhouse gas emissions amounted to 88 million tonnes of carbon dioxide equivalent in 2022, according to the latest available statistics. Around 60 percent of emissions came from household consumption and the remaining 40 percent from public consumption and public investment. Most of the emissions, 66 percent, occurred in other countries, mainly through the import of goods into Sweden. Territorial emissions in 2022 amounted to 45 million tonnes of carbon dioxide equivalent.

**Figure 2.** Relationship between territorial and consumption-based emissions.



Source: Swedish Environmental Protection Agency<sup>8</sup> (adapted by the Climate Policy Council).

## 1.4 Comparison between Sweden's national targets and EU commitments

The Swedish national interim targets for 2030 and 2040 cover the same emissions as Sweden's commitment at EU level under the Effort Sharing Regulation (ESR). However, the commitment to the EU is constructed differently from Sweden's national targets. One important difference is how carefully the path towards the targets is managed.

Sweden's national interim targets are point targets, which means that they only apply to the years 2030 and 2040. There are so-called indicative trajectories<sup>6</sup> to guide policy up to 2030 and 2040, but they are not binding. The EU's ESR regulation, on the other hand, has fixed emission levels for each year up to the target. For each year, there is thus an emissions budget for much greenhouse gas Sweden may emit up to and including 2030. Sweden's emissions budget under the ESR Regulation for the years 2021 to 2030 is just over 270 million tonnes of carbon dioxide equivalent.

The EU framework, on the other hand, allows more flexibility to fulfil Member States' commitments. Member States can save and borrow emission allowances, i.e. move them between years. Similarly, they can move a limited number of allowances between the EU Emissions Trading System (EU ETS) and the ESR, and between the ESR and the land use sector (LULUCF). In addition, Member States can sell and buy emission allowances between themselves through bilateral agreements. The flexibilities in the EU ETS are described in more detail in the Climate Policy Council report 2024.

Apart from these flexibilities, there is a high degree of agreement between the nationally decided targets and the EU targets for the final year 2030. According to EU regulations, Sweden's emissions within the ESR for 2030 may amount to a maximum of 22 million tonnes of carbon dioxide equivalent, if no flexibilities are used, and according to the Swedish climate target to a maximum of 17-21 million tonnes, depending on the extent to which supplementary measures are used.

The EU targets do not contain any direct equivalent to the supplementary measures contained in the Swedish interim targets. EU regulations do not allow investments in countries outside the EU to be counted towards target fulfilment, and in the case of bio-CCS it is not yet clear how such uptake can be counted towards the EU targets.

As regards the land use sector (LULUCF), Sweden has a separate commitment to the EU to increase net greenhouse gas removals by around 4 million tonnes of carbon dioxide equivalent. This can be compared with the maximum volume of supplementary measures in the Swedish regulatory framework, which also amounts to just under 4 million tonnes of carbon dioxide equivalents and where increased net removals in LULUCF are included as an option.

The EU targets are thus more ambitious than the Swedish climate targets for net removals in the LULUCF sector. However, as with the ESR, there are some flexibilities for achieving Sweden's LULUCF commitment. It is possible to move emission allowances between years up to 2030, and it is also possible to transfer surplus emission allowances from the ESR sector to the LULUCF sector. If the EU's overall net removals move towards the targets, individual Member States can receive relief. In addition, as with the ESR commitment, it is possible to buy emission allowances from other Member States.

To summarize, there are both similarities and differences between Sweden's and the EU's climate targets for 2030. In January 2025, the Government commissioned the parliamentary Environmental Objectives Committee to review Sweden's climate targets for 2030, so that they are more consistent with Sweden's commitments within the EU<sup>11</sup>.

<sup>6</sup> Indicative target paths support the monitoring of the development of emissions from the non-trading sector. The target pathway decreases over time, in other words, this is how you want emissions in the non-trading sector to develop, but the indicative target pathways are not binding in the same way as the target years. They are intended to provide guidance, and the bill for the climate policy framework (2016/17:146) states that "If emissions exceed the indicative target pathway, this will prompt an analysis and may require proposals for further tightening of climate policy".

## 1.5 Reporting and monitoring within the EU climate framework

The European Commission is responsible for monitoring the correct application and timely implementation of EU laws in the Member States. To follow up on the climate and energy transition, a monitoring system is in place based on each Member State having a National Energy and Climate Plan (NECP). The EU Governance Regulation plays a key role here (see Fact Box 2)<sup>12</sup>.

The Governance Regulation requires each Member State to submit a NECP describing how it intends to fulfil its commitments under EU climate and energy legislation. The Governance Regulation also governs the planning, reporting and monitoring of greenhouse gas emissions by the EU and its Member States. There are mechanisms to highlight gaps between ambitions and actions in Member States, and the European Commission can decide on subsequent corrective measures. The Governance Regulation is aligned with the EU Climate Law and the EU Green Deal and they will be revised together in 2025.

### FACT BOX 2. REPORTING AND MONITORING OF MEMBER STATES' CLIMATE POLICIES

**The EU Governance Regulation** requires Member States to monitor and report on the status and planning of their climate action in relation to the EU's climate objectives. A key element of this is the National Energy and Climate Plans (NECPs), in which each country presents its targets and baseline analyses linked to EU climate and energy legislation. Each Member State's NECP must also include the measures planned to achieve the nationally binding commitments under EU climate legislation by 2030, as well as projections showing whether these measures are sufficient. If they are deemed insufficient, Member States must present additional proposed measures and updated projections.

Member States' compliance with their commitments under the ESR will be monitored in 2027 and 2032, during which the EU will check whether countries have stayed within their emissions budgets, including any flexibility mechanisms. If a country exceeds its budget for a given year, an emissions penalty of 8 percent per year will be applied, reducing the remaining emissions space for the following years.

To ensure that the EU's land use sector (LULUCF) targets are met, Member States must also submit compliance reports (emission and removal reports) to the European Commission in 2027 and 2032. These reports will show how each country is meeting its commitment under the LULUCF Regulation and how their actions interact with other EU objectives and frameworks, such as and climate adaptation.

**The Paris Agreement** requires all countries to revise their National Determined Contributions (NDCs) every five years to progressively increase their climate ambition. Sweden is updating its contribution together with other EU countries, as the EU submits a joint NDC to the UN. As part of the preparations each Member State, including Sweden, submitted their updated NDCs to the EU in 2024. The NDC that the EU should have submitted in February 2025 is delayed.

### Consequences of failure to meet targets

If EU countries collectively fail to meet the EU's climate targets, the EU will not fulfil the Paris Agreement, thereby jeopardizing and undermining global climate goals. If this were to happen, spillovers are likely to occur, meaning that countries outside the EU would be less likely to meet their own climate targets.

The EU has established mechanisms to deal with non-compliance by Member States. If a Member State fails to comply with the objectives and guidelines of EU law, the European Commission can launch an infringement procedure. If this fails, it can lead to sanctions from the European Court of Justice. If the European Commission judges that Member States are not making sufficient progress, it can require the submission of supplementary plans for both ESR and LULUCF showing how the country will meet its commitments and fulfil its targets.

# 2 Emissions trends – global, European and national

This chapter describes emissions trends at global, European and national level. The chapter also describes which emissions are included in the EU Emissions Trading System (EU ETS) and which emissions are covered by Sweden's commitments under the Effort Sharing Regulation (ESR) and the Land Use Change Regulation (LULUCF).

There is a very strong scientific consensus that rising levels of greenhouse gases in the atmosphere have thrown the Earth's climate system out of balance, leading to a rapidly rising global average temperature. A warmer climate also leads to a more intense hydrological cycle, with an increased likelihood of both heavy rainfall and droughts. The human impact on the climate system is unequivocal.

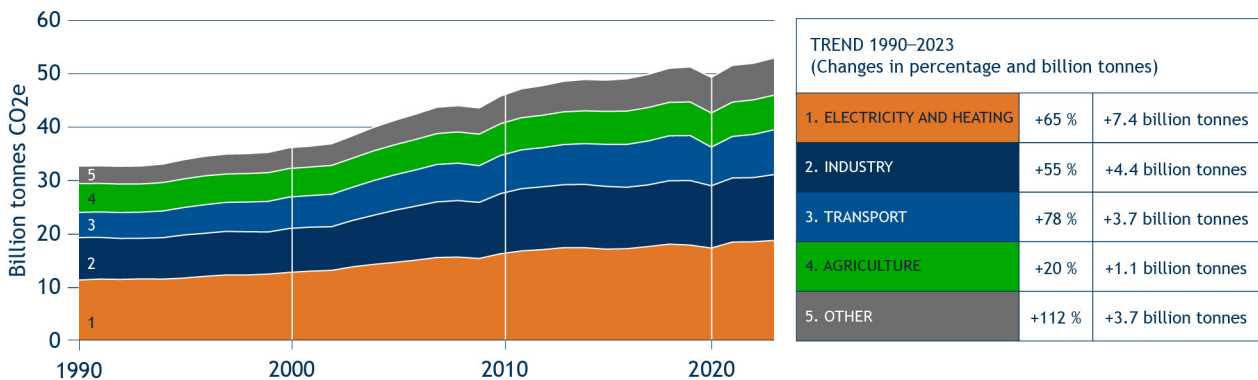
In 2024, previous heat records were broken, both in terms of air and sea surface temperatures, contributing to extreme events such as floods, heatwaves and forest fires. The global average temperature in 2024 was 15.1 degrees Celsius, which is 1.6 degrees above the pre-industrial level from 1850-1900, meaning that 2024 was the first single year that 1.5 degrees of warming<sup>13</sup>. Warming is faster over land than over sea and is most rapid in the polar regions. In Sweden, warming is therefore almost twice the global average.

Global warming will continue as long as the concentration of greenhouse gases in the atmosphere increases. Even if global emissions of carbon dioxide level off, the Earth will continue to have increasing temperature, due to the long residence time of carbon dioxide in the atmosphere<sup>4</sup>. Therefore, it is mainly the cumulative emissions and removals, i.e. the total net emissions of greenhouse gases over time, that matter for our chances of reaching the Paris Agreement's goal of keeping global warming well below two degrees and aiming to limit it to 1.5 degrees.

## 2.1 Global emissions trends

Global greenhouse gas emissions from fossil fuels continue to rise, with emissions estimated to have increased by 0.8 percent in 2024, reaching a new peak, resulting in carbon dioxide concentrations in the atmosphere that are now around 50 percent higher than in pre-industrial times<sup>14</sup>. The last time carbon dioxide concentrations were at such levels was 3-5 million years ago.

**Figure 3.** Total global greenhouse gas emissions by sector 1990–2023, in billion tonnes of carbon dioxide equivalent. The Other sector includes emissions from machinery, product use and waste treatment.



Source: European Commission Joint Research Centre<sup>15</sup>.

<sup>4</sup> The residence time of carbon dioxide in the atmosphere is less than 4 years, but because there is a large and rapid exchange with both the terrestrial biosphere and the near-surface layers of the oceans, the effective turnover time, which better describes how long carbon dioxide affects the climate, is several hundred years or more.

Two-thirds of GHG emissions come from the burning of fossil fuels and industrial processes that generate CO<sub>2</sub> emissions. In addition, there are significant emissions of other greenhouse gases, which have a stronger greenhouse effect but a shorter residence time in the atmosphere than carbon dioxide (see also fact box 4 in section 6.3). This applies in particular:

- methane (CH<sub>4</sub>), which is short-lived but powerful and comes, for example, from enteric fermentation, manure management and rice cultivation
- more persistent and powerful gases such as nitrous oxide (N<sub>2</sub>O), for example from land use and fertilizer production
- fluorinated greenhouse gases (F-gases), for example from refrigerators, air conditioning and foam insulation

In addition, greenhouse gas removals and emissions in the land use sector (LULUCF) contribute to both increasing and decreasing the global climate impact

### Those who affect the least, suffer the most

Many of the communities that have historically contributed least to climate change are disproportionately affected by its impacts. Over three billion people live in environments that are highly vulnerable to climate change. Extreme weather events have exacerbated food and water shortages for millions of people, particularly in Africa, Asia, Central and South America and the Arctic. Small island nations and the economically least developed countries are among the most vulnerable. Indigenous peoples, small-scale food producers and low-income households are also greatly affected<sup>16</sup>. In Sweden, for example, the Sami reindeer industry has been affected<sup>17</sup>.

Projections by the International Energy Agency (IEA) and other organizations suggest that global emissions from fossil fuels have peaked or could peak in this decade<sup>2</sup>. In absolute terms, China, the United States, India, the EU and Russia are the largest emitters<sup>18,19</sup>. Falling renewable energy prices create opportunities for emission reductions, but fossil fuel subsidies and weak climate policies remain a major challenge in many regions.

Emissions reductions are mainly taking place in high- and middle-income countries, which have also historically been responsible for the largest emissions. This is in line with the Paris Agreement's guidance that high-income countries should lead the climate transition.

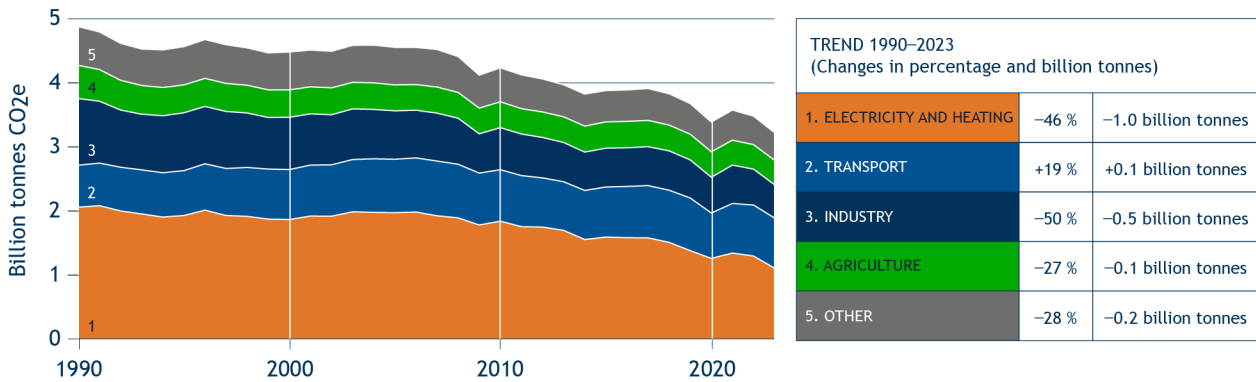
However, assessments indicate that the ambitions of countries' national climate plans (NDCs) are insufficient to achieve the goals of the Paris Agreement<sup>20</sup>. Moreover, there is a gap between the targets set and how emissions develop. This is problematic, as further warming increases the risk of further exacerbating the adverse effects of climate change. Warming must therefore be limited through large, rapid and sustained emission reductions and negative emissions. The reduction of emissions to zero net emissions will largely determine whether warming can be limited to below 2 degrees and even if we succeed, climate change is inevitable and may be irreversible.



## 2.2 Emission trends in the EU

In 2023, EU emissions fell by 8.3 percent compared to the previous year, according to preliminary statistics. Since 1990, emissions have fallen by 37 percent despite a growing population and an EU economy that has grown by almost 70 percent.

**Figure 4.** Total EU greenhouse gas emissions by sector 1990–2023, in billion tonnes of carbon dioxide equivalent. The 'Other' sector includes emissions from machinery, product use and waste treatment.



Source: European Commission Joint Research Centre<sup>15</sup>.

The large reduction in emissions in the EU in 2023 can be explained mainly by a 16.5 percent decrease in emissions from power plants and industrial installations, and a 24 percent decrease in emissions from electricity generation and heating, thanks to the deployment of renewable energy, especially wind and solar power<sup>22</sup>. Both sectors are included in the EU Emissions Trading System.

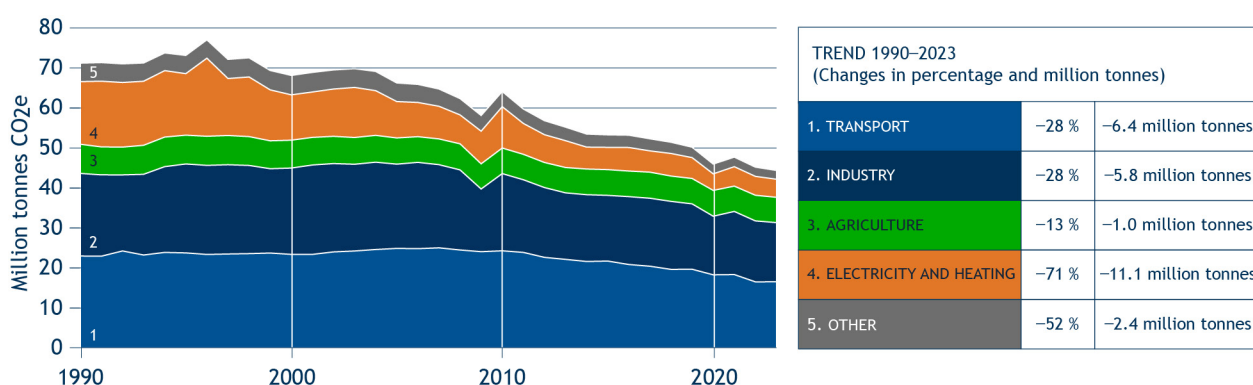
At the same time, the land use sector (LULUCF) carbon uptake in the EU increased by 8.5 percent, according to preliminary statistics that are subject to some uncertainty. However, this may mark a reversal of the recent downward trend in land use and forestry. In contrast, emissions from aviation increased by 9.5 percent, indicating that the trend of increasing aviation emissions after the coronavirus pandemic is continuing<sup>21, 23</sup>.

## 2.3 Emission trends in Sweden

Sweden is one of the few countries that has managed to reduce its emissions over a longer period, since the 1970s. This has contributed to Sweden's lower per capita territorial emissions than most other high-income countries. Emissions remained fairly stable between 1990 and 2000, but have gradually decreased since the early 2000s, except for 2010 and 2021, when emissions increased due to economic recovery from the global financial crisis and the coronavirus pandemic. Preliminary fuel statistics<sup>24</sup> show that emissions increased also in 2024, but not due to strong economic growth but to policy decisions.

Figure 5 shows the evolution of Swedish territorial emissions since 1990. In 2023, they were around 44 million tonnes, representing a decrease of 1 million tonnes or around 2 percent compared to the previous year. Since 1990, emissions have fallen by 38 percent.

**Figure 5.** Sweden's total greenhouse gas emissions by sector 1990–2023, in million tonnes of carbon dioxide equivalent. The Other sector includes emissions from machinery, product use and waste treatment.



Source: Swedish Environmental Protection Agency<sup>8</sup>.

If Sweden is to meet its climate targets, emissions will need to fall faster in the coming decades than they have so far. Much of the reduction in emissions since 1990 is due to reduced use of fossil fuels to produce electricity and heat. These emissions have fallen by around 70 percent as the use of fossil fuels for electricity and heat has virtually ceased. Sweden can therefore reduce emissions from electricity production to a very limited extent by producing more fossil-free electricity, but the production of fossil-free electricity is key to accelerating the transition in other sectors. Remaining emissions in the electricity and heat sector come mainly from heat and power plants that burn waste of fossil origin, mainly plastics.

The climate transition in Sweden is in a new phase where rapid and powerful changes are needed towards fossil-free and zero emissions in sectors other than electricity and heating. This applies not least to the transport sector, including work machines. This sector accounts for about one third of Sweden's total greenhouse gas emissions.

While emissions from domestic transport have decreased by 34 percent since 2010, the target of achieving at least a 70 percent reduction by 2030, compared to 2010, is still a long way off. Moreover, preliminary statistics show a substantial increase in transport emissions in 2024, largely due to the Government's decision to reduce the reduction obligation and the tax on petrol and diesel.

Emissions from Swedish industry account for about one third of total greenhouse gas emissions. Emissions from industry were relatively constant until around 2006 and have since declined. In 2023, emissions from industry were 26 percent lower than in 1990. The decrease is mainly due to fuel switching, energy efficiency and reduced production volumes in the iron and steel industry in the 2010s.

Industry's remaining emissions currently come mainly from the iron and steel industry, the minerals industry, the petrochemical industry and refineries. Reducing these emissions requires radical measures, such as process or product changes. Several of the larger industries are planning such technology shifts and major emission reductions are therefore expected within a few years<sup>25, 26</sup>.

The climate impact of agriculture has remained largely unchanged for three decades. This is one reason why the Climate Policy Council has chosen to focus on agriculture's emissions and possible ways to reduce them in the in-depth theme of this year's report. See Part II of the report.

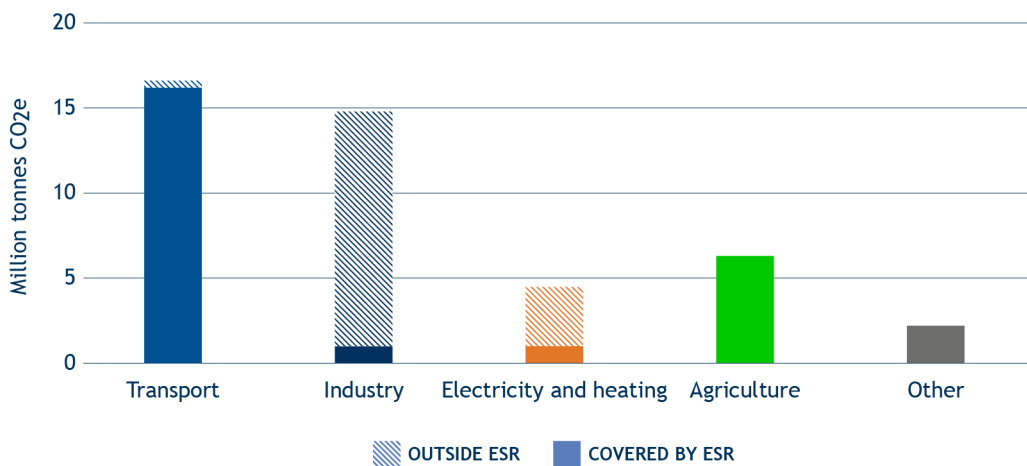
## Emissions in Sweden covered by the EU Emissions Trading System and the Effort Sharing Regulation

The EU's existing Emissions Trading System (EU ETS 1) covers greenhouse gas emissions from large industrial installations, electricity and district heating production, and carbon dioxide emissions from flights within the EU. In 2023, Sweden's emissions under EU ETS 1 were 17.2 million tonnes, which corresponds to 39 percent of Sweden's total greenhouse gas emissions. Since the start of emissions trading in 2005, emissions from the approximately 740 installations in Sweden included in the scheme have decreased by 22 percent, corresponding to 5 million tonnes.

Sweden's emissions under the Effort Sharing Regulation (ESR) cover domestic transport, machinery, agriculture, use of products and solvents, waste and small energy and industrial installations. These emissions have decreased by 35 percent since 2005. A large part of these emissions is included in Sweden's commitment under the ESR, but will also be included in the EU's upcoming Emissions Trading System for road transport, buildings and other sectors (EU ETS 2).

Figure 6 shows the Swedish territorial emissions of carbon dioxide equivalents in different sectors, and which are covered by the ESR and which emissions are regulated collectively at EU level through the existing EU Emissions Trading System (EU ETS 1).

**Figure 6.** Sweden's territorial greenhouse gas emissions in 2023 broken down by sector. The dashed part of the bars represents emissions that are not covered by Sweden's binding commitment under the Effort Sharing Regulation (ESR) but are included in the EU's existing Emissions Trading System (EU ETS 1). Other includes emissions from machinery, product use and waste.



Source: Swedish Environmental Protection Agency<sup>6</sup>.

## Greenhouse gas removals and emissions from Sweden's land use sector

The land use sector (LULUCF) in Sweden contributes to annual net removals (removals minus emissions) of the greenhouse gases carbon dioxide, methane and nitrous oxide. Over the period 1990-2023, net removals have averaged around 55 million tonnes of carbon dioxide equivalent per year, but there has been considerable variation.

However, in recent years, net removals have decreased significantly. In forests and soils, it has almost halved since the early 2010s. This is due to a combination of increased harvesting and natural regeneration together with reduced growth rates. While storage in harvested wood products and dead wood has increased at the same time, it has not been able to compensate for the decrease in removals. Net removals in 2023 were 31 million tonnes of carbon dioxide equivalent<sup>8</sup>.

# 3 Climate policy in the EU in 2024 and beyond

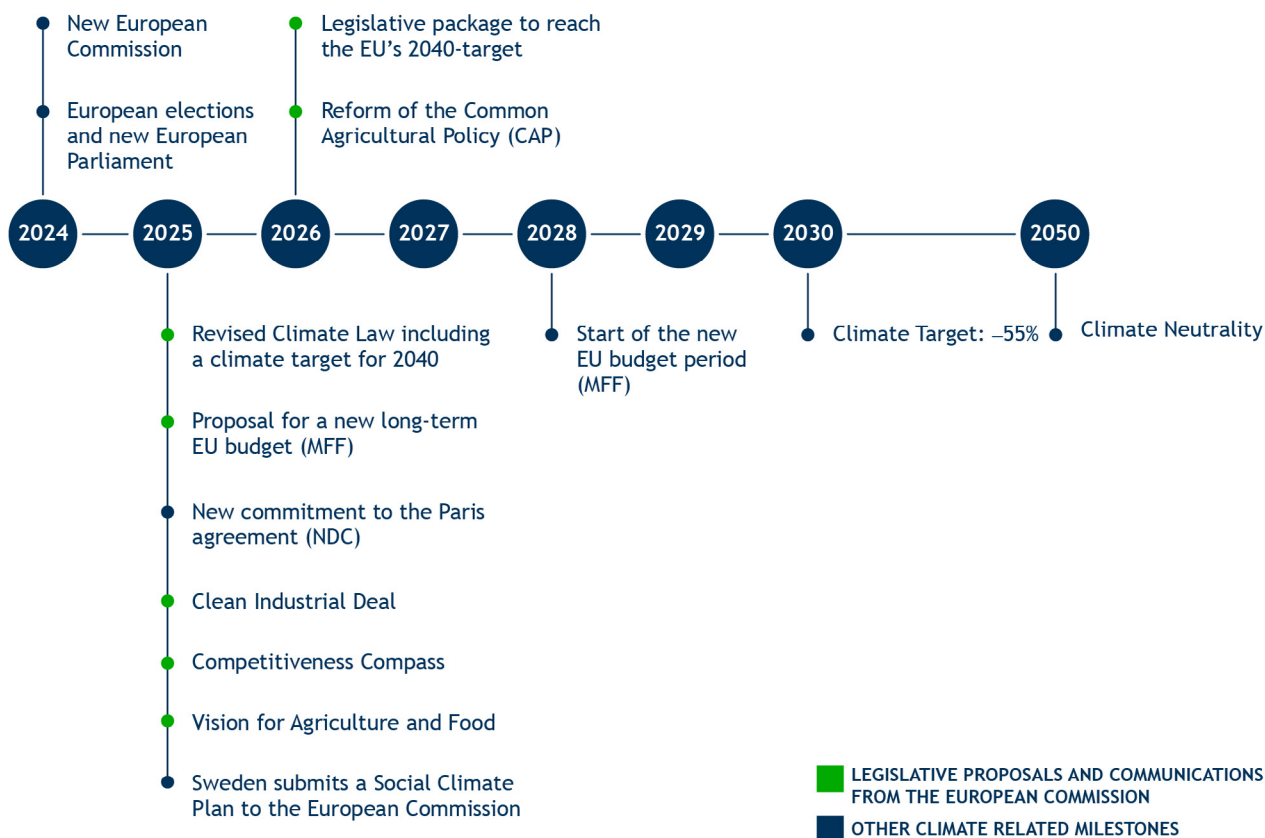
This chapter describes the development of climate policy in the EU in 2024 and future reforms. We describe how the various elements of climate policy contribute to the goal of a climate-neutral EU by 2050 and analyses the relationship with Swedish climate policy. The different sections of the chapter deal with the EU's climate goals for 2030, climate governance and legislative packages, budget systems and upcoming climate policy that Sweden can influence and be influenced by.

In this chapter, we also evaluate Sweden's actions in the EU. Many of the assessments and recommendations presented later in the report are based on the development of climate policy in the EU.

The current situation is that the EU and its Member States are facing a time of crucial choices and decisions to enable the transition needed to reach the EU's climate goals. The European Commission has recommended a 90 percent emission reduction target by 2040. To achieve this, most sectors need to reach near-zero emissions. In addition, sectors that still have high emissions, such as agriculture, need to contribute with further emission reductions.

In 2025 and beyond, the EU will make important revisions of legislation and put forward proposals to set the direction towards the targets. But of course, it is not enough for the EU to reach its climate targets alone. Therefore, the EU has a very important role to play continuing to push for more ambitious climate measures at the global level, including by acting as a role model.

Figure 7. Timeline of key milestones in EU climate action.



The 2030 climate target and climate neutrality by 2050 are still considered within reach<sup>21</sup>, EU projections show that net greenhouse gas emissions will decrease by 2030 with current policies, but only by 43 percent compared to 1990. Adding the measures Member States plan to introduce reduces emissions by 49 percent<sup>27</sup>, still short of the 55 percent target.

This emissions gap can potentially be closed by the measures described by Member States in their updated national energy and climate plans, which were due to be submitted by June 2024. They will be assessed by the European Commission in the first half of 2025. A preliminary analysis of the plans submitted so far shows that the gap between targets and measures has narrowed but that a gap remains with the EU's climate targets.

Against this background, it is important that the EU countries, including Sweden, further develop their policies to help achieve the EU's common objectives. Sweden has comparatively strong public finances and a well-developed infrastructure, which contributes to good preconditions to fulfil Sweden's EU commitments. The Climate Policy Council considers Swedish leadership in the EU cooperation to be important for the common task of closing the emissions gap by 2030, both through active support for EU policy (existing and new initiatives) and by setting an example for national implementation.

### 3.1 Climate neutrality and the implementation of the Fit for 55 package

The EU and Sweden have shown in recent decades that it is possible to reduce emissions while developing the economy and society. However, further efforts are needed to reach the targets under the EU climate law. Emissions in the EU need to continue to decrease to reach climate neutrality by 2050 at the latest. The EU relies on the efforts of Member States to achieve the common climate objectives.

The EU's 2030 climate target is to reduce net greenhouse gas emissions by at least 55 percent. To help ensure that EU policies are in line with that target, the Fit for 55 package, is in place. The package includes revisions to already adopted policies as well as new proposals and measures affecting different sectors of the economy, including energy, transport, industry and agriculture (see Figure 8)<sup>e</sup>.

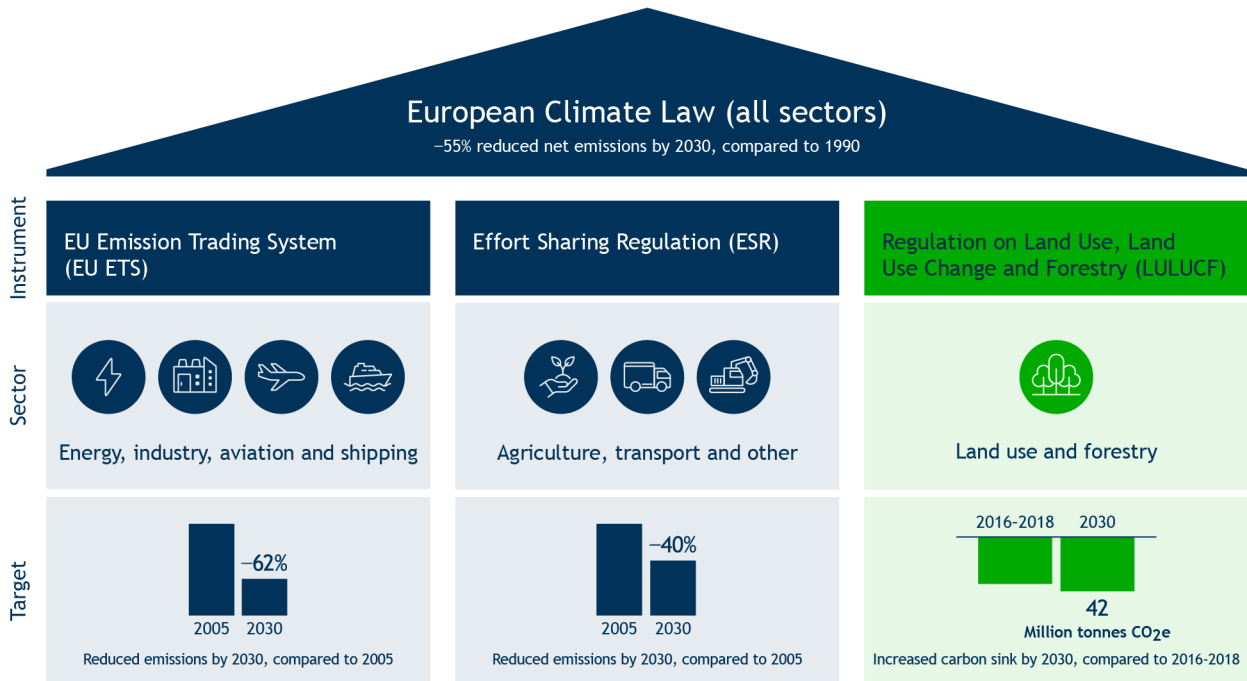
With only five years to go until 2030, the implementation of the Fit for 55 package depends on Member States' ambition, development and implementation of measures. In Sweden, the Fit for 55 package has led to stricter requirements for net emission reductions in certain sectors and demands for a faster transition of the energy system.

<sup>e</sup> For a more detailed description of the respective legislation, see the Climate Policy Council Report 2024.

## 3.2 EU policy instruments for the 2030 climate targets and beyond

This section summarizes the further development of the Fit for 55 package in 2024, and how the EU is now looking ahead beyond 2030.

**Figure 8.** Overview of the EU climate law and how emission reductions and removals are distributed in three main sectors.



Source: European Commission<sup>37</sup>.

### Carbon Removals and Carbon Farming Framework

An important piece of legislation was added in 2024, the EU Regulation establishing a framework for the certification of carbon capture and storage. The framework aims to ensure that carbon capture and storage measures are of high quality. It contains defined criteria, processes and rules based on key components of quantification, additionality<sup>f</sup>, long-term storage and sustainability. The framework is designed to facilitate and accelerate the implementation of carbon removals. Carbon sequestration can take place through carbon storage in forests and agriculture, through permanent carbon capture facilities and through carbon storage in products.

The Climate Policy Council considers a certification framework of this kind to be an important prerequisite for enabling effective and credible carbon capture and sequestration and ultimately net-negative emissions.

Over the coming years, the European Commission will develop methodologies for certification and implementation of the framework. The framework will for example include carbon sequestration methods for removals and emissions from agricultural land, forests and organic soils (such as peatland rewetting). The framework also aims to facilitate the EU in meeting the UN climate targets, as well as for Member States to meet the LULUCF Regulation ambitions.

<sup>f</sup> The additionality of an emission reduction from a specific climate measure means that the emission reduction would not have materialized without the specific action.

## EU budget and climate finance

How to finance the climate transition is an important issue going forward. In 2024, the European Commission worked on developing proposals and financing mechanisms for the next financial framework. The European Central Bank's (ECB) work during the year also moved in the same direction, as there is a growing understanding among financial institutions that environmental and climate issues must be integrated into economic and financial framework<sup>28</sup>. EU funds already exist to support green investments and initiatives for Member States to use for national measures.

The Multiannual Financial Framework (MFF) is the EU's long-term budget, setting overall financial priorities for seven years. The total budget for the current period is €1,824 billion, which includes the NextGenerationEU<sup>§</sup> recovery fund.

The budget aligns the EU's financial resources with strategic objectives, including climate action. Under the current financial framework for 2021-2027, the EU has allocated 30 percent of the budget to climate measures, i.e. more than €600 billion. The budget resources are distributed across different climate areas, including energy saving and efficiency, sustainable transport and infrastructure, renewable energy sources, and climate adaptation and emission reduction through the common agricultural policy.

The European Commission has started the work on the new EU budget for the period after 2027, which includes assessing the effectiveness of the current budget, identifying new priorities and negotiating funding allocations between Member States. The European Commission is required by the treaties to put forward a formal proposal by July 2025<sup>29</sup>. Member States can influence the budget process through several processes, including dialogue, consultation and expert meetings. The Climate Policy Council believes that it is important for Sweden to push for an EU budget that enables climate transition throughout the Union.

## A just climate transition

A just transition means that the transition to a climate-neutral economy should be socially just and economically sustainable. The EU's work focuses on ensuring that the transition to a climate-neutral economy is perceived as socially and economically just for all Member States and their populations<sup>30</sup>. There is a strong and growing awareness in the EU of the importance of the transition being perceived as fair.

In 2024, the EU has taken several important steps to promote a just transition towards climate neutrality. The EU has limited powers to develop policies that can even out the social differences by climate policies, for example in terms of taxation. It is therefore necessary that Member States contribute to a just transition through three EU tools, among others:

- Just Transition Fund - focuses on the regions and sectors most affected by the climate transition. It aims to reduce negative economic and social impacts by supporting the transition to greener technologies, skills development and job creation. Each country must develop a national plan describing the regions and industries it intends to support through the fund. Sweden's plan focuses primarily on support for the steel, metal and mineral industries<sup>31</sup>. One example is that on 4 December 2024, the Swedish Agency for Economic and Regional Growth granted the steel group SSAB SEK 1.45 billion in support from the fund. In total, the fund will provide Sweden with around EUR 155 million over the period 2021-2030, of which Sweden will co-finance 50 percent.

<sup>§</sup> Recovery Instrument launched to support the economic and social recovery from the COVID-19 pandemic with reimbursement to start in 2028.

- InvestEU - is a long-term investment programme for investments to support sustainable growth, innovation and jobs. Sweden has received funding for several projects, including the development of fossil-free steel. InvestEU, together with the European Investment Bank (EIB), has contributed EUR 371 million to Sweden.
- Social Climate Fund - to support the most vulnerable members of the population and small businesses affected by higher prices resulting from the EU's upcoming new Emissions Trading System (EU ETS 2). The fund's actions focus on measurable results in energy efficiency, renewable energy and sustainable transport.

To receive funding from the Social Climate Fund, each Member State must produce a social climate plan and submit it to the European Commission by June 2025. On behalf of the Government, Swedish authorities are contributing to the plan in various ways. In October 2024, the National Institute of Economic Research calculated the effects of price increases resulting from the introduction of EU ETS2, and the Swedish Environmental Protection Agency will provide input to the plan in spring 2025.

According to the EU, national social climate plans should include measures to mitigate the social and economic impacts of climate action on households, small businesses and the transport sector. They should also focus on support and subsidies for energy efficiency, the expansion of public transport and helping vulnerable households to manage the costs of the transition. In its work on the plan, the Government has proposed to use funds to introduce an electric car premium targeted at groups in need of support, for example in sparsely populated areas, starting in 2026.

The rules of the Social Climate Fund are as follows:

- Member States will only be granted funds if they achieve the targets they have set in the plans.
- Member States may pay out a maximum of 37.5 percent of the fund's total resources in direct income support to compensate for increased costs resulting from the ETS.
- Member States can use the fund to help households and businesses reduce emissions and thus avoid the effects of carbon pricing in the EU, such as energy efficiency measures in buildings or increasing the share of zero- or low-emission vehicles.

Sweden's share of the Social Climate Fund amounts to approximately SEK 4.5 billion per year in 2026–2032<sup>h</sup>. This is roughly equivalent to the annual amount of Klimatklivet support in recent years. These funds could help to create acceptance for achieving Sweden's climate goals. We will return to the acceptance perspective in section 4.3.

<sup>h</sup> The terms and conditions of the Fund require co-financing of at least 25 percent of the total estimated costs of the actions. In Sweden, this corresponds to approximately SEK 1.1 billion at the time of the request for the maximum allocation.



### 3.3 EU climate policy developments

In 2024, the European Commission worked intensively to develop new legislative proposals to strengthen the EU's climate objectives and consolidate the EU's global leadership on climate action. An important part of this was the development of a climate change mitigation target. The Fit for 55 package has laid the foundation, but reaching net zero emissions by 2050 will require more. The coming years will be crucial as the EU Commission, the Council and European Parliament will deepen and concretize the objectives to lead the way towards a climate-neutral EU

#### The new European Commission's priorities

In 2024, the European Council appointed Ursula von der Leyen as President of the European Commission for a second term, and her new Commission took office on 1 December. The Commission has since signaled that the implementation of the Fit for 55 package is a high priority, and we can expect more important developments in climate governance until 2027.

The new European Commission has demonstrated that competitiveness and climate transition are now integrated issues. This is reflected, for example, in the fact that the new Commission has an executive vice-president responsible for sustainable, just and competitive transition. This is different from the past, when the Commissioner for competitiveness had no formal role in relation to climate issues.

In January 2025, the European Commission presented a new roadmap to boost EU competitiveness, the so-called Competitiveness Compass<sup>32</sup>. Part of the aim of the Competitiveness Compass is to promote investment in green technologies and renewable energy, with the aim of increasing investments with EUR 800 billion per year. The European Commission wants to reconcile environmental objectives with economic development and therefore proposes sectoral green policies, i.e. different sectors are governed by different policy instruments. Examples include more open trade policies in certain sectors and incentives for sustainable technologies in areas where Europe is competitive, such as wind power. In addition, the European Commission proposes to protect new industries within climate-friendly technologies, for example through quotas in public procurement and selective trade tariffs.

The Commissioners for Energy and Climate have prepared several action plans and strategies, including a plan for affordable energy prices, an electrification plan, a sustainable energy investment strategy and a citizens' energy package. In February, the European Commission presented new proposals on sustainability reporting requirements, mainly aimed at simplifying EU rules for companies<sup>33</sup>. The European Commission is also developing an industrial carbon management strategy to accelerate a single market for carbon<sup>i</sup>. In addition, a revision of the Energy Taxation Directive is planned, as well as measures for a green VAT. The European Commission's Directorate-General for Climate Action and Directorate-General for Competition has been working together to develop a Clean Industrial Deal<sup>34</sup> that focuses on supporting the transition to net zero emissions in energy-intensive sectors such as steel and cement, where a new state aid framework is central. However, there is uncertainty about how much the Commission can change the rules here, as they are set out in the Treaty on the Functioning of the European Union<sup>35</sup>.

It is the Commission's task to propose policies for the EU, but the institution needs the support of the Member States and the European Parliament for new legislation to be put in place. Sweden should work to maintain a high level of ambition within the EU and to secure support for an ambitious climate policy at national level.

<sup>i</sup> The European Commission's Industrial Carbon Management strategy COM/2024/62.

## EU climate target for 2040

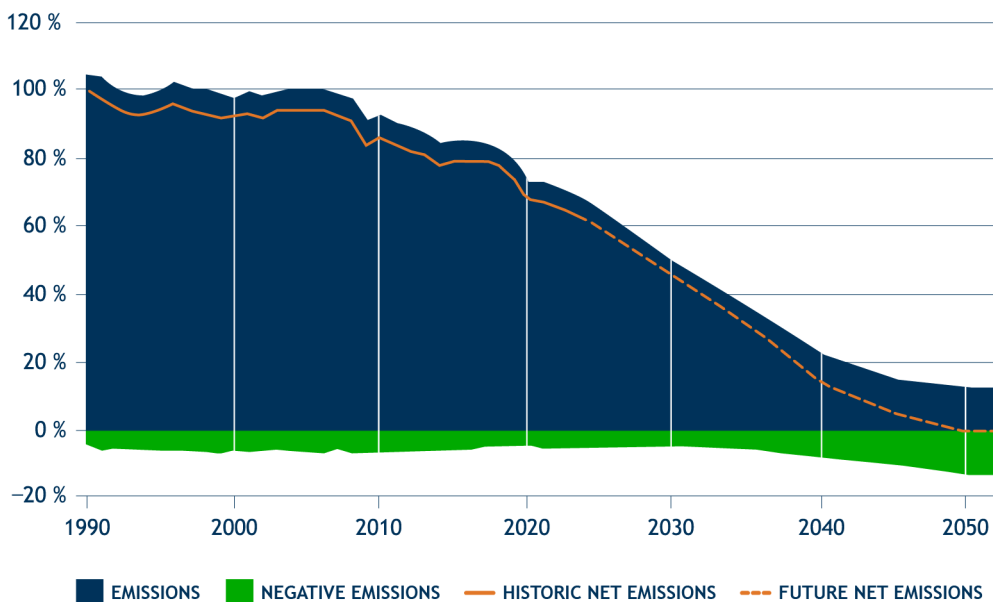
In early 2025, the European Commission will propose a new target for emission reductions by 2040. The 2040 target will be an intermediate target towards the EU's 2050 climate target. The work on the 2040 target will fit into the timetable of the UN climate negotiations. Each UN member state will present its climate target for 2035, and the EU will present the collective target for the EU. The EU will therefore calculate its 2035 target to the UN based on the 2040 target.

Ahead of the Commission's recommendation for a 2040 target, the European Scientific Advisory Board on Climate Change published a paper on what it considered a possible way forward, analyzing, among other things, the feasibility of different scenarios to reach climate neutrality in the EU by 2050, as well as estimates of what is the EU's fair contribution on the path to this goal.

The European Scientific Advisory Board on Climate Change (ECABCC) concluded that the EU must aim to reduce emissions by 90-95 percent by 2040. Their analysis shows that more efforts are needed in all sectors to achieve the EU's 2030-2050 climate targets, including construction, transport, agriculture and forestry. In addition, they assess that negative emission technologies need to be developed<sup>36</sup>. The ECABCC considers that an EU policy is needed that fully supports the phase-out of fossil fuels. The aim should be to prevent energy infrastructure from continuing to rely on emission-intensive energy sources. Emissions in agriculture have not been reduced at a sufficient rate due to insufficient incentives. The ECABCC therefore recommends targeting the Common Agricultural Policy (CAP) towards lower emission farming practices, reducing support for livestock farming and introducing emission charges for the agriculture and land use sectors to reflect the environmental costs of these sectors.

The ECABCC also calls on the EU to conduct systematic socio-economic impact assessments to ensure that vulnerable populations and affected businesses receive targeted support.

**Figure 9.** Scenario for the EU's path to climate neutrality 1990–2050. The figure shows the percentage of total net emissions in the EU in relation to the EU's net emissions in 1990.



Source: European Commission<sup>37</sup>.

Last year, the European Commission presented its recommendation on a climate target for 2040. The recommendation calls for a 90 percent reduction in net emissions by 2040 compared to 1990 levels<sup>38</sup>. While this is an ambitious target, it falls short of what the ECABCC has proposed. However, it implies a significant acceleration in the reduction of emissions from sectors such as industry, transport, and buildings, but also an increased role for sectors such as agriculture. The increased importance of net removals can be seen in Figure 9.

The basis for the European Commission's 90 percent recommendation is its own impact assessment. They have evaluated different scenarios for climate action based on several key criteria to

- ensure climate neutrality
- reduce the EU's emissions budget
- ensure a just transition
- maintain the long-term competitiveness of the EU economy
- provide clear guidance and predictability to implement the best technologies that are both cost-effective and scalable.

### Inclusion of the 2040 climate target in the EU framework

The European Commission will present a legislative proposal to include the 2040 target in the EU climate law and ensure that a post-2030 framework is in place to achieve the 2040 target in a fair and cost-effective way. The European Commission is expected to consult Member States, the European Parliament, stakeholders and the public as part of the review. These consultations will ensure that the views of different sectors and actors are included in the finalization of climate policy. In parallel, the European Commission will examine the effectiveness of current policies, in particular how countries are delivering on their national climate and energy targets. The analysis will be based on reports from Member States and the European Environment Agency (EEA), among others. Depending on the outcome of the analysis, the Commission may choose to make new legislative proposals or revise existing legislation to adjust climate policy. The proposals are then negotiated within the EU decision-making bodies.

In 2025, the EU is due to submit its climate action plan (NDC) to the UN, but the submission may be delayed due to the ongoing and lengthy process of setting a new EU climate target for 2040. The 2030 target, which forms the basis of the current EU NDC, took a year to finalize. At present, only a few countries have submitted updated targets to the UN. The Swedish Climate Policy Council believes it is important that Sweden actively promotes the timely submission of the NDC by the EU, in order clearly signal to the rest of the world that the EU has a sustained climate policy ambition.

## 3.4 The Swedish Government's actions in the EU in 2024

In June 2024, Sweden submitted an updated National Energy and Climate Plan (NECP) to the European Commission. In the NECPs, Member States should set out their strategies for achieving the EU's 2030 climate targets. In last year's report, the Climate Policy Council recommended that the Government should take the opportunity to clarify Sweden's path towards the targets.

The Government's Energy and Climate Plan 2024 showed that Sweden will not achieve the EU's targets with the adopted instruments and did not contain measures to close the gap to the targets. The Climate Policy Council believes that this is a missed opportunity for the Government to show how Sweden will implement the EU's climate policy, especially given that the Government refers to the EU level as the central level for implementing an effective climate policy, and to demonstrate Swedish climate leadership.

Political discussions have since begun in both the European Parliament and the Council of the European Union (Council of Ministers) on what climate targets the EU should have after 2030. In the Council of Ministers, the Government represents Sweden following negotiations in the Riksdag that lead to a position. Based on this position, Sweden has, in 2024, participated in discussions on the development of EU climate policy. However, the Swedish position has long been not to take a position on the European Commission's proposed recommendation for target level. Against this background, the Climate Policy Council recommended in its 2024 report the Government to develop a clear Swedish position in favor of a science-based and ambitious climate target for the EU in 2040 in a timely manner before the new European Commission takes office.

Ahead of the final meeting of Member States ministers for environment in December 2024, the Government developed a position supported a 90 percent reduction in net emissions by 2040, compared with 1990, but only under certain conditions. For the Swedish Government to support the target level, the Government believes that the implementation of the climate target needs to be realistic and that

- the framework must be designed so that all EU Member States reach climate neutrality by 2050
- The EU should not rely on hard-to-achieve commitments for net LULUCF removals, but recognize the central role of the bioeconomy in the climate transition and create the conditions for long-term increased and sustainable food production
- Emissions Trading Systems should be the main track and that national commitments under the Effort Sharing Regulation should end after 2030
- incentives should be created for permanent negative emissions after the 2030 framework, new climate targets should be combined with technology-neutral energy policies that include all fossil-free options, including nuclear power<sup>39</sup>.

The Climate Policy Council considers it positive that the Government has taken steps forward in developing its position on an EU climate target for 2040. This is in line with our previous recommendation. However, it is unclear what these conditions for realistic implementation mean in practice. The EU is expected to decide on a climate target for 2040 in a first step and, in a second step, to decide on legislation to implement the climate target (see above). It will therefore be difficult for the Swedish Government to ensure that the above conditions are met before taking a position on the climate target. The Swedish Environmental Protection Agency believes that an ambitious European climate target for 2040 could improve the conditions for achieving Sweden's climate target of zero net emissions by 2045<sup>40</sup>.

We agree with the Government's assessment that the implementation of the 2040 climate target is of key importance. The Climate Policy Council welcomes the fact that in autumn 2024 the Government formulated several Swedish positions on the legislative package to achieve the EU's 2040 target. However, the Government should not use them as conditions, but should unambiguously support an EU-wide and science-based target in line with the Commission recommendation. Achieving elimination of net greenhouse gas emissions by 2040 will require comprehensive legislation. Policy will need to require many sectors to reach near-zero emissions, with an increased focus on sectors such as agriculture, on permanent negative emissions, and on emissions from aviation and shipping, where emission reductions have been more difficult to achieve in the near term.

It is important that Swedish authorities are well prepared for the society-wide legislative package that the European Commission is expected to present in 2026. Time is short and the sooner Swedish positions can be developed, the better the chances of them having an impact in the EU policy work. The Swedish Environmental Protection Agency has presented four interim reports on the EU's climate targets and framework up to 2040, which make an overall assessment of target levels and ways forward. It is positive that analytical work has begun within ministries and relevant authorities, but our assessment is that more focused analyses are urgently needed in several areas involving relevant authorities. Our assessment is that this analytical work should be prioritized, resourced and include all relevant authorities.



## THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Ensure that the Fit for 55 package is maintained and implemented as agreed, so that the EU and Sweden can meet their climate targets.
- Provide unconditional support for an ambitious and concrete climate target by 2040. Involve relevant authorities in a broad process to further develop proposals for EU legislation and policy instruments beyond 2030.

### 3.5 The role of Member States in EU climate governance – opportunities and constraints

EU rules and regulations on climate governance create varying opportunities and constraints for Member States' national governance. The Swedish Government's scope for action therefore differs depending on whether it is a matter of developing policy or implementing it. This difference is relevant for the assessment of the Government's work and the formulation of the recommendations.

To illustrate this, we have divided EU climate policy into three categories in Table 1: Governance design (how is the policy designed?), Application and implementation (who applies and implements?) and EU governance procedures (how does the EU govern?). The aim is to show that different regulations can create different opportunities for the Swedish Government to shape the content of national policy. The Swedish Government's role and responsibility for developing and implementing climate policy varies depending on what Sweden and the EU have control over. The design and content are affected by where the Government's actions have the greatest impact<sup>35</sup>.

**Table 1.** Typology of EU climate governance.

	Governance design	Application and implementation	EU governance procedures
<b>Centre of gravity of the resource</b>	Member States, the European Parliament and the European Commission	Member States	Member States, European Parliament, European Commission and Court of Justice
<b>Characteristics</b>	Member States have limited room for manoeuvre in the implementation phase after the adoption of the legal acts.	Member States have significant room for manoeuvre to adapt policies to national circumstances.	Framework rules that establish timelines and criteria for national governance and implementation.
<b>Success depends on</b>	The quality of the capacity of EU regulations and procedures	Capacity, quality, speed and creativity in national implementation processes.	The quality of national climate governance and how well it is aligned with EU procedures.
<b>Example of regulation</b>	Regulations on: <ul style="list-style-type: none"> <li>• EU ETS</li> <li>• CBAM</li> <li>• ESR</li> <li>• LULUCF</li> <li>• CAP (collection of regulations)</li> </ul>	Directive on: <ul style="list-style-type: none"> <li>• renewable energy (RED III), energy efficiency (EED), energy performance of buildings (EPBD)</li> </ul>	<ul style="list-style-type: none"> <li>• The Energy Union Governance Regulation and</li> <li>• climate action (climate and energy reporting)</li> <li>• EU climate law</li> <li>• Just Transition Fund</li> <li>• Social Climate Fund</li> </ul>

Source: Own processing based on Boasson et al. (2020) and Dupont et al. (2024)<sup>41, 42</sup>.

Table 1 shows that the Swedish Government's scope for influence varies between different types of EU policy. The scope for action is great in the category 'Application and implementation'. It is therefore important that the Swedish Government ensures that it has sufficient capacity and competence to implement EU policy in this category<sup>41</sup>.

Sweden participates actively in the development of EU policy through negotiations, initiatives and co-operation within the EU institutions. When policies are formulated, Sweden has good opportunities to influence the outcome and change the legislation. However, once the legal acts, mainly regulations, have been adopted, the Government often has limited opportunities to adapt or change the rules, such as emission targets and the rules in the EU ETS.

Other EU policies give Member States more room for manoeuvre to adapt policies to national circumstances, such as the renewable energy and energy efficiency directives. Here, the legislation provides targets and frameworks for Member States but leaves room for national decisions on how to achieve these targets. This means that Member States need to implement the policies in a thoughtful way for them to succeed. In addition, the EU has a 'climate governance system', which allows the European Commission to monitor and facilitate national implementation<sup>42</sup>.

# 4 Government policy in 2024

This chapter evaluates how the Government's policies have developed in 2024 regarding the potential to achieve the climate objectives. In section 4.1, we analyze how the policies adopted have affected the achievement of Sweden's short- and long-term climate objectives and EU commitments. This is followed in section 4.2 by an analysis of developments in a selection of policy areas that are central to creating the conditions for the climate transition. Finally, section 4.3 contains some overall assessments based on the Climate Policy Council's analytical framework, which addresses several cross-sectoral, qualitative aspects of an effective climate policy.

In last year's report, the Climate Policy Council concluded that the Government's climate policy action plan for the mandate period was insufficient to achieve Sweden's climate goals. One year later and almost two-thirds of the way through the mandate period, this picture essentially remains.

Based on our analysis of the action plan, we presented twelve recommendations to the Government in the 2024 report. These recommendations aimed to reduce emissions in the short term and achieve the 2030 climate targets, as well as to broaden the path forward and achieve the climate targets in the longer term<sup>43</sup>. In principle, all these recommendations are still valid. The OECD recently made similar recommendations to the Government in an evaluation of Swedish environmental policy<sup>278</sup>. In the following section, we further specify some of these recommendations based on developments over the past year. Annex 1 contains a list of the Government's initiatives in 2024 that we consider to be relevant to the chances of achieving the climate objectives.

## 4.1 Assessment of the fulfilment of Sweden's climate targets



### THE CLIMATE POLICY COUNCILS ASSESSMENT

The Government's current climate policies are insufficient to meet Sweden's climate targets and EU commitments by 2030. While some decisions and announced measures in 2024 represented steps in the right direction, they do not offset other decisions made during the mandate period that have led to increased emissions, particularly in the transport sector.

There is still a significant gap to the long-term climate target by 2045, although it has gradually decreased in recent years.

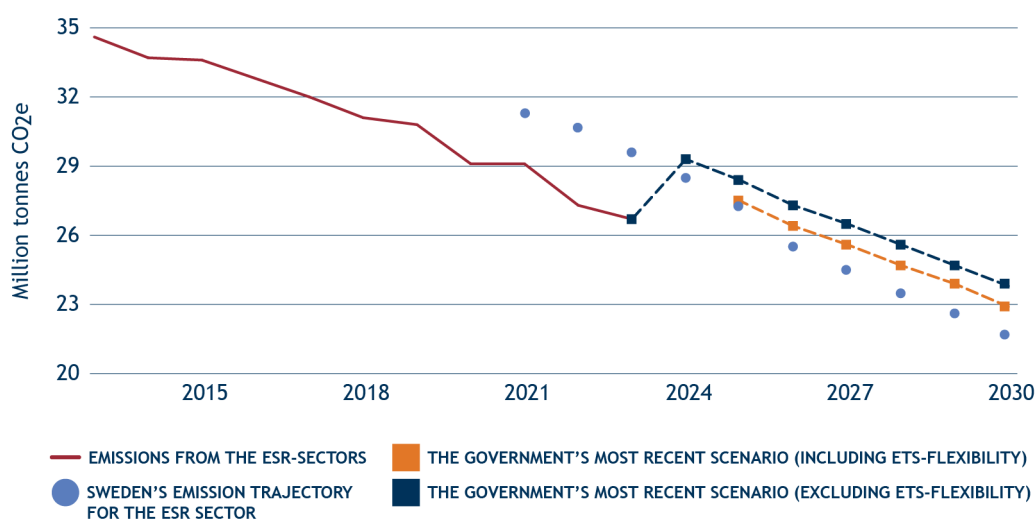
The analysis in this section is based on the Government's own scenarios for the expected development of emissions presented in the climate report to Parliament in September 2024. The focus is on the short-term targets up to 2030, where quantitative emissions forecasts and scenarios are normally more accurate. The short-term targets are important for the accumulated emissions over time and for the possibilities to reach the long-term targets in the next step.

### Sweden's work so far to reach EU commitment on ESR emissions by 2030

As shown in Chapter 1, Sweden's EU commitment for emissions covered by the Effort Sharing Regulation (ESR) is in practice an emissions budget in that the EU sets target levels for Swedish emissions in each individual year during the period 2021-2030. Figure 10 shows that Sweden's emissions in the early years of the 2020s were relatively far below the target levels in the EU regulations. The trend then indicated that Sweden would meet the target by a substantial margin. However, political decisions taken by the Government in 2023 are expected to result in emissions being above the EU's annual target levels for the rest of the decade.

The ESR Regulation contains several flexibilities that the Government believes Sweden should fully utilize. This means, among other things, that the Government intends to transfer saved emission allowances within the period, from a year when emissions are below the EU target level to a year when emissions exceed the target level. In addition, the Government has announced that it intends to transfer emission allowances from the EU Emissions Trading System (EU ETS) to the ESR. The upper curve in Figure 10 for the years 2024 and onwards shows expected actual emissions, while the lower curve illustrates a scenario in which Sweden transfers the maximum permitted emissions allowance from the EU ETS to the ESR.

**Figure 10.** Historical and expected future emissions under the Effort Sharing Regulation (ESR) in relation to the EU annual target levels for Sweden. From 2024 onwards, the upper dark blue curve illustrates expected actual emissions without flexibilities, while the lower orange curve illustrates a calculation that includes the planned transfer of emission allowances from the EU ETS. Note that the y-axis has a broken scale.



Source: Government Climate Report, 2024<sup>57</sup>.

In the climate policy action plan of December 2023, the Government assessed that the planned policy, even with these flexibilities included, was insufficient and would lead to Sweden exceeding the emissions budget in the ESR by 2030. According to the Government, this would mainly be remedied by appointing "a broad policy instrument enquiry" with the task of "analysing and providing a basis for whether and, if so, what policy instruments can be designed to ensure that Sweden's commitments in the EU are achieved in a cost-effective and socio-economically efficient manner"<sup>44</sup>. The Climate Policy Council recommended that the Government describe in more detail in the NECP submitted to the European Commission in June 2024 how Sweden would achieve its commitments to the EU. This was not done. Sweden reported a gap to our commitments regarding both ESR and LULUCF.

However, in the September 2024 budget bill, the Government presented new proposals to Sweden to stay within the ESR budget. The most important change announced was that, as of 1 July 2025, the reduction mandate would increase from 6 to 10 percent and would also include electricity. The reduction mandate would also be extended from 2026 to the previous target year of 2030. It is these scenarios that are referred to in Figure 10 as the "Government's latest scenario" (with and without ETS flexibility).

As can be seen, with these scenarios Sweden will still not reach the target level for the end year 2030. However, the Government estimates that the emissions budget will be reached by a margin of 2 million tonnes over the whole period if past undershoots and expected overshoots are summed up over the period and the maximum emission allowance is also transferred from the EU ETS to the ESR (ETS flexibility scenario).



It is positive that the Government took some steps in the right direction in 2024 that can lead to reduced emissions within the ESR. However, the assessment that the ESR commitment will be achieved with the adopted policy is associated with large uncertainties.

#### **Optimistic assumptions about fuel consumption**

The Swedish EPA's background analysis for the Government's climate report included two scenarios with different assumptions about the future consumption of fossil fuels, one with comparatively higher fuel consumption and one with lower<sup>45</sup>. The Government's assessment that Sweden will fulfil its EU commitment in ESR, is based on the scenario with lower expected fuel consumption. If the Government had instead chosen the scenario with higher fuel consumption, Sweden would miss the EU commitment by a large margin by 2030, even if flexibilities in the regulations were used. How fuel consumption develops consequently has a major impact on Sweden's ability to meet the EU commitment in the ESR.

There are two indications that fuel consumption in 2023 and 2024 has been higher than assumed by the Government:

- Emissions from domestic transport and machinery in 2023 were more than half a million tonnes higher than assumed by the Government in its ESR commitment scenario. These two sectors account for most of the fuel use.
- According to Drivkraft Sverige, carbon dioxide emissions in 2024 from petrol, diesel and gas have increased by 22 percent compared to 2023<sup>279</sup>. This is a larger increase than the Government has assumed for domestic transport in the scenario where the ESR commitment is achieved.

At the same time, the latest preliminary statistics from the Swedish Transport Administration show that road traffic emissions increased by 18 percent in 2024<sup>280</sup>, which is closer to the Government's assumptions. However, these statistics exclude so-called neighboring country refueling, which may have been caused by Sweden having lower fuel prices than its Nordic neighbors.

Overall, it is still difficult to draw any far-reaching conclusions about fuel consumption. However, we can conclude that the Government already has small margins for its assumption that the adopted policy is sufficient to fulfil the ESR commitment.

#### **The pace of electrification has slowed down**

The Government's scenario for achieving the ESR commitment is also based on assumptions of a relatively rapid electrification of the transport sector. In the data on which the Government's scenario is based, for example, the share of electric cars in new sales is assumed to increase from 32 percent in 2022 to 68 percent in 2030, while the share of electric light trucks is assumed to increase from 14 to 63 percent during the same period<sup>45</sup>.

Here too, there are indications that the actual development in 2023 and 2024 is not in line with the assumptions in the Government's scenario. In 2023, the Government assumed that the share of electric cars in new sales would be 46 percent, but in reality, the share was only 38 percent. In addition, in its latest forecast from May 2024, the Government agency Transport Analysis, predicts a more pessimistic development also in the future compared with the scenario presented by the Government in the budget bill for 2025. The most difficult scenario appears to be for the electrification of light lorries<sup>46</sup>. The industry organization Mobility Sweden also assumes a more pessimistic development than the Government's scenario for the electrification of passenger cars and light trucks. Based on Transport Analysis and Mobility Sweden's latest assessments, it may therefore be difficult to achieve the assumptions of an electrified vehicle fleet that the Government assumed in its scenario where the ESR commitment is achieved.

### **The impact of the new reduction mandate is uncertain**

The Government outlined the proposal for a new reduction mandate in a memorandum on 16 September 2024, which was then sent out for consultation<sup>47</sup>. Almost all the responses to the consultation that concern the proposal's climate effects emphasize the major uncertainties. Several respondents do not share the Government's assessment that the reform is sufficient for Sweden to fulfil its 2030 commitment to the EU<sup>47</sup>. They emphasize, among other things, that it is difficult to assess whether the system really provides a net addition of electric power or mainly leads to charging stations that would have been added anyway now being included in the reduction mandate and thus reducing the mix of fossil-free fuels. The climate benefit of the proposal is also strongly dependent on the conversion factor that will be used between electricity and fossil fuels, which is not clear from the Government memorandum.

The Swedish National Road and Transport Research Institute (VTI) commented in its consultation response that, based on available knowledge, reduced fuel taxes lead to increased traffic volumes and reduced electrification rates. VTI therefore questions the conclusion that the proposals for reduced taxes and a new reduction obligation will together contribute to increased electrification<sup>48</sup>. The Swedish Energy Agency, Transport Analysis, the Swedish Transport Administration and the industry organization Drivkraft Sverige argue that a gradual increase in the reduction obligation will be needed during the period up to 2030 in order to achieve the EU target<sup>49, 50, 51</sup>.

### **The LULUCF commitment may affect the achievement of the ESR commitment**

A further shortcoming in the Government's assessment that the ESR target will be met is the fact that the Government ignores developments in the land use sector (LULUCF). Net removals from forests and land are falling sharply according to the latest official emissions inventory and, according to the Government's own scenarios, Sweden is not expected to fulfil the EU commitment to increase net removals in LULUCF (see the following section on the Council's assessment of the LULUCF commitment).

If Sweden fails to meet the LULUCF commitment for the period 2021-2025, the corresponding net emissions are transferred directly to increased emission reduction requirements under the ESR. For the second half of the 2020s, both the ESR and LULUCF commitments must be met. Over-performance under the ESR can be used in unlimited amounts to fill a gap to the LULUCF target, while only limited transfers emission space is allowed in the other direction.

### **Conclusion on the possibility of reaching the ESR commitment with agreed policies**

The Government considers that the current policy is sufficient to achieve Sweden's ESR commitment, but, based on our reasoning above, this assessment is based on uncertainties: an optimistic assessment of relatively low fuel consumption and a high rate of electrification, and assumptions about the effects of the new reduction mandate that are questioned by several of the Government's consultation bodies.

In addition, there is the risk that Sweden will not fulfil its LULUCF commitment and will therefore need to achieve corresponding additional emission reductions under the ESR.

### **The policy review inquiry and new trading system are important in the longer term**

In its 2024 report, the Climate Policy Council already emphasized that new instruments were needed for Sweden to achieve its EU commitment by 2030, and that it was neither cost-effective nor realistic in terms of time to wait until after a major forthcoming investigation before deciding on new instruments. It then took ten months, until October 2024, before the Government decided to appoint the inquiry "Instruments to contribute to a phase-out of fossil fuels and to achieve Sweden's climate commitments in the EU" (the policy review inquiry). The inquiry will propose how the reduction mandate should be developed, as well as other possible and alternative instruments, such as a national Emissions Trading System for the transport sector, in parallel with the forthcoming EU scheme. The inquiry will also propose how the phase-out can take place without leading harmful effects for parts of the country or society.

The directive contains restrictions that limit the investigator's scope to present fully-fledged proposals. Among other things, the investigator is prevented from submitting legislative proposals in the field of taxation, proposing the design of distance-based road taxes, or proposing the design of "bans on technologies if comparable alternatives do not exist"<sup>52</sup>.

Based on the terms of reference and the timetable, a number of conclusions about the study can already be drawn:

- With reasonable assumptions about investigation and preparation times, the Government will not have time to make any decisions based on this report during this parliamentary term. In view of parliamentary elections and the formation of a Government, proposals from the report will probably not be able to enter into force until 2028. The proposals will therefore have limited significance for Sweden's ability to achieve the 2030 targets.
- Any proposals relating to taxation will require further investigation and a new round of consultation before the Government can prepare a bill for parliamentary decision - as the investigator is prevented from making legislative proposals in taxation.
- One of the main options in the debate<sup>53, 54</sup> is a national trading scheme for the transport sector that would be linked to, and enter into force at the same time as, the new EU ETS 2 in 2027<sup>i</sup>. Based on the timeline of the study, this will not be possible. A complementary national trading scheme could be introduced from 2028 at the earliest and will therefore not be able to make a significant contribution to the 2030 target.
- In 2019, the Climate Policy Council recommended that the Government begin to investigate an alternative way of taxing road transport as electrification progresses. By shifting taxation from the fuel to which vehicle is driven where, and when, the possibilities for designing socio-economically efficient taxation increase. Taxation can also more easily include distributional and fairness aspects, such as regional differences. No such investigative work has been initiated and, judging by the directive, this inquiry is prevented from making such proposals.

In September 2024, the Swedish Parliament approved the Government's proposal to introduce the EU ETS 2<sup>55</sup>. In Sweden, the new trading system will primarily cover emissions from the combustion of fuels in road transport and machinery. The Climate Policy Council welcomes the fact that the Government has taken advantage of the Member States' voluntary option to include from the outset virtually all fossil fuel combustion not already covered by EU ETS 1. However, the system will have little effect on Sweden's emissions up to 2030, particularly in the light of the Government's stated ambition to fully compensate for any price increases.

#### **Unclear whether emission allowances will be available for purchase and at what prices**

In the Climate Action Plan, the Government pointed to the possibility of utilizing the flexibility in the EU regulatory framework and buying emission allowances from other Member States that overperform in relation their EU commitments. Around ten Member States look set to meet or exceed their 2030 commitments, according to Member States' latest reported emission scenarios. This means that the majority of countries do not to meet their target with currently adopted and planned policies. For the EU, the emissions target is projected to be exceeded by around 300 million tonnes. This results in a net deficit of available emission space corresponding to just under 2 percent of the total emission space within the ESA<sup>56</sup>. However, the net deficit has shrunk by around 200 million tonnes compared with the corresponding total a year earlier.

So, there is uncertainty about whether there will be unutilized emissions space available and at what prices. The picture may clear up somewhat after the first joint review against EU targets, i.e. after 2027, but if the door turns to be closed by then, it is difficult in such a late stage to tighten domestic policies. Against this background, we believe it was wise of the Government to tone down the possibility of acquiring emission allowances from other Member States to fulfil our ESR commitment in the latest climate report.

<sup>i</sup> Implementation can be postponed until 2028 if oil and gas prices exceed certain levels.

### The way forward to fulfil Sweden's ESR-commitment

The Climate Policy Council believes that the Government needs to decide on stricter policies to ensure that Sweden fulfils its ESR commitment. There is little time left until 2030, when Sweden must have achieved the ESR targets, and the Government's room for maneuver is limited. As the EU target is in practice a budget for the whole period up to 2030, it will be important what happens in 2025-2027.

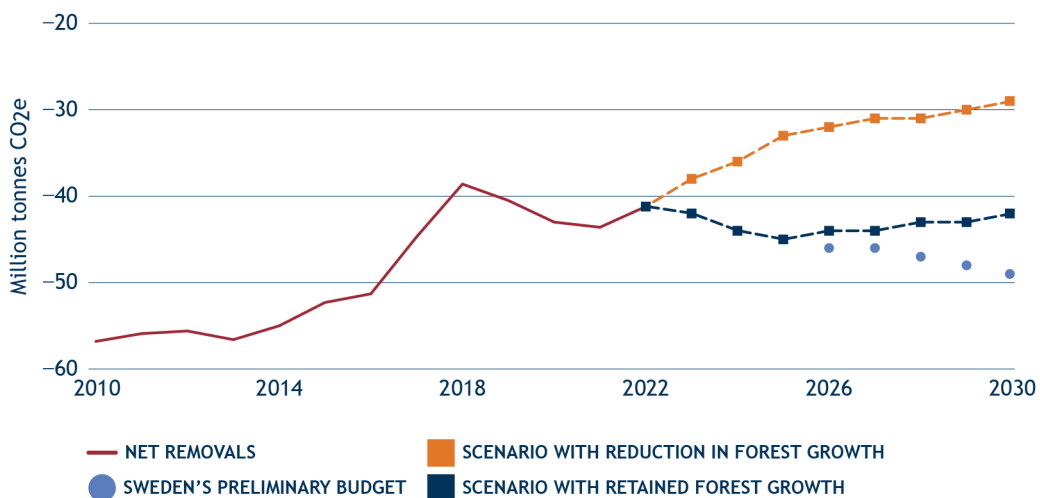
The Government has set up a policy instrument inquiry, but its proposals are unlikely to lead to new legislation until 2028 at the earliest. The inquiry will therefore primarily provide a basis for the period beyond 2030. The Government will therefore mainly need to use existing policy instruments that have already been investigated.

The vehicle fleet consists to a very large extent of internal combustion engine cars and will do so until 2030. Electrification and transport efficiency are important but cannot make a big difference in the short term. The two policy instruments that can significantly reduce emissions in the short term until 2030 and are decided before the end of the mandate period are changes to the reduction mandate and the carbon tax.

### Sweden's EU commitment for the land use sector LULUCF until 2030

Net greenhouse gas removals from forests and soils in the land-use change sector (LULUCF) have decreased significantly in recent years. A similar trend can be seen in other forest-rich EU countries such as Finland, France and Germany<sup>56</sup>. The scenarios presented by the Government in the 2024 climate report, shown in Figure 11, were more pessimistic than a year ago.

**Figure 11.** Historical data and scenarios for net greenhouse gas removals in LULUCF.



Source: Government Climate Report 2024<sup>57</sup>.

In the land use sector, there is greater uncertainty about future net emissions than for other sectors. This is due, among other things, to uncertainties about the impact of climate change on forest ecosystems and difficulties in estimating or measuring changing carbon balances. The LULUCF Regulation requires Member States to improve their calculation methods and achieve a certain level of quality by 2026. This work is important for more accurate development of LULUCF measures and instruments. But it also leads to technical uncertainties. Methodological updates can lead to relatively large retroactive recalculations of net removals in the LULUCF statistics, as was the case for Sweden in connection with the reporting for 2023<sup>k</sup>.

<sup>k</sup> The reported net removal for 2023 was only 31 million tonnes. This figure is not included in Figure 11 because the latest scenarios were calculated using previous methodology and are therefore not comparable. However, 2023 represented a continuation of the trend of a decreasing carbon sink, which points towards the more pessimistic scenario in Figure 11.

The latest emission statistics from the Swedish Environmental Protection Agency for 2023, presented in December 2024, show that Sweden's net removals have decreased to 31.4 million tonnes. These new emissions statistics are not included in the Government's scenarios in Figure 11. However, the emissions trend shows that developments in the land use sector in 2023 were worse than the Government predicted in the above scenarios.

#### **Fulfilling Sweden's commitment to LULUCF by 2025**

For the period 2021-2025, net removals in land accounting categories are compared to predetermined reference levels for each category, where total emissions cannot exceed removals, the so-called 'no debit' rule. Existing statistics show that the growth rate of forests has decreased while harvesting has increased, compared to the reference period. Based on this, Sweden does not seem to reach the no-debit rule for the period up to 2025. However, the size of an expected overshoot depends on developments in 2024 and 2025 and may be affected by a technical correction of the reference levels. The Government has tasked the Swedish University of Agricultural Sciences with proposing such a technical correction by 31 March 2025.

#### **Sweden's commitment to LULUCF between 2026 and 2030**

By 2030, Sweden's net removals of greenhouse gases in LULUCF must have increased by 4 million tonnes compared with the 2016-2018 reference period. For the period 2026 to 2029, Sweden needs to adhere to an uptake budget (see the blue dotted line in Figure 11 above). With the adopted policy, Sweden is not expected to reach the LULUCF commitment for the period 2026 to 2030 according to the Government's scenarios. Although the deterioration in net LULUCF removals for the year 2023 has not been considered, neither the more optimistic scenario with an earlier growth rate (blue line in Figure 11) nor the more pessimistic scenario with a reduced growth rate (orange line) shows that Sweden's LULUCF commitments will be met.

When we compare the scenario with the previous growth rate in Figure 11 with Sweden's preliminary LULUCF budget (uptake budget) for the years 2026-2029 and Sweden's commitment to 2030, this scenario results in Sweden missing its LULUCF commitment by a total of around 20 million tonnes over the entire period, which corresponds to around 4 million tonnes per year. Such an annual overrun of the uptake budget of around 4 million tonnes corresponds to around 15 percent of Sweden's emissions in the ESR in 2023. The gap would be even greater in the Government's scenario with a reduced growth rate in the forest.

The Government's climate policy action plan does not contain any planned measures that could significantly change the picture that Sweden is unlikely to achieve its LULUCF commitment by 2030. Nor did the Government take any new decisions in 2024 that would change this picture.

In February 2025, the parliamentary Environmental Objectives Committee presented its report on a strategy for how Sweden can fulfil its EU commitment terms of both net LULUCF removals and biodiversity. The committee presents several proposals that can increase net removals from forests and land and reduce the gap with Sweden's LULUCF commitment. The proposals that the Committee believes will have the greatest impact by 2030 are a reduction in the harvest rate by 2030 and the rewetting of wetlands. The Committee's proposals are estimated to result in an increased annual net uptake of around 7 million tonnes in 2030. Based on the deterioration in uptake in the land use sector in 2023, the Committee considers that the proposals are not sufficient to achieve Sweden's commitment by 2030<sup>58</sup>.

In August 2025, the final report of the inquiry to review forest policy, including the LULUCF Regulation, the Nature Restoration Regulation and the Regulation on enhanced forest monitoring<sup>59</sup> is also expected. There is very little time for proposals from these inquiries to have a significant impact on net emissions from the land use sector before 2030. The preparation and decision-making processes takes time and forest ecosystems changes slowly.

If the European Commission judges that Sweden is not making sufficient progress in achieving the LULUCF commitment, Sweden must, under the LULUCF Regulation, submit a plan describing, among other things, new national corrective measures and reporting how they contribute quantitatively to the commitment.

#### **Conclusion on Sweden's fulfilment of the LULUCF commitment**

The Climate Policy Council's overall assessment is that developments in LULUCF are worrying and that the trends in emissions statistics and the Government's future scenarios show that Sweden is at risk of missing its LULUCF commitment. As with the ESR, Sweden will need to relate to a budget that will start to be counted as early as 2026. To improve the chances of meeting Sweden's LULUCF commitment, the Government needs to take measures soon to ensure that these have sufficient time to take effect.

#### **National interim targets for 2030 and 2040**

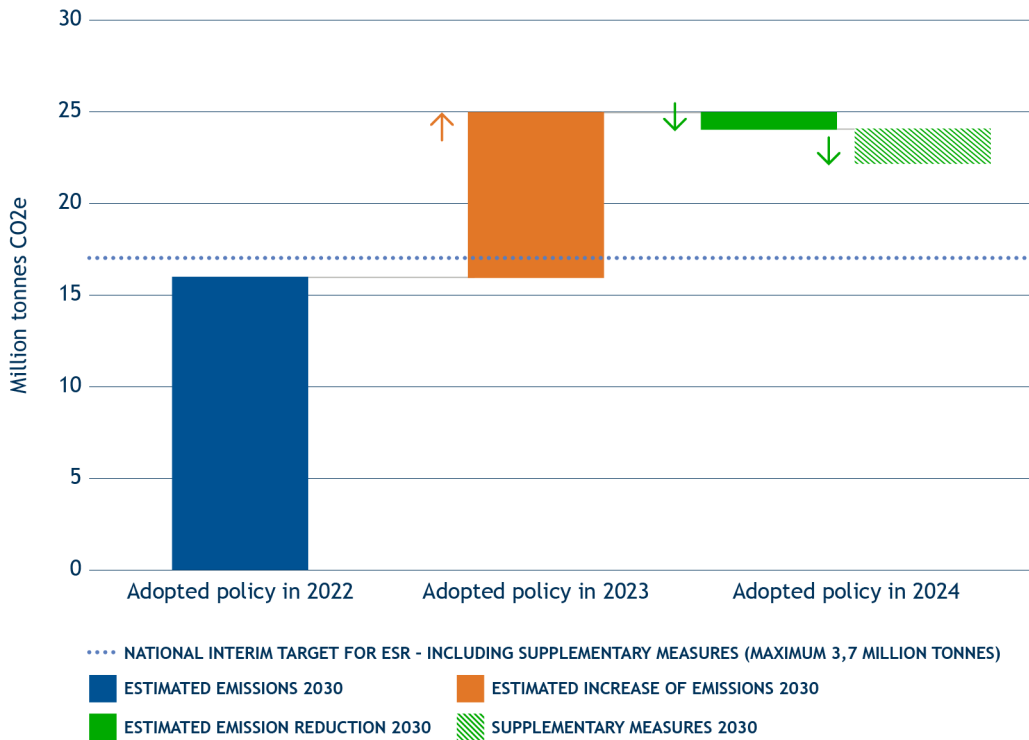
In the 2024 climate report, the Government estimates that, with currently decided and announced policies, 7 million tonnes of emission reductions will be needed in 2030 to achieve the national target for ESR without supplementary measures.

In the climate report, the Government also assesses the number of supplementary measures that can be expected to be added by 2030. This involves 1-2 million tonnes of carbon dioxide through bio-CCS and around 0.7 million tonnes of carbon dioxide equivalent through international climate action. This would reduce the gap to the 2030 target from around 7 to 4.4-5.4 million tonnes with supplementary measures included.

The Swedish emissions target for 2030 is slightly more ambitious than the EU target for the same year and it does not allow for the same type of flexibilities as the EU target. In practice, this means that if we do not reach the EU commitment for ESR, we will not reach Sweden's national target for ESR either.

Figure 12 illustrates Sweden's expected emissions in 2030 in relation to the national emissions target. The estimates are taken from the Government's climate reports to Parliament. The leftmost bar shows the expected level of emissions in 2030 with the policies decided when the current Government took office in autumn 2022. The next bar shows the expected increase in emissions to 2030 with the decisions taken by the new Government at the end of 2023. The rightmost bar shows the net changes expected in 2030 depending on the Government's decisions in 2024. These are divided into emission reductions and supplementary measures.

**Figure 12.** Projected emissions in the ESR in 2030 based on adopted policies for each of the last three years, relative to the national emissions target for the ESR in 2030.



Source: Government Climate Report 2022, 2023, 2024<sup>57</sup>.

### The 2030 target for domestic transport

The Government estimates that the target for domestic transport by 2030 will be exceeded by 5.9 million tonnes. The emissions gap is thus almost as large as for the entire ESR sector, excluding supplementary measures. Nor is this target formulated in such a way that any supplementary measures can be included in the achievement of the target. Emissions from the transport sector must therefore be reduced substantially, with or without a specific sectoral target, for Sweden to have reasonable prospects of achieving both our EU commitments and the national target for the whole of the ESR by 2030.

### The objective of the ESR 2040

The Government reports an emissions gap to the national interim target by 2040. The gap is expected to be around 4 million tonnes excluding supplementary measures and 3 million tonnes including supplementary measures. We share the Government's view that the national target for 2040 may need to be revised when the EU soon decides on a common 2040 target. Current proposals from the European Commission indicate that the national target for 2040 may need to be tightened up, which will then increase the demands on the combined policies of Sweden and the EU to contribute to emission reductions by 2040.

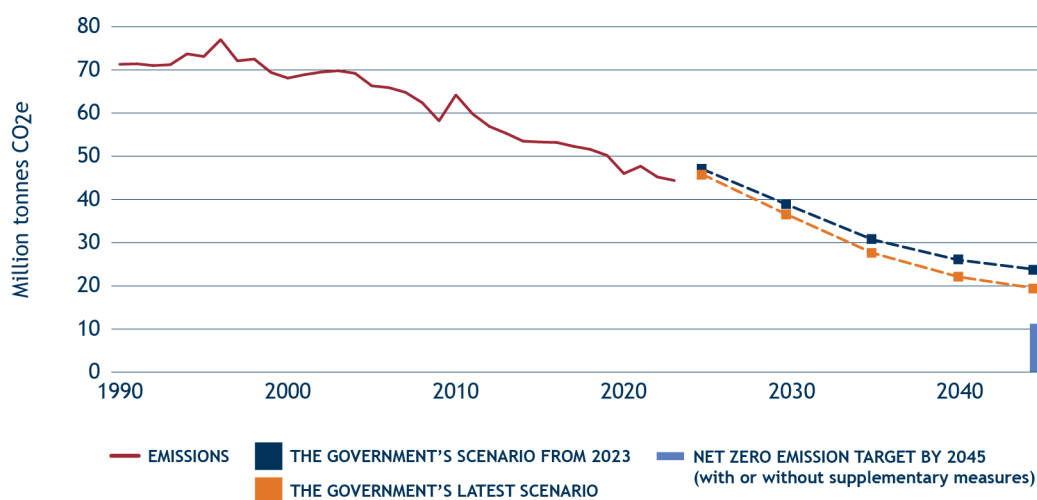
### National target of zero net emissions by 2045

The Government estimates that the emissions gap to the net zero target in 2045 with the current policy amounts to around 20.7 million tonnes. In addition to this, the Government expects that 1-2 million tonnes of supplementary measures in the form of bio-CCS can be realized under current conditions and the adopted policy. The net gap in the scenario thus amounts to 19-20 million tonnes. The gap has decreased since the Government's scenario from last year, as illustrated in Figure 13. The reduction since last year is partly due to updated conversion plans for the refinery industry and for plants in the electricity and district heating sectors.

It remains 20 years until 2045. Therefore, it is natural that a gap remains to the long-term goal. But it is necessary that the gap is reduced quickly enough by developing technology and policies in the right direction. We also want to emphasize what the Government itself writes that the scenario up to 2045 is insufficient to reach the target. It requires favorable development of, among other things, access to fossil-free electricity, access to the right skills and workforce, and well-functioning permit processes.

Of course, the actual emissions trajectory will also be affected by changes in the external environment and factors that cannot be foreseen now. These can both contribute to and hinder the climate transition. At present, there are several concerns for the global climate transition and multilateral international cooperation. In this situation, it is essential that the Government shows strong leadership on climate, sticking to ambitious climate targets and helping to strengthen the EU's leadership role in global climate co-operation.

**Figure 13.** Total greenhouse gas emissions in Sweden. Actual emissions (excluding supplementary measures) and the Government's scenarios for projected emissions to 2045 with policies decided to date<sup>1</sup>.



Source: Government Climate Report 2024<sup>57</sup>.

### Conclusions and recommendations to reach Sweden's climate targets and EU commitments

Overall, existing policies are insufficient to meet Sweden's EU commitments and national climate targets. Soon, two thirds of the mandate period will have passed. The window of opportunity to make decisions that will enable the 2030 targets to be met is shrinking rapidly. The Government needs to use existing, practically available instruments and proposals that have already been analyzed. This applies not least to transport and machinery, and to net emissions from forests and land. The Climate Policy Council therefore makes the following recommendations to the Government.

<sup>1</sup> The Government's scenarios in Figure 13 exaggerate the effect of the 2024 policy to some extent. For the 2023 scenario, the Government has chosen the upper end of a range for the emissions gap from last year and excluded supplementary measures. For the Government's 2024 scenario, the Government has chosen a scenario with lower fuel consumption and included a certain proportion of supplementary measures. Regardless of this, the emissions gap has narrowed slightly by 2045.





#### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Decide in 2025 on a package of measures to increase the net uptake of greenhouse gases in forests and soils. The report of the Environmental Objectives Committee is an important basis, but its proposals are insufficient to achieve Sweden's LULUCF commitment. Further and reinforced measures in the land use sector should be developed, considering other environmental and social objectives.
- Decide in 2025 on measures to reduce emissions in the ESR sector. Stricter reduction mandates and higher taxes on fossil fuels are the measures that can contribute to the greatest emission reductions in the short term. This can be combined with distributional policies that share benefits and costs and protect vulnerable groups.
- The Government should aim to exceed Sweden's ESR commitment in order to transfer emission allowances to the LULUCF sector.

## 4.2 Key policy areas for the climate transition

Achieving net-zero greenhouse gas emissions in just two decades will require historically rapid societal change. This requires the contribution and interaction of several key policy areas. In this section, we highlight developments in 2024 in a few selected areas. These include two key emission sectors - transport and industry - as well as energy and economic policies, both of which are important for enabling the climate transition.

### Policy for the climate transition of the transport sector

Developments in the transport sector are crucial to the ability to achieve the 2030 emissions targets, and the sector is one of those that need to achieve zero fossil emissions relatively early. Emissions from domestic transport account for around half of all emissions in the ESR in Sweden. If emissions from machinery are also included, internal combustion engines account for as much as 60 percent of Sweden's emissions within the ESR, or a total of around 16 million tonnes.

Emissions in the other ESR sectors, agriculture (discussed further in Part II of this report), waste, small-scale industry and product use may decrease slightly over the next five years, but not to the same extent as transport and machinery. To achieve Sweden's 2030 ESR target, it is therefore inevitable that a large part of the reduction will need to take place in the transport sector. The climate impact of the transport sector depends in principle on three parameters, namely: the total volume of transports, how energy-efficient transports are, and how much of the energy used in the transport sector stem from fossil sources. In more practical terms, there are three ways to reduce emissions from transport by 2030:

- A more transport-efficient society (a society with less overall traffic, by energy-intensive means of transport such as cars and aviation).
- Electrification of the vehicle fleet.
- Increasing the share of fossil-free fuels in more efficient engines and vehicles.

Here we provide an overview of the different ways to reduce emissions in three short sections. We conclude each section by summarizing actions in 2024 that contribute to or counteract the climate footprint of the transport sector.

### **A more transport-efficient society**

The Climate Policy Council and several other evaluations<sup>60, 61, 62</sup> have pointed out that the policy instruments for moving towards a more transport-efficient society have been weak and the results unsatisfactory.

In 2024, local public transport had not yet fully recovered from the pandemic. Fewer journeys to work with an increased share of work-from-home can therefore help reduce emissions. At the same time, this, together with a difficult economic situation for municipalities and regions, has complicated the financial situation of public transport. Train services are developing relatively strongly, but are limited by capacity problems and deferred maintenance, which in turn lower traveler's confidence. On the positive side from a climate perspective, fewer people are choosing domestic flights than before, and traffic volumes are still expected to remain at two-thirds of pre-pandemic levels in 2030. In contrast, international flights are increasing and are back to pre-pandemic levels. As regards freight transport, the trend for some time has been for transport efficiency to decline, probably due to increased light freight transport linked to growing e-commerce.

In 2024, the Government presented an infrastructure bill with proposals for investments in roads and railways over the next twelve years, 2025-2037. Neither the content of the plan nor the process involves any break from the planning system that has long been criticized for, among other things, preserving historical trends of ever-increasing car traffic<sup>63</sup>. The bill is based on the planning documentation from the Swedish Transport Administration, which was again strongly criticized during the consultation process, including from the Government's own authorities, county administrative boards, municipalities and regions<sup>64</sup>.

The Infrastructure Bill contains an increase in appropriations for road maintenance of 53 percent, which is expected to lead to the entire maintenance debt on the roadside being eliminated by 2037. The increase in appropriations for rail maintenance is 18 percent, which means that 85-90 percent of the maintenance debt in the railways is expected to remain by 2037. The Government writes in the Bill that this is what the Swedish Transport Administration considers possible during the planning period. The Climate Policy Council argues that this should lead to a more vigorous effort on the part of the Government to address the structural problems that obviously exist.

The overall picture is that the Government's decisions in 2024 have largely contributed to counteracting progress towards a more transport-efficient society:

#### **Contributes:**

- Extended support for environmental compensation for rail freight
- Assignment to the Swedish Transport Administration to coordinate the work of Government agencies for the transport sector's climate transition

#### **Counteracts:**

- One billion SEK in extra support for the aviation industry to avoid security check fee increases
- Abolition of aviation tax<sup>m</sup>
- Support for more regional airports
- Reduction in fuel taxes

<sup>m</sup> Does not affect the achievement of national climate targets as aviation in the EU is included in emissions trading and is not subject to national climate targets.

### Electrification of the vehicle fleet

The trend of a relatively rapid increase in the electrification of the vehicle fleet has slowed down. As shown earlier in the report (Section 4.1), the forecasts for electrification have been revised downwards in the authorities' scenarios. According to Mobility Sweden, the share of electric cars in new car sales in 2024 was 35 percent, down from just under 39 percent in 2023. A similar trend reversal is seen in several other European countries, while the share of electric cars has increased sharply in China, and thus also globally. In Norway, the share of electric cars also increased, reaching around 88 percent of total passenger car sales in 2024<sup>65</sup>. The development of electric passenger cars may recover in pace with falling interest rates, improved economic conditions and increased availability of electric cars at lower prices. Another problem is that the electrification of both heavy and light trucks is not developing as expected.

Factors other than new sales also influence the development of emissions from road transport: the second-hand market, exports and imports of vehicles, and the scrapping of fossil-fueled vehicles.

It is the composition of the vehicle fleet that determines the contribution of electrification to climate objectives.

In this area, the Government's decisions in 2024 have taken different directions and it is difficult to assess the net effect on the pace of electrification.

#### Contributes:

- New support for light electric trucks
- Assignment to the Swedish Energy Agency to propose better coordination of charging infrastructure
- Announcement of a new, limited electric car premium from 2026, targeting households with no alternative to the car
- Increased funding for charging infrastructure

#### Counteracts:

- Further reductions in taxes on fossil fuels
- Abolished electric bus premium for local buses

### Fossil-free fuels in more efficient vehicles

Historically, an increased share of biofuels has made the greatest contribution to reducing carbon dioxide emissions from transport in Sweden. This trend was broken in 2024 when the Government drastically lowered the requirements for the blending of fossil-free fuels in the reduction mandate at the same time as the tax on fossil fuels was reduced in several rounds. Based on preliminary fuel statistics, the use of fossil in the transport sector, and thus emissions, increased by around 22 percent or 3 million tonnes in 2024. This corresponds to around 7 percent of Sweden's total greenhouse gas emissions<sup>24, 66</sup>.

In 2022, fuel prices were increased, creating a debate on fuel prices that is still alive, even though we have seen equally sharp price cuts since then. In 2024, the real price of petrol was below the average of the last 25 years. If we also consider that today's cars are on average more efficient, the price of driving is 20 percent below the average since the turn of the century. As a share of household income, the price of driving a car today is close to a historical low<sup>67</sup>.

On 1 January 2024, the Government lowered the reduction mandate from the EU's highest level to one of the EU's lowest. But already in the budget bill in September 2024, the Government presented a new proposal for a changed reduction mandate from 1 July 2025. The reduction mandate will then be increased from 6 to 10 percent and extended to 2030, while public charging of electricity will also be included in the reduction mandate. The effects of this proposal are difficult to assess (see section 4.1).

The Government's decisions in 2024 have probably contributed to some reduction in the climate impact of transport from 2025 onwards. But the potential net positive effect is small compared to the increases in emissions resulting from the Government's decisions at the beginning of the mandate period. The Government estimates that the new reduction mandate will reduce cumulative emissions in 2025-2030 by around 3 million tonnes. The previous decision to lower the reduction obligation was estimated by the Government to lead to emission increases of around 5 million tonnes in 2024 alone, with further increases thereafter<sup>68</sup>.

The Government's decision in 2024 is likely to contribute to a certain increase in the share of fossil-free fuels through the new reduction obligation. On the other hand, reduced taxes on fossil fuels counteract all three elements of the transport sector's climate transition.

**Contributes:**

- The new reduction mandate, but uncertain how much

**Counteracts:**

- Further tax cuts on fossil fuels
- Abolition of malus on motorhomes

**The continued transport policy**

For the period beyond 2030, the EU Emissions Trading System is expected to be the key policy instrument for phasing out fossil fuels. However, an economically, socially and environmentally sustainable transition of the transport sector will require broad policies that support all three pathways of the transition. At the same time, the distributional effects must be managed with greater precision than through a general reduction in fuel taxation. In October 2024, the Government appointed an inquiry to introduce future policy instruments for phasing out fossil fuels from the transport sector, by 2045 at the latest. This inquiry could be important for the long-term transition of the transport sector.

The measures that can have an effect in the short term up to 2030 are a tightening of the reduction mandate and increased carbon dioxide taxation of fuels. Measures in the areas of electrification and transport efficiency are key both to contribute to some short-term emission reductions, but above all to create the conditions for achieving virtually zero emissions in the transport sector. There are several possible measures that can be implemented, and we believe that the Government can learn from developments in other EU countries, which in some areas have gone further.

**FACT BOX. EXAMPLES FROM OTHER COUNTRIES OF POLICY INSTRUMENTS TO REDUCE THE CLIMATE IMPACT OF TRANSPORT**

**Transport - efficient society**

- **Germany** has introduced a Deutschland-ticket which, for around SEK 640 per month, gives unlimited travel on all city buses, metros and trams in all municipalities.
- **Belgium** reimburses employees for cycling to work at a rate of around €3 per kilometre. The Netherlands and France also have similar compensation schemes.
- **The UK** allows local authorities to introduce charges for workplace parking, with the revenue being invested in improving public transport.
- **France** requires cities with at least 150 000 inhabitants to introduce environmental zones with reduced speeds and limited access for petrol and diesel cars.

**Electrification**

- **Norway** is expected to reach close to 100 percent electric cars of all new passenger cars sold by 2025. Norway has started to phase out the bonus for electric cars but has significantly increased vehicle taxes for new fossil-fueled cars.
- **France** has introduced a bonus scheme for electric cars that is differentiated both by income and life-cycle emissions. The latter also allows incentivizing fossil-free inputs, such as hydrogen-reduced steel.

There is also great potential in strengthening existing instruments to promote the electrification of the vehicle fleet. The Climate Policy Council has identified the following possible measures:

- Stricter vehicle tax and increased malus i.e. temporarily increased vehicle tax, for new fossil-fueled cars. Potentially based on new vehicle labelling that considers life cycle emissions.
- Tighter rules for company cars, so that the fringe-benefit taxation only covers electric vehicles.
- Targeted electric car bonus, in line with what the Government has announced. Ensure that it goes to households that need support and covers leasing and second-hand electric cars.
- A more generous scrappage scheme for fossil-fuelled cars that benefits more households.
- More generous support for the electrification of heavy-duty vehicles, as the transition is not as advanced there. Shift to a tender procedure for the subsidies to allow for a higher share of support.
- Revised reduction obligation providing electricity credits only to charging infrastructure in sparsely populated areas (so called white spots).

There are also proposals in transport-efficiency that we believe the Government should consider:

- Increased possibilities for municipalities to introduce policies that limit car traffic in cities.
- State aid for public transport.
- A thorough reform of the entire transport infrastructure planning system.
- Investigate a new tax system for road transport, based on which vehicle drives where and when.
- A deduction for commuting neutral to all forms of commuting.



**THE CLIMATE POLICY COUNCIL RECOMMENDATION TO THE GOVERNMENT**

Adopt a package of measures to reduce emissions from the transport sector and machinery by accelerating electrification, an increased share of fossil-free fuels, and a more transport-efficient society. Strengthen existing policy instruments, consider previously assessed proposals, and draw lessons from other countries.

## Policies for the structural transformation of industry

Industry, like the transport sector, accounts for about one third of Sweden's total greenhouse gas emissions. Emissions trading is the fundamental policy instrument for reducing the climate impact of industry. For existing industry emissions, the largest contributions to emission reductions can come from fossil-free electrification, fuel switching and CCS. In a broader perspective, industry's climate change position also involves changes in demand, more efficient and circular use of resources, and structural changes that will affect sectors, regions and countries in different ways.

### A variety of policy measures are needed

The EU's existing Emissions Trading System (EU ETS 1) covers virtually all industrial emissions and is the basic instrument for steering emissions towards zero. On the basis of available research, the Climate Policy Council considers that an active policy is also needed, both in Sweden and in the EU, to promote technological development and the scaling up of the fossil-free alternatives that can make the transition to zero emissions possible<sup>69</sup>.

Research shows that several forms of policy instruments are needed to reduce the costs and risks of industrial transition, i.e. to address what economists call market failures<sup>70, 71, 72</sup>. A market failure means that the market does not allocate resources efficiently. The most obvious is when the production or consumption of a good contributes to climate change without this cost to society being reflected in the market price. To address this, policy instruments are needed, including a price on carbon, which in the EU is set in the EU ETS.

Another type of market failure concerns investments in innovation. A firm investing in research, development or demonstration of new technologies is unlikely to realize the full returns from this, as other actors may also benefit from the experience generated. The private return for a company investing in research is therefore lower than the socio-economic one, especially in the early stages of the development process<sup>72, 73</sup>. Other market failures concern coordination problems and network effects, i.e. when economic actors fail to coordinate their decisions in a way that leads to optimal outcomes, even though coordination would benefit all those involved. Here, the state can have an important role to play and preferably states in co-operation as in the EU.

The National Institute of Economic Research (NIER) recently published an analysis of policies for the green transition of industry<sup>74</sup>. They emphasize that there may be reasons for the state to take a broader and more proactive role, to achieve a broad societal change towards fossil freedom. One way could be a more mission-oriented innovation policy based on the premise that policy should facilitate collaboration between different actors for them to collaborate towards one common goal<sup>75</sup>. A more proactive approach may also involve considering how climate policy is affected by other societal objectives such as security policy or considerations of social acceptability. The Climate Policy Council shares the NIER's view that policies to support industry's transition should be seen as a combination of a neoclassical economic and a more proactive approach.

One of the challenges of all public governance is to design it effectively. This requires, among other things, clear guidelines for which projects receive support and regular evaluation of the actual effects. Policy measures such as Industriklivet and Klimatklivet, or green credit guarantees, can be justified to reduce the risk for industries that want to take the lead in development. However, this does not mean that Government interventions are justified in every case; they need to be scrutinized with care for public funds. Nevertheless, by their very nature, not all projects will be successful. Otherwise, there would be no need for risk sharing.

### Sweden can be a pioneer

Sweden has great opportunities to be a pioneer in the green transition. Such a role for Swedish climate policy can be important in a global perspective. Among other things, Sweden has virtually carbon dioxide-free electricity production with historically low electricity prices, particularly favorable conditions for renewable electricity production, and several leading industries around which research environments and spin-offs are emerging<sup>76</sup>. In addition, EU climate legislation points to a long-term direction. Large parts of the industry see fossil-free as important for its competitiveness, which is clear not least through Fossil Free Sweden's roadmaps.

Sweden and the EU also need to respond to political and industrial developments in other parts of the world. Governments in key competitor countries are investing heavily and supporting key areas of the global climate transition. They do so partly for climate reasons but equally compete for new profitable markets and resources. Other drivers may be a drive towards reduced vulnerability and increased security of supply<sup>77</sup>.

Establishing new fossil-free industry is not necessarily good for Sweden's national emissions targets. If fossil-free industry does not replace fossil-fuelled industry, it does not necessarily contribute to achieving Sweden's national emissions targets. Industrial investments that make a positive contribution to the European or global climate transition may, on the contrary, increase the national environmental impact and, conversely, if industrial investments fail, this will not have a decisive impact on the chances of achieving the national climate targets. However, there may be effects on economic and regional development and unemployment, as well as on future electricity demand if the industrial transition fails or industry moves abroad.

### Challenges for the climate transition of industry

The challenges for industry's climate transition have been highlighted in previous reports from, among others, the Climate Policy Council and in various studies and research reports<sup>78,79,80</sup>. Based on the experiences of 23 industries' roadmaps, the national coordinator for Fossil Free Sweden has highlighted four general obstacles:

- Time-consuming and unpredictable permitting processes
- Lack of clarity on access to fossil-free electricity at competitive prices
- Skills shortages
- Lack risk-sharing models for long-term and stable conditions

The Climate Policy Council's view is that the Government is well aware of these obstacles. In 2024, the Government decided on several measures to facilitate the continued transition, such as bills on the licensing of electricity grids<sup>81</sup>, and more efficient environmental permitting process<sup>82</sup>, increased resources for certain authorities, as well as investment in enhanced vocational training and opportunities to attract highly skilled labor. (Issues relating to access to fossil-free electricity are dealt with in the next section.) The Government has also created an acceleration office for the transition of industry, linked to the Ministry of Climate and Enterprise, and extended and broadened the remit of the national coordinator for Fossil-Free Sweden until 2026.

Much of the risk in the industrial transition is currently borne by the regions and municipalities where large industrial establishments are currently being planned, implemented or reconsidered. They need to invest heavily in infrastructure, housing and social services before tax revenues increase. In the same way that the Government has introduced various forms of risk-sharing with industrial investors, it is reasonable for the state to help facilitate or share risk with the municipalities and regions that are leading the way in the global industrial transition<sup>80,83</sup>.

The year 2024 was partly characterized by announcements of postponed or shelved investments in the green industrial transition. The Climate Policy Council would like to point out that the basic logic of the industrial transition remains. Rapidly falling costs for renewable electricity generation, together with other fossil-free and resource-efficient technologies, are creating new competitive advantages over the old fossil-based industry. Sweden is well placed to play a leading role in this transition. It is not surprising that the development also involves some setbacks, failures or reassessments. It is important that the Government maintains its focus and continues to work systematically to improve the conditions for industry's climate transition.

Finally, it is noteworthy that Sweden's overall industrial policy objectives still do not contain any link to sustainability or the climate transition, as we have pointed out in previous reports<sup>84</sup>. The overall industrial policy, including the EU's various funding mechanisms, could be more actively used and prioritized to stimulate the climate transition.



#### THE CLIMATE POLICY COUNCIL RECOMMENDATION TO THE GOVERNMENT

Continue developing policies to support the industrial climate transition, particularly by improving permitting processes, strengthening public infrastructure, securing access to skilled labor, and expanding financing opportunities.

### Energy policy for fossil-free electrification

The Climate Policy Council shares the Government's view that electrification is a key area for the climate transition. Energy policy needs to provide the conditions for sufficient fossil-free electricity to be available where and when it is needed. Sweden's electricity consumption has remained almost constant (around 140 terawatt hours, TWh) over the past 30 years, despite an increase in population and industrial production. At the same time, electricity production has increased, mainly through the expansion of wind power, and Sweden is now one of Europe's largest electricity exporters. In 2024, Sweden produced 170 TWh of electricity and net exports amounted to 33.4 TWh<sup>85</sup>.

#### How much electricity does Sweden need?

The transformation of Sweden's basic industries - iron and steel, petrochemicals, cement, paper and pulp - will require large amounts of fossil-free electricity. But there are major uncertainties. Structural changes in industry, new technologies, energy and material efficiency, international competition and geopolitics will determine how large the long-term need really is.

In the Swedish Energy Agency's latest long-term scenario, Sweden's total electricity consumption is expected to increase to between 228 and 349 TWh in 2050<sup>86</sup>. The Government agency responsible for electricity grids, Svenska Kraftnät, is working on scenarios with similar ranges<sup>87</sup>. The major increase, and the major uncertainty, lies in the expected electricity consumption of industry. According to the Swedish Energy Agency, the production of hydrogen through electrolysis alone is expected to require between 22 and 100 TWh of electricity in 2050. Electrification of the transport sector also contributes to the increased electricity demand, but according to the Swedish Energy Agency's scenarios, this will be a maximum of 30-40 TWh in 2050, i.e. on a par with today's net exports.

Industrial investments already underway require significant reinforcements of the existing electricity system. To maintain a favorable investment climate for fossil-free industry, it is important that Sweden can meet industry's electrification ambitions, in time, in well-functioning processes, and within reasonable limits. This applies to both new production and reinforcement of the electricity grid. During the year, the Government has appointed several commissions of inquiry and announced or decided on various initiatives aimed at increasing access to fossil-free electricity.



### Conditions for new wind power

To increase incentives for the expansion of onshore wind power, the Government allocated funds in the budget proposal to municipalities that favor wind power establishments or have already allowed wind power to be built within the municipality, starting in 2025 at the level of SEK 340 million. Compensation to municipalities is supposed to correspond to the revenue from the property tax levied on wind turbines. No concrete proposal has yet been presented and there is some uncertainty about the design. For the climate transition, it is important that the compensation is permanent and that the rules are designed to provide sufficiently strong incentives to stimulate the expansion of new wind power, in relation to compensating municipalities and residents for existing wind turbines. It seems a reasonable principle that municipalities can expect to receive an annual sum corresponding to the property tax generated from wind power within the municipality.

At the same time, the Government announced that it would also proceed with other proposals from a Government inquiry<sup>88</sup> on compensation for residents and communities. If the announced reforms implemented in a well-balanced way, they could together contribute to improving conditions and local acceptance for continued wind power expansion. We argue that in this context the Government should also return to the issue of a more predictable and legally secure process regarding municipalities' decisions on new wind turbines. On this point, there are previously investigated and prepared proposals from a previous Government inquiry<sup>89</sup>.

As regards offshore wind power, the Government decided in November 2024 to reject a total of 13 applications for offshore wind farms in the Baltic Sea, citing objections from the Swedish Armed Forces. The estimated annual production from these farms together was around 140 TWh<sup>90</sup>. In connection with the decision, the Government announced that it did not consider it appropriate to build any offshore wind farms in the Baltic Sea, but that these would henceforth be referred to the Gulf of Bothnia and Skagerrak and Kattegat. This major restriction of possible areas for offshore wind power deviates from what is applied by several other NATO countries around the Baltic Sea. In the same decision, the Government authorized a new wind farm in Skagerrak and Kattegat.

### Conditions for new nuclear power

The Government's focus during the year has been to create better conditions for more fossil-free electricity from new nuclear power reactors in various ways, for example by appointing a special coordinator, increasing research funding, reducing the costs of storing nuclear waste and streamlining permitting processes.

One important issue concerns the conditions for financing new reactors. In August 2024, a Government commissioned study was presented with proposals for financing and risk sharing for investments<sup>92</sup>. In principle, all respondents, apart from some of the actors who may be directly affected by the report's proposal for state subsidies, are critical of the proposal, including the Swedish Energy Agency<sup>91</sup>, the Swedish Energy Markets Inspectorate and Svenska kraftnät<sup>93</sup>. They point out there are shortcomings in the analysis of risks and consequences for the state and taxpayers. Several respondents point to the proposal for a guaranteed price of 0,8 SEK/kilowatt hour for nuclear power generation as particularly problematic, partly because it risks creating considerable market uncertainty for the types of power that can be expected to be built until nuclear power can be put in place and partly because it risks being expensive for taxpayers.

The weaknesses in the proposals are basically due to the narrow remit of the inquiry, to show how new nuclear power can be financed. The Climate Policy Council still lacks a broader impact assessment of various options for meeting the needs of electrification, including socio-economic and fiscal effects as well as the impact on the electricity-market<sup>n</sup>. All power sources should be included together with electricity networks and various forms of flexibility and storage options, given different scenarios of future electricity demand development. The impact assessment also needs to consider when these various components can be in place and how different scenarios affect Sweden's security of energy supply and include an EU perspective and a perspective on the competitiveness of Swedish industry.

Such an impact assessment can benefit from the current state of knowledge from research<sup>o</sup> as well as several initiatives at regional level in different parts of the country<sup>p</sup>. A contribution to such a broader analysis is also expected in April 2025 through the report of the Energy Market Inquiry, with proposals on the functioning of the electricity market, including how different fossil-free power sources and flexible resources should be compensated for the benefits they contribute to the electricity system. That inquiry was appointed by the Government in 2024.

In its March 2024 energy policy bill, the Government noted that wind power could account for most of the additional electricity generation in the short term and announced measures to improve the conditions for efficient expansion<sup>q4</sup>. Wind power - especially onshore - can be developed in the short term up to 2035, and the Government's target of commissioning two new nuclear reactors by that year is a very optimistic assumption. In comparison, the Czech Republic is much further ahead than Sweden in terms of new nuclear power (decision, supplier and financing arrangements are in place) and is targeting 2038 for full commercial operation of its two new reactors<sup>q5</sup>.

If the Government, without a broader analysis, proceeds with the financing proposal for new nuclear reactors, there will be a need to quickly introduce subsidies for other renewable energy sources that can supply electricity over the next decade, so as not to strangle the electrification of industry as an important part of the climate transition. In addition to placing an additional burden on Government finances, this is likely to lead to a less economically efficient electricity system.

Energy policy also needs to focus more strongly on more efficient energy use<sup>q6, q7</sup>. In its energy policy bill in spring 2024, the Government announced that the national target for energy efficiency would be reviewed. A year later, no investigation has yet been launched, which means that the Government's announcement has so far only signaled that the current target does not apply, thereby increasing uncertainty. This is particularly worrying as, according to current scenarios, Sweden is a long way from achieving the targets in the EU's Energy Efficiency Directive.



#### CLIMATE POLICY COUNCIL RECOMMENDATION TO THE GOVERNMENT

Conduct a comprehensive impact assessment of different paths for Sweden's electrification as soon as possible, covering all fossil-free electricity generation technologies, grid flexibility, and energy storage solutions. At the same time, favorable conditions for new renewable electricity production must be rapidly restored.

<sup>n</sup> See the Climate Policy Council's report 2024. The Government's investigator of the financing proposal for new nuclear power also points out that there are different options for development of electricity and that the choice between them is a matter of weighing different risks against each other. Fi 2023F, summary, pages 17-18.

<sup>o</sup> For example, that conducted within the framework of Mistra Electrification and Northern European Energy Perspectives (NEPP) and within the national competence centre Swedish Electricity Storage and Balancing Centre.

<sup>p</sup> As the Climate Policy Council has previously emphasised, the Government can draw on experiences from regional initiatives in the industrial and energy transition and help to scale them up, such as the AGON and ACCEL initiatives and the Electrification Journey in Västra Götaland. Västra Götaland, together with the four municipal associations in the region, has adopted an energy agreement with the aim of significantly increasing electricity production.

## Economic policy can be used more actively



### THE CLIMATE POLICY COUNCILS ASSESSMENT

The Government is not using tax policy to support the climate transition but has consistently reduced energy and environmental taxation.

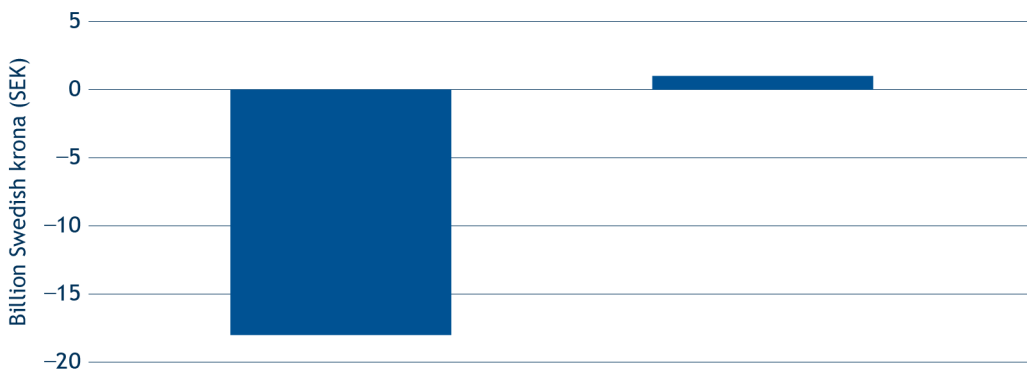
A larger share of the scope for reform in the last two budget bills has been used for reforms that have counteracted the climate transition than for economic reforms that have contributed to the transition.

### Tax policy does not contribute to the climate transition

Energy and environmental taxation contribute to revenue for the treasury and is important for steering society towards climate goals. The Government has amended environmental and energy-related taxes on 28 occasions in the three budget bills presented so far, and 16 of these decisions have counteracted the achievement of the climate targets. On 6 occasions, the decisions have contributed to the achievement of the climate goals, but all these changes have been small. The other decisions have concerned taxes that were first lowered and then raised again during the mandate period, or changes with uncertain effects.

The net effect on central Government finances of these Government decisions over three years is a reduction in environmental and energy-related taxes of almost SEK 17 billion (permanent net effect), as illustrated in Figure 14.

**Figure 14.** Net effect on central Government finances of the Government's cuts (left) and increases in environmental and energy taxes during the mandate period.



Source: Government Budget Bill for 2023, 2024 and 2025.

The analysis does not refer to the direct emissions effects of the changes but shows that the Government has clearly prioritized reductions in energy and environmental taxes, thereby relatively consistently reducing the climate-driving effect of the tax system. The Government has thus made the transition to a more resource-efficient and circular economy more difficult. Some of the changes have been small, but there is also a signaling value in decisions such as raising the value-added tax (VAT) on repairs to bicycles, shoes and clothing. The previous lower VAT rate aimed to stimulate a more circular economy.

Reducing environmental taxes does not necessarily mean that overall climate policy is weakened, but it does mean that the Government's tax policy is counteracting the climate transition. Other policies must first compensate for this counterforce before any net positive effect is achieved. In addition, the Government has lost SEK 17 billion in annual revenue that could have been used for other tax cuts or investments to contribute to the climate transition.

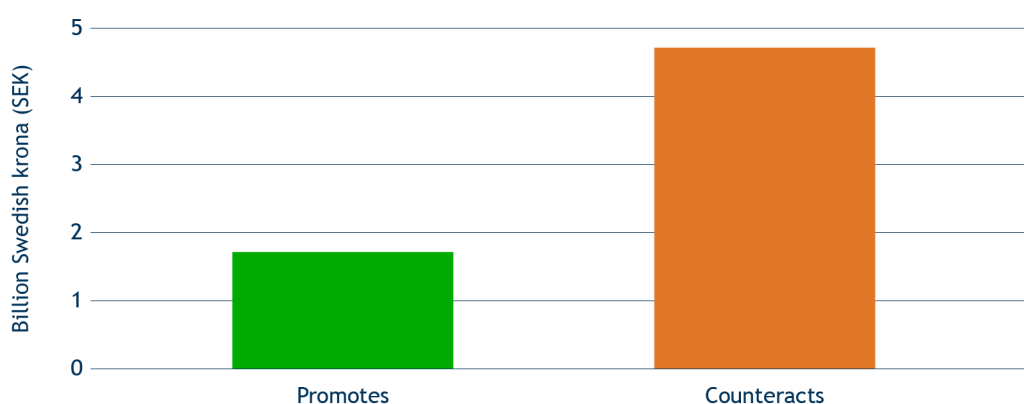
The tax changes that have the greatest impact on the climate are reductions in taxes on fossil fuels for road transport and working machines by almost SEK 15 billion. The price of emitting fossil carbon dioxide in road transport has thus fallen<sup>9</sup>.

Around €6 billion of the tax cuts have gone to car owners and drivers. This represents a significant financial redistribution from other taxpayers. This should be seen in the light of that fuel prices have now returned to the lower levels that applied before 2022 and that ticket prices for local transport have increased slightly more than fuel prices over the last decade<sup>98</sup>.

### Budget priorities pointing in the wrong direction

In the 2025 Budget Bill, the Government presented reforms totaling just over SEK 60 billion. 'Reforms' refers to new budget expenditure decisions, i.e. expenditure increases above previously estimated levels or tax changes. Of these approved budget changes, we estimate that around SEK 4.7 billion was invested in decisions that counteract the opportunities to achieve the climate targets. This applies to several tax cuts on petrol, diesel and air travel. The decisions that the Government itself categorizes as an effective climate and energy policy, plus an item for more efficient licensing processes that we also include, amount to a total of SEK 1.3 billion. This means that, as last year, the Government is using a larger proportion of the available scope for reform on initiatives that hinder the achievement of climate goals than on initiatives that facilitate the achievement of climate goals. This is a simpler form of budget analysis, regarding this year's budget reforms. The total national budget is around SEK 1 400 billion. Various frameworks are being developed to make more comprehensive assessments of the impact of Government budgets on emissions and climate targets<sup>99, 281</sup>.

**Figure 15.** Summary of the Government's scope for reform in the Budget Bill for 2025 that is deemed to contribute to or counteract the possibility of achieving the climate targets.



### The review of the fiscal framework

In autumn 2024, a parliamentary inquiry presented a review of the fiscal framework, which a broad majority in the Riksdag supported. The proposal in the report is to replace the current surplus target for state finances with a balance target<sup>100</sup>.

The report did not analyze the need for public financing for the climate transition during the period up to the next review in 2035. Such an analysis had been called for by both the Fiscal Policy Council<sup>101</sup> and the Climate Policy Council<sup>78</sup>. Both pointed to the risk that the fiscal framework would prevent the necessary climate investments and thus pass on a debt to the next generation.

<sup>9</sup> The decisions on tax reductions have been made in relation to automatic upward adjustments based on inflation and GDP growth. The nominal tax reduction per litre of diesel or petrol since 2022 amounts to just over one krona per litre of petrol or diesel. The reduction the reduction obligation has contributed to larger price reductions.

## Other decisions affecting the climate transition

The Government took several other decisions during the year that may affect the chances of achieving the climate targets. The decisions we have identified are summarized in Annex 1. Here we present some key points.

- The research and innovation bill and the separate bill on energy research and innovation were presented in December 2024. Taken together, the two bills increased research funding over the next four-year period, including for increased battery research and other areas relevant to the climate transition.
- In autumn 2024, two reports were presented with proposals for reforms to move towards a more circular economy: the report on economic instruments for a more circular economy<sup>102</sup> and a ministry memorandum on increased recycling for a more circular economy<sup>103</sup>. The reports provide a basis for developing policy in these areas but have not yet led to any concrete decisions.
- In November 2024, the Government appointed an inquiry to strengthen and develop Sweden's international climate work, including through proposals that can help to drive the climate transition in other countries all the way to net zero<sup>104</sup>. In addition to reviewing the climate targets for 2030, the Environmental Objectives Committee has also been tasked with submitting proposals to extend the objective of the Climate Policy Council. The intention is, among other things, that the Climate Policy Council will also evaluate the Government's policy to reduce global greenhouse gas emissions<sup>105</sup>.
- At the end of the year, in January 2025, the Swedish Energy Agency finalized the first so-called reversed auction for bio-energy carbon capture and storage (BECCS). The Agency decided to support Stockholm Exergi with a total of SEK 20 billion over a period of 15 years, which together with private financing will lead to the construction of a carbon capture and storage facility for around 11 million tonnes of carbon dioxide. The auction was based on previous decisions by the current and previous Governments.

## 4.3 Key conditions for effective policy



### THE CLIMATE POLICY COUNCILS ASSESSMENT

The Government's climate policy appears to be somewhat erratic, while announced target reviews and lengthy investigation processes have created unnecessary uncertainty about the goals and direction of Sweden's climate transition.

There is a lack of coherence between climate objectives on the one hand, and policies in key areas such as transport and agriculture, as well as fiscal and taxation policies, on the other hand.

There is now considerable knowledge about what policies are needed to create the conditions for a climate transition. In its assessment of policy, the Climate Policy Council is based on a number of overarching aspects that are essential for policy measures and instruments aimed at reducing emissions to be effective, efficient and robust over time. These aspects are: vision, capacity, cost-effectiveness, acceptance, coordination, collaboration and long-term approach<sup>106</sup>.

**Figure 16.** Key aspects that should be considered by policy to create the right conditions for societal transformation and achieve the goal of zero net greenhouse gas emissions.



In the center of Figure 16 is goal achievement. This is, of course, the central criterion for policy evaluation: are the policy instruments, taken together, sufficiently powerful to achieve the objectives set? This was discussed in more detail in section 4.1 Other aspects are touched on in various ways throughout this chapter. Below are some general comments and assessments based on the aspects that emerge most clearly in our analysis of the Government's policy in 2024

#### Vision and long-term approach

The Climate Change Act requires the Government's annual climate report to Parliament to include "an assessment of whether there is a need for further measures and, if so, when and how decisions on such measures can be taken". In the 2024 climate report, the Government states that the announced policy is deemed sufficient to achieve Sweden's EU commitment by 2030, while it is only expected to "contribute to" achieving the national climate targets. The Government notes that supplementary measures are needed to achieve the national targets in 2030 and 2040, but says nothing about what these measures are, or when and how decisions on such measures can be taken. Instead, the Government has tasked the Environmental Objectives Committee with "submitting proposals on how Swedish interim targets for 2030 can be designed so that they are more consistent with Sweden's commitments within the EU and steer effectively towards the long-term goal of net zero emissions by 2045 and negative emissions thereafter".

Sweden has had a climate policy framework since 2017. It is essential that the framework has broad parliamentary support if it is to fulfil its purpose of contributing to greater stability and a long-term approach. We therefore welcome the fact that the review of the 2030 targets will be carried out by the parliamentary Environmental Objectives Committee. It is also essential that the Government has included in the terms of reference that proposals from the committee should be "based on the integrity and level of ambition of the climate policy framework being kept intact with a view to 2045".

However, it is worrying that the Government's decided and planned policy instruments for the mandate period are clearly not designed to achieve the national climate goals, despite the fact that the climate goals are still valid in force by the Riksdag and before any inquiry has even been appointed.

A comparison can be made with the fiscal targets. There, a parliamentary committee has examined possible changes according to a structured process and recently submitted a report to the Government with broad consensus and after a rather intense public discussion. In this area, everyone expects the Government to respect the framework and to endeavor to achieve the existing targets until new targets are agreed. This has been the case, and the specific exceptions made for aid to Ukraine have been widely supported in Parliament.

For the actors involved, it is also unfortunate that the Government is prolonging the period of uncertainty. It took almost a year and a half from the time the governing parties first announced that the Swedish climate targets would be reviewed<sup>107</sup> to the presentation of the investigation's terms of reference, and even longer before the investigation could start. This contributes to uncertainty about the direction of policy, which increases the risk for all those interested in investing in Sweden's climate transition.

The same applies to energy efficiency. Sweden will find it difficult to achieve the current EU commitment and the Government wishes to change the nationally agreed target that Sweden should have 50 percent more efficient energy use by 2030 compared with 2005<sup>r</sup>. However, the energy policy bill from March 2024 did not contain any direction in this area, but only an announcement that the current target would be reviewed. The Government believes that the current target is not adapted to the extensive electrification expected and risks conflicting with the target net zero emissions by 2045. One year later, the Government has not yet initiated a review.

The Government's climate policy in 2024 has been characterized by a conspicuous lack of focus, which contributes to short-termism and makes it difficult for those involved in the transition:

- After the reduction mandate was drastically reduced from the highest in the EU to one of the lowest on 1 January, an increased and modified reduction obligation was announced eight months later.
- In its March energy policy bill, the Government assessed that wind power could account for most of the additional electricity generation in the short term. The Government therefore announced measures to improve the conditions for efficient expansion. But in October, the Government instead introduced an unexpected ban on offshore hydropower in the entire Baltic Sea except the Gulf of Bothnia.
- The Government increased the budget allocation for Klimatkivet by SEK 500 million for 2025, but limitations in the Swedish Environmental Protection Agency's authorisation framework forced the agency to completely close the possibility of new applications that run over several years shortly afterwards.
- The tax reduction for solar cells was increased in 2023, but as early as autumn 2024 the Government proposed that the reduction should return to the previous level, without any of the decisions being deemed to have any impact on the expansion of fossil-free electricity production.
- At the overall level, the Government has shown little interest in seeking broad agreements on energy policy, for example, which increases the political risk for anyone who wants to invest in Sweden's climate transition.

<sup>r</sup> The Swedish target for energy efficiency is that Sweden should have 50 percent more efficient energy use by 2030 compared to 2005 levels. This target is expressed in terms of energy input in relation to gross domestic product (GDP)

## Coherence

The Climate Policy Council's 2023 report highlighted several conflicts between climate objectives and social objectives in other policy areas. The Government subsequently emphasized in the climate policy action plan that the climate perspective needs to be clear in relevant areas and announced that climate objectives would be taken into account in connection with the review of objectives in the various areas of Government expenditure. The Climate Policy Council points out that there are still obvious gaps in the coherence between current climate objectives and policies in several areas, such as transport and agriculture, as well as in fiscal and tax policy.

## Collaboration

In last year's report, the Climate Policy Council criticised the Government for the way the climate policy action plan had been drawn up. The criticism was that a narrow selection of stakeholders had been involved and that the consultation process had been weak, even though the process was a step forward compared with the first plan from the previous Government. As the Government is now developing the social climate plan, EU regulations contain explicit requirements for consultation with local and regional stakeholders in particular. However, the consultation process has so far been limited and has taken place after the Government already announced in the budget bill that they intend to use the financial space in the plan for a new targeted electric car premium.

The Government often emphasizes the importance of business engagement in the transition, not least through the Fossil Free Sweden initiative. Despite this, it was uncertain for a long time the initiative would continue beyond 2024, which raised questions among the companies and industry organizations involved. In December, the Government decided on an extended and broadened mandate until 2026.

In June 2024, the Government also decided to establish an acceleration office to promote the coordination of public and private actors involved in major industrial establishments. The aim is to facilitate industry's transition to a fossil-free economy by, for example, contributing to more efficient permit and authorization procedures and other measures within Government administration, as well as identifying and addressing barriers to investment and establishment.

## Acceptance

Public acceptance was strongly emphasized by the Government in the texts of the climate policy action plan, but they did not provide any further clarity on how they viewed or intended to work to increase engagement and acceptance. In the 2024 climate report, the Government included for the first time a discussion of acceptance as a prerequisite for the climate transition. However, the Government's description is narrowly focused on household costs for transport and heating ahead of the forthcoming implementation of the EU ETS 2 and is more an assessment of the distributional effects of the policy. Moreover, only fuel and servicing of own vehicles are included in the comparison of household transport costs. Price developments for public transport are not considered at all.

Acceptance of climate policy is a much broader issue. In 2024, the Climate Policy Council brought together researchers from different research fields in a joint seminar. The aim of the seminar was to increase knowledge about how climate policy can be designed so that the actors involved and citizens at large meet it with acceptance and commitment<sup>108</sup>. The Expert Group for Studies in Public Economics (ESO) has recently contributed further data on acceptance of climate policy in the report *Climate policy without protests - is it possible*<sup>109</sup>?



The Government itself describes in the climate report that public acceptance of climate measures is primarily determined by people's perceived fairness, perception of the effectiveness climate measures and concern about climate change, which is in line with the research findings. Nevertheless, the Government's follow-up in the climate report is limited to a consumer perspective, while a broader citizen perspective is missing.

We recall that opinion polls show that the public is more concerned about climate change and the inadequacy of the measures taken than that the measures taken will have a negative impact on them. Both global and Swedish studies show that in most countries there is a great willingness to contribute to reducing climate impact, even if it means a personal financial sacrifice<sup>110</sup>. However, the willingness of others to act is underestimated - which means that there is a so-called perception gap - which can weaken commitment and acceptance of climate policy measures<sup>111</sup>. The Climate Policy Council believes that political leadership to implement the climate transition is partly about reducing this perception gap. It is important to inform about and take advantage of the broad support that exists to act in order to limit climate change.

### **Cost-effectiveness**

Cost-effectiveness is another recurring theme in the Government's climate policy action plan. The clearest concrete example of this theme was the assignment given jointly to the Swedish Environmental Protection Agency and the National Institute of Economic Research to develop a guide for assessing cost-effectiveness of climate policy. The guidance is a valuable contribution that complements an earlier guidance on impact assessments<sup>112</sup>.

Unfortunately, things went in the opposite direction in June 2024 when the Government decided on a new ordinance on impact assessments for investigators and authorities submitting proposals to the Government<sup>113</sup>. The new ordinance lacks requirements to highlight the consequences of reduced or increased emissions or removals of greenhouse gases. Several people had recommended that such requirements should be included in the regulations for impact assessments, for example the Climate Policy Council, the Environmental Objectives Committee<sup>114</sup> and the Swedish National Financial Management Authority<sup>115</sup>.

It is a basic requirement that the Government has a sound basis for decision-making on the effects of various proposals on the ability to achieve the climate goals. Without this, important tools for achieving the climate goals in a cost-effective way are lacking. The decision-making basis is needed in order to be able to assess the fulfilment of policy objectives, and to weigh up the effects and costs of different proposals.

# 5 The Government's climate report 2024



## THE CLIMATE POLICY COUNCIL ASSESSMENT

The Government's climate report to Parliament was improved in 2024 in significant respects. However, the report does not fully meet the formal requirements of the Climate Change Act. There is largely no information on when and how decisions on new measures to achieve the climate objectives can be taken.

This chapter contains the Climate Policy Council's assessment of the Government's climate reporting in relation to the Climate Act<sup>116</sup> and an initial follow-up of the implementation of the climate policy action plan<sup>44</sup>.

The Government must submit a climate report to Parliament each year in the budget bill in accordance with section 4 of the Climate Change Act. The climate report must contain

- an account of emissions trends
- an account of the most important climate policy decisions taken during the year and what these decisions might mean for emissions trends
- an assessment of whether there is a need for further action and, if so, when and how to decide such action.

The 2024 climate report was submitted in September, as part of the budget bill for 2025. Regarding the nationally agreed interim targets for 2030 and 2040 and the EU commitment for LULUCF in 2030, the Government considers that further measures are needed to achieve the targets. However, there is largely no information on when and how decisions on such measures can be taken.

## 5.1 Improved climate accounting in 2024

The latest climate report has been improved in significant, beyond the formal requirements of the Climate Change Act. These improvements are in line with our previous recommendations and the purpose of the climate policy framework:

- For the first time, the Government presents a follow-up of the climate policy action plan in the climate report. This links the Government's climate policy steering documents with the report on the policies pursued. The Climate Policy Council has regularly pointed out that this link should be self-evident, as it strengthens transparency and the ability to follow up the Government's climate policy, not least vis-à-vis the Riksdag.
- Another new feature this year is that the climate report is presented in volume 1 of the budget bill, i.e. in relation to the overall financial plan. Previously, it was presented as an annex to the budget bill's expenditure area 20, Climate and environment. Presenting the climate report at a cross-budget level signals that the climate transition is a matter of overall policy and is the responsibility of the whole Government.
- This year's climate report contains more detailed responses and comments from the Government to the Climate Policy Council's assessments and recommendations from last year's report. The Climate Policy Council also welcomes this as it is in line with the Climate Act and the purpose of the climate policy framework.

## 5.2 Potential for increased transparency and quality in future climate accounts

Although the Climate Policy Council believes that climate reporting has improved on several points, is potential for improvement. Improvements to climate reporting should also be institutionalized in the Government Offices to ensure that they are maintained in future years.

### Emission scenarios and goal achievement

The Government has partially developed the section on scenarios in relation to the policies pursued and the possibility closing the emissions gap that exists against the climate targets:

- The Climate Policy Council welcomes the Government's return to a transparent and factual description of the emissions gap towards the target of zero net emissions by 2045. The climate policy action plan instead presented a possible target scenario that was not based on adopted or planned policies. A factual description of climate policy and its expected effects is crucial for the functioning of the climate policy framework and for democratic dialogue.
- The potential development towards Sweden's LULUCF commitment is presented and shows two scenarios with significant gaps to Sweden's commitment. Compared to last year, these scenarios are more transparent and educational, for example regarding gaps for the different time periods of the LULUCF commitment.

However, the Climate Policy Council considers that the transparency and quality of climate reporting could have been further strengthened:

- The starting point for the climate accounting of Sweden's EU commitment for ESR by 2030 is the various scenarios presented by the Swedish Environmental Protection Agency (see discussion in section 4.1). The scenarios contained a number of uncertainties, and the Climate Policy Council believes that the Government should have reported this in line with the requirement for transparency. The Government should also have explained why it considers that the policy can be based on the most favorable scenario.
- The Government gives a brief account of progress towards the national climate targets for 2030 and 2040 and mentions that there is an emissions gap in both cases. However, this is not shown in any figures, unlike in previous years, which makes it more difficult to follow developments up to each target year.
- There is no emissions scenario for the national climate target for domestic transport by 2030, linked to the measures in the budget bill for 2025. It is unclear why an emissions scenario is not presented.

### Policy impact assessments

In each climate report, the Government has provided a more detailed account of the impact of its policies on emissions reductions, including this year. The Climate Policy Council welcomes the fact that the Government is reporting the difference in direct emissions impact between already decided and newly proposed policies.

However, the Council considers that transparency and pedagogy could be strengthened:

- It is unclear what assumptions underlie the assessments of additional emissions effects resulting from the new proposed measures in the budget bill for 2025 (the BP25 scenario).

### 5.3 Assessment of the Government's follow-up to the climate policy action plan

The Government already announced in the climate policy action plan that it intended to follow up the implementation of the action plan in the annual climate report. The Government now writes that the climate policy action plan contains some 70 emission-reducing measures, but without clarifying what these are. In the climate report, the Government lists 26 measures that were presented in the climate action plan and that have now been implemented.

The Climate Policy Council believes that the transparency and quality of monitoring could be improved the following ways:

- Provide a clearer description of the 70 or so measures planned.
- Clarify which ministers, departments and agencies are responsible for which actions.
- Provide a timetable for the completion of the actions.
- Refer to the actions carried out under each point of the plan and to official documents (decision, directive, mission, study, report).
- Show which remaining actions are planned for the coming years.
- Link implemented and planned actions to objectives and report on assessed impacts.

# Part II

Agriculture's climate transition



# Introduction to Part II

Agriculture faces major challenges that affect the future of the sector. As the global population grows and demands more food per capita, climate change is negatively affecting the ability to farm in many parts of the world. Current agricultural production also has significant climate impacts, as well as negative impacts on other environmental objectives. Current agricultural production is also not compatible with the Paris Agreement goal of achieving zero net greenhouse gas emissions<sup>17</sup>. However, the accumulated research emphasises that it is possible to switch to long-term sustainable food production.

In Sweden and Europe, climate measures in agriculture is increasingly coming into focus, as agriculture is expected to account for a growing share of remaining greenhouse gas emissions. Recently, however, new solutions have been developed to reduce fossil and biological emissions from agriculture, while improved methods for storing carbon in agriculture are. Agriculture also has the potential to contribute to emission reductions in other through the products it produces, such as fossil-free fuels. There is significant commitment from farmers and other actors in the food chain to contribute to climate change mitigation. Now is the time for policy-makers to take a concerted approach to strengthening the sector's contribution to climate objectives.

The ambition of this year's special feature on agriculture is to evaluate current policy in this area and to contribute to policy development. In **Chapter 6**, we provide an introduction to the climate impact of agriculture and its relationship to other relevant societal objectives. In **Chapter 7**, we describe agricultural climate measures and their potential to reduce emissions. In **Chapter 8**, we evaluate the extent to which the existing agricultural policy addresses the obstacles to implementing agricultural climate measures and enabling a socio-economically efficient climate transition. In the final chapter, **Chapter 9**, we make recommendations to the Government on how policies can be developed to strengthen the contribution of agriculture to climate objectives.

We would like to thank all the stakeholders who have contributed in various ways to this in-depth study on agriculture. Our dialogues with farmers, food chain actors, researchers, experts and civil society and Government officials have added knowledge and understanding of agriculture's opportunities and specific challenges in climate policy. These dialogues have reinforced our view that strengthening agriculture's contribution to climate objectives requires close interaction between all relevant actors.

# 6 Introduction to the climate impact of agriculture

This introductory chapter introduces agriculture and its climate impact. Section 6.1 describes the focus and boundaries of the Climate Policy Council's analysis. Section 6.2 describes the Swedish agricultural industry and section 6.3 the climate impact of agriculture. Section 6.4 discusses the societal objectives other than climate objectives that agriculture needs to address, as well as synergies and conflicts with climate objectives.

## 6.1 Focus, boundaries and methodology of the analysis

In previous reports, the Climate Policy Council has identified agriculture as a policy area where there is a lack of sufficient climate policy and where further action is needed<sup>179, 84, 118</sup>. To contribute to policy development, we have therefore chosen the climate impact of agriculture as the theme of this year's report. Our analysis is based on three overarching questions:

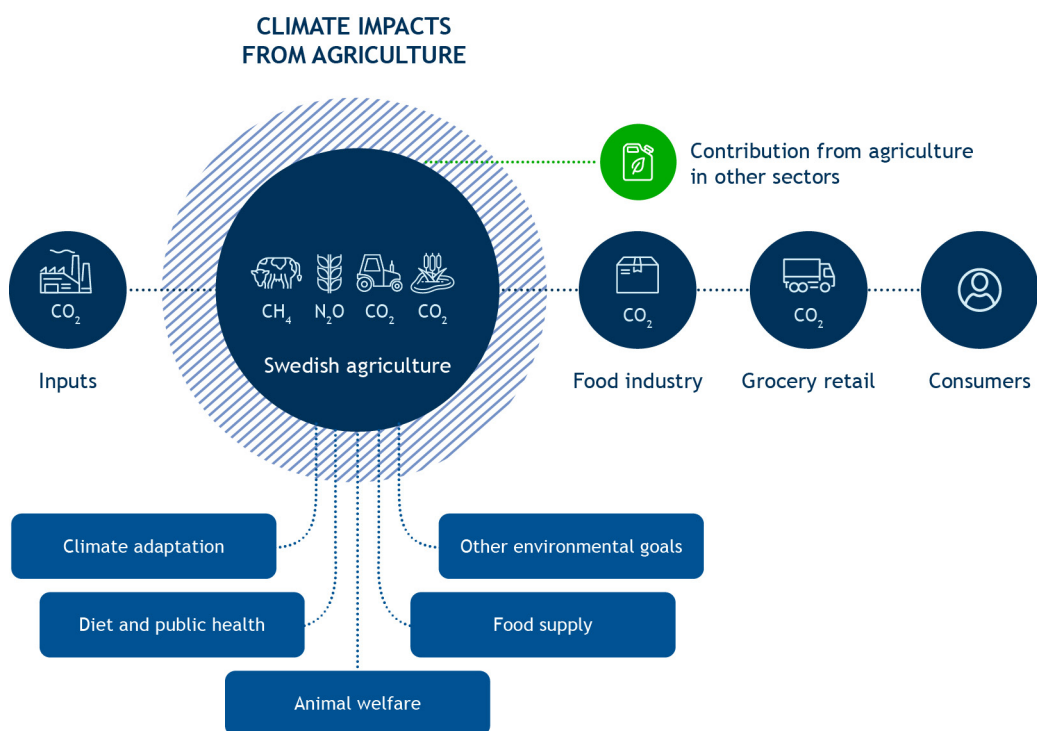
1. What is the potential to reduce greenhouse gas emissions in Swedish agriculture?
2. What are the barriers that limit the possibility of realizing this potential and how do current policies address these challenges?
3. How can policies be further developed to enhance the contribution of agriculture to climate objectives?

The mission of the Climate Policy Council is linked to the national climate targets. Therefore, the focus of this report is on territorial net emissions of greenhouse gases. Agricultural emissions include biological emissions from crop and livestock production, emissions from and carbon sequestration in cropland and pastures, and fossil fuel emissions from machinery and agricultural premises. Although we mainly focus on territorial emissions, it is crucial that Swedish policies do not lead to increased emissions abroad by shifting production. This follows from the generational goal, set by the Swedish Parliament, which requires that environmental objectives be achieved without causing additional negative environmental and health impacts outside Sweden's borders<sup>119</sup>.

Agriculture is also linked to several other important societal issues, such as food supply, nutrition and public health, and other environmental objectives. Food supply is a complex issue that relies on robust systems of production and consumption that can function even in times of crisis. In terms of diet, agriculture plays an important role in both livelihoods and public health. In terms of other environmental objectives, agriculture is essential for a rich agricultural landscape and biodiversity. At the same time, agriculture has a negative impact, including through emissions air pollutants and eutrophication substances.

In this report, we therefore take a systems perspective, linking the climate impact of agriculture to other societal issues (see Figure 17). Such a systems perspective is necessary to find long-term sustainable solutions that exploit possible synergies and manage conflicting objectives. In assessing the potential to reduce agricultural greenhouse gas emissions, we describe important synergies and conflicting objectives between emission reductions and other societal goals. We also discuss GHG emissions in other parts of the food chain and the potential for agriculture to contribute to emission reductions in other sectors. Our analysis of policy and our recommendations for policy development are also based on the premise that it is this broader problem that needs to be addressed.

**Figure 17.** Focus of the Climate Policy Council's analysis of the climate impact of agriculture. The figure describes the emissions along the food chain and the other targets that agriculture needs to meet. Agriculture's contribution, in the form of the production of fossil-free fuels, for example, is also illustrated in the figure.



FOCUS OF THE CLIMATE POLICY COUNCIL REPORT

## 6.2 Swedish agriculture today

In 2023, Swedish agriculture consisted of around 56,000 farms, with just over 31,000 person-years of work performed by almost 160,000 people on a full- or part-time basis. Agriculture is carried out under very different conditions, on different types of farms and in different parts of the country.

### Agricultural development

Sweden's agriculture has developed over time from small-scale self-sufficiency to become increasingly large-scale<sup>120</sup>. A similar structural transformation has taken place throughout Europe<sup>121</sup>. Of Sweden's 56,000 farms, just over 13,000 are full-time farms, i.e. farms that require at least one full-time position. Full-time farms cultivate 75 percent of agricultural land and account for more than 90 percent of livestock production<sup>122</sup>. Around two-thirds of agricultural land is on relatively large farms with more than 100 hectares (ha) of agricultural land<sup>123</sup>.

Swedish agricultural land reached a peak in the 1910s when it comprised approximately 3.8 million hectares of cropland and 1.2 million hectares of permanent pastures and meadow land. It has since shrunk to around 2.5 million hectares of cropland and 0.45 million hectares of permanent pasture in 2023. Around 7 percent of Sweden's land area is agricultural land<sup>124</sup>, which is relatively small from a European perspective<sup>121</sup>. One reason for this is that large parts of Sweden are made up of forest landscapes that are currently not economically suitable for agriculture. Most agriculture is concentrated in the southernmost part of Sweden and plains near the three largest lakes, Vänern, Vättern and Mälaren<sup>123</sup>.



As industrialisation has progressed, agriculture's share of the Swedish economy has declined. At the beginning of the 20th century, agriculture accounted for around 30 percent of Sweden's gross domestic product (GDP) and employed just over 60 percent of the Swedish labour force. Today, agriculture accounts for only 2 percent of GDP and employs just over 3 percent of the labour force. This pattern is found in many countries.

### What is produced in Swedish agriculture?

Agriculture in Sweden and the rest of Europe is mainly carried out on farms with a relatively high degree of specialisation. More than 85 percent of full-time farms in Sweden are focused mainly on crop, dairy or meat production<sup>122</sup>. AOf the value of production, crop and animal production account for approximately equal shares<sup>125</sup>.

In crop production, Sweden is a major producer of cereals. Together with the other Nordic countries, Sweden also stands out in Europe with an unusually high proportion of ley, i.e. perennial mixtures of grass and clover that are mainly used for animal feed. Cereals and ley each account for about 40 percent of cropland. The remaining 20 percent is used for rapeseed, potatoes, sugar beets and fallow land.

In terms of production value, milk, pork, chicken and beef dominate livestock production. In addition to just under 300,000 dairy cows, there are around 200,000 suckler cows, i.e. cows kept solely as mothers of calves to be used for meat production. Pigs account for just under half of meat production (carcass weight), while cattle and poultry each account for about a quarter. Sheep and lambs account for only about one percent.

## 6.3 Greenhouse gas emissions from agriculture

In this section, we report on greenhouse gas emissions from agriculture and the entire food chain. First, we provide an overview of greenhouse gas emissions from the entire food chain globally and in Sweden. We then describe in more detail the emissions from agriculture itself and the rest of the food chain, with a particular focus on Sweden.

### The climate impact of food

In addition to the GHG emissions from agriculture itself, the food chain generates additional emissions from the production of agricultural inputs such as mineral fertilizers and pesticides, from processing, packaging and transport, and from waste management. In some contexts, emissions from deforestation caused by expanding agricultural production are also included<sup>126, 127</sup>.

Globally, the food sector, including all these emissions, accounts for around a quarter to a third of all human-caused greenhouse gas emissions<sup>127, 128</sup>. The emissions sector agriculture, which includes only agricultural biological greenhouse gas emissions from crop and livestock production, accounted for more than 12 percent of global and European greenhouse gas emissions in 2023. Despite decreasing emissions per unit of food produced<sup>129</sup>, global emissions have increased, both as a result of a growing population and more emissions-intensive average food consumption<sup>130</sup>.

As fossil fuel emissions are phased out, food will account for an increasing share of the remaining human climate impact. Research shows that even if all fossil fuel emissions were to cease today there is a risk that the two-degree target could be exceeded solely because of the future climate impact of food supply<sup>131, 132</sup>. Even in an optimistic scenario, with substantial emission reductions through efficiency improvements and dietary changes, food supply is likely to cause around 0.6 degrees of additional warming by the end of the century<sup>132</sup>.

Swedish food consumption causes relatively high emissions per capita in a global perspective due to high consumption of emission-intensive food products<sup>133</sup>. Sweden is a net importer in many categories of food and agricultural commodities, including meat, dairy products and fruit and vegetables, as well as inputs such as mineral fertilizers and protein feeds. At the same time, the only major net export is cereals and cereal-based goods. Research shows that Swedish food consumption causes emissions of 1.6 to 2.2 tonnes of carbon dioxide equivalent per person per year<sup>134–138</sup> which is almost double the territorial agricultural emissions<sup>5</sup> of around 1 tonne of carbon dioxide equivalent per person per year. Swedish food consumption thus causes significantly more greenhouse gas emissions globally than the territorial emissions from Swedish agriculture.

The aim of Sweden's climate policy is to help achieve the global climate goals. Therefore, food consumption and international trade need to be considered so that the policy is not counterproductive from a global perspective. It is important to avoid a climate policy that simply shifts emissions to another country. However, to minimise global emissions, it is not necessarily better to produce food in Sweden. What is best for the climate depends on whether Swedish production is more or less climate-efficient than what is imported.

### Greenhouse gas emissions from agriculture in Sweden

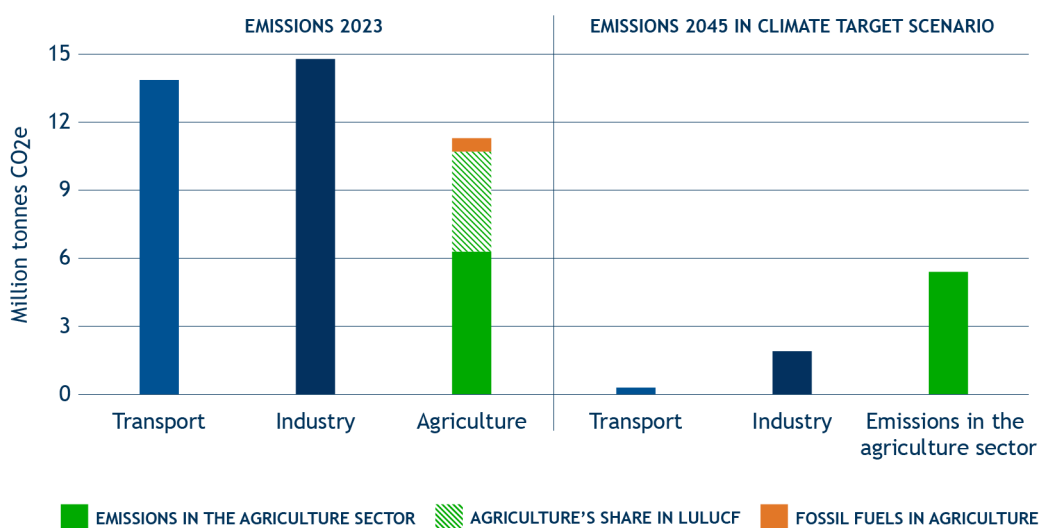
Swedish agricultural greenhouse gas emissions are calculated in this report as the sum of the emissions sector agriculture, agricultural fossil energy use for machinery and heating, and agriculture's part of the land use sector (LULUCF).

In Sweden, these total emissions amounted to 11.3 million tonnes of carbon dioxide equivalents in 2023, compared to the other major sources of emissions in Sweden, the industrial sector with emissions of 14.8 million tonnes and domestic transport with emissions of 13.7 million tonnes in the same year (see Figure 18).

While Sweden's total greenhouse gas emissions have fallen by 38 percent since 1990, total net emissions from agriculture have only fallen by 8 percent. This means that agriculture's share of Sweden's emissions has increased. According to the Swedish Environmental Protection Agency's target scenario for achieving Sweden's long-term climate goals, agriculture is expected to account for most of the remaining emissions in 2045, as shown by the right-hand bar in Figure 18.

<sup>5</sup>The territorial emissions are counted here according to the delimitation given above for this report, i.e. the sum of the emissions sector agriculture, LULUCF emissions from agricultural, and agricultural fossil energy emissions from labour machinery and heating of agricultural and forestry premises. The comparison with the consumption-based emissions statistics is not exact due to different system boundaries and assumptions, but gives a reasonable indication of approximately how large consumption emissions are compared to Sweden's territorial emissions in agriculture.

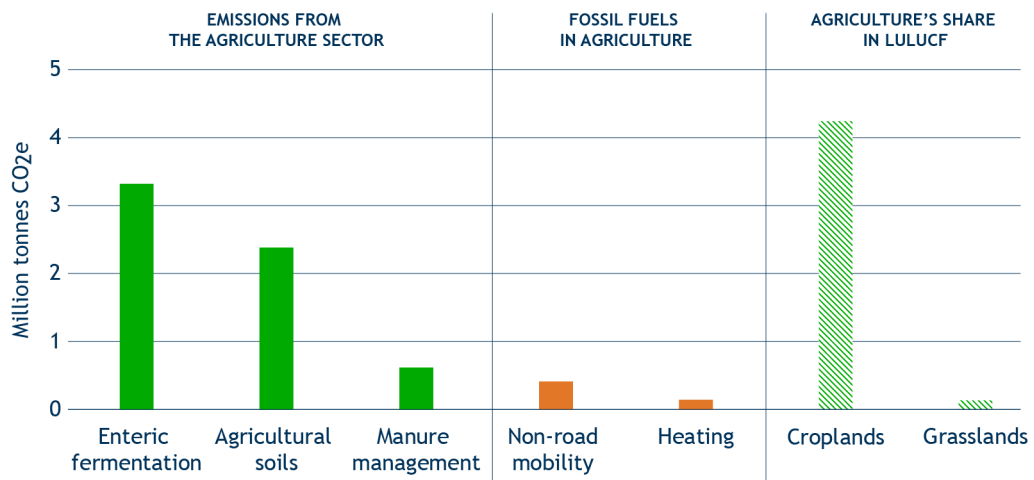
**Figure 18.** Comparison between emission sectors. The left-hand side shows Swedish emissions in 2023 according to the official emissions statistics<sup>9</sup>. The right-hand side shows Sweden's emissions in 2045 in the Swedish Environmental Protection Agency's scenario for how the long-term target can be achieved<sup>39</sup>. The bar for Agriculture in 2023 shows the emissions attributed to agriculture in this report, i.e. the sum of the emissions sector agriculture, agriculture's share of LULUCF and agriculture's use of fossil fuels. The right-hand bar only includes the emissions sector agriculture, as this was included in the Swedish EPA's target scenario.



The three components of agricultural GHG emissions included in our analysis are as follows (Figure 19):

- The emissions sector agriculture** includes methane and nitrous oxide emissions from crop and livestock production. These emissions amounted to 6.3 million tonnes of carbon dioxide equivalent in 2023, of which methane from enteric fermentation (feed digestion in ruminants such as cattle) accounted for about 50 percent, nitrous oxide from agricultural soils for just under 40 percent, and methane and nitrous oxide from manure storage for just under 10 percent. These emissions have decreased by 12 percent since 1990, mainly due to reduced animal numbers and fertilizer use<sup>140</sup>.
- Fossil energy use in agriculture** includes agricultural machinery, greenhouse heating and grain dryers. Its emissions amounted to 0.6 million tonnes of carbon dioxide equivalent in 2023. These fossil emissions have decreased the most, by over 50 percent since 1990, mainly due to increased use of renewable fuels. However, fossil fuels are used to a greater extent in agriculture for heating premises and for working machinery than in other sectors, which can be partly explained by the fact that fossil fuels in agriculture are more heavily subsidised compared to other sectors.
- The agricultural land part of the land use sector (LULUCF)** includes other greenhouse gas emissions and removals in cropland and permanent pasture. The net of these emissions amounted to 4.4 million tonnes of carbon dioxide equivalent in 2023. Agricultural emissions in LULUCF occur mainly in drained organic soils which consist of a high proportion of organic matter that gradually decomposes, releasing carbon dioxide and nitrous oxide. The organic soils' emissions of carbon dioxide (3.9 million tonnes of carbon dioxide in 2023) are attributed to the LULUCF sector, while emissions of nitrous oxide (0.5 million tonnes of carbon dioxide equivalent) are attributed to the agricultural sector. Other agricultural soils (mineral soils) fluctuate over time between net removals and net emissions of carbon dioxide, depending, among other things, on weather conditions. Net emissions from agricultural land have varied between around 2-4 million tonnes of carbon dioxide equivalent per year since 1990. Emissions from organic soils have decreased due to declining cultivated area.

**Figure 19.** Total greenhouse gas emissions from agriculture in Sweden in 2023 (million tonnes of carbon dioxide equivalent), broken down into different emission sectors.



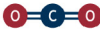

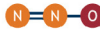
Source: Swedish Environmental Protection Agency<sup>140</sup>.

As agriculture's climate impact largely comes from hard-to-measure processes in the soil and from enteric fermentation, there are greater uncertainties around the climate impact of agriculture compared to other emission sectors.

## FACT BOX 4. METHANE AND NITROUS OXIDE

**Agriculture is the largest source of Sweden's emissions of the greenhouse gases methane and nitrous oxide.**

**Figure 20.** Comparison of the properties of different greenhouse gases.

			
	Carbon dioxide	Methane	Nitrous oxide
Climate effect (GWP100)	1	27	273
Life span	300-1000 years	12 years	109 years
Contribution to global warming	64 %	16 %	6 %

Source: WMO<sup>141</sup>, IPCC<sup>142</sup>.

**Methane (CH<sub>4</sub>)** is a 27 times more potent greenhouse gas than carbon dioxide per kilogram from a 100-year perspective (GWP100<sup>141</sup>) and about 80 times more potent from a 20-year perspective (GWP20<sup>142</sup>). The comparison between the gases is strongly dependent on the time horizon, as methane has a lifetime of about 12 years in the atmosphere, compared to carbon dioxide which has an effective residence time of about 300 – 1000 years. Methane has caused about 16 percent of global warming since pre-industrial times<sup>141</sup>. At the global level, the agricultural sector, the energy sector and waste (landfills and sewage) account for the majority of methane emissions in descending order<sup>143</sup>.

The Inter Governmental Panel on Climate Change (IPCC) emphasises the importance of sharply reducing methane emissions in the short term in order to achieve the temperature targets of the Paris Agreement<sup>146</sup>. To rapidly reduce methane emissions, 158 countries have signed a declaration to reduce methane emissions by 30 percent by 2030 compared to 2020. Sweden has signed the declaration and developed an action plan to reduce methane emissions<sup>144</sup>. Sweden has almost halved its methane emissions since 1990, mainly due to reduced methane emissions from landfills and the phasing out of fossil fuels in the energy sector. Three quarters of Sweden's methane emissions today come from agriculture, with over 90 percent coming from enteric fermentation of cattle feed.

**Nitrous oxide (N<sub>2</sub>O)** is almost 300 times more potent as a greenhouse gas than carbon dioxide per kilogram in both a 20-year (GWP20) and 100-year (GWP100) perspective<sup>142</sup>. The average lifetime of nitrous oxide in the atmosphere exceeds 100 years and therefore nitrous oxide causes more long-term warming than methane. Nitrous oxide has caused about 8 percent of today's global warming<sup>141</sup> and also contributes to stratospheric ozone depletion<sup>145</sup>. Unlike methane, there are no common global targets for reducing nitrous oxide emissions.

Nitrous oxide emissions occur mainly in the agricultural sector due to the high turnover of nitrogen in fertilisers and crop residues. As an inevitable consequence of nitrogen transformation in the soil, small amounts of nitrous oxide, around 1 percent of the nitrogen in fertilisers and crop residues, are released into the atmosphere.

**There are advantages and disadvantages to counting methane and nitrous oxide emissions as carbon dioxide equivalents.** The main advantage is that the climate impact can be summarised in one number. The disadvantage is that the different climate impacts of gases over time cannot be fully captured. Therefore, research has increasingly shifted to measuring the climate impact of food using multiple metrics, or simulating how different scenarios affect the global average temperature over time<sup>132, 146</sup>.

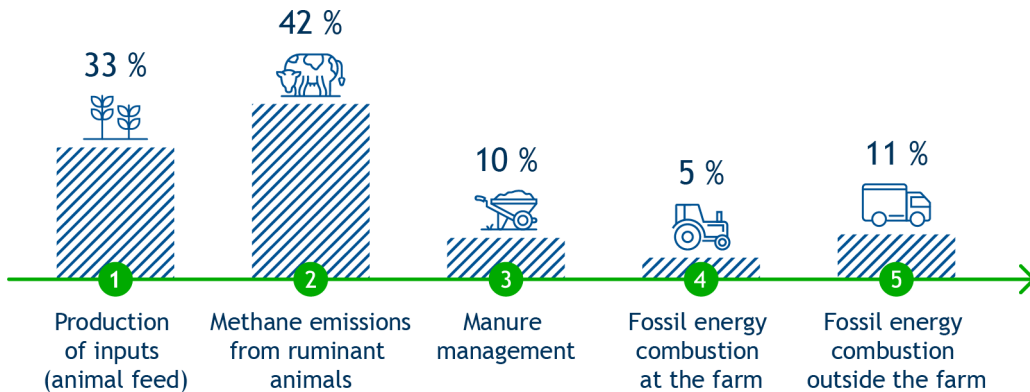
<sup>141</sup> GWP stands for Global Warming Potential and is a method for reporting the climate impact of different greenhouse gases in the same unit, carbon dioxide equivalents. According to reporting rules, methane and nitrous oxide are converted to carbon dioxide equivalents based on the effect the gases have over a hundred years (GWP100). Estimates of GWP for different greenhouse gases are based on the assessments of the InterGovernmental Panel on Climate Change (IPCC). In this chapter we present the IPCC's latest GWP factors (IPCC AR6), which differ slightly from the older factors (AR5) currently used in Sweden's emissions statistics.

## Other emissions that can be linked to the whole food chain

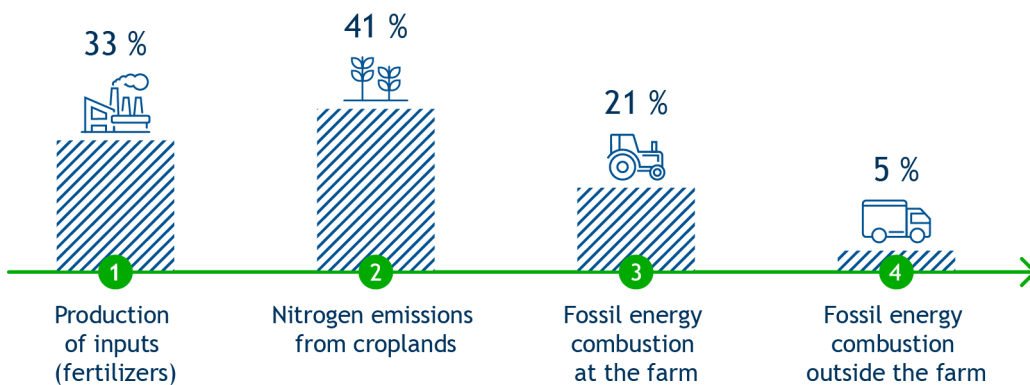
Figure 21 shows two examples of how total greenhouse gas emissions are distributed along the value chains for milk and wheat flour according to life cycle analyses. These emissions can occur both in Sweden and abroad. Emissions from inputs, such as fertilisers, occur largely abroad as Sweden imports all nitrogen mineral fertilisers.

**Figure 21.** Distribution of GHG emissions in milk and wheat flour value chains<sup>4</sup>.

### LIFE-CYCLE EMISSIONS FOR MILK



### LIFE-CYCLE EMISSIONS FOR WHEAT FLOUR



Source: Arla (for milk)<sup>147</sup> and Lantmännen (for wheat flour)<sup>148</sup>.

Other emissions from the food chain are mainly fossil carbon dioxide. They are largely covered by climate instruments in other sectors, mostly in industry and transport. An important example is the emissions caused by fossil energy use in the production of nitrogen fertilisers<sup>128, 149, 150</sup> covered by the EU Emissions Trading System (EU ETS) and the EU Carbon Border Adjustment Mechanism (CBAM).

<sup>4</sup>For milk food emissions, we have used Arla's reporting of dairy farmers' life cycle emissions. In the figure, we have excluded dairy farmers' emissions that cannot be directly linked to milk emissions, including emissions from organic agricultural soils and emissions from whey. For wheat flour, Lantmännen has reported life cycle emissions for wheat flour specifically, therefore no adjustments have been needed.

Agriculture also helps to replace fossil raw materials and thus reduce emissions in other sectors, for example by utilising residues from food production to produce biogas and liquid biofuels. More than half of Swedish biogas production can be traced back to the food chain<sup>151</sup>. Sweden also produces grain ethanol which can be used as biofuel. However, Sweden's production of biofuels is significantly lower than consumption<sup>152</sup>. Studies show that there is technical potential to increase agricultural bioenergy production by around 10-20 TWh per year (and perhaps more) through increased utilisation of, inter alia, agricultural residues, biomass from unused cropland and harvesting of brushwood from overgrown agricultural land<sup>153-155</sup>.

## 6.4 The relationship between climate change mitigation and other societal objectives

In addition to climate objectives, agriculture needs to address several other societal objectives. This section describes a number of areas where there are potential synergies and trade-offs between climate change mitigation and other societal objectives. An overview is shown in Table 2.

**Table 2.** Summary of the main synergies and trade-offs between reducing the climate impact of agriculture and other societal objectives.

Societal objectives	Synergies	Conflicts
Food supply and competitiveness	<ul style="list-style-type: none"> <li>Increasing productivity can reduce the climate impact per unit of food produced.</li> <li>Low-emission foods generally use less land, allowing more food to be produced in a given area.</li> <li>Enhanced competitiveness can improve the economic conditions for implementing climate measures.</li> </ul>	<ul style="list-style-type: none"> <li>Increased production leads to increased total emissions. The magnitude depends on what is produced and what efficiency measures are used.</li> </ul>
Other environmental quality objectives	<ul style="list-style-type: none"> <li>Reducing nitrogen use not only reduces greenhouse gas emissions, but also helps reduce air and water pollution, which in turn has a positive impact on biodiversity and human health.</li> <li>Measures that sequester carbon in agricultural soils have several potential benefits, including for soil health by reducing the need pesticides.</li> </ul>	<ul style="list-style-type: none"> <li>Ruminants grazing seminatural pastures contribute to biodiversity and open landscapes, while causing significant greenhouse gas emissions.</li> <li>Nitrification inhibitors that can reduce nitrous oxide emissions can have negative side effects on soil microbes and aquatic organisms.</li> </ul>
Animal Welfare	<ul style="list-style-type: none"> <li>A more plant-based diet means both lower greenhouse gas emissions and reduced animal production and thus reduce the extent of existing animal welfare problems.</li> </ul>	<ul style="list-style-type: none"> <li>Pigs, chickens and eggs are relatively climate-efficient livestock products, but there are animal welfare problems in their production.</li> <li>Swedish animal welfare regulation is relatively strict and therefore reduced Swedish production of animal products may lead to increased production in countries less strict animal welfare regulation.</li> </ul>
Diet and public health	<ul style="list-style-type: none"> <li>Healthier diets have great potential to reduce food consumption-based emissions and can also reduce territorial emissions from Swedish agriculture.</li> </ul>	<ul style="list-style-type: none"> <li>Nothing significant identified.</li> </ul>
Adaptation to a changing climate	<ul style="list-style-type: none"> <li>Adaptation to a changing climate can, depending on implementation, contribute to continued efficient food production and thus reduced emissions per food produced.</li> </ul>	<ul style="list-style-type: none"> <li>Adaptation to a changing climate may, depending on implementation, lead some increases in greenhouse gas emissions.</li> </ul>

## Food supply and competitiveness

Sweden is a net importer of food and agricultural products in most food categories, meat, dairy products and fruit and vegetables. In addition, some animal feed is imported into Sweden. At the same time, Sweden is a net exporter of cereals. Politically, there is an overall goal for Sweden to increase food production. This is set out in the Swedish food strategy agreed by 7 out of 8 parliamentary parties:

"The overall objective of the food strategy shall be a competitive food supply chain where overall food production increases, while meeting relevant national environmental objectives, in order to generate growth and employment and contribute to sustainable development throughout the country"<sup>156</sup>.

There may be conflicting objectives between reducing climate impact and increasing food production. However, the Climate Policy Council assesses that the food strategy's objective of strengthening competitiveness in the food chain can improve the chances of achieving the climate goals. It is important that agricultural businesses are competitive so that they are able to make costly climate investments. We will therefore return to the evaluation and proposals for enabling climate measures while maintaining or improving competitiveness in Chapters 8 and 9.

The objective of the food strategy is clearly linked to the climate impact of agriculture. Increased food production risks increasing territorial greenhouse gas emissions, but the outcome depends on the food produced and the extent to which production relies on imported inputs such as fertilisers and feed, as well as the climate measures taken. These issues are addressed in section 7.1.

In what way global greenhouse gas emissions would be affected by increased Swedish food production is more difficult to assess. Increased domestic production and thus reduced net imports may increase or decrease global emissions depending on the emission intensity of Swedish food compared with that of imported food. Based on a limited research base, the emission intensity of Swedish agriculture appears to be slightly lower than the average in the rest of the EU<sup>157, 158</sup>, which accounts for most of Sweden's trade in food and feed<sup>137</sup>. At the same time, several other countries are now taking measures to reduce emissions and fulfil commitments under climate legislation (see section 8.1), which means that competition in low-emission food production will become tougher in the future.

The Climate Policy Council also notes that food supply is not only a question of production volume. Increased food supply can also be achieved by reducing food waste and changing consumption patterns.

In terms of crisis or war preparedness, increased production in peacetime does not necessarily mean increased supply capacity in times of crisis. Agriculture and food supply are heavily dependent on many resources that may be threatened in times of crisis, including fertilisers, machinery and spare parts, fuel, electricity and labor<sup>272</sup>. At the same time, it can be noted that in a normal year, Swedish agriculture produces large quantities of cereals, peas and beans which are normally used for animal feed, but which can be redirected to human consumption in the event of a crisis.

## Other environmental quality objectives

The environmental quality objective of *Limited climate impact* is the focus of the Climate Policy Council's mission. In addition, the Riksdag has adopted 15 other environmental quality objectives that describe the state of the Swedish environment to which environmental work should lead. The development of Swedish agriculture is important for most of these environmental objectives. In addition to the climate objectives, the Swedish EPA and the Swedish Board of Agriculture consider that the environmental objectives linked to emissions of air and water pollutants and biodiversity are most strongly linked to agriculture: Clean air, Natural acidification only, No eutrophication, A rich agricultural landscape and A rich flora and fauna<sup>159</sup>.



There are several synergies between the agricultural climate transition and other environmental quality objectives. The main ones are summarised below:

- More efficient use of nitrogen in agriculture can reduce emissions of nitrous oxide as well as nitrate and ammonia<sup>160, 161</sup>. Ammonia and nitrate are both eutrophying substances with a negative impact on biodiversity. Among other things, it has been emphasised in Sweden's reporting to the EU Habitats Directive that nitrogen deposition, which is largely caused by ammonia emissions, needs to be reduced to improve the conservation status of seminatural pastures<sup>162</sup>. Ammonia emissions also have a negative impact on human health as they cause harmful air pollution<sup>163, 164</sup>. Sweden needs to reduce ammonia emissions by 2030 in order to meet the targets set in the EU's directive on national emissions of certain atmospheric pollutants, the so-called National Emission reduction Commitments Directive (NECD)<sup>165</sup>.
- Crops that store carbon in soil can contribute to better soil health, greater in the farmed landscape and reduced need for fertilisers and pesticides<sup>166</sup>.
- Rewetting of drained organic soils greatly reduces greenhouse gas emissions while contributing to biodiversity in and around wetlands. However, impact on biodiversity is a complex issue where benefits depend on site-specific conditions and how rewetting is implemented<sup>167-169</sup>.

There are also some conflicting objectives and risks that need to be addressed:

- Grazing cattle and sheep emit methane but at the same time contribute to a rich agricultural landscape, especially when it comes to seminatural pastures, a habitat type that has declined substantially in Sweden<sup>162</sup>. Technically, however, it is quite possible to preserve seminatural pastures and at the same time reduce methane emissions, partly because far from all ruminants in Sweden graze on seminatural pastures, and partly because new feed additives can reduce methane emissions (see more in section 7.1).
- Pesticide use is also relevant to consider, inter alia, because carbon sequestering intercrops can have both positive and negative effects on need for pesticides depending on management practices<sup>166</sup>.
- Nitrification inhibitors (see more in section 7.1) are chemicals that can be transported and transformed in the environment<sup>170</sup>. The intended function of nitrification inhibitors is to affect certain soil micro-organisms, but the effects on other organisms in soil and water, i.e. those other than those intended to be affected, are not fully understood. There is also a risk that nitrification inhibitors or their degradation products could end up as contaminants in foodstuffs. As the potential adverse effects are complex and poorly understood, it is not yet possible to say how serious they are<sup>170</sup>.

## Animal welfare

Pigs, chicken and eggs are livestock products with relatively low greenhouse gas emissions, but from an animal welfare point of view their production has been criticized from various quarters. In particular, the rearing of chickens and hens is characterized by serious problems related, among other things, to the rapid growth of the animals<sup>171</sup>. Both pigs and poultry have limited opportunities to exercise their natural behavior in production, which also has a negative impact on animal welfare<sup>171, 273</sup>. The production of milk and beef and lamb is also not free from animal welfare problems<sup>274</sup>.

Swedish animal welfare legislation is relatively strict in international comparison. Net imports of animal products are therefore relevant from an animal welfare point of view, as production in other countries in many cases has less strict animal welfare regulations.

Improving the efficiency of livestock production can mean both improvements and deteriorations from an animal welfare perspective. Healthy animals with low mortality are more productive, which is positive from both perspectives. However, there is also a high risk that efficiency gains are made at the expense of animal welfare. Breeding, feeding and rearing systems that are most efficient from a climate perspective are not necessarily optimal for animal welfare<sup>172</sup>.

Methane-reducing feed additives are relatively new in animal husbandry, and many hope for favorable effects. The use of methane-reducing feed additives requires health testing and authorization by, for example, the European Food Safety Authority (EFSA) or the Swedish Board of Agriculture. Such tests can never completely rule out risks, but there is a relatively well-developed system for testing and managing risks<sup>173</sup>.

### Diet and public health

Diet is of great importance to public health and research shows that a healthier diet can have a major positive side effect on the climate<sup>174, 175</sup>. Overweight and obesity have increased sharply in society and unhealthy eating habits are the second most common cause of disease in Sweden after tobacco<sup>176</sup>. Every ten years, the Swedish Food Agency publishes new dietary guidelines based on a comprehensive joint Nordic compilation of the state of research. The latest Nordic Nutrition Recommendations were presented in 2023 and new Swedish dietary guidelines are being developed based on these<sup>177</sup>. The Nordic nutrition recommendations include the recommendation that, for health reasons, Swedes should consume less red meat and processed meat products and more wholegrain cereals, legumes, vegetables, fruit and berries. The recommendation on red meat is to eat a maximum of 350 grams of red meat per week. This means a reduction of about 30 percent in Sweden<sup>178</sup>. The Nordic Nutrition Recommendations also state that, for environmental reasons, the consumption of red meat should be considerably lower than this, although this is not quantified.

A diet based on the Nordic Nutrition Recommendations would bring several climate benefits. Vegetables have on average, a significantly lower climate impact than animals due to lower methane emissions. It also requires less land and inputs to produce crops than to produce animal products with equivalent nutritional content<sup>133</sup>. If Swedish meat consumption decreases, this will have some impact on territorial emissions but also on global emissions through reduced imports.

### Adapting to a changing climate

Climate change will have both positive and negative consequences for Swedish agriculture. Growing conditions will change with new temperature and precipitation patterns. An increased average temperature in Sweden will lead to a longer growing season, which, if properly utilised, can have a positive impact on food production. At the same time, risk factors such as plant pests and salt-water intrusion may increase. Global warming also leads to an increased risk of extreme weather. Drought and floods already affect production in Swedish agriculture<sup>179</sup>.

At a global level, climate change risks having a negative impact on food production in many countries<sup>16</sup>. In southern Europe and other areas of the world that currently have a favourable climate for agricultural production, production may fall significantly due to, among other things, more heat waves and droughts. It can be expected that the need for and value of good agricultural land and agricultural production will increase, not least at our latitudes.

The overall impact of climate change on Swedish agriculture depends on the measures taken to prepare society for these changes. In Sweden, there is ongoing work to adapt society, including agriculture, to a changing climate, for example through the Government's strategy for climate adaptation and an action plan from the Swedish Board of Agriculture. The Government's strategy states that the main focus in agriculture should be to strengthen the profitability and competitiveness of agricultural enterprises in order to better equip them for changing conditions and external pressures<sup>180</sup>. The Board of Agriculture's action plan states that efforts should be focused on food production more resilient, for example through good animal health and good plant protection<sup>179</sup>.

There are some synergies between climate adaptation measures and measures in agriculture. For example, soil water holding capacity and fertility are affected by carbon sequestration measures<sup>181</sup>. Restored wetlands that reduce greenhouse gas emissions could also improve water management by acting as buffers<sup>17</sup>.

There is also some risk that climate adaptation measures will increase emissions in agriculture, for example through increased fertilisation to compensate for increased plant nutrient leakage in the event of increased precipitation, or through technology investments that lead to increased energy use<sup>182</sup>.

# 7 Potential for climate mitigation measures in agriculture

To be able to evaluate and develop policies for different climate measures in agriculture, it is important to have a basic understanding of the options and potential for reducing the climate impact of agriculture. This chapter describes climate mitigation measures in agriculture and its potential impact on greenhouse gas emissions in different future scenarios.

Our own analysis is based on established knowledge and is summarised here in a scenario-based system analysis that describes possible measures and their effect on greenhouse gas emissions and certain other societal goals. The methodology and results are described in more detail in a background report<sup>183</sup>. In this work, we have benefited greatly from international research and other summaries of potentials in agriculture. We have also received valuable input to this potential analysis from industry, civil society, research and authorities in dialogue meetings. The overarching aim of the scenario analysis is to show the impacts of agricultural development, depending on the direction. We do not assess the appropriateness of different measures.

## 7.1 The efficiency and structure of the agriculture determine greenhouse gas emissions

Greenhouse gas emissions from agriculture are determined by many interacting factors that can be broadly categorised as efficiency and structure. Efficiency is about *how* production takes place and structure is about *what* and *how much* is produced.

- Efficiency, in the sense of reduced emissions per unit of food, can be achieved through optimised management, animal breeding, plant breeding and new technologies.
- Structural issues that have a major impact on emissions include the volume of livestock production, the area of different crops, and the type and amount of land used.

As agriculture operates in a market economy, there is limited scope for direct Government control of efficiency and structure, but as in other sectors, regulatory or economic instruments can be used to incentivise change. Already today, farms operate in a market with comparatively strong political control, especially at EU level.

### Efficiency: how food is produced can reduce emissions per unit produced

There is significant potential to reduce emissions per unit produced by changing *how* food is produced. Based on available research, we have assessed the potential of a number of such efficiency measures. A full account can be found in the background report<sup>183</sup>. The following is an overview of the efficiency measures with the greatest potential for emission reductions.

In livestock production, the main measures are:

- Breeding, improved animal health and optimised feeding that reduces ruminant feed consumption and thus methane emissions and emissions from manure management.
- Feed additives that reduce methane emissions from ruminants.
- Acidification of manure by adding acid to lower the pH and reduce emissions, especially of methane and ammonia.

In crop production, the main measures are:

- Precision fertilisation, which reduces the need for nitrogen fertilisers and thus nitrous oxide emissions from agricultural land.
- Nitrification inhibitors, chemicals that slow down some microbial conversion of nitrogen in the soil, thereby reducing the formation of nitrous oxide after fertilisation.

In agriculture, the use of fossil energy for machinery and heating of agricultural premises has great potential to reduce emissions and, in the longer term, to reach zero emissions, through a combination of measures:

- Increasing the share of renewable fuels.
- Electrification of the vehicle fleet and of heating systems.
- Increasing energy efficiency.

### Structure: changes in what and how much is produced can have a large emissions impact

The structure of agriculture, i.e. *what and how much* is produced, has a major impact on its climate impact. As emissions from biological processes in agriculture cannot be completely eliminated, they will always be influenced by the scale of production and the food produced.

Some main structural changes with an impact on greenhouse gas emissions:

- Reduced production of milk and beef directly leads to reduced emissions of methane in particular from enteric fermentation. It also reduces the need for feed, freeing up agricultural land that can be used for other purposes, such as crop or livestock production of pigs and poultry, which has less impact on the climate, or afforestation, which results in significant carbon sequestration.
- Switching from annual crops (e.g. cereals) to perennial crops such as ley (perennial mixtures of grasses and clover) leads to carbon sequestration in soils. However, the system-wide emission impact of this depends on whether the ley is used as ruminant feed or for other purposes.
- Afforestation of agricultural land reduces nitrous oxide emissions from crop cultivation and simultaneously causes a large net uptake of carbon in vegetation and soil.
- Rewetting of drained organic soils greatly reduces the emissions that occur as the organic matter decomposes. Calculated per hectare of agricultural land, rewetting has several times more potential to reduce emissions than carbon sequestering crops<sup>10, 169</sup>. Drained organic soils make up around 6 percent of Sweden's agricultural land, but it is not realistic to rewet all of it. This is because rewetting also affects neighbouring land by raising the water table<sup>184</sup>.
- Organic farming has been promoted in some contexts as a climate measure. Organic farming causes about the same amount of emissions per unit of product as conventional farming, but because production is lower per hectare, emissions are also lower on a given area, although there is a risk that the corresponding production and emissions will take place elsewhere<sup>185, 275, 276</sup>.

Many of the structural measures have multiple knock-on effects across the food system that need to be considered. Here we describe the most crucial issues from a climate perspective. Section 7.3 below also discusses impacts on other societal objectives.

The examples above involve shifting production or reducing production volumes. Such changes may reduce emissions territorially, but if consumption does not change, the corresponding increase in production is required elsewhere. Thus, replacing reduced production with imports does not necessarily lead to a global climate benefit. Conversely, efficiency improvements that lead to increased production may also maintain or increase territorial emissions.

The potential to store carbon in agricultural soils is directly linked to structural changes, as most of the potential lies in switching from annual crops such as cereals to perennial crops such as ley, energy forest (fast growing trees on cropland) or forest. Carbon sequestration through, for example, ley cultivation is therefore in practice dependent on a suitable outlet for the crop output. At present, ley is almost exclusively used to produce feed for cattle, sheep and horses. Greenhouse gas emissions from milk and beef production are generally several times higher than the carbon sequestration that occurs through increased ley cultivation<sup>186, 187</sup>. Therefore, increased ley cultivation does not provide any climate benefit if the crop output is used as ruminant feed. On the other hand, it is possible to use ley biomass for pig feed<sup>188</sup>, biogas production<sup>189</sup> or in biorefineries that can produce protein concentrates and other goods<sup>190, 191</sup>. In these cases, the climate benefit can be significant. Some carbon sequestration in agricultural land can also be achieved without major structural changes, for example through increased cultivation of intercrops<sup>v</sup>.

There is an important difference between the rewetting of drained organic soils and the cultivation measures that sequester carbon (afforestation, agroforestry, ley, intercropping, etc.) Rewetting can provide a long-term and stable climate benefit by stopping greenhouse gas emissions, while most soil carbon sequestration measures are reversible and dependent on continued land use. Emissions from drained organic soils are comparable to those from fossil fuels because they are derived from stored carbon and nitrogen that is decomposed and released as long as the soil is drained.

Carbon sequestration in afforestation or ley, on the other hand, occurs because trees and ley add more decomposable carbon compounds to the soil than annual crops such as cereals. Carbon sequestration can continue for a number of decades until a new equilibrium between input and decomposition is reached, provided the measure continues to be implemented. If land use were to revert to annual crops, soil carbon stocks would again gradually decrease to the lower equilibrium level. Another method to change the soil's greenhouse gas balance is to add so-called biochar. Biochar is biomass converted to charcoal by heating without access to oxygen. In agricultural soils, biochar is a soil conditioner that also stores carbon in the soil. A very large proportion of biochar can remain in the soil for hundreds of years<sup>192</sup>.

It is possible to add large amounts of biochar to agricultural land without saturating the soil<sup>192</sup> and therefore it is rather the availability of suitable biomass that limits the potential. In Sweden, straw, litter and forestry by-products can be converted into biochar<sup>153, 155</sup>, either in dedicated biochar production plants or in co-production with electricity and heat<sup>193</sup>. However, some of these flows are already being used today, and competition for biomass is likely to become increasingly fierce in the future. The use of biochar can therefore also be seen partly as a structural climate measure, as it increases the demand for biomass from agriculture or forestry.

Structural measures have great potential to reduce greenhouse gas emissions from agriculture. In addition, unlike efficiency measures, they have a greater impact on other societal objectives such as food supply, public health and other environmental objectives.

<sup>v</sup> Intermediate crops are crops grown on cropland between main crops, such as grasses, which are grown from autumn to early spring, after harvesting one crop and before sowing the next crop. Intercrops have long been recognised as a measure to reduce leaching of plant nutrients during winter and in that context are often referred to as catch crops.

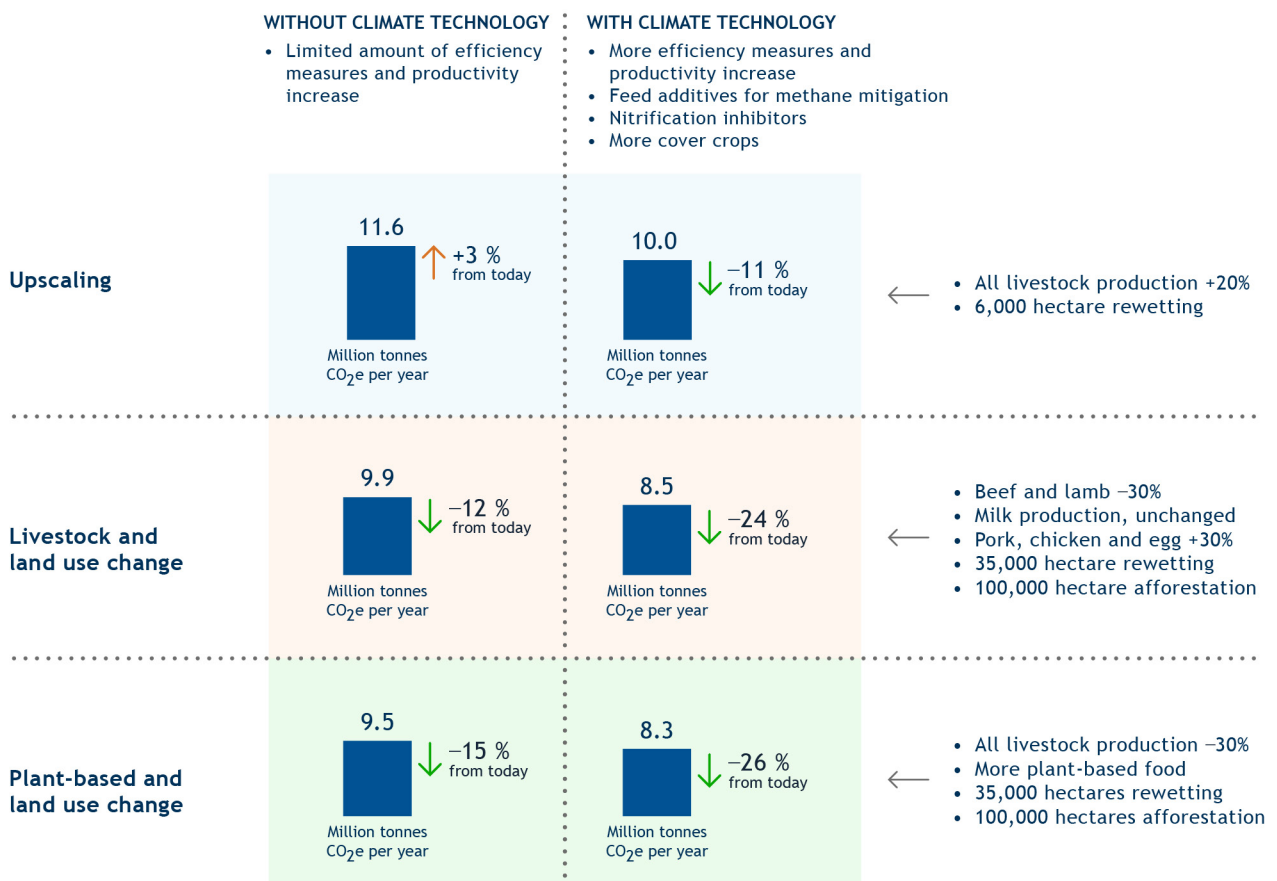
## 7.2 Alternative scenarios for the future climate impact of agriculture

To illustrate how the climate impact of agriculture could evolve by 2045, we have developed six scenarios that combine two different levels of efficiency measures (*how* production works) with three different degrees of structural change (*what* is produced). In all scenarios, food production increases in line with the food strategy, but with different production orientations as described below. The scenarios are based on technologies and measures known today, and many of the changes in the scenarios could be implemented earlier than 2045.

The purpose of the scenarios is to show different possible development paths for Swedish agriculture and to estimate their effect on emissions. The scenarios should be seen as examples of possible development paths and we note that much more far-reaching changes and larger emission reductions are technically possible and have been investigated in the international research literature<sup>131, 175, 194–197</sup>. We do not take a position on which direction is most desirable. However, in Chapters 8 and 9 we discuss how the policy links to the two directions of *how* and *what*.

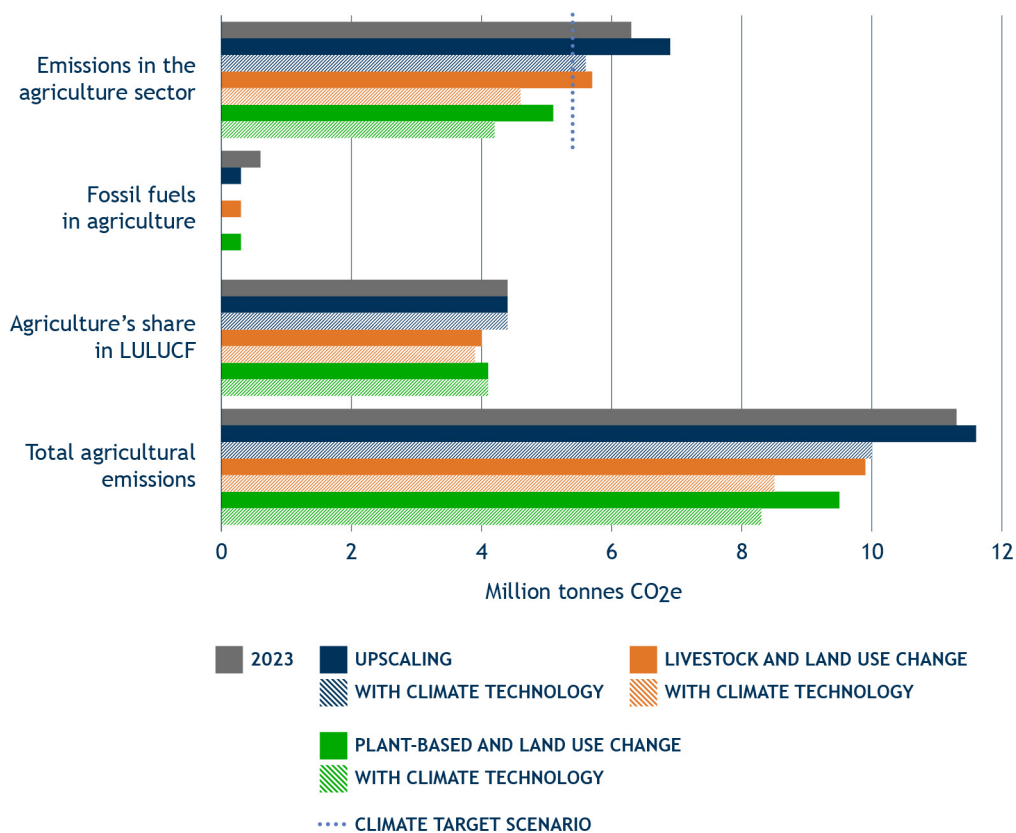
The scenarios' GHG emissions in 2045 range between 11.6 and 8.3 million tonnes of carbon dioxide equivalent, i.e. between +3 percent and –26 percent compared to the 2023 emissions of 11.3 million tonnes. Figure 22 summarises the scenarios and their GHG emissions. Figure 23 shows the emissions broken down by subsector. Figure 24 illustrates the impact of the different measures on emissions. A more detailed description of the scenario design follows below. The impact of the scenarios on other societal objectives is also presented and discussed (see section 6.4). Further details on the methodology, scenario assumptions and results are provided in the background report<sup>183</sup>.

**Figure 22.** Main assumptions in the scenarios and effect on greenhouse gas emissions from Swedish agriculture in 2045.



Source: Own calculations<sup>183</sup>.

**Figure 23.** Greenhouse gas emissions in Swedish agriculture in 2023 and in the different scenarios in 2045. Dotted line shown on the emissions sector agriculture shows the target level specified in the Swedish EPA's target scenario for 2045.



Source: Own calculations<sup>185</sup>.

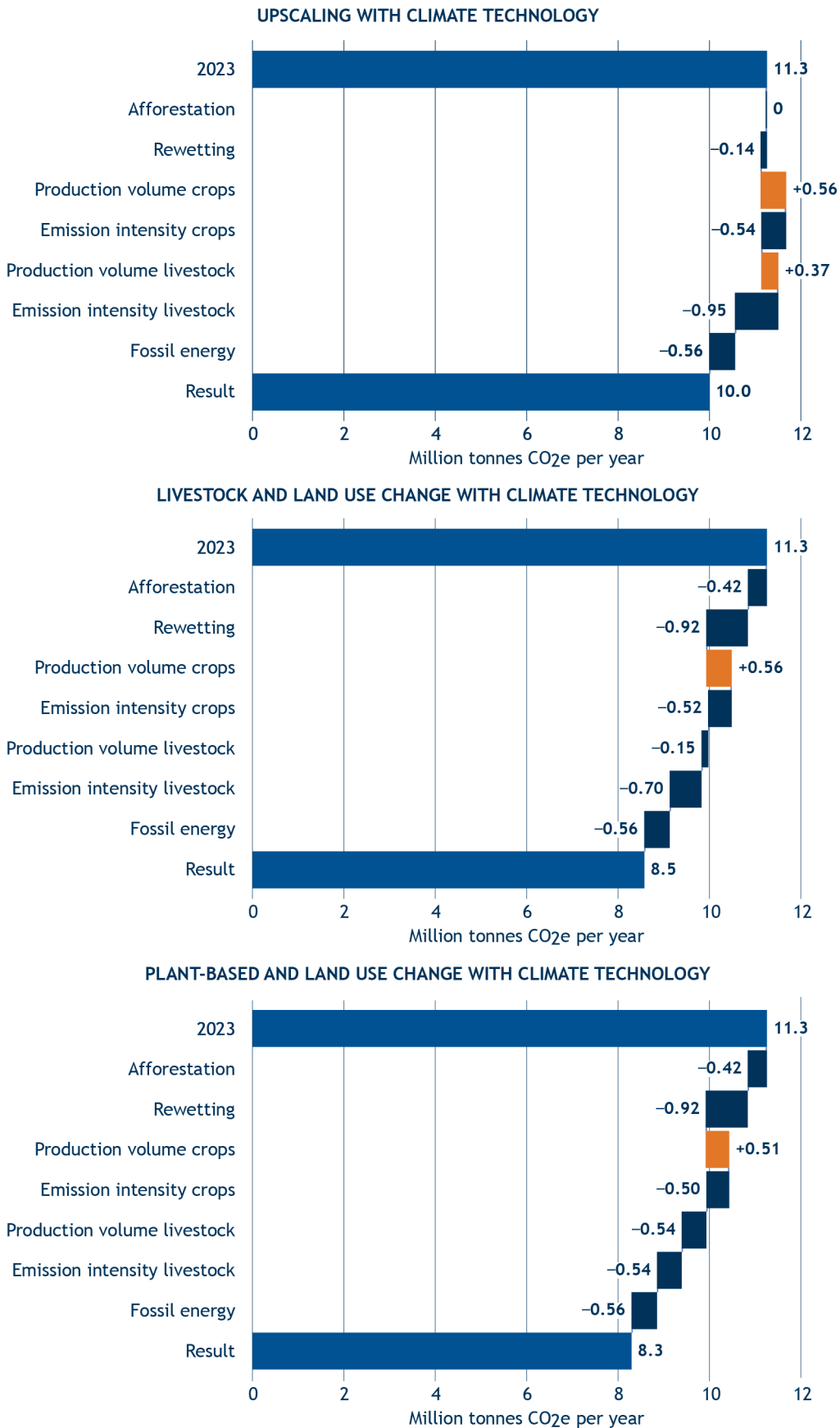
### Emissions in the scenarios compared to the EPA target scenario

The emissions scenarios in Figure 23 can be compared with the Swedish Environmental Protection Agency's (EPA) target scenario for Sweden to achieve zero net greenhouse gas emissions by 2045. Based on an overall assessment of the potential of different emissions sectors to contribute to the long-term climate target, the Swedish EPA estimates that emissions from the emissions sector agriculture need to be reduced to just over 5 million tonnes of carbon dioxide equivalent by 2045, a reduction of around 15 percent compared with current emissions. In the scenario, the Swedish EPA assumes that fossil emissions from agriculture will in principle be phased out by 2045. The target scenario level for the emissions sector is shown as a dotted line in the figure.

According to the assumptions on which our scenarios are based, some change in production orientation will thus be required to stay within the 5 million tonnes or so that the Swedish Environmental Protection Agency estimates the agricultural sector may emit in 2045. This emphasises the importance of increased food production needing to interact with the Swedish climate goals.



**Figure 24.** Impact of the different measures on GHG emissions in the scenarios with major efficiency improvements and three different degrees of structural changes. Results for all scenarios and further details are provided in the background report<sup>185</sup>.



## Details of the analysis and scenario design

The structural change assumptions used in the scenarios are summarised as follows:

- **Scaling up, mainly of current production:** Production of all livestock is increased by 20 percent and rewetting of organic agricultural soils is carried out on a small area<sup>184</sup> of 6,000 hectares (about 0.2 percent of agricultural land).
- **Livestock change and land use:** Changes in the production orientation of livestock combined with more extensive land use changes. Production of animal protein will increase by 9 percent through a 30 percent reduction in beef and lamb production, unchanged milk production and a 30 percent increase in pig, chicken and eggs. Rewetting of organic agricultural soils takes place on a larger area<sup>184</sup> of 35,000 hectares (1.2 percent of agricultural land) and afforestation<sup>w</sup> of 100,000 hectares of cropland (4 percent of cropland).
- **Crop production and land use:** Production of all livestock decreases by 30 percent and increases for cereals, beans, peas and vegetables for human consumption. Rewetting of organic agricultural soils takes place on 35,000 hectares (1.2 percent of agricultural land) and afforestation of 100,000 hectares of cropland (4 percent of cropland).

The efficiency and productivity measures are summarised as follows:

- **Without climate technology<sup>x</sup>** is a limited package of measures that involves continuing trends in productivity growth and increased utilisation of nitrogen fertilisers and feed, and halving fossil energy use.
- **Climate technology** is a more comprehensive package of measures involving accelerated trends in efficiency improvement and, in addition, the use of methane-reducing feed additives for ruminants, nitrification inhibitors for mineral fertilisers, increased cultivation of catch crops and elimination of fossil energy use.

All the scenarios have been designed so that Sweden's food production increases, in terms of both calories and protein. This is justified by the broad political consensus that Sweden should increase domestic food production and by the generational goal of not causing increased environmental problems outside Sweden's borders.

The scenarios presented here do not provide an exhaustive picture of different possible transitions. Rather, they should be seen as illustrative examples to point to different possibilities. Further analysis could include other or more measures in both efficiency and structural changes, such as increased utilisation of ley for different purposes, increased area of organic farming, production and supply biochar to land, and introduction of agroforestry. More different assumptions about dietary changes and their impact could also be explored. International research has carried out a wide range of scenario analyses of changes in farming systems and diets, often with much more far-reaching assumptions about possible changes than those we have adopted here<sup>131, 175, 194–197</sup>.

As a weighted indicator of how the scenarios affect Sweden's import dependence on agricultural goods, we have calculated a net footprint on cropland abroad in a similar way to a consumption-based carbon footprint (see section 1.3). Net imports and net exports of different agricultural commodities are converted to the cropland required for production and totaled so that the land footprint increases with net imports and decreases with net exports.

<sup>w</sup> Instead of afforestation, it would also be possible to increase the cultivation of energy forests on cropland with a similar effect on the greenhouse gas balance.

<sup>x</sup> The term climate technology is used here for a package of measures that are not only technical in a narrow sense and can also be implemented partly for reasons other than climate benefits.

The impact of changes in foreign trade on GHG emissions abroad has not been calculated here, but it is clear from research on consumption-based land use and GHG emissions that a reduced net land footprint abroad is also very likely to lead to reduced GHG emissions abroad<sup>133, 198</sup>.

To show the importance of Swedish consumption, we have calculated the land footprint in the different scenarios with two different assumptions about the diet in Sweden: the current average diet and a more plant-based diet that is less emission-intensive in line with the Nordic Nutrition Recommendations for health and the environment (section 6.4). The less emission-intensive diet involves reduced consumption of animal products and alcohol and increased intake of cereals and fruit and vegetables. Animal protein intake is reduced by 30 percent in all categories but is mostly replaced by vegetable protein so that total protein intake is reduced by only 6 percent, which is a protein intake well above nutritional requirements. In both cases, it is assumed that food waste is reduced by 5 percent of total consumption. Further details are given in the background report<sup>183</sup>.

The areas of cropland and permanent pastures have been kept unchanged in the scenarios except for rewetting of organic agricultural soils and afforestation of cropland. The need for land for ley and other forage crops and pasture has been adapted to ruminant production based on current feed consumption. To maintain the current area of natural pasture, the intake of pasture in the scenarios has been redirected to natural pasture in the first instance. Thereafter, grazing on cropland has been used to fulfil the need. This assumption means that a larger proportion of today's grazing animals (cattle, sheep and horses) graze on permanent pastures compared with today. Based on Swedish research, this is considered feasible but may require some geographical redistribution of grazing animals. See further description in the background report<sup>183</sup>.

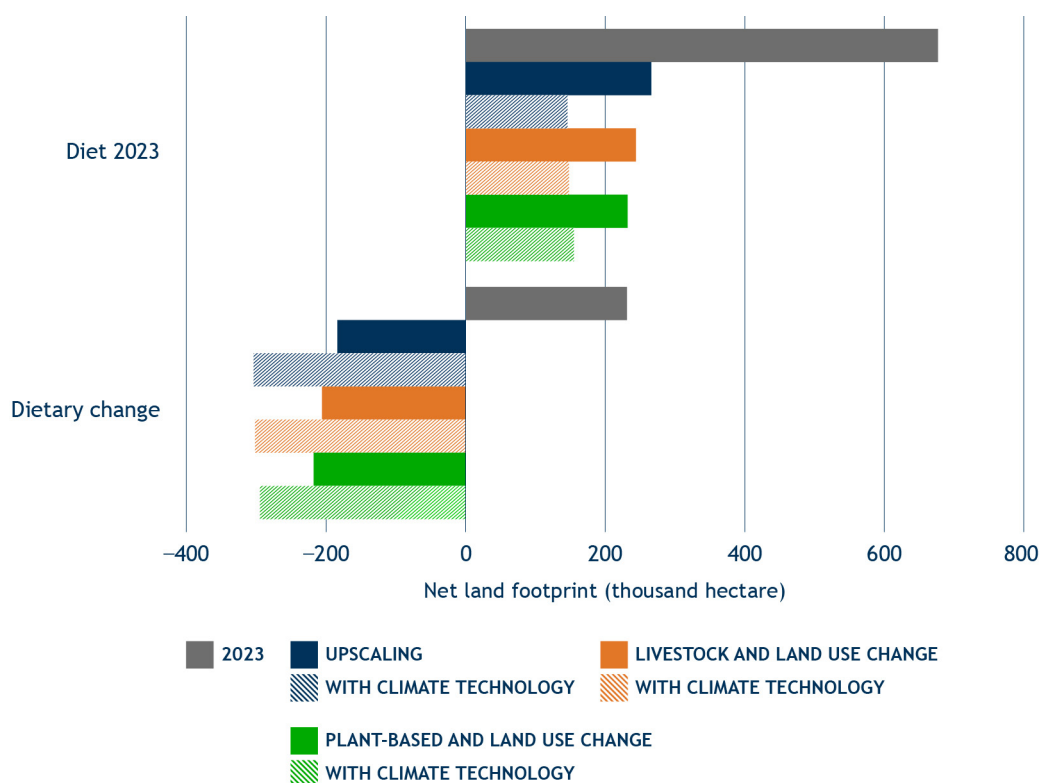
## 7.3 The scenarios in relation to other societal objectives

### Food supply

All scenarios have been designed so that domestic food production increases in terms of both energy and protein. The largest increase in production in terms of both energy and protein is in the production of vegetable products, especially cereals, which are already a significant export product and increase by 20-60 percent in the scenarios. Today, most cereals are used for animal feed and ethanol production, but much of this could be redirected to human consumption.

The production of edible animal protein (meat, milk and eggs) increases in the Scaling up (+20 percent) and Livestock change (+9 percent) scenarios but decreases in the Crops and land change scenario (-30 percent). The net footprint on cropland abroad (Figure 25) decreases in all scenarios. In the variants with unchanged diet, it decreases by 400,000-500,000 hectares, corresponding to 15-20 percent of Sweden's cropland, despite an increase in the Swedish population. The net footprint is lowest in the scenarios with greater efficiency improvements (Climate technology), mainly because feed consumption is lower for the same amount of animal production. The net footprint is very similar under the three different structural changes, although the composition of foreign trade changes. In the variants with less emission-intensive diets, the land footprint is reduced by a further 450,000 hectares, which corresponds to just over 15 percent of Sweden's cropland. The result of the dietary changes is that Sweden's net footprint on cropland abroad becomes negative, i.e. Swedish exports release more land abroad than imports utilise. The reduced net footprint on cropland abroad would very probably also lead to reduced greenhouse gas emissions abroad.

**Figure 25.** Sweden's net footprint on cropland abroad, in the current situation (2023) and in the future scenarios. A positive net footprint means that Swedish imports use more land abroad than Swedish exports replace. The lower bars show how the net footprint would be affected by a dietary change to a more plant-based and less emission-intensive diet.



Source: Own calculations<sup>185</sup>.

In addition to food production, it is relevant to consider the other biomass production that occurs in the four scenarios, i.e. afforestation or increased energy forest production. Such biomass can be used for renewable materials, energy purposes or negative emissions through carbon capture or biochar production.

### Other environmental quality objectives

Ammonia emissions to air from agriculture have been quantified in the scenarios as this is an important category of environmental impact from agriculture (section 6.4). In relative terms, ammonia emissions change about the same as greenhouse gas emissions in the different scenarios. Ammonia emissions increase by 9 percent in the Scaling-up scenario, decrease by 1 percent in the Scaling-up+ Climate Technology scenario and decrease by 5-23 percent in the other scenarios. See further details in the background report<sup>183</sup>.

The conclusion is that efficiency improvements and structural measures to reduce greenhouse gas emissions in several cases provide major benefits in the form of reduced ammonia emissions. An increase in Sweden's livestock production risks increasing ammonia emissions significantly, well above the 2030 commitment under EU National Emission reduction Commitments Directive (see section 6.4), unless comprehensive measures are implemented at the same time for efficient feed utilisation and low-emission manure management.

The impact of agriculture on biodiversity depends on a variety of factors that have not been fully quantified here. The use of permanent pasture is constant across the scenarios because grazing on permanent pasture is prioritised over grazing on cropland. Thus, the different scenarios do not affect the amount of natural pasture used. Ammonia emissions, which are significantly reduced in several scenarios, may also lead to reduced nitrogen deposition in sensitive habitats, but the issue is complex as emissions vary geographically and nitrogen pollutants can travel long distances in the atmosphere.

There are many measures at farm and landscape level that can have a major impact on biodiversity. Some, but by no means all, are directly linked to climate change. Several of the measures in the scenarios here can have both positive and negative effects on biodiversity, those that involve changing the area of different crops. However, it has not been possible to assess them in the context of this report.

### Animal welfare

The scenarios' production of animal products differs considerably, mainly in the number of animals of various types reared in Sweden. Like greenhouse gas emissions, the issue of animal welfare is global in that reduced Swedish production with constant consumption means increased imports and thus animals being reared outside Sweden instead (see section 6.4). The issues of dietary transition and trade balance are therefore also relevant from this point of view.

### Diet and public health

The scenarios with more plant-based and less emission-intensive diets not only lead to reduced net imports of agricultural goods and reduced global greenhouse gas emissions but are also in line with the Nordic Nutrition Recommendations for a healthy diet and reduced environmental impact (see section 6.4). The scenario analysis shows that dietary transition in Sweden has the potential to deliver a substantial reduction of Sweden's net footprint on cropland abroad, which would also reduce consumption-based emissions abroad.

### Adapting to a changing climate

The aspect of the scenarios that is likely to have the greatest impact on agricultural climate adaptation is the cultivation of intercrops and ley. Such cultivation increases soil carbon and water holding capacity and reduces erosion compared to annual crops (see section 6.4). The area under ley decreases in the scenarios by 5 to 50 percent of the current area (50,000 to almost 500,000 hectares) due to reduced feed consumption and increased yields. In the climate technology scenarios, this loss of soil carbon is partly offset by 100,000 hectares of increased intercropping. Many other climate adaptation options could be implemented in all scenarios, but this aspect has not been analyzed here.

# 8 Evaluation of the agricultural climate transition policy

In this chapter, we assess how existing policies affect the conditions for and implementation of the climate transition in agriculture. The Climate Policy Council has identified potential and obstacles to agriculture's contribution to the climate goals. Based on this analysis of potential and obstacles, we assess whether the Government's policies are effective in reducing agricultural climate emissions. We base our approach on the Climate Policy Council's framework for effective policy.

Section 8.1 describes EU and Swedish policies that affect agricultural climate emissions. Section 8.2 describes how these policies address the obstacles that slow down the agricultural transition, and how the policies contribute to climate measures and emission reductions. In section 8.3, we evaluate the policy in terms of key aspects to assess whether the policy is effective for the agricultural climate transition. Here we also look at how EU policy affects Swedish agriculture.

## 8.1 Agricultural policy and climate objectives

This section describes the policies that affect agricultural climate emissions at different levels of society. The focus is on Swedish policy, but the section also describes agricultural policy in the EU and the rest of the world, as the Government helps to shape large parts of EU policy and is responsible for its implementation in Sweden.

### Agriculture in the climate policy framework

Sweden's long-term climate target is zero net emissions of greenhouse gases by 2045 and net negative emissions thereafter. The targets include the possibility of using complementary measures to compensate for the fact that, for example, the agricultural sector will have difficulty achieving absolute zero emissions by 2045. In tonnes, the long-term target means that emissions in 2045 can be a maximum of 10.7 million tonnes, assuming use of co-benefits. This is an absolute upper limit for agricultural emissions in 2045 (excluding agricultural share of LULUCF). However, agriculture's emissions probably need to be less than this because there are many other sectors whose emissions also have difficulty reaching absolute zero emissions, such as waste incineration and some diffuse emissions from industry. In addition, the Paris Agreement, as well as both Sweden's and the EU's climate targets, imply that large net removals of greenhouse gases are necessary in the period after 2045.

### Agricultural policy in the EU with a bearing on climate objectives

The EU's Common Agricultural Policy (CAP) is an integrated framework that regulates and supports the agricultural sector in the Member States. The policy aims to ensure food supply, protect the environment and promote sustainable rural development. The CAP establishes common targets and rules, but Member States are also given the possibility to adapt their policies and measures to national and regional needs. The latest reform of the 2023-2027 framework particularly emphasises the role of agriculture in contributing to emission reductions.

Agricultural policy is reformed every seven years. The framework for the current period entered into force on 1 January 2023 and introduced three climate-related objectives:

- mitigating climate change and adapting agriculture to climate change
- to protect the environment
- to preserve biodiversity and landscapes.

For the current period, the total CAP budget amounts to €387 billion, of which 40 percent is dedicated to climate action. The CAP represents around 31 percent of the total EU budget<sup>199</sup>.

### The two pillars of EU agricultural policy

The EU's agricultural policy (CAP) is divided into Pillar 1 and Pillar 2 (see Figure 26):

- Pillar 1 includes a direct payment to farmers, the so-called single farm payment. It is an income support paid to farmers based on minimum requirements and measures but mainly based on the number of hectares of agricultural land. It is fully funded by the CAP and is intended to maintain farmers' incomes and strengthen their economic conditions, especially in areas with more difficult production conditions. According to the European Commission, it should help to address low profitability and ensure that agriculture can continue to develop. For some production sectors, such as cattle, specific support is provided to slow down the decline production.

The farm payment scheme allocates 25 percent of its budget to one-year environmental payments (so-called Eco-schemes). These payments are designed to promote environmentally friendly farming practices such as organic farming, agroforestry and soil conservation measures. Member States have considerable freedom to customise environmental payments to national needs and priorities, and participation is voluntary for farmers. Some measures, such as organic farming, may be Pillar 1 in one country and Pillar 2 in another.

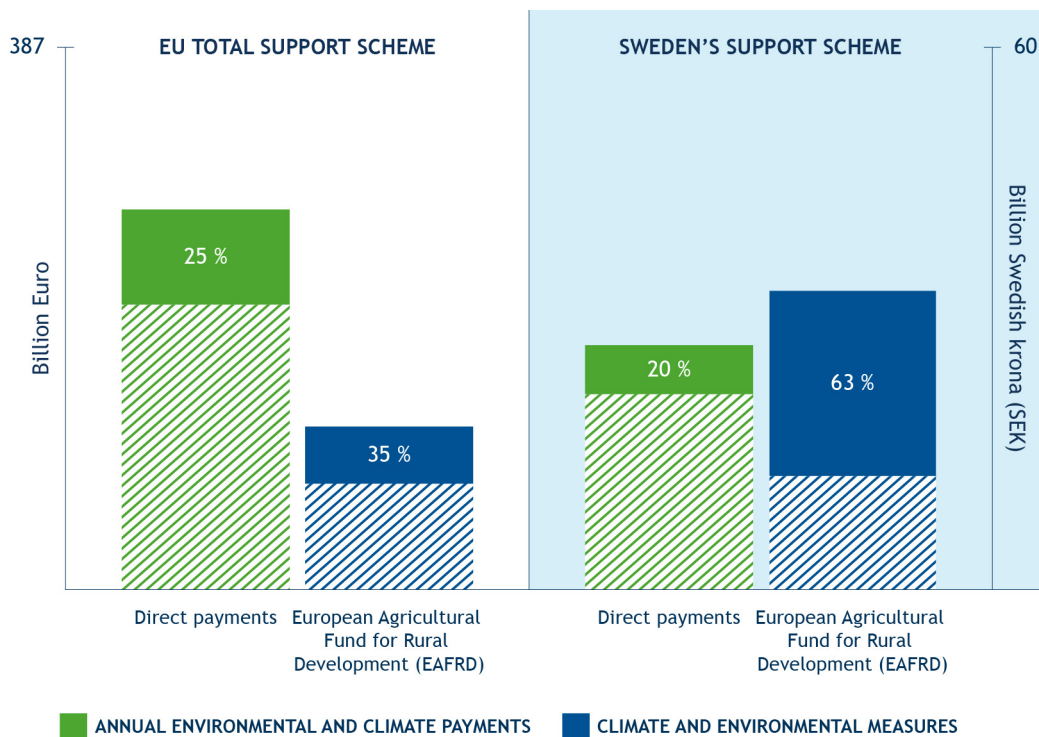
To gain full access to the single payment scheme, farmers must fulfil certain basic requirements, such as contributing to maintaining agricultural land in good condition and improving the environment. Some of these requirements are called Good Agricultural and Environmental Conditions (GAEC) standards. These requirements include wetland protection and crop rotation requirements. Although GAEC standards are supposed to be requirements, there are many exceptions attached to them.

- Pillar 2 includes the Rural Development Programme. These are targeted payments for environmental and rural development. The support is co-financed by the Member States. Of the support, 35 percent must go to climate and environmental measures. This includes, for example, Swedish support for maintaining permanent pastures.

According to an analysis by the European Commission, the potential emission reductions from 19 national strategic plans are estimated to total around 31 million tonnes of CO<sub>2</sub> equivalent. For specific payments, it is estimated that around 38 percent of this is accounted for by annual environmental payments (Pillar 1) and around 30 percent by rural development programmes (Pillar 2)<sup>240</sup>. In the recent reform, the CAP has moved from a strong emphasis on implementation towards a focus on results.

There are no qualitative evaluations of the CAP, but there have been several evaluations of parts of the CAP that show that the support is often not effective in relation to its purpose. This may be partly due to the prioritization of ineffective measures and partly due to deadweight in the programme<sup>201,202</sup>. The European Court of Auditors' evaluation of Member States' 2023 national strategic plans also shows that climate ambitions have not been fully integrated into agricultural policy<sup>200</sup>.

**Figure 26.** Climate and environmental support structure under the current CAP framework<sup>203</sup>. The EU budget for the period 2021–2027 and Sweden's budget for the period 2023–2027<sup>204</sup>. The percentage shown in each bar indicates the proportion that goes to annual environmental and climate payments and climate and environmental measures respectively.



### Sweden's strategic plan for the CAP

Member States develop their own national strategic plans for the CAP. The plan for a Member State should describe how the funding will be used, how climate and environmental objectives will be achieved, and how farmers will be supported in the transition to sustainable food systems. The plan will also identify the needs of agriculture and set out measures to meet those needs. Member States will also explain how the plan is intended to contribute to achieving overall climate objectives.

Sweden's current CAP plan does not explain how the current structure and governance of Swedish agricultural policy will contribute to the national climate objectives. Nor does the plan show how the combined support will contribute to net emission reductions and target fulfilment, for example under ESR and LULUCF. Sweden's plan was approved by the European Commission in October 2022<sup>205, 206</sup>.

According to Sweden's CAP plan, 30 percent of the funding will go to environmental and climate measures, such as carbon sequestration, biodiversity and valuable seminatural grasslands. Sweden intends to allocate 20 percent of the direct payments budget and 63 percent of the rural development programme budget to one-year climate and environmental measures<sup>204</sup>.

The EU's target is for Member States to allocate 25 percent of direct payments to agriculture to environmental and climate measures. Sweden does not achieve this target but compensates for this by allocating a larger share of the funds to the rural development programme. Sweden has chosen to place several climate-related measures for agriculture outside the national strategic plan under the CAP framework, for example under Klimatklivet. The Government has also decided on three so-called knowledge hubs to achieve the national environmental and climate goals, one of which focuses on supporting agricultural innovation development in the environmental and climate area.



### **State aid rules for land and agriculture**

In the EU, there are rules governing how Member States may support the national land and agricultural sectors. State aid rules ensure fair competition between Member States. In the agricultural sector, the rules are aligned with EU strategic priorities, in particular for the CAP, the Green Deal and the sustainable food and biodiversity strategies.

National support that does not fall within the EU's authorised forms of support is limited, but exceptions exist outside the CAP. Authorised forms of support include environmental protection, climate change adaptation and, wetland protection, greenhouse gas emission reduction and organic production. Innovation aid for new technologies that reduce environmental impact is also possible, while aid that favours individual producers or products is often not allowed. In 2022, the rules were revised to extend general block exemptions, simplify co-financing processes and allow for new farming practices.

### **Biodiversity and the Nature Restoration Act**

In 2020, the European Commission adopted a biodiversity strategy that sets out EU-wide commitments and actions for Member States to implement by 2030. The commitments include protecting at least 30 percent of EU land, which is an extension of the existing Natura 2000 sites. As part of the strategy, the Nature Restoration Regulation (NRL) entered into force in 2024. The regulation sets binding targets for the restoration of ecosystems, habitats and species, with interim targets for 2030, 2040 and 2050. Restored natural environments are expected to contribute to both climate change mitigation and adaptation. For agricultural land, a target to restore 30 percent is included of drained peatlands by 2030 and 50 percent by 2050. In addition, Member States should put in place measures to improve the conditions for carbon sequestration in cropland and agricultural land with a high diversity of landscape features such as hedgerows, trees and buffer zones. Member States are required to develop national restoration plans describing the measures needed to achieve the different objectives of the Regulation. It is up to the Member States themselves to monitor and report progress against their respective plans.

### **EU looking ahead - agriculture and land use**

The European Commission has presented various proposals for economic instruments to stimulate the climate transition in agriculture. These include a proposed Emissions Trading System for agriculture and a support scheme for increased carbon sequestration in agriculture and forestry. The European Commission also emphasises the importance of a harmonised framework for greenhouse gas reporting. In the context of EU agricultural policy, the European Commission has initiated structured dialogues with key stakeholders in the agriculture and food sector<sup>207</sup>. The dialogues aim to anchor the policy and guide the European Commission in its work to shape the common EU vision for agriculture and food<sup>37</sup>. As part of this, the European Commission has created a board for agricultural and food (European Board of Agriculture and Food). The Board will maintain a culture of dialogue, trust and participation between high-level actors in the food chain, civil society, and with the Commission itself.

### **Sweden's agricultural policy with a bearing on climate objectives**

As agricultural policy is largely harmonised within the EU, national climate policy is mainly about applying, specifying and supplementing EU legislation. This section describes the national rules, support systems and forms of co-operation that make up Sweden's climate policy for agriculture.

### Climate investment programmes and advice

Klimatklivet finances emission reduction measures within the ESR and measures that reduce the climate impact of agriculture. Klimatklivet can finance measures in several sectors, and the selection of projects is based primarily on how much emission reductions per krona invested the measure can achieve<sup>208</sup>. Klimatklivet is largely financed by the European Commission's recovery fund (NextGenerationEU).

Agriculture has received significant support from Klimatklivet, particularly for measures such as energy conversions (transition from fossil to renewable energy), biogas production and energy efficiency. The current rural development programme includes measures linked to skills development and advice, primarily in the form of the Greppa Näringen project, which is a collaborative project between the Swedish Board of Agriculture, the Swedish Farmers' Union (LRF) and the county administrative boards.

Another investment aid with some climate linkage is Kväveklivet, which has set aside SEK 300 million until 2027 with the main aim of reducing agricultural ammonia emissions. Some of the measures may also lead to some reduction in greenhouse gas emissions.

### Policy instruments to reduce fossil fuel emissions in agriculture

Fossil emissions from agriculture come mainly from the use of fossil fuels such as diesel and fuel oil. Taxes on emissions are subsidised for competitive reasons. Under Klimatklivet and the national biogas subsidy, farmers can receive support to reduce their use of fossil fuels. In the future, fossil fuel emissions will be included in the Emissions Trading System for road transport, buildings and other emissions, EU ETS 2.

## 8.2 Current policies have led to marginal emission reductions



### THE CLIMATE POLICY COUNCIL ASSESSMENT

Swedish and EU policies to date have only marginally reduced the climate impact of agriculture, and the measures currently adopted are expected to continue to produce small reductions.

National agricultural policies have led to limited emission reductions in recent decades. Since 2005, agricultural emissions - biological emissions of mainly methane and nitrous oxide - have fallen by only around 3 percent. The Swedish Environmental Protection Agency's scenarios based on adopted policies point to small emission reductions going forward, given that production levels remain roughly constant. This clearly distinguishes agriculture from other sectors, where emissions are instead expected to decrease to a large extent<sup>53</sup>. To meet Sweden's long-term climate target by 2045, agriculture will need to reduce emissions by around 15 percent by 2045, compared to current levels. This may not sound like much, but the challenge will be greater if food production is to increase at the same time. We discuss in more detail how different production options relate to Sweden's long-term climate goals in Chapter 7.

At EU level, policies have not led to significant emission reductions either. EU agricultural biological emissions have decreased by around 5 percent since 2005<sup>209</sup>. With agreed policies, emissions are expected to fall by a further 1.5 percent by 2040<sup>210</sup>. If the Fit for 55 package is implemented, the EU agricultural sector is expected to account for more than half of Europe's remaining emissions by 2030<sup>211</sup>.

Agriculture will need to achieve significantly larger emission reductions in the 2030s and 40s than current policies are expected to deliver, if the EU is to meet its 2050 climate neutrality target and the proposed 90 percent net emission reduction target by 2040. According to the European Commission's impact assessment for the proposed 2040 target, the emissions sector agriculture needs to reduce by around 30 percent compared to 2015. This represents a significant increase in ambition compared to existing policies.

### 8.3 Obstacle analysis and policy response

In Chapter 7, we have shown that there is significant potential to reduce the climate impact of agriculture through various climate measures. In this section, we first describe the main barriers to implementing these climate measures. Our analysis of the barriers is based on both previous barrier analyses<sup>159, 212</sup> and dialogue meetings with the industry, civil society, authorities and researchers. After our description each barrier, we evaluate how the policy addresses them.

The identified barriers can be summarised in three categories: economic, technical and behavioural. Based on dialogue meetings with agricultural stakeholders, we believe that there is a relatively coherent picture of these barriers. The following sections describe them in more detail.

**Table 3.** Three broad categories of barriers that limit the implementation of climate action in agriculture.

<b>Economic barriers</b>	Many climate measures in agriculture entail increased costs and weak farmer profitability can make it difficult to finance these actions.
<b>Technical barriers</b>	There is a knowledge and innovation gap for the development and monitoring of new climate measures in agriculture.
<b>Behavioural barriers</b>	Certain norms and habits hamper both the implementation of climate measures in agriculture and the demand for low-emission food.

#### Economic barriers: How does policy address the costs of climate measures in agriculture?

<b>!</b>	<b>CLIMATE POLICY COUNCIL ASSESSMENT</b>
	Several climate measures in agriculture lack sufficient incentives to be implemented by the farmer.

#### Weak profitability of agricultural climate measures

The climate measures in agriculture that we identified are:

- efficiency measures such as new technologies and methods (*how* food is produced)
- structural changes (*what* and *how much* is produced)

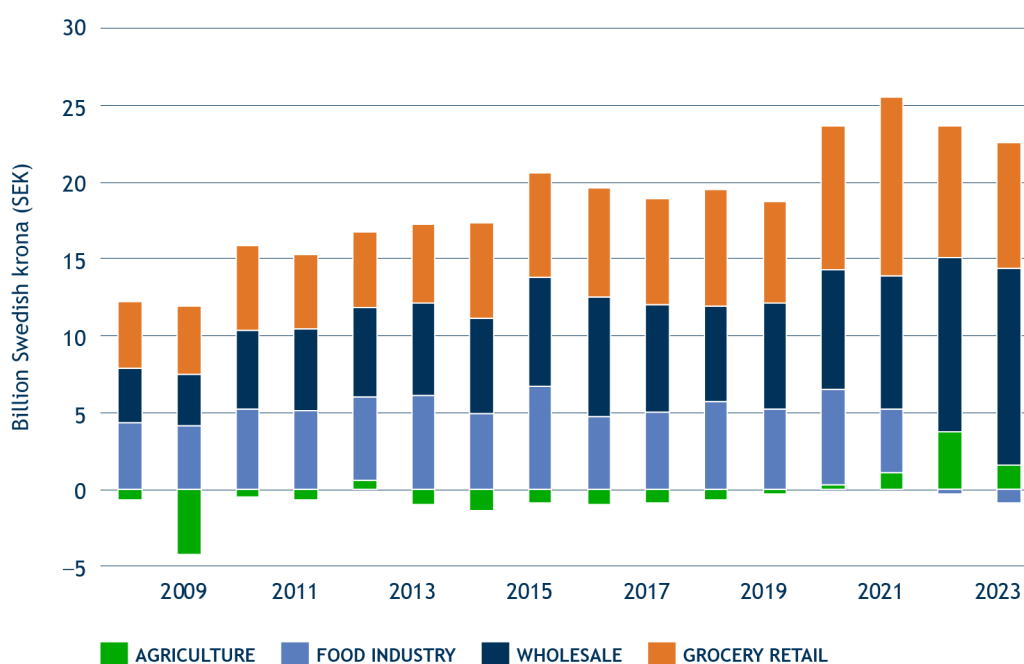
Most of the measures involve investment costs and sometimes also increased operating costs. The Swedish Farmers' Union has found that the total investment costs for the green transition of agriculture, which also includes other environmental objectives and climate adaptation, may amount to a total of SEK 85 billion and operating costs to just over SEK 10 billion annually<sup>213</sup>. Costs vary between measures, as do costs per tonne of emission reduction. We analyse cost-effectiveness in the next section.

Some climate measures lead to increased efficiency, such as improved animal health, more efficient feed use, precision fertilisation and energy efficiency, and can also lead to overall cost reductions. Costs are reduced because the measures have moderate implementation costs while reducing costs in production<sup>214-216</sup>. Such measures are already being implemented to some extent today and they can be accelerated by, among other things, investing in research, innovation and advice<sup>215, 216</sup>. These measures can thus increase efficiency and be profitable. Nevertheless, the cost may still be an obstacle because the farmer lacks the necessary capital or creditworthiness to implement the climate policies.

Other climate measures in agriculture impose costs on production without generating an increased production value for the farmer. Examples of such measures are methane-reducing feed additives, nitrification inhibitors, rewetting of organic agricultural soils and increased use of biofuels in agricultural machinery. These measures therefore require economic incentives. These may be increased willingness to pay among consumers, i.e. they are prepared to pay more for products produced more climate-efficiently, which in turn requires some type of policy instrument aimed at consumers. There may also be direct monetary incentives in production. The latter can be implemented with various instruments, which we will return to in the next chapter. However, our assessment is that complementary measures must be implemented to ensure that the farmer's profitability does not deteriorate if the farmer's total costs increase, i.e. the costs of both direct production and as a result of the policy instruments.

Financing climate measures in agriculture is complicated by the comparatively weak profitability of the sector. Among the actors in the food chain, agricultural companies have for a long time reported the weakest operating results. For several years in recent decades, Swedish agriculture has reported a negative operating result (see Figure 27). This means that there is little scope for cost-increasing measures unless they are compensated by additional payments from the value chain or public support. In addition, it follows that capital for new investments is often lacking and that it can be difficult to obtain loans for climate investments due to requirements for repayment capacity<sup>217</sup>. However, it is important to note that economic conditions differ significantly depending on farm type, size and geographical location. The figure below emphasizes the need for all parts of the food chain to be involved in discussions on how to strengthen the contribution of agriculture to the climate transition.

**Figure 27.** Operating results in the food supply chain. These statistics are somewhat uncertain. Many farms are run as sole proprietorships, which makes it difficult to account for labor costs included in the operating result.



Source: SCB<sup>218</sup>.

While the cost of climate mitigation measures can be significant at the farm level, the cost can be low relative to the food product sold in shops. An illustrative example is methane-reducing feed additives for cows. The feed additives authorised for use in the EU cost around SEK 1,300 per dairy cow per year<sup>183</sup>. This represents a significant cost for a dairy farmer. However, expressed per litre of milk, the cost is only about 12 pennies, which is about 1 percent of the price of milk. If the cost increase can be passed on along the food chain, it is thus a relatively small price increase (1 percent) for a significant emission reduction (around 10-15 percent of total milk production emissions).

#### **Climate subsidies miss out on climate measures in agriculture**

There are support schemes aimed at strengthening the profitability of climate measures in agriculture and addressing the economic barriers we have identified.

- CAP support can finance precision farming, catch and intercropping, and rewetting of organic agricultural soils.
- Klimatklivet mainly finances measures that reduce fossil fuel emissions from agriculture and, to some extent, biochar, which increases carbon storage in agricultural land.
- Climate change premiums and support for biogas use finance the transition to renewable-fuelled machinery.
- Kväveklivet will finance measures that reduce ammonia emissions from agriculture and may also have some effect on greenhouse gas emissions.

Klimatklivet could finance more of agriculture's various climate measures, but the support is only targeted at investments. This means that several of agriculture's climate measures cannot be funded, as the major expenditure is not investment but ongoing overheads in the form of, for example, feed or management measures. The Nitrogen Programme focuses on ammonia emissions but also provide funds to reduce agricultural greenhouse gas emissions. However, the Government estimates that the support will only have a limited climate impact<sup>219</sup>. Other support is therefore likely to be needed to help reduce nitrous oxide emissions and emissions from the storage of livestock manure.

There are some climate measures that are completely excluded from the existing support schemes. There is no possibility to receive State aid for climate measures aimed at reducing methane emissions from ruminants, such as breeding for reduced methane emissions and methane-reducing feed additives for ruminants. These measures also do not increase production, so the incentives for farmers to implement them are low.

Carbon sequestration measures are eligible for some of the above support schemes. However, the support is not comprehensive. For example, there is currently no support for ley cultivation, agroforestry (growing trees on parts of the farmland) and reduced tillage, measures that have the potential to increase carbon sequestration in agricultural land<sup>220</sup>. Rewetting of organic agricultural soils can be supported through certain forms of support under Sweden's strategic plan for the CAP and through other environment-related support. However, the Swedish EPA considers that the support is not sufficiently extensive to fulfil the requirements for rewetting of drained agricultural land set out in the Nature Restoration Ordinance (NRL)<sup>167</sup>.

### Pricing of agricultural greenhouse gas emissions and other regulation is weak in agriculture

To make climate measures in agriculture profitable, an alternative to subsidies is to introduce pricing of the activities that generate greenhouse gas emissions. This could create profitability for less emissions-intensive production. The 'polluter pays' principle, whereby the polluter pays for the costs of their pollution, has been central to Swedish environmental objectives and is codified in the Environmental Code<sup>221</sup>. It is also a treaty principle within the EU<sup>222</sup>.

The 'polluter pays' principle has so far had little impact on agricultural policy. Fossil fuel emissions in agriculture are taxed with a carbon tax and will also be covered by the EU's new Emissions Trading System for transport, buildings and other sectors (EU ETS 2). At the same time, Sweden is reducing taxes on agricultural diesel, removing price controls. The Government has also promised that farmers will be fully compensated for cost increases caused by EU ETS 2. How this compensation will look is crucial to the effect on emissions. If the compensation goes to climate measures, it can drive the climate transition forward, but if it only covers increased fuel costs, the effect on Swedish agriculture's emissions will be insignificant in the short term. In terms of total taxation, fossil fuels in agriculture are still heavily subsidised compared to other sectors.

There is no pricing mechanism for biological emissions of methane and nitrous oxide from agriculture, nor for net emissions from agricultural land. Thus, farmers who cause these emissions do not bear the costs of their climate impact and thus have no additional incentive to invest in less emissions-intensive production.

In addition to pricing and subsidies, other forms of regulation can also increase the profitability of agricultural climate mitigation measures. As explained in section 8.1, there are certain basic requirements for receiving EU support. The basic requirements are contained in the CAP and in the Good Agricultural and Environmental Conditions (GAEC) standards. However, these requirements cover only a limited number of measures with a weak link to climate change mitigation and there are also several exceptions.

### Technical barriers: How do policies promote knowledge and innovation for climate measures in agriculture?



#### CLIMATE POLICY COUNCIL ASSESSMENT

Innovation policy for new climate measures in agriculture needs to be strengthened. Existing efforts and proposals to develop methods for improved quantification of agricultural emissions do not cover all climate actions.

### Knowledge and innovation gaps for several agricultural climate measures

Knowledge on climate action in agriculture has evolved in recent years. New measures have emerged, although the degree of implementation. There is now knowledge about how fossil emissions from agriculture can reach zero emissions through electrification, biofuels and efficiency improvements. There is also knowledge of measures that can reduce agricultural emissions of methane and nitrous oxide and increase carbon sequestration in agricultural soils.

There is a relatively well-developed knowledge base for several measures to improve efficiency and productivity in fertilisation, plant breeding, breeding and animal husbandry. The measures that reduce emissions per unit produced have developed steadily over time and Sweden, together with the other EU countries, is well placed in a global perspective<sup>157, 158</sup>.

There are varying knowledge gaps for other known climate measures in agriculture. Nor is it entirely clear how large emission reductions can be achieved in Swedish conditions and what the effects will be on other social objectives for certain technical climate measures, such as nitrification inhibitors, the addition of biochar and acidification of slurry<sup>159</sup>. There is also a need to identify the potential, costs and effects on other societal objectives of the structural options for changing what and how much is produced (Chapter 7)<sup>167, 216</sup>. Knowledge of climate adaptation is also important for the efficient use of agricultural resources and thus contributing to reduced emissions.

There are challenges in quantifying agricultural emissions and the impact of different climate measures on emissions. This is because agricultural emissions are mainly the result of biological processes, which are more difficult to quantify than fossil fuel emissions. Emissions vary between regions, over time and between farms. Therefore, various templates and models combined with so-called activity data are widely used to estimate emissions<sup>223, 224</sup>. However, these estimates are sometimes so rough that they cannot capture the climate impact of all climate measures. This may be both because the processes behind emissions are scientifically complex and because available data on, for example, feed utilisation, manure management and crop residues are insufficient<sup>140</sup>.

Agriculture is facing a generational shift, with a large share of farmers being over 65 years old. To ensure long-term sustainability, strategies are needed to attract young farmers. Despite the central role of agriculture in addressing climate challenges, research and innovation in the sector have not been prioritized.

The Climate Policy Council shares the assessment of the Swedish Agency for Nature Conservation and the Swedish Board of Agriculture that the market has failed to produce innovations for new climate measures in agriculture. This means that there are no incentives for agricultural actors to develop and implement new solutions in the stages between research and large-scale implementation<sup>159</sup>.

#### **How are policies addressing the knowledge gap?**

Existing policies address to some extent the knowledge gap for climate action in agriculture. In 2023, so-called knowledge hubs were introduced with the aim of compiling current research and making it available to farmers. Two of the hubs have some relevance for agricultural climate action; one is about the livestock sector, and one is about crop production<sup>225</sup>. The Knowledge Hubs are relatively new and not yet evaluated, which makes it difficult to assess their effectiveness and whether they meet the needs for knowledge development for agricultural climate mitigation measures.

The Government funds research on climate action and emission reduction potential in the food sector under the National Food Research Programme. In the latest Research and Innovation Bill of 2024, the Government proposes a reinforcement of this appropriation. In addition, there is other Government-funded research through higher education institutions and external research grants, as well as industry-led research and innovation initiatives. At EU level, there are initiatives to reduce climate emissions from agriculture under the EU's Horizon Europe research programme<sup>226</sup>. The Climate Policy Council welcomes the strengthening of relevant national research funding.

Support and advice to farmers is another prerequisite for climate measures to be implemented. Evaluation of the Rural Development Programme shows that there are climate actions in agriculture that should be profitable for farmers but are still not fully implemented. This is likely to be partly due to that the cost of acquiring and acting on new knowledge is too high<sup>216</sup>. The Swedish Environmental Protection Agency and the Swedish Board of Agriculture make a similar observation about a lack of information among farmers<sup>159</sup>.

The advice on efficiency and the environment provided by Greppa Näringen has worked well, not least because it has been free for farmers. The advice is also tailored to needs and linked to financial incentives and regulations<sup>227</sup>. The advice does not focus primarily on specific climate measures but on plant nutrient leakage and other issues<sup>228</sup>. Nevertheless, we note that the organisation is increasingly taking a holistic approach to sustainability issues and that advice on climate and energy, including climate adaptation, is continuously developing<sup>229</sup>.

#### Lack of innovation efforts in current agricultural policy

Government policy lacks a clear focus on innovation for climate mitigation measures in agriculture. The agricultural sector generally suffers from a low level of innovation<sup>159</sup> and would need support in the steps from developing new solutions to implementing them on a large scale in agriculture<sup>230</sup>. However, some work is taking place at Swedish universities and through various industry-led initiatives, but there are no Government innovation programmes focusing on climate emissions from agriculture. Other sectors, such as industry and transport, have clearly targeted innovation programmes to support the transition. Industriklivet and the Vehicle Strategic Research and Innovation programme are good examples of such initiatives.

#### Development of quantification methods misses important areas

One obstacle to developing effective climate policy for agriculture is the lack of knowledge about the emission impacts of different measures, as we have illustrated above. Quantifying the full range of emissions impacts requires additional data and improved quantification methods.

The Swedish Board of Agriculture is working to improve the quantification of nitrous oxide emissions from agricultural land and carbon storage in mineral soil. In the interim report on an assignment, the Swedish Board of Agriculture proposes measures to improve capacity, knowledge and calculations regarding nitrous oxide from agricultural land. In addition, projects that can help verify the potential for carbon sequestration are being funded<sup>231</sup>.

However, there are no corresponding measures for other emission reductions, such as more efficient feed utilisation, reduction of emissions from manure storage and other carbon storage methods. The Swedish Board of Agriculture cites a lack of resources as the reason why it has not developed methods for quantifying reduced methane emissions<sup>231</sup>. Methane is the greenhouse gas that has the greatest climate impact in the emissions sector agriculture, and there are several opportunities to reduce methane emissions that cannot currently be quantified in the reporting. Our assessment is therefore that the ongoing methodological development is too narrowly focused.

At EU level, methodological development is ongoing under the Carbon Capture and Certification Framework (CRCF). So far, the focus has been on developing methods to quantify negative emissions in other sectors. Methodologies to measure, report and verify agricultural emissions and carbon sequestration are not yet finalised but are expected to be presented by the European Commission in 2025<sup>232</sup>.

#### Behavioral barriers: How do policies work to change behavior in the food supply chain?



##### CLIMATE POLICY COUNCIL ASSESSMENT

There are few effective Government interventions aimed at shifting demand from high-carbon to low-carbon foods.



### **Weak demand for low-emission food**

Climate change adaptation in the agriculture and food sector requires many actors to change their behaviour in different. These include farmers who are responsible for agricultural production, food sector actors who process and market agricultural goods, and consumers who buy the goods. Without diminishing the importance of behavioral change in agriculture<sup>216, 233</sup> we focus here primarily on barriers to consumer demand for low-carbon food.

For farmers to implement climate measures, it is important that demand for lower-emission food increases. The importance of demand is clearest when it comes to structural changes. If Swedish consumers do not change their behaviour, the effect of changing Swedish production will only be to increase imports and shift emissions abroad.

In an international comparison, Sweden has a high consumption of foods with high climate emissions, including meat and dairy products, which means that Swedish food consumption has much higher emissions than low- and middle-income countries. Sweden also has higher emissions than the average of high-income countries<sup>234</sup>. Since 1980, Swedish total consumption of meat per capita has increased by a quarter, while vegetables have almost doubled<sup>235</sup>. Since 2016, however, there has been a break in the trend with a slight decrease in beef and pork. In recent decades, chicken consumption has increased significantly in parallel. It is difficult to assess the reasons for these trends. It could be due to increased awareness the climate impact of food or to the lower price of chicken compared to beef and pork.

Even though Swedish food consumption leads to high climate emissions, many consumers are willing to change their consumption, partly for climate reasons. However, it is more difficult to draw any conclusions about the extent to which Swedish consumers are willing to pay. Are we willing to pay more for the same food products when climate action has been taken to reduce emissions? For example, dairy products cost more if methane-reducing feed additives are used, and wheat flour produced with more efficient use of fertilisers has a higher price.

### **How do policies address behavioral barriers to agricultural climate action?**

There are several underutilised opportunities for policy to promote more sustainable food consumption. Here we provide some background on this and on the Government's work in this area.

The Swedish Environmental Protection Agency has commissioned a knowledge compilation on policy instruments to reduce the environmental impact of food consumption<sup>198</sup>. It makes several recommendations for policy development, including prioritising targeted information-based policy instruments over general information campaigns. One example could be to highlight and promote plant-based alternatives and remind consumers of desirable behaviors.

However, the evidence review concludes that information-based instruments are insufficient to bring about the changes needed to achieve environmental objectives. There is also a need further investigate and test both economic instruments and regulations. Similar conclusions are drawn in international reports commissioned by the European Commission and the Nordic Council of Ministers<sup>236, 276</sup>.

In addition to providing dietary advice, public actors can set environmental and climate requirements in procurements of public meals. The Swedish Agency for Public Procurement has monitored the extent of environmental and climate requirements in procurements and notes that relatively many public actors use them. It is possible to see a reduction in the climate impact of public meals<sup>237</sup>.

The Swedish National Food Agency believes that there are several advantages to increasing the consumption of food produced in Sweden, for example from a fairness perspective. It is favourable if Swedish meat consumption does not give rise to climate emissions or environmental impacts in other countries.

In its evaluation from 2024, the Swedish National Food Agency states that measures are needed to ensure that consumers have a high level of confidence in food and can make informed choices based on aspects such as sustainability. To achieve this, grocery stores, together with politicians and authorities, also need to be involved in the work<sup>238</sup>.

In June 2023 and December 2024, the Swedish Government gave directives to the National Food Agency to update the dietary guidelines according to the Nordic Nutrition Recommendations (see section 6.4). The update in December 2024 specifically addressed the recommendation to reduce the recommended maximum intake of red meat and meat products from 500 grams to 350 grams cooked weight per week for public health reasons. The Government has expressed concerns about how this change could affect Swedish food production, public health, climate, biodiversity and food supply. The Government's updated directive from December 2024 gave the Swedish National Food Agency additional guidance in the assignment to analyse the impact of the proposed dietary advice on red meat. The Swedish National Food Agency must report on the assignment by 30 April 2025. Only after that will they update the dietary guidelines.

By slowing down the update of dietary guidelines and requiring a more specific analysis, the Government gives the impression that it does not fully support health-promoting recommendations that can also reduce the climate impact of food consumption.

We note, however, that there are some private initiatives aimed at increasing information about the climate impact of food and redirecting consumption towards goods where measures have been taken to reduce emissions, such as Lantmännen's Natur & Klimat label and Oatly's climate labelling of their products.

## 8.4 The policy for the agriculture's transition is not effective

The Climate Policy Council recognizes that the policies pursued so far have a limited ability to address the main barriers to reducing the climate impact of agriculture. It is therefore not surprising that greenhouse gas emissions from agriculture have remained relatively constant in Sweden for a long time.

Within its analytical framework, the Climate Policy Council has identified seven important, overarching aspects of an effective climate policy that will help to achieve the climate goals. The model is introduced earlier in the report, in Chapter 4. The key aspects are vision, capacity, cost-effectiveness, acceptability, coherence, stakeholder co-operation and long-term perspective. Each is important for climate policy to be effective, efficient and robust over time.

It assesses the policy, i.e. policy instruments, political leadership and governance in a broader perspective, such as how the Government governs its agencies and how well national policies work with EU policies.

Target fulfilment is central to our task of evaluating the Government's policies in relation to the climate goals; we assess whether the policies are sufficiently effective to achieve the set goals. The seven aspects of effective policy all play a role in the extent to which and degree to which the overall policy contributes to achieving the agreed objectives. For the overall quantified climate targets, it is relatively easy to determine whether policies are sufficient or not, as greenhouse gas emissions can be measured and valued against them. However, it is more difficult to assess the contribution of agriculture to climate objectives and the transition, as there are no clear qualitative or quantitative targets in this area.

## Lack of a clear vision and long-term strategy

An essential part of political leadership is to create a context that presents the policy direction and objectives. Political leadership needs to answer what the efforts are aiming at, how the goals can be reached and why it is desirable to reach them. This is as important as quantified emission targets. If the vision can be anchored in society, the conditions for commitment and determination to contribute to common solutions increase. It also promotes cooperation and coordination between different actors<sup>106</sup>.



### THE CLIMATE POLICY COUNCIL ASSESSMENT

There is no clear policy vision and strategy for agriculture's contribution to the climate transition, both in terms of the sector's own emissions and its contribution to the transition of other sectors.

Current policy lacks a clear objective or vision for the role of agriculture in the climate transition. In both Sweden and the EU, agricultural emissions are included in the overall climate targets, but it is not specified to what extent agriculture is expected to contribute, either to reducing its own emissions or to the transition in other sectors.

For several other sectors, a general target of fossil-free and zero emissions goes a long way towards setting a common direction of travel. For agriculture, which is dominated by biological systems and non-fossil emissions, it does not provide much guidance, especially as the authorities' target scenarios allow for significant remaining emissions in agriculture even in 2045.

Reducing nitrous oxide, methane and carbon dioxide emissions requires different measures. Currently, there are no specific targets for the reduction of individual greenhouse gases. In the absence of such targets, the industry, partly on its own initiative, has developed and quantified its own targets.

For fossil emissions, on the other hand, there is an ambition from both politicians and the industry to reduce these to virtually zero. In 2021, the report “The road to fossil-independent agriculture” was published, which presented a number of measures and instruments<sup>239</sup>. The proposals have had limited impact. For example, the proposal to phase out existing subsidies for fossil fuels has not resulted in any concrete measures.

Targets can also act as a stabilizing force and structure for long-term policies. This is important because agriculture's climate transition requires long-term policies and stable conditions to be implemented effectively. To create a long-term perspective for agriculture, long-term incentives for change are also needed, for example in terms of taxation or support for substantial change. Adapting and equipping Swedish agriculture to meet climate change and strengthen its competitiveness will take a long time and include all parts of the value chain. A long-term policy that is widely supported is therefore important for different actors to dare to invest in new solutions and measures.

The current policy has locked agriculture into a structure that is not adapted to long-term transition. The governance of agricultural policy is not based on what research shows is needed for agriculture to be sustainable in the long term, but is instead characterised by regulations that largely conform to structures<sup>240–242</sup>. Short-term political decisions make long-term and stable implementation of climate measures difficult. One example of this is that in 2024 the European Commission presented a new regulation that relaxed some of the basic conditions relevant to the environment and climate benefits<sup>243, 244</sup>. Sweden also chose to relax the requirements by granting agriculture exemptions from certain otherwise mandatory environmental requirements. Short-term policy decisions like these can help agriculture in the short term, but at the same time create uncertainty about future investments, which risks slowing down the transition.

### There is a lack of quantification and process

There is currently no quantification of agriculture's contribution to the EU's climate objectives, but there is a growing demand for policies to account for the impact of climate action in agriculture on emission reductions. Several studies, including the European Court of Auditors' special report, note that Member States' plans for agriculture's contribution to the Green Deal targets are currently not quantified<sup>245</sup>. A vision and direction for EU agricultural policy and the role of the agricultural sector in climate policy is crystallizing, with an increasing emphasis on its importance.

Sweden lacks a process similar to that at EU level to clarify the future contribution of agriculture to the climate transition. The lack of a clear political objective means that neither the Government authorities nor other stakeholders are given any concrete guidance or direction on the issue of the target and the path to it. Through the many dialogues that the Climate Policy Council has had with the relevant stakeholders, we conclude that the lack of a clear target is a major weakness in the current policy and that this has contributed to the fact that the policy has so far led to very little reduction in emissions.

### Cost-effective measures in agriculture are not sufficiently rewarded

Cost-effectiveness is an important aspect of the transition to ensure that the long-term goal of zero net emissions is achieved at the lowest possible cost to society.



#### THE CLIMATE POLICY COUNCIL ASSESSMENT

Existing policies do not cover all the measures that can reduce emissions at low cost. Agricultural policies are largely preservative in nature and in many cases counteract cost-effective measures.

If a measure is unprofitable for farmers, it is a problem for society as a whole if the same measure is a cost-effective way to reach climate targets.

The cost per unit of emission reduction varies between different agricultural climate measures<sup>170, 195, 214–216, 246, 247</sup>. Some measures are estimated to increase agricultural costs while others have a negative cost, i.e. they provide more economic benefits than they cost. A summary of cost estimates (Table 4) shows that most measures included in our scenarios cost around 500 to 2,000 SEK per tonne CO<sub>2</sub>e but that there are also measures with low or negative costs<sup>183</sup>. This is roughly in line with current and expected future prices of emission allowances under the EU Emissions Trading System (EU ETS). The price of emission allowances was around SEK 900 per tonne in February 2025 and, according to most estimates, is expected to increase until 2030<sup>248</sup>. It is also reasonable to assume that the costs of agricultural climate measures will decrease as they are scaled up. For structural measures that affect what and how much is produced, the cost assessment becomes more complex as the farmer's income is determined by what is produced and the market for the products.

In addition to the economic cost, a socio-economic analysis also needs to consider the possible side effects of the measures. For example, several climate measures have other benefits in the form of reduced vulnerability to climate change, improved public health or reduced emissions of nitrogen and phosphorus (see Table 4). For some of the measures, such as acidification of fertilisers and rewetting of organic soils, the economic valuation of these other benefits may be of the same order of magnitude as valuation of GHG emission reductions<sup>247, 249, 250</sup>. We also note that higher cost measures may prove cost-effective and profitable in the future when other emission reduction options have been exhausted and society as a whole is moving towards net zero emissions<sup>195, 246</sup>.

**Table 4.** Approximate implementation costs for a selection of measures that can reduce agricultural greenhouse gas emissions. The costs are estimates of the weighted economic costs and benefits of on-farm implementation, divided by the reduction in greenhouse gas emissions<sup>183</sup>.

Measure	Cost (SEK/tonne CO <sub>2</sub> e)	Other significant social benefits and costs
Breeding, feeding and animal husbandry for more efficient livestock production	Low or negative	Possible positive and negative effects on animal welfare
Energy efficiency	Low or negative	
Precision farming for increased nitrogen utilisation in crop production	Low or negative	Reducing eutrophication
Increased legume cultivation	Low or negative	
Nitrification inhibitors	500-1500	Reduced eutrophication, possible negative effects on soil microbes and aquatic animals
Acidification of slurry during storage	500-1600	Reduced ammonia emissions
Re-wetting of drained organic soils	500-1000	Reduced eutrophication, landscape values, biodiversity
Methane-reducing feed additive 3-NOP	600-1000	
Methane-reducing feed additive nitrate	600-1100	
Catch crops	700-2000	Reduced eutrophication, improved soil health
Methane reducing feed additive red algae	1500-4500	
Fat in feed to reduce methane emissions from ruminants	1500-3000	

Cost estimates vary for several reasons. Firstly, costs vary due to interactions between different measures and regional variations in costs due to site-specific conditions such as climate, soil type and crop rotations<sup>214, 246, 247</sup>. Secondly, slightly different methods are used to estimate costs, limiting comparability between studies<sup>214</sup>. Finally, prices and costs in agriculture fluctuate over time, which can strongly influence the economic calculation of, for example, increased productivity or reduced fertiliser use. At the same time, technological developments generally lead to gradual reductions in the costs of measures<sup>214</sup>. The Climate Policy Council notes that there is yet no comprehensive marginal cost curve developed specifically for Swedish conditions<sup>216</sup>.

There are elements of existing policy that we believe contribute to cost-effective climate measures in agriculture. For example, support for efficiency improvements in food production can help to increase production per utilised resource and thus also reduce greenhouse gas emissions per food product. However, it does not necessarily reduce overall emissions if it also leads to increased production.

For a long time, efficiency improvements in Swedish agriculture have been prioritised by both industry and the public sector, and they remain a priority in both policy and the Swedish food strategy<sup>156</sup>. The publicly funded advice given to farmers under Greppa Näringen is an important example of an initiative that helps to accelerate efforts to improve the efficiency of plant nutrients, feed and energy, for example. Some potentially cost-effective climate measures, such as precision fertilisation and some rewetting of organic agricultural soils, are also currently eligible for Government support (see also section 8.3).

However, there appears to be significant potential for additional climate measures that can be implemented at low or moderate cost, particularly those that reduce emissions without providing benefits to the farmer in terms of increased production or reduced costs. In the previous section, we show that there is a lack of support for some climate measures such as reducing emissions from ruminants and storing manure, but also for some measures that increase carbon sequestration in agricultural soils. The EU's Common Agricultural Policy (CAP) also contains conservative elements that contribute to potentially cost-effective climate measures not being implemented. A large part of the CAP is distributed in the form of generalised income support based on farmland used and the number of animals. While there are basic requirements for receiving support, the basic structure is that you get paid per animal or hectare. This does not incentivise a switch to production that reduces emissions on the farm.

There is also a lack of pricing of agricultural climate emissions at both national and EU level, which has been criticised by, among others, the European Court of Auditors, which argues that there are no cost-effective climate instruments for agriculture<sup>242</sup>. The lack of pricing of methane and nitrous oxide emissions from agriculture also means a lack of cost-effectiveness.

Fossil fuel emissions from agriculture are covered by price-setting instruments such as carbon tax and the EU Emissions Trading System for road transport, buildings and other sectors (EU ETS 2), but the tax for agricultural diesel in particular is reduced and the Government has promised to fully compensate agriculture for the price of emission allowances in EU ETS 2<sup>55</sup>. Relatively simple and cheap solutions are thus counteracted by the fact that agricultural diesel and heating oil are heavily subsidised, for example to increase the use of biofuels, to switch to fossil-free heating or to upgrade their vehicle fleet.

### Untapped potential for cooperation and the need for a stronger consensus

Collaboration between different actors is a strategy to address the complexity and challenges of the climate transition. It aims, among other things, to stimulate engagement and cooperation between the different societal actors involved and, in combination with traditional policy instruments and research-based knowledge, to ensure the most effective achievement of the objectives set.



#### CLIMATE POLICY COUNCIL ASSESSMENT

Forms of cooperation between policy and industry exist, but the Government does not fully utilise them for the climate transition of agriculture. Consumers and civil society are represented to a limited extent.

Sweden has strong coordination within the agricultural sector, but the Government is not fully utilising the sector's driving force and collaborative structures to drive climate work forward. More proactive and strategic cooperation between the Government and the industry, cooperatives, environmental organisations and researchers could accelerate the climate transition and ensure an effective and broadly based policy. In our dialogue meetings with the agricultural sector, the industry and several interest groups have called for a stronger dialogue between the actors and a more proactive policy that they believe should take more account of farmers' own experiences.

Sweden's policy in this area could be inspired by the Danish tripartite model. It was presented in 2024 to strengthen co-operation and ownership of the climate transition in agriculture. The model involves the Government, relevant actors from the agriculture and food sector, and representatives from different parts of Danish society, and has proven to be effective in developing direction and policy instruments to reach the Danish climate targets. Denmark created the conditions for a broad and long-term collaboration by starting the process with an expert group, where different climate regulation models were discussed and laid the basis for collaboration. Sweden, on the other hand, has not yet fully utilised the potential of creating such extensive collaboration.

The collaborative initiative Fossil Free Sweden's roadmaps for agriculture are an example of good stakeholder collaboration as they involve a broad group of public and private actors. Within Fossil Free Sweden, key actors from the agricultural industry, such as LRF (Lantbrukarnas Riksförbund), Lantmännen, Arla, and HK Scan, have developed a joint plan to reduce the sector's carbon emissions. In Sweden, there are also collaborative programmes to achieve targets in specific areas. For example, Sweden Food Arena which is a national programme where actors from the entire food chain work together to create a sustainable and competitive food sector. Another example is AKIS (Agricultural Knowledge and Innovation Systems), which promotes knowledge and innovation in agriculture and is identified by the Swedish Board of Agriculture as a key to reducing emissions in agriculture<sup>225</sup>.

However, none of the above collaborative initiatives include consumer and environmental organisations<sup>251</sup>. While industry often has a well-established dialogue with the Government, consumer organisations and civil society actors often lack corresponding platforms for influence<sup>252</sup>. Unlike business organisations, there are no formal requirements to include consumer organisations in collaborative models in the agricultural climate transition.

Despite Sweden's involvement in the EU's agricultural policy, there is no forum where Sweden can build common interests with countries facing similar challenges, such as Forest Europe for forestry issues. Stronger cooperation could facilitate joint initiatives, such as research and innovation, and the development of common strategies and goals that favour both climate and farmers' competitiveness based on Swedish conditions.

The Climate Policy Council also recognises that coherence between climate, environment and agriculture policies is weak. Improving the coherence between agricultural and climate policies should be relatively straightforward and would increase the chances of progress in successfully reducing emissions.

Climate measures in agriculture are influenced by several policy objectives beyond climate mitigation, such as environmental quality, competitiveness and animal health objectives. Among the various objectives related to agriculture it is not always clear how they align with climate objectives. This also applies to the ambition of increased production. The 2017 food strategy emphasises that Sweden should develop agricultural production so that it makes a greater contribution to meeting global demand for food with a low climate impact. The ambition of the strategy is to increase Swedish food production by 2030. However, the strategy does not specify how the increase in production will be realised or how it will fit within the framework of the Swedish climate goals. The broader sustainability work in agriculture in Sweden is also covered by other relevant objectives, in particular the 16 national environmental quality objectives.

Even within EU policies, there are overlapping objectives and potential conflicts of objectives within regulation, particularly between climate, environmental and agricultural objectives. Climate and environmental legislation, such as the NRL, LULUCF and ESR, should be implemented in coherence, but many different ecosystem services should be provided on the same land area.

Another example is that Swedish policy has so far not fully exploited the synergies that exist between climate objectives and the needs of total defence. We believe that a more coordinated and proactive approach could yield both climate and preparedness policy benefits. For example, increased investment in decentralised, domestic production of fuels, such as biogas, could contribute both to the climate transition and to strengthening Sweden's energy security.

If the policy had a clear strategy for linking objectives in a systematic way, it could bring multiple benefits: strengthened resilience in agriculture, reduced climate impact, and increased security of supply for both agriculture and the Armed Forces in the event of a crisis. Sweden would have the opportunity to develop a more integrated approach where green industries are seen as part of a broader security policy.

### Acceptance and commitment to the agricultural climate transition - policy gaps and opportunities

The success of the climate transition requires broad support and acceptance of the that affect agriculture and the entire food chain, from primary producer to final consumer. The Government itself emphasises that increased acceptance is crucial to the success of the broad climate policy and achieving the goals. Politicians have a major responsibility to contribute to understanding and commitment.

While many people living in Sweden sees protecting the environment and combating climate change as important priorities for agricultural policy, many also recognize that agriculture has already made significant contributions to climate change<sup>253</sup>.

The way in which policy instruments are designed and packaged has a major impact on whether the distribution of costs and benefits is perceived as fair. Even changes that are perceived as a burden are acceptable if costs and benefits are distributed fairly over time, between regions and between different groups<sup>108</sup>.

The policy's efforts to create acceptance and commitment to the agricultural climate transition among consumers are weak. We have pointed out that climate policy in Sweden has so far had too little focus on equity and participation<sup>96</sup>. This lack of focus may lead to reduced consumer engagement in the agricultural climate transition. Questions about how the benefits and costs of the transition are distributed and how to ensure that everyone can participate in shaping the society of the future need to be at the heart of climate policy<sup>108</sup>.

The acceptance of climate measures in agriculture varies between different actors operating within or in relation to the agricultural sector<sup>217</sup>. Some farmers have already started to make the transition, but further support and clearer governance are needed to create broader acceptance and change<sup>254</sup>. How policy decisions are made, and which actors are involved and have influence also affect acceptance. It is not just about what decisions are made. Decision-making processes need to be perceived as fair, consistent and impartial. This is important to minimize the risk of climate measures being perceived as an undue burden<sup>137</sup>.

Many farmers feel that the new requirements imposed on them are not practical or economically viable, creating resistance to further action. This has been reflected in protests from farmers in several European countries. In the EU, this has resulted in a strategic dialogue between policy makers and industry stakeholders, to enable the implementation of a sustainable and competitive strategy at EU level.

The Climate Policy Council argues that a more inclusive process is needed to shape agricultural policy going forward. A common understanding of the challenges and solutions where the costs are perceived to be fairly distributed can achieve broad acceptance and the policy can thus gain greater legitimacy.



# 9 Recommendations for agriculture to further contribute to climate objectives

The Climate Policy Council recognizes that there is potential to reduce the climate impact of agriculture and at the same time concludes that existing policies do not take advantage of the potential of agriculture to contribute to climate goals. In this chapter, we therefore make recommendations to the Government on how policies should be developed to support climate mitigation measures in agriculture. To enable the development of climate action in agriculture in both the short and long term, better conditions are needed as soon as possible. We therefore believe that all the recommendations we present below should be implemented before the end of the mandate period.

The chapter begins with recommendations relating to the overall governance of the climate impact of agriculture, section 9.1. Then, in section 9.2, we discuss the role Sweden should play in EU co-operation to develop instruments that can strengthen the climate transition of agriculture throughout the EU. In section 9.3, we propose how a policy mix can be developed at national level that improves the conditions for Swedish farmers to contribute to the climate goals. Finally, in section 9.4, we discuss the institutional conditions that need to be put in place to strengthen the climate work of agriculture in order to enable the development of policy instruments.

## 9.1 Develop the governance of the climate impact of agriculture



### THE CLIMATE POLICY COUNCIL RECOMMENDATIONS TO THE GOVERNMENT

- Develop a vision and strategy for agriculture's climate transition in close collaboration with farmers and stakeholders across the entire food supply chain, civil society, researchers, and Government agencies. The strategy should provide stable and long-term conditions for the sector and be based on the latest knowledge about the potential of possible measures.
- Clarify how the goal of increased food production in the Government's food strategy can be achieved within the framework of the climate targets.

### Developing a vision and strategy for the climate impact of agriculture

One conclusion we draw from the evaluation of agricultural policy is that there is a lack of direction and clear objectives for reducing the climate impact of agriculture. This contributes to uncertainty in the sector about how the Swedish climate targets can be achieved. This has probably contributed to the fact that policy to reduce the climate impact of agriculture is comparatively undeveloped.

The Climate Policy Council considers it important to strengthen agriculture's climate work and clarify the direction of travel towards the climate goals. In the long term, this is not only about increasing agriculture's contribution to the climate goals, but also about ensuring competitiveness in and for agriculture. Agricultural emissions need to be reduced if the climate targets for the EU and Sweden are to be met by 2040, 2045 and 2050. At the same time, higher demands will be placed on climate-friendly food production. Prioritising work to strengthen the competitiveness of agricultural climate measures in the short term can thus help to future-proof Swedish food production in the longer term.

## Consider different target constructs and build on growing knowledge base on climate policy

A target scenario for agriculture can be constructed in several ways. Ireland, Denmark, France and Finland have adopted direct quantified emission targets to reduce the overall climate impact of agriculture. A quantitative sectoral target can provide clarity for stakeholders and a stable basis for developing agricultural climate policy. The European Commission's evaluation of the Swedish strategic plan for the EU's agricultural policy (CAP) suggests that Sweden should clarify how large emission reductions Sweden can achieve in agriculture in order to fulfil its commitment under the Effort Sharing Regulation (ESR)<sup>255</sup>. Such a quantitative sectoral target can provide clarity, but there is a risk that it sub-optimises the achievement of society's overall climate objectives, i.e. that emission reductions are not made where it is most cost-effective from a socio-economic perspective<sup>54</sup>. Such risks can be partly countered with various types of flexibility. For example, the Danish climate target has a target range that depends on developments in the other emission sectors within the ESR<sup>256</sup>.

Another option could be to develop qualitative targets for how agriculture should be developed to meet climate targets. Such targets would set the direction for how agricultural production should be developed with the help of efficiency measures and what production focus it should have to contribute to reduced climate impact. A third option could be to adopt an efficiency target based on the amount of emissions generated by each unit of agricultural production. Such a target is easy to monitor and focuses on climate-competitive Swedish agricultural production. However, it is not certain that an efficiency target will ensure sufficient emission reductions in line with Sweden's climate targets.

The pros and cons of different target structures should be considered in dialogue with stakeholders. Our recommendation is that the vision and strategy that are developed should be as concrete and clear as possible and as far as possible, describe how agriculture will contribute to achieving both Sweden's short-term and long-term climate goals. In this work, it is important to strike a balance between clarity and flexibility. It is also important that a vision is complemented by a strategy that sets out the direction for how the vision will be achieved. The strategy should describe both how work towards the target should be structured (governance) and what the main instruments (instruments) are to ensure that the target is met.

Methane and nitrous oxide emissions are different from fossil fuel emissions in society. It is important to develop the methane and nitrous oxide targets based on what is possible to achieve in agriculture.

It is important that the Government, based on existing knowledge bases that present new potential assessments for reducing the climate footprint of agriculture, initiates a close dialogue with research and authorities on what is possible in Swedish conditions as part of the process of developing a target image for the sector<sup>183, 257–260</sup>.

## Reconciling food supply objectives with climate and other environmental goals

A clear goal for agriculture is set out in the Government's food strategy, which states that Sweden's food production should increase, without specifying exactly how. The Climate Policy Council agrees that it may be justified for several reasons to increase Sweden's food production. Our analysis shows that it is possible to increase Sweden's degree of self-sufficiency in several ways, for example through dietary changes.

However, increased food production needs to be compatible with agreed climate targets and other environmental objectives. Structural changes offer great opportunities to increase food production while reducing emissions, and thus also meeting climate targets. Structural change can also contribute to increased food supply. A combination of changes in *how* production takes place and *what* is produced enables a balance between climate and production targets. As we have shown in our previous scenario analysis, it is also possible to reconcile food production with reduced climate impact without compromising other environmental objectives. Coherence between production, climate and environmental objectives should therefore be an important part of agriculture's vision to reduce emissions and contribute to climate objectives.

### Engaging with agricultural stakeholders on climate impacts

A key lesson from climate policy development in other countries and regions is the importance of anchoring through broad co-operation involving many different actors. Cooperation is needed not least to achieve broad agreement on direction and governance and to avoid polarising and blocking conflicts. The commitment to the transition that already exists among many stakeholders should be better utilised. Sweden can learn from the collaborative processes on climate and agriculture that have been implemented in various ways in the EU, Denmark and Norway, for example.

The Government should initiate a collaborative platform that includes the entire value chain in the food supply, civil society, businesses, authorities and universities to ensure that different perspectives, knowledge and interests are utilised in the process. In this dialogue, it is important that ownership, distribution of responsibilities and costs are clarified.

## 9.2 Participate actively in EU cooperation



### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Advocate for the Common Agricultural Policy (CAP) reform to ensure cost-effective emission reductions. Assign relevant authorities to develop proposals aligned with this objective for the next programming period.
- Continue to work towards immediate and mandatory inclusion of fossil fuel emissions from agriculture for all EU Member States in the upcoming EU Emissions Trading System (EU ETS 2).
- Promote the introduction of common and economically efficient climate policies at EU level to regulate methane and nitrous oxide emissions from agriculture, such as an Emissions Trading System.

Common climate instruments at EU level have several advantages, including that they can be cost-effective and reduce the risks of carbon leakage and reduced competition<sup>54</sup>. Effectively designed climate instruments at EU level can strengthen the competitiveness of farmers who take climate action in agriculture. If Swedish food production has a lower climate impact than in other European countries, there is potential for Swedish agriculture to benefit from a common climate policy instrument.

### Strengthen the climate elements of European agricultural policy

To assist farmers in implementing climate measures, it is important that the right conditions are created in the broad and common agricultural policy within the EU (CAP). In section 8.2, we show that the CAP has neither contributed to nor is currently expected to steer towards significant emission reductions from European agriculture. In section 8.1, we show, among other things, that there is an implementation gap in the countries in terms of implementing the possible climate measures in agriculture that exist within the framework of the CAP.

The EU Climate Science Council suggests that a reform of agricultural policy should include: an overall target for emission reductions; requirements for climate measures that reduce methane and nitrous oxide emissions; a shift from generalized production subsidies to targeted climate measures; and incentives for the consumption of healthy products. The Climate Policy Council agrees with these assessments. The CAP will be a key instrument for Member States to achieve their climate objectives through the agricultural transition.

Experience in the EU shows that there are significant opportunities to improve synergies between CAP implementation and climate policy. One low-hanging fruit is to work towards improving the coherence between agricultural and climate policies, for example by better coordinating planning processes and reporting of emissions and removals in the agricultural sector.

Furthermore, we believe that further development of the support systems is needed so that they provide more socio-economically effective compensation for climate benefits that can be quantified. There is a need gain a better insight into the climate impact of CAP measures, where Sweden for the period beyond 2027 should quantify to a greater extent how the use of CAP funds contributes to climate goals. As many of agriculture's emissions are difficult to quantify, in practice such support needs to be based on modelling of greenhouse gas emissions based on data that is already available or can be obtained cost-effectively.

By linking support to quantified outcomes, taxpayers' money can be used more cost-effectively and targeted to measures that deliver the greatest environmental and climate benefits. CAP support that is better targeted to measures that help farmers access private or public payments for ecosystem services, for example through better advisory and monitoring services, can enable additional and more diversified sources of income for the farmer.

Support structures should be designed taking into account farmers' need for predictable income, despite uncontrollable external variations such as weather conditions. In addition, schemes should be flexible enough to include the possibility for farmers to choose for themselves the practices that work best for them given their specific conditions. This can increase the level of innovation and acceptance of the measures in the sector.

### Steer EU emissions trading towards a phase-out of fossil fuels in agriculture

The use of fossil fuels in agriculture is subsidized for competitive reasons in several EU countries, including Sweden. The EU Energy Taxation Directive allows for such exemptions from energy and carbon taxes. Agriculture in most EU countries thus faces a dilemma, that the fossil-free alternatives, such as electricity, biogas and other high blended biofuels, are expensive while fossil diesel and fuel oil are relatively cheap and exempt from climate legislation. This is not an effective policy to promote the decarbonisation of agriculture.

As part of the EU's Fit for 55 package, the EU decided to introduce a new Emissions Trading System for fossil fuels in road transport, heating of buildings and other sectors (EU ETS 2). EU ETS 2 includes most fossil CO emissions from road transport and heating of buildings. However, there are fossil emissions that are excluded in both EU ETS 1 and EU ETS 2. Exemptions include machinery and heating in agriculture and forestry<sup>261</sup>. Thus, as in the Energy Taxation Directive, there is an opportunity for Member States to exempt agriculture from the pricing of greenhouse gas emissions. The ETS Directive states that the European Commission will evaluate the possibility of including these additional sectors, but the Commission has until 31 October 2031 to consider this possibility<sup>262</sup>. However, EU Member States can choose to include these emissions voluntarily. Sweden and several other countries have chosen to include agricultural fossil emissions in the EU ETS 2. The European Commission is also free to propose a mandatory inclusion of these excluded sectors if it so wishes.

It is positive that Sweden has chosen to include fossil emissions from agriculture and other activities in the EU ETS 2 because it creates clearer incentives for emission reductions and a long-term approach to phasing out fossil fuels in the EU. However, the Climate Policy Council sees problems with the voluntary nature of the commitment. On the one hand, it weakens the steering towards joint target fulfilment and fossil-free agriculture, and on the other hand, it risks undermining the core value of the internal market of the possibility of competition on equal terms. The Climate Policy Council therefore recommends that the Government urgently and actively push for the mandatory inclusion of all fossil greenhouse gas emissions from agriculture in EU ETS 2. In addition to the above-mentioned reasons, such mandatory inclusion would also contribute to additional revenue for the Member States, which would enable increased support for the climate transition of agriculture.

### European governance of methane and nitrous oxide emissions from agriculture

A common EU climate policy instrument is needed for methane and nitrous oxide emissions from agriculture. Methane and nitrous oxide emissions from agriculture will need to be significantly reduced if the EU is to meet its climate target of reducing net emissions by 90 percent by 2040, compared to 1990. According to the European Commission's impact assessment, emission reductions from the agricultural sector, where methane and nitrous oxide are the main greenhouse gases, need to be reduced by around 30 percent by 2040 compared to 2015<sup>263</sup>.

### Emissions trading for agricultural biological emissions – could be a cost-effective solution

The polluter pays principle is a fundamental principle of the Treaty on the Functioning of the European Union (TFEU). Today, there are Emissions Trading Systems that set both caps and prices for virtually all fossil carbon dioxide emissions. However, there is no equivalent Emissions Trading System for biological emissions from agriculture, i.e. emissions of mainly methane and nitrous oxide from crop and livestock production. Both the European Court of Auditors<sup>242</sup> and the EU Climate Science Council have suggested that the EU should introduce a pricing mechanism for agricultural biological emissions<sup>36</sup>. As a result of these recommendations and the fact that agricultural emissions have not decreased at all in recent years, the European Commission has commissioned a consortium of consultancy and environmental agencies to develop proposals for pricing the climate impact of agriculture<sup>264</sup>.

The proposal recommends that the polluter pays principle should be implemented through an Emissions Trading System for agricultural emissions. Several possible designs of the instrument are discussed, including which emissions should be included and which actor in the food chain should be subject to requirements to surrender the allowances. One option highlighted to reduce the administrative burden on farmers is to allow emissions trading to target the food industry or retailer. An additional benefit of this would be that the climate impact of imported food is also included in the trading system. In contrast, an ETS targeting farmers provides clearer incentives for farmers themselves to reduce their emissions<sup>264</sup>. The EU has recently conducted strategic dialogues on the future of agriculture. They conclude that a strong policy instrument is needed. At the same time, the parties to the dialogue consider that the pricing of greenhouse gas emissions from agriculture needs to be further explored and consider the specificities of agriculture<sup>265</sup>.

The Climate Policy Council sees several advantages in pricing greenhouse gas emissions of methane and nitrous oxide at EU level through an Emissions Trading System. The conditions for negotiating an ETS are better than negotiating a climate tax, as environmental taxation requires the active agreement of all 27 Member States. An ETS also ensures the level of emissions for a given year through an emissions cap. This creates better control over emissions in relation to the EU's climate goals<sup>266</sup>. In addition, the EU already uses Emissions Trading Systems extensively, which will increase further with the introduction of EU ETS 2. There are probably coordination gains, not least politically, from different schemes having a relatively similar design.

A disadvantage of an Emissions Trading System where the target is fixed is that the costs to operators are more difficult to predict, compared to a tax where the cost is fixed but the effect more uncertain. At the same time, we believe that there may also be other interesting climate instruments for agricultural biological emissions. Such instruments would be stricter climate requirements for companies' life cycle emissions or more targeted climate support for agriculture.

#### **Principles for the introduction of a climate control measure for methane and nitrous oxide**

The Climate Policy Council welcomes the fact that the European Commission is analyzing various options for designing climate policy instruments for agricultural biological emissions. This analysis work should be continued as a matter of urgency. Denmark has proposed that an Emissions Trading System could include carbon sequestration on cropland and pastures and converted agricultural land, such as forests or wetlands<sup>267</sup>. This would mean that a larger proportion of agricultural climate measures would be included in the scheme, but on the other hand it is a challenge to include less permanent carbon sinks and equate them with permanent emission reductions.

An important principle for discussions on emissions trading or other climate policy instruments for agriculture is the importance of equity. Both those who will take action and those who have already done so should benefit from the instrument.

Another important prerequisite is that the scheme is based on reliable data for climate action in agriculture. The measurement, reporting and verification (MRV) system already in place for the EU ETS 1 and 2 therefore needs to be developed. As it will cover up to 9 million European farms, an MRV system needs to make it easy for individual farmers to report, but at the same time it needs to be detailed enough not to distort incentives for different climate measures. The Carbon Capture and Storage Certification Framework (CRCF), which also covers agricultural emissions, is a step towards a comprehensive MRV system for agricultural biological emissions. A European regulatory framework needs to be implemented at Member State level. It is therefore important that Sweden also develops the conditions for quantifying and monitoring climate measures in agriculture.

Other societal objectives are also important to consider. Depending on how the system is designed, an emissions trading system can provide incentives to produce less of what has a high climate impact. It is important that such structural changes are balanced by other policies so as not to jeopardize other societal objectives.

One advantage of pricing emissions, for example via emission allowances, is that it creates revenue on top of existing funding. This revenue is generated by increased prices that could be channeled back into food production. If the scheme is modelled on the EU ETS 1 and 2, most of the revenues will go directly to Member States and a smaller share to the same EU funds. These revenues could be used in different ways, for example to support farmers to take climate action or to compensate consumers for higher food prices.

It is also important that a climate policy instrument does not lead to carbon leakage and that emissions instead increase outside the EU. If a climate change mitigation measure targets food sold in the EU, it automatically includes imported food, thereby reducing the risk of carbon leakage. If the climate policy instrument only targets European farmers, there may instead be a need for trading mechanisms to ensure that imported food fulfils the same requirements as food produced in Europe. Inspiration can be drawn from the Carbon Border Adjustment Mechanism (CBAM) introduced by the EU for the existing Emissions Trading System (EU ETS 1), although introducing such a scheme for all food commodities may be more challenging.

All in all, the Climate Policy Council believes that Sweden should participate actively in the development of the EU's climate policy instrument for agricultural biological emissions. We would like to emphasize the importance of introducing a common climate policy instrument as soon as possible. It is the cumulative emissions that are important for climate change and if the climate instruments are delayed, the requirements for agriculture to reduce its climate emissions will probably have to be stricter in the future.

As discussions at EU level are already under way, it is important that Sweden actively participates in the advocacy work. The Climate Policy Council therefore recommends that the Government develop a constructive position based on the following principles:

- Develop a climate control instrument for methane and nitrous oxide emissions from agriculture that favours farmers who take and have taken climate action in agriculture.
- Develop the climate policy instrument in close dialogue with stakeholders, similar to the work of the strategic dialogues on the future of agriculture.
- Ensure that an effective measurement, verification and reporting (MRV) system is developed as soon as possible.
- Consider how revenues from the Climate Stewardship Fund or other European and national sources of finance can be targeted to support the farmer to implement climate measures.
- Balance the climate policy instrument with other societal objectives. Where there are conflicting objectives, ensure that other policies compensate for them.
- Consider introducing trading mechanisms that reduce the risk of carbon leakage in parallel with a European climate policy instrument.

### 9.3 Developing a national policy mix for reducing emissions



#### THE CLIMATE POLICY COUNCIL'S RECOMMENDATIONS TO THE GOVERNMENT

- Strengthen and improve support for climate measures in agriculture that are economically efficient from a societal perspectives but not currently profitable at the farm level. Develop support schemes that also consider other social objectives.
- Design risk-sharing mechanisms where the state takes part of the financial risk associated with major climate investments in agriculture.
- In the absence of an EU level climate policy instrument, consider introducing a pricing mechanism for methane and nitrous oxide emissions from agricultural that takes farm profitability into account, for example, through a refunding scheme.
- Advocate for a rapid phase-out of tax reductions on fossil diesel. Compensate farmers appropriately to avoid negative impacts on agricultural profitability.
- Implement measures to shift demand toward climate -friendly and healthy food products, such as enhanced information campaigns, differentiated value-added tax (VAT) and procurement of public meals.

Our analysis has identified three main barriers to implementing climate measures in the agricultural sector: costs, knowledge and innovation gaps, and lack of demand for low-carbon food products. We have also found that existing policies do not fully address these barriers. This section discusses how these barriers can be addressed in a socio-economically efficient way through the development of a national policy mix for agriculture.

Overall, we believe that food tax shifting, pricing of agricultural emissions and consumer taxes are interesting policy options to develop further in a Swedish context.

### Strengthening and streamlining support for climate action in agriculture

Today, there are various support schemes aimed at reducing emissions in agriculture. As we show in Chapter 8, there are shortcomings in these support schemes. Firstly, they do not cover all measures, and secondly, the incentives for taking climate action are often insufficient. The general profitability of agriculture is also weak, which makes major climate investments difficult.

There are currently no incentives for cost-effective climate measures and farms have low profitability. The Climate Policy Council therefore believes that the Government should strengthen and streamline support for climate measures in agriculture.

Government support for climate action in agriculture can help to commercialize technologies and reduce the cost of climate measures in the long term. The Climate Policy Council also believes that strengthening climate compensation in agriculture can improve the acceptance of climate measures through Government subsidies. A common criticism of subsidies is that they can be costly and are not as effective as price-setting measures. However, subsidies can be combined with pricing. Subsidies can sometimes also be justified from an economy of scale perspective. If subsidies are initially used to scale up operations so that unit costs fall, subsidies can be gradually removed.

#### How can climate support for agriculture be designed?

There are different ways to strengthen existing support schemes for climate action in agriculture. One way is to expand Klimatklivet, the existing investment programme. Klimatklivet could be broadened to include more agricultural climate measures, for example to reduce methane emissions from ruminants and strengthen carbon sequestration in agricultural land. However, we note a trend towards breaking out measures that the Government particularly wants to prioritise from Klimatklivet. Support for charging infrastructure, biogas, electric lorries, buses and work machinery, and solar cells are examples of climate measures where the Government has moved from financing these via Klimatklivet to designing special support. We believe that the Government could consider doing the same for all climate measures in agriculture. A compensation system for climate measures aimed solely at agriculture could be introduced without risking necessary support for other sectors.

A targeted compensation scheme could cover all agricultural climate measures that the Government and its authorities deem appropriate to support. The rules of the compensation scheme and the level of support could be based on the specific conditions of the measures. The Government can draw lessons from the Netherlands, which, through an EU-approved state aid scheme, finances 22 different agricultural climate measures to reduce agricultural climate emissions and contribute to other environmental objectives<sup>268</sup>. There, the level of support is determined on the basis of a points system for the benefits that a measure provides to climate and environmental objectives. In addition to climate benefits, a support system could take account of other social objectives in agriculture to a greater extent than is possible under Klimatklivet. Authorities such as the Swedish Environmental Protection Agency and the Swedish Board of Agriculture should be tasked with analysing such a support system. In this analysis, it is important to take into account the opportunities that exist within the framework of the EU's common agricultural policy to further support climate measures in agriculture.



### More innovation and research needed

The Climate Policy Council believes that there is a need for increased investment in research and new innovations in agriculture. The Swedish Environmental Protection Agency and the Swedish Board of Agriculture show that there is a lower level of innovation in agriculture than in other sectors, and that there are immature climate technologies that need to be developed and tested to a greater extent. An innovation grant for climate measures, similar to what is available for industry and transport, could assist with the commercialization of climate measures in agriculture. It would also provide greater opportunities for Sweden to become a leading knowledge nation in low-emission food production. We therefore assess that the Government should draw inspiration both from other sectors and other countries to develop a targeted innovation programme for climate measures in agriculture.

### Distribute the risk sharing of major climate investments in agriculture

The creditworthiness of many Swedish farmers is weak due to low profitability. This makes it difficult for farmers to obtain loans for major climate investments in agriculture. An effective way to support agriculture can therefore be for the Government to take on part of the risk for major climate investments.

The Swedish Agency for Economic and Regional Growth has analysed the possibilities for various risk-sharing systems based on the broader concept of green investments, which in addition to climate also includes other environmental and climate adaptation measures<sup>269</sup>. In addition to increased support for investments, the Agency proposes two possible risk-sharing instruments for farmers: either a publicly funded guarantee, where the state covers credit losses for loans for green investments within specified limits, or a publicly (partially) funded loan fund, where a state actor provides loans for certain green investments. For other parts of the food chain, the Agency for Economic and Regional Growth proposes further investigation of, among other things, a form of investment loan aimed at new innovative food production and a publicly financed fund for scaling up innovative food companies.

The Climate Policy Council considers these risk-sharing options to be interesting. They could enable farmers to take out loans for major climate investments, while innovative food companies could stimulate supply and demand for new food products with a lower climate impact. We share the Swedish Agency for Economic and Regional Growth's assessment that the relevant Government agencies should investigate how such risk-sharing instruments should be designed.

### Consider national pricing for agricultural biological emissions

An alternative or complement to climate subsidies is to price biological emissions of methane and nitrous oxide from agriculture, as has been discussed at EU level. In practice, a tax on methane and nitrous oxide emissions from agriculture would mean applying the polluter pays principle, which would favor low-emission food production and create incentives to take action to reduce emissions.

In Denmark, the parties have jointly developed a proposal to create incentives to significantly reduce the sector's emissions through strengthened governance and new instruments. The proposal is to partially restructure Danish agriculture with a pricing mechanism that increases the total costs for the farmer, but also a significant green area fund to encourage the conversion of agricultural land to forests and wetlands. A clear consequence of the proposal is that the amount of utilised agricultural land in Denmark will decrease, and probably also the total food production<sup>270</sup>. Denmark is currently a large net exporter of food. Denmark has chosen this path because its large agricultural sector generates high emissions compared other emitting sectors. Agricultural emissions therefore need to be reduced if Denmark is to meet its climate targets. In addition, Danish agriculture gives rise to other environmental problems such as eutrophication and various air pollutants.

The Danish proposal is therefore not compatible with the objective of increased food production agreed in the Swedish food strategy. If Sweden wants to avoid negative consequences for overall food production, this places demands on the design of policy instruments. One option that could therefore be considered is to make the system cost-neutral for farmers. This would be possible by simultaneously rewarding food production that reduces emissions with subsidies and increasing compensation for the ecosystem services provided by agriculture.

However, there are risks associated with a carbon tax system that are linked to the design of other policies. For example, a carbon tax on agriculture could lead to fewer naturally grazing cattle, which has negative implications for biodiversity and open space objectives. It is also uncertain how a carbon tax on cattle would affect global emissions. If the reduction in Sweden leads to increased production of dairy and beef in other countries, as well as increased imports, the policy has not contributed with any climate benefits globally. But if the carbon tax is combined with changing consumption patterns and efforts to strengthen the supply of low-emission food, it could help reduce emissions both in Sweden and globally.

An important argument in favor of a climate fee or tax, apart from the fact that it is deemed to be cost-effective, is that Sweden is thus preparing for the policy development that has already begun at European level.

The Climate Policy Council assess that a levy system for agriculture is an interesting proposal that should be investigated further. An investigation of climate levies should therefore consider the consequences for other social objectives. Other things to consider are the potential administrative burden and the undesirable indirect effects that follow from all incentive-based systems.

### Promote a rapid phasing out of tax reductions for fossil diesel

A clear obstacle to reducing fossil fuel in agriculture is that fossil fuels are heavily subsidized. Since 2005, diesel tax in agriculture has been subsidized compared to the cost for other sectors of the economy, with some variations over the years. The tax rebate for agricultural diesel and the weakening of the reduction obligation means that a switch to electrically powered machinery or other renewable fuels is difficult to justify on cost grounds for the individual farmer.

The Climate Policy Council believes that the tax reduction for fossil diesel in agriculture should be phased out as soon as possible in combination with the introduction of compensatory instruments that do not impair farmers' competitiveness. Our assessment is that the Government should design and introduce compensatory instruments in accordance with EU state aid rules.

Phasing out the tax reduction and introducing other compensation mechanisms has been discussed at length. The Government inquiry "A fossil-independent agriculture" proposed the introduction of an agricultural deduction to replace the tax reduction for diesel<sup>239</sup>. Such a deduction would, on a general level, compensate agriculture for the cost increase.

If the inquiry's proposal is not deemed feasible under EU law, an alternative compensation mechanism should be designed as soon as possible based on the same overall ambition: to phase out fossil fuel subsidies without impairing farmers' competitiveness.

### **Redirect demand to healthy, low-carbon food**

There are major synergies between diets that are good for both human health and the climate. A change in eating habits can contribute to increased demand for Swedish food products that have comparatively low emissions, which can also help to reduce emissions in other countries. A more climate-friendly diet also creates the conditions for a change in the production orientation of Swedish agriculture. At present, food consumption policy is largely limited to information initiatives from the National Food Agency and the Environmental Protection Agency. To achieve the climate goals, the Climate Policy Council sees a need to increase incentives to change dietary habits.

### **Strengthen information efforts on health and climate**

Strengthening information on the climate and health benefits of certain foods is one way of stimulating demand for foods that reduce the climate impact of agriculture. One way could be to develop better standardized systems for climate and health labelling of foods in Sweden and the EU. The Climate Policy Council assesses that there is a need to analyse the conditions for such climate and health labelling.

### **Consider tax shifting on food**

The Climate Policy Council believes that consumer taxes could be considered as a policy instrument to stimulate a shift from demand for food with a high climate impact to food with a low impact. A tax shift on food could provide direct financial incentives for a transition to food consumption with lower climate impact.

Research shows that consumption taxes have advantages over carbon taxes on production<sup>271</sup>. If the tax is levied at the point of sale, imported food is also covered, preventing carbon leakage. A food tax does not affect the administration of farmers because the tax is paid by the final consumer. The research also argues that tax shifting can lead to greater acceptance of changes in food taxation. One possibility is to return the tax revenue, or the equivalent amount, to finance climate measures in agriculture.

The Swedish Environmental Protection Agency and the Swedish Board of Agriculture propose an analysis of a green tax shift in agriculture but warn of risks. If the tax shift is made as a percentage through changes in VAT on different product categories, more expensive foods will have a higher price premium than cheap foods. This could weaken competition for organic food, for example<sup>159</sup>.

### **Public procurement of healthy, low-carbon diets**

A further opportunity to stimulate increased consumption of low-emission food is to set climate requirements in the public procurement of meals. The regulatory framework for public procurement enables climate requirements to be set, and this is already being done to some extent today<sup>237</sup>. However, there is great potential in increasing the proportion of public meals consisting of healthy and climate-friendly food, and in strengthening regulations and information efforts based on the public dietary guidelines that are published.

## 9.4 Prerequisites for effective climate policy instruments



### CLIMATE POLICY COUNCIL RECOMMENDATIONS TO THE GOVERNMENT

- Assign relevant authorities to enhance their work on method development and data collection to quantify the impact of all climate measures in agriculture.
- Strengthen analytical capacity and co-operation between the Swedish Board of Agriculture, the Swedish Environmental Protection Agency and other relevant authorities involved in the agriculture's climate transition.
- Continue to support and further develop agricultural advisory services on climate measures and ensure that they reach farmers across the entire country.

#### Improving the quantification and monitoring of climate action in agriculture

Agriculture faces challenges in quantifying greenhouse gas emissions, compared to other sectors. Reliable quantification of emissions is a prerequisite for effective and targeted policies. Currently, there are gaps in quantification data and methodologies that make it difficult to assess actual GHG emissions from agriculture and to evaluate the climate impact of policy instruments. Data and methods are needed for both pre- and post-implementation calculations and for counterfactual analysis.

In section 8.3, we argue in favor of the need to further develop a system for measurement, reporting and verification (MRV) at EU level, but there are two good reasons for Sweden to take the lead and develop statistics and follow-up at national level. Firstly, to be able to influence a European MRV system and secondly to be able to capture regional differences and specific conditions for different climate measures at our latitudes.

The Climate Policy Council believes that the mandate already given to the Swedish Board of Agriculture to improve statistics and monitoring of agricultural emissions can be further developed. Broaden the collaboration, make the initiative long-term and ensure that all agricultural climate emissions and climate measures are included, including methane emissions from ruminants. We believe that permanent efforts are needed by the authorities to develop this work and that the collaboration should include relevant authorities and research.

However, uncertainties in quantification should not become an obstacle to starting to implement climate policies in the agricultural sector. Some uncertainties, for example around farm-level variations, will need to be accepted. An effective approach could be to develop models for emissions from different agricultural activities and measures as a first step.

#### Strengthening inter-agency cooperation for the agricultural climate transition

A great deal of extensive work is being carried out by Swedish authorities on large parts of the climate change agenda. In the transport sector, in addition to the Swedish Environmental Protection Agency and the Swedish Energy Agency, there are transport-oriented authorities such as Transport Analysis, the Swedish Transport Administration and the Swedish Transport Agency. The same applies to industry, where, in addition to Government agencies, there are also several new Government bodies working on the climate transition of industry, such as acceleration offices and regional industrial projects.

In our view, there are relatively few officials in the relevant authorities in the agricultural sector who have the climate transition of agriculture as their main task. This is worrying as there is a need to support the transition of the agricultural sector. In addition, work is ongoing at EU level to prepare for comprehensive policy development. Neither the Swedish Environmental Protection Agency nor the Swedish Board of Agriculture has carried out in-depth analyses of potential European climate instruments for agriculture, nor have any Swedish actors participated in the working meetings organised by the European Commission in this policy development, which distinguishes Sweden from our Nordic neighbours, which have been represented by the Government, authorities and other organizations<sup>232</sup>.

We also note that the Swedish Board of Agriculture considers that it does not have sufficient resources to develop the quantification of agricultural methane emissions. There are clear indications that Government governance should be strengthened through additional resources to enhance the capacity for analysis and evaluation of the agricultural climate transition at Swedish Government agencies. This applies above all to the Swedish Environmental Protection Agency and the Swedish Board of Agriculture, but other relevant authorities should also be considered for capacity strengthening. Considering developments at EU level, we would also like to see a more developed and better collaboration process between agricultural policy and climate policy at national level.

### Strengthen climate advice within Greppa Näringen

Today, farmers are offered climate counselling within Greppa Näringen. The initiative is an example of co-operation between Government agencies, industry and regional actors. Free counselling is valuable in helping farmers to reduce their environmental impact.

Climate counselling within Greppa Näringen is important for strengthening climate work among Swedish farmers and thus strengthening Swedish competitiveness internationally. In our dialogue meetings with all stakeholders in agriculture, it has emerged that there is a lack of access to Greppa Näringen advice in some parts of the country. The Climate Policy Council urges the Government and its authorities to ensure that there are enough counsellors who can reach out and meet the needs of all farmers in Sweden. The opportunity to receive support and participate in climate work should be equal for everyone.

# Glossary

The glossary contains general explanations intended to facilitate understanding of the report. The explanations should not be seen as a terminology established by the Climate Policy Council. In alphabetical order, general climate-related terms and concepts are presented first, followed by those related to the agricultural section of this report.

## General terms and concepts

### **Accompanying measures**

Measures within the Swedish climate policy framework that may be used to compensate for remaining emissions. Examples of measures include increased carbon dioxide uptake in forests and soils, bio-CCS and investments in emission reduction measures in other countries. In the Swedish climate framework, the interim targets may be achieved with a limited number of supplementary measures.

### **Agenda 2030**

Agenda adopted by UN member states, containing 17 global sustainable development goals.

### **Bio-CCS**

A technology for the capture and storage of carbon dioxide from the combustion of biomass. See also CCS.

### **Bioeconomy**

An economy designed to contribute to societal development through the sustainable use of biomass. The aim is to reduce climate impact and the use of fossil raw materials.

### **Carbon dioxide equivalent (CO<sub>2</sub>e)**

A metric used to compare emissions of different greenhouse gases by taking into account their ability to contribute to global warming. By converting greenhouse gas emissions into carbon dioxide equivalents, the effect of individual gas emissions can be compared and totalled.

### **Carbon dioxide leakage**

Carbon leakage, either because production moves to countries with lower emission reduction ambitions or because domestic products are replaced by more carbon-intensive imports.

### **CBAM**

Carbon Border Adjustment Mechanism (CBAM): an EU-wide carbon adjustment mechanism to protect competitive industry in the EU after 1 January 2026, when the requirements of the EU Emissions Trading System will be tightened, through a levy on imports of certain goods. The aim is to ensure competitive neutrality between EU and non-EU companies and to counter the risk of carbon leakage.

### **CCS**

Carbon Capture and Storage. Process whereby carbon dioxide is captured at major emission sources, such as combustion plants, power stations or process industries. The carbon dioxide is compressed and then transported for long-term storage in the bedrock.

### **Climate neutrality**

When there is a balance between greenhouse gas emissions and the uptake of carbon dioxide from the atmosphere in natural and managed systems (e.g. forests).

**Climate policy**

Policies that have the express purpose of reducing society's climate impact, in whole or in part.

**Climate policy framework**

The Swedish climate policy framework was adopted in 2017 and consists of three parts: the Climate Act, the Climate Targets and the Climate Policy Council.

**Coal sink**

Process where the uptake of carbon dioxide in an ecosystem or other natural system is greater than the release of greenhouse gases. Important natural sinks are the oceans and forests.

**Committee on Environmental Objectives**

A parliamentary committee set up by the Government in 2010 to reach broad political consensus on various climate and environmental issues. The task of the Environmental Objectives Committee is to propose how Sweden should achieve the environmental quality objectives through politically based proposals, strategies with interim targets, instruments and measures.

**COP**

Conference of the Parties: annual conferences where representatives of the parties to the UNFCCC meet and negotiate.

**ESR**

Effort Sharing Regulation. EU regulation for emissions from sectors not covered by the EU ETS, i.e. transport, agriculture, machinery, domestic heating, etc. The ESR includes binding targets for Member States. The ESR is often used as an abbreviation for the emissions or sectors not covered by the EU ETS. This group is sometimes called the non-trading sector.

**EU ETS 2**

The EU's future Emissions Trading System for carbon dioxide from the combustion of fuels from road transport, residential and commercial or public premises. It also covers parts of the energy, manufacturing and construction industries not already covered by the EU ETS 1.

**EU ETS, EU ETS 1**

The EU Emissions Trading System, an instrument that covers emissions from large industries and combustion plants, as well as from some aviation and shipping.

**Fit for 55 package**

The reform agenda presented by the European Commission to enable the achievement of the target of reducing net emissions by 55 percent by 2030 compared to 1990 emissions. The package contains a number of different regulatory frameworks agreed within the EU and is a key part of the EU's efforts to contribute to the Paris Agreement.

**Flexibilities**

Mechanisms that a Member State can use to meet the emission reductions imposed on them by the Effort Sharing Regulation (ESR) and LULUCF, such as borrowing and banking emission allowances between years, transferring emissions between Member States, using allowances from the EU ETS and using net removals from LULUCF, to achieve the imposed emission reductions.

**Fossil-free**

When the use of fossil fuels such as coal, fossil gas and oil is zero, for example in a particular sector, or in a country.

**Greenhouse gas emissions**

Emissions of carbon dioxide, methane, nitrous oxide and fluorinated gases. The definition applies in the climate report to the UN and in Sweden's and the EU's climate targets.

**IPCC**

InterGovernmental Panel on Climate Change. An interGovernmental organisation established in 1988 by two UN agencies, the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP), the IPCC's purpose is to summarise the current state of scientific knowledge on climate change, its impacts and possible solutions.

**LULUCF**

Land Use, Land Use Change and Forestry. The Land Use, Land Use Change and Forestry sector of EU climate reporting. EU Member States report carbon stock changes (emissions and removals) in vegetation and soils for different land types and in harvested wood products. Carbon stock changes are calculated for all land types that are considered to be managed, i.e. human-influenced. Often referred to as the land use sector. Regulated by the LULUCF Regulation.

**LULUCF Regulation**

EU regulation on land use, land use change and forestry, which regulates, among other things, how emissions and removals of greenhouse gases from these activities are to be accounted for and included in the EU's climate targets. The regulation includes a binding EU target and national commitments for net emissions from forests and land.

**National Energy and Climate Plan**

In 2019, each EU Member State developed a national energy and climate plan covering the years 2021-2030, which was updated in 2024 and aims to meet the EU's energy and climate targets by 2030.

**NDC**

Nationally Determined Contribution. Parties to the Paris Agreement are obliged to determine their national contributions to the agreement by outlining concrete targets and actions for emission reductions. The NDCs are updated every five years, most recently in 2025. Sweden is part of the EU's NDC.

**Negative emissions**

When total greenhouse gas emissions are less than total removals.

**Net greenhouse gas removals**

The difference between total removals and total emissions of greenhouse gases. Used in the land use sector, LULUCF.

**Reduction obligation**

Instruments requiring fuel suppliers to reduce greenhouse gas emissions from petrol and diesel by a certain percentage each year, through increased blending of renewable or other fossil-free fuels.

**Renewable energy**

Energy from flowing sources such as solar and wind, and from sustainably utilised biomass.

**Renewable fuels**

Fuels produced from renewable raw materials. Examples include ethanol, biogas and biodiesel.



### **The EU Green Deal**

EU roadmap for climate and environmental challenges. By 2050, the EU should be climate neutral, i.e. not emit more greenhouse gases than it absorbs, and by 2030, greenhouse gas emissions should be reduced by at least 55 percent (compared to 1990). The targets are set out in a climate law that makes them legally binding for all Member States and EU institutions.

### **The Paris Agreement**

A global climate agreement adopted at COP21 in Paris in 2015. The agreement states, among other things, that global warming should be kept well below 2 degrees but ideally limited to 1.5 degrees. This will be achieved primarily through the reduction of greenhouse gas emissions. Another part of the agreement is to increase the capacity to adapt to adverse impacts, and to manage the damage and losses resulting from climate change.

### **Zero net emissions**

When greenhouse gas emissions and removals balance each other. See also climate neutrality: a net-zero emissions strategy means reducing emissions as much as possible and offsetting what is still emitted, for example through removals from forests and soils.

## **Agriculture-related words and concepts**

### **Agricultural land**

Land used for growing crops or grazing. Agricultural land is divided into two main parts: cropland and permanent pasture.

### **Arable land**

The part of agricultural land used for growing annual or perennial crops, including cereals, vegetables, oilseeds and ley. It may be permanently or temporarily fallow and is distinguished from permanent pasture by its primary use for active crop production.

### **Biochar**

Biomass that has been carbonized by heating in an oxygen-poor environment (known as pyrolysis). Biochar can be used, for example, as a soil conditioner and as a carbon sink in the soil.

### **Cereals**

Different types of cereals and seeds used as a basis for many foods and also for animal feed. The main types of cereals grown in Sweden are wheat, barley and oats, but cereals also include rye, rice, maize and many other species.

### **Drained organic soils**

Organic soils where the water table has been lowered by drainage to make the soil more suitable for agriculture or forestry. Drainage causes accelerated decomposition of organic matter, resulting in emissions of the greenhouse gases carbon dioxide (CO<sub>2</sub>) and nitrous oxide (N<sub>2</sub>O).

### **Energy forests**

Fast-growing trees or shrubs grown on cropland for bioenergy production.

### **Fallow land**

Cropland temporarily taken out of production to recover and improve soil fertility, biodiversity and structure. Fallow land is used as part of the crop rotation system to promote long-term agricultural sustainability.

**Hay**

Feed mainly for cattle, sheep and horses, preserved by drying grass or other green fodder crops. Hay was very common in Sweden until the late 20th century but has since been largely replaced by silage.

**Intermediate**

Crop grown between two main crops to improve soil fertility, reduce erosion, increase biodiversity and reduce nutrient leaching. Usually grown when the main crop is not growing, for example during winter, and can include species such as legumes, cruciferous plants and grasses.

**Ley**

Cropland sown with grasses, in Sweden usually mixtures of grass and clover or other fodder legumes. Most of the ley is harvested and preserved as winter fodder in the form of silage or hay. Leys can also be grazed by animals.

**Natural loss**

The natural loss of trees through processes such as ageing, disease, insect attack, storm felling, fire or competition for light and nutrients. Part of the ecosystem dynamics that contribute natural forest regeneration and biodiversity.

**Organic soils**

Soils with particularly high organic matter content. These soils are formed by the accumulation of incompletely decomposed plant material in water-saturated environments with low oxygen availability, such as bogs, fens and marshes. Examples of organic soils are peat soils and mud soils.

**Permanent pasture**

Agricultural land that is not cropland and is managed mainly through grazing. Permanent pastures are permanently covered by grasses and other plants. Swedish agricultural statistics also include small areas of meadows and other permanent grasslands not necessarily managed through grazing. Note that grazing can also occur on cropland, on leys.

**Rewetting**

Raising the water level in drained organic soils by stopping or limiting drainage. The aim is to restore natural hydrological conditions and reduce organic matter decomposition, thereby reducing carbon dioxide (CO<sub>2</sub>) and nitrous oxide (N<sub>2</sub>O) emissions.

**Silage**

Feed mainly for cattle, sheep and horses that is preserved by fermenting grass or other green fodder crops under low oxygen conditions. A large part of the Swedish ley harvest is used for silage.

**The Takings Directive (NECD)**

National Emission Reduction Commitments Directive. EU directive setting out how much EU Member States may emit of various air pollutants by 2030. The Ceiling Directive covers sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NOX) and non-methane volatile organic compounds (NMVOCs), ammonia (NH<sub>3</sub>), small particulate matter up to 2.5 micrometers in diameter (PM<sub>2.5</sub>).

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# Annex – Government initiatives in 2024

## Here's how we follow Government decisions throughout the year relevant to climate goals

As part of the Climate Policy Council's task of evaluating the Government's overall policy and its impact on Sweden's ability to achieve its climate goals, we regularly summarise the Government's climate-relevant decisions during the year. The decisions are listed and categorised according to several parameters. This review facilitates various qualitative and quantitative analyses and is used together with reading the Government's various decision texts, interviews and dialogue conversations, Government and research reports, etc. to evaluate how the Government's overall policy has developed over the past year in terms of the opportunities to achieve the climate goals.

### Selection of Government actions

The list of the Government's climate-relevant initiatives for 2024 has been compiled by collating decisions published on the Government website. All legal documents (ministry series and memorandums, ordinance motives, committee directives, legislative council referrals, bills, letters, Government public inquiries and Sweden's international agreements), referrals, Government commissions, ordinances and press releases published during the year are included in the selection. Of these, an assessment is made and a selection made of those that can be considered "climate-relevant". This gross list is made to follow the flow of how the policy is progressing and capture different stages in the process, i.e. also incoming evaluations, etc. that do not involve active decisions by the Government.

A Government decision is climate-relevant if it can be expected to affect Sweden's ability to achieve the agreed climate goals. This includes both decisions that can be expected to have a direct impact on greenhouse gas emissions and decisions that affect the conditions for the transition and thus have an indirect or longer-term impact. Both decisions that are expected to have a positive and negative impact are included.

The mission of the Climate Policy Council is to evaluate the Government's overall policy. In principle, this includes initiatives from all ministries. The Ministry of Climate and Enterprise, followed by the Ministry of Rural Affairs and Infrastructure, is responsible for the largest proportion of Government decisions in our compilation.

The climate issue is complex and is linked to many different social issues. Decisions that are not intended as climate measures, but which can nevertheless have a significant impact on emissions and can therefore be considered climate-relevant are included in the analysis. There are many related areas, such as climate adaptation issues or biodiversity, but these are not included unless they are also deemed to have an impact on Sweden's ability to achieve the climate goals.

## Categories

In addition to listing Government actions, some additional information (date, reference, short explanation) is also noted, and they are categorized according to a number of parameters.

1. The first parameter is *the industry/sector*, which refers to the economic sector that the decision affects. This could be, for example, the transport industry, green industries or cross-industry.
2. The second parameter is *emission sector*. Here we have used the Swedish Environmental Protection Agency's emission sectors and grouped them into: Electricity and heating; transport and labour; industry; agriculture; LULUCF and other. Decisions that do not affect any sector are listed as not relevant/all.
3. The third parameter is the Climate Policy Council's four *key areas*. This is a division of emission reduction measures into four cross-sectoral areas: more efficient use of resources and energy; fossil-free electrification; biomass from forests and agriculture; and carbon capture and storage. Not all decisions can be attributed to a particular key area.
4. The fourth parameter is *policy instruments and governance/leadership*. The latter category relates, for example, to the Government's governance of authorities or can be a methodological guide for cost-effective climate policy. The policy instruments are in turn divided into the categories: economic instruments; administrative instruments and informative instruments.

In the case of *budget decisions*, the amounts are also stated for each year, over the three-year period covered by the budget bill. Decisions on appropriations and tax revenue are treated in the same way. Credit guarantees, authorisations and so on, which do not directly affect central Government expenditure or revenue, are listed separately.

## Quality assurance

The list is reconciled and compared as far as possible with the monitoring carried out by the Swedish Environmental Protection Agency, including for its reports to the EU and the UN. The Climate Policy Council's secretariat also sends the list to the climate unit at the Ministry of Climate and Business Affairs and invites them to point out if any relevant Government initiatives have been omitted. Furthermore, some informal quality assurance takes place by sharing the list with the Panorama editorial team, with members from the Swedish Environmental Protection Agency and the Swedish Energy Agency, who are responsible for keeping Panorama updated with decisions on climate policy instruments.

## List of Government climate measures in this year's report

This is a list of the initiatives in 2024 that the Climate Policy Council believes will have an impact on Sweden's ability to achieve its climate goals. The purpose of the list is to reflect the active decisions taken by the Government during the year. This means, for example, that it does not include investigations or Government reports received but does include the appointment of new investigations. To be more transparent, the list also does not include all the steps in the process leading up to, for example, a bill to the Riksdag, such as a referral to the Council on legislation and so on, but only the latest step in the legislative chain. Nor does it include Government initiatives that are deemed in the final assessment to be of little significance to the ability to achieve the climate goals.

Date	Category	Description	Source
2024-01-04	<b>National coordinator for the expansion of nuclear power</b>	A special investigator, in the role national coordinator, will support the Government's efforts to promote new nuclear power in Sweden.	Dir. 2024:1
2024-01-11	<b>Letter dealing with the Swedish National Audit Office report on Government measures for the electricity system</b>	In the letter, the Government presents its assessment of the Swedish National Audit Office's report State measures for the development of the electricity system – reactive and insufficiently substantiated (RiR 2023:15).	Skr. 2023/24:58
2024-01-11	<b>Mandate to the Swedish Energy Agency for the implementation of the Energy Efficiency Directive</b>	The Swedish Energy Agency is tasked preparing a basis for Sweden's implementation of Article 8 "Energy saving requirements", Article 10 "Alternative policy measures" and parts of Article 24 "Strengthening and protecting vulnerable customers and reducing energy poverty" of the Energy Efficiency Directive.	KN2024/00052
2024-01-15	<b>Mandate to coordinate work on the climate transition of the transport sector</b>	The Swedish Transport Administration will be tasked coordinating the work of the relevant Government agencies on the transport sector's climate transition.	LI2024/00171
2024-01-25	<b>New support for light electric trucks and increased support for smaller companies buying zero-emission heavy-duty trucks</b>	The Government is introducing a new temporary subsidy for light electric trucks. Small and medium-sized enterprises investing in emission-free heavy goods vehicles will receive increased support. The support is also aligned with changes to EU state aid rules.	SFS: 2024:18–21
2024-01-25	<b>Mandate for the possible development of offshore wind energy</b>	The counties of Västra Götaland and Östergötland are commissioned to review the conditions for two offshore wind farms – Västvind and Dying. The Geological Survey of Sweden (SGU) will investigate the possibilities for underwater cables to the facilities.	–

Date	Category	Description	Source
2024-01-25	<b>Inquiry into electricity market design to be launched</b>	A special investigator is commissioned to analyse and propose how the Swedish electricity market can be developed and regulated.	Dir. 2024:12
2024-02-01	<b>Mandate for the possible development of offshore wind energy</b>	The Blekinge County Administrative Board commissioned to review the conditions for the Cirrus offshore wind farm. The Geological Survey of Sweden (SGU) will investigate the possibilities for underwater cables in connection with the facility.	–
2024-02-07	<b>Forestry inquiry to be launched</b>	A special investigator is commissioned to review the national forest policy to develop a future appropriate forest policy that promotes long-term sustainable Swedish forestry and a growing bioeconomy.	Dir. 2024:16
2024-03-06	<b>New delegation for the circular economy</b>	The Government appoints Mattias Philipsson, CEO of Svensk Plaståtervinning, as new chairman of the Delegation for Circular Economy and Caroline Andermatt, CEO of Myrorna, as new vice chairman to give delegation a clearer business focus.	–
2024-03-07	<b>Mission for the possible development of offshore wind energy</b>	Uppsala and Gävleborg counties are commissioned to review the conditions for three new offshore wind farms - Najaderna, Olof Skötkonung and Sylen. The Swedish Geological Survey (SGU) is commissioned to investigate the possibilities for underwater cables in two of the parks.	–
2024-03-11	<b>Swedish Board of Agriculture to submit proposals for changes to Sweden's CAP plan</b>	The Swedish Board of Agriculture is tasked submitting a proposal to amend Sweden's strategic plan for the common agricultural policy 2023-2027 to the European Commission. The amendment means, among other things, that support for precision farming will be available throughout the country from 2025.	LI2024/00599, LI2023/03737
2024-03-14	<b>Climate change adaptation strategy and action plan</b>	A revised national strategy for climate change adaptation is presented together with an action plan for the next five years.	Skr. 2023/24:97
2024-03-14	<b>Energy policy orientation proposal</b>	The Government clarifies the long-term direction of energy policy through, among other things, a planning target and a security of supply target.	Prop. 2023/24:105

Date	Category	Description	Source
2024-03-14	<b>Assignment to the State Treasury to promote new nuclear power</b>	The State Treasury is commissioned to investigate an appropriate and effective organisation of technical support for nuclear safety and radiation protection.	KN2024/00621
2024-03-14	<b>New rules for the authorisation of electricity networks</b>	Legislative proposals aiming to contribute a clearer and faster process for renewing, reinforcing and extending electricity networks.	Prop. 2023/24:88
2024-03-27	<b>New regulation on impact assessments</b>	A new regulation is adopted that regulates how impact assessments should be carried out.	Förordning (2024:183)
2024-03-27	<b>Extension of the coordinator for the maritime climate transition</b>	The Swedish Transport Administration's assignment as national coordinator for domestic shipping is extended to focus on the climate transition of shipping.	LI2024/00655
2024-03-27	<b>Supplementary terms of reference for the Inquiry into offshore wind power</b>	The inquiry into offshore wind power will consider whether Sweden should eventually switch to a system whereby permits for offshore wind power granted solely by the state designating suitable sites for establishment.	Dir. 2024:33
2024-04-15	<b>Increased support for charging infrastructure and strengthened authorisation framework for Klimatklivet</b>	Klimatklivet strengthened by SEK 100 million for increased support for charging infrastructure in the spring amending budget. At the same time, the authorisation framework for Klimatklivet is increased to SEK 6.5 billion for the period 2025 to 2028.	Prop. 2023/24:99
2024-04-15	<b>Focus on more efficient authorisation procedures</b>	The County Administrative Board of Västerbotten County and the Swedish Agency for Marine and Water Management are awarded in The spring amendment budget set aside SEK 10 million each to speed up the authorisation process for permits relevant to the climate transition.	Prop. 2023/24:99
2024-04-15	<b>Billion-dollar investment in aviation</b>	The Government is investing more than SEK 1 billion in the aviation sector to avoid sharp increases in charges for airlines under the so-called GAS system that would otherwise have been necessary.	Prop. 2023/24:99
2024-04-15	<b>Support for regional non-Governmental organisations airports are expanded</b>	The Government subsidy for operating support to municipal and private airports is more than doubled from the current SEK 103 million to SEK 210 million annually.	Prop. 2023/24:99

Date	Category	Description	Source
2024-04-12	<b>New environmental requirements for Government cars</b>	New environmental requirements for Government cars and car journeys were introduced.	Förordning (2024:215)
2024-05-02	<b>Mandate on climate labelling of vehicles</b>	The Swedish Energy Agency is tasked with analysing and proposing a vehicle label for light vehicles. The labelling should include tailpipe emissions, vehicle energy efficiency and life cycle emissions.	–
2024-05-08	<b>Mandate to develop the implementation of European legislation in the field of energy</b>	The Swedish Energy Agency is tasked with producing a basis for implementing parts of the revised EU directives on energy efficiency, the energy performance of buildings and renewable energy.	KN2024/01007
2024-05-16	<b>Implementation of the new EU Emissions Trading System for fossil fuels (ETS 2)</b>	The draft law introduces a new Emissions Trading System covering emissions from buildings, road transport and some additional sectors.	Prop. 2023/24:142
2024-05-23	<b>Legislative proposals for a more efficient environmental assessment</b>	Legislative proposals aimed at a more modern and efficient environmental assessment. The proposals will also simplify the regulatory framework for environmental assessment through greater uniformity and clearer requirement levels.	Prop. 2023/24:152
2024-06-08	<b>Heavier electric trucks on B licence</b>	The Swedish Transport Agency is tasked with designing a pilot scheme where it will be possible to apply to drive heavier electric trucks on a B licence.	LI2023/02684
2024-06-13	<b>Acceleration office for the industrial transition</b>	A committee in the form of an acceleration office will facilitate the industrial transition and strengthen the competitiveness of companies in Sweden.	Dir. 2024:57
2024-06-20	<b>The Swedish Transport Administration will propose more efficient use of existing infrastructure</b>	The Government instructs the Swedish Transport Administration to draw up proposals on how the conditions for state co-financing of infrastructure measures in steps 1 and 2 of the four-step principle can be clarified.	LI2024/01376
2024-06-27	<b>Swedish Energy Agency tasked with improving flexibility in the electricity system</b>	The Swedish Energy Agency is tasked developing measures to improve flexibility in, so that demand and small-scale production can adapt to each other more easily.	KN2024/01432

Date	Category	Description	Source
2024-06-27	<b>Electricity and hydrogen infrastructure co-planning</b>	Svenska kraftnät is tasked with proposing how electricity and hydrogen infrastructure can be co-designed in northern Sweden.	KN2024/01431
2024-06-28	<b>Strategy for neo-industrialisation in northern Sweden</b>	The strategy contains measures in seven areas that the Government considers particularly important for new industrialisation and social transformation to go hand in hand.	KN2024/01434
2024-07-01	<b>Increased responsibility for Article 6 cooperation</b>	The Swedish Energy Agency's responsibility for Article 6 co-operation under The Paris Agreement is extended to reduce global emissions.	SFS 2024:306, SFS 2024:528
2024-07-18	<b>New rules for bio-CCS support</b>	A regulation is adopted on State aid for the capture, transport and geological storage of carbon dioxide of biogenic origin (bio-CCS).	Förordning (2024:626).
2024-07-25	<b>Scrappage premium introduced</b>	A scrappage premium will be introduced for those who scrap an older car with an internal combustion engine and buy or lease an electric car at the same time.	KN2024/00983
2024-07-31	<b>Sweden and US launch new nuclear co-operation</b>	The agreement aims to strengthen co-operation between Sweden and the United States to contribute to the development new nuclear power.	-
2024-08-14	<b>Nordic declaration on electric aviation</b>	The transport ministers of Denmark, Finland, Iceland, Sweden and Norway have signed a declaration on electric aviation aimed at strengthening co-operation on commercial electric aviation.	-
2024-08-21	<b>NIER to analyse proposals under the EU Green Deal</b>	The Government is commissioning the National Institute of Economic Research to assist the Ministry of Finance with analyses of proposals within the framework of the European Green Deal.	Fi2024/01485
2024-08-12	<b>Proposals on financing and risk sharing for new nuclear power investments published</b>	The report's proposal means that state aid will be granted to companies for investments in new nuclear power following an application procedure. A new law is proposed to regulate the conditions for receiving support, the forms of support and what an application must contain.	Fi 2023:F



Date	Category	Description	Source
2024-08-29	<b>Environmental Protection Agency to improve authorisation processes for the establishment of new nuclear power</b>	The Swedish Environmental Protection Agency is tasked financing and coordinating the work of selected municipalities enable effective planning and authorisation processes for the establishment of nuclear energy facilities.	KN2024/01682
2024-08-30	<b>Mandate on more effective support for charging infrastructure</b>	The Swedish Energy Agency is tasked with submitting proposals on how support for charging infrastructure can be administered, pooled and developed.	KN2024/01680
2024-09-16	<b>Proposed changes to the reduction obligation</b>	The memorandum proposes sustainability criteria for renewable fuels. The reduction obligation is proposed to be increased from 6 to 10 percent for both petrol and diesel. Electricity is proposed to be included in the reduction obligation.	KN2024/01751
2024-09-19	<b>The purpose of the appropriation is broadened for International Climate Investments</b>	Purpose of the appropriation for international climate investment is broadened to include expenditure to participate in, prepare, implement, evaluate and develop cooperation in for the purpose of implementing the acquisition of emission allowances under the ESR and the LULUCF Regulation.	Prop. 2024/25:1
2024-09-19	<b>Klimatklivet strengthened by 500 million</b>	The Government is strengthening Klimatklivet by SEK 500 million in 2025 and further years to come for initiatives that help Sweden to achieve our climate goals and the ESR commitment within the EU. In addition, the appropriation is extended from 2028 to 2030.	Prop. 2024/25:1
2024-09-19	<b>Targeted electric car support under the Social Climate Fund</b>	A new allocation for the Social Climate Fund that can be used to support measures and investments that can be financed by the EU Social Climate Fund. For 2025, the support is SEK 10 million, but in 2026 and 2027, a targeted electric car support corresponding to SEK 800 million per year is planned.	Prop. 2024/25:1
2024-09-19	<b>Energy research increases and earmarking for nuclear power development is introduced</b>	The energy research appropriation will increase by SEK xx million. SEK 100 million of the increase 2025 is earmarked to support pilot and demonstration projects in nuclear power development.	Prop. 2024/25:1

Date	Category	Description	Source
2024-09-19	<b>New support for local wind energy deployment and other energy planning</b>	The energy planning allocation will be increased by SEK 480 million to improve incentives to municipalities for wind power development, provide investment support for security of supply, strengthen efforts for new nuclear power and clarify planning responsibilities for.	Prop. 2024/25:1
2024-09-19	<b>Replenishment of support for charging infrastructure</b>	The estimated level of support for charging infrastructure for heavy traffic increases for the year 2027 and then the support is estimated to amount to about SEK 1.2 billion.	Prop. 2024/25:1
2024-09-19	<b>A nitrogen holiday is introduced</b>	Kväveklivet is an investment of SEK 100 million over three years to limit acidification, eutrophication and the climate impact of agriculture.	Prop. 2024/25:1
2024-09-19	<b>Strengthening support for biogas production</b>	The existing support for biogas production will be increased by SEK 100 million in 2025. For 2026, the support is expected to be increased by SEK 150 million and for 2027 by SEK 400 million.	Prop. 2024/25:1
2024-09-19	<b>Investing in a strategy for net zero technologies</b>	The Swedish Agency for Economic and Regional Growth's appropriation will be increased by SEK 9 million to strengthen the strategic work on the EU regulation on net zero techniques.	Prop. 2024/25:1
2024-09-19	<b>Reduced tax on petrol and diesel</b>	The energy tax on petrol will be reduced by a further 32 öre per litre, compared with the previously decided level for 2025. The energy and carbon dioxide tax on diesel will be reduced by SEK 170 per cubic metre, compared with the previously decided level for 2025.	Prop. 2024/25:1
2024-09-19	<b>Further reduction in tax on so-called agricultural diesel</b>	Additional tax reduction (compared to above) is implemented for diesel that used in machinery, ships and some boats in professional agricultural, forestry and aquaculture activities.	Prop. 2024/25:1
2024-09-19	<b>Reduced subsidy rate for photovoltaics</b>	The subsidy rate for solar PV installation is reduced from 20 percent to 15 percent and is justified by a sharp increase in deployment, which justifies reducing the subsidy.	Prop. 2024/25:1

Date	Category	Description	Source
2024-09-19	<b>Abolition of tax reduction for microgeneration of renewable electricity</b>	Previous tax deductions for self-generated electricity are removed due to the existence of market forces that drives this development without subsidies.	Prop. 2024/25:1
2024-09-19	<b>Abolition of air passenger tax</b>	The aviation tax will be abolished as of 1 July 2025.	Prop. 2024/25:1
2024-09-19	<b>Abolished malus for motorhomes</b>	As of 1 February 2025, motorhomes will not be no longer subject to the increased vehicle tax (malus) for vehicles with high CO2 emissions	Prop. 2024/25:1
2024-09-19	<b>No reduced electricity tax on CCS</b>	A reduction in electricity tax for carbon capture and storage (CCS) has previously been announced. The Government communicates that they are not going ahead with this reduction.	Prop. 2024/25:1
2024-09-19	<b>Increased funding for shorter authorisation processes for offshore wind</b>	The Government is increasing the county administrative boards' appropriations by SEK 15 million in 2025 to assess cases of offshore wind power.	Prop. 2024/25:1
2024-09-19	<b>Extension of environmental compensation for rail freight transport</b>	Environmental compensation for freight transport is extended. The compensation stimulates a shift from road freight transport.	Prop. 2024/25:1
2024-09-19	<b>Increased travelling allowance</b>	The threshold for deduction of travel expenses is increased from SEK 11,000 to 13,000 kr.	Prop. 2024/25:1
2024-09-20	<b>Impact calculation of price increases due to the introduction of the new EU Emissions Trading System</b>	The NIER is commissioned to calculate the effects of price increases due to introduction of the EU's new emissions trading system for emissions from road transport and buildings and certain other emissions (ETS 2).	Fi2024/01484
2024-09-27	<b>The Swedish Agency for Economic and Regional Growth will contribute to the green transition of industry</b>	The Swedish Agency for Economic and Regional Growth is tasked with implementing and strengthening efforts to define and remove barriers to industrial competitiveness and green across Sweden.	KN2024/01855
2024-10-03	<b>The infrastructure bill is submitted</b>	The bill contains proposals for investments in transport infrastructure for the period 2026-2037. The bill contains proposals for financial frameworks and guidance for the prioritisation of measures in the action planning that follows Parliament's decision. The climate issue is addressed in relation to this.	Prop. 2024/25:28

Date	Category	Description	Source
2024-10-04	<b>Increased funding for Halland County for offshore wind</b>	The County Administrative Board in Halland County will receive SEK 5.2 million to promote and coordinate the work of the county administrative boards in preparing cases for licences for offshore wind power.	–
2024-10-10	<b>Preparation of offshore wind energy in the northern Bothnian Bay</b>	The County Administrative Board in Norrbotten is commissioned to review the conditions for the Polargrund wind farm.	–
2024-10-18	<b>Mandate to the National Debt Office for new nuclear power</b>	The Debt Office is tasked with investigating and proposing how the state can reduce the programme risk in the decommissioning phase, i.e. the costs of decommissioning and final disposal of nuclear waste products.	KN2024/01133
2024-10-25	<b>Investigation of policy instruments to contribute to a phase-out of fossil fuels</b>	A special investigator has been tasked with analysing whether and, if so, what policy instruments can be designed to phase out fossil fuels in order to achieve Sweden's climate targets and EU commitments.	Dir. 2024:98
2024-11-04	<b>Rejection of 13 offshore wind farms in the Baltic Sea</b>	The Government has decided not to grant a licence under Swedish Economic Zone Act (1992:1140) to build and operate 13 planned wind farms in the Baltic Sea outside Swedish territorial waters.	–
2024-11-04	<b>Green light for Poseidon wind farm in Västerhavet</b>	The Government has decided to authorise the Poseidon offshore wind farm in the southern Skagerrak off Stenungsund on the west coast.	–
2024-11-12	<b>New support for international climate funds</b>	Sweden announces SEK 200 million for the Climate Damage and Loss Fund and SEK 8 billion for the Green Climate Fund.	–
2024-11-19	<b>Inquiry into Sweden's international climate policy</b>	An investigator will develop proposals for measures to strengthen Swedish efforts to help drive climate work in other countries and to support the Government Offices in the implementation Swedish international climate policy.	Dir. 2024:108
2024-12-06	<b>Increased resources to municipalities for pilot projects for new nuclear power</b>	Another SEK 5 million given to the Swedish Environmental Protection Agency to allocate to municipalities' pilot projects for new nuclear power.	–

Date	Category	Description	Source
2024-12-12	<b>Research and Innovation Bill presented</b>	In the bill, the Government presents the research policy for the years 2025-2028. The policy is based on the goal of Sweden being one of the world's foremost research and innovation countries and a leading knowledge nation.	Prop. 2024/25:60
2024-12-12	<b>Mission to strengthen the role of wind and solar power in electricity</b>	The Swedish Energy Agency, Svenska kraftnät and The Energy Markets Inspectorate is tasked with strengthening the contribution of intermittent power generation to the resource adequacy.	KN2024/02494
2024-12-12	<b>A broadening and extension of Fossil Free Sweden</b>	Fossil Free Sweden's mandate is broadened and extended for two years. An additional directive specifies that the national coordinator Svante Axelsson will now focus on implementation of the roadmaps and promote demand for fossil-free products and services in the public sector.	Dir. 2024:121
2024-12-16	<b>Preparatory mission for two offshore wind farms</b>	County Administrative Board in Gävleborg County and County Administrative Board in Västra Götaland County is commissioned to prepare licence applications for two offshore wind farms, Gävle Öst Havsvindpark and Vidar.	-
2024-12-18	<b>Mandate on instruments and financing to implement the Energy Performance of Buildings Directive</b>	The Swedish Energy Agency is tasked developing policy instruments and financing proposals for Sweden's implementation of the Energy Performance of Buildings Directive (EPBD).	KN2024/02515
2024-12-19	<b>Energy research policy proposal presented</b>	Energy research is being aligned with the new energy policy direction.	Proposition 2024/25:72
2024-12-19	<b>Guidance for efficient authorisation processes for new nuclear installations</b>	The Environmental Protection Agency is commissioned to develop guidance for an effective authorisation process for new nuclear energy facilities under the Environmental Code.	KN2024/02586
2024-12-19	<b>Evaluation of tax reduction for pure and high blend liquid biofuels</b>	In accordance with the European Commission's decision in a state aid case, the Swedish Energy Agency will conduct an evaluation of the existing Swedish support.	KN2024/02543

Date	Category	Description	Source
2024-12-19	<b>Change of mission linked to the dietary guidelines</b>	The Swedish National Food Agency is tasked conducting an in-depth impact assessment of how the The Swedish dietary advice on red meat now proposed by the Authority is likely to have an impact on public health, food production, climate, biodiversity and food supply.	LI2024/01002
2024-12-19	<b>Mission on forest fertilisation</b>	The assignment includes reviewing the effect of forest fertilisation on, for example, carbon stocks. General advice on forest fertilisation under the Forestry Act will be reviewed, and the effects on Sweden's LULUCF commitment will be analysed.	LI2023/03423
2024-12-19	<b>Mapping of agri-environmental measures</b>	The Swedish Board of Agriculture will conduct a survey of types of measures carried out by farmers that are deemed to contribute significantly to enhancing biodiversity, to reducing eutrophication or to reducing climate impact.	LI2023/03170
2024-12-19	<b>Current situation analysis of the industrial transition</b>	The Swedish Energy Agency will compile and analyse the current situation regarding concerns the emission trends of different industrial sectors, their emission reduction potential and contribution to negative emissions.	KN2024/02543
2024-12-20	<b>Proposals to enable uranium mining</b>	The memorandum proposes amendments aimed enabling the extraction of uranium as a concession mineral. Amendments are also proposed to clarify when nuclear facilities are to be covered by the Government's mandatory admissibility check.	KN2024/02540
2024-12-20	<b>New law on the use of renewable and low-carbon fuels for maritime transport.</b>	The law contains supplementary provisions to the EU regulation on the use of renewable energy sources and low-carbon fuels for maritime transport.	Prop. 2024/25:76