

The Swedish energy transition

A race far from won

• Introduction

Sweden is often described as a leader in the transition to a low-carbon society.¹ With the highest share of renewable energy in the EU² and almost entirely decarbonised electricity and heat systems, the front-runner status is well deserved. Recent clean-tech success stories, such as the roll out of battery production for electric vehicles³ and the world's first carbon-free steel production⁴, add to this picture.

Apart from being a sparsely populated country with favourable geographical condi-

tions for renewable energy production, large-scale nuclear power development together with the early implementation of energy and carbon taxes and government support for renewables have been key to the Swedish achievements so far. Additionally, the long-standing culture of consensus-making and collaboration, environmental policy integration, and broad political agreements on energy and climate policy have all played their part in shaping the current state of affairs.⁵

By 2045, Sweden aims to be the first fossil free welfare state in the world. Several les-

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1 IEA, 2019. *Energy Policies of IEA Countries: Sweden 2019 Review*, Paris; Cruciani, M., 2016. *The energy transition in Sweden*. Études de l'Ifri, Paris; Rüdinger, A., 2014. *La transition énergétique en Suède : un aperçu du modèle scandinave*, Les cahiers de Global Chance, n°36, 2014.

2 European Commission. (2020). EU energy in figures. Statistical pocketbook 2020. Luxembourg: publications Office of the European Union.

3 See [Northvolt's webpage](#).

4 Vattenfall. 2022. *HYBRIT: The world's first fossil-free steel ready for delivery*.

5 Johansson, B., (2021). Energy Governance in Sweden, In: M. Knodt, J. Kemmerzell (eds.), *Handbook of Energy Governance in Europe*, Springer Nature, Switzerland; Persson, Å., Eckerberg, K. and Nilsson, M., 2015. Institutionalization or wither away? Twenty-five years of environmental policy integration under shifting governance models in Sweden. *Environment and Planning C: Government and Policy*, 34(3), pp.478-495.

sons can be drawn from the success of the Swedish energy transition so far, but the race is far from won. While the carbon neutral finish line has been agreed upon by a broad political majority across the political blocks, the road towards net-zero remains unclear.⁶ **The near dead-lock situation in the parliament is likely to continue after the elections⁷ on the 11th of September, and could potentially result in a change of government to a right-wing rule supported by an extreme-right party, which creates an uncertain situation for the transition going forward.**

The ongoing energy price crisis has put energy policy at the forefront of the debate for the upcoming elections. While politicians are attempting to beat each other with proposals to reduce energy costs for the electorate, the climate crisis has taken the backseat in the discussions⁸. At the same time as the latest IPCC report has stressed the urgency of increasing climate ambitions, this summer's heatwave in Europe has given a dire taste of what the future will look like.

This paper provides a recap of the Swedish energy transition to date, covering energy demand, energy mix and electricity, and emissions. Thereafter it outlines policies and governance methods of the Swedish energy transition, together with the challenges

of the current parliamentary dead-lock situation that is likely to continue after the elections with or without a change of government. Before going to the conclusions and recommendations, the key energy debates before the elections will be covered, namely nuclear energy and the energy price crisis, and the electrification and deployment of renewables.

I • The Swedish energy transition to date - a recap

With a last push from the unprecedented emission reductions and the low industrial production during the covid-19 pandemic, Sweden managed to reach all of its targets stipulated in the European Union's 2020 Climate and Energy Package. For the Union as a whole, the targets were set to achieve 20% emissions reduction, 20% energy use reduction and 20% renewable energy of total energy use until 2020. Due to Sweden's relatively advanced position from the onset, the country's objectives were set higher than the overall EU targets (see the table below). This section will present a short recap of the Swedish energy transition to date, outlining the energy demand, energy mix, and emissions trajectory, starting from the 1970s, summarising key political choices and policies that have contributed to these achievements.

BOX 1. EU energy and climate targets – 20-20-20 (2009)⁹

Sweden's targets for 2020

- 40 % emissions reduction compared to 1990 (outside of the EU ETS). 13% can take place through flexible mechanisms.
- Energy use reduction of 20 % through energy efficiency, compared to 2008.
- At least 50 % renewable energy of total energy use.

Outcome in 2020

- 35 % territorial emissions reductions¹⁰, and the remainder through flexible mechanisms thus reaching its 40% reduction target.
- 23 % lower energy use
- 60 % renewable energy¹¹

6 Matti, S., Petersson, C. and Söderberg, C., 2021. The Swedish climate policy framework as a means for climate policy integration: an assessment. *Climate Policy*, 21(9), pp.1146-1158.

7 Only one mandate is currently separating the two political blocks in recent polls. Dagens Nyheter. 2022. *Ny sammanställning: Ett mandat skiljer mellan blocken*.

8 Aftonbladet Debatt. 25 August 2022. *Nog nu, politiker – ta klimatkrisen på allvar*.

9 European Commission. *2020 Climate and Energy Package*.

10 Swedish Environmental Protection Agency. 2022. *Rekordminskning av Sveriges utsläpp av växthusgaser 2020*.

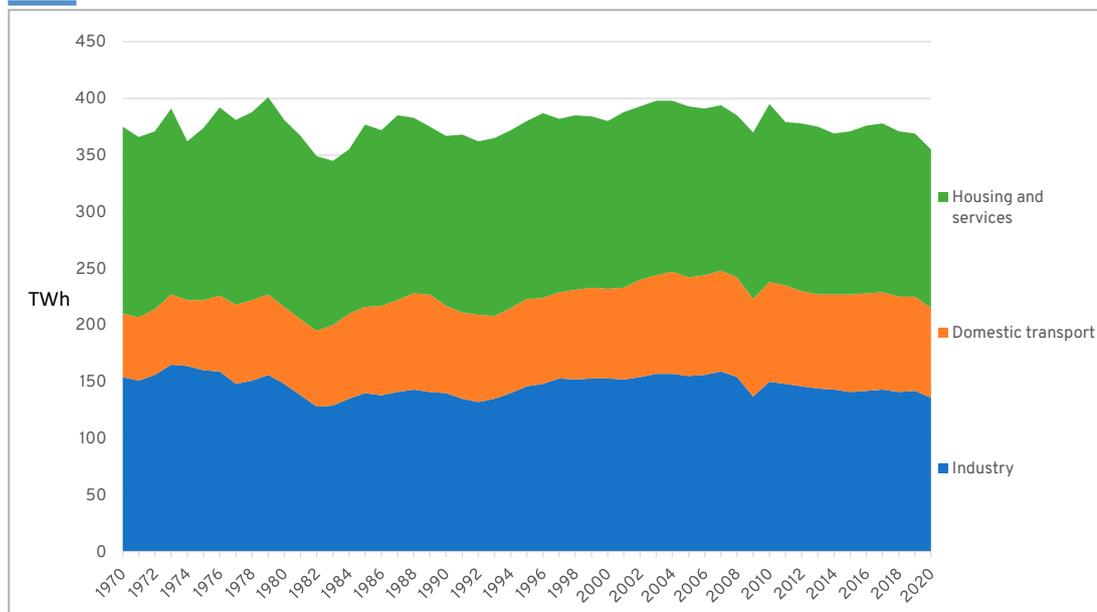
11 Swedish Energy Agency. 2022. *Energiindikatorer 2022 - Uppföljning av Sveriges Energpolitiska mål*.

ENERGY DEMAND

In 2020, the Swedish energy demand amounted to 355 TWh (cf. 369 TWh 2019).¹² Per capita, Sweden has a 62% higher energy demand than the EU average.¹³ This can mainly be explained by an energy inten-

sive industry that historically has enjoyed exceptions from energy taxation and climate ambitions¹⁴, the cold climate and a heating season spanning from October to April¹⁵, and a legacy of relatively cheap, clean electricity, that to a large extent is used for heating.¹⁶

FIGURE 1. Total final energy use by sector 1970-2020, TWh.



▲ Source: Based on data from the *Swedish Energy Agency and Statistical Central Bureau*. 2022.

Since the 1970s, Swedish energy demand has remained relatively stable, while the EU energy demand has been increasing to reach its peak in 2006. (see figure 1). The EU energy consumption has since been steadily decreasing, with significant drops in 2008-2013 following the global financial crisis and in 2020 due to the COVID-19 pandemic. In addition to economic fluctuations, the biggest variations in energy demand are due to temperature, especially the occurrence of cold winters like in 2010.

In 2020, the large energy-intensive industry and the housing and services sectors, each account for a bit less than 40% of total final consumption each, while domestic transport makes up just above 20%. From 1970-2021, while the energy demand has remained stable, the Swedish GDP has multiplied by over 16¹⁷ and the population has grown with 31.25 %, from 8 to almost 10.5 million inhabitants¹⁸. Overall, the energy efficiency gains in the industry, domestic transport, and housing and services sectors have been coupled with an expansion in the built environment and an increase in domestic transport, leaving the demand stable over time.

¹² Swedish Energy Agency. 2021. *Energy in Sweden 2021*; Swedish Energy Agency. 2020. *Energy in Sweden 2020*.

¹³ Based on data from *British Petroleum 2022*. Accessed August 25th 2022.

¹⁴ Hildingsson, R., Kronsell, A. and Khan, J., 2018. The green state and industrial decarbonisation. *Environmental Politics*, 28(5), pp.909-928.

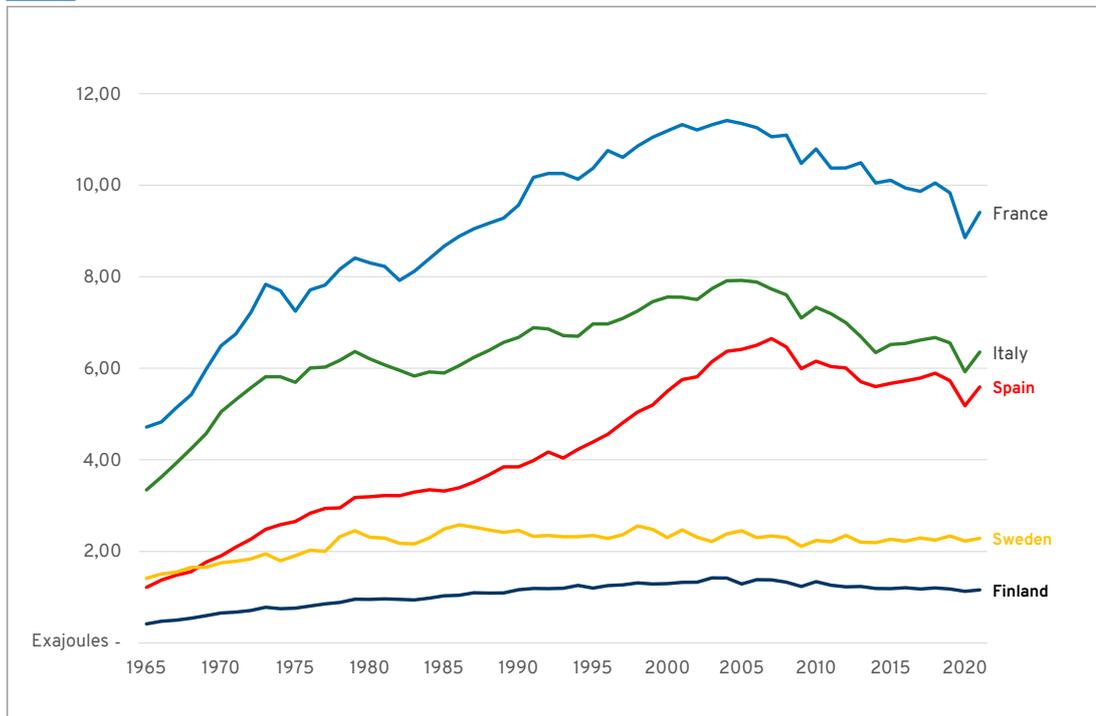
¹⁵ Sovacool, B., Cabeza, L., Pisello, A., Colladon, A., Larijani, H., Dawoud, B. and Martiskainen, M., 2021. Decarbonizing household heating: Reviewing demographics, geography and low-carbon practices and preferences in five European countries. *Renewable and Sustainable Energy Reviews*, 139, p.110703.

¹⁶ IEA. 2019. *Energy Policies of IEA Countries: Sweden 2019 Review*.

¹⁷ Worldbank. 2022. *GDP (current US\$) - Sweden | Data*. Accessed August 25th 2022.

¹⁸ Statistics Sweden. 2022. *Befolkningsstatistik i sammandrag 1960-2021*. Accessed August 25th 2022.

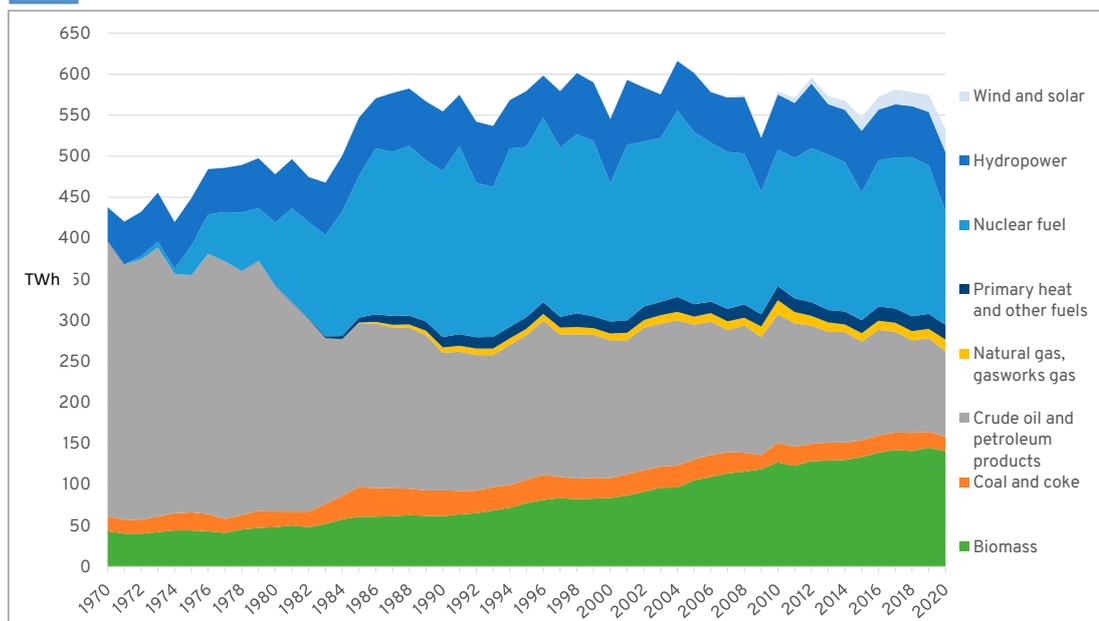
FIGURE 2. Primary energy consumption in France, Italy, Spain, Sweden and Finland, 1970-2021, Exajoules.



▲ Source: Based on data from [Bp statistical review of World Energy](#), June 2022

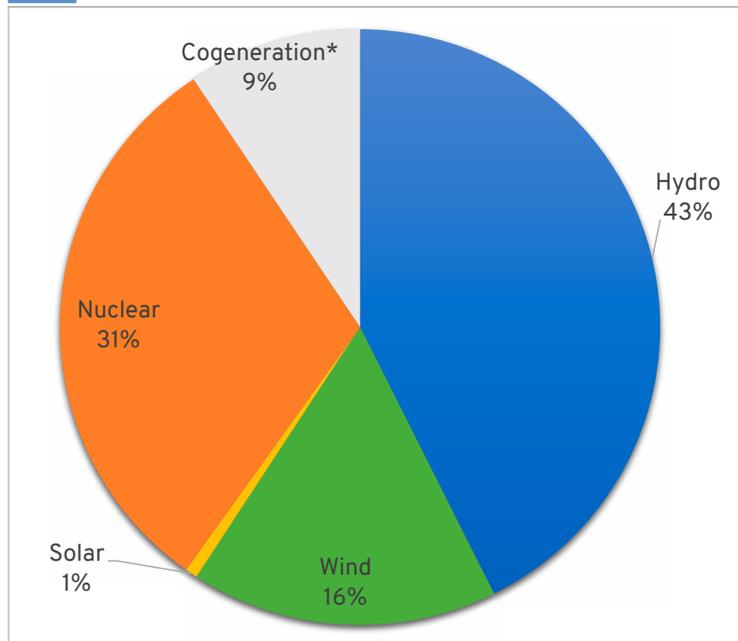
ENERGY AND ELECTRICITY MIX

FIGURE 3. Sweden, total primary energy supply by source, 1970-2020, TWh.



▲ Source: Based on data from the [Swedish Energy Agency and Statistical Central Bureau](#). 2022.

FIGURE 4. Electricity production by source, TWh, 2021.



▲ Source: Based on data from the [Swedish Energy Agency](#) 2022.

* Cogeneration signifies combined heat and power, used in the district heating network. Over 90% of the fuel comes from biomass and waste. The rest is made up from fossil fuels.

While hydropower and biomass have played a continuously important role in the Swedish energy mix since the beginning of the 1900s, the oil crisis during the 1970s can be said to have ignited the Swedish energy transition. Without any noteworthy domestic fossil fuels sources, nuclear power development had been in the Social Democrat leaders' plans since the post WWII years to guarantee the clean cheap energy needed for the expansion of the welfare state. The oil crisis created the right political momentum. As a response to the crisis and an objective to increase energy independence, Sweden invested heavily in nuclear power. Between 1972 and 1985, 12 reactors were put to use.¹⁹ This meant an addition of around 70-80 TWh of total energy use in less than 15 years and an evolution of nuclear energy from 0 % of the total energy use to around 20%. The concurrent expansion of nuclear power together with an increase in energy taxes on petroleum products²⁰, complemented with targeted energy efficiency policies, made a

great contribution to decreasing Sweden's dependence on oil imports.

From the early 1990s, climate concerns took over as the main narrative in energy policy development. **In 1991 one of the world's first carbon taxes was introduced by the Swedish government** (see part 2). The carbon tax in combination with continued investments in research and expansion of biomass for energy production, supported development of district heating and continued energy efficiency efforts, has contributed to making Sweden's electricity and heating systems almost completely fossil free.

Moreover, a *renewable energy certificate system*²¹ was introduced in 2003. It replaced previous investment grants and subsidies. Since then, Sweden has seen an upscaling of wind deployment, and to a lesser extent solar photovoltaic.²² Through the combination of investment in technology, research, and policy measures, Sweden succeeded to

¹⁹ Ekberg, K. and Hultman, M., 2021. A Question of Utter Importance: The Early History of Climate Change and Energy Policy in Sweden, 1974–1983. *Environment and History*.

²⁰ Johansson, B. 2021. Energibeskatningens utveckling i Sverige: En översiktlig historisk beskrivning. (LUTFD2/TFEM; Nr. 3111.) Miljö- och energisystem, LTH, Lunds universitet.

²¹ To learn more, see: Swedish Energy Agency. 2021. *The Electricity Certificate System*.

²² Other factors such as decreasing prices for wind power development have contributed as well.

more than halve its oil consumption between 1970-2020²³, especially in electricity and heat production.²⁴

The remaining oil is predominantly used in the transport sector and to a smaller extent in the industry. Of the total energy use in 2020, 22% was constituted by oil. As opposed to many other European countries, coal and natural gas only make up small shares of the Swedish energy use with 3 % and 2 % respectively in 2020.²⁵ Like in many other European countries, the transport and industry sectors are Sweden's main challenges when it comes to reducing carbon emissions.

As previously mentioned, Sweden's electricity production today is almost entirely fossil free (43% from hydropower, 31% from nuclear, 16% from wind power, cf. figure 4).

I CLIMATE CHANGE MITIGATION AND GREENHOUSE GAS EMISSIONS

Similarly to other States in north-western Europe, Sweden's territorial GHG emissions have fallen sharply since 1990, particularly in the sectors of electricity production and residential heating, industry, and waste. Emissions from the agriculture and domestic transport sector remain relatively stagnant (see figure 5).

As in most countries of the European Union, **the transport sector is the main blind spot²⁶ of Swedish energy policy in**

recent decades. If emissions of the international aviation sector are added to those of domestic transport, greenhouse gas emissions from transport even increased by 7% in 2020 compared to 1990. Nonetheless, Sweden managed to decrease its sectoral emissions by 35% in 2020, reaching its target of reducing its greenhouse gas emissions by 40% by 2020 compared to 1990 levels mainly through its decarbonisation of electricity and heating. The remainder was achieved through flexible mechanisms.²⁷

Moreover, the increased use of biomass, at the heart of Sweden's decarbonisation strategy, could ultimately threaten the carbon sink potential of its forests. Carbon sinks that are essential to reaching Swedish and European climate objectives and account for almost 16% of the EU's total carbon removals.²⁸ Since the 1990s, Sweden has indeed made increased use of biomass for its district heating network, for transport fuels, and industrial processes and is predicted to grow even further with the continued decarbonisation of industry and transport. To produce biofuels, the Swedish forest industry resorts to extraction methods which damage carbon stocks²⁹. In order to reach Sweden's climate goals, there is a need to combine emission reductions with changed forestry methods that serve to increase carbon stocks.³⁰ **If Sweden wants to continue to increase its use of biomass for energy purposes, Sweden will have to ensure the resilience of its forests so as not to see its emissions start to rise again.**

²³ For an overview and short history of Swedish energy governance, see: Johansson, B., (2021). Energy Governance in Sweden, In: M. Knodt, J. Kemmerzell (eds.), Handbook of Energy Governance in Europe, Springer Nature, Switzerland.

²⁴ Today heat production is dominated by district heating (mainly supplied with biofuels and municipal waste), electricity (including electric heat pumps) and modern small-scale biomass heating.

²⁵ Swedish Energy Agency. 2022. *Naturgas*.

²⁶ Magdalinski, E. *Clean Mobility: The European Way – A Comprehensive Approach to Electric Vehicles in the Energy Transition*. Policy paper. Paris, Institute Jacques Delors. 2019.

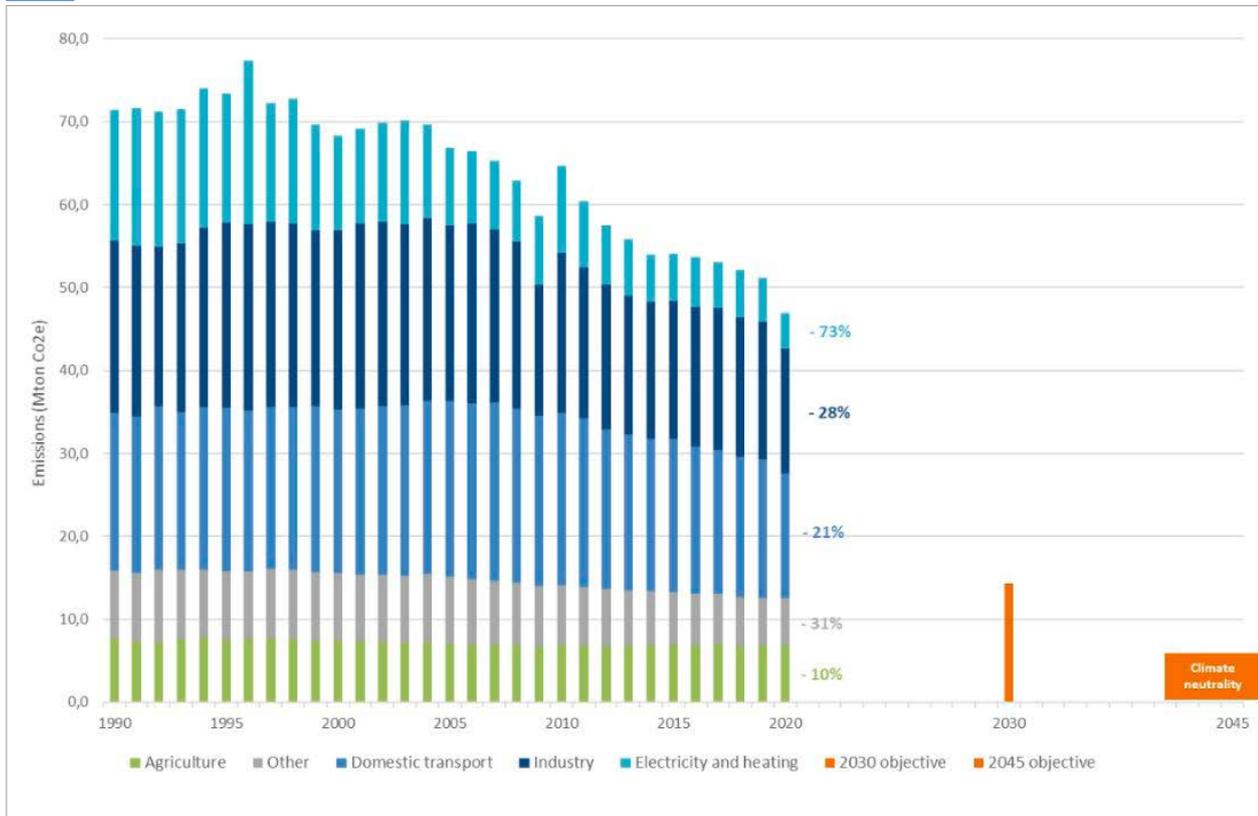
²⁷ Flexible mechanisms are enshrined through the Kyoto Protocol and broadly means climate measures in other countries. See: [UNFCCC - Mechanisms under the Kyoto Protocol](#)

²⁸ EPRS, Climate action in Sweden, October 2021, based on EEA data for the year 2019.

²⁹ For example stopping clearcutting, a logging practice in which most or all of the trees in an area are evenly felled.

³⁰ The Swedish Society for Nature Conservation. 2021. *Skogen, klimatet och den Rapport biologiska mångfalden*.

FIGURE 5. Sweden's greenhouse gas emissions since 1990



*Excluding LULUCF. Excluding international aviation. Source: Swedish Environmental Protection Agency
 **Other emissions includes emissions from solvents, fluorinated greenhouse gases, non-road mobile machinery and waste management other combustion (rest of military CRF 1.A.4, 1.A.5) and fugitive emissions from fuels (1.B)

Furthermore, the COVID 19 pandemic has also enabled Sweden to achieve exceptional emissions reductions in 2020 and preliminary data for 2021 already shows a 5% increase in emissions due to the economic recovery. **Sweden will have to increase its efforts to reduce its sectoral emissions to achieve its climate ambition.**

Sweden has indeed set itself more ambitious climate objectives than those adopted by the European Union: reducing its GHG emissions not covered by the EU emission trading scheme (ETS)³¹ by 63% in 2030 and by 75% in 2040 in order to achieve climate neutral-

ity by 2045. However, in its 2022 report, the Swedish Climate Policy Council established that the transition must accelerate to achieve those climate objectives, notably by taking ambitious and coordinated measures to use resources more efficiently, clean electrification, reduce emissions through biomass from forestry and agriculture and by developing carbon capture and storage technologies.³² Furthermore, it is important to note that the current Swedish climate targets are not sufficient to limit global warming to 1.5°C, which would require adjusting 2030 objectives to 72-78% reduction below 1990 levels, depending on scenarios.³³

³¹ More more info on how the EU ETS works, see: Pellerin-Carlin T., Vangenechten D., Lamy P. & Pons G. 2022. *No more free lunch. Ending free allowances in the EU ETS to the benefit of innovation.* Policy brief, Jacques Delors Institute, E3G and Europe Jacques Delors, February 2022.

³² Swedish Climate Policy Council. 2022. *Report of the Swedish Climate Policy Council 2022.*

³³ See Climate analytics report on 1.5°C Pathways for Europe. *Country factsheet for Sweden.*

II • Governing the Swedish energy transition

I SWEDISH CLIMATE AND ENERGY POLICY: A FAVOURABLE LEGACY THAT NEEDS FURTHER STRENGTHENING

Major energy policies that put Sweden on track to reduce its dependence on fossil fuels were implemented before the mid-1990s. Until then the energy sector was in public ownership and centrally planned. Main policy instruments were taxes, permits, regulations, and targeted R&D, that gave predictability for investments towards the long term objective of ensuring a secure and cheap supply of energy.³⁴ The early introduction of energy taxes has been a cornerstone to this end.³⁵ For example, the success of the 1991 Swedish carbon tax can be explained by an already well developed energy taxation system, the high acceptability of environmental taxes, a gradual and predictable increase, as well as advanced heating decarbonization policies. The decarbonisation of electricity and heating was already well underway when the tax was introduced, due to the large supply of clean electricity from nuclear and hydro power, the supported development of district heating and energy efficiency policies, in particular in the buildings sector.³⁶ The carbon tax started at a low rate of €25 per ton, and has gradually increased.³⁷ **Today the carbon tax is the highest in the world at €118 per tonne of CO₂.**³⁸

Alongwith Sweden's entry into the European Union in 1995, the main objective of energy policy shifted towards climate change mitigation and soft, market-oriented policy measures were favoured. Some examples of market-oriented policy instruments are: incentive-based instruments such as climate funding schemes for municipalities and industries³⁹, a bonus-malus system for cars and light vehicles that economically rewards or punishes new vehicles depending on how polluting they are⁴⁰, the renewable electricity certificate system that comprises a quota obligation of renewable electricity production for electricity producers, and investment grants for solar electricity, to mention a few.⁴¹

With the signing of the 2015 Paris Agreement, **significant steps have been taken to develop long-term objectives for energy and climate policy in Sweden, but the overall framework remains weak and insufficiently binding.** Agreements backed with a parliamentary majority aim at the creation of clear and coherent energy and climate policy sending long term signals towards decarbonization. Given the parliamentary political system in Sweden, these kinds of cross-party collaborations are key aspects of the current governance of the climate and energy transition, as we will see in the next section.

The Framework Agreement on Energy Policy from 2016 can be seen as a continuation of the 2020 EU climate and energy objectives

³⁴ Persson, Å., Eckerberg, K. and Nilsson, M., 2015. Institutionalization or wither away? Twenty-five years of environmental policy integration under shifting governance models in Sweden. *Environment and Planning C: Government and Policy*, 34(3), pp.478-495.

³⁵ A fuel tax was employed already in the 1920s and in the 1950s an electricity tax and later a generalised energy tax was introduced.

³⁶ For an overview of energy efficiency policies in the building sector from 1970-2010, see: Kiss, B., McCormick, K., Neij, L., Mundaca, L. 2010. *Policy Instruments for Energy Efficiency in Buildings: Experiences and Lessons from the Nordic Countries*. Conference paper.

³⁷ As a general rule the carbon tax is indexed to the consumer price index, and more recently to GDP growth. The indexation was however paused during the pandemic, and again as a response to the energy price crisis. Periodically, the taxes on energy have been decreased while the carbon tax has increased to avoid sharp price increases. Similar to for example Germany, the tax exemptions for the industry have as a general rule been paid by households. See: Johansson, B. 2021. *Energibeskattningsens utveckling i Sverige: En översiktlig historisk beskrivning*. LUTFD2/TFEM; Nr. 3111. Miljö- och energisystem, LTH, Lunds universitet.

³⁸ Swedish Government. 2022. *Sweden's carbon tax*.

³⁹ The local climate investment aid programme Klimatklivet (the climate leap), is one such current example, but it has been criticised for not being cost-efficient, see: Swedish National Audit Office. 2019. *Klimatklivet – Support for Local Climate Investments*. Another one is Industriklivet (the industrial leap) for industries, see: Swedish Energy Agency. 2022. *The industrial leap*.

⁴⁰ Swedish Transport Agency. 2022. *The bonus malus system*.

⁴¹ Johansson, B., (2021). *Energy Governance in Sweden*, In: M. Knodt, J. Kemmerzell (eds.), *Handbook of Energy Governance in Europe*, Springer Nature, Switzerland

(see the box below).⁴² The Climate Policy Framework was adopted in 2017 and, in addition to interim targets until 2045 (see the box below), sets out procedural rules for climate policy.

The adoption of the energy and climate policy frameworks has symbolic importance for moving the transition forward. It shows a political will to prioritise climate mitigation

and has been described as a success in terms of generation of broad support for climate policy measures. However, **since its introduction, climate has not been prioritised but rather considered side-by-side with economic and social priorities.**⁴⁶ Furthermore, no sanctions are built into the framework if

BOX 2.. The Framework Agreement on Energy Policy (2016)⁴³

Objectives

- 2030 - Energy use reduction of 50 % through energy efficiency, compared to 2005⁴⁴
- 2040 - 100 % renewable energy production
- 2045 - Net-zero emissions of which at least 85 % shall be within the territory compared to 1990. Thereafter Sweden shall have negative emissions.

BOX 3. The Climate Policy Framework (2017)⁴⁵

Targets

- 2020 – 40 % (compared to 1990 of which maximum 13% can take place within flexible mechanisms)
- 2030 – 63 % (compared to 1990 maximum 8% through supplementary mechanisms)
 - Including 70% for domestic transport compared to 2010 (with the exception of domestic flights)
- 2040 – 75 % (compared to 1990 maximum 2% through supplementary mechanisms)
- 2045 – Net-zero (as stipulated in the Framework Agreement on Energy Policy)

Procedure

- **The Climate Act** that obligates the government to:
 - ensure that the state budget is in line with climate objectives and present a climate report in its budget bill each year and;
 - draw up a climate policy action plan every fourth year.
- **Climate Policy Council** is an interdisciplinary expert body that shall:
 - provide independent assessments of current policy measures and their compatibility with the targets;
 - submit a yearly progress report and assess the government's climate policy action plan and;
 - contribute to increased societal discussions on climate policy.

⁴² Following the entry into force of the Kyoto Protocol in 2007, the European Union undertakes to reduce its GHG emissions by 20% by 2020, an objective that the Member States, including Germany, must transpose into their national legislation.

⁴³ *Framework agreement between the Swedish Social Democratic Party, the Moderate Party, the Swedish Green Party, the Centre Party and the Christian Democrats.* 2016.

⁴⁴ The target on energy efficiency was agreed upon later that year: Swedish Government. 2016. *Överenskommelse om Sveriges mål för energieffektivisering.*

⁴⁵ Report of the Committee on the Environment and Agriculture 2016/17: MJU24. *Ett klimatpolitiskt ramverk för Sverige.*

⁴⁶ Matti, S., Petersson, C. and Söderberg, C., 2021. The Swedish climate policy framework as a means for climate policy integration: an assessment. *Climate Policy*, 21(9), pp.1146-1158.

the government does not adhere to the provisions. While the procedural rules (see box above) are legally regulated, the actual targets are not legally binding.⁴⁷

Lastly, **the ability to implement climate policy instruments to achieve the goals depends on shifting parliamentary majorities.**⁴⁸ The Energy Agreement has been criticised on the same ground, among others by the International Energy Agency. Swedish decision makers are called upon to urgently complement the long-term goals with interim milestones and identify clear pathways to be translated into action with broad consultation.⁴⁹

I GOVERNANCE: CORPORATISM, CONSENSUS AND COOPERATION TO FOSTER A BROAD COALITION OF ACTORS AROUND CLIMATE ACTION

The Swedish political system has a long legacy of corporatist governance struc-

tures, i.e., dialogue, collaboration and consensus-seeking between government, industry and labour organisations. This implies the formulation of common interests and the generation of broad legitimacy for political choices. The close relationship between the State and the industry has translated into the prioritisation of competitiveness and **energy-intensive industries have largely been exempt from stringent taxation and regulation.**⁵⁰ While these structures have changed during the last decades, some elements remain. Today, incumbent industries are seen as potential change makers in terms of developing and investing in low-carbon technologies. The continued model of deliberation between State actors and influential societal interests have resulted in a shift among industry representatives towards embracing the goal of decarbonisation.⁵¹ An illustrative example is the policy network Fossil Free Sweden (see box below).

BOX 4.

Fossil free Sweden is a policy network that was initiated by the Swedish Government in 2015, ahead of the UN Climate Change Conference in Paris. The goal is to enhance the competitiveness of Swedish businesses and industries by going fossil free. Under a National Coordinator appointed by the government, Fossil Free Sweden brings together industries, businesses, municipalities, regions, and sector organisations that support Sweden's 2045 objective of carbon neutrality. Today, more than 500 stakeholders are part of the network. Through collaboration and deliberation, 22 sectorial roadmaps for energy intensive sectors have so far been produced with key stakeholders, as well as strategies on main challenges in the transition. The network then follows up on the Government's implementation of the proposals from the roadmaps and strategies.

Another key feature of Swedish energy and climate governance is *environmental policy integration* (EPI), a process that started in the late 1980s. EPI largely signifies an integration of environmental and climate objectives into all policy areas through sector res-

ponsibility. This means that all government bodies are made responsible for achieving the determined targets.⁵² In addition, EPI translates into establishing a long-term political orientation, creating broad support and strong coalitions at all levels of government,

⁴⁷ Nash, S. and Steurer, R., 2019. Taking stock of Climate Change Acts in Europe: living policy processes or symbolic gestures?. *Climate Policy*, 19(8), pp.1052-1065.

⁴⁸ Matti et al. 2021.

⁴⁹ IEA. 2019.

⁵⁰ Kronsell, A., Khan, J. and Hildingsson, R., 2019. Actor relations in climate policymaking: Governing decarbonisation in a corporatist green state. *Environmental Policy and Governance*, 29(6), pp.399-408.

⁵¹ An additional factor is the industry's weakening position in the economy, see: Hildingsson, R., Kronsell, A., & Khan, J. 2019. The green state and industrial decarbonisation, *Environmental Politics*, 28:5, 909-928, DOI: 10.1080/09644016.2018.1488484

⁵² The concept of environmental policy integration has been around since the publication of the 1987 Brundtland Report – Our Common Future. Persson, Å., 2004. *Environmental Policy Integration: An Introduction*. PINTS – Policy Integration for Sustainability. Stockholm: Stockholm Environment Institute.

as well as with other key stakeholders and the public.⁵³ Stemming from the corporatist legacy, the Swedish referral system is one such example. It is a formal procedure for a broad variety of stakeholders to be heard in the decision-making process⁵⁴, although more ad-hoc and informal forms of interaction also occur.

In 2010, a political committee, the Cross-Parliamentary Committee on Environmental Objectives, was appointed to reform and deepen the sector responsibilities. The idea behind this committee, consisting of members from seven parliamentary parties and experts, is to create coherence between targets and policy, and achieve a broad consensus on long-term decisions in the most difficult areas of environmental and climate policy. For example, the committee was responsible for the proposal of a climate policy framework with targets to 2045 and the Swedish Climate Act that was adopted in 2017. In April 2022, the committee presented a comprehensive strategy to reduce the climate impact of consumption.

Overall, the relatively high climate ambitions in the energy sector, illustrated by the shift from fossil-fuels to renewables, can be seen as a proof of successful institutionalisation of EPI, while still not reaching its full potential. **Over time, despite shifting political majorities, key policy instruments and targets for the scaling up of renewables have been kept.**⁵⁵ However, the shift from an administrative sector responsibility to a

political one through the cross-parliamentary committee has been criticised. While it does create legitimate policy across party boundaries already at the pre-proposal stage, the political nature of the process risks slowing down the pace of the transition. According to the logic of EPI, strong integration means that priorities should remain steady with shifting majorities - the move towards more political steering through the cross-parliamentary committee can be seen as a missed opportunity to further entrench the climate agenda through EPI⁵⁶ especially considering the elections ahead.

I GOVERNING THE TRANSITION WITH A PARLIAMENTARY DEAD-LOCK SITUATION

Consensus-seeking and negotiations over party lines are common features of the Swedish one chamber parliamentary system where minority or coalition governments are common. With the growth and normalisation of the far-right party⁵⁷, the Sweden Democrats (SD), this has become all the more complicated, not least due to increased polarisation in the parliament.⁵⁸ At their entry into parliament in 2010, the other political parties refused to collaborate with SD. This lasted until the current mandate period, when the Moderates, Christian Democrats and Liberals have opened up for collaboration. This development results in a new situation for the upcoming elections.⁵⁹

⁵³ Persson, Å., Eckerberg, K. and Nilsson, M., 2015. Institutionalization or wither away? Twenty-five years of environmental policy integration under shifting governance models in Sweden. *Environment and Planning C: Government and Policy*, 34(3), pp.478-495.

⁵⁴ In the legislative process, the government normally appoints a committee of inquiry to prepare a report on a given topic, the report is then referred for consideration to relevant authorities, advocacy groups and the public before the government makes a proposal. To learn more go to: Swedish Government. 2022. *How Sweden is Governed - Committees*.

⁵⁵ From a social democrat government supported by the greens and the left 1994-2006, to a centre-right coalition 2006-2014, and finally a social democrat and green party coalition government 2014-2021. In the energy sector, one of the main political events during the centre-right coalition government was the 2008 decision to allow planning and feasibility studies for new nuclear reactors, which had been prohibited earlier. This reflects the political divide on the expansion of nuclear power in Sweden.

⁵⁶ Persson, Å., Eckerberg, K. and Nilsson, M., 2015. Institutionalization or wither away? Twenty-five years of environmental policy integration under shifting governance models in Sweden. *Environment and Planning C: Government and Policy*, 34(3), pp.478-495.

⁵⁷ The Sweden Democrats entered into parliament for the first time in the 2010 elections.

⁵⁸ Their normalisation and growth have also resulted in a shift in the political discourse, especially regarding migration and law and order.

⁵⁹ The Moderates and Christian Democrats want to form a government with support of the Sweden Democrats (the role of the Liberals is currently more unclear), and the influence of the Sweden Democrats on the politics of such a potential government will largely depend on how well they do in the upcoming elections.

BOX 5. The Swedish political system⁵⁸

- One-chamber, parliamentary constitutional monarchy, proportional representation, general elections every 4 years
 - 349 seats in parliament
 - 4% vote threshold for a party to get into parliament
- Currently ruled by a social democrat minority government
- Next General elections: 11th of September 2022
- Eight parties currently in the parliament, more or less divided into two political blocks in the upcoming elections:
 - The Left Party, the Greens, the Social Democrats, and the Centre Party.
 - The Liberal Party, the Conservative Party, the Christian Democrats, and the Sweden Democrats

After the last elections in 2018, it took five months for the Social Democrats, the Greens, the Centre and the Liberals to agree on a form of government that was accepted or tolerated by a majority in parliament. This allowed the Social Democrats and the Greens to form a minority coalition government, with the support of the Centre and the Liberals. Yet, the last mandate has been largely characterised by instability. Depending on the outcome of the elections on the 11th of September, Sweden could again find itself in a similar unstable situation. The latest polls show that a dead-lock situation between the two blocks is a likely scenario after the elections.

The Left and the Greens support the most ambitious climate policies, followed by the Centre Party and the Social Democrats. While the Moderates have been trying to lower the ambition of climate policy in Sweden and in the EU, the Christian Democrats and the Sweden Democrats have actively been opposing ambitious climate policy.⁶⁰ The Sweden Democrats were for example the only party that did not support the adoption of the Climate Policy Framework. The election could therefore dramatically impact the Swedish climate policy in the coming years. While the climate policy framework and the cross-parliamentary committee on environmental objectives safeguard the legacy of

broad agreements and climate policy procedures, the non-existence of sanctions in the climate policy framework and the non-legally binding character of the climate objectives could jeopardise Sweden's current ambitions.

III • Current debates and challenges

I NUCLEAR POWER AND THE ENERGY PRICE CRISIS

While nuclear has remained a cornerstone of the Swedish electricity mix ever since its rapid expansion in the 1970s, **the Swedish two political blocks largely hold different views on the future role of nuclear power.** The parties in the right-wing block favour an expansion of nuclear, the Left party and the Greens support a nuclear phase out. Both the Social Democrats and the Centre party have an open stance towards nuclear whilst putting emphasis on renewable energy production.

Nuclear has dominated the Swedish energy discourse during the past 40 years. Similar to France⁶¹ and Germany⁶² energy policy has largely been treated as a mere electricity policy. In 1980, a referendum held following the Three Mile Island accident⁶³ led to a parliamentary decision to halt the expansion

⁶⁰ Nicholas, K. et al. 2022. *Analys av sju riksdagspartiers klimatpolitik utförd av klimat- och omställningsforskare*; Swedish Society for Nature Conservation. 2022. *Granskning: Vilka partier har varit bäst och sämst för miljön?*

⁶¹ Nguyen P.-V. 2022. «L'avenir énergétique de la France: quelle politique pour le nouveau quinquennat», Policy paper, Paris: Institut Jacques Delors, 21 juillet.

⁶² Delair, M. & Pellerin-Carlin, T. *The German Energy Transition*. Policy Paper. Paris, Institute Jacques Delors. September 2021.

⁶³ It is the most serious commercial operating incident in the United States, where, in March 1979, a partial meltdown of a reactor at the Three Mile Island nuclear power plant in Pennsylvania resulted in the release of a small amount of radioactive material.

of nuclear power plants and subsequently decommission existing plants by 2010. Since then, the firm end date has been revoked and the main principle that political parties have agreed on has been for nuclear to bear its own costs.⁶⁴ In 2019 and 2020, two nuclear plants were decommissioned by its owners due to the lack of profitability at the time of the decision in 2015.⁶⁵ In 2019, political clashes on nuclear power led to two parties quitting the 2016 cross-party energy agreement. The Moderates and the Christian Democrats left as they wish to reformulate the 2040 objective of 100% “renewable” to 100% “fossil free” electricity production, thus opening for an expansion of nuclear power. **The path taken in this question will largely depend on the next parliamentary majority.**

In light of the ongoing energy price crisis, nuclear power has become a key topic in election campaigns.⁶⁶ Despite Sweden’s clean electricity supply, prices have continued to rise as a consequence of the Russia-Ukraine war. Due to the division of the Swedish electricity market into four bidding zones (see box below) there are large differences in prices in the northern parts of the country and the southern parts. Average spotprices in August 2022, differed from €20/MWh in the north to €300/MWh in the south.⁶⁷ **The high electricity prices, in addition to high prices for petrol and diesel, and the large differences in electricity bills between the north and south are creating a growing popular discontent.⁶⁸**

BOX 6. The Swedish electricity market

Sweden is divided into four electricity bidding zones to incentivise greater balance between demand and supply in the grid. The northern parts of the country generally have a surplus of electricity production from wind and hydro power, whereas the south has a deficit despite its nuclear production. The northern parts of Sweden are sparsely populated, whereas most inhabitants live in the southern parts. Moreover, the transfer capacity from the north to the south is limited due to insufficient investment and expansion of the grid. As a consequence, the south is more dependent on energy imports and vulnerable to price volatility on the European electricity market.

In their campaigns, political parties are therefore trying to trump each other with promises of lowered electricity costs. Economists have however warned that the short-sightedness of these suggestions with the aim to win votes can create unwanted effects on public finances.⁶⁹ **Additionally, the European perspective and proposals on how to coordinate action or reform the European electricity market has shone with its absence.**

I ELECTRIFICATION AND THE DEPLOYMENT OF RENEWABLES

All parties in the parliament are in favour of an increased electricity production and electrification which rhymes well with the governments electrification strategy for 2022-2024 that was published in February

2022. However, as seen in the last section, there are competing views on where the electricity should come from. The Social Democrats, the Green Party, the Centre Party and the Left Party have all highlighted renewable energy and, in particular, offshore

⁶⁴ *Framework agreement between the Swedish Social Democratic Party, the Moderate Party, the Swedish Green Party, the Centre Party and the Christian Democrats.* 2016.

⁶⁵ Low electricity prices at the time and large investment costs for planned upkeep.

⁶⁶ See the Sweden part in: Březovská, R. (AMO), Zachmann, G., Sgaravatti, G. (Bruegel), Pellerin-Carlin, T., Nguyen, P-V., Leuser, L., Thalberg, K., (JDI), Panzeri, D. (ECCO) and Galindo, J. (EsadeEcPol). *United in diversity? National responses to the European energy crisis.* Briefing Paper 05, Association for International Affairs, Prague. May 2022.

⁶⁷ Nordpool SE monthly spot prices. 2 September 2022.

⁶⁸ The Facebook group *fuel rebellion* has over half a million followers.

⁶⁹ Sveriges Television. 17 August 2022. *Debatten om elpriserna borde pausas till efte valet.*

wind as major future producers of electricity. The right-wing block, as noted in the section above, generally favours an expansion of nuclear energy.

The main challenges that the outgoing government's electrification strategy addresses are: the expansion and improvement of the electricity grid due to current transmission bottlenecks in transmission; speeding up the deployment of wind power on land; and preparation for the development of offshore wind. The government expects that close cooperation with other Nordic countries and the EU will be increasingly important in the years to come, as the EU as a whole aims for electrification.⁷⁰ **The Swedish contribution with clean energy to other European countries has however been questioned in the ongoing election debates.** During the summer, **Sweden overtook the role as the EU's largest electricity exporter in Europe from France⁷¹** and it has been hard for the electorate to understand why Sweden exports electricity when households are experiencing price increases.

The relative deficit of electricity production in the south means that both investments in electricity production and transfer capacity must be strengthened, which the government's plan addresses. **At the same time, in 2021, 78% of all wind power projects were stopped by the municipal veto right, particularly in the southern parts of the country that are seeing the highest price rises due to the energy price crisis.⁷²** This questions the **social acceptability** of the government's plan, and further pinpoints the importance of the upcoming elections to determine Sweden's future energy path. In April 2022, the government appointed a special investigator to look at ways to strengthen municipalities' incentive to contribute to the development of wind power.⁷³ This study will however not be done until spring 2023.

Like in many other European countries, electrification is a key strategy for the decarbonisation of Sweden's two hard to abate sectors, industry and transport. While the electrification of the industry relies heavily on electrification through hydrogen, and is not expected to be reached until 2045. The electrification of the transport sector, which has the objective to reach a 70% emissions reduction by 2030, has been starting to move closer lately. **Increased climate awareness, the bonus-malus system, and the rising fuel prices have contributed to a fast scale-up in the sale of electric vehicles.** During the first four months of 2022, almost 30% of all new cars sold were electric vehicles (i.e. pluggable hybrids, electric hybrids, and electric).⁷⁴

However, **there are aspects of social justice that need to be taken into better concern in Sweden's electrification strategy.** For example, the north-south divide in terms of deployment of renewable energy is further complicated by past and ongoing injustices suffered by the indigeonous Sámi population in the north of Sweden (see box below). Furthermore, at the household level, the adoption of renewable technology is uneven. Sweden remains among the EU countries that have a lower rate of direct use of renewables, for example through own-production of electricity. With few exceptions, there is a lack of funding from the Swedish Energy Agency for research on the Swedish energy transition taking into account aspects such as migrant communities, gender and social justice.⁷⁵ If not properly acknowledged, the adoption of new technologies and roll-out of renewable infrastructure can serve to entrench and even increase already existing inequalities, both social and spatial.

While energy poverty is not separated from poverty by Swedish policy makers, the ongoing energy price crisis has highlighted vulnerabilities in the face of the transition. Estimates show that around 2.7% of the

⁷⁰ Swedish Government. 2022. *Nationell strategi för elektrifiering*.

⁷¹ Euractiv. 11 August 2022. *Sweden tops France as Europe's largest net power exporter*.

⁷² In SE3 and SE4, 83% of all projects were stopped compared to 50% in SE1 and SE2. Tidningen Energi. March 2022. *Allt fler kommuner säger nej till vindkraft*.

⁷³ Swedish Government. 2022. Dir. 2022:27, *Stärkta incitament för utbyggd vindkraft*.

⁷⁴ Dagens nyheter. 15 May 2022. *Nya siffror: elbilar nu populärast i Sverige*.

⁷⁵ Ring, M., Wilson, E., Ruwanpura, K. and Gay-Antaki, M., 2022. Just energy transitions? Energy policy and the adoption of clean energy technology by households in Sweden. *Energy Research and Social Science*, 91, p.102727.

Swedish population are unable to keep their homes adequately warm (compared to 8% on average in the EU)⁷⁶, and around 2.2% of the population are unable to pay their utility bills

on time (compared to an EU average of 6.6% EU)⁷⁷. There is a need for more research and directed efforts, to make sure that the transition benefits everyone.⁷⁸

BOX 7.

The Sámi is an indigenous population that historically lives in an area called Sápmi, that covers parts of Sweden, Norway, Finland, and Russia. In Sweden the Sámi are recognised as a national minority with its own parliament that concurrently functions as a government agency and an elected body whose mission is to promote Sámi culture and livelihoods. The development of energy infrastructure in Sápmi territory has a historical legacy, during the 1900s when large scale hydro power was developed in Sweden the interests and views of the Sami were not taken into consideration.⁷⁹

As a response to the national government's plans to develop wind power in Sápmi, the Sámi parliament adopted a [position paper in 2009](#), that remains relevant to this day. It is critical towards large scale wind power development in Sápmi and stresses the need to nationally reduce energy consumption, localise energy production to where it is in demand (i.e. the southern parts of Sweden), and respect environmental values and Sámi rights, needs, and livelihoods (e.g. reindeer husbandry) in wind power development processes.

IV • Conclusions and recommendations

With the long-term objectives set, Swedish policy-makers now need to ensure broad support and legitimacy for a road towards net zero greenhouse gas emissions by 2045. The already existing model for deliberation and cooperation could be built upon and be expanded to go beyond the incumbent industry and business interests. The current model of deliberation, while importantly ensuring that the industry is on board, has rightfully been criticised as a top-down exclusive form of inclusion.⁸⁰ The transition cannot be done by the industry alone. To have a chance to stay within the carbon budget, Swedes must decrease their consumption based and territorial emissions from 9 tonnes in 2019 to 1.7 tonnes in 2045⁸¹, which requires a profound societal transition.

To create legitimacy for this transition, especially in a situation where no political vision has a clear majority, an inclusive and holistic discussion could be held, determining how a net-zero Sweden would and should look like in 2045, and which pathways can lead Sweden there. Following similar exercises in other European countries, such as Ireland, France, Spain and Germany, **Sweden could set up a citizen climate assembly**. Furthermore, social justice should be given a closer look in policy discussion to ensure that the Swedish transition does not unintentionally serve to entrench already existing inequalities.

While energy efficiency policies consequently have been used since the 1970s, and allowed Swedish energy consumption to remain stable over time, despite a growing economy and population, efforts must be

⁷⁶ Eurostat. 2021. [8% of EU population unable to keep home adequately warm](#).

⁷⁷ Eurostat. 2020. [Arrears on utility bills](#).

⁷⁸ The number of households in energy poverty Sweden is relatively low. This is partly due to the high energy performance of the housing stock and a strong social support system that subsidises costs for housing and heating for the worst-off. The non-use of the concept has however led to energy vulnerabilities being under-researched, see: von Platten, J., 2022. Energy poverty in Sweden: Using flexibility capital to describe household vulnerability to rising energy prices. *Energy Research Camp, Social Science*, 91, p.102746.

⁷⁹ To learn more about hydro power development and Sámi rights, see: Stockholm Environment Institute. 2020. [Sámi lands and hydroelectric power in Sweden – what's the potential to redress harm and injustice?](#)

⁸⁰ Kronsell, A., Khan, J. and Hildingsson, R., 2019. Actor relations in climate policymaking: Governing decarbonisation in a corporatist green state. *Environmental Policy and Governance*, 29(6), pp.399-408.

⁸¹ Swedish Agency for Nature Protection. 2019. [Konsumtionsbaserade växthusgasutsläpp per person och år](#).

scaled up for Sweden to meet its 2030 objective of 50% energy use reduction. Moreover, **energy sufficiency should be better used as levers to help Sweden reach its objectives.** Such efforts would be of particular importance in the food, industry and transport sectors; and would help Sweden to secure its role as being the pioneer of the European and global green transition.

Even if Sweden chooses to keep and perhaps expand nuclear power in the electricity mix, renewable electricity production through wind and solar should continue to be scaled up. This can deliver cleaner electricity to the rest of Europe but can also serve to produce high-value green industrial goods in Sweden, such as green steel entirely made of green hydrogen.

Finally, the Swedish mobility system has largely been a blind spot of Sweden's environmental policies. Just like many other countries, such as France⁸² or Germany⁸³, Sweden has not yet a clear operational strategy to ensure a shift towards a clean mobility system. The reduction of unnecessary travel, the promotion of active modes of transportations (walking, cycling, public transport, and trains) will be key for Sweden as for any other EU country. Being a vast country with a powerful truck industry, **Sweden can also play a role in the early adoption of greener trucks, such as battery electric trucks**, that may constitute a part of the future clean mobility system.

⁸² Nguyen P.-V. 2022. « L'avenir énergétique de la France: quelle politique pour le nouveau quinquennat », Policy paper, Paris: Institut Jacques Delors, 21 July.

⁸³ Delair, M. & Pellerin-Carlin, T. "The German Energy Transition", Policy Paper. Paris, Institute Jacques Delors. September 2021.

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