NATIONAL ENERGY AND CLIMATE PLANS

comparing Czechia and Austria
new challenges resulting from the Green Deal

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Content

Abstract

This Seminar Paper focuses on a comparative Analysis of the Czech Republic and Austria's National energy and climate plans, looking at their sustainable energy and climate mitigation approaches. The paper begins with a brief introduction to the topic and outlines a methodology that uses a structured analysisi of the critical elements in both plans.

The first chapter explores the crucial role of the Green Deal framework in shaping contemporary energy and climate strategies, providing a contextual backdrop for the subsequent analysis. The paper navigates the specifics of the Czech and Austrian national plans, explaining their objectives and targets in addressing climate change and transitioning towards renewable energy sources.

A primary point of the comparative study is in describing both plans' energy and transport sectors. In scrutinizing the Austrian National Energy and Climate Plan, emphasis is placed on strategies aimed at intensifying energy efficiency and strenghtening sustainable transport infrastructure. Comparably, the Czech National Plan directed towards its initiatives for promoting renewable energy adoption and optimizing transport networks.

Through a comparative view, this seminar paper uncovers the differences and commonalities between the approaches of the Czech Republic and Austria towards achieving their climate and energy objectives. By analyzing these national strategies, the paper seeks to contribute to a broader understanding of policy frameworks for climate change and promoting sustainable development in the European circumstances

Introduction

The escalating pace of climate change presents an existential threat to both global ecosystems and societal well-being. Record-breaking temperatures, severe weather events, and the impending collapse of natural systems underscore the urgent need for significant policy shifts. Activists protest previously made political decisions are gaining traction, exerting pressure on politicians worldwide to take decisive action. Simultaneously, the staggering amount of **100 billion $** in lost investments in the fossil fuel sector further underlines the need for a dramatic shift towards sustainable practices.

Under the German presidency of the European Council, in the year 2008, The European Union responded to these challenges by setting ambitious climate targets, known as the 20-20-20 goals. These targets aimed to reduce greenhouse gas emissions, improve energy efficiency, and increase renewable energy use, all by **20 %**. While Europe successfully met and partially exceeded these goals, it became evident that further action was necessary to address the looming environmental crisis. Consequently, in 2020, the European Commission introduced the European Green Deal, a comprehensive strategy to combat climate change while fostering economic growth and sustainability.

Central to the Green Deal's objectives is the commitment to achieve net-zero greenhouse gas emissions by 2050 and decouple economic growth from resource utilization and fossil fuel emissions. Recognizing the importance of inclusive participation, policymakers emphasize the need to support those most affected by the transition to ensure its success. The implementation of National Energy and Climate Plans (NECPs) provides a vital mechanism for translating the Green Deal into tangible actions at the national level, tailored to each member state's unique circumstances. These plans address key dimensions such as decarbonization, energy efficiency, energy security, the internal energy market, and research and innovation, fostering collaboration, knowledge-sharing, and the integration of lessons learned between nations like the Czech Republic and Austria to drive sustainable energy transitions.

In this paper we want to give a brief overview over the two countries NECP’s, highlighting their most problematic areas and their respective problem – solving strategies. For comparisons sake we will focus on the same sectors, the energy, and the transportation sector.

Methodology

Since the Green Deal and the National Energy- and Climate Plans (NECP's) are rather complex packages of policy initiatives, a mixed methods research approach, which combines qualitative and quantitative methods, seemed to fit best. The data we used has not been collected by ourselves, so we depended on secondary data to do our research.

To gain deeper knowledge in understanding the framework and political nature of the green deal we used qualitative methods like reviewing and interpreting legislative texts, strategic plans, and other relevant documents. These methods allowed us to explore the complexity and nuances of the Green Deal in a comprehensive manner.

However, to give some sort of comparison between Austria and Czechia it was imperative that we also include quantitative data, thus our research also included the collection and analysis of numerical data related to the energy production, consumption and GHG emissions. The data we collected originate from various sources, such as government reports, statistics from the energy sector and international databases.

The data collected from both methods were analysed separately and then integrated to provide a comprehensive understanding of the two countries NECP's within the context of the Green Deal. By combining qualitative and quantitative methods, we provided a holistic overview of the NECP's, identifying common problem areas and perspectives.

Results

The European Green Deal

The basic idea of the Green Deal was born on 20. June 2019 where the leaders of the European member states called for a “climate – neutral, green, fair and social Europe '', so the European Council adopted a new strategic agenda for the years 2019 – 2024 to make this vision a reality. Delivering the goals set by this growth strategy requires a significant public and private investment. They are transforming the economy with the aim of climate neutrality by 2050 by incorporating circular economy principles. A priority for decarbonisation is the energy system, which integrates renewable sources, decarbonising gas production, and phasing out coal, all supported by constructing an efficient power transmission infrastructure. At the same time, the modernisation of resource and energy-intensive industries is vital for decarbonisation. One of the further measures is a sustainable product policy, which includes steps to encourage companies to allow their customer to choose reusable and repairable products and offers claims and verifiable information about the characteristics of products sold in the EU.

There is great emphasis on increasing the number of renovations in the construction sector. And in the field of mobility and transport. Transport and mobility are crucial areas for upcoming transformation, and sustainable transport puts users first and provides them with cost-effective, accessible, healthy, and clean alternatives to how they currently move around. At the same time, the EU should accelerate the development and implementation of sustainable alternative modes of transport. Transport should be dramatically decarbonised, particularly in urban areas. A multi-pronged approach should focus on emissions, urban transport bottlenecks, and public transport improvements. The Commission will propose stricter air pollution emissions standards for new combustion-engine vehicles. Other sectors included in the Green Deal are designing a fair and healthy environment for food production, preserving ecosystems and biodiversity and zero pollution goals for a toxic-free environment.

Figure 1: The European Green Deal and its key areas (Commision, The European Green Deal, 2020)

The National Energy and Climate Plans

For the European Green Deal to take effect, the European Commission introduced the 'Regulation on the governance of the energy union and climate action (EU) 2018/1999', which entered legislation on 24 December 2018 as part of the 'Clean energy for all Europeans' package. (European Commission, 2019)

This regulation mechanism outlined the importance for the member states and the European Commission to work together to reach the EU's agreed upon 2030 energy and climate targets. It seeks to improve cooperation among the member states to reach these objectives, while simultaneously providing long – term certainty and predictability for investors. Further on the regulation aims to promote job creation, social solidarity, and economic growth. And finally, the European Commission wants to improve administrative procedures by integrating and streamlining energy and climate planning and reporting requirements, reducing bureaucracy.

For all of this to work a governance mechanism called the National Energy and Climate Plans (NECP's) were introduced, which cover 10 – year periods from 2021 to 2030, as well as integrated reporting, monitoring, data publication and public consultation.

Austria

Austria's geography is significantly shaped by the Alps, which cover **63 %** of the country. This mountainous terrain helps Austria in the production of hydroelectric power, which is essential to the domestic energy production since it amounts to **26,5 %** of our primary energy production mix. For that reason, Austria is one of Europe's leading countries in terms of hydroelectric power usage, which is constitutes as a major portion of its renewable energy sector.

Due to the country's different climatic conditions, with the Alps serving as a meteorological divide, its central and eastern area is experiencing more continental climate conditions (cold winters and hot summers) and the western parts are dominated by more temperate moist Atlantic conditions. This does not only influence the energy consumption patterns, particularly for heating and cooling, but also the energy production itself.

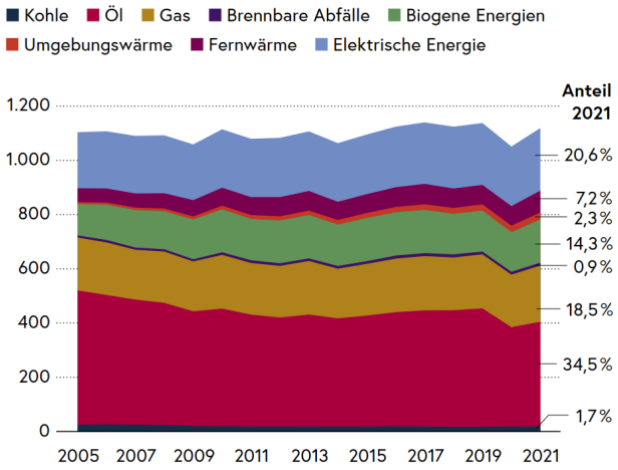

Figure 3: final energy consumption by energy source in petajoules (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2022)

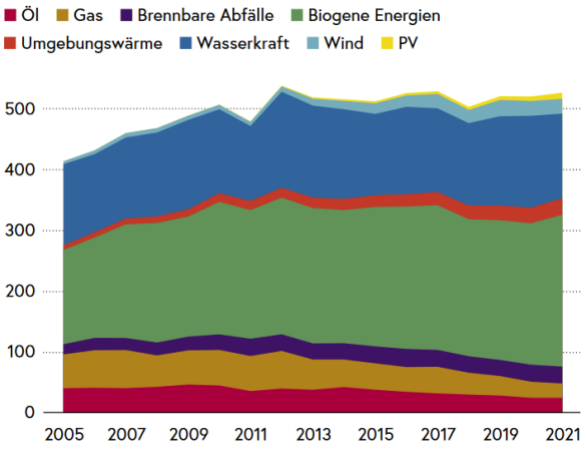

Figure 2: Austrias primary energy production mix in petajoules (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2022)

These figures show the discrepancy between Austria's primary energy production and its consumption. On the one hand, its energy production predominantly consists of renewable energy sources, but on the other hand the consumption still heavily relies on fossil energies. Since Austria produces only half of the electricity it is consuming, the country faces a massive expansion wave of renewable energy carriers while simultaneously expanding and strengthening its power grid.

Another problematic sector in Austria is the transportation sector, which lacks important measures and policy changes to decrease the amount of GHG emitted on Austrian soil. According to the "Umweltbundesamt", the federal environment agency, the highest share in emissions is noticeable on the road transport, particularly the individual transport has a huge impact on the GHG balance. (Umweltbundesamt, 2024)

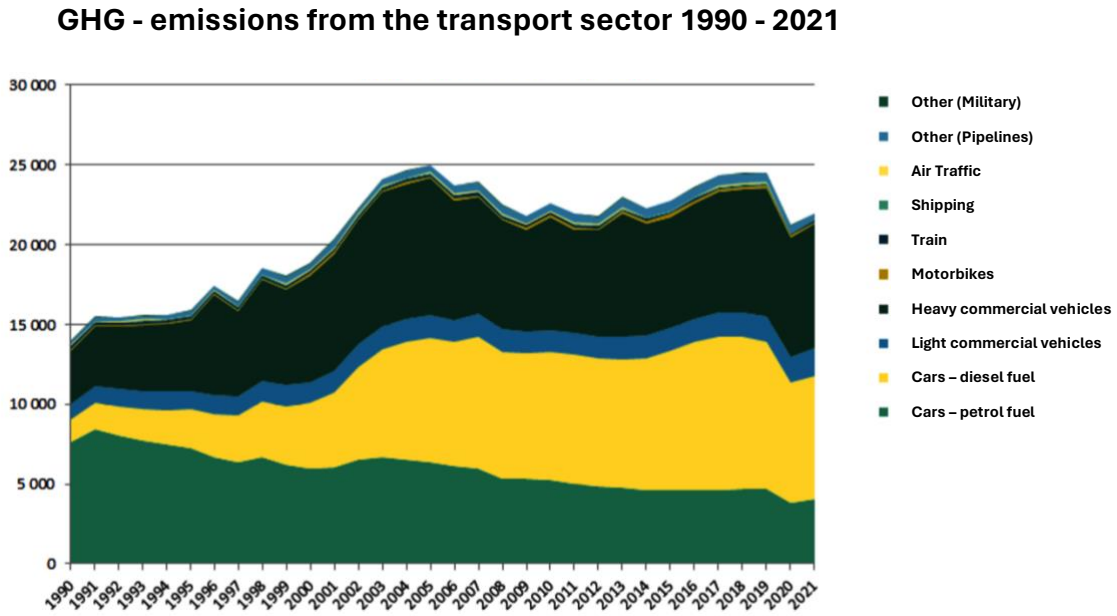

Figure 4: GHG emissions of the transportation sector in 1000 t CO_2 eq (Umweltbundesamt, 2024)

This chart depicts the comparatively high share (~ **50 %**) of individual transport in the entire sector, which further highlights the need for policy measures to establish incentives for the Austrian population to switch to the more environmentally friendly option, the public transport.

Comment to Austria's NECP

The situation with Austria's commitment to the European Green Deal and particularly to the NECP, sadly, is a little bit complicated. Ever since Austria agreed to partake in this huge ecological and economic shift in 2019, we already sent one draft of our NECP to the European Commission, which got reviewed and the feedback got published on 14. October 2020. This review contained many demands and suggestions on how to improve in different sectors or how to handle various situations. The federal government currently in charge, consisting of the Austrian Peoples Party (ÖVP) and the Green Party (die Grünen), and especially the Minister for Climate Action, Environment, Energy, Mobility, Innovation and Technology, Leonore Gewessler, have since been debating on how to implement the Commissions suggestions. With the time running low Leonore Gewessler submitted a not yet agreed on NECP, which shortly after got retracted by the Minister for the European Union and Austria's Constitution, Caroline Edtstadler. The current federal government must submit the final version of the NECP until the 30. June 2024 for the European Commission not to open an infringement procedure, which would cost Austria millions of taxpayer money.

However, in this paper I am going to focus on the latest draft of Austria's NECP which got published in 2023 and already includes several improvements and suggestions of the European Commission.

Energy Sector

Diversification of gas imports

For the regional and national energy systems to become more resilient, the government needs to diversify its energy sources and energy supply from third countries. To ensure, that Austria's electricity demand is supplied, current import dependencies, especially the dependency on Russian gas, must be replaced by energy cooperation's with more trustworthy partners. A step toward a safer energy supply strategy is made by

a) diversification of import routes for natural gas to Austria,
b) building resilient supply chains,
c) prevention in supply security through further measures, like supply security strategy or risk prevention plans,
d) the creation of import possibilities for green hydrogen and
e) the construction of a suitable hydrogen infrastructure.

To reach those requirements, Austria hugely depends on the expansion of renewable energy sources and the efficient usage of the provided energy. In addition, short and medium – term measures to diversify the energy supply and to limit increases in energy prices for end – customers. Reducing the dependence on imports of natural gas from Russia and further diversification of gas supply sources is particularly important. (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2023)

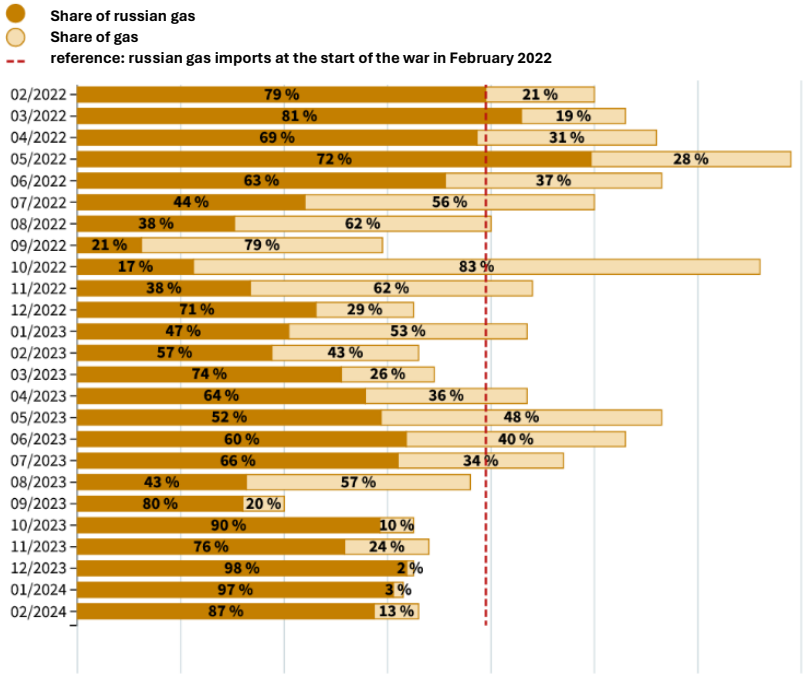

Figure 5: monthly share of Russian gas of Austrias gas imports (Bundesministeriums für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2024)

Based on the graph shown above, Austria is still very dependent on Russian gas imports, but has, ever since Russia invaded Ukraine, made significant progresses in reducing energy imports from Russia However, further measures are necessary to ensure grid

stability and continue lowering the percentage of Russian gas in our supply line. As of February 2024, approximately **87 %** of Austria's gas net – imports originated from Russia.

One of the major factors for Austria's dependency on Russian gas is, that gas providers are not only receiving gas via direct supply contracts, but they also purchase it on the gas exchange, where more frequently economic interests are prioritized over a safe and reliable energy supply. In February 2024 Leonore Gewessler proposed a diversification obligation to gas providers, which ever since its announcement is being worked on in the ministry. (Bundesministeriums für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2024)

Policies and measures

In response to the energy crisis Austria decided on a series of measures in 2022 to ensure the supply of natural gas. These short – term measures included amendments to the "**Gaswirtschaftsgesetz**" (GWG 2011), the "**Energielenkungsgesetz**" (EnLG 2012) and further measures. Given the long – term nature of the NECP's these short – term measures won't be considered in this paper.

These medium- and long-term effective measures encompass a rapid expansion of renewable energy supply, implementation of energy efficiency measures and a realignment of import strategies, particularly for gas. A coordinated approach across the EU is beneficial, but national activities are also being pursued. In addition to diversifying gas imports in the short term, there is a need for the transformation of the entire energy mix towards renewable sources.

The realignment of existing import strategies and the ramping up of new ones involve the development of a concept for creating import possibilities and establishing European and international cooperation partnerships for green hydrogen. Imports of climate – neutral hydrogen are expected to play a significant role in the decarbonization of not only Austria's but also the EU's industry in the future. For this purpose, strategic cooperation, and partnerships with potential states, for example in Africa (Gambia), are being promoted and concepts are being developed. The aim is to strategically support the establishment of holistic supply chains for imports to consumption centers in Austria to ensure the supply security and competitiveness of the domestic industry.

Concrete measures in renewable energies and more flexibility include the "Klima - und which supports the use and construction of electricity storage systems at existing electricity generation plants based on renewable energy sources. In 2022, **15 million €** were made available for this. As part of the implementation of the annual program of the year 2023, a total of **50 million €** will be made available for the further development of the program regarding innovative electricity and heat storage. Additionally, research priorities and incentives aim to foster Flexibility options within the power grid. These include enhancing energy efficiency, further developing various storage technologies such as batteries, thermal storage facilities and pumped hydro storage, implementing demand shifting and management strategies, exploring electrolysis applications and finally upgrading and expanding the power grid infrastructure. Furthermore, there is an

emphasis on prioritizing the utilization of renewable gases in hard – to – abate sectors like industry, heavy traffic, air traffic, electricity, and district heating generation. (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2023)

Expansion of renewable energy carriers

In 2022, the EU achieved a notable milestone, by reaching a **23 %** share of the gross final energy consumption produced by renewable sources, stepping up **1,1 percentage points** compared to the previous year. This achievement aligns with the strategic objectives outlined in **EU Directive 2023/2413**, which advocates for the advancement of renewable energy utilization. This directive has augmented the EU's renewable energy target for 2030 from **32 %** to **42,5 %**, with aspirations to increase it further to **45 %**. As a result, member states are tasked with intensify their aspirations to stick to the 2030 target, with a need for a substantial increase of nearly **20 percentage points** in the share of renewable energy sources within the EU's gross final energy consumption.

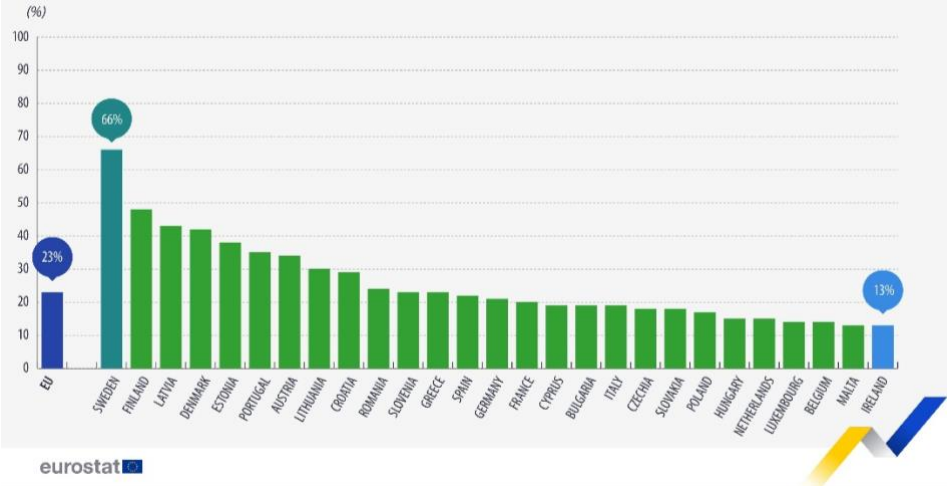

Figure 6: Overall share of energy from renewable resources in 2022 (Eurostat, 2023)

Austria counts itself among the 10 member states with the highest share of renewable energy carries, however, the federal government has set ambitious goals to further extend renewable energy and reduce its dependence on fossil fuels. By 2030, the aim is to increase the share of renewable energy in total energy consumption to at least **60 %** in accordance with EU regulations. In addition, the plan includes covering **100 %** of the domestic electricity consumption using renewable sources in the same year.

Goals to support this transition include generating at least **7,7 %** of energy from green gas by 2030. Plans also include installing 1 gigawatt of electrolysis capacity by 2030 to produce renewable hydrogen and also at least **80 %** of fossil hydrogen consumption in energy intensive industries should be replaced by green hydrogen.

To better integrate renewable energy sources into the grid, the Austrian government pledged that more efforts will be taken on accelerating grid expansion and enhancing

network capacities for electrical energy transmission. (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2023)

Policies and measures

The government has introduced various legislative measures and regulations to support the expansion of renewable energy sources, which include the "**Erneuerbaren Ausbau - Gesetz**" related regulations, for example the "**Investitionszuschüsse Verordnung**" for Electricity and Gas. Additionally, in response to the urgency of accelerating renewable energy deployment, the government has implemented the EU Emergency Regulation, which establishes a framework for this purpose.

To accelerate approval process on renewable energy projects, the government has updated the "**Umweltverträglichkeitsprüfung**", which assesses various construction projects in its environmental compatibility. Furthermore, to advance the expansion of renewable energy infrastructure, the government has put the "**Erneuerbaren – Ausbau – Beschleunigungs – Gesetz**" Act into legislation and initiated the implementation of REPowerEU.

Recognizing the importance of collaboration between federal and regional authorities, the government has established a dialogue between the federal government and the states on renewable energy. Initiatives, like the "**PV Offensive 2023 – 2026**", have the goal to accelerate and simplify the adoption of photovoltaic energy.

The government is actively working on drafting the "**Erneuerbaren – Gas – Gesetz**" based on consultation drafts. Additionally, efforts to decarbonize district heating systems are underway within existing federal budgetary frameworks, including contributions to biomass – based district heating under the "**GAP 2023-2027"**, which is a strategy of EU member states to harmonize their efforts in the agricultural sector. This strategy rests on 10 columns: 1) ensuring fair incomes for farmers, 2) increasing competitiveness, 3) improving the position of farmers in the food chain, 4) climate protection measures, 5) environmental care, 6) preservation of landscapes and biodiversity, 7) promotion of generational renewal, 8) promotion of vibrant rural areas, 9) protection of food quality and health, 10) promoting knowledge and innovation.

To combat a rough transition towards a sustainable energy production and address workforce needs for the industry, the government is implementing the **"Just Transition Aktionsplan"** and advancing the Austrian hydrogen strategy. Furthermore, to support the overall energy transition, the government is currently developing the "**Integrierter österreichischer Netzinfrastrukturplan**", which is an overarching strategic planning instrument for the rapid, targeted expansion and conversion of an intelligent interlinked energy infrastructure. (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2023)

Transportation Sector

The GHG emissions reduction target for Austria from the "**Effort Sharing Ordinance**" **(EU) 2018/842**, is also the guideline for the transportation sector. The emissions have increased by almost 59 % in the years from 1990 – 2021. From the year 2020 – 2021 the increase amounts to **777.000 t CO_2 eq,** due to higher diesel (+ 3.2 %) and gasoline (+ 5.5 %) sales, alone. (Umweltbundesamt, 2023)

However, the reasons for this steady increase are diverse, whereas in addition to the strong increase in domestic mileage, the export of fuels in vehicle tanks has also contributed significantly to this development. GHG emissions from freight transport on the road have risen by **109 %** over the given timespan, while individual transportation increased by **58 %**.

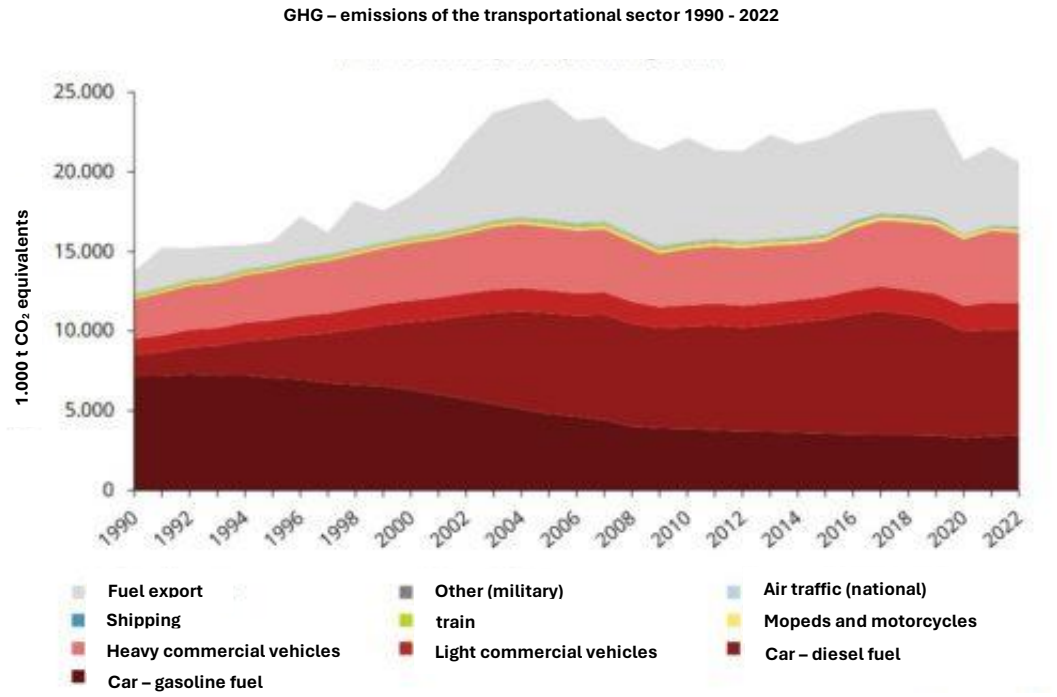

Figure 7: breakdown of emissions in the transport sector by type of use (BMK Infothek, 2023)

The transport sector counts among the strongest drivers of overall GHG emissions with around **64 %** of these emissions alone are attributable to individual transport. (Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie, 2023)

Policies and measures

The Austrian government has set its path on a strategy to address mobility challenges while aligning with broader environmental and sustainability objectives. Central to this strategy are investments in public transportation infrastructure, aimed at promoting a more efficient and accessible network for both urban and rural areas. The "**Zielnetz 2040**" initiative further underlines the long – term vision of creating an intelligent transportation framework that improves connectivity and reduces reliance Austrians on their vehicles, thus reducing emissions and traffic jams.

In sync with various infrastructure investments, the introduction of the "**1 – 2 – 3 Klimaticket**" initiative signals a commitment to create awareness for its population to make more sustainable transportation choices. By offering one ticket for all modes of public transportation nationwide, the government introduced a simple solution to incentivise shifts away from carbon – intensive modes of transportation, like the individual transport. Ever since the Klimaticket got introduced in 2021, the shift to public transportation has already taken effect, with about **65.000 t CO_2 eq** saved in 2022, this roughly translates to a reduction of **0,3 t CO_2 eq** for each sold ticket. In total this amounts to **0,5 %** of emissions made by passenger transport. (Follmer & Treutlein, 2023)

Furthermore, the introduction of new mobility services, like car or bike sharing initiatives, and digital transformation are additional measures taken by the Austrian government. Introducing a concept called "**Mobility as a Service**", they try to bundle as many available resources as possible into a mobility offer tailored to individual needs.

Promoting active mobility, such as walking and cycling, is another important cornerstone of Austria's mobility strategy. Through investments, as of April 2024 **443.000 €** (Bundesministerium für Finanzen, 2024), in infrastructure and initiatives to promote cycling and walking, the government aims to not only reduce emissions from individual modes of transport and thus enhancing the liveability of cities and communities, but also improve public health. For the plan to take effect the federal government further developed the "**Masterplan Gehen 2030**" together with the federal states, cities and municipalities. This measure aims to raise the share of cycle traffic in the Modal Split by **13 %** until 2030.

With the "**E – Mobilitätsoffensive**" Austria aims to transition towards cleaner transportation options. Austrias Climate Protection Ministry provided **95 million €** for 2023 and further **10 million €** in mid – 2023, for the expansion of the charging infrastructure. This investment sum is devoted to the promotion of plug – in hybrid cars and in an investment allowance of **15 %** of the acquisition cost. In addition, a separate funding programme for zero – emission commercial vehicles and infrastructure will be established, which will provide targeted support for companies in converting their fleets. **100 million €** will further be provided for this measure alone. All in all, the "**E – Mobilitätsoffensive**" aims to reduce the carbon footprint of the transportation sector, mitigate air pollution and foster the adaptation of electric vehicles throughout the country. (Bundesverband Elektromobilität Österreich, 2022)

Finally, spatial planning and local traffic management play an important role in organizing transportation patterns and reducing traffic jams. Sustainable regional, city, and transportation planning can create conditions that help to reduce traffic and promoting environmentally – friendly forms of mobility. Key aspects include implementing innovative traffic calming measures, promoting sustainable urban mobility and logistics plans, and prioritizing public transportation accessibility in land – use planning. Due to their compact structures that favour public transportation, cities play a critical role in this transformation. Important measures include

a) adapting building regulations to support decarbonization efforts,
b) adjusting planning frameworks to promote decarbonized mobility infrastructure,
c) expanding legal mechanisms for municipalities to implement climate and energy goals
d) reforming housing subsidies to support sustainability initiatives and
e) linking urban development to "**ÖV – Güteklassen**" and district heating systems.

Czechia

The state of the environment in the Czech Republic is in better shape than it was 30 years ago, after 1990. However, it is still inadequate in air quality and areas affected by it. Most emissions released in Czechia are from coal-fired plants, even though they have recently stagnated. Transportation emissions, mainly in the cities present, are increasing due to petrol and diesel engines. Development of greenhouse gas emissions (in tonnes of CO2 equivalent) in individual sectors of human activity over the period 1990-2021 decreased from 201.4 million tonnes CO2eq to 119.4 million tonnes CO2eq in 2021. (Fakta o klimatu, 2023)

Electricity consumption will increase significantly in the coming decades. That is why we must increase production while replacing existing sources with low-emission ones. Moreover, we must make this change as quickly as possible, given the severity of the consequences of climate change. The Czech National Energy and Climate Plan aligns with the Paris Agreement, which commits to meeting the 1.5 °C average warming target. The future Czech energy sector will consist of low-carbon and flexible sources, i.e., biomass, hydropower, but also stored electricity, e.g., pumped storage, batteries, or green hydrogen (i.e., hydrogen produced from surplus renewable electricity). Nuclear power plants are considered a stable source, linked to the construction of new reactors and the promotion of research and innovation in small and medium-sized modular reactors (SMRs). Lastly, constructing wind and photovoltaic power plants is a priority. However, these sources are more affordable, especially in the initial phase; their full potential has yet to be explored in the Czech Republic. (Climate, “Jaké Cesty Mohou Dovést Česko K Bezemisní Elektřině?” , 2023) This situation is expected to change shortly, thanks to new developments in the field of community energy, where these sources play a significant role. (UKEN, 2023)

Within the programme Doprava 2030 (Transport 2030) released in the year 2022, the goals set are sustainable development and reducing transport's negative impact on the environment. (ČR M. d., Doprava 2030, 2022) Up to three-quarters of all emissions in the Czech Republic are caused by combustion processes - mainly in the energy sector (electricity and heat production) and transport. Together, these two sectors account for half of all emissions in the Czech Republic. Combustion processes also include combustion in industry and combustion in domestic services and institutions (typically heating). Except for transport, emissions in these sectors have been declining since 1990 - most significantly in industry and households. Individual car transport has increased substantially since 1990 and is responsible for the rise in emissions. (ČR S. p., Zelená transformace, nedatováno)

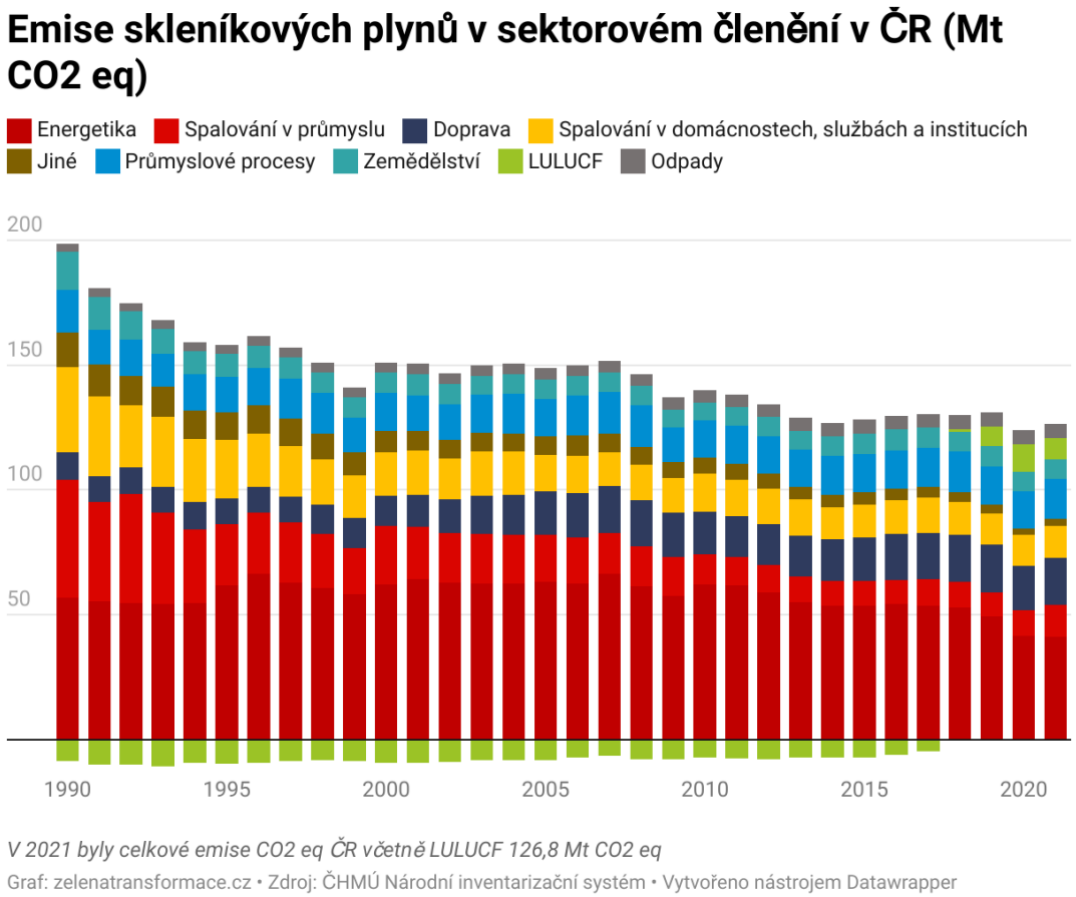

Figure 8: Greenhouse gas emissions by sector in the Czech Republic (Mt CO2 eq) (ČR S. p., Zelená transformace, nedatováno)

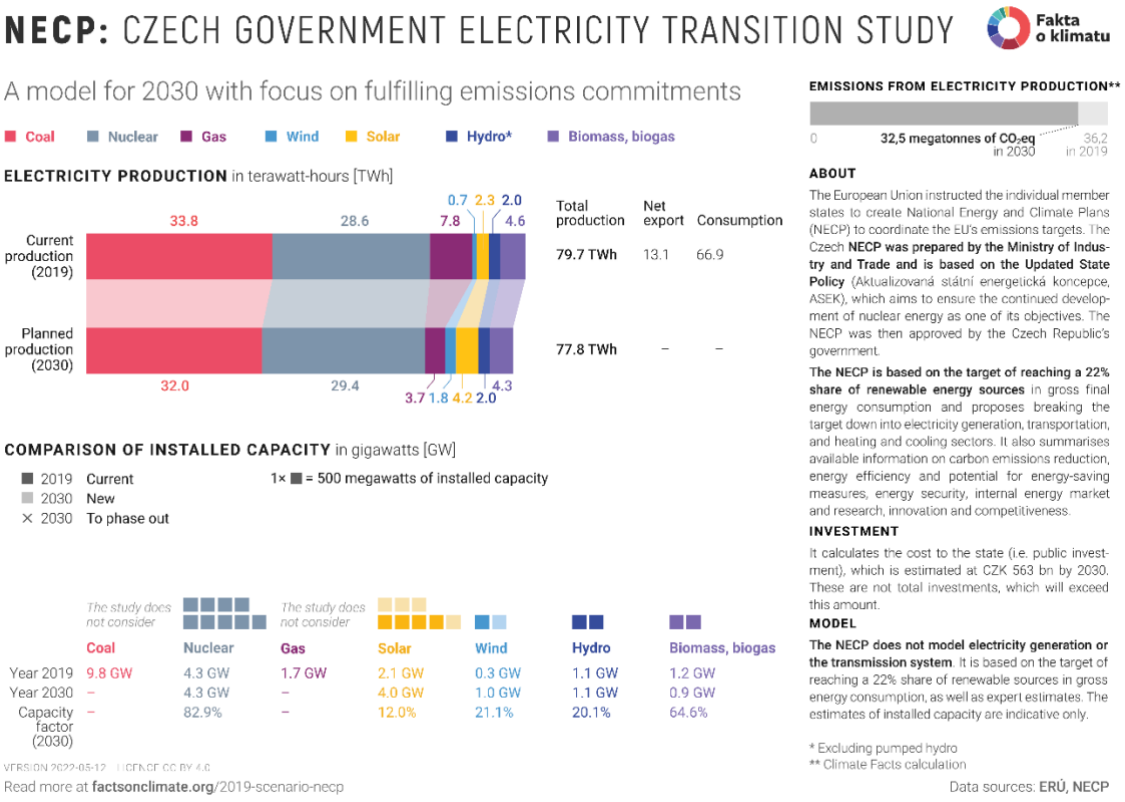

Figure 9: NECP – Czech Government Electricity Transition Study (Climate, NECP - Czech Government Electricity Transition Study, 2022)

Comment to Czechia's NECP

The National Energy and Climate Plan of the Czech Republic was prepared based on the requirements of the European Parliament and the Council of Governance of the Energy Union and climate action and contains objectives and policies in all five dimensions of the Energy Union for the period 2021-2030 with a view to 2050. The most up-to-date version is now an updated draft of Czech NECP from October 2023, and the submission of the final version is due by 30 June 2024. The update of the 2019 document is more than necessary due to political, economic and security changes. (ČR M. p., NECP, National Energy and Climate Plan of the Czech Republic, 2023)

Energy Sector

The critical part of the National Plan is setting the Czech Republic's contribution to the EU's so-called European climate and energy targets in reducing greenhouse emissions and increasing the share of renewable energy and energy efficiency. In the energy security sector, the national plan focuses mainly on diversification of energy mix, maintaining self-sufficiency in electricity supply, ensuring the sufficiency of energy infrastructure development, and not significantly increasing import dependence. The energy sector and its market link to sufficiently developed electricity systems and the Czech Republic already has sufficient interconnectivity, so in this area, it will be more about maintaining the export capacity of the transmission system. The final dimension in the energy sector is the promotion of research, innovation, and competitiveness. In this context, the Czech Republic is setting targets also based on the so-called European Strategic Energy Technology Plan. (ČR M. o., 2023, stránky 26-74)

The European Climate Law sets the EU climate and energy policy, and emissions reduction was resolved for 2030 by at least 55%, which is part of the legislative package Fit for 55 included in the 2030 Climate and Energy Framework. The Innovation and Modernisation Fund should also play a critical role in the Green Transition in the Czech Republic. To achieve these objectives, Climate Policy of the Czech Republic was introduced in 2017, contributing to the Paris Agreement objectives. (Tramba, 2023)

Including the fundamental measures for attaining the intentions of the Czech NECP, there are selected spheres of action. Among them is considering a crucial decarbonisation tool: emission allowance prices. In the field of renewable energy, the focus lies on developing wind energy. Additionally, building a grid will help to administrate flexibility, which will be helped in part by gas. Another is taking nuclear power into account, constructing new nuclear reactors, and supporting the research of SMRs. The Czech Republic also developed a national hydrogen strategy, which encourages using low-emission and renewable hydrogen in industry. (obchodu, NECP, National Energy and Climate Plan of the Czech Republic, 2023, stránky 26-74)

The objectives around diversification are summarised in the target corridors of the State Energy Concept of the Czech Republic. However, it should be emphasised that the State Energy Concept was approved in 2015 and is currently being updated.

Promotion and construction of renewable energy sources

The development of renewable energy sources is one of the strategic priorities of the current State Energy Concept and National Energy and Climate plan, where the Czech Republic wants to push for the development of competitive RES with adequate state support in grid access, permitting processes, including support for technological development and pilot projects. The 2023 draft of the NECP envisages a Czech target for 2030 of a 30% share of renewable energy sources in gross final energy consumption. In 2022, the share of RES was 18.2%. Although it has yet to be officially approved, the Renewable Energy Directive has also set partial indicative targets for the growth of the share of renewable energy sources in the EU heating, transport, and industrial sectors. The Czech Republic has also made indicative contributions to meeting these targets in its NCEP, but its update still needs to be added to the NCEP 2023. (dopravy, 2024)

Regarding the promotion of RES as the transformation of the electric power industry, there are several key objectives:

a) Major development of wind power plants to complement the development of photovoltaic power plants already underway.

b) Developing flexibility management elements, including various forms of accumulation or demand side response, to ensure the stability of the electricity system.

c) Maintaining a high-quality energy supply.

d) Gradual decline in energy exports.

e) Maintaining a positive power balance and ensuring adequacy of power reserves.

f) Ensure a systematic solution to circular flows of electricity and transit in terms of safety and cost compensation.

g) Ensure the diversification of primary energy sources by the target corridors of the State Energy Concept of the Czech Republic.

h) The continued development of nuclear energy in the Czech Republic

(obchodu, NECP, National Energy and Climate Plan of the Czech Republic, 2023, stránky 50-52)

The objectives of interconnectivity, i.e., the interconnectivity of the transmission system, are given by the State Energy Concept of the Czech Republic. The target in the State Energy Concept of the Czech Republic corresponds to the target of 15%, as the share of maximum load about installed capacity is approximately 50% (in 2017, it was 53%).

The current state of electricity production from renewable sources made up 17% (from 2019 to 2021); individual members set national targets for states themselves, and the adequate and achievable target for the Czech Republic in this study is 32-35%. The

original NECP from 2019 is based on a significantly lower ambition at its creation, with only 22% of renewable energy in consumption. The fastest-growing sector is heating, aided by the higher price of emission allowances and the increased use of solid biomass. According to the study mentioned in the publication Development of Renewable Energy in the Czech Republic by 2030, one of the essential tools for further development of decarbonisation is to involve (on the production side):

a) The use of heat pumps

b) Use of solid biomass in cogeneration of electricity and heat

c) Development of biomethane production

d) Development of advanced biofuels

Regarding energy savings, it is essential to reduce the demand for heat and reduce the energy intensity of buildings. Still, consumer behaviour or the electrification of transport can also significantly contribute to this.

Steps to develop solar of solar and wind energy in the Czech Republic

Today in the Czech Republic, electricity from the sun and wind covers a negligible part of consumption and only on the best summer days. The current state of wind and solar energy has been relatively stagnant since the so-called solar boom in the Czech Republic took place 12 years ago, and since then, new installations have stopped. However, the situation is very different today due to the reduction in the price of solar and wind power generation, and there may be a great opportunity in the years to come. The main barriers to the development of solar and wind energy in the country include:

a) Thoughtful strategy - strategic documents in this area are no longer up-to-date and do not reflect the latest geopolitical and economic developments

a. An updated NECP is planned for release in mid-2024

b. Ongoing revision of the European Renewable Energy Directive

b) Swift permitting processes - the main obstacle is the regional spatial development principles, which set strict conditions for the siting of wind turbines

a. Requirement to evaluate suitable areas for the development of renewable resources; areas should be negotiated based on a compromise

c) The infrastructure is not sufficient even for the current development of renewable energy sources - the barrier is the insufficient capacity of the distribution network, which is keeping up with the times

a. ČEPS, the transmission system operator, is preparing a 10-year plan for the development of the transmission system, considering future increased needs

d) Smart Energy – lack of legislation for batteries, energy communities and intelligent technologies

> a. 1.1. 2024, the amendment to the Lex RES II was approved, which should allow for the creation of energy communities (individuals, companies, and municipalities can share electricity from RES, thus strengthening energy self-sufficiency and optimization of local production and consumption) (Jan Krčál L. O., 2023)

A study by the Institute of Atmospheric Physics of the Czech Academy of Sciences estimates that wind power plants could generate up to 18.8 TWh of electricity in the Czech Republic around 2040, which would correspond to covering about 28% of the country's consumption in a year 2019. (Climate, “Potenciál Větrné Energie V ČR.” Fakta o klimatu, 2022)

In comparison the solar, A study by EGÚ Brno estimates that installing solar power plants on all technically suitable roofs and facades in the Czech Republic would cover up to 27% of electricity consumption in 2019. (klimatu, “Potenciál Solární Energie v ČR: Střechy a Fasády”, 2022)

Policy and Measures

The Government had released various measures and legislatures to promote and support of development renewable energy sources. The Czech NECP by itself promotes RES and encouraged or is connected to other ones:

State Energy Concept

The legislative framework sets out the long-term goals of the energy sector in the Czech Republic and sets priorities for development and support in the following period. The main strategic priorities of this document include:

a) A balanced energy mix based on a broad portfolio and making full use of domestic resources

b) Increasing savings and efficiency along the whole energy chain in the economy and households

c) Developing network infrastructure and strengthening international cooperation, especially in Central Europe

d) Supporting research, development and innovation that helps the competitiveness of the energy sector in the Czech Republic

e) Enhancing energy security and the ability to ensure stable energy supplies

(ČR M. p., 2014, stránky 45-54)

In the part of the document dealing mainly with the concept of development of individual energy sectors, the general objective is to transform the structure of energy production and consumption, with a partial shift away from coal-fired sources towards nuclear power plants, natural gas, and renewable sources. Specifically for RES, this involves promoting construction according to the country's natural conditions, exploiting the potential of biomass, and ensuring sufficient capacity and flexibility in the distribution systems. (ČR M. p., Státní energetická koncepce České republiky, 2014, stránky 47-49)

RePower EU

European Commission had, on 22nd May 2022, released a new strategic document to reduce dependence on fossil fuels from Russia and increase energy security. This document aims to increase the share of renewables in the EU's energy consumption and reduce energy consumption. Individual countries are setting their targets within the framework of NECO, which is still being prepared. Russia's invasion of Ukraine has long-term implications for the EU's energy and climate policies. It is an opportunity for more significant European and national energy self-sufficiency, leading to a reduction in greenhouse gas emissions and moving closer to the Paris Agreement commitments. The Repower EU strategy paper complements the Green Deal for Europe and the Fit for 55 packages of legislative proposals. The main objectives and impacts for the Czech Republic include the need to diversify energy sources and develop RES and energy efficiency. (Jan Krčál L. O., 2023, stránky 4-8)

Transportation Sector

The overarching theme of the future shape of transport is electrification and its impact on electricity consumption in the Czech Republic. Governments in many countries are planning strategies for gradually introducing petrol and diesel vehicles, and manufacturers are launching new electric models yearly. In general, the change will be very gradual in the passenger car sector and other types of cars. It will, therefore, not mean a sharp increase in overall electricity consumption in the Czech Republic. (klimatu, Elektrifikace dopravy, 2024)

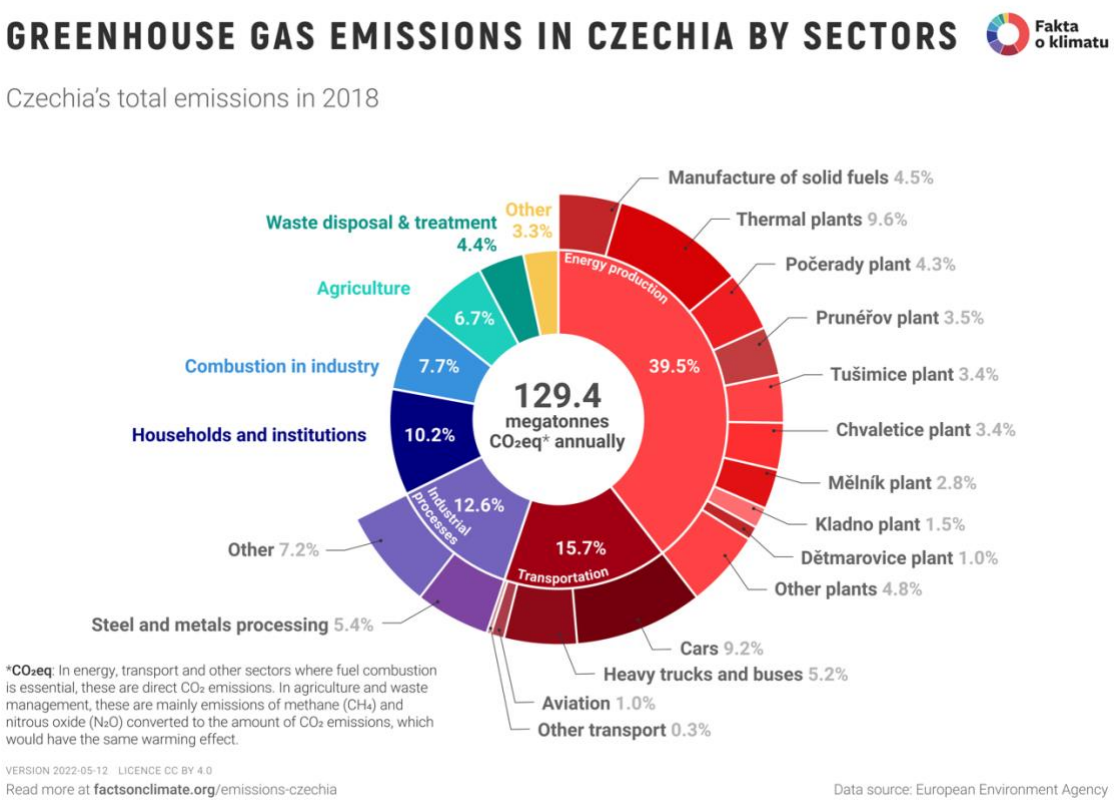

Figure 10: Greenhouse gas emissions in Czechia by sectors (Climate, Greenhouse gas emissions in Czechia by sectors, 2022)

Policy Measures

Transport policy of the Czech Republic for the period 2021-2027

The main objective of this document is to create conditions for the development of the transport system considering economic, social, and environmental impacts. Regarding the gradual transition from conventional fuels (oil-based fuels) to alternative energy in road transport, electrification of railways and public transport and other modes of transport.

Strategic and conceptual objectives in transport networks are set out in the Transport Policy of the Czech Republic for 2021-2027. A key theme of the document is the decarbonisation of transport, i.e., the reduction of hydrocarbon fuels with a shift to low-emission fuels. The goal and vision are for the Czech Republic and the individual regions to be equipped with a transport system to support sustainable development requirements. The aim is not to restrict transport but to develop it in the right direction. (ČR M. d., Doprvní politika ČR pro období 2021-2021, 2021, stránky 4-17)

The document has four strategic objectives:

a) Territorial cohesion

b) Society 4.0 in transport

c) Sustainable mobility

National Clean Mobility Action Plan

Issued in 2015, last revised in 2020. Clean mobility reduces energy consumption, carbon dioxide, and health-damaging emissions. In terms of reducing carbon dioxide production, the Czech National Energy and Climate Plan sets a target to reduce CO2 emissions from fossil fuel combustion from 116 Mt/year to 104 Mt/year between 2020 and 2030, i.e., by around 10%.

The Action Plan addresses four main areas:

a) Electromobility in road transport
b) Natural Gas in road transport
c) Hydrogen electromobility in road transport
d) Alternative fuels in non-road modes of transport

These four areas are supported from 4 points of view. Firstly, by developing infrastructure, for example, for electromobility building a well-available and reliable charging infrastructure for electric vehicles. This includes the installation of charging stations in public places such as car parks, shopping centres and public transport hubs. Secondly, financial support for the purchase can be provided by various economic incentives and subsidies for individuals and companies who want to purchase electric or gas vehicles. Then, education and information campaigns The Action Plan focus on information campaigns to increase awareness and support for new technologies and ways. Lastly, it supports innovation and development, such as electric buses and the electrification of other forms of public transport, such as trams and rail vehicles. (ČR M. p., 2020, stránky 12-44)

Conclusions

Austria

Energy Sector

In response to the energy crisis, Austria has implemented both short – term measures, such as amending relevant laws, and medium – to long – term strategies outlined in its NECP. These strategies prioritize a rapid expansion of renewable energy carriers, energy efficiency improvements and a shift towards a more sustainable and safe gas supply, particularly green hydrogen, and imports from reliable partners. Cooperation within the EU is crucial, yet Austria also takes national actions to ensure energy security and meet agreed upon climate targets. Concrete measures, including the funding for more electricity storage capabilities and research in grid flexibility underline Austria's commitment to resilience.

However, as of April 2024 Austria still heavily relies on Russian gas imports, which poses a massive threat to its energy security. Further measures must be taken to ensure a rapid but safe phase out of the long – term contracts signed with cooperation within the Russian Federation.

Overall, Austria has great potential for expanding renewable energies. However, due to insufficient allocated land, shortages in skilled workforce or inadequate targets set by the federal states, the expansion is progressing slowly.

According to organizations like for example the "Klimadashboard", which focuses on making the climate crisis and the whole physical & chemical processes more understandable for the public, Austria will likely not reach its set goals in the expansion programme for renewable energies. At least 4750 additional photovoltaic panels (each 20 kWp and 200 m^2 area) and 8 wind turbines must be installed each month until the year 2030 to reach the set goals. This number of photovoltaic panels would cover about 92,53 km^2, which is equivalent to **0,11 %** of the area of Austria and the 668 wind turbines would consume about 1,67 km^2 of Austria's total area, which is **0,002 %**. (Klimadashboard, 2024)

Transportation Sector

Austria's efforts to reduce GHG emissions in the transportation sector show a mix of progresses and challenges. Despite successful initiatives like the "**1-2-3 Klimaticket**" and investments in public transportation infrastructure, emissions have continued to rise, largely due to the dominance of individual transport modes. While the "**E-Mobilitätsoffensive**" targets cleaner transportation options, a more comprehensive approach that considers alternative fuels, efficiency improvements and urban planning is needed.

All the stakeholders, namely the federal states, cities and municipalities must take a well – coordinated approach to speed up this transformation. Spatial planning and local traffic management also play vital roles, but cohesive policy frameworks and collaboration are crucial.

One way to quickly reduce emissions in the transportation sector would be a long – demanded speed regulation on motorways that caps at **100 km/h**. This quick and effective measure would lead to a decline in emissions by **– 22,6 %** in CO_2 emissions, further reduce traffic noise and makes driving for all participants in the traffic safer. (Umweltbundesamt, 2024)

In conclusion, addressing rising emissions demands more ambitious, faster, and holistic strategies to achieve meaningful reductions and advance sustainability goals in Austria's transportation sector.

Czechia

Energy Sector

The Czechia's National Plan emphasizes its commitment to EU climate and energy targets, focusing on reducing greenhouse emissions and increasing renewable energy sources. Notably, the plan prioritizes energy security by diversifying the energy mix, infrastructure development, and promoting innovation. The Climate Policy introduced in 2017 aligns with the Paris Agreement objectives, further emphasizing the country's dedication to sustainable practices.

Key measures within the National Plan include decarbonization tools, renewable energy development, and nuclear energy support. Additionally, the plan promotes hydrogen and gas adoption, fostering research and innovation. The State Energy Concept and ongoing revisions to the European Renewable Energy Directive further complement these efforts, aiming to ensure energy self-sufficiency and reduce environmental impact.

Despite barriers such as outdated strategic documents and permitting processes, the Czech Republic aims to accelerate the development of wind and solar energy. Legislative amendments and infrastructure upgrades are underway to address these challenges and facilitate the transition to cleaner energy sources.

Looking ahead, initiatives like Repower EU underscore the urgency of reducing fossil fuel dependence and enhancing energy security. By diversifying energy sources and prioritizing renewable energy and efficiency measures, the Czech Republic strives to achieve its climate commitments and contribute to a more sustainable future.

Transportation Sector

In conclusion, the future trajectory of transport in the Czech Republic is deeply rooted in the electrification of vehicles and its impact on electricity consumption. The Transport Policy of the Czech Republic for 2021-2027 outlines strategic objectives to foster the development of a transport system that balances economic, social, and environmental considerations—emphasizing the gradual shift from conventional fuels to alternative energy sources, such as electrification in road and rail transport.

Furthermore, the National Clean Mobility Action Plan provides a structured framework for reducing energy consumption and emissions while promoting clean mobility solutions and addressing key areas such as electromobility, natural gas, hydrogen, and alternative fuels. In essence, these policy measures underscore Czechia's commitment to embracing sustainable transportation practices, not by restricting mobility but steering it towards a more environmentally conscious and technologically advanced future.

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