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Assessing the Policy Pathways of Organic Agriculture in Schleswig-Holstein

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Abstract

This master's thesis examines the development of the political pathway of organic agriculture in Schleswig-Holstein between 2009 and 2023 using the Multi-Level Perspective (MLP) approach. The aim is to analyze the dynamics of the sustainability transition by exploring political frameworks, actor networks, and societal conflicts. Schleswig-Holstein, shaped by its agricultural traditions and its political focus on sustainability, serves as a suitable case study. The increasing societal demand for sustainably produced food and the impacts of climate change are putting growing pressure on the agricultural system, while European frameworks such as the Green Deal and the Common Agricultural Policy (CAP) support the transformation toward organic practices.

The investigation is based on a case study analysis of political documents, committee protocols, and newspaper articles, which were evaluated using qualitative content analysis. The results show that Schleswig-Holstein's transition to organic agriculture was primarily driven by political institutions and funding programs at various levels. European frameworks and regional subsidies, such as the Joint Task for the Improvement of Agricultural Structures and Coastal Protection (GAK), led to a significant increase in organically farmed land in the observed timeframe. However, conflicts, such as those related to land use or environmental regulations, highlight the tensions between ecological goals and economic interests.

The MLP approach illustrates that the regime is the primary driver of the transformation, while niche innovations play a supporting role but remain reliant on regime support. External factors have also positively influenced the development.

The thesis recommends to strengthen financial backing for organic farmers, expand education and awareness, and encourage stakeholder collaboration, to support a further transition to sustainability. Targeted financial mechanisms, like long-term subsidies and market-based incentives, can help with economic stability. Reducing bureaucratic barriers and supporting technological innovation in digital farming and resource efficiency will boost productivity. This study underscores the central role of political leadership, institutional frameworks, and societal acceptance in fostering sustainability transitions.

Zusammenfassung

Diese Masterarbeit untersucht die Entwicklung des politischen Pfades des ökologischen Landbaus in Schleswig-Holstein zwischen 2009 und 2023 anhand des Multi-Level-Perspective-Ansatzes (MLP). Ziel ist es, die Dynamiken der Nachhaltigkeitstransformation zu analysieren, indem politische Rahmenbedingungen, Akteurnetzwerke und gesellschaftliche Konflikte beleuchtet werden. Schleswig-Holstein, geprägt durch landwirtschaftliche Tradition und eine politische Ausrichtung auf Nachhaltigkeit, ist ein geeignetes Fallbeispiel. Der steigende Druck durch gesellschaftliche Nachfrage nach nachhaltigen Lebensmitteln und den Klimawandel sowie europäische Rahmenwerke wie der Green Deal und die Gemeinsame Agrarpolitik (GAP) fördern die Transformation zu ökologischen Praktiken.

Die Untersuchung basiert auf einer Fallstudienanalyse politischer Dokumente, Ausschussprotokolle und Zeitungsartikeln, ausgewertet durch eine qualitative Inhaltsanalyse. Die Ergebnisse zeigen, dass Schleswig-Holsteins Transition zum ökologischen Landbau primär durch politische Institutionen und Förderprogramme verschiedener Ebenen getrieben wurde. Europäische Rahmenwerke und regionale Subventionen wie das Gesamtaufgabe Agrarstruktur und Küstenschutz (GAK)-Programm führten zu einem signifikanten Anstieg der ökologisch bewirtschafteten Fläche in dem beobachteten Zeitraum. Konflikte um Landnutzung oder Umweltauflagen verdeutlichen jedoch Spannungen zwischen ökologischen Zielen und wirtschaftlichen Interessen.

Der MLP-Ansatz zeigt, dass das Regime die Transformation maßgeblich vorantreibt, während Nischeninnovationen unterstützend wirken und auf Regime-Unterstützung angewiesen sind. Externe Faktoren beeinflussen diese Entwicklung ebenfalls positiv.

Abschließend wird empfohlen, die finanzielle Unterstützung für ökologische Landwirte zu verstärken sowie Aufklärung und Zusammenarbeit zwischen den Interessengruppen zu fördern, um einen weiteren Übergang zur Nachhaltigkeit zu unterstützen. Gezielte Finanzmechanismen, wie langfristige Subventionen und marktbasierte Anreize, tragen zur wirtschaftlichen Stabilität bei. Der Abbau bürokratischer Hürden und die Unterstützung von technologischen Innovationen bezüglich Digitalisierung in der Landwirtschaft und Ressourceneffizienz tragen zur Produktivitätssteigerung bei. Die Studie unterstreicht die zentrale Rolle von politischer Führung, institutionellen Rahmenbedingungen und gesellschaftlicher Akzeptanz für nachhaltige Transformationen.

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List of Abbreviations

ABL	The Working Group of Rural Agriculture
AfD	Alternative für Deutschland
AFP	Agricultural Investment Program
CAP	European Common Agricultural Policy
CAU	Christian-Albrechts-Universität zu Kiel
CO2	Carbon Dioxide
CDU	Christlich Demokratische Union Deutschlands
DBV	Deutscher Bauernverband
DINAK	Deutsches Institut für Nachhaltige Agrarkultur
EKSH	Gesellschaft für Energie und Klimaschutz Schleswig-Holstein GmbH
EP	Election Period
EU	European Union
FAO	Food and Agriculture Organization
FDP	Freie Demokratische Partei
GAK	Improvement of the Agricultural Structure and Coastal Protection
GHG	Greenhouse Gases
ha	Hectare
KMSH	Kompetenzzentrum Milch Schleswig-Holstein
LSV	Land schafft Verbindung
MELUR	Ministerium für Energiewende, Landwirtschaft, Umwelt und ländliche Räume Schleswig-Holstein
MELUND	Ministerium für Energiewende, Landwirtschaft, Umwelt, Natur und Digitalisierung Schleswig-Holstein
MSL	Market and site-adapted land management
MLP	Multi-Level Perspective
NABU	Naturschutzbund Schleswig-Holstein
SDG	Sustainable Devekopment Goals
SH	Schleswig-Holstein
SHZ	Schleswig-Holsteinischer Zeitungsverlag
SPD	Sozialdemokratische Partei Deutschlands
ST	Sustainability Transitions
SSW	Südschleswigscher Wählerverband
UN	United Nations

1 Introduction

The agricultural sector is of great cultural and economic significance for the federal state of Schleswig-Holstein, Germany. With around 68% of agricultural landscape coverage, it has the highest percentage of agricultural land compared to other German states (Statistisches Bundesamt, 2022b). In 2022, the sector acquired nearly 2,4 billion euros of gross value, which is around 2.3% of the total value added in the country (Landesportal Schleswig-Holstein, 2020a). However, the sector faces growing challenges due to its environmental impacts such as greenhouse gas emissions and water contamination, as well as the need to adapt to global sustainability goals and more ethical livestock production. These challenges have gained prominence in the wake of global initiatives like the 2015 Paris Agreement, which aims to achieve climate resilience, climate change mitigation and long-term environmental stability (UNFCCC, n.d.), or the introduction of the European Green Deal, which aims to make Europe the first climate-neutral continent by 2050 (European Commission, 2019). As part of this shift, organic farming has emerged as a key strategy for creating more sustainable agricultural systems. The European Commission defines organic farming as an agricultural method that relies on natural substances and processes, aiming to minimize environmental impacts while enhancing biodiversity, soil fertility, and water quality (European Commission, 2024a).

Given the dual role of agriculture as both a contributor to environmental challenges and a sector heavily affected by them, examining pathways toward sustainable practices is critical. Organic farming, as an established and growing sector in Schleswig-Holstein, provides an ideal lens to explore how policy frameworks, actors, and societal conflicts are shaping sustainability transitions. Schleswig-Holstein represents a particularly relevant case study for examining transitions in agriculture due to its characteristics. Its geographical and climatic conditions, including coastal areas and fertile soils, offer both opportunities and challenges for sustainable agricultural practices. Furthermore, the state has shown a strong commitment to organic farming which is reflected in a significant increase in organically farmed land since 2014 (Statistik Nord, 2024). This commitment can be further seen in the region's political landscape, where environmental policies have played a central role for many years. The long-standing participation of the *Green Party* in the state government has prioritized sustainability and supported initiatives such as organic farming, renewable energy, and climate adaptation. Understanding the political and societal dynamics in Schleswig-Holstein can provide valuable

insights for other regions seeking to promote organic agriculture as part of broader sustainability transitions.

This master thesis explores sustainability transitions within the agricultural sector of Schleswig-Holstein with the focus on organic agriculture. It answers the following research question: "**How has the political pathway of the organic agriculture sector in Schleswig-Holstein developed in the period from 2009 to 2023?".** To systematically approach and answer this question, this thesis focuses specifically on policy implementation, actors and their influence on the system, and the main discussions and concflicts shaping the discourse in the agricultural sector. The Multi-Level Perspective (MLP) framework serves as the theoretical basis for this research. This framework is particularly well suited for the study of sustainability transitions as it provides a structured way to analyze the interplay between different levels of socio-technical systems: Niches (spaces for innovation), regimes (prevailing practices and structures) and the broader landscape (external factors such as cultural, economic or political changes) (Geels, 2002; Köhler et al., 2019). By applying the MLP framework, this thesis captures the dynamic interactions between these different levels. This approach enables a systematic examination of how policies, actor networks and conflicts influence the development of organic agriculture and provides valuable insights into pathways to sustainability in the region's agricultural sector.

The thesis is structured as follows: Chapter 2 provides context on agriculture's environmental impacts, climate change effects, sustainable farming, and the role of Schleswig-Holstein, aligning organic agriculture with current political goals of the European Union. Chapter 3 introduces the theoretical framework, the Multi-Level Perspective (MLP) on sustainability transitions, including its critiques and limitations. In Chapter 4 the methodology details the case selection, data collection and analysis methods, including qualitative content analysis and MAX-QDA. Chapter 5 presents the study's findings. Chapter 6 is the discussion, which addresses the research question through the MLP framework, examining niches, regimes, and landscape dynamics. Lastly, Chapter 7 presents the final statement of the thesis.

2 Background

For thousands of years agriculture has been vital for human survival, providing food, nutrients, and essential resources. Its success has always been deeply intertwined with ecological processes as agriculture both depends on and influences the environment. While sustainable agricultural practices, such as organic farming, conservation agriculture, or agroforestry, can enhance biodiversity, soil health, water conservation, and climate resilience by mimicking natural ecosystems (Adedibu, 2023), the agricultural sector also poses significant challenges to ecology. Modern agricultural systems are under increasing pressure to ensure a long-term stable food supply for a growing global population, yet their environmental footprint threaten these goals. Biodiversity loss, soil degradation, water pollution, and greenhouse gas emissions are some of the negative consequences of conventional farming practices (Velten et al., 2015). Agriculture causes a high rate of biodiversity loss and land degradation through soil erosion, compaction and salinization. This has a negative impact on agriculture. Likewise, the depletion and pollution of water resources increase as well as production costs and poverty arises. Additionally, there is an ever-decreasing number of farms and a decrease in the rural population in general (Velten et al., 2015). These challenges highlight the urgent need for a transition to more sustainable agricultural approaches that mitigate environmental harm while ensuring productivity.

Among diverse sustainable farming practices, organic agriculture has gained prominence as a strategy to address these challenges. By minimizing synthetic inputs and fostering ecological interactions, organic farming not only reduces environmental impacts but also contributes to the resilience of agricultural systems. The following subchapters introduce reasons for sustainable practices in agriculture, with a deeper focus on organic agriculture and drawing on Schleswig-Holstein as a case study.

2.1 The Impact of Agriculture on the Environment & Climate Change

Intensive farming practices like monoculture cropping and excessive use of chemical fertilizers and pesticides in agriculture cause many environmental issues, such as land degradation, soil degradation, water pollution, biodiversity loss, and greenhouse gas emissions (Adedibu, 2023). Agriculture is one of the great contributors to greenhouse gas emissions, deforestation, and terrestrial biodiversity loss worldwide (Dudley and Alexander, 2017; IPBES, 2019).

Soil degradation

When the soil loses quality, it is known as soil degradation. The result can be a deterioration in agricultural performance, loss of biodiversity, increased vulnerability to soil erosion, and nutrient depletion (Adedibu, 2023). This often comes from the excessive use of chemical fertilizer which leads to higher production on crop yields on the one hand. Furthermore, it has a negative impact on the soil, as chemical fertilizer change the soil's pH, the utilization of nurtients, or they disrupt microbial communities. The latter can result into soil fertility and biodiversity loss (Altieri, 2002). Another driver for soil degradation comes from the overgrazing of livestock. When farm animals are in the same area for too long, it causes damage to vegetation covers, and soil is therefore more likely to erode. This results in a decrease in organic matter in the soil and reduced water infiltration (Belfort and Cherry, 2017; Paustian et al., 2016). Finally, tillage practices like plowing and harrowing, are highly responsible for soil degradation. These are also causing the reduction in organic matter in the soil, damaging the structure of the soil and increasing erosion due to wind and water (Campbell and Lobell, 2017). Soil degradation causes, among other things, land loss, reduced water quality, and a reduction of biodiversity, and it negatively influences the productivity and sustainability in agriculture (FAO, 2020a; Paustian et al., 2016; Tscharntke et al., 2012).

Water pollution

Agriculture is also responsible for water pollution in lakes, rivers, groundwater, and coastal waters. This has a far-reaching impact on aquatic ecosystems, human health, and the economy. When agro-chemicals, like fertilizer and pesticides, are excessively used in agricultural processes, it can lead to nutrient pollution and eutrophication in water bodies, algal blooms, oxygen depletion, fish kills and immunization to chemical pesticides (FAO, 2020a; Giller et al., 2011). Another cause of water pollution is poor livestock manure and waste management since nutrients, pathogens, and other harmful substances can contaminate the ground or surface water. Drinking polluted water or using it for recreational activities can pose severe risks to human health since it can cause gastrointestinal illnesses, respiratory issues, and other chronic diseases (Giller et al., 2011). Also other living beings, such as fish, amphibians, and aquatic invertebrates, suffer from the negative effects of pollution, which can lead to a loss in biodiversity and ecosystem health (Lipper et al., 2014). Furthermore, water pollution is also relevant to the economic cost coming with it. Money payed by taxpayers, water utilities and local communities is used to clear polluted water, and local economies, which depend on clean water, can be endangered (FAO, 2020b; Hatfield and Prueger, 2015).

Loss of biodiversity

Agriculture is not only a threat to soil and water, it is also one of the leading causes of biodiversity loss worldwide (IPBES, 2019). The released pollution from agricultural activities significantly impacts ecosystems, and more and more natural habitats are being converted to intensively managed systems (Dudley and Alexander, 2017). The technique of monoculture reinforces the decrease of biodiversity in that area. Additionally, agriculture is responsible for habitat destruction, pesticide use, and genetic homogenization of crops. The vulnerability of crops to pests, diseases, and climate change increases with the loss of biodiversity (Tscharntke et al., 2012). Pollination, biological control of pests, soil fertility, and nutrient cycling are indispensable to maintaining agricultural productivity, but this is only possible if an ecosystem provides biodiversity (Lemaire et al., 2014).

Climate Change and Greenhouse gases

Agriculture is a significant tributer to climate change and it is also highly vulnerable to its effects, creating a "complex and interconnected relationship between agriculture and climate change" (Adedibu, 2023, p. 6). With 38-40% of worldwide greenhouse gas (GHG) emissions caused by humans, the agricultural sector is responsible for a significant proportion of emissions (IPCC, 2019). These greenhouse gases, such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), are responsible for shifts in climate patterns globally (IPCC, 2019; Paustian et al., 2016). Enteric fermentation from livestock, manure management, synthetic fertilizers, rice cultivation, and agricultural burning are some of the agricultural processes responsible for GHG emissions (Lal, 2014, 2008; Zomer et al., 2008). The emission of these gases affects the atmosphere. It warms up leading to climate change effects, which impact agricultural systems, such as temperature and rainfall changes, as well as the rise of extreme weather events (Adedibu, 2023).

In 2021, the global emissions from agrifood systems reached 16 billion tons of carbon dioxide equivalent (Gt CO2eq), marking a 14% increase compared to numbers from 2001. These emissions accounted for 30% of the overall anthropogenic emissions, totaling 53 Gt CO2eq and are the world's highest total GHG emissions (FAO, 2021). Agrifood systems generate GHG emissions in different steps of the value chain. With crop and livestock production activities, , the farm gate is part of this, as well as land-use change with deforestation and peatland drainage. Furthermore, processes before and after production are also included for food manufacturing,

transport, retail, household consumption, and food waste disposal, which are responsible for generating GHG in the sector (FAO, 2023a). From 2019 to 2020 the GHG emissions sank around 4% globally because of the economic decline due to the COVID-19 pandemic. But in the following year an economic rebound by the same percentage happened. Over a two-decade period, the contribution of agrifood systems to total emissions declined from 37% in 2001 to 30% in 2021. This shift highlights the accelerated growth observed in emissions from sectors other than agrifood. Emissions from the farm gate accounted for nearly half of the total emissions generated by agrifood systems worldwide. Meanwhile, pre-and post-production processes contributed one-third, and land-use change contributed one-fifth to these emissions (FAO, 2021).

Looking at Figure 1, enteric fermentation has the most GHG emissions in the farm-gate sector. Combined with manure management, manure applied to soils and manure left on pasture, the total livestock emissions is about 4.2 Gt CO2eq in 2021, 54% of the emissions in farm-gate. The net forest conversion generated the highest GHG emissions in the land-use change sector 2021. With 2.9 Gt CO2eq it is together with the enteric fermentation of ruminant livestock the biggest emission generator in the agrifood system (FAO, 2023).

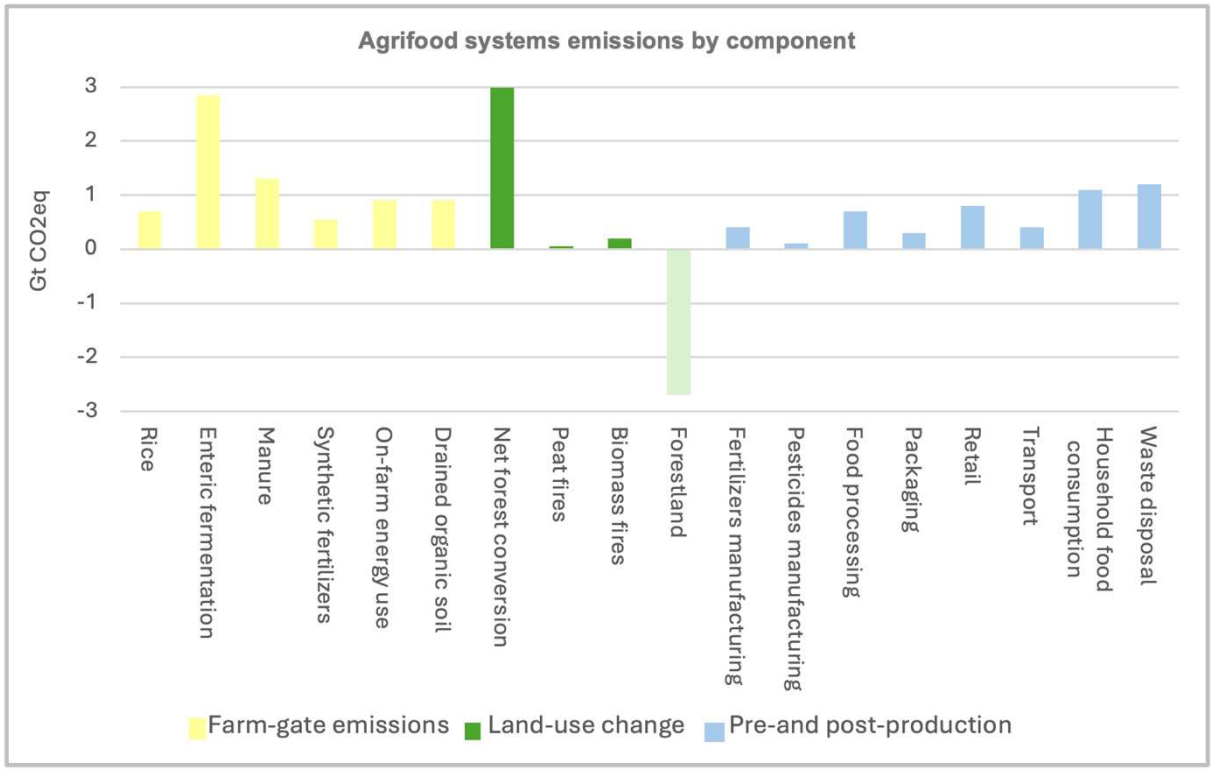

Figure 1: Agrifood systems emissions by component in 2021. (Own illustration. Based on FAO, 2023).

The most generated emissions in pre- and post-production processes were in the sectors of household food consumption and agrifood waste disposal, both with an amount of 1.2 Gt CO2eq each (ibid. Figure 1).

In 2023, enteric fermentation had in the European Union by far the highest percentage of contribution to emissions in the agricultural sector with 43,6%, followed by direct N2O inorganic fertilizers (11,9%), CH4 emissions (9,9%) and indirect N20 emissions (6,7%). Then, in descending order, the sectors of direct N2O organic fertilizers, N2O emissions, deposition grazing animals, crop residues, cultivation organic soils and liming (European Environment Agency, 2021) come. In Germany, the biggest factor in greenhouse gas emissions is enteric fermentation, followed by N2O emissions. In general, Germany released around 52,2 million tons of CO2 equivalents, which is about 7,7% of total GHG-emissions for the year in 2023 (FAO, 2023; Umweltbundesamt, 2024).

2.2 The Impact of Climate Change on Agriculture

In the field of agriculture, climate change is a broadly discussed topic. Greenhouse gases enhance climate change, and the effects of climate change are significant for the agricultural sector (Adedibu, 2023). It is a sector that is heavily affected by it as the production is mostly outdoors and depending on the climatic conditions (Grüneis et al., 2016; Lobell et al., 2008; Vermeulen et al., 2012). Given the critical role of agriculture in human well-being, numerous organizations and individuals have voiced apprehension about the possible impact of climate change on agricultural productivity. This concern has spurred considerable research interest in the intersection of climate change and agriculture in recent years. Anticipated repercussions of climate change encompass agricultural and livestock output, water management, input resources, and various facets integral to agricultural systems (Aydinalp and Cresser, 2008). At the same time, there is a steady increase in the world population, which results in a more significant need for food (Tait and Morris, 2000). The most recent IPCC report (2023) showed that due to climate change, food and water security will decline since it comes with more frequent and intense extremes. This will lower the chances of reaching the Sustainable Development Goals since the priorities will shift. In general, the productivity of agriculture has risen, but the growth has been slowed down by climate change over the last 50 years (IPCC, 2023). While in mid- and low-latitude regions mostly negative impacts were found, high-latitude regions showed the opposite, and mainly positive impacts were found there. Also, the change of temperature and acidity in the oceans influences the productivity of shellfish

aquaculture and fisheries in certain areas. The highest exposure to food and water insecurities, linked to climate change and extreme weather events, have locations and communities in Africa, Asia, Central and South America, Small Islands and the Arctic. Indigenous Communities, as well as small-scale food producers and households with a low income became more vulnerable to increased malnutrition when food production losses appear or access to food is restricted. Therefore, their diet diversity is limited (ibid).

Agricultural productivity is strongly linked to regional climate conditions. Temperature, solar radiation, carbon dioxide and water availability influence plant metabolic processes and can hinder or favor them (Chaves et al., 2003; Lucier et al., 2006; Pidwirny, 2004). This can also has positive comparative effects in agricultural markets (IPCC, 2023), but it is relatively low compared to the harmful negative effects of climate change on the agricultural sector (Easterling et al., 2007; Stern, 2006). Due to climate change and the rising sea level, significant losses of fertile land are expected. Furthermore, changes in weather conditions are causing an increase in pests and diseases and spreading them into areas that were not affected by them previously (Tait and Morris, 2000). Climatic factors are also influencing agricultural productivity and crop damage. Changes in temperatures and humidity, as well as heat waves, storms, droughts and floods, which climate extremes can cause, affect crop growth, development and yields directly (Adedibu, 2023; BoM, 2011, 2006a, 2006b). Also, the reduction of pollination, fertilization and grain quality are results of climate change in agriculture (Lal, 2014).

Agricultural farming systems have been dynamic since they are connected to their surrounding climate and natural resources (Adams, R.M., Hurd, B.H., Lenhart, S., & Leary, N.A., 1998; Cline, 2007). They must constantly adapt to biophysical changes like diseases and socioeconomic changes, fluctuations in markets or regional or international policies, such as subsidies, credit facilities, and more. Furthermore, innovation, land-use regulations, terms of trade or management practices challenge agricultural farming systems to respond (Stokes and Howden, 2010; Troost et al., 2012). This instability is leading to more risk-averse farmers and therefore there is also a bigger barrier to trying out unconventional options like organic farming or integrated farming systems (Tait and Morris, 2000).

2.3 Sustainable Agriculture

Sustainable agricultural practices could be an answer to lower the impact on the climate while still providing enough resources to feed the population (Altieri, 2002; Pretty et al., 2002; Rockström et al., 2016). The term sustainability can have different definitions, one of the most frequent used ones is the division into ecological, social and economic sustainability. The concept of the three-pillar model of sustainability was developed around 1994 based on the Brundtland Report. It stated that all three pillars of sustainability are given equal importance (Haase, 2020).

Ecological Sustainability

The ecological dimension of sustainability is historically the oldest and developed directly from the origins of sustainable forestry, where the propose was to only cut as much wood as could grow back (Kropp, 2019; cf. Hartig 1795, cited in Ninck, 1997, p. 52). This dimension was given priority in the early debates on sustainability and formed the basis for society and the economy (Grunwald and Kopfmüller, 2022). The ecological dimension focusses on topics such as environmental protection, resource conservation and the preservation of biodiversity. In brief, the principles of environmental sustainability were defined as following: Firstly, no overexploitation of nature. Conservation of natural resources with resilient, vital ecosystems and biodiversity. Secondly, the use of natural resources only to the extent that they can regenerate and persist in the long term. And lastly, non-renewable resources should be consumed as little as possible, and if so, only to the extent that equivalent renewable resources are created (ibid; Haase, 2020; Kropp, 2019).

Social Sustainability

The foundation of social sustainability is a good life for humans, focusing on peace and justice. A dignified existence through the satisfaction of basic material and non-material needs must be guaranteed, as well as democratic structures, equal opportunities and a fair distribution of income (Haase, 2020; Kropp, 2019; Zimmermann, 2016). The indicators in this dimension are poverty reduction, health, equal opportunities, education, inclusion and participation (Henseling et al., 1999). In addition, Grunwald and Kopfmüller (2022) name basic goods at an individual level like health, basic services, education and participation, and overall societal basic goods like tolerance, solidarity, ability to integrate, focus on the common good and sense of law and justice.

Economic Sustainability

The current economic system, which is based on globalization, growth and capitalism, is not aligned with the goals of ecological sustainability and must therefore fundamentally change in terms of consumer behavior, level of prosperity and values of society (Grunwald and Kopfmüller, 2022; Zimmermann, 2016). The sustainable approach describes an economic system that can continue to exist in the long term and for following generations while remaining within ecological limits (Kropp, 2019). Haase (2020) defines the following indicators: high level of employment, price stability, labor productivity and external balance.

Looking at research on **sustainable agriculture**, interest in this topic has risen significantly since the Brundtland Report (ibid.). Based on the definition in the Brundtland Report, the Food and Agriculture Organization of the United Union (FAO) defined sustainable development for agriculture, forestry and fisheries as described in 1987: "Sustainable development is the management and conservation of the natural resource base, and the orientation of technological and institutional change, in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agricultural, fisheries and forestry sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable" (FAO, 1994). Also, the concept of sustainable development gained importance during this period (Velten et al., 2015). Similar to the concept of sustainable development, where its meaning can vary, the approach of sustainable agriculture can be viewed from different angles. There is “a great variety of different discourses, views or paradigms of sustainable agriculture” (Velten et al., 2015 n.p.). But still, one comprehensive definition of sustainable agriculture can not be found in the literature as it is too complex and contested and it also depends on the adaptation of the context (Pretty, 1995; Velten et al., 2015).

According to Christen (1998, 1996), the general definitions from the literature on sustainable agriculture show six sub-aspects: 1) ethical component (intergenerational justice), 2) conservation of resources (protection of soil, water and air, preservation of the production base), 3) preservation of biodiversity (avoidance of damage to natural or near-natural ecosystems through agricultural production), 4) ensuring the economic viability of agricultural businesses, 5) overall social responsibility of agriculture for food supply and food quality, and 6) global component of sustainable development.

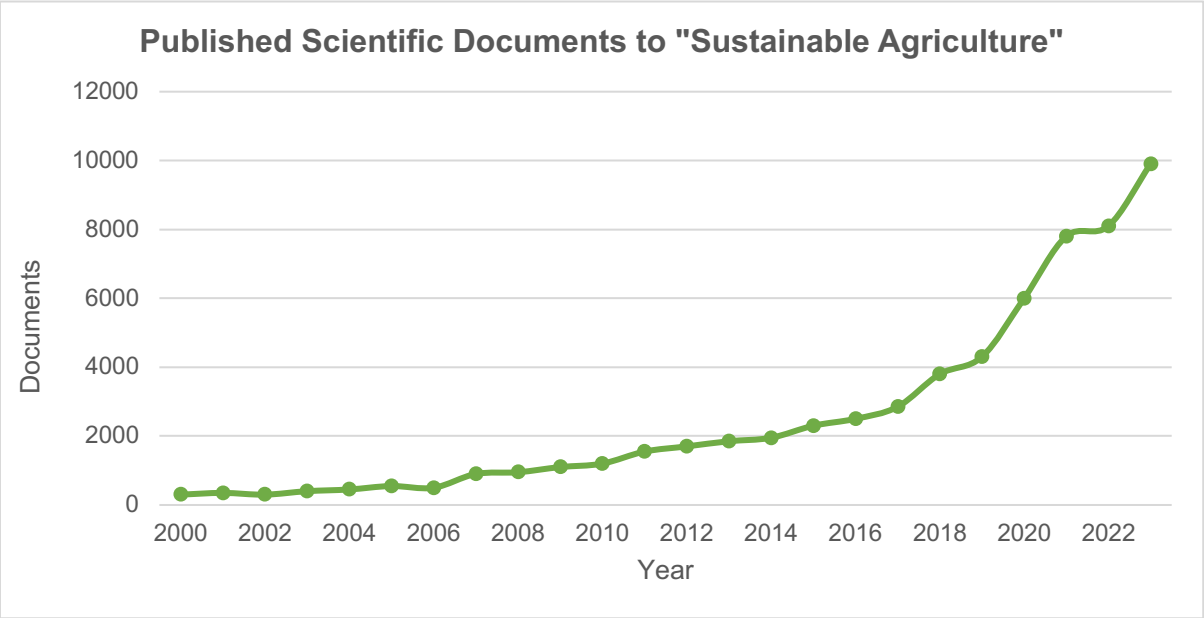

Figure 2: Documents by Year with the term "sustainable agriculture" in the title, abstract, or keywords mentioned. (Own illustration. Based on "Scopus - Analyze search results,", July 11, 2024)).

Since 2000, the number of scientific publications dealing with the topic of sustainable agriculture has risen sharply (see Figure 2). Between 2000 and 2014, publications on the topic increased slowly, from 383 papers in 2000 to 1922 papers 14 years later. Since then, the number of publications has risen continuously. In 2019, the number of publications per year on sustainable agriculture had already more than doubled since 2014, with over 4,000 papers and almost tripled in 2020 with 5,944. In 2023, 9871 scientific publications were published on the topic ("Scopus - Analyze search results," 2024).

2.4 Schleswig-Holstein – Context and Embeddedness

Schleswig-Holstein is the northernmost federal state in Germany and is home to nearly 2.9 million people (as of 2022), distributed over an area of 15.730 km² (Statistik Nord, 2022). Although the average income of citizens in Schleswig-Holstein is slightly below the national average, the inhabitants are nevertheless among the more than average satisfied part of the overall German population (Deutsche Post, 2013; Staatskanzlei des Landes Schleswig-

Holstein, 2014). Geographically, Schleswig-Holstein comprises the southern part of the Cimbrian Peninsula (Jutland, Denmark) and a section of the North German Plain. The federal state is bordered by the North Sea to the west, the Baltic Sea and Mecklenburg-Western Pomerania to the east, Hamburg and Lower Saxony to the south, and Denmark to the north. It forms an important link between Western and Central Europe and the Scandinavian countries. Often referred to as the 'Gateway to Scandinavia', Schleswig-Holstein is closely linked economically to the metropolis of Hamburg, the dynamic growth regions of the Öresund region in Denmark and Sweden, as well as other areas in Denmark, Norway, and Sweden (Staatskanzlei des Landes Schleswig-Holstein, 2014). In 2022, Schleswig-Holstein generated a gross domestic product of around 112.8 billion euros (or just under 38,274 euros per capita) (Landesportal Schleswig-Holstein, 2023a). In addition to agriculture, the digital economy, renewable energies, life sciences, maritime economy, mechanical engineering, and tourism are of economic importance for the federal state (WTSH Wirtschaftsförderung und Technologietransfer Schleswig-Holstein GmbH, n.d.).

Schleswig-Holstein is traditionally an agricultural state. Agriculture not only shapes the cultural landscape but also plays a vital economic role in the state. About 68% of the land used in Schleswig-Holstein is for agriculture. It has the highest proportion of agricultural land among all German states (Statistisches Bundesamt, 2022b). In 2022, the agricultural sector generated nearly 2.4 billion euros in gross value, contributing around 2.3 % to the state's total value added (Landesportal Schleswig-Holstein, 2020). Numerous policies, strategies, legislations, and regulations focusing on sustainability and climate change adaptation have been implemented at various levels, including the United Nations' Paris Agreement or the European Green Deal.

Schleswig-Holstein had a strong rise of the Greens recently, a political Party in Germany which has a strong focus on the fight against climate change and support for renewable energies, nature conservation, and organic agriculture over years now. The party was elected into the state parliament since 1996 and has grown since 2005 constantly, with an exception in 2017 (2005- 6,5%; 2009- 12,4%; 2012- 13,2%; 2017- 12,9; 2022- 18,3%) (Landesportal Schleswig-Holstein, n.d.). Since 2012, the party has been represented in the state government (2012-2017 SPD, SSW and Grüne, 2017-2022 CDU, the Greens and FDP, and since 2022 CDU and the Greens (Statista, 2024). Werner Schwartz (CDU) was selected as the minister of agriculture, even though he had spoken out against separating agriculture and nature conservation in his

previous role as President of the State Farmer´s Association ("Agrarminister Schwarz sieht Landwirtschaft vor großen Herausforderungen.," 2023).

It has good prerequisites for accomplishing a transformation of sustainable agriculture. On the one hand, agriculture plays an essential role in the identity of the federal state, and on the other, social and political conditions exist for a sustainable transformation in this sector.

2.4.1 Agricultural Practices towards Sustainability in Schleswig-Holstein

There are several elements that can be categorized as contrary to conventional agriculture and towards sustainability in Schleswig-Holstein's agriculture. The most common are listed below.

Climate-adapted agriculture

Due to increasingly frequent crop failures caused by drought, farmers in Schleswig-Holstein are forced to deal with the effects of climate change and strategies for adapting to it. Be it through additional crop rotations, resistant varieties, water-saving soil cultivation, or crop insurance cushioning production risks. There is a call for reorganizing industrial agricultural systems. For this, more resilient fields are needed, more humus in the soil, and agroforestry systems in which trees are combined with arable or vegetable crops (SHZ 2023: 26.06.). Increase of flooding in lowlands, such as the Eider-Treene-Sorge river landscape, which is the largest contiguous river and lowland area in Schleswig-Holstein, also means that agriculture in these areas must reorient itself. The cultivation of legumes is one way to make use of this change. These catch crops are suitable for aerating the arable soil and are also very rich in protein. The plant can be used as animal feed as well as a meat substitute for human consumption. So far, the plant has mainly been imported from abroad, but a market does exist (SHZ 2023: 28.02.).

Rewetting of peatlands

Peatlands provide food and raw materials, but above all they bind greenhouse gases when they are intact, i.e. wet. Nationwide, emissions from drained peatlands contributed 7% to climate change in 2023; in Schleswig-Holstein, the number is almost 20 %. If all peatlands in Schleswig-Holstein were drained, a fifth of greenhouse gases could be saved (SHZ 2023: 24.08.). However, this conflicts with many agricultural businesses, as a large proportion of agricultural land is located on these moors and can no longer be used as usual. Although the

landowners would be compensated, the land users, such as tenants, would not be compensated separately(SHZ 2023: 24.08., p. 3).

Patent-free seeds

The idea of public use of important resources is a point supported by the Ministry of Agriculture. Farmers should continue to have free access to all types of seeds for breeding and marketing. In the interests of sustainable agriculture, animals, plants and their genetic material should not be declared inventions and thus become the property of a few. The Ministry opposes the progressive monopolization of the global seed market (SHZ 019: 26.02.).

Biogas plants

In response to the changing climate in Schleswig-Holstein, solutions are being sought in agriculture. One option that is being discussed and implemented is to focus more on maize cultivation and thus on biogas plants (SHZ 2012: 13.09.). However, this idea is highly controversial. On the positive side, it is possible to switch to renewable electricity and avoid using finite resources. It can also provide farmers with a second source of income in addition to their traditional earnings to secure their financial future. One criticism is that this creates monocultures and farmers compete for leased land for food. This displaces food production and increases environmental pollution (SHZ 2009: 06.06.; 2010: 13.12., 05.03.; 2011: 03.11., 08.04.).

Organic Farming

Organic farming is a holistic approach to agriculture that prioritizes long-term environmental sustainability, focusing on producing food in a way that minimizes harm to the environment (Seufert, 2012). The European Commission defines it as following: “it promotes the responsible use of energy and natural resources; the preservation of biodiversity; the maintenance of ecological balance in the regions; soil fertility and the preservation of water quality” (European Commission, 2024a, n.p.). This definition highlights the multifaceted contribution of organic farming to sustainability, making it a critical tool in addressing the environmental and social challenges posed by modern agriculture.

2.4.2 Organic Agriculture in Schleswig-Holstein

The first organic farms in Schleswig-Holstein were established in the 1950s, and more were added in the 1980s. In 1991, the first EU organic regulation was introduced, which gave the

sector its first boost by protecting the term and allowing organic food to be marketed (Statistik Nord, 2024). In 2009, there were 519 organic farms and 35,656 ha of organically farmed land. In terms of area, it increased from 2009 to 2014 to 37,085 ha (see Figure 3). A clear increase happened from 2014 onwards. Between then up to 2021 organic farmland expanded to 73,700

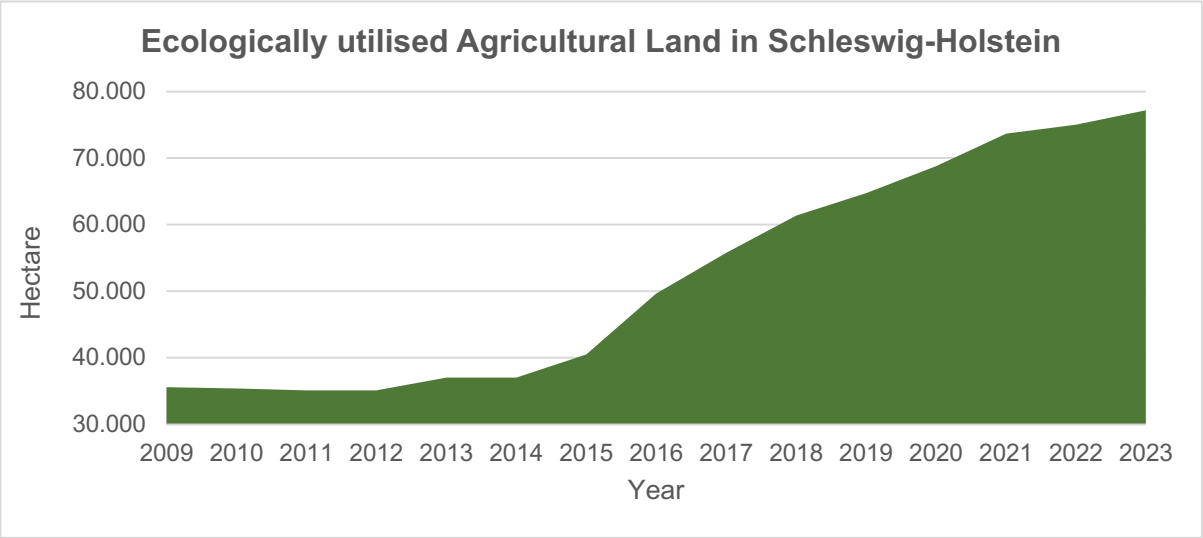

Figure 3: Ecologically utilized agricultural land (in ha) in Schleswig-Holstein between 2009-2023. (Own illustration. Source: MELUR, 2020; Statistik Nord, 2024).

hectares, reflecting a gradual but consistent upward trend. In 2023, a peak of 77,200 hectares was counted, which represents a total share of 7,9% of the total agricultural area in Schleswig-Holstein (Statistik Nord, 2024). The number of organic farms fell slightly after 2012 but this leveled off again by 2015 to the previous number of farms (see Figure 4) A particularly significant leap occurred in 2016, with the number of organic farms increasing by 14.2% compared to the previous year, alongside a 22.4% expansion in organically farmed land (MELUR, 2020).

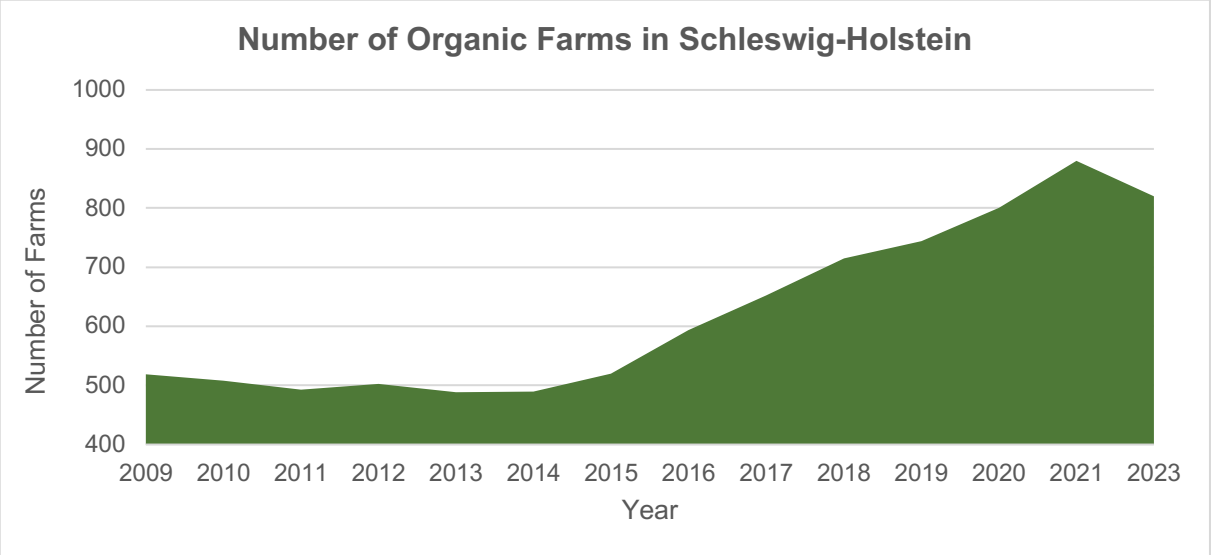

Figure 4: Number of Organic Farms in Schleswig-Holstein between 2009-2023 (Own illustration. Source: MELUR, 2020; Statistik Nord, 2024).

Robert Habeck (the Greens, at the time Minister of Agriculture for the Greens in Schleswig-Holstein) said: "We are seeing that the processing, marketing, and catering sectors, among others, are increasingly focusing on the organic market. They are utilizing the opportunities presented by the continuous growth in consumer demand for organically produced food“ (MELUND SH, 2015, n.p.).

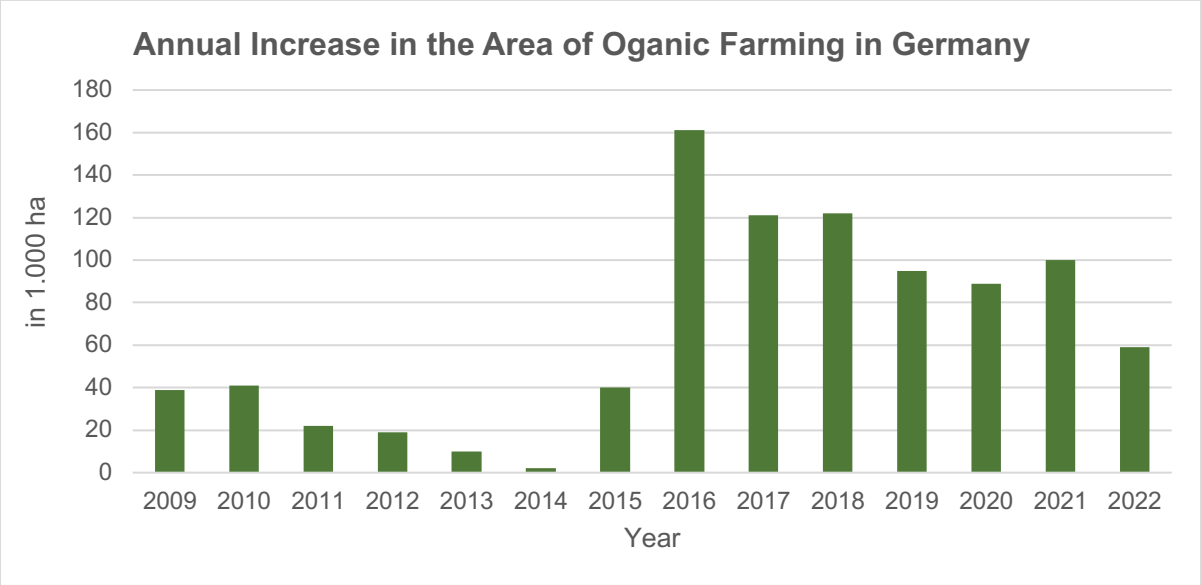

Figure 5:Annual increase in organic farming area in Germany between 2009 and 2022. (Own illustration. Source: Thünen Institute (2003)),

In addition, financial subsidies from the GAK (Improvement of the Agricultural Structure and Coastal Protection) for organic farming in Schleswig-Holstein and state funding increased. Habeck commented: “Organic farming does an enormous amount for society. It helps water protection and biodiversity. These are services that the market does not remunerate. That is why state support for organic farming is certainly appropriate” (MELUND SH, 2015, n.p.).

The development of growth in organic farming in Schleswig-Holstein is particularly interesting to observe when compared with the annual increase in the area of organic farming at national level (see Figure 5). Both, the number of organic farms and the area under ecologically utilized land in Schleswig-Holstein, increased around 2015 (see Figures 3 and 4), as did the annual increase in organic farming in Germany as a whole. However, while the numbers in Schleswig-Holstein continue to rise for the most part after 2016, they fall at the national level. There is another slight increase in 2021, but the following year the numbers declined strongly (see Figures 3,4 and 5). This shows that Schleswig-Holstein has a development in organic farming that contrasts with the national level.

2.4.3 Organic Agriculture Development in Aligment with the European Green Deal

The developments of organic agriculture in Schleswig-Holstein mirror the current European objectives of the European Green Deal. Since 2019, the European Green Deal has provided the overarching framework for sustainable agriculture and organic farming within the EU, including in Schleswig-Holstein. The primary objective of the Green Deal is to make Europe the first climate-neutral continent by 2050, while protecting ecosystems and biodiversity through reduced environmental pollution and sustainable resource use (European Commission, 2019a). The agriculture sector was included in the strategy and point seven of "The European Green Deal - Agricultural Aspects Presidency paper" is dedicated to sustainable agriculture. In it, the commission advocates the importance of national strategies to act in line with the Green Deal and the Farm to Fork strategy and its role to increase the use of sustainable practices (e.g. precision agriculture, organic farming, agro-ecology, agro-forestry stricter animal welfare standards) and the increase of organic utilized land. Additionally, measures like eco-schemes should incentivize farmers who are improving environmental and climate performance. This can be managing and sequestering carbon in the soil, using alternative plant protection products, and improving nutrient management to enhance water quality and reduce emissions(Council of the European Union, 2020). To pursue these goals in the agricultural sector, more specific supporting strategies have been implemented by the European Union: The Farm to Fork strategy, the Biodiversity Strategy, and the Soil strategy. Furthermore, the renewing of the Common Agricultural Policy (CAP) and the 'EU Mission: A Soil Deal for Europe' are implementations to realize the transformation to more organic agriculture in the EU (Boix-Fayos and de Vente, 2023).

Farm to Fork Strategy

The Farm to Fork Strategy emphasizes reducing dependency on pesticides, antimicrobials, and fertilizers while promoting organic farming, improving animal welfare, and reversing biodiversity loss (European Commission, 2020). It identifies organic farming as a key practice for transitioning to more sustainable agricultural systems. To achieve its goals, the strategy outlines several instruments, including: 1) adapting directives such as the sustainable use of pesticides; 2) enforcing environmental legislation like reduced fertilizer use; 3) developing specific action plans, including an action plan for organic farming; and 4) integrating targeted measures into the CAP national strategic plans (Boix-Fayos and de Vente, 2023).

Soil Strategy

While being intertwined with the Green Deal and the Farm to Fork Strategy, the Soil Strategy also fosters the Biodiversity Strategy. Within the Soil strategy soil health is the prioritized target. It consists of a framework of specific measures for the protection and restoration of sustainable utilized soils. The goal is to ensure that the EU has healthy soils in 2050 and specific actions will be taken by 2030 (i.e., a Soil Health Law for environmental and health protection) (European Commission, 2021). The strategy is supported by the 'EU Mission: A Soil Deal for Europe' since on of its focus lies on academic work and innovation in the field of sustainable agriculture(Boix-Fayos and de Vente, 2023).

Biodiversity strategy

The Biodiversity Strategy focuses on biodiversity and natural capital with the goal of restoring carbon-rich habitats and agriculture, which does not cause harm to the environment or the climate. It is based on the fact that food systems and agricultural activities are endangered by biodiversity loss and "aims to bring nature back to agricultural land and acknowledges the vital role of farmers preserving biodiversity" (Boix-Fayos and de Vente, 2023 n. p.).

Common Agriculture Policy (CAP)

The CAP is a common policy for all EU countries launched in 1962. It is a partnership between agriculture and society and between Europe and its farmers, (European Commission, 2024b). In 2020, the CAP expanded from being about food security and the income of farmers including healthy products from sustainable production (Council of the European Union, 2020). The objectives from the most recent CAP (2023-27) are based on fulfilling the goals of the Green Deal and the EU sustainability goals of agriculture and rural areas (Boix-Fayos and de Vente, 2023) , and they will be implemented at a national scale (Nadeu et al., 2023). It should support European farmers in combating climate change as well as nature conservation and encourage transition processes regarding sustainable and resilient food systems (European Comission, 2020).

EU Mission: A Soil Deal for Europe

The EU Mission was created to lead the transition towards healthy soils across the EU. The defined actions to reach this are: 1) funding an ambitious research and innovation program where the focus lays strongly on social sciences; 2) setting up 100 living labs and lighthouses with the reason of co-creating knowledge, as well as test solutions and demonstrating their value

in real-life conditions; 3) Creating a harmonized framework for soil monitoring across Europe; and 4) Enhance people´s awareness on the vital importance of soils (European Union, 2024). The mission contributes to the European Green Deal´s goals of sustainable farming, climate resilience, biodiversity and zero pollution (ibid.).

The example of Schleswig-Holstein demonstrates that organic farming serves as a practical application of sustainability principles in the region. Its growth aligns closely with the goals of the European Green Deal and its supporting strategies, making it an ideal case study for understanding the dynamics of agricultural sustainability transitions.

3 Theoretical-Conceptual Framework

The conceptual framework of Sustainability Transitions and the Multi-Level Perspective Approach is presented in this chapter. The different levels of this approach are presented as well as the critiques and limitations of this framework.

3.1 Sustainability Transitions

Environmental problems like climate change, loss of biodiversity and resource depletion are part of grand societal challenges in the field of sustainability transitions research. They are the result of unsustainable consumption and manufacturing structures in socio-technical systems. These can be, e.g., heat, electricity, buildings, mobility and agro-food (Köhler et al., 2019). To fight these grand societal challenges, technological innovation and improvements are not enough. Radical changes to new systems are needed, which are then called "Sustainability Transitions" (Elzen et al., 2004; Grin et al., 2010). The field of Sustainability Transitions has a different focus from what was usually used to in past sustainability debates. Usually, these have been analyzed only at the macro level, such as changes in the nature of capitalism or the interactions between nature and society, or at the micro level, such as changes in individual decisions, attitudes and motivations (Köhler et al., 2019). In sustainability transitions, however, the unit of analysis is at the meso level. The aim is to develop theories and find explanations as to how a radical change can occur that can also comply with the functions of society at the same time (Geels, 2004). It is described as a "long-term, multi-dimensional and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption" (Markard et al., 2012, p. 956). The central role of power, politics, and public policies are of great significance for sustainability transitions (Kern and Markard, 2016). Especially for sustainability debates and the broader social sciences, it is a topic of interest and discussion since it has a wide range of implementations and is transdisciplinary (Köhler et al., 2019). Actors should not be seen as one homogenous block with the same opinions and beliefs (Fuenfschilling and Truffer, 2014), and the regime can also have incoherence within itself (Geels, 2011). According to Fuenfschilling and Truffer (2014) and Geels (2011), internal disputes and discussions within a regime should be examined, as they can reveal the extent to which fractures can be seen and where changes could take place.

Köhler (2019) identifies several key characteristics of sustainability transitions, highlighting their complexity and unique dynamics. These transitions are multidimensional and shaped by

co-evolution, meaning they do not follow a linear path but instead develop individually. They are also multi-actor processes involving various stakeholders with differing perspectives, making progress challenging and beyond the scope of single theories or disciplines. A key tension in sustainability transitions lies between stability and change. New sustainable innovations such as renewable energy systems often challenge well-established systems like fossil fuel-based energy which are reinforced by lock-ins and entrenched patterns. This also applies to organic farming and conventional/ intensive agriculture (Unruh, 2000; Walker, 2000). Understanding the interplay between the stability of these systems and the push for radical change is a significant focus of research. These transitions are inherently long-term processes, requiring time to develop sustainable ideas and unlock existing systems. They are also open-ended and uncertain, with outcomes that depend on unpredictable political, cultural, and social factors. The concept of sustainability itself is contested, leading to debates about priorities and pathways. Established industries often resist change, using their influence to delay the adoption of sustainable innovations. Finally, the normative directionality of sustainability transitions underscores the central role of politics and policy. As sustainability is a public good, political frameworks and clear goals are essential for guiding transitions, as private actors alone lack the capacity to drive systemic change (ibid.).

Sustainability Transitions research is working on how transformation of socio-technical systems evolves with the help of radical changes into more sustainable systems. This is not only limited to technologies but also implies changes in institutions, practices, and cultures with which the previously ruling technology was surrounded and linked (Markard et al., 2012). Sustainability Transitions are processes that are contested, complex, uncertain, long-term, multi-dimensional, and context-dependent (Kern and Markard, 2016).

The founding theoretical scope shows that the most used frameworks to comprehend, conceptualize and develop transitions towards sustainability are the Technological Innovation System approach, Strategic Niche Management, Transition Management and the Multi-Level Perspective (MLP*)* on socio-technical transitions (Markard et al., 2012; Van Den Bergh et al., 2011). Other notable frameworks are technological innovation systems, techno-economic paradigm shifts and socio-metabolic transitions (Lachman, 2013). They grasp co-evolutionary complexity, key elements, path-dependency, emergence and non-linear dynamics from a systematic point of view (Köhler et al., 2019). The sustainability transitions field is characterized by various research directions, such as the speed of transitions, breakthrough,

diffusion and tipping points, or the destabilization, decline and phase-out of existing systems (Köhler et al., 2019). Relevant to this paper is research that looks at the power of lock-in mechanisms, especially what shifts are detectable over time. This direction has just developed over the last few years (Klitkou et al., 2015). The aim is to find particular evaluation of the degree of path dependency and to identify stresses or cracks in the established system (Köhler et al., 2019). Furthermore, Sustainability Transition research also uses ideas from other social science fields to understand the development or aspects of transitions, such as policy change (Markard et al., 2016).

3.2 Selection of the Framework – the Multi-Level Perspective

The Multi-Level Perspective is one of the commonly used transition studies approaches (Geels, 2002; Rip and Kemp, 1998; Smith et al., 2010) and will be used in this study. It combines aspects from different theories like evolutionary economics, the sociology of innovation and institutional theory to show the multi-dimensional nature of shifts in socio-technical systems. The MLP framework was created by Rip and Kemp (1998) and was further sharpened by the scholars Geels and Schot (Geels, 2005, 2004; Geels and Schot, 2007; Grin et al., 2010) years later. It supports the idea that transitions are the result of dynamic processes inside and between three analytical levels: 1) niches, which are the locus for radical innovations); 2) socio-technical regimes, which refer to how the established structure of existing systems determines the path dependency or incremental changes; and 3) exogenous socio-technical landscape developments (Geels, 2002; Köhler et al., 2019). It combines the micro, macro and meso levels and focuses on socio-technical regimes (Lachman, 2013).

The scientific database Scopus is one of the most important bibliometric databases of peer-reviewed scientific publications. It was used for this paper to see if the Multi-Level Perspective framework is well suited to examining the theory of sustainability transitions. To find publications that focus mainly on the topic, it is limited to ones where the keywords appear in the titles, keywords or abstracts. The search entry was TITLE-ABS-KEY (“Sustainability” AND “Transitions” AND “Agriculture”). Overall, 1328 documents were found (search date of 17th of May, 2024) and were sorted by relevance. Furthermore, the language restriction was applied only to articles written in English and German. The timeframe for publication dates starts in 2014 because there was a strong rise in the number of papers on sustainability transitions in peer-reviewed journals and citations (Köhler et al., 2019). The end of the timeframe is until the end of 2023, so the research period is exactly ten years. Highly specialized

topics like medicine, chemistry, physics, etc. were excluded. 1023 documents were found with these limitations. To gain an overview of the main topics in this field the results were sorted by "relevance" and the citation overview was downloaded from the first 100 documents. These were then worked through chronologically until there were 55 documents, which is a decent number to get a comprehensive first overview. A chronological order was chosen to find the most relevant and most recent papers and perspectives on this topic. This was done by reading the abstracts to get an overview of whether the papers fit thematically with sustainability transitions in agriculture. If the documents did not fit thematically (when sustainability transitions within the agricultural sector was not the topic of interest), the paper was removed from the citation overview. Twelve of the articles were either applying to the MLP framework or discussed it within their work. The MLP is "underpinned by a broad and deep empirical evidence base" (Geels, 2019, p. 189), which is a clear strength of the framework (ibid.). Furthermore, the framework of the MLP approach is currently incrementally used for studies in the field of agriculture research (Vermunt et al., 2020).

Niches

Radical innovation arises in niches where alternatives can grow due to the influence of new actors like pioneers and entrepreneurs (Rip and Kemp, 1998). It is a protective space, free from dominant rules of the market, where innovations can grow (Geels, 2011; Smith et al., 2010). In the context of agriculture, niches are conceptualized in this thesis as "alternative and innovative approaches to agriculture, developing around the principles of sustainable agriculture […]. These innovations are almost invariably responding to concerns about the environment and rural communities and tend to challenge mainstream agriculture. They often occur in the form of networks of individuals and/or organizations experimenting with new solutions that form innovative niche practices on the margins of the mainstream agriculture regime. These can be bottom-up networks emerging in a self-organizing fashion and coordinated by farmers and rural actors themselves, coalition networks with regime actors, or emanating from within the regime itself (e.g., Aarts et al., 2007; Knickel et al., 2009) They can include urban networks of citizens-consumers and non-traditional rural actors" (Ingram et al., 2015, p. 56).

Regimes

With the regime, a long-established socio-technical system is described, which consists of the network of actors and social groups with their values, beliefs, and power relations, formal and informal policies and regulations, and technologies and materials, which are fundamental for

the system and its processes (Geels, 2011, 2004; Holtz et al., 2008). These elements of social and technical aspects are closely interrelated, dynamically stable, autonomous, and they serve a (societal) purpose, such as food or nutrient provision. Changes or transformations in these systems are not common (Holtz et al., 2008) and result in the reduction of complexity (Rip and Kemp, 1998). The regime level is represented in the agricultural sector by established actors, including large-scale farming enterprises, agricultural cooperatives, policymakers, and agribusiness corporations.

Landscape

The socio-technical landscape refers to the broader, external environment that shapes socio-technical systems and represents the macro-level of the MLP approach. The effects, events and developments on this level strongly influence the levels below, e.g., through and with demographical patterns, macro-political ideologies, autonomous trends and global events, deep cultural patterns, societal ideologies or macro-economic patterns. This can even lead to systemic change. However, the niches and regimes have nearly no influence on it (Geels and Schot, 2007; Lachman, 2013). There are three landscape dynamic patterns, which are dominant in the field of research. Firstly, there are elements that either change not at all or really slowly (e.g., physical climate). Secondly, there are factors that shape the direction in the long term. Finally, there are external shocks, such as wars or pandemics, which have a direct impact (Driel and Schot, 2005; Geels, 2011).

Through processes between and within these levels transitions can develop (see Figure 6). Geels and Schot (2007, p. 400) describing the process as follows: "(a) niche-innovations build up internal momentum, through learning processes, price/performance improvements, and support from powerful groups, (b) changes at the landscape level create pressure on the regime and (c) destabilization of the regime creates windows of opportunity for niche- innovations. The alignment of these processes enables the breakthrough of novelties in mainstream markets where they compete with the existing regime". Landscape development is in the role to challenge the regime, so "cracks, tensions and window[s] of opportunity" (Köhler et al., 2019, p. 4) occur and niche-innovations have a chance to be established.

In existing systems and regimes the innovation process is due to different lock-in mechanisms incremental and path-dependent and therefore not radical enough (Klitkou et al., 2015). Techno-economic lock-in mechanisms describe either the interest in maintaining old structures since a) money was invested in competencies, factories or infrastructures or b) the high money outcome (Köhler et al., 2019).

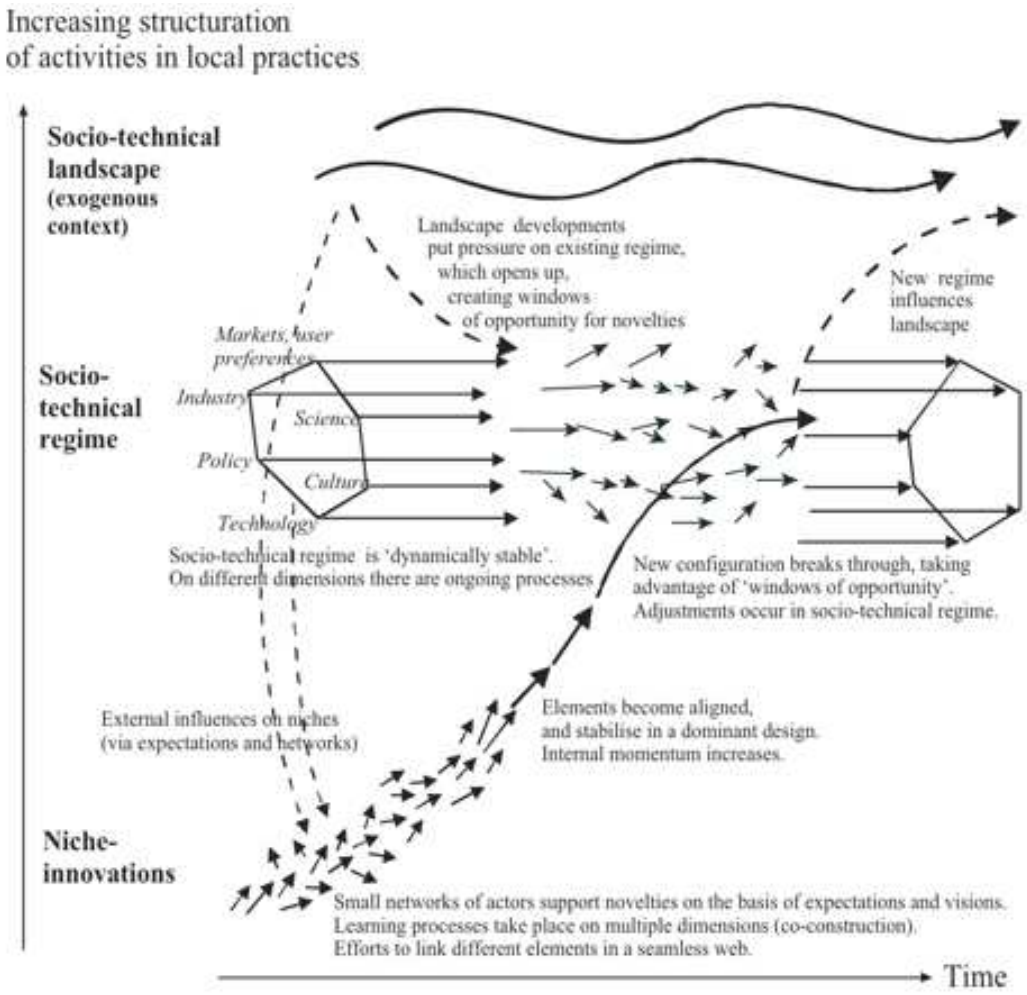

Figure 6: Multi-Level perspective on transitions (by Geels and Schot, 2007, p. 401, adapted from Geels, 2002, p. 1263).

There are various elaborations in the field of MLP that cover different areas (Köhler et al., 2019):

1) The increasingly differentiated considerations of relationships between niche-innovations and existing regimes while beyond substitution dynamics. Such considerations include specified translation of niche characteristics into regimes (Smith, 2007), clashes on a political level between niche and regime actors (Hess, 2016) and the role of intermediary and boundary actors in matching niche and regime developments (Diaz et al., 2013; Kivimaa et al., 2017; Smink et al., 2015a) as well as the aim of niche-enablement activities at aligning established

regimes (Smith and Raven, 2012) or joint work between incumbent firms and new entrants (Geels et al., 2016).
2) The shift from the early beginnings of this theory studied niche-innovations to the focus on incumbent regime actors, like active resistance to transitions (Geels 2014), as well as institutional regime-shaping processes (Fuenfschilling and Truffer, 2014; Smink et al., 2015b). Expanding the initial stereotype of new entrants that create radical innovations and incumbents that develop incremental innovation, recent literature shows that established players can also switch to radical niche innovations (Berggren et al., 2015; Penna and Geels, 2015) or that established players from other sectors are involved with niche innovations (Hess, 2013).

3) There was a move away from a one-sided to a multifaceted approach to look on transition pathways. This resulted in different typologies, which accordingly also differ in the dimensions they affect (Köhler et al., 2019). On the one hand, it is divided (Berkhout et al., 2004) into purposive transition, endogenous renewal, reorientation of trajectories and emergent transformation. On the other hand Geels and Schot (2007) differentiate between substitution, transformation, reconfiguration, and de-alignment and re-alignment. Lastly, De Haan and Rotmans (2011) show various combinations of dynamic patterns with multiple outcomes of pathways.

4) Scholars have examined the contribution of certain stakeholders or dimensions in transitions and the MLP, like users (Schot et al., 2016), civil society actors (Smith, 2012), cultural discourses (Roberts, 2017) and businesses (Farla et al., 2012).

3.3 Critiques and Limitations

Even though the MLP provides a unique approach to the sustainability transformation approach, scholars have identified its critics and limitations. For example, there is limited focus on socio-ecological systems, distribution systems (e.g., labor markets, tax, and monetary systems) and social sustainability (e.g., inequality, poverty, work conditions) (Geels, 2019). Another criticism is the very little to no focus on sustainability outcomes or impacts (Gillard et al., 2016). Geels (2019) emphasizes that green innovations are often overlooked for their potentially negative effects. Furthermore, the literature tends to neglect the question of how significant the sustainability improvements truly are, and whether they are worth the time required compared to the time it takes for environmental issues to escalate. Also, the room for various interpretations that the descriptive framework allows is another general point of criticism

(Markard and Truffer, 2008; Smith et al., 2005). It is also important to note the criticism of the MLP approach regarding its lack of spatial awareness. This refers to the fact that research that uses this approach often only superficially applies geographic perspectives and spatial dimensions to existing theories from the transition literature. Therefore scale and space are often neglected in transition studies (Coenen et al., 2012; Frantzeskaki et al., 2017). The MLP-approach in its original form is not sufficiently focused on the spatial and scale-related dynamics of transition processes, which may limit the possibilities for conceptual innovation. The approach of Geographies of Transition (Loorbach et al., 2017; Markard et al., 2012) aims to close this missing layer and to create spatial awareness through questions about the spatial contexts and the general understandings of space (Levin-Keitel et al., 2018).

However, the MLP framework offers a comprehensive and systematic methodology for analyzing sustainability transitions, encompassing interactions at the niche, regime, and landscape levels. This allows for a comprehensive approach to understanding the complex dynamics of the pathway of organic farming within the agricultural sector of Schleswig-Holstein and to answer the research question(s).

4 Methodology

The aim of this research is to show the pathway of sustainability transitions with the sector of organic agriculture in Schleswig-Holstein. This was done by studying the stakeholders involved, the policies and the conflicts within the sector. The MLP approach was used for operationalization. The focus of this master's thesis is on an empirical research approach from a qualitative perspective. The chosen research design is an embedded single-case study (Yin, 2018). The context is the development of sustainability transitions in agriculture, and the case hereby is Schleswig-Holstein. The subunits within this case-study are **Policy & Regulatory Frameworks, Public & Societal Discourse, Strategic & Practical Initiatives, Key Actors and their Roles, and External Events & Influences** (see Figure 7).

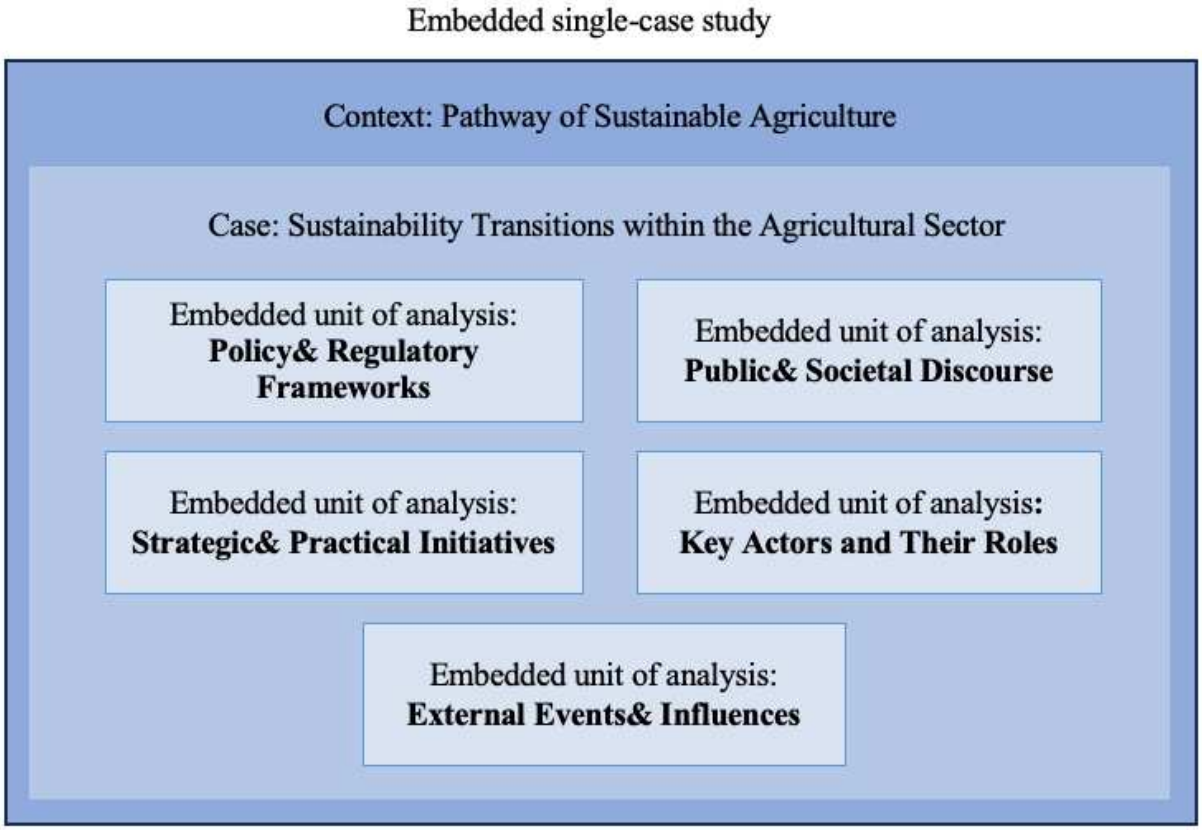

Figure 7: This studies case design (Own illustration. Based on Yin, 2018, p. 84, Fig. 2.4).

These were selected based on the selected main categories (see Table 1 in Chapter 4.4) that emerged from the coding process with the MAX-QDA software. These categories were inspired by the research question(s) and a framework for content analysis from Kuckartz and Rädiker (2022), therefore an indicative way of choosing categories was used (See Chapter 4.4). Policy & Political frameworks are intended to represent the basic political framework that exists at

various levels (regional, national, global) for organic agriculture. Another unit is Strategic& Practical Initiatives, which analyses which bottom-up, grassroots or other initiatives exist that have an influence on the development of the sector. The Public & Societal discourse was chosen as an embedded unit of analysis to examine society's compliance with policy implementation and also to see relevant topics that are not covered in official policy documents. The Key Actors and Their Roles unit helps to show the influence of the actors and to understand networks. The last embedded unit of analysis is External Events& Influences. The aim here is to identify factors at the landscape level.

The data that was gathered was analyzed by using the qualitative content analysis method and then applied to the multi-level perspective approach.

The main research question is the following:
How has the political pathway of the organic agriculture sector in Schleswig-Holstein developed in the period from 2009 to 2023?

Secondary questions:

1. How did policy implementations shaped the development of organic agriculture?
2. Which actors are involved, and how did they support or hinder the development of organic agriculture?
3. What are the main conflicts discussed in a political and societal context regarding agriculture?

4.1 Case selection

The choice of a single-case design was made on different selection criteria, on which the case and its subunits were based on (Yin, 2018). More research regarding sustainability transitions and organic agriculture is **critically** needed since it is an urgent issue that is globally faced. Agricultural practices have many challenges to adapt to, like climate resilience, environmental protection, and food security. Therefore, it makes this research relevant to policymakers, and agricultural stakeholders. With the MLP approach, the interplay between niches, regimes, and the landscape can be analyzed, and it reveals essential conditions for a successful Sustainability Transition. There is no similar study to the case of Schleswig-Holstein known till now. Furthermore, it is also a **common** case since it shows typical challenges, policies, and strategies for sustainable agricultural practices within a European context. The issues Schleswig-Holstein

faces are like those of many other European agricultural regions, such as policy demands, responding to environmental pressures, and balancing economic and ecological needs. Because of this, insights from this study can be applied to other regions with similar prerequisites and problems as well. Schleswig-Holstein, as a case for this study, is also an **exceptional** case since it has a rural character combined with an environmentally conscious general public, which can be seen in the high presence of the Green Party over time in the state government (Landesportal Schleswig-Holstein, n.d.). Therefore, the general support for sustainability is higher compared to other regions, which influences the regime actors and could be a favorable basis for Sustainability Transitions. The sector of organic agriculture has grown significantly since 2014 and established itself in this region. Therefore, it can be seen as a 'best practice' example for establishing organic agriculture. Furthermore, this study is a **longitudinal** case since it spans a significant period from 2009 to 2023 and, therefore, studies the same case at different points, which is crucial to understand changes over time (Yin, 2018). It can show how various factors like changes, trends, and development in organic agriculture have changed over the years, how Schleswig-Holstein is responding to emerging challenges, and how the sustainability pathway has emerged over this period.

4.2 Method for Data Analysis

This chapter provides an overview of the analytical technique employed in the data analysis.

4.2.1 MAX-QDA

The MAX-QDA software program was selected as an instrument for the evaluation of qualitative data analysis. In addition to managing the texts of a project and organizing the texts in the form of subgroups according to user-selected criteria, the software can also be used to define categories and construct a category system, assign categories to selected sections of text, or compile all text segments coded to a category (Kuckartz, 2010). In addition, the program can group categories into hierarchies and networks and create visual representations of category assignments. Thus, it supports data analysis and makes it possible to evaluate large data sets in a smaller time frame than would be possible analogously (ibid.).

4.2.2 Qualitative Content Analysis

The qualitative content analysis is a widely used qualitative research method that is used for the systematic analysis of texts, interviews, focus groups or other written documents. The goal of a content analysis is to identify and interpret central themes, patterns or categories from the

textual data. It can be carried out both inductively (from the data) and deductively (based on existing theories). The qualitative content analysis can be applied to a wide range of different types of texts which allows a structured and comprehensible analysis (Kuckartz and Rädiker, 2022; Mayring, 2015; Schreier, 2012). The use and procedure of Qualitative Content Analysis in this thesis is further explained in detail in Chapter 4.4.

4.3 Data collection

In this thesis, various data was collected from different sources, which was then subsequently used for the analysis. Two relevant document types from the social sciences were chosen: newspaper articles, as a group of official documents, and transcripts from the Environment and Agriculture Committee as well as official policy documents, as internal documents from state administrative organizations (Salheiser, 2019)

Newspaper articles were chosen as one of the data sources for this thesis as they are an easily accessible source that is regular and long-term, allowing comparisons to be made over a period of time (Taddicken, 2019). It is assumed that one can also draw conclusions about social reality from the findings of newspaper articles, so that there can be a certain correspondence between media reality and actual reality (Merten, 1995). Conclusions about the historical, political, or social context are relatively straightforward to infer, as media reporting is generally assumed to offer reliable insights into social reality, particularly in democratic states with a free press (Rössler, 2010). Even if newspaper articles only ever represent a section of reality, "media discourse in newspaper articles and online news can be a very good indicator of what moves a society and what it is discussing" (Taddicken, 2019, p. 1160).

To obtain a balance of data from media reality and actual reality, the transcripts from the Environment and Agriculture Committee as internal documents from state administrative organizations, were chosen. These are available online by the Schleswig-Holstein state parliament. The selected data sources and the procedure within these for reducing the data used are presented in detail below.

4.3.1 Newspaper

Fixed regulations were defined for data acquisition to guarantee a transparent and reproducible work process. The Schleswig-Holsteinische Landeszeitung was selected as the medium to be examined, as it is sold nationwide and covers regional and local topics. It was the newspaper

with the highest print run in the 4th quartal of 2023 with 12462 prints (IVW, n.d.), which also met the criteria of not having a focus on a specific region within Schleswig-Holstein and having a digital archive that goes back several years and which can be accessed as a private individual. Kieler Nachrichten and Lübecker Nachrichten, for example, have a higher circulation, but the archive is only available in analog form, and only ten copies can be retrieved per day, which was discovered via email correspondence with the Kiel City Library and the contact office of the newspapers. This would take up too much time and exceed this thesis's scope. The Flensburger Tagesblatt also has a higher circulation with 16829 prints in the 4th quarter of 2023 and a digital archive, but the focus here is on the Flensburg region and, therefore, does not reflect the entire area under investigation.

A Premium subscription was required to gain access to the archive of the Schleswig-Holsteinische Landeszeitung, which is released under the SHZ publishing house. With this, it is possible to search for articles with keywords in a certain period. However, the keyword search does not allow an "OR" search, so if several words are searched for, all articles containing one or both keywords are displayed, which is an "AND" search. For this thesis, the words “Nachhaltig” (sustainable) and “Landwirtschaft” (agriculture) were entered in the search bar. The archive goes back to January 2004 up to the current day of the page visit, and it is possible to enter the exact date on which an article was searched. It is possible to search within several newspapers published under the SHZ publishing house, but a frequent duplication of articles was noticed in the sample, which is why this work concentrates on just one newspaper. In order to find texts relevant to the research question, the articles found with the keywords are filtered again by the author sorting out articles in which neither the title nor the text contains “Nachhaltig” and “Landwirtschaft” or similar content words, like “Landwirt(in)” (Farmer) and “Klimawandel” (Climate Change), “Klima(wandel)anpassung” (Climate (Change) adaptation); “Bio” and “Öko” (Organic), “Umweltschutz” (Environmental protection), “Umweltgerechtigkeit” (Environmental justice) and “Naturschutz” (Nature conservation). Articles containing the term "Landesamt für Landwirtschaft, Umwelt und ländliche Räume" were not included if the focus was not on agriculture. Only the articles that were displayed via the search function were considered. Articles that have appeared several times in the search are only included once. The articles in the archive are not in chronological order.

Furthermore, segments for external or internal advertising were excluded, and references to online articles and articles that focus on location are not in Schleswig-Holstein or about the

German or European Union Agriculture policies. In addition, articles were also included that were not displayed directly via the search but were announced on the front page and then individually selected. The referring articles were not included in the text corpus to avoid duplication. Furthermore, articles in the sector of sports, travel, people and recommendations were excluded, as well as segments in quizzes or similar. The sample did not include articles whose content is clearly not about sustainable agriculture or similar.

The time frame for a year goes from the first day of publication in January till the last day of publication in December of each year, beginning in 2009 till 2024. This time frame was chosen because in 2009, the Green Party, which is supposed to promote sustainable development, was represented in the state parliament in Schleswig-Holstein for the first time with over 10% and has remained above this threshold ever since (Statista, 2024). This makes a total of three legislative periods and nearly two years and, therefore, also forms a representative basis for the development over time that can be observed. During the research, it became apparent that some text segments of an article were not included in the archive, i.e., the article was not always complete. This is an error in the system and could not be rectified.

The newspaper articles to be examined were limited to a set of the first 30 articles in order not to go beyond the scope of this work and still have a lot of comparable material. In some years, especially before 2014, this number wasn't reached. However, this also provides important insights, as it allows the relevance of the topic to be interpreted in a public context. For example, in 2009, there were 17 selected articles; in 2010 it was 14, and in 2011 it was a total number of 18 articles. 2012 saw an increase to 24 articles; in 2013 it went down again to 19. From 2014, the number of articles varied between 24 and 30, and from 2019, 30 articles were always reached. This finding coincides also with the increase in scientific articles on the topic of sustainable agriculture (see Chapter 2.3), as well as the increase in organically cultivated land and organic farms in Schleswig-Holstein (see Chapter 2.4.2), where there is a steady increase since 2014. The number of articles on the searched buzzwords also increases over the years. Between 2009 and 2017, there were between 5 and 6 pages (20 articles per page), rising to 6 pages in 2018, 8 in 2019, and then increasing exponentially until 2023. The density of usable articles has also increased over the course of time. In 2011, for example, all suitable articles could be found on a total of five pages. In 2019, 15 articles regarding the search limitations could be found on the first three pages. From 2020, 30 articles could always be found on the first one to three pages. If 30 or more articles were available, the first 30 texts were included in

the database. If there were fewer, then as many as were available were included. This resulted in a total corpus of 365 articles, but was reduced after a second round of reading, where some articles were excluded that matched the search terms but whose content did not correspond to sustainable agriculture or related topics or were not relevant to the regional restriction. The corpus of articles included in the analysis is 296 articles.

4.3.2 Transcripts of the Environment and Agriculture Committee

Through internet research and e-mail contact with the office of the Environment and Agriculture Committee of the Schleswig-Holstein State Parliament, I gained access to the transcripts of the Environment and Agriculture Committee of the electoral periods under consideration (2009-2023). This series of policy documents was chosen because various members of parliament from the different parties in the Schleswig-Holstein Bundestag have to meet regularly in this committee and discuss agriculture-related topics. The documents also show which external actors are given a political hearing, as the transcripts also provide information about invitations from or to stakeholders or interest groups or statements from them on topics discussed in the committee. This gives a deeper insight into the relationship between policymakers and external actors. “Governance and politics are central to understanding, analyzing, and shaping transformations towards sustainability. This is because (1) governance is inherently implicated in any intentional effort to shape ‘transformations towards sustainability’, and (2) transformations towards sustainability are deeply and unavoidably political, and need to be recognized as such” (Patterson et al., 2017).

All committee transcripts were read according to the agenda at the beginning of the document. If a topic was found in there that was thematically relevant, the relevant section of the transcript was read and, if relevant, included in the summary. The extent to which topics were relevant was determined, on the one hand, by which topics had already appeared in the newspaper articles and which topics had been found in the literature review to sustainable agriculture. However, the relevant topics were continually adjusted while the transcripts were being read. In the 17th parliamentary term (EP), there were a total of 49 committee transcripts in the 18th EP 70, in the 19th EP 73, and in the 20th EP, which runs until 2027, the first 21 transcripts were considered, which ran until the end of 2023. This makes a total of 213 transcripts from 2009 to 2023 that were considered for this thesis.

4.3.3 Official Policy Documents

Finally, strategies and policy documents (eg., the Reports "Joint Task 'Improvement of the Agricultural Structure and Coastal Protection' (GAK)) which were found through online research and the newspaper and/ or transcripts, were considered. These were not coded but used to find information regarding official implementations or strategies. These were found on the official websites of the Schleswig-Holstein state parliament, the German federal parliament or the European Commission.

4.4 Data analysis

With the help of the computer-assisted qualitative analysis software MAXQDA (Yin, 2018), a structured qualitative content analysis is carried out in this research with a **deductive-inductive category formation** (Kuckartz and Rädiker, 2022; Mayring, 2015; Schreier, 2012)**.** This is the core method in qualitative content analysis procedures, which is also the most frequently used and is characterized by several coding runs (Kuckartz and Rädiker, 2022). The aim is to create predefined main categories from the research question(s) and already viewed text data and then use is as a search grid to categorize and identify useful information (deductive category formation). While reviewing and sorting these data into these main categories, subcategories will be created from new findings (indictive category formation) (Kuckartz and Rädiker, 2022).

The procedure for this research is described in the following subchapter, based on the process model of a structured qualitative content analysis according to Kuckartz and Rädiker (2022) (Figure 8).

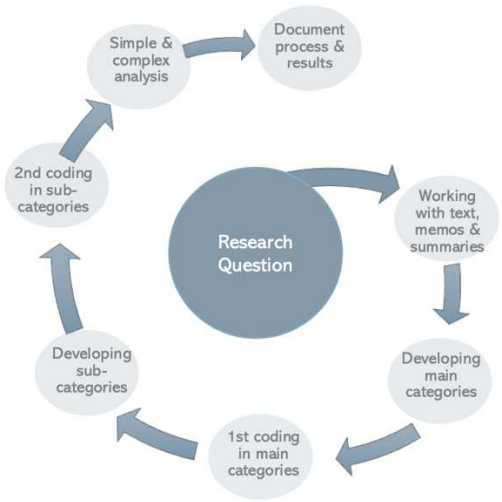

Figure 8: Procedure of a structuring content analysis in seven phases (Own illustration. Based on Kuckartz & Rädiker 2022: 132, Fig. 16).

Phase 1: Initiating text work, memos, case summaries

In this phase an overview of the material (newspaper articles, transcripts of the Environment and Agriculture Committee) were made. The text units were read in detail in chronological order of the years and notes/ memos were taken on conspicuous topics and aspects. The data was organized within MAXQDA. Initial thematic focal points that were relevant to the research question(s) were identified. For each year/ legislative period, a case summary was written for the different data sets with key points to get an overview of which topics were written about in that year/ legislative period.

Phase 2: Developing the main categories

A category system was developed with initial main categories inspired by the research question and the framework (Kuckartz and Rädiker, 2022). Nine main categories were established (see Table 1). A test run was carried out with a small amount of text before the actual coding process was started. This is important to check the legitimacy of the main categories and to start the first coding process of the whole material (Kuckartz and Rädiker, 2022).

Phase 3: Coding data with main categories (1st coding process)

The original categories provided a structured foundation for Phase 3 (ibid.), the initial coding phase. At this stage, the interviews were manually coded using a search grid that incorporated nine primary categories. Throughout this process, text sections unrelated to the research focus were omitted, while passages relevant to multiple main categories were assigned accordingly to more than one category. The code segments could be a single sentence, a group of sentences, or a full paragraph.

Phase 4: Creating inductive subcategories

In Phase 4, subcategories were inductively developed from the content associated with each main category. The aim was to create a coding system that maintained clarity and simplicity while capturing the required level of specificity. This approach minimized the potential for coding inaccuracies. Careful adjustments were made to ensure alignment with empirical data and research objectives based on close examination of the data and consistent reference to the research questions.

Phase 5: Coding data with subcategories (2nd coding process)

Phase 5 began with a test run in MAXQDA, which marked the start of the second coding phase. Phases 4 and 5 were conducted in an iterative cycle: Subcategories were generated for each main category and then provisionally applied to the dataset before moving on to the next main category. For text segments associated with multiple main categories, this iterative approach facilitated the identification of the most appropriate main category for each segment and ensured clarity and consistency in the coding structure.

Phase 6: Simple and complex analyses

This phase focused on the analysis of the refined main and subcategories employing both simple and complex analytical techniques. An analysis was conducted based on the primary categories. This scrutiny aimed to identify differences, similarities, significant elements, and interconnections among the categories (ibid.). Additionally, data from all the other sources of evidence were integrated into the analysis to provide a comprehensive understanding of the research findings.

Phase 7: Write down the results and document the procedure

The analysis process was documented comprehensively in this phase, with findings from earlier phases summarized. Phases 6 and 7, involving data analysis and final documentation, are inherently linked and often require iterative refinement. While Phase 6 focuses on data examination, where initial notes and draft segments are created, Phase 7 involves organizing and systematically presenting the final results. In this study, the analytical framework and theoretical foundations provided structure for both the analysis sequence and the reporting process, ensuring clarity and coherence in the documentation of findings.

Table 1:The final Main- and Subcategories from the Deductive-Inductive Category Formation.

ID	MAIN CATEGORY	SUBCATEGORIES
1	Regional Context & embeddedness	**1.1** Spatial context; **1.2** Economic context; **1.3** Socio-cultural context; **1.4** Political context; **1.5** Environmental context
2	Politics & Policies	**2.1** Policies; **2.2** Regulations; **2.3** Political Initiatives **2.4** Laws & Strategies **2.5** Funding Programs **2.6** National Policies & Politics
3	Agriculture in SH	**3.1** Problems **3.2** Reputation **3.3** Economic
4	Sustainable Agriculture	**4.1** Sustainable Methods; **4.2** Critics to Sustainable Agriculture
5	Actors, Agencies & Networks	**5.1** Regional Actors **5.2** Agricultural Organizations; **5.3** Environmental Organizations; **5.4** Political Actors/ Parties; **5.5** Research; **5.6** Conflicts
6	Innovations	**6.1** Environmental; **6.2** Social **6.3** Financing Funding; **6.4** Technological Innovation; **6.5** Networks, **5.7** Collaborations
7	Landscape Influences	**7.1** Environmental crisis; **7.2** Market Changes; **7.3** Consumer Demands; **7.4** EU agricultural Policies
8	Barriers	No subcategories
9	Drivers	No subcategories

According to Yin (2018), due the representation of logical statements of a research design the quality can be assured through validity and reliability. In this research, **construct validity** was ensured by using multiple sources of evidence. Data was collected from newspapers, as well as official transcripts and policy documents were used. Through this, the topic was illuminated from a social and official point of view. The research design was also approved by the thesis supervisor. **Internal validity** was ensured in this study due to pattern matching, explanation buildings, addressing rival explanations, and the use of logical models (ibid.). **External validity** refers to the capacity to generalize the results of a case study beyond the specific scope of the

study. It examines whether the conclusions of the study can also be applied to other contexts, cases, or situations (Yin, 2018). By comparing the empirical results with the assumptions and processes of the MLP, it can be shown that the findings are theoretically anchored and could be transferred to other cases that exhibit similar niche regime landscape dynamics. Schleswig-Holstein could serve as a representative case for European agricultural regions that share similar sustainability challenges and policy frameworks. Alternatively, it could be considered as an exceptional case to study specific mechanisms and dynamics that can later be applied to other regions (ibid.). Lastly, the **reliability** test was also used in this research. With this, multiple replications of a study can be done, and it will result in the same findings and conclusions as the original one (Yin, 2018). A comprehensive digital database was created from the beginning of the research for this study, where research material was collected and organized in folders and subfolders to retrace the data, which was used in different chapters in this thesis. The Zotero software was used to organize and categorize the literature. Newspaper articles and official meeting transcripts were stored and organized, firstly with Microsoft Excel sheets and later with the MAX-QDA software, which was also coded and analyzed. Microsoft Word and Excel sheets were also used to organize thoughts, to-do lists, and notes. With the above it was made sure to have a transparent and replicable case study.

4.5 Limitations

In the literature there is also criticism on applying transition models to a sustainable agricultural system since the ecological factor is essential for agricultural systems. But the socio-technical transition literature does not contemplate the relationship with the ecological perspective and, therefore, can't give guidelines to enforce it for societal change (Patterson et al., 2017; Vermunt et al., 2020). Vermunt et al. (2020, p. 236 f.) identified two main characteristics of biodiversity relevant to the agricultural sector: "First is the place-based embeddedness of agricultural systems, which is a critical issue as it is in this place-based context where ecological, biophysical, and geographical dependencies occur. Second, in attempts to promote biodiversity in agriculture, specific problems arise due to the public goods' character of nature". Since place-based embeddedness and public goods aren't significantly weighted in socio-technical transition systems, these can be expected to result in other paths of transition development (ibid.).

The work is also limited in that it does not deal comprehensively with laws, resolutions, public statements, discussions, and the equivalent in Germany and the European Union since it would exceed the scope of this paper. The material that stood out from the data collection was selected.

5 Results

In this chapter, the different aspects of the pathway of organic farming in Schleswig-Holstein will be presented in line with the research question. Based on the MLP framework and the secondary research questions, political strategies and policies are outlined, actors and networks are presented, conflicts and external influences to the agricultural sector are shown as well as the barriers and drivers and local innovations, that all contribute to an comprehensive overview of the (organic) agricultural sector in this region.

5.1 Policy& Regulatory Frameworks

This chapter looks at the various policies and strategies implemented in the different electoral periods in Schleswig-Holstein at different scales regarding the agricultural sector and in particular organic farming, for the period of 2009 to 2023.

5.1.1 National and International Policies

The **German Sustainability Strategy**, published in 2002**,** must be mentioned to shed light on the various implementations after 2009. This strategy builds on the Agenda 21, which was adopted at the Earth Summit in Rio de Janeiro in 1992. For Germany, this is the first national strategy that focuses on sustainability. Its goals include the promotion of sustainable agriculture, like organic farming, as well as the protection of biodiversity, soils, water, and resources. The role of agriculture in combating climate change by reducing greenhouse gases through humus formation, peatland conservation, and extensification was also mentioned, even though very roughly in different subchapters. However, there were no direct measures for implementation. There are no clear, measurable, time-bound targets, and the strategy is more of a recommendation for action. At that time, 97% of agricultural land in Germany was farmed conventionally; the target was to increase the organic land up to 20% by 2010. However, this was also not addressed to agriculture with demands or measures but was placed in the hands of the consumers (“Whether this succeeds depends above all on the consumers, who decide with their demand”) (Deutscher Bundestag, 2002, p. 50).

The **Federal Organic Farming Program** was also introduced in the same year. From the program's inception to the year 2025, approximately 1,500 research projects have received funding totaling around 256 million euros. Additionally, nearly 4,900 knowledge transfer events, including seminars, workshops, field days, and competitions, have been conducted to

share practical research outcomes. Through these activities—alongside press and media efforts, a trainee program, and other initiatives—the program fosters collaboration across the entire value chain, raising awareness and building networks among stakeholders. It is also basis for the current Organic Strategy 2030 (see below) (Bundesanstalt für Landwirtschaft und Ernährung, 2025).

In 2007, the Council of the European Union adopted the **EU Organic Regulation (EC) No. 834/2007**. This was the first comprehensive EU-wide regulation on organic agriculture. It provided regulations for organic production and the labeling of organic products (e.g. EU organic logo). It also bans synthetic pesticides, chemical fertilizers and GMOs. A control system and traceability measures have been established and import regulations (European Union, 2007).

The policy framework for organic agriculture has been strongly influenced by **scientific research**. **The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC),** published in 2014, provided a crucial foundation by demonstrating with a high degree of scientific certainty that human-induced warming is the main cause of climate change (IPCC, 2014). In particular, the report highlighted the role of agriculture as both a cause of and a potential solution to climate change. These scientific findings have contributed to the increased integration of climate action into policy programs.

In this context, the **EU's Common Agricultural Policy (CAP)** was reformed in 2014 “Greening” measures were introduced, such as the introduction of ecological priority areas and the linking of subsidies to sustainable environmental measures and practices, like organic agriculture. A particular focus was placed on the protection of biodiversity and soils. The support model was based on production incentives and area payments (Council of the European Union, n.d.; European Commission, 2024c).

One year later, the **Paris Agreement** was adopted in December 2015, representing a significant international agreement within the United Nations Framework Convention on Climate Change (UNFCCC). The objective of the Paris Agreement is to address global climate change by establishing targets for the reduction of greenhouse gas emissions and the promotion of climate resilience. At its core, the Paris Agreement places significant emphasis on the importance of sustainability in the context of climate change mitigation and long-term environmental stability

(UNFCCC, n.d.). The newly introduced CAP and the Paris Agreement provided a new basis for working together towards more sustainable agricultural development at different policy levels within the European Union.

In 2016, the extensive **Revision of the German Sustainability Strategy** from 2002 was published. It was aligned with the SDGs from the **2030 UN Agenda**, which was published in 2015. In this context, agriculture is addressed in terms of climate protection, biodiversity, animal welfare, and international responsibility. Climate protection in agriculture is explicitly addressed, e.g., by reducing methane and nitrous oxide emissions, and there are precise targets for soil protection. Concrete target, namely, a reduction in the annual utilization of new land to a maximum of 30 ha by 2030 and organic agriculture and organic farming should account for 20% of the total agricultural area. Action programs and organic agriculture-model regions are proposed to be implemented by the federal states. (Bundesumweltministeriums, n.d.).

2016 was also the year when the European Union sued Germany because the nitrate levels in the groundwater were too high (Europäische Kommission, 2016) , and Germany published the **Climate Protection Plan 2050**, which aims for long-term reduction of greenhouse gas emissions. It aims to reduce greenhouse gas emissions in the agricultural sector by 31% compared to 2014. Nitrogen reduction, organic farming, and agricultural policy subsidies are the focus of the strategy, which then serves as a model for the peatland strategy at the regional level (Bundesministerium für Wirtschaft und Umweltschutz, 2016).

In 2019, the nationwide **Climate Package** was adopted, which includes the **Climate Protection Act** and the **Climate Action Plan 2050**. The latter defines the linking of EU payments to environmental services, reference to the Fertilizer Ordinance, expansion of organic farming and grassland protection as well as pilot projects for nature conservation. The bill standardizes the climate protection targets in law for the first time and translates the sector targets of the Climate Action Plan 2050 into annual emissions budgets for the energy, industry, transport, buildings, agriculture, and waste management sectors (Deutscher Bundestag, 2019).

The German federal government published a new **Fertilizer Regulation**, thereby establishing uniform legislation for farmers and state governments across all federal states (Landesportal Schleswig-Holstein, 2020b).

A nationwide **Farming Strategy 2035** was published in 2021. The aim of this strategy is to have an economically and ecologically efficient agricultural sector in Germany by 2035 to provide food security for Germany. Economic and ecological goals should go hand in hand, the conventional and organic farming sectors should overcome their mutual reservations and learn from each other and try to make use of synergies. Conflicts, goals, indicators, and measures are listed for the fields of soil, crop diversity and crop rotation, fertilization, plant protection, plant breeding, digitalization, biodiversity, climate adaptation, and climate protection. “With regard to biodiversity in the agricultural landscape, the Federal Ministry of Food and Agriculture is funding the first nationwide monitoring of biodiversity in the agricultural landscape in order to obtain representative data”(Bundesministerium für Ernährung und Landwirtschaft, 2019, p. 61).

The European Green Deal was presented by the EU Commission at the end of 2019 and was launched in 2021. This has since served as a set of rules for the nations and thus also the federal states such as Schleswig-Holstein. It’s a driving factor in promoting organic agriculture within the EU, what is also visible in the growing numbers of organic farmland in Schleswig-Holstein, as mentioned in Chapter 2.4.2. The aim is to increase the proportion of organic farmland in the EU to 25% by 2030 to ensure more sustainable food production. It also aims to reduce environmental pollution. Measures will be taken to minimize the use of chemical pesticides and fertilizers and to promote natural alternatives to protect biodiversity and reduce the impact on the environment. Furthermore, supporting farmers is an important element. Financial incentives and support schemes, such as those integrated into the Common Agricultural Policy, should help farmers to switch to organic farming methods and encourage demand for organic products (European Commission, 2019b).

The **Farm to Fork Strategy**, the **Biodiversity Strategy** and the **Soil Strategy** as well as the **'EU Mission: A Soil Deal for Europe'** were also launched as part of the European Green Deal. These strategies and programs directly promote the expansion and support of organic farming, while indirectly creating a foundation for its long-term success by promoting biodiversity, soil conservation and sustainable practices (see also in chapter 2.4.3) (Boix-Fayos and de Vente, 2023; European Comission, 2020; European Commission, 2024b, 2021).

In the same year a new **Revision of the Perspectives for Germany - Sustainability Strategy** was published. About agriculture, the following is listed in it: “Sustainable agriculture and

fisheries must be productive, competitive and socially and environmentally compatible. In particular, it must protect and conserve biodiversity, soil, and water, as well as comply with the requirements for animal welfare and precautionary consumer protection, particularly with regard to health" (Die Bundesregierung Deutschland, 2021, p. 22). Direct goals/measures addressed to agriculture are listed in SDG 2 (End hunger, achieve food security and improved nutrition, and promote sustainable agriculture). Land management should be environmentally sustainable and is measured by the indicator of nitrogen surplus in the agriculture sector. This is to be reduced to 70 kg per hectare of agricultural land in Germany between 2028 and 2032. According to the strategy's own information, this target is not yet on track at the time of publication. In addition, the aim is to increase organic farming to 20% by 2030 (Die Bundesregierung Deutschland, 2021).

The Federal Ministry of Food and Agriculture launched **the Agricultural Investment Program** in 2021, with a funding period until 2024 and a funding amount of 800 million euros. The program aims to strengthen climate, nature, and environmental protection in agriculture by supporting farmers' investments in modern technologies. A technology hub is intended to actively support emission reductions, the preservation of biodiversity, and an increase in resource efficiency (Bundesministerium für Ernährung und Landwirtschaft, 2021). The Federal Ministry of Agriculture refers to this as the "largest modernization program for agriculture in the history of our country" (Klöckner in SHZ 2021: 13.01., p. 16).

Due to increased agricultural, climate and environmental protests in 2020, a commission was convened. The task of this **Future Commission for Agriculture** was to draw up recommendations for sustainable agriculture in Germany. The members of this commission consist of representatives from agriculture and the food industry, conservationists and animal rights activists, as well as the retail sector and the scientific community. The experts unanimously adopted their final report in June 2021 and submitted it to the German government. It contains various recommendations. For example, state support for farmers should be geared towards environmental and climate policy interests, as well as the protection of biodiversity and the reduction of greenhouse gases. This also involves strengthening regional agri-environmental cooperation, including organic farming. There are also recommendations in the area of consumers and nutrition, such as a more sustainable diet and a reduction in meat consumption. To accompany this change, an increase in state funding is recommended, as these demands automatically go hand in hand with a reduction in livestock numbers. At the same

time, financial compensation for socially disadvantaged people in Germany is also called for in order to be able to cope with rising food prices (Bundesministerium für Ernährung und Landwirtschaft, 2024; Zukunftskommission Landwirtschaft, 2021). According to former Agriculture Minister Julia Klöckner (CDU), the commission has managed to establish a consensus on the course of agriculture between different interest groups for an economic, sustainable, and socially accepted agriculture in the future (SHZ 2021: 01.07., 06.07.).

The **Sixth Assessment Report (AR6)** of the Intergovernmental Panel on Climate Change (IPCC), published in 2021/2022, provided updated scientific evidence on accelerated global warming and the increasingly dramatic impacts of climate change on global ecosystems and agricultural production systems (IPCC, 2023). Compared to previous reports, AR6 emphasized even more strongly the need for profound structural changes to limit global warming to 1.5°C and ensure long-term resilience in agriculture. The report's recommendations increased the political pressure to act and influenced the design of new agricultural policy measures at EU level.

In this light, 2022 the European Commission introduced a new **Common Agricultural Policy (CAP reform 2023-2027)**, which was intended to place a stronger focus on environmental sustainability. The reform of the CAP in 2022 led to a 30% cut for dairy farmers who graze their animals on grassland; in Schleswig-Holstein, unlike other federal states in Germany, there were no compensation payments, which particularly affected small sustainable farms, as the Working Group for Rural Agriculture (AbL) reported (SHZ 2022: 07.10.).

In addition, the new **Organic Basic Regulation (EC) 2018/848** of the European Parliament and of the Council came into force in 2022, replacing Regulation No. 834/2007 from 2007. There is an extension of the scope of application, which is no longer limited to food, higher standards as well as stricter import regulations and stronger controls have been introduced. However, it also offers greater flexibility in order to take better account of regional particularities and smaller businesses (European Union, 2018).
In 2023, the national **Organic Strategy** was launched by the Federal Ministry of Food and Agriculture. It sets out measures to increase the proportion of land used for organic farming to 30% by 2030 (from just over 11% in 2021). In addition, the main objectives are to better reward the common good of the organic farming and food industry, to support the processing and trade of organic food and to increase its share in out-of-home catering, to strengthen research,

knowledge transfer, data availability and infrastructure for the organic food chain, and to develop solutions to bureaucratic challenges (Bundesministerium für Ernährung und Landwirtschaft, 2023a).

5.1.2 Policies & Strategies in Schleswig-Holstein

The following is an overview of Schleswig-Holstein's various implementations and strategies to organic farming and sustainable agricultural practices and regulations, which influences directly or indirectly the development of organic agriculture. It is divided into the electoral terms under consideration.

17th Electoral term (2009-2012)

In 2009 a **Sustainability Report** by the Schleswig-Holstein state government was created. The sector of agriculture was not included as a separate area. Only in the last point, "Outside the guiding themes: Socio-ecological lead area", agricultural topics are included. For example, the field "Nutrient balances" deals with nitrogen surpluses, which could help to promote multifunctional agriculture. The formulated objective "Orientation towards fertilizer law requirements" was not fulfilled, except for data from random samples. In the field "Environmentally compatible farming methods", the objective "Increase in the proportion of land" is mentioned. There is talk of a positive development. These are the only mentions of the term or the topic of agriculture in the 2009 Sustainability Report (Schleswig-Holsteinischer Landtag, 2010).

The **Schleswig-Holstein Nature Conservation Act** was an independent state regulation that came into force in 2010. Climate protection in agriculture was mentioned in passing, as were the biotope network and the protection of permanent grassland and Natura 2000 sites, for which there were hardly any strict regulations. Contractual nature conservation was already part of the law but was not heavily promoted (LIS-SH, 2010).

18th Electoral term (2012-2017)

The Green-led Ministry of the Environment in Kiel decided that, with very few exceptions, liquid manure may no longer be applied to harvested maize fields from October (SHZ 2012: 23.10.) and through a ban on plowing up grassland and with a fertilizer ordinance, reports Environment Minister Robert Habeck, the groundwater on the island of Föhr is usable again after it had been contaminated by fertilizers the years before (SHZ 2012: 27.07.). In 2013, the

Ministry for Energy Transition, Agriculture, Environment and Rural Areas of Schleswig-Holstein passed a new **Elevated Embanked Hedgerow Protection Regulation**. It includes stronger legal protection of the embarked hedgerow and defines it as a biotope and cultural heritage, which the farmers' association harshly criticized as they saw this as expropriation (MELUR, 2015; SHZ 2013: 28.06.). The width of the buffer zone was extended to 50cm and in the regulation (MELUR, 2015).

In 2013, the state government published the report "Joint Task for the Improvement of the Agricultural Structure and Coastal Protection **(GAK)- Framework Plan for 2013** (LIS-SH, n.d.). The GAK is a central funding instrument in Germany to provide sustainable support for agriculture and coastal protection. It is based on Article 91a of the German Constitutional Law from 1969 and is jointly funded and implemented by the Federal Government and the states (BMEL, 2024). In it, the following objectives are stated for Schleswig-Holstein's agriculture under the heading "Improvement of the market structure": Increasing the depth of processing, introducing innovative processes and products, improving the environmental situation and resource protection, improving and monitoring hygiene regulations and quality and adapting to changing market structures - particularly around milk processing. One of the general funding objectives of the GAK is "the promotion of sustainable, site-adapted land management, taking into account the requirements of environmental, animal, and health protection" (Schleswig-Holsteinischer Landtag, 2013, p. 2). The term "sustainable" is used here. Funding for organic farming is not mentioned in this report (ebd.).

In 2014, the **2050 Lowlands Strategy** was developed by a working group of the Schleswig-Holstein Marshes Association and published by the Ministry of Energy Transition, Climate Protection, Environment and Nature. The lowlands are mainly located in the west of Schleswig-Holstein, close to the North Sea coast. They are low-lying areas of landscape, often moorland and wetlands, which are particularly vulnerable to the impending climate change and, therefore need to be aligned with the requirements of climate protection, biodiversity, and the water balance. The strategy aims to reduce greenhouse gas emissions by changing cultivation practices on drained moorland or rewetting the land and to support farmers financially through extensification and alternative forms of utilization such as paludiculture (wet agriculture, e.g., cultivation of reeds or peat mosses). Farmers are increasingly being encouraged to refrain from using chemical fertilizers and pesticides and to apply more extensive forms of use but are also experiencing a loss of land for conventional agriculture, as drained areas are no longer suitable

for traditional farming or grassland use. It aims towards a reorientation towards more sustainable and biodiversity-friendly forms of cultivation, organic agriculture included. The state secures a statutory pre-emptive right for particularly valuable areas such as the edges of bodies of water or nature conservation areas (Marschenverband Schleswig-Holstein e.V., 2015).

The **Amendment of the Schleswig-Holstein Nature Conservation Act** was published the same year. It recognizes agriculture as an important partner in nature conservation but sets out clear rules and restrictions in order to promote biodiversity, soil conservation, and climate protection. Farmers are obliged to conserve natural resources and maintain ecological diversity when utilizing soils, waters, and landscapes. Particularly relevant are the protection of curtilages, the management of permanent grassland, the maintenance of watercourse edge strips and restrictions in protected areas, the renaturation and rewetting of moors, and the restriction of the use of pesticides and fertilizers in ecologically sensitive areas (e.g., watercourse protection strips or protected areas) (Landesportal Schleswig-Holstein, n.d.). However, farmers have the opportunity to benefit financially from ecological measures through contractual nature conservation and support programs. Furthermore, Natura 2000 areas were also given a higher protection status. Clear regulations were introduced to maintain favorable conservation status, particularly with regard to agricultural activities, and there were restrictions on the use of fertilizers and pesticides in these areas (LIS-SH, 2010; SHZ 2015: 21.11; 02.09.). The Nature Conservation Act was passed by Environment Minister Habeck, which is based on the assumption that agriculture is largely responsible for the loss of species. This law was not criticized by the CDU, which angered the farmers' association because the party had “always seen itself as the closest ally of farmers and hunters” up until then (SHZ 2015: 02.09., p. 2).

In the state government's report on the “Joint Task for the Improvement of Agricultural Structures and Coastal Protection **(GAK) - Framework Plan for 2016,** organic farming gained prominence in the GAK framework. Funding area 3, which is for improving marketing structures, states: “[...] the focus should be on strengthening processing and marketing structures in the regional, artisanal and/or organic sector.” (Schleswig-Holsteinischer Landtag, 2016, p. 11) In funding area 4, in which market and site-adapted land management (MSL) is listed, there is a separate section for organic farming and particularly sustainable practices of arable agriculture. This also did not exist in the previous GAK report from 2013. Under this heading, farms are to receive financial compensation if they use production methods that serve

nature conservation and the preservation of a natural environment. It is stated that the main goal for Schleswig-Holstein hereby is to reduce the occurrence of fertilizers and pesticides in water bodies (ibid.). By implementing these measures, other environmental goals should also be met: "Winter greening" and "Organic farming" fall under soil protection, "Diverse crops in arable farming" and "Low-emission and water-conserving application of farm fertilizers" fall under climate protection. The measures "Diverse crops in arable farming" and "Organic farming" also fall under biodiversity conservation. It is emphasized that the funding of organic farming methods in MSL funding is of particular importance because it allows several environmental protection goals to be implemented simultaneously if a farm operates in an environmentally friendly manner in the long term. Funding area 4 also includes the conservation of agrobiodiversity and the sustainable use of these genetic resources as an objective. In total, a percentage share of 5.2 % of the GAK funding was registered for the MSL in Schleswig-Holstein, which corresponds to 3,210,000 euros. These funds are the sum of federal and state funds (Schleswig-Holsteinischer Landtag, 2016).

19th Electoral term (2017-2022)

Philipp Albrecht (the Greens) took office as Minister for Energy Transition, Agriculture, Environment, Nature and Digitalization in the federal state of Schleswig-Holstein. When he took office, he called for a significant increase in subsidies for agriculture but tied to climate-friendly conditions, such as a special commitment to nature conservation or using less fertilizer (SHZ 2018: 31.07.; 2020: 11.08.). During his term of office, the focus should also be placed primarily on organic farming and close cooperation will be maintained with the Department of Grassland and Forage Production/Organic Farming at the Faculty of Agricultural and Nutritional Sciences at Kiel University, which also manages the *Noer experimental farm*, for example. (SHZ 2018: 31.07.; 2020: 11.08.). According to the government, the increase of organic farming is due to organic farming subsidies, investment programs for species-appropriate animal barns, improved advice, networking, and educational programs (SHZ 2019: 26.02.).

An amendment was submitted by the CDU, the Greens and FDP calling for a reduction strategy for pesticides containing glyphosate as part of the strategy to reduce the use of pesticides agreed in the coalition agreement. The resolution passed by the Federal Council in April 2018 (printed matter 107/18 (resolution), which focuses on research into alternatives, advice for companies, and a restriction of glyphosate, is welcomed in this regard. Like the Federal Council, the state parliament requests that the federal government present a systematic reduction strategy for

pesticides containing glyphosate that complies with EU law. This call passed with the votes of CDU, the Greens, FDP and AfD and against the SPD vote and the abstaining of voting from SSW (19/14 Summary report) (Schleswig-Holsteinischer Landtag, n.d.).

Also in April 2018, the state government's report on the Joint Task for the Improvement of Agricultural Structures and Coastal Protection **(GAK) - Framework Plan for 2018** was published. Due to the expiry of the federal legislative period, the federal government's draft budget for 2017 was used as a benchmark. The full scope of the funding could not be clearly estimated, but a reduction of the financing was assumed. Funding area 2 includes environmental and climate protection measures. Funding is to be provided through the Agricultural Investment Program (AFP), which supports farms that practice particularly species-appropriate animal husbandry and meet special requirements in the areas of climate and environmental protection. This funding area also includes support for equipment for spreading liquid manure. Soil, water, and climate-friendly fertilization techniques are to be supported with GAK funds. They are not listed in the notification of funds from Schleswig-Holstein to the federal government (Schleswig-Holsteinischer Landtag, 2018a).

In funding area 4, which stands for market and site-adapted as well as environmentally friendly land management including contractual nature conservation and agricultural management (MSL), the first two blocks (organic farming and particularly sustainable practices in arable farming and conservation of the diversity of animal genetic resources in agriculture) have not been changed in terms of either the title or the content compared to the report on previous GAK - Framework Plan. However, funding area 4 has been expanded to include two further subject areas. One is the non-productive investment-based nature conservation, which arose from the new “nature conservation” objective from the GAK Act for the MSL funding area. This is intended to promote the “creation, restoration, and development of habitats for wild animal and plant species in the agricultural landscape”(Schleswig-Holsteinischer Landtag, 2018a, p. 13). For Schleswig-Holstein, the focus here is on the creation of wetland biotopes and the rewetting of areas, as well as the acquisition of land to realize this. The second new area is contractual nature conservation, which promotes the development and conservation of grassland habitats and valuable grassland. The share of funding for MSL (including investment-based nature conservation), which was still 5.2% in the 2016 report, amounted to 9.0% of the GAK funding volume from federal and state funds in the 2018 report, which corresponds to a total of EUR 5,600,000.

In June 2019, the state government's report on the Joint Task for the Improvement of Agricultural Structures and Coastal Protection **(GAK) - Framework Plan for 2019** was published. For the MSL, including investment in nature conservation, the actual expenditure for 2018 was calculated at EUR 4,692,000 with provisional data. For the 2019 framework plan application, 6,100,000 euros, i.e., 7.7 % of the total from federal and state funds for the GAK, were registered. The content has not changed from the previous framework plan with regard to topics relating to sustainability in agriculture (Schleswig-Holsteinischer Landtag, 2018b).

Based on the nationwide Fertilizer Regulation, the **Funding Program for Nutrient Agriculture** in Schleswig-Holstein was created in 2020. This program subsidizes the purchase of liquid manure spreading technology, the construction of solid manure storage facilities, and the construction of lagoons and earth basins to collect contaminated surface water, such as seepage water discharges or rainwater from farmyards. New storage tanks are also subsidized, which must have solid covers to protect against emissions in the interests of climate protection (Landesportal Schleswig-Holstein, 2020b).

In June 2020, the Joint Task for the Improvement of Agricultural Structures and Coastal Protection **(GAK) - Framework Plan for 2020** was adopted, with 13,347,000 euro calculated for the MSL that year. Compared to the previous year, a special framework plan for insect protection was added, which accounts for a share of 5,012,000 euros. The financial resources from the GAK framework plan for 2020 were reduced in funding area 4 (MSL, from here on MSUL), the area in which organic farming and particularly sustainable practices in arable farming are addressed, compared to 2019 (Schleswig-Holsteinischer Landtag, 2020).

In 2020 a nutrient report was compiled for the state of Schleswig-Holstein on behalf of the Ministry of Energy Transition, Agriculture, Environment and Rural Areas of the state of Schleswig-Holstein and showed that the nitrate concentration in groundwater had increased in previous years. Schleswig-Holstein was also well above the average for the federal states in terms of the use of mineral nitrogen in agriculture (Taube et al., 2020).

In 2021, the Ministry for Energy Transition, Agriculture, Environment and Digitalization SH published 24 theses for the **Future of Agriculture 2040** in Schleswig-Holstein. In 2018, a dialogue process was initiated with various stakeholders and interest groups from the

agricultural sector in which problem areas were identified, problems and challenges were worked on in groups and the common goals for agriculture were formulated for agriculture in the year 2040. The overarching themes into which the 24 theses are divided are as follows: Climate, climate change, climate adaptation; added value and value creation; animal welfare; biodiversity; water and soil protection, and agriculture and society (Ministerium für Energiewende, Landwirtschaft, Umwelt, Natur und Digitalisierung, 2021). These also align with the aims of the European Green Deal, which was introduced the same year.

Before the end of the legislative period, the Schleswig-Holstein parliament also passed the **Energy Transition and Climate Protection Act (EWKG).** In the sector of land use, land use change, and forestry, the aim is to reduce greenhouse gas emissions gradually. The state government undertakes to record these emissions in annual monitoring, to set up a targeted peatland protection program and to report on implemented and planned measures for biological climate protection at least once per legislative period. This is based on the crucial role of biological sinks such as moors and forests for climate protection (Landesportal Schleswig-Holstein, 2021a).

20th Electoral term (since 2022)

For the 20th legislative period of the Schleswig-Holstein state parliament, the old ministry, in which the areas of agriculture and climate protection, environment, and nature were still together, was split into two different ministries. Climate protection, environment, and nature are since then together with the topic of energy transition in one department, while the area of agriculture is united with rural areas, Europe and consumer protection in one ministry. However, there is still a joint committee. At the second meeting of the Environment, Agriculture and Digitalization Committee, the Minister of Agriculture, Minister Schwarz, who was previously President of the Farmers' Association, and Ministers Kumbartzky and Dirschauer criticized the division of the ministries (Schleswig-Holsteinischer Landtag, 2022a).

The criticism of the division of ministries suggests that co-operation between agriculture and the environmental issues may be hampered. This could indicate that the transition to more sustainable agricultural practices could be less coherent, as different ministries with potentially different priorities are now responsible. The fact that the Ministry of Agriculture has been linked to rural areas and consumer protection could indicate that there is a stronger focus on supporting farmers and rural development. The fact that the Minister of Agriculture is a former

president of the farmers' association could indicate that agricultural policy is more strongly characterized by traditional agricultural interests. This could pose challenges in integrating sustainable practices with the interests of conventional agriculture and could fuel a certain tension between these areas.

Due to the EU's legal action against Germany for excessive nitrate levels (2016), the federal states were urged to publish new designations of heavily polluted areas by the federal states, a **State Fertilizer Regulation**. In these areas (red areas), special fertilizer restrictions apply to agriculture in order to reduce nitrate in the soil and restore groundwater bodies to a good chemical status. As a result, the red areas in Schleswig-Holstein increased from 5.4% 2020 to 9.5% (Landesportal Schleswig-Holstein, 2024).

In 2022, the Ministry of Agriculture and the Ministry of Energy commissioned a report to calculate the impact of climate protection measures in Schleswig-Holstein, which were developed by a working group of scientists and practitioners in 2021. Agriculture has a ‘key role’ in achieving the climate targets, according to Energy Transition Minister Tobias Goldschmidt (The Greens) (SHZ 2022: 19.09., p. 1). A **Roadmap for Reducing Greenhouse Gas Emissions** was drawn up based on the report, focusing on methane and nitrous oxide reduction. The reason for this was Schleswig-Holstein's 2022-2027 coalition agreement, in which the Greens and CDU set the goal of **Climate Neutrality by 2040** (SHZ 2022: 19.09., p. 1; CDU und GRÜNE, 2022). On this basis, the **Competence Centre for Climate-Efficient Agriculture** was established in the same year, which is intended to make climate protection measures in the agricultural sector visible and develop adaptation strategies to climate change (SHZ 2022: 19.09., p. 3). The draft budget of the Ministry of Agriculture, Rural Areas, Europe and Consumer Protection allocates 490,000 euros for the structural development of the Competence Centre for Climate-Efficient Agriculture for project funding, knowledge transfer, and event management in the areas of climate protection and climate adaptation in agriculture (Schleswig-Holsteinischer Landtag, 2023a). Schleswig-Holstein was elected to chair the 2023 Conference of Agriculture Ministers. This is a meeting of all agriculture ministers and agriculture senators from the federal and state governments to discuss agricultural policy issues and proposed legislation (Schleswig-Holsteinischer Landtag, 2023b).

Table 2: Policy Implementations for Organic Agriculture at EU, National and Regional Level.

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
German Sustainability Strategy - Perspectives for Germany	2002 (updated 2021)	GER	• First publication of the National Sustainability Strategy. Implementation of Agenda 21, which was adopted at the 1992 Earth Summit in Rio de Janeiro • Promotion of sustainable agriculture • Protecting biodiversity and conserving resources • Very low binding force, relies on voluntary implementation
Federal Organic Farming Program	2002	GER	• Central program to support research projects, information measures and other projects to promote organic farming
EU Organic Basic Regulation (EC) No. 834/2007	2007	EU	• Promotion of sustainable agriculture, protection of the environment, animal welfare and clear rules for the labeling of organic products (e.g. EU organic logo) • Production standards, control system and traceability and import regulations for organic agriculture
Sustainability Report	2009	SH	• Every four years new published (since 2004) • Only a few isolated references to agriculture without concrete measures

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
Nature Conservation Act	2010	SH	• Incentives for voluntary cooperation between farmers and nature conservation authorities • Definition and expansion of protected areas to protect important habitats • Few binding measures
GAK-Framework Plan for 2013	2013	SH	• Promotion of sustainable, site-adapted land management, taking into account the requirements of environmental, animal, and health protection • Organic farming is not mentioned
New elevated embarked hedgerow protection regulation	2013	SH	• The width of the buffer zone extended to 50cm • Protection of the embarked hedgerow as a biotope and cultural heritage • Promotion of sustainable maintenance
IPCC Fifth Assessment Report (AR5)	2014	Global	• Finds with a high degree of scientific certainty that human-induced warming is the main cause of climate change • Emphasises in particular the role of agriculture as both a cause of and a potential solution to climate change

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
EU agricultural policy (CAP) reformation	2014-2020	EU	• Introduction of "Greening measures" • Promotion of organic agriculture • Subsidies linked to environmental conditions
2050 Lowland Strategy	2014	SH	• Climate resilience/ mitigation strategy • Rewetting of drained land, promoting paludiculture and reduction of agrochemical use • Financial support for farmers because of land-loss • Restructure of aricultural practices in this area
The Paris Agreement	2015	UN	• Setting targets for reducing greenhouse gases and promoting climate resilience
Amendment of Nature Conservation Act	2015	SH	• State's right of first refusal for ecologically valuable natural areas • Biotopes are to be better protected and priority areas for nature are to be extended from the current 13 to 15 % of the state's land area
Extensive revision of the German Sustainability Strategy - Perspectives for Germany (2002)	2016	GER	• Alignment with the global UN Sustainable Development Goals (SDGs), which were adopted in 2015 with the 2030 Agenda. • Agriculture is addressed in the context of climate protection,

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
			biodiversity, animal welfare and international responsibility • Promotion of regional value chains • Strengthening organic farming (up to 20% of the total agricultural area)
EU lawsuit against Germany for excessive nitrate levels	2016	EU	• Penalty payments
Climate Protection Plan 2050	2016	GER	• Long-term reduction of greenhouse gas emissions • Promotion of humus build-up and extensive cultivation • Model for SH strategies
GAK-Framework Plan for 2016	2016	SH	• Strengthening processing and marketing structures in the regional, artisanal and/or organic sector • Separate funding area for organic farming
Future Strategy for Organic Agriculture	2017	GER	• By 2030, 20 % of agricultural land should to be farmed organically
Fertilization package	2017	SH	• Fertilizers/ Nitrate Fertiliser Act: upper limits for nitrogen inputs in areas with critical water values • Longer periods during which no fertilisers may be applied

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
GAK-Framework Plan for 2018	2018	SH	• More funding for Soil, water, and climate-friendly fertilization techniques • Creation of more wetland biotopes and the rewetting of areas
European Green Deal	2019	EU	• Increase the proportion of organically farmed land in the EU to 25 % by 2030 • Financial incentives and support programs to help farmers transition to organic farming methods • Measures to minimize the use of chemical pesticides and fertilizers and to promote natural alternatives
Farm to Fork Strategy	2019	EU	• Reduction of pesticides and fertilizers: Aim to reduce the use of chemical pesticides by 50% and the loss of nutrients through fertilizers by at least 50% by 2030 • Promoting sustainable food systems: Supporting farmers in the transition to more environmentally friendly production methods and increasing the proportion of land under organic cultivation

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
Biodiversity Strategy	2019	EU	• Protecting and restoring nature (protect at least 30% of the EU's land and sea areas) • Promoting sustainable agriculture: increasing biodiversity on agricultural land through measures such as crop rotation, agroforestry and the restoration of degraded ecosystems
Soil Strategy	2019	EU	• Protecting soil resources by improving soil quality through sustainable use, e.g. reducing soil erosion and enriching organic soil • Combating soil pollution: The aim is to keep all soils in a healthy condition by 2050 and to remediate contaminated areas
EU Mission: A Soil Deal for Europe	2019	EU	• Supports research projects and initiatives to restore soil ecosystems and promote innovative approaches to land use
Climate Package Germany	2019	GER	• Includes the Climate Protection Act and the Climate Action Plan 2050 • Linking EU payments to environmental performance, reference to the Fertiliser Ordinance, expansion of organic farming and grassland protection as well as pilot projects on nature conservation.

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
			• Standardizes climate protection targets for the first time in law • translates the sector targets of the Climate Action Plan 2050 into annual emissions budgets for the energy, industry, transport, buildings, agriculture and waste management sectors.
GAK-Framework Plan for 2019	2019	SH	• Further expansion of funding
Farming Strategy 2035 (BMEL)	2020	GER	• Promotion of soil-conserving cultivation • Improvement of nutrient efficiency • Synergies between conventional and organic farming are supported
State Fertilizer Regulation	2020	SH	• Clear and stricter requirements for fertiliser/nitrate use • Basis for the support programme for nutrient management in agriculture in Schleswig-Holstein
Funding program for nutrient management in agriculture	2020	SH	• Fundingprogram for more sustainable practices and greenhouse gas reduction
GAK-Framework Plan for 2020	2020	SH	• Strong focus on organic farming and sustainable practices • Further expansion of funding

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
Revision of the Perspectives for Germany - Sustainability Strategy	2021	GER	• Stricter nitrogen regulations • Increase of organic farming
Future of Agriculture 2040	2021	SH	• 24 theses as a result of the 'Future of Agriculture' dialogue • Experts recommend that state support for farmers should be orientated towards environmental and climate policy interests as well as the protection of biodiversity and the reduction of greenhouse gases • Transformation towards a more sustainable diet with less meat consumption, saying that more state funding is needed to make the change easier for farmers, which would also go hand in hand with lower livestock numbers. • Strengthening & promoting organic farming
Agricultural Investment Program	2021	GER	• Incentive for farmers to invest in modern technologies • Emission reduction • Preservation of biodiversity • Resource efficiency

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
Future Comission for Agriculture Report	2021	GER	• Recommendations for sustainable agricultural practies in Germany • Oorganic agriculture is to be further expanded, productivity is to be increased through research and innovation, as well as counselling and training
Energy Transition and Climate Protection Act (EWKG)	2021	SH	• Reduction of GHG-Emissions • Annual state monitioring • Targeted Peatland Protection Program • Report of implemented and planned measures for biological climate protection at least once per legislative period
IPCC Sixth Assessment Report (AR6)	2021/22/23	Global	• Updated scientific evidence on accelerated global warming • Emphasized more strongly the need for profound structural changes to limit global warming to 1.5°C and ensure long-term resilience in agriculture
EU Organic Basic Regulation (EC) 2018/848	2022	EU	• Updated version of EC Organic Basic Regulation (EC) No. 834/2007 with higher standards and flexibility • Extension of the scope of application (new categories such as salt, beeswax and mixed products) • Stricter import regulations

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
			• Stronger controls and transparency
State Fertilizer Regulation	2022	SH	• Contribution to the implementation of the federal government's General Administrative Regulation on Area Designation (AVV GeA).
Road map for reducing greenhouse gas emissions in agriculture	2022	SH	• Focus on methane and nitrous oxide reduction
Competence Centre for Climate-Efficient Agriculture	2022	SH	• Targets linked to the Federal Climate Protection Act • It is intended to visualise effective climate protection measures in the agricultural sector • Developing adaptation strategies to climate change
Common Agricultural Policy (CAP reform 2023-2027)	2023	EU	• Introduction of eco-schemes to promote environmental and climate protection measures • Direct impact on agri-environmental measures in SH through rewarding sustainable agricultural practices like organic farming
Organic Strategy 2030	2023	GER	• National strategy for 30% organic farming and food production by 2030

Strategy/ Program	Year of publication	Scale	• Goals and Implementations
			• Better reward the common good of the organic farming and food industry • Support the processing of and trade in organic food and increase its share in out-of-home catering. • Strengthen research, knowledge transfer, data availability and infrastructure for the organic food chain. • Develop solutions to bureaucratic challenges.

5.2 Local Agricultural Conflicts

In this chapter, the environmental, social, and economic problems, which were identified, are presented. These characterized discussions in Schleswig-Holstein's agricultural sector in recent years.

5.2.1 Environmental Conflict

Fertilizers

A huge discussion within the agricultural sector are fertilizer. Liquid manure or fermentation residues from biogas plants are the main cause of increased nitrate levels in groundwater. These levels should be kept as low as possible to avoid contamination of drinking water, since too much nitrate is potentially harmful to health for humans and animals. In bodies of water such as rivers or lakes, nitrate and phosphate can harm ecosystems, for example, by influencing algae growth and thus displacing other organisms (SHZ 2020: 11 August). In 2015, barn buildings were only subsidized by the federal state if they produced less than the area could absorb (SHZ 2015: 29 May). In 2016, Schleswig-Holstein's Environment Minister Robert Habeck called on the federal government to adopt stricter regulations regarding nitrate. The nutrient surpluses have been too high for years. “We urgently need a uniform, ambitious fertilizer law to reduce

nutrient inputs from agriculture. [...] The federal government must finally wake up. It's about protecting the drinking water of future generations" (Habeck in SHZ 2016: 17 September, p. 7).

In 2017, there was an 'emergency situation' in Schleswig-Holstein's agricultural sector, as farmers were no longer able to get rid of their waste (liquid manure). The fields were too wet, so the soil could not absorb the liquid manure sufficiently without jeopardizing the contamination of water bodies and groundwater. The media was talking about a task for society, a structural change towards a more environmentally friendly production method, ideally to organic standards. To realize this, consumers would have to agree to a price increase (SHZ 2017: 12.12.). The state responded to the problem by promoting innovations for more environmentally friendly fertilizer technologies (SHZ 2017: 06.03.). In April 2018, the state parliament requested the federal government to improve and efficiently implement fertilizer regulations through a call by the SPD. Agricultural nutrient inputs into water bodies should be reduced to improve water quality and protect drinking water in the long term. This would be in line with compliance with the limit values required by the EU (19/675) (Schleswig-Holsteinischer Landtag, n.d.). In 2020, the Federal Council passed a new fertilizer ordinance, which lays down stricter regulations for agriculture. Schleswig-Holstein responded to this with a nutrient management support program for farmers (see Chapter 5.1.2) (Landesportal Schleswig-Holstein, 2020c). The total funding amount for a total of two years is 4.8 million euros, which comes from the Ministry for Energy Transition, Climate Protection, Environment and Nature (SHZ 2020: 16.07.).

Before 2022, measures to combat excessive nitrate and phosphate levels in groundwater and water bodies were still the responsibility of the federal states. Since then, the procedure has been standardized. Each federal state now specifies area designations regarding nitrate pollution (SHZ 2020: 11.08.). From November 2022, 10 % of the state's area was designated as red areas (previously, it was 5 %). Significantly stricter fertilizer regulations were applyed in these areas, which are intended to protect groundwater from nitrate pollution (Schleswig-Holsteinischer Landtag, 2022b). This was implemented in order to avoid EU fines for Germany's violation of the EU Nitrates Directive (Landesportal Schleswig-Holstein, 2024).

According to a Federal Agency for Nature Conservation report, the situation of birds, insects, plants, and entire habitats in agricultural landscapes was deteriorating dramatically. Practically

all animal and plant groups in the agricultural landscape are affected by a blatant decline (SHZ 2017: 03.07.)

5.2.2 Social Conflicts

Extinction of farms

For many farmers, the question arises as to whether the next generation wants to take over the farm. In the 2010 agricultural census conducted by the Federal Statistical Office, 30.6% of farmers in Germany stated that they still needed a secure successor for their farm (SHZ 2011: 16.11.). Uncertainty about the future is often cited as a reason for not taking over a farm, especially with regard to large investments ("I only have two options: Fully invest or give up; it is completely unclear what perspective you have“ (SHZ 2020: 08.06., p. 3). There are always new political requirements regarding production, whether in terms of nature conservation or animal welfare, which can make farmers hesitate to invest (“Because nobody can tell me what political requirements will be imposed on production in a few years’ time. Then I might have built a barn that is no longer permitted” (SHZ 2020: 08.06., p. 3).

In 2010, almost 1.1 million people in Germany were employed in agriculture. Just under half of these were family members to other employes from the sector. This suggests that people often work in agriculture if they have (family) contact with the sector and that people who have had no family contact with it beforehand are less likely to go into this sector (SHZ 2011: 16.11.).

Reputation

Over time, the emerging problem of the reputation of farmers in society has been striking. In 2013, Robert Habeck spoke of society “daring to take an open, unsparing look at agriculture as the basis of our food production” and thus spoke of the “dreamed-of idyllic farm on the one hand” and a “distorted image of cruel animal mass farming on the other” (Habeck in SHZ 2013: 04.04., p. 2). This suggests that these two perspectives on agriculture are in the majority and speak of an “acceptance crisis” (ibid.). “From society's point of view, we are the armed, the affected and the perpetrator” says Werner Schwarz, President of the Farmers' Association in Schleswig-Holstein (Schwarz in SHZ 2011: 03.09.).

Even though campaigns by organizations such as Peta and Greenpeace were already being reported on in 2012, which “insulted agriculture and farmers as animal abusers, poisoners or even “mass murderers”’ (SHZ 2012: 31.03.), the topic was mentioned most frequently in the media between 2018 and 2021. In these years, there has been more talk in newspaper articles

about the pressure farmers exert on society. This could be related to the generally greater interest of the German population in the environment, animals, and climate change. For example, in October 2018, the IPCC published a special report called 1.5 °C global warming (SR1.5), and in 2019, a special report on climate change and land systems (SRCCL) and a special report on the oceans and cryosphere in a changing climate (SROCC) (IPCC, 2024).

Schwarz says that “farmers are being pushed out of the middle of society” (SHZ 2021: 22.04.). Agriculture is heavily criticized for problems such as animal mass farming, insect mortality, and groundwater pollution ("Everything negative is blamed on agriculture. But the farmer must not be stigmatized as the nation's bogeyman” (commentary in SHZ 2019: 02.12.), Farmers’ Association President Werner Schwarz accuses non-governmental organizations, the media, and some politicians of often steering debates in agriculture, for example, on climate protection or animal welfare, too emotionally and “hunting down farming families” instead of engaging in objective discussions (Schwarz in SHZ 2020: 05.09.). Prof. Dr Edgar Schallenberger, representative for animal welfare in agriculture, puts forward the following thesis: “Farmers were used to being a proud profession - today they are often not only not recognized, but despised [...] in the village, farmers threatened to be socially marginalized - often people who moved to the area made up the majority of the population” (Schallenberger in SHZ 2016: 23.01.) (“There are emotional arguments about agriculture, animal husbandry or pesticides. […] And it quickly becomes unobjective, and the entire profession is discredited. Environmental and animal welfare organizations must bear the blame for this” (Rukwied in SHZ 2018: 31.01.). He sees a conflict between urban and rural society: “What really concerns me is the alienation between the urban classes and us.” (Ruckwied in SHZ 2019: 27.06.). “The arrogance of the supposed urban elites already existed in the last century. What seems to be new, however, is that the lack of respect for agriculture has reached the nation” (Farmers comment in SHZ 2018: 31.01.).

Over the course of the period analyzed, newspapers repeatedly reported that the negative reputation of agriculture has an impact on children from farming families. For example, farmers say that their children are verbally attacked by classmates at school (SHZ 2018: 31.01.; 19.03.; 2019: 22.01.) (“you are responsible for destroying the groundwater” (SHZ 2020: 09.06., p. 5); “[...] that farmers' children are bullied in schools and farmers see their profession paraded” (SHZ 2020: 07.08., p. 16.))

In 2021, the state government launched an appreciation campaign for agriculture. The Schleswig-Holstein Farmers' Association welcomes this: “In recent years, there has been very little appreciation for us and we have had to deal with reproaches. In this respect, we hope that more appreciation will also bring more added value back to our farms” (Schwarz in SHZ: 2021: 04.09). The “ErnteKunst” campaign cost the federal state of Schleswig-Holstein 100,000 euros (SHZ 2021: 28.08).

5.3 Economic Conflicts

Milk price crisis

Almost throughout the period between 2009 and 2023, there have been regular reports of economic problems for farmers, especially dairy farmers, due to low prices on the market. As early as 2009, the media reported that milk prices were too low. Many farmers are looking for other sources of income, such as biogas plants (SHZ 2009: 6.06.; 25.06.). A dairy farmer from Schleswig-Holstein, for example, describes: “The reason for [his] entry into biogas production is not cold profit thinking, but a simple struggle for survival in the ruinous milk price business, which leaves [him] no other chance” (SHZ 2009: 25.06., p. 18). In 2011, a general stabilization of the markets could be observed in Schleswig-Holstein, but this was different for the agricultural sector due to rising production costs in the areas of energy, fertilizer, crop protection, and concentrated feed. In 2011, the problem of dwindling leased land was added to this, as the biogas market was booming and dairy farmers were competing for leased land (SHZ 2011: 3.06.), which was also noticeable in the following years (“It was becoming increasingly difficult to keep up with the boom in lease prices triggered by the cultivation of maize for biogas” (SHZ 2014: 9.07.). The farmers' association also criticizes the government's environmental regulations, which cause additional costs (SHZ 2011: 03.06.). In 2017, German farmer president Rukwied reported an improvement in the situation in Germany, with prices rising again after the losses in milk, for example (SHZ 2017: 26 June). A year later, he speaks of a crisis in the industry: “Everything used to be better. Today it's five to twelve and in the long run we're all dead” (Schwarz in SHZ 2018: 01.09., p.2). Also in 2020, the Schleswig-Holstein dairy farmers' association is once again talking about a serious situation, as milk prices remain tight (SHZ 2020: 11 February).

Economic hurdles

The economic situation of farmers also plays a role in the demand for organic agriculture. The pressure on food prices also has a negative impact on farmers' economic activity. This

represents a hurdle for them to set aside money for sustainable investments and then invest to work in a more climate-friendly way, but also to be better able to adapt to extreme weather events (SHZ 2023: 26.06.) Accordingly, there are calls for support from politicians to help farmers on the path to sustainable agriculture. (SHZ 2023: 26.06.). Furthermore, high bureaucratic hurdles discourage people from applying for additional payments for sustainable investments (SHZ 2020: 05.09.).

5.4 Actors, Agencies & Networks

This chapter outlines the various regional players and networks and their roles over the years. It is categorized according to agricultural actors and networks, environmental organizations, institutional actors and bottom-up initiatives.

5.4.1 Agricultural Actors & Networks

Agricultural organizations represent the interests of various farmers and campaign for them publicly and with political representatives. In the Schleswig-Holstein state parliament and in topic-related committees, these non-political organizations are sometimes invited to hearings and asked for an opinion.

Farmers' Association

The **Schleswig-Holstein Farmers' Association** represents the interests of farmers and agricultural businesses in Germany's northernmost federal state. It is committed to the economic, social, and political interests of agriculture in Schleswig-Holstein. The Schleswig-Holstein Farmers' Association is part of the German Farmers' Association (DBV) and works closely with the district farmers' associations in the state. It represents the interests of its members at the state, federal, and EU levels and for the public. The association also offers practical help and advice, for example, on support programs, legal issues, and business management decisions. The focus is on promoting regional agriculture. The aim is to emphasize the importance of Schleswig-Holstein's agriculture in the areas of food production, landscape conservation, and climate protection. The association is also committed to promoting a positive image of agriculture, including through events, campaigns, and educational programs. The association promotes cohesion among farmers and offers a platform for the exchange of knowledge and experience (Bauernverband Schleswig-Holstein e.V., n.d.; “Deutscher Bauernverband e.V. - DBV,” n.d.).

A recurring conflict between the farmers' association and politicians is the problem of farmers' **self-determination** in the face of state obligations or restrictions. The farmers' association repeatedly advocates the self-determined, voluntary decision of farmers in favor of nature and animal protection and climate-friendly farming (SHZ 2015: 10.03.), as they say farmers have been farming sustainably for centuries and passed on their farm's generation after generation (SHZ 2011: 01.09.). Schwarz stated that the regulations from 2013 on the fertilizer-free buffer zone between fields and embarked hedgerows would destroy acceptance for nature conservation and call into question the voluntary commitment of farmers in the future (Schwarz in SHZ 2013: 28.06.). Even in 2015, after the stricter state nature conservation law came into force, there was criticism from the farmers' association: nature conservation "depends on participation and acceptance" (Gersteuer in SHZ 2015: 21.11.). Schwarz also said in 2021: "Does anyone seriously believe that the enormous challenges could be met with strict rules, more precise controls, and tougher sanctions? The world will not be saved by law but through cooperation and voluntary action. Sustainability does not need a top-down revolution" (Schwarz in SHZ 2021: 04.09., p. 25). „The fronts are particularly hardened with regard to sustainable agriculture" says Stephan Gersteuer, Secretary General of the Schleswig-Holstein Farmers' Association, who also favors voluntary approaches in this sector (Gersteuer in SHZ 2021: 22.04., p. 10).

Over the time frame examined, it is very noticeable that there is consistently **strong criticism from the farmers' association towards the Greens**. The farmers' association repeatedly accuses the Greens party of not having the interests of farmers in mind when making political plans or decisions ("The Greens wanted to score points with consumers, they were not there for the farmers" (SHZ 2013: 07.09., p.3.)). The fact that Schleswig-Holstein's farmers are not competitive on the world market is apparently only due to special European and German requirements, such as environmental protection. This should be compensated for with direct payments to farmers (SHZ 2010: 11.09.). At a farmers' protest in 2013, at which Green parliamentarian Jürgen Trittin spoke out against industrial factory farming, the managing director of the farmers' association at the time also addressed the perceived tension between the party and farmers: "We will not accept being sidelined by the Greens in this way"(Trittin in SHZ 2013: 31.08., p. 1).

The discussion about **organic and conventional agriculture** is a very important topic that can be observed in connection with the farmers' association**.** After the Schleswig-Holstein state

government provided 25 million euros in funding for organic farming in 2018, the farmers' association criticized: “Some of the previous programs have not even been exhausted, which is why additional funding alone makes little sense” (Schwarz in SHZ 2018: 16.05). However, this accusation was rejected by Agriculture Minister Habeck, as the demand for organic farming is high, and almost all the state funds have been drawn down (SHZ 2018: 16.05.). In 2019, Farmer President Schwarz spoke out in favor of intensifying nature conservation and investing in ecological priority areas, hedgerows, and bodies of water on the part of farmers. Nevertheless, this should be done on a voluntary basis and not because of political coercion (SHZ 2019: 19.07.). In 2021, the state parliament launched an agricultural investment program to subsidize investments to make farms more environmentally and animal-friendly, i.e., political compensation payments. This is being done with funds from the Joint Task ‘Improvement of Agricultural Structures and Coastal Protection’ (GAK) and the European Agricultural Fund for Rural Development (Bundesministerium für Wirtschaft und Klimaschutz, Referat, n.d.). There was criticism from the Schleswig-Holstein Farmers' Association, which criticized the fact that too much focus was placed on sustainability. Too little consideration was given to conventional agriculture. Minister President Günther (CDU) promises to focus more on this: “We also want to provide support for conventional agriculture” (SHZ 2021: 22.04.). The association displays mixed support for organic farming. While it supports nature conservation and biodiversity as part of agriculture, it often questions the allocation of resources to organic farming, advocating for equal support for conventional agriculture. Criticism of the organic farming funds in 2018, as well as a preference for voluntary ecological practices, highlights a cautious stance toward the expansion of organic agriculture.

From 2008 to 2022, **Werner Schwarz was President of the Farmers' Association** in Schleswig-Holstein, after which he was appointed Minister for Agriculture, Rural Areas, Europe and Consumer Protection as a member of the CDU (Landesportal Schleswig-Holstein, n.d.). In 2022, **Klaus-Peter Lucht** will be appointed as the new farmers' president in Schleswig-Holstein. At the opening of Norla, one of the most important agricultural and consumer trade fairs in northern Germany, he talks about his vision for the future of agriculture. For him, agriculture and environmental protection go hand in hand, and climate protection and biodiversity are essential parts of agriculture. He actively invited environmentalists to visit Norla and engage in dialogue with each other (SHZ 2022: 02.09.). This reflects a more inclusive stance, emphasizing collaboration with environmentalists and integrating climate protection into agriculture. This evolution indicates a potential shift toward balancing economic and

ecological goals while maintaining a strong emphasis on voluntary measures and farmer participation

The farmers' association has been **involved in the state's political decisions** since the beginning of the period analyzed, and representatives have been appointed to various committees or the Future Commission for Agriculture. Farmers' representatives are not only consulted exclusively on purely agricultural matters; since 2009, there has also been a farming representative on the Advisory Council for Nature Conservation in Schleswig-Holstein (SHZ 2009: 25.02.; 2021: 01.07.; LIS-SH, e.g. 18/55; 18/56).

The Association also organizes the State Farmers' Day, which serves as a central platform for exchange between farmers, politicians, scientists, and other stakeholders from the agricultural sector (Bauernverband Schleswig-Holstein e.V., n.d.; SHZ 2018: 01.09.).

The Working Group of Rural Agriculture (AbL*)* is a German association strongly represented in Schleswig-Holstein and campaigns for the interests of farms and smaller agricultural businesses. They call for sustainable agriculture and criticize farming and factory farming, which large agricultural corporations dominate. The organization offers training courses and seminars for farmers on organic farming, regenerative agriculture, and sustainable animal farming and demonstrates as part of "Wir haben es satt!" (We're fed up!) demonstrations and is in contact with the state government on agricultural issues (SHZ 2013: 28.06. ;2012: 22.03.; 2016: 18.01.; 2022: 07.10.; Arbeitsgemeischaft bäuerliche Arbeitsgemeinschaft e.V., n.d.).

5.4.2 Environmental Organizations

The **Naturschutzbund Schleswig-Holstein** (NABU) is the state organization of the German Nature and Biodiversity Conservation Union. It is committed to the protection of nature and the environment as well as the preservation of biodiversity in Schleswig-Holstein. They coordinate overarching projects, lobbying, and public relations work. The NABU Association is often involved or considered in discussions and decisions by the ministries regarding nature conservation. For example, they were involved in the agreement on the maintenance of embarked hedgerows in 2015 together with the farmers' association (SHZ 2015: 26.03.). They demand more funding from the EU for farmers who want to get involved in environmental protection (SHZ 2016: 08.11.).

The **Stiftung Naturschutz** (Nature Conservation Foundation**)** acts as an independent institution dedicated to the conservation, restoration, and development of natural habitats. It plays an important role in the implementation of nature conservation measures and projects, which are often in cooperation with other institutions, farmers, and volunteers. The main goals of the foundation are to preserve biodiversity and restore habitats. Among other things, it specifically acquires areas of particular importance for nature conservation in order to secure them in the long term. With around 38,000 hectares of land, it is the largest private landowner in Schleswig-Holstein, with areas such as moors, meadows, and wetlands. The Schleswig-Holstein Stiftung Naturschutz is financed from various sources, such as state and EU funding, donations and sponsorship, and its own income from the sustainable management of its land (Stiftung Naturschutz Schleswig-Holstein, n.d.; SHZ 2023: 24.08.). The Stiftung Naturschutz is therefore an important partner for organic farming in Schleswig-Holstein. It supports this by promoting biodiversity, providing land, project work and public relations, thereby facilitating the transition to more sustainable agriculture.

The **Naturschutzring Aukrug** is a nature conservation initiative in the Aukrug area of Schleswig-Holstein, which is committed to the preservation and maintenance of the natural and cultural landscape in this region. The Aukrug is a rural region characterized by forests, moors, meadows, and small bodies of water. It is known for its high level of scenic and biological diversity. The organization focuses on the protection of nature, the promotion of biodiversity and public relations, work, and environmental education to promote sustainable land use. The organization works closely with farmers in the region. In 2010, it received the German Landscape Conservation Award. The laudation said: “With Holstein’s tenacity and tireless commitment, he [the chairman] has succeeded in uniting things that in other regions are as opposed to each other as fire and water: agriculture and nature conservation”. According to the laudation of the German Association for Landscape Conservation (SHZ 2012: 05.01.). The association contributes to biodiversity, for example, by distributing mown material from different areas to others. This allows rare plants to colonize and spread to new locations (SHZ 2014: 29.12.).

BUND Schleswig-Holstein (Bund für Umwelt und Naturschutz Deutschland, Landesverband Schleswig-Holstein) is the state organization of BUND, one of the largest environmental and nature conservation organizations in Germany. BUND SH is committed to protecting nature,

the environment, and the climate and is involved in various areas such as biodiversity, climate protection, and water protection. They favor sustainable agriculture, which they understand as a commitment to ecological and environmentally friendly agriculture, such as organic farming, and against intensive livestock farming (BUND SH, n.d.). BUND's interests are heard and discussed by the state government on environmental and nature conservation issues. In 2019, BUND called for extensive animal farming and payments linked to ecological measures (SHZ 2019: 19.07.). BUND showed no sympathy for the farmers' demonstrations in 2020 against the new insect protection program: “I can't understand the grumbling. Agriculture is a highly publicly subsidized industry. It must accept that the public does not want pesticides in the soil,” says Ole Eggers, regional director of BUND “and relying on voluntary measures by farmers has not achieved much in 30 years” (Eggers in SHZ 2020: 10.11., p. 4).

5.4.3 Institutional Actors

Even though many politicians in the Schleswig-Holstein state parliament repeatedly mention that conventional agriculture should not be replaced by organic farming, especially **the Green Party** is consistently in favor of the growth and promotion of organic farming. The Greens motion “For a fundamental reform of the EU agricultural policy (CAP) in 2013: No more public money for the industrialization of agriculture” (LIS-SH, 17/30 , n.d.). In 2014, a motion was submitted by the SPD, The Greens, and the SSW parliamentary groups to draw up a “Strategy for the development of organic farming in Schleswig-Holstein” (18/2214). The aim was to achieve the goal of cultivating 7% of the land in the federal state organically. The strategy is to be developed in cooperation with farms and associations as well as institutions representatives from industry and science. However, the application was refused (Schleswig-Holsteinischer Landtag, 2014). The Greens' 2016 election program sets a long-term goal of 100% organic farming (SHZ 2016: 26.11.). In 2018, 25 million euros were released by the Schleswig-Holstein state government for organic farming. Robert Habeck says: „We need an ecologization of agriculture. And not just so that the environment, nature and animals are better off. But also so that farmers have an alternative to the hamster wheel of intensification” (Habeck in SHZ 2018: 16.05., p. 19). Or as the Schleswig-Holstein Agriculture Minister Jan Philipp Albrecht declared in 2021: “We want to achieve a strong expansion of organic farming” (SHZ 2021: 22.01). The coalition agreement of 2022 also aims to double the number of organic farms in the state within the next five years (CDU und GRÜNE, 2022). The year also speaks of a boom in organic trade in Germany, which has developed into a market worth million (SHZ 2021: 04.10.).

Universities

In 2015, the Faculty of Agricultural Sciences at **Kiel University of Applied Sciences** was extended and renovated for 3.5 million euros. While the agricultural buildings were previously designed for 220 students, more than 460 students could be accommodated after the remodeling (SHZ 2015: 11.12.). **The Christian-Albrechts-University to Kiel (CAU)** is furthermore engaged in various research projects regarding organic agricultural practices and sustainable agriculture, such as the Climate-Farm Project or the Competence Centre for Milk, as well as the **TH Lübeck University** (see more in chapter Innovation). The universities are also invited to political discussions in parliament, e.g., in the environment and agriculture committees, or to state their opinions on discussed matters (Schleswig-Holsteinischer Landtag, 2018c).

Church

In Schleswig-Holstein, there is increasing friction between individual members of **churches** and some farmers. For example, after a speech on Norddeutscher Rundfunk radio on Thanksgiving Day, in which a Protestant pastor strongly criticized modern agriculture, triggering much discussion on social media, especially with the Schleswig-Holstein Farmers' Association (SHZ 2022: 13.10.). The regional bishop of the Evangelical Lutheran Church in Northern Germany, Gerhard Ulrich, called for a change in agricultural policy at an event on the Future of Agriculture in Kiel. Not only would productivity alone have to increase, but agricultural concepts would also have to be expanded. He called for fair trading conditions, new investments in land reforms, more food aid, and support for food-insecure communities. This should be achieved through a combination of modern science together with methods, traditional experience and cultural forms on the ground (SHZ 2011: 14.04.). “Even the church cannot be indifferent to how animals are used in agriculture, because questions of animal, environmental and economic ethics are closely linked to the Christian faith” (Ulrich in SHZ 2017: 02.02., p. 4). The church sees its role as a mediator. It is a place „where conventional farmers and animal rights activists can enter into dialogue“ (State Bishop Meister in SHZ 2020: 16.01., p. 2.). As an important moral authority, the Church's values and beliefs are influential in the public debate on issues such as animal welfare, environmental protection and sustainable agriculture. Their criticism of modern agricultural practices and emphasis on ethical issues show that sustainability is not just an economic or political issue but is also strongly influenced by social and religious values.

The **Schleswig-Holstein Chamber of Agriculture** is an independent self-governing organization that acts as a service provider for agriculture, forestry, horticulture, fisheries, and rural areas. Its main task is to provide fundamental work, training, and advice. As a professionally oriented and politically neutral institution, it aims to optimize the profitability of agricultural and fishing businesses as well as their working and production conditions. It wants to ensure harmony with the interests of the general public and focuses on nature conservation and environmental protection (Landwirtschaftskammer Schleswig-Holstein, n.d.). It is consulted for advice in the Agriculture Committee or cooperates in various projects on sustainable agriculture and provides information on new organic farming practices, for example, at Norla (SHZ 2012: 29.08.).

5.4.4 Bottom-up Initiatives

The bottom-up initiative **'Land schafft Verbindung'** (LSV-Deutschland) „is a movement of German farmers whose livelihoods and farms are jeopardized by politics" ("LSV Deutschland – Landwirtschaft verbindet Deutschland e.V.," 2024, n.p.). The initiative was launched in 2019 as part of farmers' demonstrations in Hamburg, Berlin, and Schleswig-Holstein, among others, with around 30 farmers in Eutin to "demonstrate against an unreasonable ban policy, in favor of a fact-based discussion of our future, better living conditions and for fairer coexistence, without farmer bashing and more" ("LSV Deutschland – Landwirtschaft verbindet Deutschland e.V.," 2024, n.p.; SHZ 2019: 19.12.; 2020: 11.01.). They are calling for regional and sustainable agriculture that small and medium-sized farms can implement with the help of politics (SHZ 2019: 19.12.). Among other things, the association is committed to ensuring that there is a neutral tool, independent of industry and politics, with which the sustainability of farms can be measured (see Chapter 5.6.4). In 2022, three of the farms analyzed for this purpose were in Schleswig-Holstein (SHZ 2022: 01.12.). In November 2022, the DINAK sustainability assessment of farms in Schleswig-Holstein was presented by 'Land schafft Verbindung' to the Environment and Agriculture Committee. 'Land schafft Verbindung' is calling for a binding measurement of sustainability for farms, which should be 100% publicly funded (Schleswig-Holsteinischer Landtag, 2022b).

'Meine Landwirtschaft' is an alliance of over 50 environmental and consumer organizations whose aim is "to actively shape agricultural policy from below as a broad social alliance" (SHZ 2011: 17.01., p. 3). They are in favor of farming and ecological, socially just, animal-friendly, and environmentally friendly agriculture. They initiated the 'We're fed up!' demonstration in

2011 and since then have taken to the streets every year during Green Week in Berlin to protest for a sustainable change in agricultural policy (Meine Landwirtschaft, n.d.). They also protest on the streets in Schleswig-Holstein and organize demonstrations, such as in 2012, where they called for a "new and fair agricultural policy in Schleswig-Holstein" (SHZ 2012: 22.03., p. 21). Partners included BIOLAND, DEMETER, ProVieh, BUND, the Federal Association of German Dairy Farmers (BDM), and Bread for the World (Landwege e.V., 2012).

The '**Pro Vieh'** association is one of the largest animal welfare organizations for species-appropriate animal husbandry in Germany and was founded in Kiel. The association advises politicians, farmers, and companies on more animal-friendly production methods. In addition, they network with other animal welfare organizations, associations, and institutions to pursue common goals. They are part of the 'Meine Landwirtschaft' alliance, as mentioned above. Furthermore, they support pilot projects that test innovative and animal-friendly approaches in agriculture. (SHZ 2013: 15.06., "PROVIEH," 2024).

The concept of **solidarity-based farming**, which is community-supported agriculture, is reported several times in newspaper articles over the course of the period. The concept works as follows: Consumers finance the economic costs of a farm, and the harvest is divided among the members. The reports in the newspapers tend to be isolated informative reports, but they have a very positive connotation. It can be concluded that part of the population in Schleswig-Holstein is interested in the concept of regional, mostly organic farming. However, these farms make up a very small proportion of the farms in Schleswig-Holstein (SHZ 2022: 03.05; 05.08; 2019: 25.10.; 2018: 17.08.). The topic has not been addressed by the Agriculture and Environment Committee, and the government will not show any real interest in the concept until 2020. Agriculture Minister Albrecht says that community-supported agriculture deserves more attention and is an inspiration for alternative forms of farming. However, farmers who participate report that they are not interested in large-scale expansion but would prefer to set up more new farms (SHZ 2020: 29.07.).

5.5 Strikes

During the period under review, farmers in Schleswig-Holstein have continued to voice their concerns in protests and demonstrations over issues ranging from land use and environmental regulations to agricultural policy and market conditions. These events reflect the challenges

facing the agricultural sector and its ongoing struggle to balance economic viability with evolving societal and environmental expectations.

Land Use and Nature Conservation

A recurring source of tension has been the conflict between the use of agricultural land and nature conservation measures. As early as 2009, farmers in Segeberg staged a peaceful motorway demonstration to draw attention to the loss of farmland caused by compensation areas for major infrastructure projects like the A20 motorway (SHZ 2009: 29.07.). Similarly, in 2015, more than 400 farmers, hunters, fishermen, and forest owners protested the passing of a new state nature conservation law in Kiel, accusing politicians, particularly Green Party member Robert Habeck, of prioritizing conservation over their livelihoods. Their frustrations were vividly expressed with an airplane banner reading: “Robert takes off, farmers stay on the ground” (SHZ 2015: 02.09., p. 1).

Agricultural Policy and Market Prices

The impact of European agricultural policy was also reason for significant protests. In 2011, over 40 environmental and consumer organizations, farmers, and associations gathered in the Steinburg district under the campaign "Farms instead of agribusiness." This event, organized by the alliance ‘Meine Landwirtschaft,’ called for ecologically adapted and globally fair agriculture that prioritizes sustainable food production (SHZ 2011: 17.01., p. 3). Similarly, the ongoing struggle of farmers to secure fair market prices led to nationwide protests in the year of 2013. Low milk prices prompted over 200 farmers to boo and jeer at Green Party politician Jürgen Trittin during an election event in Flensburg after he criticized intensive livestock farming (SHZ 2013: 31.08.). In 2021, farmers continued their fight for fair producer prices, targeting warehouses of large corporations with demonstrations to demand higher compensation for their products (SHZ 2021: 14.01.). After a period of reduced activity due to COVID-19 restrictions, protests resumed in 2023, with demonstrations in front of the Kiel state parliament advocating for small-scale agriculture, regional marketing, and the appreciation of local farming practices (SHZ 2023: 01.08.).

Fertilizer Regulations and Environmental Protection

Stricter agricultural regulations have also been a topic of discussion over the years. The largest protests occurred in 2019, when thousands of farmers across Germany, including Schleswig-Holstein, demonstrated against tighter rules on fertilizers, glyphosate bans, and climate laws.

These protests were marked by tractor convoys, the placement of green crosses on fields, and warning fires. The protests were supported by the initiative ‘Land schafft Verbindung,’ which organized regular demonstrations in Schleswig-Holstein (SHZ 2019: 18.09., 18.10., 19.12.). Farmers expressed concerns that the new regulations would threaten their livelihoods while failing to recognize their contributions to food security. This frustration continued into 2020. Farmers criticized unclear policy guidelines, particularly with regard to measures such as open stalls, which improve animal welfare but have a negative impact on CO2 emissions (“In general, we need clear guidelines from politicians on what they want“) (SHZ 2020, 09.06., p. 5, 11.08.). Later in the year, there were protests regarding the state government's insect protection program, which was perceived as a further burden on the industry (SHZ 2020: 10.11.).

The strikes highlight the tension between agricultural and environmental policy objectives and the need for a balanced and comprehensive approach that ensures both the sustainability of agriculture and economic stability. The strikes also underline the growing activism of farmers who are demanding fair treatment and recognition of their contribution to food production and environmental protection.

5.6 Advancing Technologies, Practices, and Collaborations

This chapter presents examples of innovations that strengthen sustainable practices in agriculture in Schleswig-Holstein. They are organized into the following categories: Climate Action and Environmental Sustainability, Technological and Technical Innovations, Social and Economic Innovation, Sustainability Assessment and Policy Support and Research, Collaboration, and Knowledge Transfer. The aim is to gain an overview of the local scope of sustainable innovations and to identify possible linkages to the development of organic farming.

5.6.1 Climate Action and Environmental Sustainability

Climate Farm Project

The Stiftung Naturschutz established the Climate Farm Project in 2021, which aims to wet and cultivate agriculturally utilized peatlands in the Eider-Treene-Sorge lowlands by 2031. It is funded by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) to promote climate-adapted and biodiversity-promoting agriculture. The Christian-Albrechts-Universität to Kiel is also involved in the project, for example, by measuring greenhouse gases and monitoring biodiversity on around 400 hectares of wet peatland owned by the Foundation for Nature Conservation. The project has a funding

volume of 12.4 million euros from the Federal Ministry for the Environment; the total project costs amount to around 15.5 million euros (Stiftung Naturschutz, n.d.). It is the only project of its kind in Germany. The aim is to achieve a positive climate balance and an economic alternative for agriculture (SHZ 2022: 21.09.; 2023: 05.07., 13.02.).

Production of climate-friendly plant charcoal

In Dithmarschen, two farmers have developed a machine that produces biochar from the scrub and tree residues that accumulate on the edges of fields. Until now, burning has been tolerated, but the inventors did not believe that this would be possible for much longer and, therefore, looked for another way to utilize it. The charcoal is used as a fertilizer, among other things, but also as a feed additive for livestock. The hummus formation in the soil is strengthened by the biochar, and CO2 can be bound to the soil. This innovation was honored with the VR Prize for Agriculture in 2023 (SHZ 2023: 25.08.).

Dialogue - The Future of Agriculture 2040

In the autumn of 2018, the Future of Agriculture Dialogue was initiated by Agriculture Minister Jan Philipp Albrecht after the CDU and Greens unanimously passed a motion to this effect in the state parliament. The aim of the dialogue is to do more for agricultural contract nature conservation, organic farming, the agricultural investment support program, and animal welfare measures. The aim is to clarify what agriculture should look like in 2040. Stakeholders from agriculture, nature conservation and research were invited to help develop cross-sector theses with the aim of future-orientated agriculture. A steering group was created from these representatives. In 2021, this collaboration resulted in 24 theses from the five thematic areas of climate change/climate adaptation, value creation and appreciation, animal welfare, biodiversity, water and soil protection, and agriculture & society (Landesportal Schleswig-Holstein, 2021b; Ministerium für Energiewende, Landwirtschaft, Umwelt, Natur und Digitalisierung, 2021; Schleswig-Holsteinischer Landtag, 2022c).

Wilde Weiden

The Wilde Weiden association is a nature conservation concept focusing on extensive, robust cattle farming in the Liether Moor, in the south of Schleswig-Holstein, in the active region of Pinneberger Marsch und Geest. Robust grazing animals graze in small groups all year round on large areas of peatland (SHZ 2012: 24.04.). Browsing and footprints create “new and varied mosaics of pasture grasses, tall herbaceous plants, open ground and shrubs, as well as forests,

which provide a natural habitat for other animals and plants. In addition to traditional biotope management and organic farming, this near-natural grazing creates a cost-effective pillar for preserving the natural heritage" (2012: 24.04., p. 10.). The aim is to make the area a recreational area with a learning effect and to increase biodiversity in the region. The association co-operates with schools and kindergartens, which can use the tax orchards and visit the wetland biotopes. The aim is to familiarize young people with the original natural landscape and to promote more environmentally friendly land cultivation (SHZ 2012: 24.04.).

5.6.2 Technological and Digital Innovations

Experimental Farm Lindhof bei Noer

The Lindhof experimental farm near Noer is an agricultural research and educational facility that belongs to the Christian-Albrechts-Universität to Kiel. It serves as a practice-oriented center for research, teaching, and knowledge transfer in the fields of sustainable agriculture and ecology (CAU Kiel, n.d.). Projects such as 'Digitalization of the grazing cow' (SHZ 2023: 24.05.) are carried out here by scientists from the CAU. The aim of the experimental farm is to increase the level of sustainable agriculture. Research is being carried out into how cultivation can be optimized, what effects wild herbs have on the methane emissions of cows, and thus how they can be kept in a more climate-friendly way. More sustainable fertilization has also been a focus since the early 1990s (SHZ 2020: 11.05.).

Digitalization

The requirements for agricultural studies are changing in line with the changes in the professional field. Working with computers is becoming increasingly important in the agricultural sector (SHZ 2017: 06.09.). In the state government in 2017, the area of digitalization was placed in the Ministry of Agriculture, which some have seen as a signal that the state government also wants to focus more on digitalization in agriculture (SHZ 2017: 06.09.).

Kompetenzzentrum Milch – Schleswig-Holstein (KMSH)

The Faculty of Agricultural and Nutritional Sciences at CAU oversees the 'Kompetenzzentrum Milch' with the support of various business partners and the Chamber of Agriculture. This is intended to guarantee quality cooperation between science and industry. The KMSH is a platform that was founded in 2009 for research, innovation, and technology transfer in the milk industry. Expertise should be pooled, and interdisciplinary research should be able to address

and work on topics relating to the modern and rapidly developing dairy industry. It is also intended to be an interface for dialogue between science, business, and politics. It was the first competence center of its kind in Germany ("Kompetenzzentrum Milch - Schleswig-Holstein (KMSH)," 2024). There are various research projects, such as **eMissionCow**, where the research focus is on breeding for feed efficiency and reduced methane emissions in dairy cattle, or the EIP project: OG Milch - Food & Feeding, which pursues the goal of sustainable, efficient feeding without genetic engineering on dairy farms in Schleswig-Holstein ("KMSH - Forschung und Projekte," 2024).

5.6.3 Social and Economic Innovations

EIP-Agri Projects

Schleswig-Holstein has participated in the **European Innovation Partnership** since this funding instrument was launched in 2003. Since 2015, these include innovative projects in the fields of digitalization, animal welfare, conservation of animal genetic resources, and regional agricultural value creation. It focuses on "operational groups" (OGs), which can receive up to 500,000 euros of EU funding for their innovation projects. These range from initiatives to improve grazing and animal welfare to improving nutrient management and digitalizing vegetable production (Landesportal Schleswig-Holstein, 2023b). One, out of 34 funded projects, is the 'Green Care Project: Further development of farms by integrating social services'. This program supports farms that offer social services for people with disabilities, for example, by providing suitable jobs, accessible farm tours, accommodation, and care facilities for a few hours or whole days (EIP Agrar Schleswig-Holstein, 2023). The project is a cooperation between the Schleswig-Holstein Chamber of Agriculture, Maschinenring Mittel-Holstein, scientific support from the Deutsche Arbeitsgemeinschaft Soziale Landwirtschaft/PETRARCA e. V and ten regional farms (ibid.).

Animal Welfare Initiative

The Animal Welfare Initiative is a program founded in 2015 by companies and associations in agriculture, the meat industry, and the food retail sector. The initiative aims to improve the conditions under which farm animals, particularly pigs, chickens, and turkeys, are kept in Germany. There is financial support for farms that join the program and comply with voluntary minimum requirements on their farms, such as more space in the barn, materials to keep the animals occupied (such as straw or toys), and measures to monitor and promote animal health (Tierwohl mbH, n.d.). In the founding year, 334 pig farms and 19 chicken breeding farms in

Schleswig-Holstein applied to participate in the animal welfare program (SHZ 2015: 15.09.). One in four fattening pigs in Germany will be kept in an animal welfare barn in 2022, thanks to the 'Animal Welfare Initiative', in which many farmers are represented. For example, the animals in these stables have more space and opportunities for exercise (SHZ 2022: 17.01.).

5.6.4 Sustainability Assessment and Policy Support

Analysis concept for evaluating the sustainability of farms

The German Institute for Sustainable Agriculture (DINAK) in Leipzig has developed an analysis concept that uses a scientific method to measure sustainability on farms not only by environmental standards but also by economic and social factors in equal measure (SHZ 2022: 01.12.; "DINAK – Deutsches Institut für Nachhaltige Agrarkultur," n.d.). 2022, this analysis concept was presented to the Schleswig-Holstein Agriculture and Environment Committee of the state parliament. The bottom-up initiative 'Land schafft Verbindung' favors state funding to finance these DINAK reports so that farms can transparently show where the weak points are and where the farms can become even more sustainable. The institute would recommend a report covering at least two years. This costs around 2700 euros per year for a 1000-hectare farm. However, the certification has not yet been officially recognized by Schleswig-Holstein. The Greens and SSW have criticized the method, as the weighting could, for example, compensate for a lack of sustainability aspects in the ecological area due to good results in social sustainability (e.g., fair pay or good gender parity). The institute rejects this criticism by stating that DINAK weighs up the criteria scientifically and has made all data transparent so that details can be scrutinized. Somehow, however, an overall score had to be decided. The representatives of the FDP and CDU parliamentary groups in the committee found the institute's assessment to be reasonable (SHZ 2022: 01.12.).

Runder Tisch Ökolandbau

It was held for the first time in March 2023, convened by Agriculture Minister Werner Schwarz. It is intended to serve as a platform for exchange and dialogue within the agricultural sector to strengthen organic farming in Schleswig-Holstein. It consists of representatives from agriculture, politics, and administration (SHZ 2023: 28.02.; MLLEV, 2023).

Agricultural Investment Support Program

In 2014, the Chamber of Agriculture in Schleswig-Holstein set up project groups for various sustainable areas in agriculture. Innovative sustainable projects were able to be funded by the

Ministry of Agriculture (SHZ 2014: 08.07.). In 2021, the Ministry of Energy Transition, Agriculture, Environment, Nature and Digitalization launched the agricultural investment support program, under which agricultural businesses can apply for financial support for investments to make their operations more competitive, sustainable, environmentally and climate-friendly and animal-friendly (SHZ 2021: 22.04.).

5.6.5 Research, Collaboration, and Knowledge Transfer

University Programs

The Chamber of Agriculture, Farmers' Association, Deula, the vocational-technical college in Osterrönfeld, and the agricultural science department of the University of Applied Sciences are working together to design the Bachelor's degree program in “Agriculture” and the Master's degree program in “Farm Management” (SHZ 2015: 11.12.).

Collaboration

In 2015, a *target agreement* was adopted between the Ministry of Energy Transition, Agriculture, Environment and Rural Areas of the State of Schleswig-Holstein and the Schleswig-Holstein Chamber of Agriculture for the period 2016 to 2020. This declares the Chamber of Agriculture as a self-governing institution of the agricultural sector. It plays a key role as a mediator between agricultural practice and state administration, politics, science, the public, and consumers (Schleswig-Holsteinischer Landtag, 2015). One of the operational objectives in this is the plant cultivation and grassland management associated with sustainability is the improvement of production technology regarding the more efficient use of resources. This should serve to adapt to climate change, as well as to optimize environmentally friendly and competitive market crop and fodder production and the use of agricultural technology while further developing good agricultural practices in organic farming. The adaptation of agricultural production to climate change and the promotion of sustainable and environmentally friendly grassland management are also named as objectives in relation to sustainability. Solutions relating to environmental, nature, and climate protection are to be promoted, and the transfer of up-to-date information on organic farming will be incorporated into agricultural advice and practice. This is intended to appeal to various target groups, including agricultural businesses, farmers, and farmers' associations (Schleswig-Holsteinischer Landtag, 2015). In some of the measures, it is indicated how many of the planned key figures and target figures are specifically targeted at “organic farming”. However, especially in the area

of "advice and public relations", the numbers of some measures are significantly smaller compared to the total number (Schleswig-Holsteinischer Landtag, 2015).

Farm Future Research Project

Lübeck University of Applied Sciences (TH Lübeck) founded the Farm Future Research Project in 2022 to conduct research into post-fossil agriculture. The research project is funded by the Gesellschaft für Energie und Klimaschutz Schleswig-Holstein GmbH (EKSH) (with 140,000 euros in 2022) to support cooperation between industry and research. For example, the TH Lübeck and the EKSG are working together with Westhof Bio-Gemüse GmbH & Co. KG, which is a large organic vegetable farm from Schleswig-Holstein, and the Schleswig-Holstein Chamber of Agriculture to achieve more climate-friendly agriculture through research, cooperation and funding (SHZ 2022: 24.05.;TH Lübeck, 2022).

5.7 External Influences

The external influences that have affected the agricultural sector in Schleswig-Holstein are listed below. The main influences identified are climate change, the Fridays for Future movement, Insect extinction, the COVID-19 Pandemic, the Ukraine-Russia conflict, and the awareness and changing demands on the agricultural industry.

Climate Change

Climate change and its regional and global consequences are significant threats to Schleswig-Holstein's agriculture (see also Chapter 2.2.). The topic of heatwaves and dry spells has been a recurring theme in the media and politics in Schleswig-Holstein almost every summer since 2014 which overlaps with the publication of the AR5 from the IPCC (IPCC, 2014). In many places, there are significant water shortages in the upper soil layers, which has a negative impact on plant growth. The same applies to winters that are too warm, in which precipitation is not retained in the form of ice and snow, and the soil is therefore saturated with water, which has a negative impact on the harvest. In 2014, Schleswig-Holstein's Environment Minister Robert Habeck spoke of the chance that warmer summers could also mean a second harvest in the year (SHZ 2014: 06.06.), but in the following years, there were more and more reports of a threat posed by climate change, both for harvests and for endangered animal species, their habitats, biodiversity, and land use due to rising sea levels (SHZ 2014: 06.06.; 2016: 11.01.; 2017: 03.07., 11.05.; 2018: 07.08.; 2023: 18.01., 26.06.).The lowland areas in the coastal regions, which make up around a fifth of the federal state, pose a particular problem, as they are

especially at risk from rising sea levels and heavy rainfall (Landesportal Schleswig-Holstein, n.d.).

Fridays for Future

In 2019, the social movement Fridays for Future attracted worldwide attention with their global climate strikes, the aim of which is to draw attention to climate change and call on politicians to adopt climate-friendly policies. The movement was started in 2018. Agriculture also plays an important role in Fridays for Future's demands, calling for more sustainable and environmentally friendly farming and demanding that Germany "internalize the external costs of agriculture, promote agricultural and natural CO2 sinks, improve livestock farming, while not forgetting consumers, society and international issues" (Fridays for Future, n.p.,n.d.). This was a driver for awareness of the climate impact of agriculture within (German) society.

Insect extinction

A report by the Federal Agency for Nature Conservation reports on the decline of insects in the agricultural landscape throughout Germany. A "blatant decline" is reported (SHZ 2017; 03.07.). The number and diversity of insects in Germany are shrinking dramatically, and the German government is launching an action program for insect conservation (Ministerium für Energiewende, Landwirtschaft, Umwelt, Natur und Digitalisierung, 2019; NABU, 2021). The study cites agriculture and the associated remodeling of the natural landscape as the main cause of insect mortality. Too little vegetation on the edges of fields results in too little food, fodder, and habitat for insects. Pesticides from agriculture, especially glyphosate, also cause additional damage to insects (ibid; SHZ 2019: 01.11). The use of nitrogen in soils, for which agriculture is responsible for 63% in Germany, also has an impact on biodiversity and insect mortality, as nitrogen-loving plants such as nettles and brambles benefit from this and overgrow these areas. The insect-friendly plants disappear (SHZ 2018: 15.01.).

COVID-19 Pandemic

The coronavirus pandemic led to an acute shortage of harvest workers in Schleswig-Holstein in 2020 due to travel restrictions. The state government, the Schleswig-Holstein Farmers' Association, and the Federal Employment Agency are appealing for support from farmers under the initative "Erntehilfe SH". The appeal is aimed at skilled workers in the catering and retail sectors, people on short-time work and students (Landesportal Schleswig-Holstein, 2020d). However, the coronavirus crisis was also seen by some as an opportunity for agriculture, like

Minister of Agriculture Albrecht said: “The fact that attention for regional food production is increasing is a consequence of the crisis that we should see as an opportunity” (Landesportal Schleswig-Holstein, 2020e, n. p.).

Ukraine - Russia conflict

Possible economic losses for agriculture due to the Russia-Ukraine conflict were already reported in 2016 (SHZ 2016: 30.06.). After Russia launched a war of aggression against Ukraine on 24 February 2022, the impact on agriculture was discussed. Rising costs for fertilizers, energy, and logistics costs put a strain on farms and, together with resource shortages, have been responsible for the rise in food prices since then and jeopardized global food supply (SHZ 2022: 02.09., 15.06., 2023: 26.06.)

Awareness and Change of Demands on the Agricultural Industry

Both in Germany and specifically in Schleswig-Holstein, there has been an increase in social awareness of animal welfare, climate change, and environmental protection. This can be seen in the increasing number of newspaper articles and mentions published during the period under review, but also in studies and the frequency and depth of discussions on these topics in the political arena, for example, in the Transcripts of the Environment and Agriculture Committee. ("The adverts are overflowing with “Veganuary” - meat-free January. Should that scare farmers?“). In 2016, the Federal Ministry for the Environment published a study on the German population's awareness of nature. It states that Germans want agriculture to show more consideration for nature and the landscape. For example, 93% of respondents would like to see more space for farm animals to roam (BMUB, 2016; SHZ 2016: 28.04.). A similar study was published in 2020, in which 37% of respondents from northern Germany agreed with the statement: “German farmers should focus more on landscape protection and less on the production of agricultural products”, which is above the national average. 98% of respondents in northern Germany are in favor of compliance with animal welfare standards, 94% are in favor of more climate and environmental protection, and 90% are in favor of more biodiversity in agriculture (BMU, 2019; SHZ 2020: 24.11.). Schwarz, then President of the Farmers' Association, also said of the changes in agriculture: “We are engaging in a much stronger dialogue with society on the topics of sustainability, climate protection, biodiversity, and soil management. This has increased enormously over the past five years” (Schwarz in SHZ 2022: 12.02., p. 23).

This is also backed by the expand of new markets. In an interview on new consumer demands for food, the current Farmers‘ President Rukwied talks about new opportunities in agriculture arising from current trends such as the demand for vegetarian and vegan products (“The trend towards vegetarian or vegan food is also an opportunity for farmers. After all, it is us farmers who grow the raw materials for the substitute products [...]. We supply sustainable, local raw materials that are processed into trendy foods” (Rukwied in SHZ 2022: 17.01.)). Examples for this is the increases of chickpea cultivation (SHZ 2022: 17.01.) or hemp farming (SHZ 2022: 17.01.). In general, a positive overall sociatal tone towards organic farming is recognized in the period under review. Newspaper articles mention positive effects on climate, environmental protection, and animal welfare (SHZ 2009: 16.12.; 2015: 29.05;).

Additionally, consumers demand on the agricultural industry also change. Products should be cheap and, at the same time, meet high standards. This is being expanded to include the aspect of sustainability (SHZ 2022:15.06.). Consumers often expect agricultural products to be both affordable and of high quality, including attributes like freshness, taste, and nutritional value. However, with growing awareness of sustainability issues, there is an increasing expectation for products to meet additional criteria. Balancing these demands poses a significant challenge for farmers, who must reconcile cost pressures with investments in more sustainable but often more expensive production methods (Bundesministerium für Ernährung und Landwirtschaft, 2023b). The demand side should be given greater consideration when it comes to sustainability and its feasibility and financial viability, as the farmers' association repeatedly emphasizes (("But it also depends on the consumers, who must be prepared to pay the higher price for greater animal welfare “(Ruckwied in SHZ 2022: 17.01, p. 15; SHZ 2023: 28.02.).

6 Discussion

The discussion begins by addressing the research questions central to this study. In 6.2, the results are analyzed using the MLP framework as a guiding perspective, and the study's methodological approach is critically examined to highlight its strengths and limitations. Finally, recommendations for future research regarding that topic and area are made.

6.1 Addressing the research question

1. **How did policy implementations shaped the development of organic agriculture?**

The development of organic agriculture in Schleswig-Holstein was shaped by the alignment of international, national, and regional policy frameworks, creating a supportive environment for transitioning to sustainable farming practices. The subunits Policy& Regulatory Frameworks and Strategic& Practical Initiatives formed the base of this findings.

At the international level, the **European Union's Common Agricultural Policy (CAP)** provided financial incentives and eco-schemes that directly supported organic farming. The **Farm to Fork Strategy** and **the Biodiversity Strategy**, both under the **European Green Deal,** outlined clear goals to reduce synthetic inputs, enhance soil health, and protect biodiversity. These strategies provided a framework for Schleswig-Holstein's policies, ensuring the region's agricultural practices aligned with EU-wide sustainability goals. At the national level, Germany's **Federal Organic Farming Program** and the **Climate Action Program 2030** provided funding for research, education, and the adoption of climate-friendly practices. The **National Strategy for Organic Farming**, introduced in 2017, set the goal of increasing organic farming to 20% of the country's agricultural area by 2030, which reinforced efforts in Schleswig-Holstein. These national measures laid a foundation, but the regions success was primarily driven by its targeted, region-specific implementations (see Chapter 5.1.1).

At the regional level, Schleswig-Holstein implemented these frameworks with a focus on its specific agricultural and ecological conditions. One critical turning point in the growth of organic farming was observed from 2014/ 2015 onwards, driven by a combination of financial incentives, rising consumer demand for organic products, and targeted policy support. Regional funding for organic farming saw a significant increase during this period, with subsidies from the Improvement of the **Agricultural Structure and Coastal Protection (GAK)** program playing a central role (see Chapter 5.1.2). These subsidies reduced the financial risks for farmers

transitioning to organic farming and spurred an expansion in organically farmed land. Another key factor was the increased integration of organic agriculture into public and private sector supply chains, due to the **EU Organic Regulation (EC).** Organic farming was further supported by consumer-driven demand. Policymakers seized this opportunity to emphasize organic farming as a strategic sector, aligning with broader sustainability goals while tapping into a growing market. The political landscape also played a critical role. The Green Party's leadership in the state government further prioritized organic farming and sustainability during coalition agreements (see Chapter 5.4.3). Their advocacy for increased funding, education campaigns, and market development initiatives created a strong push for the organic sector's growth. For example, financial incentives for certification costs and support for supply chain development were introduced, addressing both the production and distribution challenges associated with organic farming. The combination of these factors created a tipping point around 2015, leading to sustained growth in organic agriculture.

2. **Which actors are involved, and how did they support or hinder the development of organic agriculture?**

In the case of Schleswig-Holstein, several actors and networks can be identified that have an influence on the development of the agar sector, especially organic farming. These have been categorized as supporting, hindering and dual role actors. The embedded unit of analysis was Key actors and their roles but also the subunit of Strategic& Practical Initiatives provided insight into this field.

Actors Supporting Development of Organic Agriculture

In Schleswig-Holstein, there are various **environmental organizations and interest groups** (NABU, BUND, ProVieh, Stiftung Naturschutz, Naturschutzring Aukrug) (see Chapter 5.4.2). These organizations actively advocated for stricter environmental standards and raised public awareness about the benefits of organic farming, helping to build societal momentum for sustainability transitions. influence is often reflected in regional policy over time, e.g., in the peatland restoration programs and the regulation to protect hedgerows. They are often invited to participate in discussions in political bodies or asked for their opinion These organizations also run public awareness campaigns to encourage community support for sustainable practices or organize and/or are part of strikes calling for an agricultural transition and more organic farming (see Chapter 5.5). Furthermore, they support or run innovative projects that contribute to a sustainable transformation, such as the **Climate Farm Project,** which collaborates with

the BMUV and the CAU (see Chapter 5.6.1) Grassroots initiatives, including farmer cooperatives and community-driven campaigns further bolstered this momentum (see Chapter 5.4.4& 5.6.1). There is a regional group of **innovative farmers and agricultural networks** (ABL, Land schafft Verbindung, Meine Landwirtschaft) that are proving to be an important driver for sustainable practices in Schleswig-Holstein. These actors are experimenting with organic farming, agroecological methods, and precision agriculture to reduce environmental impacts while maintaining economic viability. These are bottom-up initiatives, networks, and individual farmers that are driving innovation (see Chapter 5.4.1& 5.4.4). These farmers play a crucial role in demonstrating the feasibility of sustainability innovations and challenging the conventional norms of the agricultural regime. This is also noticeable in public demonstrations, where they have been calling for many years for an ecological, regional, more animal-friendly, and climate-friendly agricultural policy, i.e., an agricultural transformation towards organic agriculture (see Chapter 5.5). Furthermore, **regional initiatives** support these efforts, such as the **KMSH** or **"Wilde Weiden"** (see Chater 5.6.2) or the **Competence Centre for Climate-Efficient Agriculture** (see Chapter 5.1.2).

Policymakers at the EU, national, and regional levels contribute to organic farming by creating frameworks such as the European Green Deal and CAP reforms that link subsidies to environmental performance. **The Green Party** has been a pioneer in advocating more sustainability criteria for agriculture in Schleswig-Holstein and calling for the expansion of organic farming. Through its influential role in Schleswig-Holstein's government, it ensured that sustainability remained a political priority, channeling resources into organic farming and increasing its visibility and viability The **regional institution** Chamber of Agriculture also play an important role in translating this policy into practical tools and resources for farmers or funding programs regarding new organic practices. They also collaborate in projects regarding this (see Chapter 5.4.3).

In cooperation with environmental organizations and innovative farmers, **research institutions** provide the data, technological innovations, and pilot projects required for the transformation to more organic practices. Universities, such as CAU or TH Lübeck, contribute significantly to the development of sustainable agricultural practices by advancing education and providing evidence-based recommendations to policymakers and farmers. Their integration into political and agricultural discourse strengthens the link between science and practice, positioning them as crucial players in the transition to environmentally friendly farming systems, such as organic

farming (see Chapter 5.4.3). They are partners to various collaborative project and lead own projects regarding sutainability in agriculture, like the Lindhof Experimental Farm, digitalization projects, the Climate Farm Project or Competence Center for Milk.

The **church** should also be mentioned as a reinforcing factor, as individual representatives have spoken out in favor of more sustainable agriculture. As the church represents a high moral authority for many people, including farmers, public positioning can lead to greater social acceptance of more sustainable practices (see Chapter 5.4.3).

Actors Hindering Development of Organic Agriculture

Despite these supportive efforts, several actors have hindered the transition to organic agriculture, driven by economic concerns, resistance to change, and conflicting priorities. **Traditional farming networks and associations** often resist change due to their economic dependence on conventional farming methods (see Chapter 5.4.1). These organizations prioritize the economic viability of their members and see stricter environmental regulations and sustainability measures as an economic threat. Their influence can be seen in the widespread resistance to stricter fertilizer regulations. These networks also uphold a path dependency that reinforces intensive agricultural practices, creating significant barriers to an agriculture with organic practices. This path dependency, combined with a cultural attachment to traditional methods, hinders the transition. While some political decision-makers actively support organic farming, internal differences of opinion within coalition governments, so **inconsistent political will**, often lead to disagreements when it comes to prioritizing environmental goals. For example, conflicts between the Ministry of Agriculture and the Ministry of Environment, which has been separate since 2022, delay the implementation of a comprehensive sustainability policy and therefore organic agriculture (see Chapter 5.1.2). This lack of coherent political will hinders the effectiveness of landscape-level measures, such as EU mandates, and weakens the enforcement of regional measures.

Actors with a Dual Role

Adding complexity to this dynamic were actors who played dual roles, both supporting and hindering the transition depending on the circumstances. The **Farmers' associations** exemplified this duality. While they supported educational programs and provided resources for farmers adopting organic practices, they also lobbied against certain regulations perceived as overly restrictive, such as land reallocation policies However, it should be noted that in recent

years, especially with the election of Klaus-Peter Lucht as president, the association has begun to recognize the need for cooperation on environmental and climate issues, signaling a gradual shift towards reconciling conventional agriculture with sustainable practices (see Chapter 5.4.1). **Consumers** can be also classified as hybrid actors, as, on the one hand, they demand more organic products and practices from agriculture. Climate protection and animal welfare are becoming increasingly important to them, and it can create market incentives for farmers to adopt environmentally friendly practices. On the other hand, price sensitivity and limited willingness to choose the more expensive but organic product can hinder the potential for widespread adoption (see Chapter 5.7). This can create a barrier for producers, as they are afraid to make cost-intensive investments or conversions if it is not financially viable. The urban-rural divide reinforces this dynamic, as urban consumers are more likely to call for organic products (see Chapter 5.2.2). Similarly, **policymakers** also occupy a unique hybrid position, **as they can both enable and hinder the transition organic agriculture.** While initiatives at the EU and national level provide a framework for organic agriculture, weak enforcement mechanisms and fragmented regional policies often dilute their impact. Policymakers have the potential to act as bridge builders by fostering collaboration between environmental organizations, farmers and agricultural associations, and research institutions, but this requires consistent political will and clearer prioritization of sustainability goals. During the period under review, it became apparent at the regional level that a common direction in Schleswig-Holstein politics is becoming increasingly apparent and that even traditionally more conservative parties and decision-makers are at least publicly striving for a more sustainable course and are more likely to accept or support organic agriculture.

3. **What are the main conflicts discussed in a political and societal context regarding agriculture?**

The political and societal discourse surrounding agriculture in Schleswig-Holstein has been shaped by several prominent conflicts that reflect the tensions between environmental goals, economic priorities, and social equity. The embedded units of analysis for this chapter are Public& Societal Discourse, External Events& Influences and Policy& Regulatory Frameworks. These conflicts, discussed by both politicians and society, can be categorized into environmental conflicts, economic conflicts, and social conflicts, each underscoring the challenges of transitioning to sustainable agricultural practices.

Environmental Conflicts

When looking at environmental concerns, the topic of **biodiversity loss** is very present. The traditional agricultural practices of intensive farming were a strong factor in the damage and loss of biodiversity in Schleswig-Holstein during the period analyzed. This problem can be seen in emerging discussions, such as discussions around embarked hedgerows, which are important for biodiversity or insect extinction. Furthermore, agricultural **Greenhouse Gas Emissions** are a recurring theme. These emissions are primarily linked to methane from livestock farming, fertilizer use, nitrate pollution, and peatland drainage. This is also shown in one of the most significant environmental conflicts, the concerns the **rewetting of peatlands**, a key ambition of Schleswig-Holsteins government for reducing greenhouse gas emissions and restoring biodiversity (see Chapter 5.1.2). Peatlands act as critical carbon sinks, making their restoration vital for meeting climate targets under the European Green Deal and Germany's Climate Action Program 2030. However, farmers and agricultural associations strongly oppose this policy, arguing it results in the loss of productive farmland and threatens livelihoods. While landowners receive compensation, tenant farmers are often excluded, fueling perceptions of unfairness and sparking accusations of expropriation (e.g., see Chapter 2.4.1& 5.5). Politicians aligned with agricultural interests have called for more balanced solutions to address these concerns and mitigate harm to rural communities. **Water pollution** is another constant topic of discussion related to agriculture. Excessive nitrate use in fertilizers has led to significant water pollution, as noted in EU lawsuits against Germany for excessive nitrate levels in 2016 (Europäische Kommission, 2016). In Schleswig-Holstein, the nitrate surplus was already too high for years. Although stricter fertilization rules (2017) were introduced, compliance remains inconsistent, creating ongoing environmental and political tensions. Another environmental conflict concerns the **cultivation of monocultures**, particularly for bioenergy crops like maize used in **biogas plants** (see Chapter 2.4.1& 5.2.1). While biogas production is promoted as a renewable energy source, critics argue that the extensive cultivation of maize creates environmental problems such as biodiversity loss, soil degradation, and water pollution. Environmental organizations and some policymakers have called for diversifying crops and adopting agroforestry systems instead.

Economic Conflicts

In the political and societal context conflicts center on the **financial viability** of organic farming. Conventional farmers and agricultural associations have frequently expressed concerns over the high costs associated with transitioning to organic farming. **Certification**

fees, high bureaucratic hurdles, infrastructure investments, and **potential yield reductions** during the transition period create significant financial risks While subsidies from programs such as the GAK have mitigated some of these costs, critics argue that the financial support is insufficient, particularly for small-scale farmers and dairy farmers (see Chapter 5.3).. Additionally, there is tension surrounding land competition. The increasing demand for rewetting peatlands and renewable energy projects (such as wind farms and biogas plants) has intensified **competition for arable land.** Farmers and landowners face rising land lease prices, which further strains their economic viability. Politicians have debated how to balance these competing land uses, with some advocating for stronger regulations to prioritize food production, while others focus on renewable energy and environmental restoration (see Chapter 2.4.1). A related conflict involves the market dynamics of organic farming. While there is growing consumer demand for organic products, small-scale organic farmers are in competition with larger agribusinesses that dominate supply chains.

Social and Cultural Conflicts

A polarization in society around discussions about (sustainable) agriculture is quite noticeable. Strikes on various topics, be it against environmental regulations for agriculture, for more organic farming, or against mass animal farming, are taking place throughout the entire process, with the exception of assembly bans due to COVID-19 regulations (see Chapter 5.5). Compounding these challenges is the broader societal debate over the **reputation** of farmers, which peaked between 2018 and 2021 (see Chapter 5.2.2). Farmers report feeling marginalized, with some noting that negative perceptions of agriculture have led e.g. to bullying of their children. Conventional farming is often portrayed as environmentally harmful, exacerbating feelings of alienation in rural communities. Farmers argue their contributions to food security and rural economies are undervalued and express concerns about the uncertain future of agriculture, the decline of family farms, and insufficient economic incentives. This is also linked to the extinction of farms. The number of people deciding to go into the industry and take over farms is shrinking. This reflects a growing call for greater societal appreciation of their work. This conflict also highlights the **urban-rural divide**, a recurring theme in Schleswig-Holstein. Urban populations, largely supportive of stricter sustainability measures, often clash with rural communities, who feel sidelined by top-down policies. For many farmers, these policies represent not only economic pressures but also a threat to their way of life and cultural identity. This divide complicates the implementation of sustainability policies, as mutual understanding between urban and rural stakeholders remains limited. In Schleswig-

Holstein, where agriculture is central to cultural identity, these tensions heighten the challenges of transitioning to sustainable practices. Bridging this divide requires fostering understanding, creating fair policies, and emphasizing the shared benefits of sustainable agriculture for all. Additionally, the introduction of **biogas plants** was a highly discussed topic in politics and the media, especially during the 17th electoral term (2009–2012) (see Chapter 5.3& 5.2.1). Biogas production provided a financial lifeline for many farmers, particularly dairy farmers facing severe economic losses. However, it also sparked social conflicts within rural communities. While some farmers benefited from the additional income biogas offered, others, particularly those without large landholdings or resources, felt excluded from these opportunities. The financial advantage of biogas farmers created resentment, as traditional farmers struggled to compete, deepening divides within rural communities. Additionally, critics argued that prioritizing energy production over traditional farming could harm food security. These tensions highlight how renewable energy policies, while economically beneficial for some, can inadvertently exacerbate social divides. Over the years, there has been a particularly noticeable **tension from the farmers' association towards the Green Party**. The farmers' association repeatedly speaks negatively about the party and conveys the image that the Greens are damaging agriculture with their environmental requirements and sustainable demands.

4. **How has the political pathway of the organic agriculture sector in Schleswig-Holstein developed in the period from 2009 to 2023?**

The development of organic agriculture in Schleswig-Holstein from 2009 to 2023 illustrates a steadily evolving political commitment to sustainability, shaped by a combination of multi-level policy frameworks and regional governance strategies. While embedded in broader European sustainability objectives, the state’s unique socio-political dynamics and its population's environmental consciousness played a critical role in shaping this transformation.

2009–2014: Laying the Foundations

The timeframe from 2009 to 2014 set the stage for Schleswig-Holstein’s organic agriculture pathway. The German Sustainability Strategy, the Federal Organic Farming Program and the EU Organic Regulation were already implemented in the years before, but it did not contribute to significant growth. During this time, organically farmed land expanded gradually, from 35,656 hectares in 2009 to 37,085 hectares by 2014 (Statistik Nord, 2024). The political momentum was still relatively modest, with organic farming seen as a niche within the broader agricultural sector, even though bottom-up initiatives like the alliance “Meine Landwirtschaft”

were already protesting in this time already for a new and fair agricultural policy in Schleswig-Holstein (see Chapter 5.4.4.)

This phase also marked the emergence of key institutional support systems, such as funding for sustainability-oriented farming practices through programs like GAK- Framework Plan 2013. Political will began to crystallize around addressing environmental issues like biodiversity loss, water contamination and climate change and its impacts, setting the foundation for more robust policy frameworks in subsequent years.

2014–2019: Accelerated Growth and Policy Strengthening

This period is characterized by the emergence of influential environmental movements, such as Fridays for Future (2018), and the rise of public awareness regarding environmental issues, due to publications like the IPCC's Fifth Assessment Report (AR5) in 2014. This also marked a turning point in climate policy. The AR5 provided conclusive evidence that human-induced global warming is the primary driver of climate change, highlighting agriculture as both a contributor to and a potential solution for environmental challenges. These findings reinforced the integration of sustainable agricultural practices into international key policies, including the 2014 CAP reform and the 2015 Paris Agreement, which in turn supported the promotion of organic farming in Schleswig-Holstein, because a major driver during this period was the alignment of organic agriculture with broader sustainability frameworks. This is also reflected on a national level. The Extensive Revision of the Sustainability Strategy - Perspectives for Germany in 2016 declared the goal that of up to 20% of the total agricultural area should be converted to organic utilized land. This aim is also further elaborated in national Future Strategy for Organic Agriculture. Key political actors, such as Robert Habeck, then Minister of Agriculture, championed the benefits of organic farming, emphasizing its contributions to water protection, biodiversity, and long-term climate resilience. Under Habeck’s leadership, state support for organic farming increased significantly, with the introduction of higher subsidies for conversion and maintenance of organic farms.

2019–2023: Institutionalization and Challenges

The period from 2019 to 2023 marked the institutionalization of organic agriculture as a political priority in Schleswig-Holstein Particularly was this through Schleswig-Holstein’s commitment to the European Green Deal, and its associated strategies, including the CAP reforms and the Biodiversity Strategy as well as the Farm to Fork Strategy. These policies

underscored the importance of organic agriculture in achieving climate neutrality, biodiversity restoration, and sustainable resource management and became a cornerstone for Schleswig-Holstein to implement it on a regional level. This political commitment translated into a substantial expansion of organically farmed land, surpassing 73,700 hectares by 2021. The AR6 of the IPCC intensified this pressure by emphasizing the increasing threat to agricultural systems and calling for far-reaching measures to reduce emissions. By 2023, organically farmed land in Schleswig-Holstein had reached a peak of 77,200 hectares, which represented 7.9% of the state's total agricultural area (Statistik Nord, 2024). This growth was enabled by continued financial support through GAK programs and eco-schemes introduced in the CAP reforms. Furthermore, implementations on a national scale, like the Agricultural Investment Program and the Organic Strategy 2030 are supporting further expansion of organic agriculture. The state of Schleswig-Holstein also supported innovations in organic farming practices, such as agroforestry, digitalization and climate-adapted agriculture, ensuring that the sector remained resilient in the face of climate change. It also enables collaborations and connections between different stakeholders like farmers, environmental organizations, research institutions and more.

With a new election, political dynamics shifted following the 2022 coalition agreement between the CDU and the Greens, which restructured ministerial responsibilities. While the Green Party retained oversight of environmental policies, the CDU assumed control of the agriculture ministry, leading to debates over the balance between economic interests and environmental goals. The separation of the two ministries was seen as a threat to future cooperation between agricultural issues and environmental protection. Despite this, the institutional commitment to organic agriculture remained strong. The alignment of regional policies with European sustainability goals ensured that organic farming continued to receive political and financial support, even amidst changes on the political landscape.

6.2 Analysis through the Multi-Level-Perspective Framework

This section summarizes the results of the sustainability pathway in Schleswig-Holstein's agriculture using the Multi-Level Perspective (MLP). It assesses the interaction across the three analytical levels: niches, regimes, and landscapes (see Chapter 3.2). This offers insights into the dynamics within the system and to key challenges and opportunities for achieving a sustainable transformation.

Niches: Spaces of Innovation and Experimentation

In Schleswig-Holstein, niches serve as testing grounds for innovative agricultural practices. These spaces often operate at the margins of conventional systems, driven by grassroots initiatives and small-scale organic farms. Farmers experimenting with agroecology, crop diversification, and biodiversity-friendly practices exemplify the innovative potential of these niches. For instance, some pioneering farmers in the region have adopted agroforestry systems to enhance soil health, mitigate climate impacts, and promote biodiversity. Similarly, the cultivation of legumes, such as lupins, has gained attention as a dual-purpose crop that improves soil nitrogen levels while serving as a protein-rich alternative for animal feed and human consumption. These niche practices are often supported by collaborative networks involving farmers, environmental orgaizations, and research institutions. Programs that connect urban consumers with rural producers, such as solidarity-based agriculture initiatives, also play a role in fostering demand for organic products. While niches provide fertile ground for radical innovations, their role in driving the broader transition is secondary. Barriers such as limited funding, entrenched dominance of conventional practices, and difficulties in scaling innovations without policy backing mean that their influence remains incremental. They depend heavily on regime-level support to gain wider traction and overcome systemic challenges.

Regime: The central driver of transition

The established socio-technical regime in Schleswig-Holstein is the key driver of the transition to organic agriculture. Unlike typical transitions where niches disrupt entrenched systems, in this case the regime actively leads the shift through deliberate policy design and implementation. At the heart of this regime-led transition is the alignment of regional policies with broader European Union frameworks, such as the European Green Deal. These initiatives emphasize more sustainable practices, biodiversity preservation, and the reduction of fertilizers in agriculture. Schleswig-Holstein has localized these goals through state-level programs, including financial incentives under the Improvement of the Agricultural Structure and Coastal Protection program. These subsidies have encouraged farmers to adopt organic practices, leading to a significant expansion of organic farmland. Combined with targeted support for transitioning farmers and initiatives like peatland rewetting and climate-adapted agriculture, these are examples of regime-driven efforts to institutionalize sustainability. The presence of the Green Party in the state government has further amplified these efforts, ensuring that environmental priorities remain central to agricultural policy like the long-term funding for organic farming and partnerships with institutions like the KMSH. Economic incentives further

illustrate the regime's role as a driver of transition. Subsidies for organic farming, coupled with rising consumer demand for organic products, have created a favorable environment for farmers to shift away from conventional practices.

Despite these advancements, the regime is not without internal tensions. Resistance from certain actors highlights conflicts over land use and economic implications. For instance, debates surrounding the rewetting of peatlands reveal concerns about expropriation and financial viability for conventional farmers. However, these conflicts also reflect the regime's capacity for negotiation and compromise, demonstrating its ability to address challenges while driving systemic change.

Landscape: External pressures and Influences

The socio-technical landscape provides the external context that shapes the transition to organic agriculture. In Schleswig-Holstein, climate change serves as a significant driver, with increasing periods of droughts, floods, and other extreme weather events forcing the agricultural sector to adapt. These pressures have spurred interest in climate-resilient practices, like crop diversification and the cultivation of climate-adapted crops. Scientific findings, like AR5 and AR6 have reinforced the urgency of these adaptations In Schleswig-Holstein, the demand to more sustainable practices with the environmentally conscious ethos of the region's population, further reinforcing the legitimacy of regime-led interventions. This also interwinds with global and EU-level frameworks, such as the Paris Agreement and the European Green Deal, provide overarching directives that influence regional policies, ensuring alignment with international sustainability goals.

Beyond climate concerns, cultural shifts play a crucial role, as growing public awareness of sustainability has driven consumer demand for organic products. Lastly, global supply chain disruptions have further underscored the need for localized, sustainable production systems, strengthening the momentum for organic agriculture.

The Interplay between Levels

The interaction between niches, regime, and landscape in Schleswig-Holstein reveals a distinctive pattern of transition. While niches foster innovation and experimentation, their impact remains limited without the structural support of the regime. The regime, with its policies, financial incentives, and governance structures, acts as the central driver of change, integrating niche innovations into the mainstream agricultural system. Landscape-level

pressures, including climate change and cultural shifts, amplify the urgency of the transition and provide a favorable context for regime actions.

In Schleswig-Holstein, the transition to organic agriculture is primarily regime-driven, with a strong emphasis on policy frameworks, governance structures, and economic incentives. Niches play a critical yet limited role as spaces of experimentation, while landscape-level pressures provide additional momentum for change. The region's experience demonstrates the importance of coordinated policy leadership and institutional support in driving sustainability transitions, especially when aligned with broader environmental and societal goals.

6.3 Limitations and Methodological Considerations

To ensure transparency and credibility, it is essential to reflect on the limitations of this study as well as the methodological considerations that shaped its findings.

The chosen research design—a single-case study focusing on Schleswig-Holstein—allowed for a detailed exploration of the region's unique political and agricultural dynamics. However, a multiple-case study design encompassing other regions or countries could have provided additional comparative insights into the political pathways of organic agriculture. To address this limitation, the study incorporated multiple units of analysis within Schleswig-Holstein, including policy documents, committee protocols, and media articles, to capture diverse perspectives. Nevertheless, the focus on a single case limits the generalizability of the findings, though the detailed insights offer valuable lessons for similar contexts.

The decision to rely on qualitative content analysis for evaluating policy documents and media articles allowed for an in-depth understanding of narratives, conflicts, and institutional priorities. However, this method is inherently interpretive and influenced by the researcher's perspective. To mitigate this bias, the coding process was structured and grounded in established methodologies. Even so, the absence of direct stakeholder interviews represents a limitation, as first-hand accounts could have added depth to the findings and provided richer insights into the motivations and strategies of key actors.

The scope of the work also required broadening the scope of primary data collection. For instance, the inclusion of perspectives from tenant farmers, environmental NGOs, or consumers could have offered a more comprehensive view of the societal dimensions influencing organic

agriculture in Schleswig-Holstein. While the selected data sources reflect diverse policy and public perspectives, future studies could adopt mixed-method approaches to triangulate findings and enhance robustness.

The application of the Multi-Level Perspective (MLP) framework was instrumental in analyzing the interplay between niches, the regime, and the socio-technical landscape. However, the MLP's systemic focus on structural dynamics risks oversimplifying the agency of individual actors or the nuanced evolution of conflicts. In this study, the regime emerged as the central driver of the transition, but niche contributions and landscape-level pressures, such as climate change and EU frameworks, added complexity to the analysis. Future research could consider integrating complementary frameworks, such as Transition Management or Actor-Network Theory, to capture these additional layers of complexity.

7 Conclusion

The political evolution of organic agriculture in Schleswig-Holstein between 2009 and 2023 reflects the region's commitment to integrating more sustainability. This shift was not just a product of growing environmental awareness but also the result of strong regional policies, European and national frameworks, and public support. In this period, organic farming has shifted from being a niche practice to a central pillar of agricultural policy. With the support of multi-level governance systems, like the European Green Deal and the Common Agricultural Policy, Schleswig-Holstein successfully expanded its organic farming area significantly. Financial incentives, such as subsidies from the GAK program, collaboration between stakeholder and a political emphasis on biodiversity, climate adaptation, and environmental protection played a key role in enabling this growth.

The analysis through the Multi-Level Perspective (MLP) framework indicates that this transition was primarily a regime-driven change rather than a niche-led innovation. Unlike many sustainability transitions where radical innovations emerge from protected niche spaces and later challenge the dominant system, the shift towards organic farming here has largely been pushed by established institutions, as well as by policy frameworks. Government policies, regional subsidies, and regulatory measures have actively shaped the transition. This reflects a top-down transformation rather than bottom-up pressure, like from niche actors. The role of landscape pressures, like climate change awareness and European Union sustainability goals, has further reinforced the regime´s alignment with organic agricultural practices.

Despite these advancements, the full achievement of sustainability goals remains uncertain. While organic farming has contributed to reducing chemical pesticide use, improving soil health, and enhancing biodiversity, questions remain regarding long-term economic viability. The extent to which organic farmers can sustain their businesses independently, without ongoing subsidies, needs further evaluation. A deeper assessment of financial stability, market trends, and the overall resilience of organic farming in Schleswig-Holstein is necessary to determine its lasting success.

Also, the transition was not without its challenges. Resistance from conventional farmers, particularly concerning land-use changes, underscored the ongoing tension between environmental and economic priorities. Political shifts, including the restructuring of

ministerial responsibilities in 2022, also revealed the complexities of maintaining continuity in sustainability transitions. Nevertheless, the region's long-term alignment with European sustainability objectives, coupled with growing societal demand for organic products, ensured that progress remained on track.

Looking ahead, strengthening financial support for organic farmers, expanding education and awareness campaigns, and fostering greater collaboration among stakeholders is recommended. More targeted financial mechanisms, such as long-term subsidy frameworks or market-based incentives, could provide organic farmers with greater economic stability. Bureaucratic hurdles should also be reduced. Additionally, technological innovation, particularly in digital farming and resource efficiency should be supported. This would further enhance productivity while reducing environmental impacts. Addressing these areas will be critical for sustaining and scaling the transition.

When compared to other European regions, Schleswig-Holstein's transition stands out for its strong regime-driven approach and consistent political backing. However, lessons from more grassroots-driven transitions could provide valuable insights. Integrating both top-down and bottom-up strategies could create a more adaptable and resilient transition framework. Future research should focus on evaluating the long-term impacts of policy frameworks, exploring the economic viability of organic agriculture under changing climate conditions, and analyzing social implications such as equity and community resilience. Comparative studies with other regions would provide transferable lessons for sustainable agricultural transitions.

Schleswig-Holstein's transition to organic farming serves as a case study in how a regime-driven approach can align agricultural practices with sustainability goals. However, its long-term success will depend on its resilience—whether the sector can sustain itself without continuous external support and adapt to evolving environmental, economic, and social conditions. As climate challenges intensify, Schleswig-Holstein's experience offers insights for regions worldwide.

Ensuring that this transition remains adaptive, inclusive, and economically viable will be key to securing its long-term success. Schleswig-Holstein's experience underscores the importance of coordinated governance, stakeholder collaboration, and innovative policy mechanisms in fostering sustainable agriculture.

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