

UNIVERSITY OF TARTU

School of Economics and Business Administration

Brigita-Veronika Pähn

IMPACTS OF THE EU GREEN TRANSITION POLICIES ON ECONOMIC
SECTORS: A SYSTEMATIC LITERATURE REVIEW

Master's Thesis

Supervisor: Professor Annela Anger-Kraavi

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I have written this thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

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Abstract

This master's thesis maps the economic impacts of the European Green Deal (EGD) with the aim of identifying potential winners and losers of the green transition. Using a systematic review of the existing academic literature, the database search was conducted in Web of Science and Scopus and covered articles published from 2019–2025. The results show that regulatory pressures may negatively impact the primary sectors and transport, while activities related to waste management, water supply and renovation are likely to benefit due to increased demand. The thesis suggests that economic impacts do not only differ across sectors but also within sectors depending on the capital availability and technological adaptability of the impacted firms. However, the current evidence base is sparse and scattered across sectors, with studies concentrated in a small number of energy-intensive and EGD-policy exposed sectors, while many service and knowledge-intensive activities remain under-studied.

Keywords: European Green Deal, economic sectors, environmental economics, economic impact, systematic literature review

CERCS field: S180 Economics, econometrics, economic theory, economic systems, economic policy; T270 Environmental technology, pollution control

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Introduction

Environmental degradation and related sustainability challenges require fundamental transformations across economic and social structures. The European Union (EU) has set out a long-term strategic vision for addressing environmental concerns called the European Green Deal (EGD). EGD represents a comprehensive policy framework addressing interconnected policy areas such as emission reductions, biodiversity loss, the circular economy transition, sustainable food systems, and the clean energy transition, all while aiming for a zero-pollution environment (European Commission, 2019). For example, as a leader in the green transition¹, the EU aims to achieve climate neutrality² by 2050, in line with the objectives of the Paris Agreement (UNFCCC, 2015). In this context, the EGD announced the intention to increase the EU's 2030 greenhouse gas reduction target to at least 50% and towards 55% compared with 1990 levels (European Commission, 2019). While the collective target uses 1990 as a baseline, the national targets are set based on 2005 levels and GDP per capita (European Environment Agency, 2024).

The recent geopolitical changes have expanded the scope of the green transition. The need to reduce dependence on politically unreliable partners and to increase energy autonomy has turned decarbonisation into a security issue in addition to the environmental one. Russia's invasion of Ukraine in 2022 forced Europe to rapidly reduce its reliance on Russian natural gas and to reconsider its energy mix. This crisis has accelerated investment in clean energy, raised renewable energy targets and placed energy security at the centre of the EU policy agenda (European Commission, 2022). At the same time, techno-economic competition between the United States and China over clean energy technologies is intensifying, potentially fragmenting global markets and slowing decarbonisation (Busby et al., 2024). EGD has thus become closely linked to industrial strategy.

The green transition also raises questions of global and social justice (Calvin et al., 2023). Advanced economies, which bear a disproportionate historical responsibility for the current greenhouse gas concentrations or other pollution, often have better access to capital and technology, enabling them to benefit more from green investments. In contrast, many developing countries face both greater vulnerability to environmental change and other environmental pressures and more limited access to green finance and technology transfer

¹ According to ETF (2021), the green transition represents a shift toward a development model that fosters fair and sustainable societies while tackling biodiversity loss and environmental damage.

² Under the EGD, climate neutrality is equated with having net zero greenhouse gas emissions (European Commission, 2019). Similarly, the IPCC (2021) defines this state as a balance between anthropogenic GHG emissions and their removal over a set timeframe.

(UN Trade and Development, 2023). Trade-related measures, such as the EU's Carbon Border Adjustment Mechanism (CBAM), designed to prevent carbon leakage, are sometimes viewed as forms of green protectionism (UN, 2011). Colli (2024) argues that such instruments may exacerbate existing inequalities by shifting adjustment burdens onto trading partners with lower capacities to decarbonise. However, this strategic vision acknowledges that for the transition to be successful, it must be just³ and inclusive (European Commission, 2019, p. 2). The EU Just Transition Mechanism – an EGD pillar – is specifically designed to “leave no one behind” (European Commission, 2019, p. 16; Krawchenko & Gordon, 2021).

The EGD is not treated as a pure threat or guaranteed opportunity, but the aim is to explore how burdens and gains are distributed across sectors and firms within the EU. While the EGD framework promises long-term environmental sustainability, its transition period is likely to involve significant economic adjustments and tensions. Companies face new regulations, investment needs and shifts in demand. Against this policy and geopolitical backdrop, understanding sectoral impacts may help policymakers to anticipate where new opportunities may emerge or where the barriers are in order to support a just and sustainable transition.

The following core research questions are addressed: which economic sectors are potentially most affected by the green transition, i.e. by EGD regulations, and which stand to win or lose? To answer this question, this thesis systematically reviews the existing literature for the years 2019–2025 to map the potential impacts of EGD across economic sectors using the Estonian Classification of Economic Activities (EMTAK) framework. The analysis focuses on several key economic dimensions, including changes in productivity, input and output costs, investment needs, skills requirements and sectoral restructuring by classifying these impacts at the level of the EMTAK sectors and sub-sectors and summarising them in a sectoral impact matrix.

The analysis suggests that existing studies are heavily concentrated in a small number of energy-intensive and climate-policy-exposed sectors, while many service and knowledge-intensive activities remain under-studied. The results also suggest that the economic impacts are likely to be uneven within sectors, with firms' adjustment capacities and investment opportunities playing an important role. These findings provide insights for the design of industrial, labour market and regional policies aimed at supporting a just and

³ According to the IPCC (2021), a just transition encompasses a framework of principles and practices designed to mitigate the social and economic risks of shifting to a low-carbon economy, ensuring that no specific regions, sectors, or social groups are unfairly disadvantaged by the process.

competitive green transition.

The remainder of this thesis is structured as follows: Section 1 reviews the relevant literature and outlines the policy framework of the EGD. Section 2 describes the methodology, including the systematic literature review (SLR) design, the EMTAK-based coding strategy and the construction of the impact matrix. Section 3 presents the results of the review and the sectoral impact patterns identified. Section 4 discusses these findings in light of the existing literature and considers their implications for competitiveness, just transition and future research. The conclusions section summarises the main contributions and outlines directions for further work.

1. European Green Deal as a mechanism of economic transition

In economic terms, the EGD (Figure 1) is best understood not as a single policy instrument but as an interconnected policy ecosystem that restructures the EU economy by reshaping incentives, costs and demand across sectors over a time period (European Commission, 2019). These changes could be understood as a green transition of the economy. Concepts of sustainable development, the green economy, the circular economy and climate neutrality form the theoretical framework of the green transition.

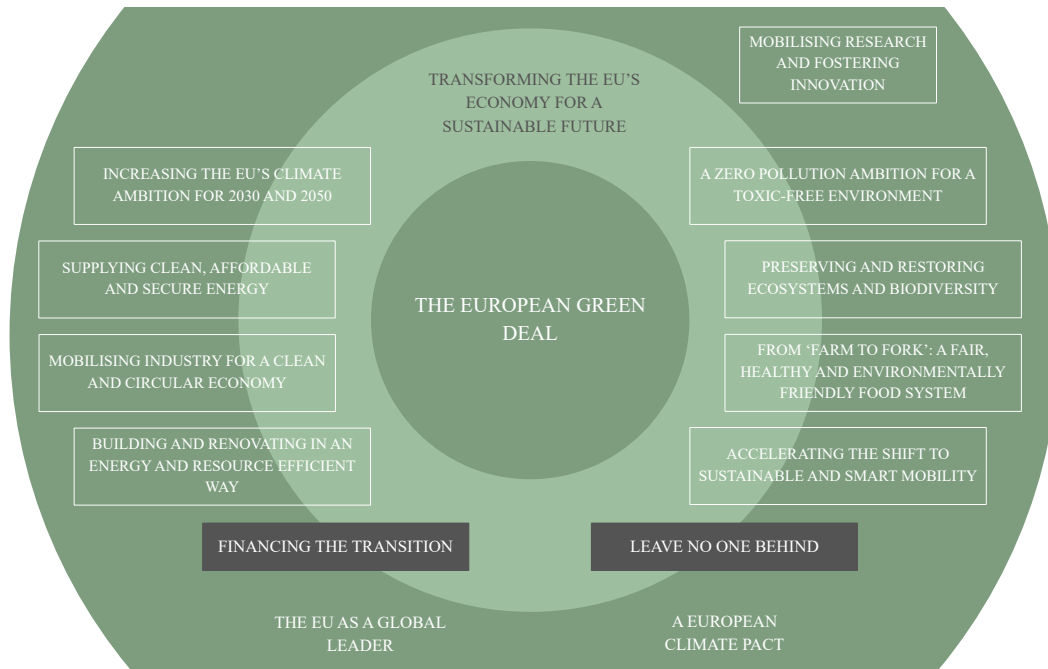


Figure 1. The EGD structure

Source: Author’s own compilation based on European Commission (2019)

The EGD translates the EU's environmental ambitions into a concrete policy roadmap. While it responds to the climate urgency documented by the IPCC (Calvin et al., 2023), climate neutrality is only one of its policy pillars, which also encompass biodiversity protection, zero pollution and sustainable food systems (European Commission, 2019).

The economic implications of the EGD are subject to academic and policy debates. The dominant institutional framing presents the EGD as Europe's new growth strategy (European Commission, 2019). This perspective aligns with the double dividend argument (Fullerton & Metcalf, 1997), suggesting that well-designed environmental taxation and regulation can deliver both environmental improvements and gains in economic efficiency. This strategic approach finds further theoretical support in the Porter Hypothesis (Porter & Linde, 1995), suggesting that technological advances triggered by strict environmental policies create value that covers the costs of meeting these standards. The decoupling of economic growth from environmental degradation is evident in the EU trends: between 2005 and 2022, greenhouse gas emissions fell by 24% despite an increase in GDP per capita (European Environment Agency, 2023, p. 18)

In contrast, the literature also highlights implications to cost competitiveness, especially for energy-intensive and export-oriented sectors (Paleari, 2024; Škuflić & Družić, 2016). Even prior to the EGD, studies identified signs of potential deindustrialisation in Europe (Škuflić & Družić, 2016). Škuflić & Družić (2016) concluded that this trend was primarily a natural process driven by rising GDP per capita and a shift towards the service sector, but warned that productivity is increasingly driven by industry dynamics rather than traditional firm or industry size. Paleari (2024) argues that without adequate support measures and trade protection (e.g., via CBAM), regulatory costs could weaken the strategic autonomy of European industry.

Furthermore, these structural shifts raise questions regarding social stability and uncertainty. Studies from countries with a long-term carbon pricing (such as Finland) suggest that while energy taxes can reduce emissions, they can also have negative impacts on social welfare due to increased consumer prices and reduced disposable income that need to be managed through compensatory policies (Khastar et al., 2020). Northern European and wider European energy markets also point to rising CO₂ allowance prices and increased energy price volatility associated with decarbonisation policies, which could increase uncertainty for both industry and households (Nagaj, 2024; Nagel et al., 2023). Finally, these structural shifts raise questions regarding just transition. The reallocation of capital and labour away from carbon-intensive industries could create distributional impacts. Comparative reviews indicate

that instruments such as regional development funds and social support programmes are needed to manage the consequences of decarbonisation and prevent the worsening of social inequalities (Krawchenko & Gordon, 2021; Markkanen & Anger-Kraavi, 2019).

In this thesis, conceptual logic of Markkanen & Anger-Kraavi (2019) is used, which is adapted to map the sectoral impacts of EGD policy measures (Figure 2). The framework shows how policy design and implementation, together with contextual factors and accompanying mitigation measures, are linked to the economic outcomes of the sector, which in this thesis are treated as positive and negative (or mixed) impacts based on the literature.

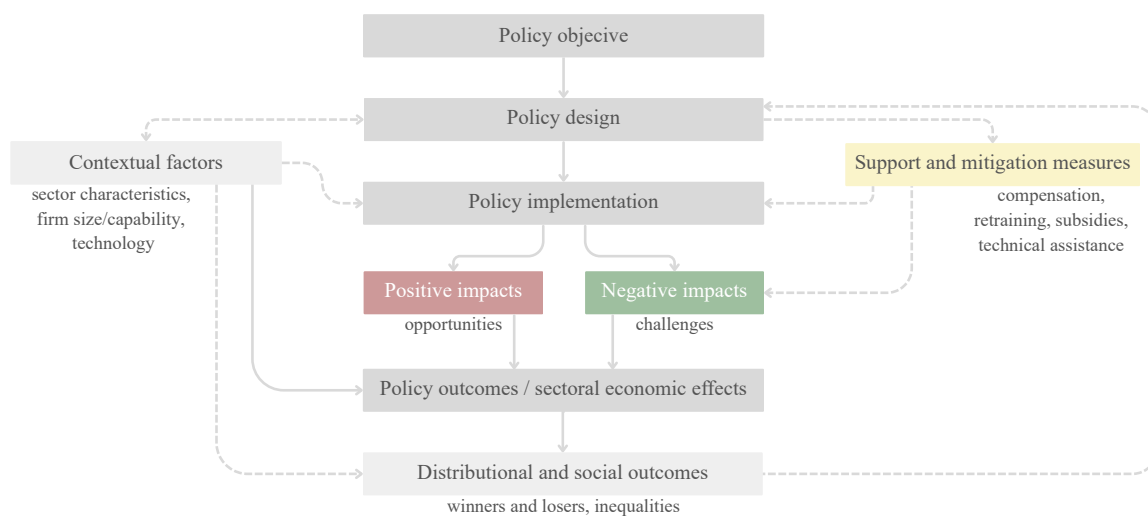


Figure 2. Analytical framework for identifying EGD policy impacts

Source: author’s own work, adapted from Markkanen & Anger-Kraavi (2019)

These contrasting perspectives discussed above highlight that the impact of the green transition is likely to be highly uneven across the economy. However, current literature often addresses these issues in isolation. There remains a lack of integrated analysis that maps these competing pressures such as opportunities, challenges and transition costs systematically across the full spectrum of economic sectors. According to the best knowledge of the author, to date no comparable systematic review of the impacts of EGD regulations in economic sectors has been carried out.

2. Methodology

2.1. Research questions and scope

This research is guided by the following questions:

- What are the main economic impacts of implementing the EGD in different EMTAK sectors in Europe?

- Which sectors are positioned as potential “winners” and which as potential “losers”, based on the identified economic impacts in the reviewed literature?

Given the fragmented and rapidly evolving nature of the literature on the EGD, a systematic literature review (SLR) was selected as a research method. An SLR allows for a transparent process of identifying, screening and synthesising relevant studies, reducing the possibility of *ad hoc* selection and providing a structured basis for mapping sectoral impacts (Snyder, 2019).

EMTAK is Estonia’s national classification of economic activities, largely based on the Statistical Classification of Economic Activities in the European Community (NACE) system (Centre of Registers and Information Systems, 2025). Although the reviewed studies are international, classifying them under EMTAK is justified since this thesis serves as part of the MKM-POL23 project. Applying the national classification system ensures the findings are applicable in the Estonian policy-making context and hence was a requirement of the project. On the one hand, it enables clear differentiation between major sectors (e.g., manufacturing, agriculture, construction, transport, etc.). On the other hand, it avoids excessive fragmentation into very narrow sub-sectors, which would complicate comparison across studies and reduce the policy relevance of the findings. The use of EMTAK serves several purposes: 1) it enables to identify where studies are concentrated and where they are sparse; 2) it helps to identify sectors that are under-represented in the literature or appear particularly exposed to transition-related challenges or opportunities and 3) it provides a normalising framework for harmonising heterogeneous terminology used in the literature.

The review is restricted to the European context. This geographical limitation is important because the EGD is specific regulatory framework with targets set for EU Member States, creating a unique policy environment that differs from global initiatives. Hence, findings from the non-EU countries may not be directly generalisable to the regulatory reality faced by European and Estonian decision-makers.

2.2. Design of the systematic literature review

To ensure that the review focuses on relevant and comparable studies, specific pre-defined inclusion and exclusion criteria were applied (Table 1), based on the research questions and the timeline of the EGD. While limits on time period and language were primarily applied as database filters during the initial search, criteria regarding the study type, topic focus and economic impacts were applied manually during the title, abstract and full-text screening stages.

Table 1

Inclusion and exclusion criteria

Criteria	Description
Time period	Articles published from December 2019 (launch of the EGD) to May 2025.
Geographical limitation	Studies focusing on the EU or its Member States.
Language of the study	Articles written in English. Non-English publications were excluded during screening.
Study type	Peer-reviewed journal articles and research papers providing empirical data or clearly defined economic analysis of the EGD.
Specific topic focus	Articles solely addressing environmental impacts, purely technological aspects without an economic focus, or those not specifically within the European context were excluded ⁴ .
Definition of economic impacts	For this thesis, economic impacts are defined as estimated or reported changes in a sector's economic performance or structure that a source links to EGD policies. Impacts were coded using six categories; costs, output and productivity; innovation, technology and investment needs; export demand and international competitiveness; employment and skills; administrative burden and compliance costs; and overall competitiveness implications.

Source: compiled by the author based on research objectives

The search strategy combined a comprehensive database search with careful screening and deduplication. The databases were Web of Science (WoS) and Scopus, which are widely regarded as the largest and comprehensive repositories of high-quality and scientific literature. Their multidisciplinary coverage is particularly important for capturing research at the intersection of economics, environmental science and public policy.

Searches were conducted using combinations of keywords related to the EGD, economic impacts and specific sectors, relying on Boolean Operators (AND, OR, NOT) and different search fields. Searches targeted three main fields:

- Topic (WoS) / All fields (Scopus): a broad search including title, abstract, author keywords and database assigned keywords.
- Title: to identify articles where the main concepts appeared prominently.
- Abstract: to capture studies whose titles were less explicit, but which discussed the relevant topics in detail.

Table 2 provides an illustrative example of search queries using Boolean Operators.

⁴ Clinical articles were excluded where the acronym "EGD" referred to *esophagogastroduodenoscopy* (a gastrointestinal procedure).

Table 2

Examples of searches using Boolean Operators

Boolean Operators	Description	Example
AND	Used to combine different concepts and ensure retrieved articles covered all major subject areas.	Europe* AND econom*
OR	Used to combine synonyms or related terms to broaden the search.	manufacturing OR industry OR "green technology" OR "energy efficiency"
NOT	Used to exclude irrelevant topics when they dominated the search results.	NOT "circular economy"

Source: author's own work based on WoS database

For each major EMTAK sector, a specific search string was constructed. For example, for the construction sector: (ABS (("European Green Deal" OR EGD) AND (construction OR building* OR "sustainable building" OR "energy efficiency in buildings" OR "renovation wave" OR "building materials" OR "circular construction" OR "nearly zero-energy buildings"))). Analogous search strings were developed for other sectors, ensuring that the search systematically covered the main economic activities in EMTAK. The full list of search strings is provided in Appendix D.

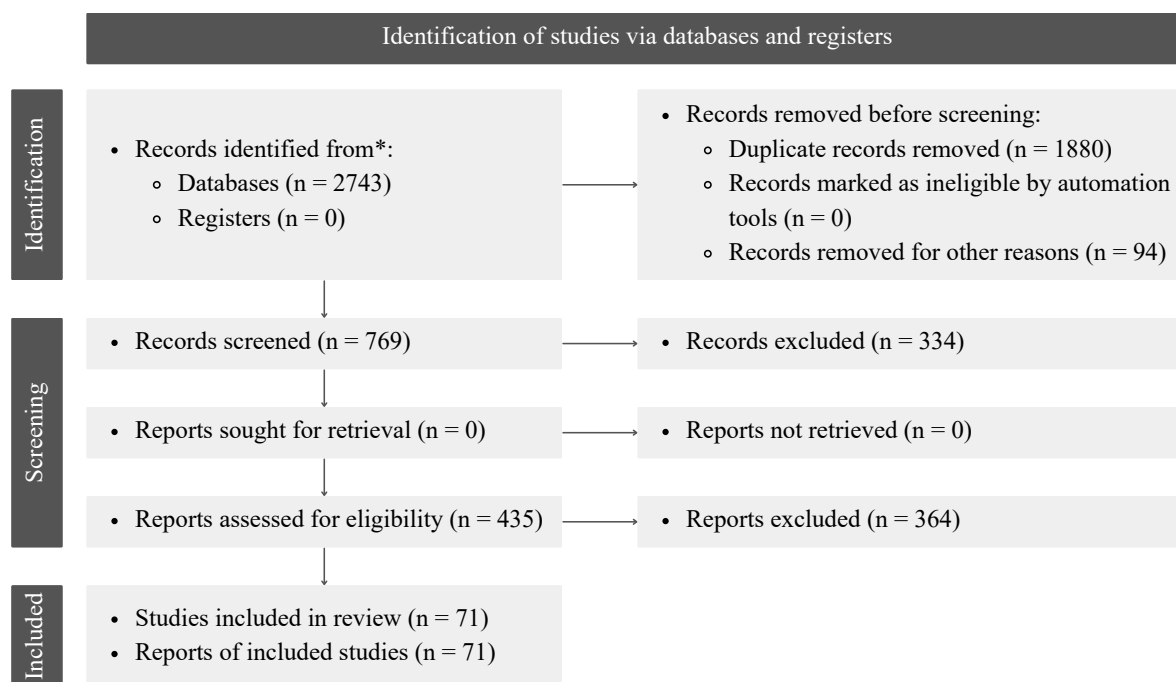
2.3. Selection process

The review follows the logic of the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Page et al., 2021), adapted to the context of economic and policy research (see Figure 3). All search results were initially managed in Zotero (reference management software), which was used for deduplication within and across databases. The main steps were as follows:

1. Initial WoS search: The first WoS search yielded 1,336 records. After removing internal duplicates using Zotero's duplicate detection, 538 unique articles remained.
2. Refined WoS and Scopus searches: A second, refined search in WoS retrieved 678 records, of which 217 remained after deduplication. A parallel search in Scopus retrieved 729 records, reduced to 311 unique articles after internal deduplication.
3. Cross-database deduplication and preliminary filtering: The unique records from WoS (initial and refined searches) were combined, with 104 overlapping articles removed between the two WoS searches, resulting in 651 unique WoS articles. Together with the 311 unique Scopus searches, this produced a preliminary pool

of 1,066 records. After cross-database deduplication, 863 unique articles remained. These 863 records were then filtered based on topic and geography, including the removal of six health-related articles (where “EGD” referred to medical procedures) and studies focused exclusively on non-European regions. After this step, 772 articles remained.

4. Screening in Rayyan: The 772 articles were exported from Zotero to Rayyan, a web-based tool designed to support systematic reviews (Ouzzani et al., 2016). Rayyan detected and removed a further three duplicates, leaving 769 records for screening. Title and abstract screening were conducted by the author, using the predefined inclusion and exclusion criteria. Rayyan’s keyword highlighting function was used to improve consistency. Articles whose main language was not English were excluded at this stage (32 articles). Ambiguous or borderline cases were discussed with the supervisor, particularly at the beginning of the process, to calibrate screening decisions.



Notes: *1336 (WoS 1) + 678 (WoS 2) + 729 (Scopus)

Figure 3. PRISMA 2020 flow diagram for the SLR

Source: author’s own work

After screening, 435 articles were retained as relevant for the review. These records formed the basis for the subsequent full-text analysis and data extraction. Figure 3 summarises this process. As shown in the diagram, the majority of exclusions at the final stage (n=364) occurred because the studies lacked specific economic impact data or focused solely on environmental metrics without an economic dimension.

2.4. Data extraction, coding and construction of the impact matrix

Initial attempts to extract only quantitative economic impacts from the 435 screened articles proved unfeasible due to the scarcity of consistent numerical results, which were identified in only approximately 10% of the screened articles. Therefore, the inclusion criteria were broadened to encompass qualitative evidence. Qualitative studies were included if they provided a clearly defined causal link between an EGD policy and a specific economic outcome (e.g., directional changes in costs, revenue or competitiveness, etc.), even in the absence of precise numerical coefficients.

The filtering resulted in a final sample of 71 studies. The included studies were organised into folders according to their primary sectoral focus. Relevant information was extracted on the sectors analysed, the EGD-related policies, and the type of economic impacts examined.

To bridge the gap between these broad policy goals and sectoral economic activities, a thematic mapping tool was required. Since the EGD is not a single document but a vast regulatory ecosystem comprising an interconnected set of approximately 176 legislative acts, directives and strategies, navigating this complexity requires a structured framework to ensure consistent data coding.

To systematically link policy areas to economic sectors, this thesis uses the “Climate Neutral by 2050” framework overview developed by CircuLaw (2024). CircuLaw (2025) serves as a methodological assistant – a knowledge platform designed to make complex EU environmental legislation accessible and navigable. For the purposes of this thesis, its value lies in its architectural mapping of the EGD. The framework aggregates the multitude of individual legislative acts into distinct, manageable policy sections.

Specifically, the framework categorises⁵ the regulatory environment into key domains such as the Fit for 55 package, Circular Economy Action Plan (CEAP), the Biodiversity Strategy, the Zero Pollution Action Plan (ZPAP) and the Farm to Fork Strategy. By using this

⁵ Transport-related impacts are primarily linked to the Fit for 55 package rather than as a standalone Sustainable and Smart Mobility Strategy. Hence, this domain was omitted.

pre-validated structure, the thesis avoids *ad hoc* selection of policies. Instead, it uses CircuLaw’s grouping logic to map studies against these established policy clusters, which are then cross-referenced using the relevant EMTAK sectoral codes. This ensures that the economic impacts identified in the literature are attributed to the correct regulatory source.

The next step was to classify the types of economic effects described in the selected studies. Since different authors use varying terminology (e.g., “profitability” vs “viability”), a thematic analysis was used to group these diverse impacts into broader, comparable categories. Table 3 summarises these thematic categories and indicative keywords used to identify them.

Table 3

Analysed economic impacts

Thematic category	Scope of analysis	Indicative keywords
Cost, revenue, viability	Impacts on financial performance output/production volumes, operational efficiency and economic viability.	Cost(s), production costs, capacity, energy costs, additional costs, profitability, profit, revenue, expenditure, performance, value, economic value, efficiency, effectiveness, productivity, viability, output, economic viability, feasibility
Competitiveness and innovation	Effects on market position, innovation capacity, trade performance and competitive landscape.	Competitiveness, competition, demand, innovation, export, import, trade, market share, production, consumption
Investments and finance	Analysis of capital requirements, access to finance, technology adoption, modernisation needs and the impact of financial instruments.	Investment(s), green investment(s), financial, finance, funding, capital, return(s), tax(es), taxation, subsidies, fiscal, taxonomy
Labour market	Changes in employment levels, required skills, wages.	Employment, job(s), labour, unemployment, skill(s), wage(s), pay, salaries, income, inequality, affordability, burden, welfare, just transition, training
Economic indicators	Effects on economic indicators, including growth, development and stability.	Growth, development, stability, economics, economic impacts, economy
Administrative burden and compliance costs	Analysis of the operational burden and direct costs related to complying with new regulations.	Administrative burden, compliance cost(s), reporting, documentation

Source: author’s own compilation based on thematic analysis of keywords from the SLR

To provide a structured overview of sector-policy-impact combinations, a granular dataset was constructed (see Appendix C). From the included studies, specific information was translated into data points. In total, 113 matrix entries were created. The number of matrix entries exceeds the number of included studies (n=71) because a single study often analysed impacts across multiple economic sectors or policy domains. Each distinct sector-impact combination was coded as a separate entry to capture the granular effects. To illustrate the coding process, Figure 4 presents an excerpt of representative entries.

EMTAK	Policy	Indicator	Trend	Direction	Impact	Type of study	Reference No
A1	Farm to Fork	output value	↓ decrease	- -1	Polish agricultural production impact analysis	EA	5
A1	EGD	profitability	↑ increase	+ 1	Sicilian horticultural sector (potato) case study	EP	8
A1	EGD	operational costs	↓ decrease	+ 1	Sicilian horticultural sector (potato) case study	EP	8
A1	Farm to Fork	income	↓ decrease	- -1	Economic analysis of EU trade policy (mirror clauses)	EA	10
A1	EGD	output value	↓ decrease	- -1	Dairy cattle feeding experiment (Spain)	EP	67
A1	EGD	output value	↓ decrease	- -1	Finnish rural food waste reduction model	EA	35
A1	Farm to Fork	operational costs	↑↓ mixed	± 0	Polish organic farming development perspectives	EP	53

Notes: Trend: ↑ = growth or increase (e.g., in revenue, costs, value); ↓ = decrease; ↑↓ = variable or mixed trend. Direction: +1 = positive economic impact (+); -1 = negative economic impact (-); 0 = mixed or neutral impact (±). Type of study: EA (ex ante) indicates a forecast of impact before policy implementation; EP (ex post) indicates actual measured impact after implementation. Reference number: the numbers in this column correspond to the specific source reference numbers in the list of references for matrix entries (Appendix B).

Figure 4. Illustrative excerpt of the impact matrix entries

Source: author’s own compilation (see Appendix C for full dataset)

Each row represents one coded observation, specifying the EMTAK/NACE sector, the EGD policy area (based on the CircuLaw.nl framework), the impact dimension, the study type (ex ante/ex post), and the direction of impact (positive/negative/mixed). Based on this dataset, a sectoral impact matrix was generated (full matrix presented in Appendix A) to highlight patterns of potential “winners”, “losers” and under-researched sectors. The matrix should be read as a map of documented direct impacts in the literature. Therefore, limited or

missing literature for sectors missing examples reflects research gaps rather than zero impact. Formal quantitative quality scoring was not applied in this review due to the significant heterogeneity of the included studies, which ranged from ex ante macroeconomic modelling to firm-level case studies.

Consequently, a uniform quality metric was not feasible. Instead, in the results and discussion, findings are contextualised by clearly distinguishing between theoretical predictions (ex ante) and observed empirical evidence (ex post), ensuring that model-based projections are not conflated with realised economic impacts.

2.5. Use of artificial intelligence

Generative artificial intelligence was used during the preparation of this thesis. The model Gemini 2.5 (Google) served as a supportive tool in brainstorming, text editing and refinement (generating initial keyword combinations for the literature search and refining the linguistic clarity of the English text) and thesis' structure optimisation (identifying logical gaps between sections, ensuring a coherent flow from research questions to methodology and maintaining consistency in the use of technical terminology throughout the sections). AI-provided suggestions were critically reviewed, verified, and manually edited by the author, who retains full responsibility for the final text, the interpretation of results and the conclusions of the research.

3. Results: sectoral impacts of the Green Deal

This section presents the results of the SLR on the economic impacts of the EGD across EMTAK sectors. The findings are structured as the following: Section 3.1 describes the coverage and characteristics of the studies. Section 3.2 summarises sector-level impact patterns using an EMTAK-based impact matrix. Section 3.3 examines the mechanisms through which the EGD affects firms across key economic dimensions, illustrated by examples from the literature.

3.1. Coverage of the studies

The existing research on the EGD covers a wide array of economic sectors, yet the scientific papers are distributed highly unevenly across the EMTAK sectors, as illustrated in Figure 5. The primary focus of existing literature is concentrated on Sector D (Electricity, gas, steam and air conditioning supply) with 176 articles, and Sector P (Public administration and defence; compulsory social security) with 145 articles. The dominance of Sector D is expected, as energy transition is a fundamental pillar of the EGD. Significant attention is also directed toward Sector N (Professional, scientific and technical activities) with 108 articles

and Sector A (Agriculture, forestry and fishing) with 104, reflecting the EGD’s emphasis on technical innovation and sustainable land use.

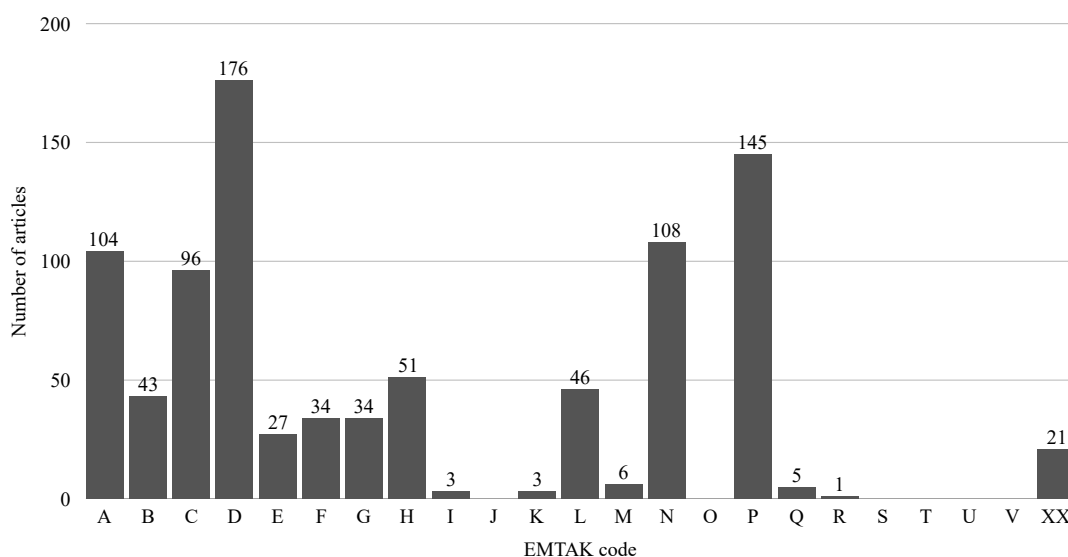


Figure 5. Distribution of articles by EMTAK⁶ economic sectors⁷

Source: author’s own compilation based on searches

Conversely, there are research gaps. For several EMTAK sectors, no relevant research articles were identified at all. These include Sectors J, O, S, T, U and V (covering publishing and broadcasting, support service activities, arts, sports, recreation and activities of extraterritorial organisations). Furthermore, sectors such as I (Accommodation and food service activities) and R (Human health and social work activities) show minimal coverage with only 3 and 1 articles respectively. This highlights a research gap regarding the impact of the EGD on service and social welfare industries. Finally, 21 articles were categorised as cross-sectoral (XX). These publications focus on horizontal macroeconomic impacts or

⁶ A – Agriculture, forestry and fishing; B – Mining and quarrying; C – Manufacturing; D – Electricity, gas, steam and air conditioning supply; E – Water supply, sewerage, waste management and remediation activities; F – Construction; G – Wholesale and retail trade; H – Transportation and storage; I – Accommodation and food service activities; J – Publishing, broadcasting, and content production and distribution; K – Electronic communications service, programming, consultancy, data processing infrastructure and other information service activities; L – Financial and insurance activities; M – Real estate activities; N – Professional, scientific and technical activities; O – Administrative and support service activities; P – Public administration and defense, compulsory social security; Q – Education; R – Human health and social work activities; S – Arts, sports and recreation; T – Other service activities; U – Activities of households as employers; V – Activities of extraterritorial and organizations and bodies; XX – Cross-sectoral.

⁷ Articles addressing multiple sectors were assigned to multiple categories, reflecting the cross-cutting nature of the EGD. Consequently, the sum of the sectors in Figure 5 exceeds the total number of articles in the sample.

overarching policy frameworks that transcend specific industry boundaries and cannot be confined to a single EMTAK category.

The studies included in the thesis also differ substantially in their contextual scope. Some articles focus on highly specific cases: individual technologies, firms or regions. Examples include analyses of production processes, such as wastewater treatment technologies, zero-residue farming systems or new building materials, typically implemented in one country or even a single plant. These studies provide detailed insights into the mechanisms through which the EGD's policies and measures can affect costs, productivity and profitability at the level of individual businesses. At the other end there are broad studies that model the impacts of entire policy packages, such as the Farm to Fork Strategy, the extension of the EU ETS or the Fit for 55 package, on whole sectors or on the EU economy as a whole. These analyses simulate, for example, aggregated output losses, export reductions or investment needs in EU-27 agriculture, fisheries, basic materials or transport under different scenario assumptions.

The combination of very narrow and very broad perspectives makes the study base inherently scattered: many results are highly informative about specific technologies or regulatory designs, while others speak to overall policy directions, but there are relatively few studies that systematically link firm-level responses to sector-wide and economy-wide outcomes.

The studies also differ according to their time perspectives: *ex ante* or *ex post*. Approximately 65% of the analysed impact dimensions (73 out of 113 recorded entries) are derived from *ex ante* economic modelling: scenarios, projections and impacts assessments that attempt to project, for example, the future capital requirements, potential production losses or the viability of infrastructure that has not yet been built (e.g., Karnitis et al., 2024). Models may not always capture real-world dynamics, such as technological breakthroughs, unexpected changes in consumer behaviour or geopolitical shocks. Their accuracy also decreases over time. As a result, *ex ante* studies provide possible future scenarios rather than definitive forecasts.

This is contrasted by a smaller but valuable body of *ex post* empirical research (e.g., Ascoli et al., 2023; Roman-Collado et al., 2023) that, unlike predictive modelling, analyses impacts that have already occurred, such as cost savings resulting from the adoption of new technologies or the decline of specific fossil-based activities. These studies provide concrete and verifiable information, but their number is limited, as many of the EGD measures have only recently been implemented.

Geographically, the reviewed literature includes broad EU-level impact assessments as well as specific national case studies. This thesis includes studies from Western European economies (e.g., Austria, Ireland), Central and Eastern European member states (e.g., Poland, Romania, the Balting States) and Southern Europe (e.g., Spain, Italy, Greece), reflecting the urgent transition challenges in these regions.

3.2. Sector-level impact patterns: potential winners, losers and under-researched sectors

Building on the subset of 71 detailed articles (generating 113 impact entries) listed in Appendix C, this section summarises how the identified economic impacts differ across sectors. The aim is not to provide precise quantitative estimates of the net effect in each sector, as the reviewed studies use widely different methods and indicators, but to identify emerging patterns of potential “winners”, “losers” and blind spots in the impact assessments. Each matrix entry represents a unique combination of:

- economic sector (EMTAK two-digit code),
- EGD policy area (based on the CircuLaw framework domains),
- type of economic impact (e.g., costs, revenues, employment, investment),
- type of study (ex ante model or ex post evaluation), and
- direction of impact (positive, negative or mixed).

The sector-level patterns are depicted in an impact matrix (Appendix A). Figure 6 provides an illustrative fragment of this matrix, showing its structure and how data was coded.

EMTAK		FARM TO FORK	BIODIVERSITY STRATEGY	FIT FOR 55	CIRCULAR ECONOMY ACTION PLAN	ZERO POLLUTION ACTION PLAN	EGD	EA	EP
A AGRICULTURE, FORESTRY AND FISHING	01 Crop and animal production, hunting and related service activities	↓ OUTPUT VALUE EA: -(5, 61)	↓ OUTPUT VALUE EA: -(61)				↓ OUTPUT VALUE EA: -(35); EP: -(67)	-	+
		↓ INCOME EA: -(10, 61)	↓ INCOME EA: -(61)				↓ OPERATIONAL COSTS EP: +(8)	-	-
		↓ OPERATIONAL COSTS EP: +(53)					↑ PROFITABILITY EP: +(8)	-	+
	↑ REVENUE EP: +(54)						-	-	
	02 Forestry and logging		↓ PROFITABILITY EA: -(1)	↑ REVENUE EA: +(1)				-	+
			↓ OPERATIONAL COSTS EP: +(71)					+	
	03 Fishing and aquaculture			↓ PROFITABILITY EA: -(24)			↑ OPERATIONAL COSTS EP: -(23)	-	-
							↓ PROFITABILITY EP: -(23)		-
	05 Mining of coal and lignite						↓ PROFITABILITY EP: -(26)	-	-
							↓ EMPLOYMENT EA: -(33, 27)	-	
	06 Extraction of crude petroleum and natural gas						↑ OUTPUT EA: +(6)	+	

Figure 6. Illustrative excerpt of the full impact matrix

Source: author’s own compilation (see full matrix in Appendix A)

For each entry, the direction of impacts reported in the literature was coded +1 (positive), -1 (negative) or 0 (mixed). In the full matrix presented in Appendix A, these are visually represented with colour coding (green for positive, red for negative, and yellow for mixed) to facilitate readability.

Table 4 provides an overview of how the identified impacts are distributed across the EGD's policy domains.

Table 4

Distribution of matrix entries by policy domain

Policy domain	Number of entries
Farm to Fork	9
Biodiversity Strategy	4
Fit for 55	31
Circular Economy Action Plan	5
Zero Pollution Action Plan	1
EGD (cross-cutting)	63

Source: author's own compilation based on data in Appendix C

As shown in the table above, most of the identified impacts (n=63) are associated with the broad EGD/cross-cutting category, covering more than half of the total entries and comprising studies that address the EGD as a holistic framework or refer to EGD initiatives that fall outside the specific thematic pillars listed in the table. The second largest group is the Fit for 55 package (n=31), reflecting a strong focus of research on climate and energy targets. Specific sectoral strategies such as Farm to Fork Strategy appear less frequently.

Furthermore, the aggregated impact matrix (Figure 7) reveals a difference between sectors. Primary and heavy industries (Sectors A, C, H) have a high density of reported negative impacts, mainly in the form of rising operational, capital, and compliance costs associated with these climate policies. Conversely, positive impacts – such as increased revenue or new market opportunities – appear more randomly and are often linked to specific technological adoptions in ex post studies rather than sector-wide ex ante projections. These diverging patterns and specific sectoral implications are analysed in detail in the following subsections.

EMTAK	EX ANTE IMPACTS	EX POST IMPACTS	POLICY PACKAGE
A01	↓ output value ↓ income	↓ output value ↑↓ operational costs ↑ revenue ↑ profitability	Farm to Fork Biodiversity Strategy EGD
A02	↓ profitability ↑ revenue	↓ operational costs	Biodiversity Strategy Fit for 55
A03	↓ profitability	↓ profitability ↑ operational costs	Fit for 55 EGD
B05	↓ employment	↓ profitability	EGD
B06	↑↓ output		EGD
B07	↑ revenue ↑ output value ↑ capital costs		EGD
B08		↓ revenue ↓ employment	EGD
B09			
C10	↓ operational costs ↑ profitability ↓ export ↓ output value	↑ operational costs	Farm to Fork Fit for 55 EGD
C11		↑ operational costs	Fit for 55
C12			
C13		↓ operational costs	Fit for 55
C14		↓ operational costs	Fit for 55
C15		↓ operational costs	Fit for 55
C16			
C17			
C18			
C19			
C20	↑ compliance costs ↑ revenue ↓ profitability		Fit for 55 CEAP EGD
C21		↑ capital costs	EGD
C22			
C23	↑ compliance costs ↑↓ operational costs ↑ capital costs		Fit for 55 EGD
C24	↓ revenue ↑ compliance costs ↑↓ operational costs ↑ capital costs	↑↓ operational costs ↑ capital costs	Fit for 55 EGD
C25			
C26			
C27			
C28			
C29	↑ capital costs	↓ feasibility	EGD
C30			
C31			
C32			
C33			
D35	↑ revenue ↑ output value ↓ operational costs ↑ capital costs ↑ compliance costs ↑ employment ↑ profitability	↓ profitability ↑ operational costs ↑↓ capital costs ↑ revenue ↑ transition costs	Fit for 55 EGD
E36	↑↓ operational costs ↓ profitability	↑↓ operational costs ↓ profitability	CEAP
E37	↓ operational costs ↑ revenue ↑ capital costs		ZPAP EGD
E38	↑ employment		CEAP
E39			
F41	↑ capital costs ↑↓ revenue ↑ profitability ↑ employment		Fit for 55 EGD
F42	↑ capital costs	↑ capital costs ↑ revenue	EGD
F43	↑ capital costs	↓ capital costs ↓ operational costs	Fit for 55
G46			
G47	↑↓ output value ↓ operational costs ↑ profitability		Farm to Fork EGD
H49	↑ price ↑ operational costs ↑ revenue ↑ capital costs	↑ operational costs ↑ capital costs	Fit for 55 EGD
H50	↓ output value ↑ operational costs ↑ capital costs		Fit for 55 EGD
H51	↑ operational costs		Fit for 55
H52	↑ capital costs		EGD
H53			
I55			
I56			
J58			
J59			
J60			
K61			
K62			
K63			
L64	↑ operational costs	↑ revenue	EGD
L65	↑ operational costs		EGD
L66			
M68			
N69			
N70			
N71			
N72			
N73			
N74			
N75			
O77			
O78			
O79			
O80			
O81			
O82			
P84	↑ compliance costs ↑ operational costs ↑ skills		EGD
Q85		↑ skills	EGD
R86			
R87			
R88			
S90			
S91			
S92			
S93			
T94			
T95			
T96			
U97			
U98			
V99			
XX		↑ operational costs ↑ capital costs	EGD

Figure 7. Simplified impact matrix⁸

Source: author’s own compilation based on SLR

⁸ Trend: ↑ = growth or increase (e.g., in revenue, costs, or value); ↓ = decrease; ↑↓ = variable or mixed trend. Colour: green for positive, yellow for mixed, red for negative impacts.

3.2.1. Potential “losers”

The sectoral impact matrix suggests that several EMTAK sectors may be exposed to negative economic impacts under the EGD, at least in the short to medium term. These can be considered potential “losers”, in the sense that the balance of identified impacts in the literature tends to tilt towards negative impacts, such as higher costs, reduced output or profitability.

Primary sectors such as agriculture, forestry and fishing (EMTAK A) and mining and quarrying (EMTAK B) stand out in this regard. Ex ante analyses of the Farm to Fork Strategy and related measures frequently point to projected reductions in agricultural output and farm incomes due to stricter input limits and environmental standards (e.g., Pawlowski & Soltysiak, 2024; Gohin & Matthews, 2024), while studies on fisheries highlight the vulnerability of fleets to fuel price increases and the removal of tax exemptions (e.g., Carvalho & Guillen, 2021; Gonzalez-Cancelas et al., 2025). In mining and extraction, EGD-driven decarbonisation and biodiversity policies reduce the economic viability of conventional operators, even as demand for certain critical raw materials increases (e.g., Brauers & Oei, 2020; Laasasenaho et al., 2022).

Within manufacturing (EMTAK C), many sub-sectors, especially energy- and carbon-intensive industries such as basic metals, cement and certain chemical processes face substantial compliance and investment costs related to carbon pricing, industrial emissions standards and the introduction of CBAM. While some firms may be able to turn early investments in low-carbon technologies into a competitive advantage, the overall direction of impacts in the literature is predominantly negative for traditional production processes that depend on fossil fuels or high energy consumption (e.g., Lewandowski & Kadzielawski, 2022; Ozga-Blaschke, 2020; Mehling & Ritz, 2023).

The transport and storage sector (EMTAK H) is likely to be another negatively impacted area. Modelling studies on the extension of the EU ETS to maritime transport, tighter fuel standards for aviation and stricter emissions limits for road transport project higher operating costs, potential output losses and pressure on profit margins, particularly in segments with limited possibilities to pass costs on to customers (e.g., Goyal & Llop, 2024; Erceg et al., 2022; Charlampowicz et al., 2025). This highlights again that companies unable to invest in cleaner technologies may lose market share or exit.

3.2.2. Potential “winners”

At the same time, the impact matrix also points to EMTAK sectors that are more likely to benefit from the EGD, at least in relative terms, and can therefore be considered

potential “winners”. Sectors related to water supply, sewerage, waste management and remediation (EMTAK E) appear to show predominantly positive or mixed results. A number of ex post and ex ante studies indicate how investments in wastewater treatment, circular waste solutions and recycling technologies reduce operating costs, create new revenue streams and increase employment (e.g., Pomberger et al., 2021). The CEAP, ZPAP and related regulatory initiatives expand demand for such services, particularly where they enable regulatory compliance for other sectors.

Similarly, parts of wholesale and retail trade (EMTAK G) appear as opportunity sectors. Studies in food retail and consumer goods suggest that firms able to integrate green transition principles into their business models, through energy efficiency, sustainable sourcing or new product lines, can reduce operating costs and strengthen competitiveness, especially in market segments where consumer demand for sustainable products is growing (e.g., Baicu et al., 2022; Gerini et al., 2025; Bernabeu et al., 2023).

Several activities closely linked to the circular economy and building renovation, for example waste management (EMTAK 38), construction and specialised construction activities (EMTAK 41, 43), are highlighted as areas of job creation and investment under the Renovation Wave, energy performance standards and circular economy policies (e.g., Battisti et al., 2023; Gangoellis et al., 2020).

It is important to note that even in these “winning” sectors, the transition is not cost-free. Firms still can face capital requirements, regulatory complexity and competition. However, compared to fossil-intensive activities, the EGD tends to expand rather than shrink their markets, creating conditions for growing output, employment and profitability.

3.2.3. Under-researched sectors

Several EMTAK sectors that are important in terms of employment and value added are covered by only a handful of studies, and in some cases the existing work is too narrow in scope to support general conclusions. This applies, for example, to:

- electronic communications service, programming and other information service activities (K),
- accommodation and food service activities (I),
- real estate activities (particularly regarding asset valuation and market dynamics, M),
- education (Q) and
- human health and social work (R).

The same applies to broader service categories, such as publishing and broadcasting, administrative and support activities, and arts, sports and recreation, are almost absent from the literature on EGD-related economic impacts or only appear indirectly, for example as consumers of energy rather than as being direct targets of EGD regulations. The current study base is simply too limited to classify these sectors as winners or losers with any confidence.

3.3. Mechanisms of impact across key economic dimensions

Table 5 presents the frequency distribution of the specific impact mechanisms identified across the included studies. The results indicate a distinct concentration of research on direct financial indicators, while broader structural dimensions appear less frequently.

Table 5

Distribution of analysed impact mechanisms

Impacts	Number of examples
Costs, output and productivity	39
Innovation, technology and investment needs	10
Export demand and international competitiveness	4
Employment and skills	7
Administrative burden and compliance costs	6
Overall competitiveness implications	5

Source: author's own compilation based on SLR

As shown in the table above, the largest category is “Costs, output and productivity” (n=39), which accounts for more than half of all studies included in the matrix. This indicates that the main focus is on financial performance and efficiency. The next most common category is “Innovation, technology and investment needs” (n=10), covering investments in new technologies.

Other areas appear less frequently. “Employment and skills” accounts for 7 examples, followed by “Administrative burden and compliance costs” (n=6). Finally, “Overall competitiveness implications” (n=5) and “Export demand and international competitiveness” (n=4) make up the smallest portion of the results.

3.3.1. Costs, output and productivity

Ex post and ex ante analyses indicate that green innovation has already yielded substantial economic benefits in some sectors. For example, a study by Samoichuk et al. (2025) showed that a new milk homogeniser (EMTAK 10) reduced energy costs by up to 90%, a key objective aligned with the EU's Farm to Fork strategy (European Commission, 2020a). Similarly, in Italy, Campo et al. (2024a) found that biogas upgrading – the process of

purifying raw biogas to biomethane – in wastewater treatment plants (EMTAK 37) is economically viable. However, this economic viability starts only from a plant of a specific size, namely one designed to treat wastewater load of 500,000 people, at a sales price of €62/MWh. The study also showed that applying a specific thermo-alkali pretreatment can increase methane productivity by 110% and revenues by approximately €10/MWh, potentially contributing to the goal of energy neutrality (Campo et al., 2024a).

Operating cost reductions have also been seen in sectors such as energy infrastructure maintenance, where the Portuguese grid operator REN cut costs by around 20%, in line with the Biodiversity Strategy (European Commission, 2020d), by replacing the existing vegetation (EMTAK 02) under power lines with local, less maintenance-intensive species (Ascoli et al., 2023). Scuderi et al. (2021) showed that “zero-residue” potato farming (EMTAK 01) could be more profitable primarily due to its lower production costs. This economic advantage comes from significantly less fuel consumption due to fewer tillage operations and crop treatments. The study found this method provided a net income of €2,823/ha compared to organic (€1,985/ha) and conventional (€1,845/ha), while its low carbon footprint contributes to the EGD goals of carbon neutrality (Regulation (EU) 2021/1119, 2021).

Metal recycling (EMTAK 38) is a sector in which the direct recycling of rare earth permanent magnets has been found to be more cost-effective than chemical or thermal recovery processes (Cherkezova-Zheleva et al., 2024). This finding represents a step towards achieving the goals of the circular economy agenda (European Commission, 2020b). A study by Roman-Collado et al. (2023) found that in the textile industry (EMTAK 13–15), previous directives promoting energy efficiency – such as the Energy Efficiency Directive (European Parliament & Council of the EU, 2012) and Industrial Emissions (European Parliament & Council of the EU, 2010) – had already increased the sector’s competitiveness. These policies were estimated to account for 27% of the industry’s emission reductions (Roman-Collado et al., 2023).

Some examples also highlight the role of EU funding flows. Estonia has received funding under the EGD, such as the €1.36 billion Baltic Synchronisation Project, and benefits from €37.5 million from a statistical transfer in renewable energy (EMTAK 35, 42) with Ireland (Khorishko et al., 2023), which effectively channels EGD funding into EMTAK 35 (electricity) and 42 (civil engineering), thereby strengthening these sectors’ investment capacity.

In addition to observed impacts, ex ante simulations indicate potential for new revenue streams. An economic viability assessment by Ahmed et al. (2024) found that a proposed green hydrogen production facility in Crete could be profitable. Within the framework of the Fit for 55 package (Council of the EU, 2025), their simulation suggested that the facility could generate a net profit of €6.19 million at a selling price of €3.5/kg. In the financial sector, the market for sustainable finance instruments (EMTAK 64), such as green bonds, has grown to \$4.4 trillion by mid-2023, thereby expanding the market for related financial services (Solianyuk et al., 2024). In the construction sector (EMTAK 41), renovation projects aligned with the Renovation Wave objectives (European Commission, 2020c) may be economically profitable even without incentives, but only in specific high-value urban areas. A study in Florence by Battisti and Campo (2021) explained that in these areas, such as the historic city centre, the real estate market appeal is already so high that the significant difference in market value between a “to be renovated” and a “new” building is sufficient on its own to cover all renovation costs and ensure profitability. The study found this to be the case in nearly a third (32.28%) of the city’s territory but also cautions that one policy might not fit all, considering the negative or unprofitable impact in the remaining, lower market value areas where renovation is not economically viable (Battisti & Campo, 2021).

However, numerous ex ante studies point to significant costs and production losses. Modelling by Pawlowski and Soltysiak (2024) indicates that limiting fertilisers and pesticides under the Farm to Fork strategy (European Commission, 2020a) could reduce the value of production for large Polish farms (EMTAK 01) by an average of 21.4% (–€248/ha). Similar implications have been modelled in the EU-27 fisheries sector (EMTAK 03), where the removal of the fuel tax exemption (Energy Taxation Directive – ETD (Directive 2003/96/EC, 2003), Fit for 55 (Council of the EU, 2025) is projected to reduce the entire sector’s profit margin from 11.7% to –4.8% (Carvalho & Guillen, 2021). This is amplified by the age of fleets: countries with older and smaller fleets are more vulnerable due to higher operating costs and lower fuel efficiency (Gonzalez-Cancelas et al., 2025). In maritime transport (EMTAK 50), projections suggest that an EU ETS extension to the shipping sector (Directive 2003/87/EC, 2024) would increase operational costs by 0.57%–2.84% and reduce output by 15.24%–73.78% (Goyal & Llop, 2024).

The green transition entails substantial capital needs across multiple sectors. The automotive industry (EMTAK 29, Regulation 2019/631 (European Parliament & Council of the EU, 2019)), for example, requires significant investment in electrification (Haas & Sander, 2020). However, this may only be economically viable (given an eight year payback

period) in 15% of cases, based on real driving habits (Strada et al., 2025). Building a pan-European hydrogen value chain (EMTAK 42, 52) in Europe could require €65 billion by 2030 (Trincone & Ronconi, 2024). Decarbonisation of the basic materials industry (EMTAK 24) is estimated to need nearly €28.9 billion for 20% of primary production by 2025 (Chiappinelli et al., 2021). Consequently, the growing demand for critical raw materials resulting from the EGD industrial strategy (European Commission, 2023) necessitates further capital investments in both mining projects (EMTAK 07) and the supporting transport infrastructure (EMTAK 49, 50, 52) (Vidal, 2024). Finally, the Renovation Wave (European Commission, 2020c) and the updated Energy Performance of Buildings Directive (EPBD) (Directive (EU) 2024/1275, 2024) are also expected to drive additional capital expenditure in construction (EMTAK 41, 43), for example, with the requirement to renovate at least 3% of the surface area of public sector buildings each year (Karnitis et al., 2024).

Both ex post analyses and ex ante projections indicate several economic challenges and costs associated with the green transition, some of which have already materialised. For example, the EU ETS (Directive 2003/87/EC, 2024) and the Industrial Emissions Directive (IED; European Parliament & Council of the EU, 2010) have reduced the profitability of Polish coal-fired power plants (EMTAK 35), which constitute a significant part of the country's coal sector (EMTAK 05). This has led to a difficult financial situation for the sector, resulting in bankruptcies and the suspension of new projects, which in turn serves as a key driver for a shift away from coal (Brauers & Oei, 2020). A similar collapse in production and profitability has affected the Finnish peat sector (EMTAK 08), where production fell from 21.6 TWh (2018) to 2.85 TWh (2021) due to market changes and tax policy. This collapse has had negative socioeconomic consequences, particularly in rural areas, associated with reduced employment opportunities and lost household income (Laasasenaho et al., 2022).

The F-gas regulation (Fit for 55 (Council of the EU, 2025)) has increased operating costs in the food industry (EMTAK 10, 11) by limiting the availability and thus increasing the price of high-GWP refrigerants (Moreira-Dantas et al., 2023). Pressure from EGD presents a significant challenge for the steel industry (EMTAK 24), necessitating heavy investment in new decarbonisation technologies. These projects represent major financial commitments, with individual project costs ranging from €65 million to €120 million (Ozga-Blaschke, 2020). Some business models have also appeared economically challenging – for example, end-of-life tire recycling (EMTAK 38, under the CEAP (European Commission, 2020b)) in Latvia is often unprofitable when using traditional business models due to high operating costs. However, it was found that financial viability improves for companies that adopt

circular business model innovations. These profitable situations include manufacturing innovative, higher value-added products like rubber coverings for sports and playgrounds (Uvarova et al., 2020). In the pharmaceutical industry (EMTAK 21), the adoption of green solutions often has been hampered by high investment costs (van Vliet et al., 2025).

The challenges of high capital costs and uncertain return on investment are also reflected in ex ante studies. For instance, the transition to hydrogen technology in the steel industry (EMTAK 24) presents a significant economic challenge under the EGD. While hydrogen-based steel production offers clear technical advantages over traditional methods, its implementation currently involves both high capital investments and greater operating costs due to the price of hydrogen (Brandner et al., 2021). The transition of the oil and gas industry (EMTAK 06) is projected to be slow (1.5%–3.5% renewables by 2035), creating a twofold economic impact. According to Midttun et al. (2022), companies are locked in by highly profitable petroleum revenues, but this simultaneously creates significant long-term financial impacts as green investment policies, like EU Taxonomy regulation (Regulation (EU) 2020/852, 2020), intensify.

The impacts of green policies are often in conflict within sectors. For example, in forestry, the Fit for 55 package (Council of the EU, 2025) increases demand for wood-based (EMTAK 2) bioenergy (Mansuy et al., 2024), while the Biodiversity Strategy (European Commission, 2020d) limits the economic use of forests (Mansuy et al., 2024). A similar conflict is evident in the raw materials sector: although EGD favours local mining (EMTAK 07), for example in the production of lithium, high energy prices in Europe make it economically more expedient to move the energy-intensive chemical processing step (EMTAK 20) outside the EU, which hinders the development of complete value chains within the EU (Kowasch et al., 2025).

In the transport sector, the same Fit for 55 policies (Council of the EU, 2025) are predicted to increase aviation (EMTAK 51) costs, as sustainable fuels are 3–5 times more expensive, while economically favouring the railway (EMTAK 49) sector (Erceg et al., 2022). Within the energy sector (EMTAK 35), tightening the EU ETS (Directive 2003/87/EC, 2024) with a CO₂ price of around €129/t by 2030 could mean the closure of coal-fired power plants, but is expected to create a significant market for renewable energy, the share of which could increase to 74% (Pietzcker et al., 2021), although internal political uncertainty may discourage investment (Zepa, 2022). Even for green investments, such as hydropower (EMTAK 35), outcomes fluctuate – construction activity for new projects has fallen, although the energy crisis has renewed interest (Schleiss et al., 2023).

The picture in agriculture (EMTAK 01) is also mixed: the use of certain feed crops can reduce milk production by 3.4–4.2%, though it can bring qualitative benefits in terms of product healthiness (Baizan et al., 2023). In the context of the Farm to Fork strategy (European Commission, 2020a), Polish organic producers report both falling and rising costs. A survey by Kociszewski (2022) specified that while 33.9% of farmers reported decreased costs for plant protection products, a larger percentage reported increased costs for labour input (43.1%), administrative procedures (49.2%), and environmental standards (55.4%).

Limited consumer participation presents a further challenge, as the implementation of short food supply chains (SFSCs) remains limited, though EGD promotes it to strengthen farmers' positions in the value chain. This is reflected in purchasing habits; for example, a study in Italy found that only 22% of consumers purchase directly from farmers at least once a week – a figure the authors describe as modest (Gerini et al., 2025). A study by Gangoellis et al. (2020) highlights an economic trade-off when renovating (EMTAK 43) office buildings (in response to the Energy Performance of Buildings Directive (Directive (EU) 2024/1275, 2024)). While significant energy savings are possible (for example up to 18.1%, by replacing old and inefficient heat pumps with new high-efficiency models), this comes with a high initial investment, possibly resulting in payback times exceeding 20 years for many renovation measures. Similarly, the overall profitability of projects in sustainable wastewater treatment technologies (EMTAK 37) is highly dependent on location and complex trade-offs between land and capital costs: in sunny climates, a solar-based solution with smaller land use can be 3.5% more cost effective than an algae-based alternative, which requires a massive land area (Vindel et al., 2021).

3.3.2. Innovation, technology and investment needs

Exploratory modelling highlights the scale of investments needed for the green transition. For example, to align with the goals of the Renewable Energy Directive (RED; Directive (EU) 2018/2001, 2018), the share of solar energy (EMTAK 35) in Europe alone would need to increase to 61–63% by 2050. This would require the construction of 7,740–8,820 GW of new capacity, however, it appears economically attractive, as the transition could be made cost-neutral because of the levelized costs of electricity (Breyer et al., 2023).

At a sector level, the European cement industry (EMTAK 23) needs to adopt low-emission technologies by 2050, with investments exceeding €36 billion (Lewandowski & Kadzielawski, 2022). These macro-level projections also translate to the national and corporate levels. In Lithuania, the widespread deployment of electric vehicles (EMTAK 49) under the EGD according to the most optimistic scenario would require investments of €230

million in the low-voltage grid and €209 million in charging stations (EMTAK 35) by 2030 (Jaržemskis & Jaržemskiene, 2022). Transport companies (EMTAK 49) themselves face the need to invest additional capital in zero-emission vehicles as well as incur higher training and compliance costs (Charlampowicz et al., 2025).

In the steel industry, Di Maria et al. (2022) show that replacing the more expensive coke with the cheaper biochar (EMTAK 24), thus avoiding the carbon tax, reduces operating expenses by 2.2% or approximately €265,000 over 25 years. Campo et al. (2024b) also tested a new membrane aerated biological reactor (MABR) technology (Urban Wastewater Treatment Directive (Directive (EU) 2024/3019, 2024)) in wastewater treatment plants (EMTAK 37), which reduced energy consumption by approximately 80%. Although the production cost of small modular reactors (SMRs; EMTAK 35) is high (on average €85/MWh), the EU ETS (Directive 2003/87/EC, 2024) carbon price (75–100 €/tCO₂ in 2023) creates market conditions that make them competitive with gas plants when the CO₂ price reaches the range of €98–121/t (Van Hee et al., 2024).

Potential also exists in building materials – for example, a prototype of a “green brick” (EMTAK 23), which is a building block that replaces natural sand with waste from the paper industry (Fit for 55 (Council of the EU, 2025)), would reduce production costs by around 10% (Santos et al., 2023). The payback period for building renovations (Renovation Wave (European Commission, 2020c); EMTAK 41) can be reduced from 1.41 years to 1.23 years if work is planned in synergy with maintenance cycles (Castagna et al., 2024). Finally, a study by Vaitiekuniene et al. (2024) validates the EGD’s innovation-led strategy – it indicates that higher spending on R&D by European companies is directly correlated with reduced CO₂ emissions (regression coefficient –1.015). The negative relationship implies that these R&D expenditures are being effectively used to develop and adopt the green innovations necessary to reduce environmental pollution, reinforcing the view that investment in innovation is key for achieving climate neutrality.

3.3.3. Export demand and international competitiveness

Some studies examine how the EGD may affect export demand and international price competitiveness. The increase in maritime transport (EMTAK 50) costs resulting from the Fit for 55 package (Council of the EU, 2025) could reduce Irish exports by up to 2.29% by 2050 (Ahearne & Cassidy, 2023). In the agricultural sector, modelling indicates that previous restrictions under the Farm to Fork strategy (European Commission, 2020a) could have led to a halt in EU fruit and vegetable (EMTAK 01) exports with a corresponding revenue loss of \$28.9 billion (Gohin & Matthews, 2024). Similarly, achieving the restrictive

targets of the Farm to Fork strategy (European Commission, 2020a) – such as the mandated 50% cut in pesticides and 20% cut in fertilisers – is estimated to potentially reduce agricultural production (EMTAK 01) by up to 12% and exports by 20% by 2030 (Chiripuci et al., 2022). Finally, regarding industrial goods, Fit for 55 policies (Council of the EU, 2025), such as the CBAM (Regulation (EU) 2023/956, 2023), do not protect exporters, potentially affecting, for example, the steel industry (EMTAK 24), which directs 15% of its output to markets without a carbon tax (Evans et al., 2021).

3.3.4. Employment and skills

The impact of the green transition on employment is, according to ex ante studies, twofold: projecting significant job losses in fossil fuel-based sectors, while simultaneously creating new opportunities in the circular economy and green activities.

The transition of the EU's energy system, as part of the goal of achieving climate neutrality, is projected to result in the loss of around 154,000 jobs, which could exacerbate energy poverty and create economic hardship, especially in former mining regions (EMTAK 05) (Janikowska, 2024). In the Western Macedonia region of Greece alone, 21,000 jobs are potentially under pressure (Ziouzios et al., 2021). On the other hand, implementing the CEAP (European Commission, 2020b) is more labour-intensive, creating 91 jobs per 100,000 tonnes of waste in waste management (EMTAK 38) compared to 31 jobs for mass incineration (Pomberger et al., 2021). Green investments also have great potential: the Spanish recovery plan projects 103,700 new jobs to be created through building renovation (EMTAK 41) alone, which amounts to 15.2 jobs for every million euros invested (Garcia Vaquero et al., 2021). Further job creation is also anticipated in the conversion of old quarries into energy storage (EMTAK 35) systems (Krassakis et al., 2023).

The structural shift in the labour market also requires new skills and supporting policies. Ex post research suggests that integrating green transition principles into education (EMTAK 85), such as architecture, improves the competence of future professionals (Widera, 2021). Ex ante analyses highlight the need to broaden labour market policies to include green retraining and support programmes, which in turn implies additional costs for both the state and employers (EMTAK 84) (Bohnenberger, 2022).

From the perspective of EMTAK sectors, this suggests that sectors B and C could experience net job losses without substantial transition support, whereas activities in waste management (EMTAK 38) and construction/renovation (EMTAK 41) may be relative winners in terms of employment contingent on investment and policy design.

3.3.5. Administrative burden and compliance costs

The implementation of the EGD is expected to entail significant administrative burdens and compliance costs for both the private and public sectors. For businesses, the burden mainly stems from new monitoring and reporting requirements.

Ex ante analyses indicate that the CBAM (Regulation (EU) 2023/956, 2023) creates a complex administrative burden for importers in energy- and material-intensive (EMTAK 20, 23, 24, 35) sectors (Mehling & Ritz, 2023). The administrative costs of the EU Taxonomy (Regulation (EU) 2020/852, 2020) alone are estimated at €140–350 million per year for companies (including banks, insurers, and large listed companies; EMTAK 64, 65) (Kirschenmann, 2022). EU Taxonomy may increase the reporting burden, especially in the energy sector (EMTAK 35) (Tettamanzi et al., 2024). Even green project developers (EMTAK 35) face higher costs due to strict assessment procedures (de Simone et al., 2025).

At the same time, the burden on the public sector is also increasing. An analysis of Romania's decision-making process indicates that the successful implementation of EGD may require significantly greater administrative capacity, the creation of new structures and better coordination, especially in Central and Eastern Europe (Ciot, 2021). Similarly, Nagy et al. (2025) emphasise the necessity to finance new participatory processes.

These compliance costs may not directly affect productivity, but they can shift relative competitiveness within and between sectors, favouring firms with stronger administrative and financial capacity, particularly in EMTAK 64–65 and 35.

3.3.6. Overall competitiveness implications

Several studies discuss the overall implications of the EGD for competitiveness, combining cost, demand, investment and regulatory perspectives.

For example, qualitative studies suggest that managers of food retail (EMTAK 47) see the implementation of green transition principles as an opportunity to reduce operating costs and strengthen competitiveness, which in turn has a positive impact on financial results (Baicu et al., 2022). Similarly, Renovation Wave (European Commission, 2020c) and the growth of electric vehicle production are projected to bring 8% growth or €18 billion to the chemical industry (EMTAK 20) by 2030 (Thormann et al., 2023). However, demand-side constraints are also evident. Food waste reduction scenarios show that as households and food services halve their food waste, they correspondingly reduce their demand for food products. This projected drop in sales is the mechanism identified as driving a reduction in the value added of the food industry (EMTAK 10) by 11.06% and agriculture (EMTAK 01) by 5.11% (Friman & Hyytia, 2022). Consumer price sensitivity also constrains the market

(EMTAK 47), as doubling the price of organic products could reduce their market share of the most price-sensitive segment, according to the simulation, from 69.7% to 45% (Bernabeu et al., 2023). Furthermore, carbon pricing would increase input costs, for example in the transport sector (EMTAK 49), which could have a regressive effect, as these higher costs fall on poorer households who spend a larger share of their income on energy goods (Fredriksson & Zachmann, 2021).

4. Discussion

The SLR conducted in this thesis points to a fragmented evidence base that is heavily concentrated in emission-intensive sectors while leaving many service activities overlooked. These implications are detectable both within and across sectors.

One key implication is that the line between “winners” and “losers” may not run clearly between sectors, but rather within them. The literature indicates that the most significant divergence tends to occur within the sectors themselves. As detailed in Section 3.2, firm-level outcomes appear to be driven by capital intensity and technological options.

In energy-intensive and heavy industrial sectors, such as mining, basic materials and transport, the balance of studies indicates rising production costs and pressure on margins under current technological assumptions (e.g., Goyal & Llop, 2024; Carvalho & Guillen, 2021). This aligns with concerns in the literature that the EGD could potentially add to already existing deindustrialisation trends in parts of heavy industry and put pressure on export-oriented manufacturers competing with companies subject to less stringent climate regulations (e.g., Paleari, 2024; Škuflić & Družić, 2016).

The challenges in agriculture appear to stem mainly from direct regulatory restrictions on inputs. For example, some studies on the Farm to Fork strategy suggest that tighter restrictions on fertilisers and pesticides could reduce production volumes and farm incomes (e.g., Pawlowski & Soltysiak, 2024). This suggests a potential decline in the production capacity of the European food sector if yield-enhancing innovations do not scale quickly enough to compensate for the reduction in inputs.

However, there are also potential opportunities in the same sectors where companies may be able to reposition themselves. In the steel and cement industries, early investments (for example in hydrogen-based processes, as modelled by Brandner et al., 2021) can create a competitive edge (or early advantage) if regulatory frameworks and carbon prices remain credible over time. In agriculture, zero-waste farming or biogas production can improve the profitability of producers who are able to adopt resource-efficient technologies. This pattern aligns with the Porter Hypothesis (Porter & Linde, 1995), which suggests that strict

environmental regulation can induce innovation that offsets compliance costs and enhance long-term competitiveness.

The review suggests that the green transition creates an advantage for larger and capital-rich enterprises through being able to absorb technological economies of scale and administrative fixed costs. First, while implementation of the EGD policies and measures offer theoretical savings (Section 3.3.1), in reality profitability is often volume dependent. As demonstrated by Campo et al. (2024a), specific green technologies become viable only at high operational scales, hence favouring firms with a strong capital base. Second, this structural advantage appears in regulatory dynamics. The compliance costs identified in the review (Section 3.3.5) could disproportionately burden smaller firms compared to well-resourced organisations. This suggests that competitive advantage could depend on the financial and administrative capacity to manage high investment costs and regulatory complexity, rather than only on its environmental efficiency or technological innovation.

At the same time, several EMTAK sectors that are significant in terms of employment and value-added including information and communication, education, healthcare, real estate and cultural activities have been covered by only a handful of studies, often of a very specific scope and location. This lack of attention likely comes from their lower environmental impact, such as GHG emissions intensity, compared to heavy industry. This aligns with the findings regarding policy domains, the concentration on Fit for 55 and cross-cutting targets suggests that the identified economic impacts are largely driven by energy transition and emission reduction costs. Although the EGD encompasses broader environmental goals beyond climate mitigation (as detailed in Section 1), the academic literature currently prioritises high-emitting sectors, which makes service sectors a lower priority for technical impact assessment studies. This gap is important because many of these activities provide critical support functions (digital infrastructure, skills development, social infrastructure supporting workforce participation) that can shape the smooth transition. From a policy perspective, the lack of systematic analysis means that the potential challenges and opportunities in these areas may be underestimated.

Overall, the findings of SLR paint a more complex picture than the categorical claims in the literature that the EGD could either undermine or enhance European competitiveness as a whole (e.g., as discussed in the context of the growth strategy narrative by European Commission, 2019 vs. CBAM implications by Colli, 2024). Instead, they point to a selective redistribution of competitive advantage. Firms that are able to mobilise investment, adopt low-carbon technologies or integrate circular economy practices can benefit, provided they

can keep costs low or earn additional income, while firms and regions with a focus on fossil fuel-intensive activities and have also constrained capital may potentially face negative impacts of the green transition implications. The net impact at sectoral or national level is therefore likely to depend on the distribution of these capabilities and the effectiveness of the accompanying policies.

Another implication concerns the timeline of costs and benefits. Many of the negative impacts identified in the literature, such as higher input costs, output losses in agriculture or the closure of coal and peat production – tend to materialise in the short term, while the benefits of green innovation often have a long payback period. For example, investments in building renovation or new industrial processes may only become profitable after decades (e.g., Gangolells et al., 2020; Strada et al., 2025), whereas emission reductions are immediate. This asymmetry may help explain the political tensions associated with the EGD, because groups who bear the immediate costs are often highly visible and organised, while beneficiaries of long term environmental and productivity gains are more dispersed. This temporal difference highlights the need for transition support mechanisms to cover the gap between short-term challenges and long-term benefits.

The sectoral patterns identified in this review indicate that employment impacts will be geographically and structurally asymmetric. Job losses are concentrated in fossil-fuel-based activities (e.g., mining, heavy industry), which are often clustered in specific regions (e.g., Janikowska, 2024). While the transition creates new employment potential in labour-intensive circular economy and renovation activities (e.g., Pomberger et al., 2021), these opportunities do not automatically absorb displaced workers due to a structural skills mismatch. The new green jobs often require technical and digital competencies that differ from the skill sets prevalent in declining industries (e.g., Bohnenberger, 2022). Consequently, the main challenge is not a shortage of jobs, but reallocation. This suggests that labour market policies (including upskilling and reskilling of workers) and regional development programmes may play a key role in reducing the likelihood of sectoral shifts leading to structural unemployment.

Beyond sectoral divides, the results highlight that internal policy contradictions can create economic uncertainty. As identified in sectors such as forestry and transport (see Section 3.3.1), conflicting objectives between different EGD pillars such as increasing bioenergy demand versus protecting biodiversity, can trap businesses between rising market demand versus regulatory supply constraints. This implies that achieving “winner” status depends not only on the firm’s adaptability but also on the coherence of the regulatory

framework. Without alignment between supply-side restrictions and demand-side incentives, conflicting signals may hinder necessary long-term investments.

Finally, the thesis raises questions about justice and legitimacy. In the EU, many sectors facing the most negative short-term impacts, such as agriculture, conventional energy production and basic materials, are closely linked to specific regions and communities (e.g., Krawchenko & Gordon, 2021). Without targeted support, the economic and social burden of the green transition may deepen existing inequalities and disproportionately impact vulnerable groups (e.g., Markkanen & Anger-Kraavi, 2019), potentially weakening political support for ambitious climate policies. Furthermore, instruments such as the CBAM are designed to prevent carbon leakage and protect EU industry, but they can create significant administrative and compliance costs for their trading partners with limited decarbonisation capacity. Although the scope of this thesis is limited, it highlights that domestic competitiveness cannot be separated from global fairness when designing EU strategies.

Overall, the analysis of sectors suggests that the EGD should not be seen as a shock to competitiveness, but as a change in the direction of investments and incentives. The challenges and opportunities depend on the specificities of the sector and companies within the sector, such as energy needs and place in the supply chain and how quickly it can adapt. The core policy challenge, therefore, seems to lie not only in tightening the rules but in ensuring that this change is affordable for both the economy and people.

4.1. Limitations and future research

A large part of the literature reviewed in this thesis relies on ex ante model simulations of individual policy packages or scenarios. This reflects the fact that many key components of the EGD have only been recently implemented or are still being implemented, limiting the availability of ex post studies. Because most of the results are based on modelled policy shocks rather than observed outcomes, they capture potential exposure to regulatory changes rather than realised firm-level impacts. While the identified sample of 71 studies was sufficient for constructing a sectoral impact matrix, this sample size is limited compared to the scale of the EU economy. Consequently, the findings presented in this thesis should be interpreted as indicative trends regarding potential winners and losers rather than definitive statistical facts. Uneven coverage means that the impact matrix should not be used to definitively categorise all EMTAK sectors as “winners” or “losers”. Instead, the sector categories should be interpreted as relative indicators of transition implications and opportunities based on current knowledge.

This thesis itself has several methodological limitations that need to be acknowledged. First, while the EMTAK classification provides a useful framework, it may not fully capture cross-cutting patterns that have multiple codes. Second, the systematic review is limited to publications in English. This exclusion of grey literature (e.g., national ministry reports, policy briefs) and non-English national studies likely omits relevant local context, particularly in member states where domestic policy discussions are not published in international academic journals.

The search strategy relied on the overarching term “European Green Deal” to maintain a manageable scope. This choice reflects a necessary trade-off between breadth and depth. Attempting to map impacts across the entire EMTAK spectrum meant that it was unfeasible, within the time constraints of this thesis, to conduct granular sub-searches for every specific legislative act for every individual sector. Consequently, articles that focused exclusively on specific technical regulations without explicitly referencing the “Green Deal” in the title or abstract might have been overlooked. While this approach successfully identifies high-level sectoral patterns, it may lack the granularity required to assess niche regulatory impacts. Future reviews could therefore improve data retrieval by narrowing the sectoral scope and expanding search strings to include specific legislative titles.

Moving forward, future research should prioritise firm- and regional-level analysis using administrative data, particularly in sensitive sectors such as agriculture, basic materials and transport. This approach would allow for a more precise identification of actual adaptation strategies and cost mechanisms, revealing how the EGD policies interact with specific local industrial legacies and labour market conditions – structural vulnerabilities that aggregate EU-level models often may overlook. Additionally, future research could weight these sectoral impacts against national GDP structures to assess specific challenges for small open economies like Estonia.

Conclusions

This thesis maps the economic impacts of the EGD across economic sectors in the EU. It is based on a systematic literature review of the published academic research for the years 2019–2025 and offers a first structured attempt to understand the green transition’s effects on firms.

The reviewed literature concentrates mostly on primary sectors, energy-intensive manufacturing and transport, as well as on circular-economy and waste-related activities, which are among the sectors most directly exposed to environmental changes. However, service sectors remain to a large extent under-researched.

Potential losers are primarily identified in the primary sector and fossil-fuel-dependent manufacturing, where rising energy prices, input costs and compliance requirements threaten short-term production and profitability. In contrast, potential winners emerge in sectors such as construction, renovation and waste management, where EGD regulations are creating new market demand and investment opportunities.

However, the literature suggests that the distinction between winners and losers is not only between sectors but also intra-sectoral. Firm-level outcomes appear to be determined by capital availability, access to finance and administrative capacity. Consequently, the transition is likely to create a market structure where large, well-resourced organisations gain a competitive advantage over smaller firms that struggle with high investment needs and administrative burdens of compliance. These patterns provide early indications of who is affected and how.

Methodologically, there is a scarcity of firm-based assessments. The existing studies are dominated by ex ante modelling and mostly consider policy packages directly linked to decarbonisation (e.g., Fit for 55). This focus on future simulations rather than observed economic data limits the ability to draw definitive conclusions on the actual impacts. Hence, future research would benefit from more studies, particularly ex post evaluations, as policy impacts become observable.

Based on these findings, three key conclusions emerge. Firstly, policymakers should consider the asymmetry between immediate transition costs (e.g., input price increases, output losses) and long-term benefits (e.g., innovation gains). Transition finance instruments are essential to bridge this gap, particularly for smaller firms in high-impact sectors. Secondly, to prevent complex regulations from putting smaller firms at a disadvantage, reporting requirements (e.g., EU Taxonomy, CBAM) should be simplified and technical support provided. Thirdly, since sectors like mining and agriculture face the highest transition pressures, reskilling programmes must be proactive rather than reactive to prevent structural unemployment.

To conclude, the EGD is changing how investments and economic incentives work. While it creates growth for some firms, the transition can also bring about challenges for others. It is not enough to set high targets – policymakers should also proactively provide specific support to those who are challenged by the green transition.

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B MINING AND QUARRYING	Mining of coal and lignite						↓ EMPLOYMENT EA: - (33, 27)		
	06 Extraction of crude petroleum and natural gas						↑ OUTPUT EA: +- (6)	+-	
	07 Mining of metal ores						↑ REVENUE EA: + (29) ↑ OUTPUT VALUE EA: + (29) ↑ CAPITAL COSTS EA: - (30)	+	
	08 Other mining and quarrying						↓ REVENUE EP: - (34) ↓ EMPLOYMENT EP: - (34)		-
	08 Mining support service activities								
	10 Manufacture of food products	↓ OPERATIONAL COSTS EA: + (4) ↑ PROFITABILITY EA: + (4)		↑ OPERATIONAL COSTS EP: - (32)			↓ EXPORT EA: - (35) ↓ OUTPUT VALUE EA: - (35)	+	-
11 Manufacture of beverages			↑ OPERATIONAL COSTS EP: - (32)					-	
12 Manufacture of tobacco products									
13 Manufacture of textiles			↓ OPERATIONAL COSTS EP: + (31)				+		
14 Manufacture of wearing apparel			↓ OPERATIONAL COSTS EP: + (31)				+		
15 Manufacture of leather and related products			↓ OPERATIONAL COSTS EP: + (31)				+		

T OTHER SERVICE ACTIVITIES	94 Activities of membership organisations								
	95 Repair and maintenance of computers, personal and household goods, and motor vehicles and motorcycles								
	96 Personal service activities								
U ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS AND UNDIFFERENTIATED GOODS – AND SERVICE-PRODUCING ACTIVITIES OF HOUSEHOLDS FOR OWN USE	97 Activities of households as employers of domestic personnel								
	98 Undifferentiated goods- and service-producing activities of private households for own use								
V ACTIVITIES OF EXTRATERRITORIAL ORGANISATIONS AND BODIES	99 Activities of extraterritorial organisations and bodies								
XX CROSS-SECTORAL	XX Cross-sectoral						↑ OPERATIONAL COSTS EP: - (22)	-	-
							↑ CAPITAL COSTS EP: - (28)		

Source: author's own compilation based on SLR

APPENDIX B

Matrix entry reference list

No.	Reference
1	Mansuy, N., Barredo, J. I., Migliavacca, M., Pilli, R., Leverkus, A. B., Janouskova, K., & Mubareka, S. (2024). Reconciling the different uses and values of deadwood in the European Green Deal. <i>One Earth</i> , 7(9), 1542–1558.
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Source: author's own compilation based on SLR

APPENDIX C

Matrix entries

EMTAK	Policy	Indicator	Trend	Direction	Impact	Type of study	Reference No
A1	Farm to Fork	output value	↓	decrease	– –1	Polish agricultural production impact analysis	EA 5
A1	EGD	profitability	↑	increase	+ 1	Sicilian horticultural sector (potato) case study	EP 8
A1	EGD	operational costs	↓	decrease	+ 1	Sicilian horticultural sector (potato) case study	EP 8
A1	Farm to Fork	income	↓	decrease	– –1	Economic analysis of EU trade policy (mirror clauses)	EA 10
A1	EGD	output value	↓	decrease	– –1	Dairy cattle feeding experiment (Spain)	EP 67
A1	EGD	output value	↓	decrease	– –1	Finnish rural food waste reduction model	EA 35
A1	Farm to Fork	operational costs	↓↑	mixed	± 0	Polish organic farming development perspectives	EP 53
A1	Farm to Fork	revenue	↑	increase	+ 1	Italian consumer behaviour in short supply chains	EP 54
A1	Farm to Fork	output value	↓	decrease	– –1	EU consumer preferences for organic food	EA 61
A1	Farm to Fork	income	↓	decrease	– –1	EU consumer preferences for organic food	EA 61
A1	Biodiversity Strategy	output value	↓	decrease	– –1	EU consumer preferences for organic food	EA 61
A1	Biodiversity Strategy	income	↓	decrease	– –1	EU consumer preferences for organic food	EA 61
A2	Biodiversity Strategy	profitability	↓	decrease	– –1	EU dead wood (biodiversity) management model	EA 1
A2	Fit for 55	revenue	↑	increase	+ 1	EU dead wood (biodiversity) management model	EA 1
A2	Biodiversity Strategy	operational costs	↓	decrease	+ 1	Analysis of wildfire prevention measures in Southern Europe	EP 71
A3	EGD	operational costs	↑	increase	– –1	Role of Spanish fishing sector in the blue economy	EP 23
A3	EGD	profitability	↓	decrease	– –1	Role of Spanish fishing sector in the blue economy	EP 23
A3	Fit for 55	profitability	↓	decrease	– –1	Impact analysis of the EU fishing fleet fuel tax exemption	EA 24
B5	EGD	profitability	↓	decrease	– –1	Political economy analysis of Poland's coal phase-out	EP 26
B5	EGD	employment	↓	decrease	– –1	Socio-economic impact of coal phase-out in West Macedonia	EA 33
B5	EGD	employment	↓	decrease	– –1	Comparison of energy transitions in mining regions (Poland, Greece, Bulgaria)	EA 27
B6	EGD	share of green energy	↑	increase	± 0	Analysis of greening strategies for the European oil industry	EA 6
B7	EGD	revenue	↑	increase	+ 1	Social acceptance of lithium mining in Austria (Wolfsberg)	EA 29

B7	EGD	output value	↑	increase	+	1	Social acceptance of lithium mining in Austria (Wolfsberg)	EA	29
B7	EGD	capital costs	↑	increase	-	-1	Sustainability analysis of the European Arctic mining industry	EA	30
B8	EGD	revenue	↓	decrease	-	-1	Just transition perspectives of Finnish peat companies	EP	34
B8	EGD	employment	↓	decrease	-	-1	Just transition perspectives of Finnish peat companies	EP	34
<hr/>									
B9									
C10	Farm to Fork	operational costs	↓	decrease	+	1	Energy efficiency analysis of dairy equipment (homogenizers)	EA	4
C10	Farm to Fork	profitability	↑	increase	+	1	Energy efficiency analysis of dairy equipment (homogenizers)	EA	4
C10	EGD	export	↓	decrease	-	-1	A model for reducing food waste in rural Finland	EA	35
C10	EGD	output value	↓	decrease	-	-1	A model for reducing food waste in rural Finland	EA	35
C10	Fit for 55	operational costs	↑	increase	-	-1	EU food supply chain decarbonisation initiatives	EP	32
C11	Fit for 55	operational costs	↑	increase	-	-1	EU food supply chain decarbonisation initiatives	EP	32
C12									
C13	Fit for 55	operational costs	↓	decrease	+	1	Emissions and decarbonisation drivers in the EU textile industry	EP	31
C14	Fit for 55	operational costs	↓	decrease	+	1	Emissions and decarbonisation drivers in the EU textile industry	EP	31
C15	Fit for 55	operational costs	↓	decrease	+	1	Emissions and decarbonisation drivers in the EU textile industry	EP	31
C16									
C17									
C18									
C19									
C20	Circular Economy Action Plan	revenue	↑	increase	+	1	Opportunities and challenges of the circular economy in the chemical industry	EA	20
C20	Fit for 55	compliance costs	↑	increase	-	-1	Impact of the Carbon Border Measure (CBAM) on trade and emissions	EA	21
C20	EGD	profitability	↓	decrease	-	-1	Social acceptance of lithium mining in Austria (Wolfsberg)	EA	29
C21	EGD	capital costs	↑	increase	-	-1	Barriers to implementing the green transition in the pharmaceutical industry	EP	39
C22									
C23	Fit for 55	compliance costs	↑	increase	-	-1	Impact of the Carbon Border Measure (CBAM) on trade and emissions	EA	21

C23	EGD	operational costs	↓	decrease	+	1	Technical and economic viability of green bricks	EA	46
C23	EGD	operational costs	↑	increase	-	-1	Analysis of green competencies of cement industry employees	EA	64
C23	EGD	capital costs	↑	increase	-	-1	Analysis of green competencies of cement industry employees	EA	64
C24	EGD	operational costs	↓↑	mixed	±	0	Energy and resource efficiency of metallurgical waste recycling	EP	16
C24	Fit for 55	revenue	↓	decrease	-	-1	Impact of CBAM on industrial competitiveness	EA	19
C24	EGD	capital costs	↑	increase	-	-1	Replacement of coke with biochar in the steel industry	EP	25
C24	Fit for 55	compliance costs	↑	increase	-	-1	Impact of the Carbon Border Measure (CBAM) on trade and emissions	EA	21
C24	EGD	capital costs	↑	increase	-	-1	Green recovery of the EU basic materials sector (post-COVID-19)	EA	36
C24	EGD	operational costs	↓↑	mixed	±	0	Hydrogen-based recycling of electric arc furnace dust	EA	40
C24	EGD	capital costs	↑	increase	-	-1	Hydrogen-based recycling of electric arc furnace dust	EA	40
C25 C26 C27 C28 C29	EGD	capital costs	↑	increase	-	-1	EU Transport Decarbonization Standards and Perspectives	EA	55
C29	EGD	feasibility	↓	decrease	-	-1	Italian Private Vehicle Electrification Feasibility Index	EP	60
C30 C31 C32 C33	Fit for 55	revenue	↑	increase	+	1	Optimization of a Green Hydrogen Production Unit on the Island of Crete	EA	3
D35	Fit for 55	revenue	↑	increase	+	1	Impact of Tightening the EU Emissions Trading System (ETS) on the Electricity Sector	EA	7
D35	Fit for 55	output value	↑	increase	+	1	Impact of Tightening the EU Emissions Trading System (ETS) on the Electricity Sector	EA	7
D35	EGD	employment	↑	increase	+	1	Building a Hybrid Pumped Hydro Power Plant in a Former Coal Mine in Greece	EA	13
D35	EGD	capital costs	↑	increase	-	-1	Impact of the Green Deal on National Energy Consumption (using the Case of Lithuania)	EA	14
D35	Fit for 55	operational costs	↓	decrease	+	1	Global and Regional Perspectives on the	EA	15

F41	Fit for 55	capital costs	↑	increase	-	-1	Cost-effectiveness analysis of Latvian district heating system renovation	EA	47
F41	Fit for 55	revenue	↓↑	mixed	±	0	Analysis of building renovation incentives in Italy (Florence)	EA	48
F41	Fit for 55	profitability	↑	increase	+	1	Optimizing energy renovation of public building portfolio	EA	51
F41	EGD	employment	↑	increase	+	1	The impact of the Spanish recovery plan on green job creation	EA	70
F42	EGD	capital costs	↑	increase	-	-1	European hydrogen transport corridor strategies	EA	56
F42	EGD	revenue	↑	increase	+	1	Estonian energy policy and reducing dependence on Russian energy	EP	57
F42	EGD	capital costs	↑	increase	-	-1	Estonian energy policy and reducing dependence on Russian energy	EP	57
F43	Fit for 55	capital costs	↑	increase	-	-1	Cost-effectiveness analysis of Latvian district heating system renovation	EA	47
F43	Fit for 55	capital costs	↑	increase	-	-1	Life cycle and cost-effectiveness analysis of office building renovation (Spain)	EP	49
F43	Fit for 55	operational costs	↓	decrease	+	1	Life cycle and cost-effectiveness analysis of office building renovation (Spain)	EP	49
G46	Farm to Fork	output value	↓↑	mixed	±	0	Consumers' reaction to organic food price increases (Spain)	EA	18
G47	EGD	operational costs	↓	decrease	+	1	Retail managers' assessment of the impacts of the green transition (Romania)	EA	45
G47	EGD	profitability	↑	increase	+	1	Retail managers' assessment of the impacts of the green transition (Romania)	EA	45
H49	Fit for 55	price	↑	increase	-	-1	Socio-economic distributional impacts of the Green Deal in the EU	EA	12
H49	Fit for 55	operational costs	↑	increase	-	-1	Socio-economic distributional impacts of the Green Deal in the EU	EA	12
H49	EGD	capital costs	↑	increase	-	-1	National energy consumption forecast in light of the Green Deal (Lithuania)	EA	14
H49	EGD	capital costs	↑	increase	-	-1	Sustainability challenges for the extractive industry in the European Arctic	EA	30
H49	Fit for 55	revenue	↑	increase	+	1	Competitiveness of air and rail transport ("Fit for 55" and COVID-19)	EA	58
H49	EGD	capital costs	↑	increase	-	-1	Readiness of European land transport companies for the green transition	EP	68
H49	EGD	operational costs	↑	increase	-	-1	Readiness of European land transport	EP	68

H50	Fit for 55	output value	↓	decrease	-	-1	companies for the green transition Impact of the "Fit for 55" package on Irish maritime transport and the economy	EA	9
H50	EGD	capital costs	↑	increase	-	-1	Sustainability challenges for the extractive industry in the European Arctic	EA	30
H50	Fit for 55	output value	↓	decrease	-	-1	Impact of the EU Green Deal on global shipping and trade	EA	59
H50	Fit for 55	operational costs	↑	increase	-	-1	Impact of the EU Green Deal on global shipping and trade	EA	59
H51	Fit for 55	operational costs	↑	increase	-	-1	Competitiveness of air and rail transport ("Fit for 55" and COVID-19)	EA	58
H52	EGD	capital costs	↑	increase	-	-1	Sustainability Challenges for Mining Industries in the European Arctic	EA	30
H52	EGD	capital costs	↑	increase	-	-1	Strategies for European Hydrogen Transport Corridors	EA	56
H53									
I55									
I56									
J58									
J59									
J60									
K61									
K62									
K63									
L64	EGD	revenue	↑	increase	+	1	Financial determinants of the post-war recovery of the Ukrainian economy	EP	63
L64	EGD	operational costs	↑	increase	-	-1	The impact of the EU taxonomy on the banking sector and corporate lending	EA	65
L65	EGD	operational costs	↑	increase	-	-1	The impact of the EU taxonomy on the banking sector and corporate lending	EA	65
L66									
M68									
N69									
N70									
N71									
N72									
N73									
N74									
N75									
O77									
O78									
O79									
O80									
O81									
O82									
P84	EGD	compliance costs	↑	increase	-	-1	Academic discourse on public engagement in the green transition (Central and Eastern Europe)	EA	52
P84	EGD	operational costs	↑	increase	-	-1	Analysis of labour market policies for green job creation	EA	69
P84	EGD	skills	↑	increase	+	1	Analysis of labour market policies for green job creation	EA	69

Q85	EGD	skills	↑	increase	+	1	Education of architecture students in light of the Green Deal (Poland)	EP	50
R86									
R87									
R88									
S90									
S91									
S92									
S93									
T94									
T95									
T96									
U97									
U98									
V99									
XX	EGD	operational costs	↑	increase	-	-1	Analysis of Romania's administrative capacity in implementing the Green Deal	EP	22
XX	EGD	capital costs	↑	increase	-	-1	Comparison of financial and innovation performance of companies in Europe, Asia and Oceania	EP	28

Source: author's own compilation based on SLR

APPENDIX D

Search strings

EMTAK sector	Search string
Accommodation and food service activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "tourism*" (Abstract) not "circular economy" (All Fields)
Accommodation and food service activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "food waste*" (Abstract) not "circular economy" (All Fields)
Accommodation and food service activities	(ABS (("european green deal" OR egd) AND (tourism OR "hospitality industry" OR restaurants OR "food waste" OR "sustainable tourism" OR "eco-tourism" OR "sustainable food" OR "green hotels" OR "circular practices")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Activities of extraterritorial and organizations and bodies	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "trade" or "global governance" (Abstract) not "circular economy" (All Fields)
Activities of extraterritorial and organizations and bodies	(ABS (("european green deal" OR egd) AND ("international organizations" OR "eu institutions" OR "global governance" OR "international cooperation" OR "multilateral agreements")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Activities of households as employers	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "consumption*" or "diy" or "local food" (Abstract) not "circular economy" (All Fields)
Activities of households as employers	(ABS (("european green deal" OR egd) AND (household* OR "consumer behavior" OR "energy consumption at home" OR "waste segregation" OR "home energy efficiency" OR "personal carbon footprint")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Administrative and support service activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "corporate sustainability" (Abstract) not "circular economy" (All Fields)
Administrative and support service activities	(ABS (("european green deal" OR egd) AND ("administrative services" OR "support activities" OR "facilities management" OR "cleaning services" OR "security services" OR "renting and leasing" OR "sustainable procurement" OR "eco-labeling" OR "corporate sustainability")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Agriculture, forestry and fishing	"green deal" (Title) and europe* (Abstract) and econom* (Abstract) and agricultur* (Abstract) not "circular economy" (All Fields)
Agriculture, forestry and fishing	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and forestry or "timber*" or wood (Abstract) not "circular economy" (All Fields)
Agriculture, forestry and fishing	"green deal" (All Fields) and europe* (Abstract) and economy (Abstract) and fish* (Abstract) not "circular economy" (All Fields)
Agriculture, forestry and fishing	(ABS (("european green deal" OR egd) AND (agriculture OR farming OR forestry OR fishery OR "farm to fork" OR "common agricultural policy" OR "food system" OR "bioeconomy" OR "sustainable agriculture" OR "carbon sinks" OR "pesticide reduction" OR "biodiversity loss" OR "rural development")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Arts, sports and recreation	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "cultur*" (Abstract) not "circular economy" (All Fields)
Arts, sports and recreation	(ABS (("european green deal" OR egd) AND (arts OR entertainment OR recreation OR tourism OR "cultural heritage" OR "sporting activities" OR "sustainable events" OR "eco-tourism")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Construction	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "building regu*" (Abstract) not "circular economy" (All Fields)
Construction	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "renovation*" (Abstract) not "circular economy" (All Fields)
Construction	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "urban*" (Abstract) not "circular economy" (All Fields)
Construction	(ABS (("european green deal" OR egd) AND (construction OR building* OR "sustainable building" OR "energy efficiency in buildings" OR "renovation wave" OR "building materials" OR "circular construction" OR "nearly zero-energy buildings")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Education	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "education" (Abstract) not "circular economy" (All Fields)
Education	(ABS (("european green deal" OR egd) AND (education OR training OR "green skills" OR "environmental education" OR "sustainability education" OR "lifelong learning" OR "vocational training")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Electricity, gas, steam and air conditioning supply	"green deal" (All Fields) and europe* (Abstract) and economy (Abstract) and gas* (Abstract) and "greenhouse gas*" (All Fields) not "circular economy" (Author)
Electricity, gas, steam and air conditioning supply	"green deal" (All Fields) and europe* (Abstract) and economy (Abstract) and gas* (Abstract) not "greenhouse gas*" (Abstract) not "circular economy" (All Fields)
Electricity, gas, steam and air conditioning supply	"green deal" (All Fields) and europe* (Abstract) and economy (Abstract) and steam* (Abstract) not "circular economy" (All Fields) or "green deal" (All Fields) and europe* (Abstract) and "air condition*" (Abstract) not "circular economy" (All Fields)
Electricity, gas, steam and air conditioning supply	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "renewable energ*" or "decarbonization" or "cooling" or "heating" or "energy storage" or "hydrogen energy" or "carbon capture" or "electrification" (Abstract) not "circular economy" (All Fields)
Electricity, gas, steam and air conditioning supply	(ABS (("european green deal" OR egd) AND (energy OR "power generation" OR electricity OR gas OR "district heating" OR "renewable energy" OR "wind power" OR "solar energy" OR "hydrogen" OR "energy transition" OR "energy security" OR "grid infrastructure" OR "smart grids" OR "energy efficiency" OR "carbon neutrality")) AND TITLE ("european green deal" OR egd OR "eu green deal"))

Electronic communications service, programming, consultancy, data processing infrastructure and other information service activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "data process*" (Abstract) not "circular economy" (All Fields)
Electronic communications service, programming, consultancy, data processing infrastructure and other information service activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "digital*" (Abstract) not "circular economy" (All Fields)
Electronic communications service, programming, consultancy, data processing infrastructure and other information service activities	(ABS (("european green deal" OR egd) AND (ict OR "information technology" OR telecommunications OR "digital transformation" OR "green it" OR "data centers" OR "digital solutions" OR "smart cities" OR "iot" OR "big data")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Financial and insurance activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "financial regu*" (Abstract) not "circular economy" (All Fields)
Financial and insurance activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "financial stab*" (Abstract) not "circular economy" (All Fields)
Financial and insurance activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "climate finance" (Abstract) not "circular economy" (All Fields)
Financial and insurance activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "sustainable finance" (Abstract) not "circular economy" (All Fields)
Financial and insurance activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "central bank*" (Abstract) not "circular economy" (All Fields)
Financial and insurance activities	(ABS (("european green deal" OR egd) AND (finance OR banking OR insurance OR "sustainable finance" OR "green bonds" OR "esg investment" OR "climate risk" OR "financial regulation" OR "taxonomy regulation")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Human health and social work activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "health" or "healthcare*" or "diet*" (Abstract) not "circular economy" (All Fields)
Human health and social work activities	(ABS (("european green deal" OR egd) AND (health OR healthcare OR "public health" OR "environmental health" OR "social care" OR "well-being" OR "air quality" OR "water quality" OR "sustainable healthcare")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Manufacturing	"green deal" (All Fields) and europe* (Abstract) and economy (Abstract) and manufactur* (Abstract) not "circular economy" (All Fields)
Manufacturing	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "supply chain*" (Abstract) not "circular economy" (All Fields)
Manufacturing	(ABS (("european green deal" OR egd) AND (manufacturing OR industry OR "industrial transformation" OR "decarbonization" OR "circular economy" OR "emission reduction" OR "green technology" OR "energy efficiency" OR "textile industry" OR "chemical industry" OR "steel industry" OR "automotive industry")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Mining and quarrying	"green deal" (All Fields) and europe* (Abstract) and economy (Abstract) and mining* (Abstract) not "circular economy" (All Fields)
Mining and quarrying	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "raw material*" (Abstract) not "circular economy" (All Fields)
Mining and quarrying	(ABS (("european green deal" OR egd) AND (mining OR quarrying OR "raw materials" OR "critical raw materials" OR "circular economy" OR "resource efficiency" OR "extractive industry" OR "sustainable mining")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Other service activities	(ABS (("european green deal" OR egd) AND ("personal services" OR "repair of computers" OR "repair of household goods" OR "laundry services" OR "religious organizations" OR "environmental services" OR "sustainable practices")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Other service activities	(ABS (("european green deal" OR egd) AND (research OR development OR "r&d" OR "consulting" OR "engineering services" OR "scientific innovation" OR "policy analysis" OR "environmental consulting" OR "sustainability consulting")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Professional, scientific and technical activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "science*" or "renewable energy*" or "energy efficiency*" or "environmental technology" or "life cycle assess" or "green innovation" (Abstract) not "circular economy" (All Fields)
Professional, scientific and technical activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "smart grid*" (Abstract) not "circular economy" (All Fields)
Public administration and defense, compulsory social security	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "green public" or "mitigation" or "environmental policy" or "social welfare" or "environmental justice" (Abstract) not "circular economy" (All Fields)
Public administration and defense, compulsory social security	(ABS (("european green deal" OR egd) AND ("public administration" OR "governance" OR "policy implementation" OR "national regulations" OR "eu law" OR "climate policy" OR "social security" OR "just transition" OR "social impact" OR "public participation")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Publishing, broadcasting, and content production and distribution	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "publish*" (Abstract) not "circular economy" (All Fields)
Real estate activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "real estate*" (Abstract) not "circular economy" (All Fields)
Real estate activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "property*" (Abstract) not "circular economy" (All Fields)

Real estate activities	(ABS (("european green deal" OR egd) AND ("real estate" OR "property management" OR "sustainable buildings" OR "green buildings" OR "urban planning" OR "land use" OR "property valuation" OR "energy performance certificates")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Transportation and storage	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "alternative fuel*" or "mobility" (Abstract) not "circular economy" (All Fields)
Transportation and storage	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and transport* (Abstract) not "circular economy" (All Fields)
Transportation and storage	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and logistic* (Abstract) not "circular economy" (All Fields)
Transportation and storage	(ABS (("european green deal" OR egd) AND (transport OR mobility OR logistics OR "electric vehicles" OR "sustainable transport" OR "green freight" OR "aviation emissions" OR "shipping emissions" OR "public transport" OR "charging infrastructure" OR "fuel cells")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Water supply, sewerage, waste management and remediation activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and water (Abstract) not "circular economy" (All Fields)
Water supply, sewerage, waste management and remediation activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and waste (Abstract) not "circular economy" (All Fields)
Water supply, sewerage, waste management and remediation activities	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and pollut* (Abstract) not "circular economy" (All Fields)
Water supply, sewerage, waste management and remediation activities	(ABS (("european green deal" OR egd) AND (water OR "wastewater treatment" OR "waste management" OR "circular economy" OR "pollution control" OR "resource recovery" OR "waste to energy" OR "landfill reduction")) AND TITLE ("european green deal" OR egd OR "eu green deal"))
Wholesale and retail trade	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and "distribution" or "local sourcing" or "sustainable packaking" (Abstract) not "circular economy" (All Fields)
Wholesale and retail trade	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and trad* (Abstract) not "circular economy" (All Fields)
Wholesale and retail trade	"green deal" (All Fields) and europe* (Abstract) and econom* (Abstract) and retail* (Abstract) not "circular economy" (All Fields)
Wholesale and retail trade	(ABS (("european green deal" OR egd) AND (retail OR wholesale OR "e-commerce" OR "supply chain*" OR "sustainable consumption" OR "product lifecycle" OR "packaging" OR "vehicle sales" OR "repair services" OR "green products" OR "consumer behavior")) AND TITLE ("european green deal" OR egd OR "eu green deal"))

Source: author's own work

Resümee

ELI ROHELISE ÜLEMINEKU POLIITIKA MÕJU MAJANDUSSEKTORITELE: SÜSTEMAATILINE KIRJANDUSE ÜLEVAADE

Brigita-Veronika Pähn

Käesolev töö kaardistab Euroopa rohelise kokkuleppe (EGD) majanduslikke mõjusid Euroopa Liidu majandussektorites. See põhineb aastatel 2019–2025 avaldatud teadusuuringute süstemaatilisel kirjanduse ülevaatel ja pakub esimest struktureeritud katset mõista rohepöörde mõjusid ettevõtetele.

Vaadeldud kirjandus keskendub peamiselt primaarsektorile, energiamahukale tootmisele ja transpordile, samuti ringmajanduse ja jäätmetega seotud tegevustele, mis kuuluvad keskkonnamuutustest enim otseselt mõjutatud sektorite hulka. Teenindussektorid on aga suures osas väheuuritud.

Potentsiaalsed kaotajad tuvastatakse eelkõige primaarsektoris ja fossiilkütustest sõltuvas tootmises, kus tõusvad energiahinnad, sisendkulud ja regulatiivsed nõuded ohustavad lühiajalist tootmist ja kasumlikkust. Seevastu ilmnevad potentsiaalsed võitjad sellistes sektorites nagu ehitus, renoveerimine ja jäätmekäitlus, kus EGD regulatsioonid loovad uut turunõudlust ja investeerimisvõimalusi.

Kirjandus viitab aga sellele, et eristus võitjate ja kaotajate vahel ei ole ainult sektoritevaheline, vaid ka sektorisisene. Ettevõtte tasandi tulemusi näivad määravat kapitali kättesaadavus, juurdepääs rahastusele ja haldussuutlikkus. Järelikult loob üleminek tõenäoliselt turustruktuuri, kus suured ja heade ressurssidega organisatsioonid saavad konkurentsieelise väiksemate ettevõtete ees, kes on hädas suurte investeerimisvajaduste ja nõuete täitmisega kaasneva halduskoormusega. Need mustrid annavad varajasi indikatsioone selle kohta, keda ja kuidas üleminek mõjutab.

Metodoloogiliselt on ettevõttepõhiseid hinnanguid vähe. Olemasolevates uuringutes domineerib *ex ante* modelleerimine ja need käsitlevad peamiselt otseselt süsinikuheite vähendamise seotud poliitikapakette (nt Eesmärk 55). Keskendumine pigem tulevikusimulatsioonidele kui vaadeldavatele majandusandmetele piirab võimalust teha lõplikke järeldusi tegelike mõjude kohta. Seega oleks tulevastel uuringutes kasu suuremast hulgast analüüsist, eriti *ex post* hindamistest, kuna poliitikamõjud muutuvad jälgitavaks.

Nendele leidudele tuginedes koorub välja kolm peamist järeldust. Esiteks peaksid poliitikakujundajad arvestama asümmeetriat koheste üleminekukulude (nt sisendhindade tõus, toodangu vähenemine) ja pikaajaliste tulude (nt innovatsioonist saadav kasu) vahel. Ülemineku rahastamise instrumendid on selle lõhe ületamiseks hädavajalikud, eriti suure

mõjuga sektorites tegutsevate väiksemate ettevõtete jaoks. Teiseks, vältimaks olukorda, kus keerulised regulatsioonid panevad väiksemad ettevõtted ebasoodsasse olukorda, tuleks lihtsustada aruandlusnõudeid (nt ELi taksonoomia, CBAM) ja pakkuda tehnilist tuge. Kolmandaks, kuna sellised sektorid nagu kaevandamine ja põllumajandus seisavad silmitsi suurima üleminekusurvega, peavad ümberõppeprogrammid olema ennetavad, mitte reageerivad, et vältida struktuurilist tööpuudust.

Kokkuvõtteks võib öelda, et EGD muudab investeeringute ja majanduslike stiimulite toimimist. Kuigi see loob mõnele ettevõttele kasvu, võib üleminek teistele kaasa tuua väljakutseid. Ei piisa vaid kõrgete eesmärkide seadmisest – poliitikakujundajad peaksid pakkuma ka ennetavat ja konkreetset tuge neile, kellele rohepöörde raskusi valmistab.

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Brigita-Veronika Pähn

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