

Joint Master in Global Economic Governance and Public Affairs

Uneven Implementation of EU Waste Legislation and the Potential of the European Green Deal: A Comparative Analysis of Greece and Spain

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*If there is a single idea running quietly beneath all my work and academic career,
it is that the things we value are worth protecting while we still have them,
whether the people around us or the planet we share.*

As Benito Antonio Martínez Ocasio once said:

“Mientras uno está vivo, uno debe amar lo más que pueda”

Thesis Pitch

The video pitch presenting this thesis, which addresses the research question *"What political, institutional, and administrative factors explain the variation in Spain's and Greece's implementation of the Waste Framework, Landfill Directives, packaging waste rules, and end-of-life product management?"*, can be accessed at the following link:

https://youtu.be/N_USXASdcb4?si=sCIW08cKMJMATR7a

Statutory Declaration

I hereby declare that I have composed the present thesis autonomously and without use of any other than the cited sources or means. I have indicated parts that were taken out of published or unpublished work correctly and in a verifiable manner through a quotation. I further assure that I have not presented this thesis to any other institute or university for evaluation and that it has not been published before.

21/06/2026 Noemi Calzolari

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Abstract

European legislation establishes common, binding targets for recycling and landfill diversion, yet Member States operating under the same framework deliver markedly different results. This thesis investigates the political, institutional, and administrative drivers of that divergence through a comparative case study of Greece and Spain, two decentralised Southern European states with similar socio-economic profiles and a shared history of difficulty meeting EU waste obligations, yet significantly different implementation outcomes. Drawing on EU monitoring instruments, national policy documents, and five expert interviews, and applying multi-level governance theory and the political economy of environmental regulation, the study finds that divergence is explained neither by the shared legislation nor by decentralisation alone, but by the constitutional quality of what each country devolves. Spain combines genuine legislative devolution to its Autonomous Communities with task-specific integrating institutions, namely the Waste Agency of Catalonia and intermunicipal *mancomunitats*, that bridge coordination failures. Greece, by contrast, decentralises administrative tasks without the legislative authority its regions need to resolve those failures, and operates within a political economy in which recurrent infringement fines function as an accepted cost rather than a catalyst for reform. The thesis concludes that common legislation does not produce common outcomes. Recent substantial revisions of the legislation under the European Green Deal will narrow the implementation gap only if it builds the integrating institutions, devolved competences, and accountability structures on which its success depends.

Keywords: *Circular Economy, European Green Deal, Waste Management, Multi-level governance, Extended Producer Responsibility, Spain, Greece.*

Abbreviations

*in order of appearance in the text

EU	European Union
WWII	World War II
EGD	European Green Deal
EWR	Early Warning Report
MS	Member State(s)
EPR	Extended Producer Responsibility
CEAP	Circular Economy Action Plan
WFD	Waste Framework Directive
PPWR	Packaging and Packaging Waste Regulation
PROs	Producer Responsibility Organisations
MLG	Multi-Level Governance
PEER	Political Economy of Environmental Regulation
MSSD	Most-Similar Systems Design
OECD	Organisation for Economic Co-operation and Development
EIR	Environmental Implementation Review
ARC	Agència de Residus de Catalunya (Waste Agency of Catalonia)
GDP	Gross Domestic Product
ACs	Autonomous Communities
ESDA	Εθνικό Σχέδιο Διαχείρισης Αποβλήτων (National Waste Management Plan, Greece)
CMUR	Circular Material Use Rate
FODSAs	Φορείς Διαχείρισης Στερεών Αποβλήτων (Regional Associations of Solid Waste Management Agencies)
AI	Artificial Intelligence

EEA	European Environment Agency
DDC	Door-to-door Collection
PRECAT2020 2013–2020	Programa de Prevenció i Gestió de Residus i Recursos de Catalunya
MITECO	Ministerio para la Transición Ecológica y el Reto Demográfico (Ministry for the Ecological Transition and the Demographic Challenge)
RRF	Recovery and Resilience Facility
ERDF	European Regional Development Fund
MBT	Mechanical Biological Treatment
DRS	Deposit Return System
TFEU	Treaty on the Functioning of the European Union
PET	Polyethylene Terephthalate
SCO	Separate Collection Obligation
CJEU	Court of Justice of the European Union
PAYT	Pay As You Throw

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1. Introduction

The ability of human societies to generate waste has outpaced their capacity to manage it since mass consumerism emerged after WWII, and the consequences are increasingly impossible to ignore.

Municipal solid waste generation is projected to rise by about 56% by 2050¹, driven primarily by population growth and GDP expansion in emerging economies, with urbanisation and rising consumption also contributing. Additionally, in 2020, 38% of this waste was improperly disposed of, and without urgent action, its volume is expected to double. Notably, the economic costs are equally alarming: the direct global cost of waste management already stands at USD 252 billion annually, and it could reach USD 640 billion by 2050 if business-as-usual continues (UNEP, 2024).

These figures point to a systemic failure that cannot be resolved through better waste collection alone. The fundamental challenge is upstream: if materials, particularly plastics, continue to be designed, used, and discarded in ways that prioritise point-of-scale convenience over recoverability, end-of-pipe management will remain overwhelmed (UNEP, 2024). More rational utilisation of materials across their lifecycle, including designing out problematic elements such as composite materials and non-detachable components that contaminate recycling streams, is a prerequisite for any meaningful reduction in waste volumes (European Commission, 2020; de Sadeleer, 2025).

To tackle these challenges, the European Union has progressively built one of the world's most ambitious regulatory frameworks for waste reduction and recycling, anchored by the Waste Framework Directive (WFD) (2008), complemented by regulations for individual waste streams, and given renewed political momentum by the European Green Deal (EGD) (European Commission, 2019b). The EGD emphasises the transition to a circular economy, where waste is minimised, materials are utilised for as long as possible, and landfilling is regarded as a last resort. This is reflected in revisions of waste legislation under the EGD. Binding recycling targets, mandatory separate collection requirements, and the expansion of Extended Producer Responsibility (EPR) schemes impose significant responsibilities on all 27 Member States

¹ Global Waste Management Outlook, UNEP (2024)

(MS). However, the Commission's 2023 Early Warning Report (EWR) indicates that implementation remains deeply uneven: while some MS are making progress, others may fall significantly short of meeting their legally binding targets (European Commission, 2023b).

This divergence is the central issue addressed in this thesis. Despite operating under the same supranational regulatory framework, MS deliver significantly different outcomes in waste governance. Greece and Spain serve as particularly insightful cases for comparison. Both are Southern EU MS with decentralised governance structures, similar socio-economic profiles, and a shared history of challenges in waste management. However, Spain has made significantly greater improvements in areas such as collection, recycling, EPR and waste prevention, while Greece remains one of the EU's most landfill-dependent countries, consistently identified in European Commission EWR as at risk of failing to meet its 2025 and 2035 targets (European Commission, 2023b). This divergence raises questions, beyond these two cases, about how the EU can better support MS with weaker administrative capacity in meeting shared sustainability obligations.

1.1 Background and Context

The WFD and the Landfill Directive set binding targets for recycling and the reduction of municipal waste sent to landfills (European Commission, 2019b). While the 2023 Monitoring Report (most recent) indicates some progress, implementation remains inconsistent. Crucially, the European Commission's EWRs specifically identify Greece and Spain as being at risk of missing the 2025 municipal waste recycling target of 55% (European Commission, 2023a).

Greece and Spain exhibit notably different paths towards circular transition. As per the European Environment Agency (2024) in the *Circular Economy Country Profiles*, Spain has made considerable strides in embracing circular practices, whereas Greece continues to encounter structural obstacles in waste management, enforcement, and administrative coordination (European Environment Agency, 2025b).

1.2 Purpose and Structure

The purpose of this thesis is to identify and explain the factors that contribute to variation in the implementation of EU waste management legislation among MS, particularly Greece and

Spain. Understanding the reasons behind these differences is important for assessing the effectiveness of EU environmental governance and identifying barriers to successful policy implementation. The central research question guiding this inquiry is:

What political, institutional, and administrative factors explain the variation in Spain's and Greece's implementation of the Waste Framework Directive, Landfill Directives, Packaging Waste and end-of-life product management?

Chapter 2 presents the literature review, examining the legislative frameworks. Chapter 3 details the methodology, including research design, case selection, data collection, and analytical approach. Chapter 4 presents the comparative analysis, structured around the cases of Greece and Spain before a cross-case comparison. Chapter 5 discusses the findings considering the theoretical frameworks, and Chapter 6 draws conclusions from this research.

2. Literature Review

2.1 Introduction to the Literature

This chapter examines the supranational policy and legislative framework that governs waste management within the EU. As part of its broader transition towards sustainability, the Commission has developed an increasingly ambitious regulatory framework aimed at reducing waste generation, promoting recycling, and advancing the principles of the circular economy.

Hence, this literature review examines five thematic areas:

1. The objectives, ambitions, and contested legitimacy of the EGD
2. The EU waste governance framework: the Waste Framework Directive and the Circular Economy
3. The Landfill Directive
4. Extended Producer Responsibility as a pillar of waste financing and governance and the Separate Collection Obligation and its territorial implications
5. Comparative perspectives: multi-level governance and the political economy of implementation

Together, these themes provide the conceptual and legislative foundation for the analysis. The review draws on academic literature and EU policy documents.

2.2 The European Green Deal

The 2019 EGD is the EU's overarching policy framework for achieving climate neutrality by 2050, launched largely in reaction to the strength of climate concerns displayed in the 2019 European Parliament elections. It encompasses various areas such as biodiversity, energy, and transport, aiming for net-zero greenhouse gases, restoration of ecosystems, and a resource-efficient economy (Catarinella & Kram, 2025; European Commission, 2019b; Ranga, 2025). An increasingly key motivation is resource scarcity, as Europe's industrial economy, and particularly the development of renewable energies, relies heavily on critical raw materials sourced mainly from a few countries, particularly China². Thus, the circular economy serves as

² Strategic autonomy has gained renewed political salience following successive external shocks: the Covid-19 pandemic, Russia's invasion of Ukraine, and renewed transatlantic uncertainty under Trump's second administration (Jakimów et al., 2024)

both a means to achieve environmental goals (climate, biodiversity and pollution) and a strategy to address Europe's dependence on external resources (Catarinella & Kram, 2025).

Hence, the transition to a circular economy is a key operational pillar, focusing on keeping materials in use, reducing waste, and closing material loops to support the EGD environmental goals and reduce resource dependency (European Commission, 2019b, 2026a). Waste management, in turn, is one of the primary mechanisms through which loops are closed, setting binding targets for recycling, landfill diversion, and separate collection that translate the EGD's high-level ambitions into enforceable national obligations.

The 2020 Circular Economy Action Plan (CEAP), adopted as part of the EGD package, set out a strategy for specific value chains, plastics, textiles, electronics, construction, and food, and provided the policy scaffolding on which subsequent revisions of waste legislation were built (European Commission, 2020). These instruments form a hierarchy — the EGD as political narrative, the CEAP as policy package, and waste legislation as delivery mechanism — framing the legislation discussed below.

Regarding compliance, the EGD Index highlights Estonia, Sweden, and Latvia as leaders, while revealing disparities among EU MS that face challenges due to the strategy's complexity (Catarinella & Kram, 2025; Olczyk & Kuc-Czarnecka, 2025).

2.3 The EU Waste Governance Framework

The EGD built on the existing EU WFD, pushing circular economy policy beyond end-of-pipe waste management towards upstream product lifecycle requirements. The relevant product instruments predate the EGD but existed as Directives, with either a limited scope (the Ecodesign Directive initially covered only energy-related products) or a largely end-of-pipe focus (the Packaging and Packaging Waste Directive and the Batteries Directive). The EGD has since recast them as broader Regulations: the Ecodesign Regulation, the Packaging and Packaging Waste Regulation (PPWR), and the Batteries Regulation, and extended EPR eco-modulation as a design incentive. The WFD, which entered into force in December 2008, is therefore not a product of the Green Deal but preceded it by over a decade. It represents the foundational layer of EU waste law upon which the EGD has subsequently built, establishing

the principles, definitions, and targets that all subsequent waste-related legislation refines and strengthens (European Commission, 2026e).

The WFD outlines the fundamental principles of waste management, including definitions for waste, recycling, and recovery, along with the five-tiered waste hierarchy, prioritising prevention as the most desirable option and placing landfilling at the bottom (European Commission, 2026c). Crucially, the WFD affirms the polluter-pays principle and formalises the concept of EPR, under which producers bear financial or organisational responsibility for the waste stage of a product's life cycle (Directorate-General for Environment, 2025; OECD, 2024). As discussed in section 2.5, EPR is a policy instrument that the WFD codified and that, despite remaining poorly applied in practice, has been progressively expanded in scope under the EGD and is expected to be further extended and simplified under the forthcoming Circular Economy Act (European Commission, 2026b).

In 2018, an Amending Directive (Directive 2018/851/EU) modified the original WFD to strengthen waste management requirements and accelerate the transition to a circular economy (European Parliament and the Council, 2018). This revision tightened the EU's separate collection obligations, requiring MS to collect paper, metal, plastic, glass, and bio-waste separately if recycling targets are to be met (European Commission, 2026e). Separate waste collection has been identified as a fundamental condition for attaining high recycling rates; however, its success is largely influenced by local facilities, community engagement, and the ability to enforce regulations.

2.4 Landfill Directive

The Landfill Directive (Council of the European Union, 1999) also predates the EGD, having entered into force in 1999. This Directive requires MS to progressively reduce landfilling, and particularly the amount of biodegradable municipal waste sent to landfills, as the breakdown of this type of waste in landfills generates methane, a powerful greenhouse gas. Thus, the Directive aims to circumscribe the lowest level of the waste hierarchy by categorising landfilling as the final disposal option.

In its current form, after the 2018 amendments, from 2030 the Directive bars recyclable or recoverable waste from landfill, caps municipal waste landfilling at 10% by 2035 (European

Commission, 2018), and obliges MS to trace and quality-control what they landfill (Directorate-General for Environment, 2026).

2.5 Extended Producer Responsibility

EPR is one of the most significant instruments in EU waste governance, and it is important to situate it correctly within the historical trajectory of EU policy. Its origins lie in German packaging legislation from the early 1990s, and was codified by the 2008 WFD, which for the first time made producers, not municipalities or households, responsible for funding or organising end-of-life management of their products (Europen, 2024; OECD, 2024). Well before the EGD was launched, EPR schemes had been operating across EU MS for packaging, batteries, electrical and electronic equipment, and end-of-life vehicles.

The EGD, through revisions to the WFD and other legislation (PPWR and Batteries Regulation) built upon this established framework, expanding it to new product categories such as textiles and footwear.

Across EU MS, EPR is administered through Producer Responsibility Organisations (PROs), which collect fees from producers and channel them into waste collection, sorting, and recycling infrastructure (OECD, 2016). The governance structure of PROs has a direct bearing on whether EPR fees translate into improved waste infrastructure, a question that is particularly relevant to the Spain–Greece comparison.

Although generally considered as a logical approach, even by those who foot the bill, the application of EPR has drawn considerable criticism: companies placing products on the markets of several MS are required to register in multiple national programmes, each having unique administrative requirements, fee structures, and reporting duties (Zero Waste Europe, 2025). The forthcoming Circular Economy Act, under the 2025 Clean Industrial Deal, has the stated objective of tightening governance requirements and transparency, simplifying, digitising and harmonising EPR implementation across MS (European Commission, 2026b).

Recent comparative research reinforces concerns about fragmentation in EPR governance. Dolan (2026), in a comparative study of textile EPR systems across France, the Netherlands, Sweden, Hungary, and Australia, notes that many of these systems are either “fragmented” or “voluntary,” and this disunity hampers coordination, consistency in reporting, and enforcement. The research shows that centralised national EPR systems, like France's ReFashion initiative,

attain significantly higher scores for implementation quality compared to those that function under voluntary or decentralised frameworks, highlighting the critical role of governance structure in the effectiveness of EPR. Furthermore, the analysis finds that eco-modulation, linking producer fees to product design factors such as durability and recyclability, is one of the most significant policy tools for incentivising improvements in upstream design (Dolan, 2026).

In addition, the separate collection obligation connects directly to both the WFD and the EPR framework: it is the operational prerequisite that makes EPR work in practice. Without functioning separate collection systems, EPR fees have no quality material to process; without EPR funding, municipalities often lack the resources to establish and maintain those systems. The two instruments are therefore interdependent components of the same delivery chain, and both are reinforced by the EGD's circular economy agenda (European Commission, 2026d).

2.6 Comparative Perspective: Multi-Level Governance and the Political Economy of Implementation

This section outlines the two analytical perspectives that will be used to interpret evidence in the rest of the thesis: multi-level governance (MLG) and the political economy of environmental regulation (PEER). MLG theory, articulated by Hooghe & Marks (2001), treats the EU as a polity where authority is dispersed across supranational, national, regional and local tiers rather than concentrated in the state. When applied to environmental policy, this viewpoint emphasises the allocation of responsibilities for transposition, funding, and operational execution among these tiers, as well as the coordination challenges that emerge when binding commitments are established at one level but executed at another. This makes it particularly appropriate for comparing two decentralised MS where regions and municipalities undertake the operational responsibilities of waste management, while the Commission and the national legislature establish the objectives. The PEER adds to this by highlighting the interests, incentives, and capabilities of the actors responsible for implementing policy; it emphasises the diverse influences on policy implementation (Newell & Mulvaney, 2013; Theodoropoulou et al., 2025). Together, these perspectives shape the main analytical argument of the thesis, which hypothesises that identical EU regulations can lead to different national outcomes due to their interpretation through varying governance frameworks and political-economic contexts.

An MLG perspective illuminates how the distribution of competences across European, national, regional, and municipal levels shapes the incentives and constraints that public officials face when implementing EU waste legislation (Catarinella & Kram, 2025).

Ultimately, despite growing research on EU waste governance, several gaps remain. Existing studies often examine EPR system design or performance outcomes separately, without linking them to the political, institutional, and administrative factors that shape implementation. Furthermore, comparative research has largely focused on Eastern and Western Europe; where Southern European member States such as Greece and Spain appear, they are typically incorporated into broad multi-country datasets rather than isolated for direct comparison. The governance dimensions of EPR, including PRO transparency, eco-modulation, and the allocation of financial resources, have also received limited attention. Finally, while intermunicipal cooperation models such as those found in Catalonia are increasingly recognised as effective approaches to waste management, their applicability to more fragmented administrative contexts remains insufficiently studied. How this thesis will address these gaps is further explained in the next chapter.

3. Methodology

This chapter outlines the methodological framework that supports the comparative examination of waste management practices in Greece and Spain. To operationalise the main research question and ensure systematic empirical coverage, the analytical process is organised around four sub-questions:

1. What explains the difference in the relative effectiveness of Greece and Spain in implementing waste legislation, particularly EU recycling and landfill diversion targets?
2. What role do governance structures, inter-ministerial coordination, and regulatory arrangements play?
3. To what extent does administrative capacity (expertise, staffing, resources) influence policy delivery, and how are emerging technologies (e.g., AI in waste sorting or chemical recycling) being integrated into national strategies?
4. What will be the consequence of evolving approaches to waste management through revisions of legislation in the EGD?

3.1 Research Design

This study employs a comparative case study approach. Qualitative methods suit research questions about political, institutional, and administrative dynamics that resist quantification without a loss of analytical depth. Flyvbjerg (2006) argues that case study research generates the kind of context-dependent knowledge that is indispensable for understanding social and political phenomena.

Within-case analysis investigates the particular factors influencing waste governance in each nation, while cross-case analysis highlights the variations that account for differing outcomes. This combination, what George & Bennett (2005) refer to as process tracing situated within a comparative context, is well recognised in comparative public policy research and is especially useful for analysing EU implementation.

The table below aligns each sub-question with the necessary information, relevant sources, employed research methods, and the analytical framework used.

Table 1: Research Design (Author, 2026)

Research Question	Information Required	Information Source / Respondent	Research Method	Analysis Method
RQ1: What explains the difference in the relative effectiveness of Greece and Spain in implementing waste legislation?	- National implementation outcomes of EU waste legislation - Performance indicators (recycling rates, landfill use, compliance records) - Timeliness and completeness of transposition - Compliance with Landfill and Waste Directives	- European Commission, EIR - National waste management strategies - Eurostat waste statistics - Academic literature on EU waste governance - EU Early Warning Reports	- Desk research - Comparative document analysis	Thematic analysis
RQ2: What roles do governance structures, inter-ministerial coordination, and regulatory arrangements play?	- Institutional responsibilities for waste policy - Coordination mechanisms between ministries and agencies - Regulatory design and enforcement structures	- National legislative frameworks - Government organisational charts - EU governance reports - Interviews with policymakers and governance experts	- Desk Research - Semi-structured expert interviews (primary research)	Thematic analysis
RQ3: To what extent does administrative capacity (expertise, staffing, resources) influence policy delivery, and how are emerging technologies being integrated into national strategies?	- Staffing levels and expertise in public administrations - Budgetary resources allocated to waste management - Administrative performance indicators - Investment in AI	- National public administration reports - OECD and EU administrative capacity assessments - Interviews with civil servants and policy experts - National Investment Plans, Technical Reports	- Desk research - Semi-structured expert interviews (primary research)	Comparative analysis
RQ4: What are the consequences of evolving approaches to waste management through revisions of legislation in the European Green Deal?	- Changes introduced by revised waste legislation under the EGD, WFD, PPWR, and forthcoming Clean Industrial Deal - Expected impacts on national waste governance - Policy adaptation strategies in Greece and Spain	- EU legislative proposals and revisions (waste directives/regulations) - Academic and policy literature on waste governance	- Desk research - Policy analysis - Semi-structured expert interviews	Thematic analysis

The choice of Greece and Spain as the cases for comparison is based on the principles of the Most-Similar Systems Design (MSSD), a concept first developed by Przeworski and Teune (1970) and later improved in the field of comparative policy research. The MSSD chooses cases that exhibit as many similar contextual characteristics as possible, allowing any observed differences in results to be more accurately associated with the factors that differentiate the cases, rather than unconsidered background influences (Anckar, 2008; Przeworski & Teune, 1970).

Greece and Spain meet the criteria of the MSSD on several fronts. Both are MS of the EU located in Southern Europe with long-standing membership, Spain since 1986, and Greece since 1981 (European Union, n.d.), and therefore are subject to the same EU regulations regarding waste and enforcement mechanisms. Both countries have significantly decentralised governance structures (Catarinella & Kram, 2025; Theodoropoulou et al., 2025), with regional and local authorities taking primary responsibility for waste collection and treatment. Both faced the sovereign debt crisis from 2008 to 2012 and its related fiscal limitations on public investment, which continue to affect the resources allocated to environmental infrastructure (Featherstone, 2011; Royo, 2013). They also share climatic and geographical characteristics, such as island territories with unique logistical challenges (Logothetis et al., 2025; Santamarta et al., 2023), that complicate waste governance; additionally, both are specifically noted in the European Commission's 2023 EWRs as at risk of failing to meet binding recycling and landfill diversion targets (Directorate-General for Environment, 2023).

Despite these structural similarities, the two nations show diverging performance on implementation effectiveness. Spain records higher performance across key waste governance indicators, including packaging recycling rates, EPR target attainment, and separate collection coverage (European Environment Agency, 2024). In contrast, Greece remains the EU's most landfill-dependent member country, with municipal waste recycling rates significantly below the European average and persistent shortfalls against EU landfill diversion targets (European Commission, 2025).

It is recognised that no comparative approach achieves absolute equivalence between cases, and the two countries do exhibit differences in certain background conditions beyond governance, especially regarding their respective economic journeys and overall administrative practices. Nevertheless, the MSSD framework offers a solid foundation for controlling many

potentially confounding factors and directing analytical focus toward the political, institutional, and administrative elements that are the main subjects of inquiry.

3.2 Research Methods

The empirical study integrates both secondary and primary research. Secondary data offers a systematic, quantitative and documentary basis for assessing implementation outcomes and charting the governance environment. Primary data, gathered through semi-structured expert interviews, provides the experience of practitioners working within these systems, offering grounded perspectives that help explain the divergent implementation outcomes observed between the two countries.

Desk research served as the primary methodology for addressing RQ1, while also providing the contextual and institutional foundation for RQ2, RQ3, and RQ4. It provides a comprehensive, verifiable overview of the regulatory landscape and its implementation record (M. N. Saunders et al., 2019; M. N. K. Saunders & Lewis, 2023). This is particularly relevant given the wealth and public accessibility of EU-level monitoring instruments.

Moreover, to ensure reliability and systematic coverage of the desk research, explicit inclusion and exclusion criteria were applied, as set out in Table 2. These criteria were informed by the guidance of Hiebl (2023) on methodological transparency in qualitative desk research.

Table 2: Inclusion and Exclusion Criteria for Desk Research (Author, 2026)

Inclusion criteria	Exclusion criteria
Peer-reviewed academic articles, books, and conference papers and official regulatory documents, national policy documents, and EU monitoring reports	Non-peer-reviewed academic sources
Published from 2008 onwards (year of the original Waste Framework Directive), unless the source provides a foundational theoretical definition or model applicable independently of its date	Sources published before 2008, unless used for theoretical models or definitional purposes
English-language publications, with an exception for a Spanish national law (Ley 7/2022) that could not be found published in English	Non-English-language sources (to maintain consistency and verifiability)
Sources that address at least one of the following themes in their title or abstract: EU waste governance; circular economy; Extended Producer Responsibility; separate collection; waste management in Spain or	Sources that address waste management solely in non-EU contexts without a dimension relevant to EU regulatory frameworks

Inclusion criteria	Exclusion criteria
Greece; multi-level governance; EU implementation; European Green Deal	

Primary data were gathered through semi-structured expert interviews, which served as the main source of evidence for RQ2 and RQ3 and provided additional interpretive insights for RQ4. Semi-structured interviews are a qualitative method for collecting data that seeks to examine various perspectives on a specific topic through the interviewees' own insights and experiences (McIntosh & Morse, 2015). They blend the benefits of a structured guide, ensuring systematic coverage of the themes relevant to the research questions, while also allowing the flexibility to explore unexpected yet analytically significant avenues as they arise in the discussion (Doody & Noonan, 2013).

An interview guide was created beforehand based on the research questions and prior literature. It was organised into five thematic categories: (1) governance and institutional coordination; (2) administrative capacity and resource allocation; (3) Extended Producer Responsibility; (4) political influences, separate collection, and socio-economic limitations; (5) enforcement, policy tools, and future legislative developments. The guide was provided to participants beforehand to aid in their preparation and to maintain transparency, aligning with best practices for expert interviews (Berry, 2002). The full interview guide can be found in [Appendix A](#).

Three out of the five interviews took place during a single focus group session, while two were conducted individually. The focus group featured three participants from supranational perspectives and facilitated beneficial dialogue, allowing participants to build on each other's evaluations, resulting in a deeper and more multidimensional dataset. The one-on-one interviews with ES-CEE2 and ES-CEE3 offered more extensive insight related to Spain.

All interviews were held in English through video calls on Microsoft Teams. They were recorded with the consent of participants and later transcribed. The transcripts were then refined, coded, and aligned with the questions in the interview guide, as detailed in the data analysis section below. Participation was entirely voluntary, and participants were informed of their right to withdraw at any time without consequence, as shown in the Interview Declaration Form in [Appendix B](#), in accordance with the ethical principles governing academic research,

as outlined by Al Habsi (2024). Data is stored on the researcher's password-protected personal device and will be retained in accordance with the relevant data protection requirements.

The expert sample is presented in Table 3.

Table 3: Expert Interview Sample (Author, 2026)

Code	Country focus	Experience (years)	Interview format
GR-CEE1	Greece (institutional perspective)	20+ in Sustainability; 10+ in Waste/CE	Focus group
GR-CEE2	Greece (institutional perspective)	~12 Waste Management	Focus group (partial — left earlier)
ES-CEE1	Spain (institutional perspective)	25+ in Environment	Focus group
ES-CEE2	Spain (national representation)	~10 in CE and Waste	Individual interview
ES-CEE3	Spain (regional representation for Catalonia)	~35 years on waste management and biowaste	Individual interview

Both the selection of secondary sources and the expert interview sample were developed using non-probability purposive sampling. Purposive sampling entails the intentional choice of participants or sources based on their specific expertise and relevance to the research question (Palinkas et al., 2015). This approach is standard and well-validated for qualitative research that seeks to acquire in-depth expert insights rather than generalisable aggregate data (Campbell et al., 2020).

The criteria for including participants in the expert interviews are detailed in Table 4.

Table 4: Primary Research Inclusion Criteria (Author, 2026)

Inclusion criteria	Rationale
Minimum five years of professional experience in EU or national waste management, circular economy policy, or environmental governance	Ensures depth of institutional knowledge and longitudinal perspective
Current or recent professional engagement with EU waste legislation and/or its implementation in Spain or Greece	Ensures direct relevance to the research questions

Inclusion criteria	Rationale
Familiarity with at least one of the following: the Waste Framework Directive, the Landfill Directive, the PPWR, EPR schemes, or national/regional waste planning processes	Guarantees substantive coverage of the thesis's core policy instruments
Availability and willingness to participate within the research timeframe, and to consent to recording and transcription	Practical requirement for primary data collection

3.3 Data Collection and Analysis

Data collection followed a sequential procedure. Secondary data collection was carried out first, producing the thematic and empirical groundwork for the literature review and research design. The interview guide was then developed iteratively, with questions derived directly from the sub-questions and informed by the gaps and ambiguities identified during the desk research phase. This focused primary data collection on what secondary sources could not provide: the interpretive, experiential knowledge of practitioners in the governance processes studied.

The fully cleaned transcripts will not be available in the thesis for privacy reasons; the coded table with themes from the experts will be found in [Appendix C](#). The analytical strategy is entirely qualitative, employing thematic analysis as the primary method for both secondary and primary data. Its ability to reveal interpretive patterns across diverse materials without requiring a predetermined coding scheme makes it particularly effective in this context (Castleberry & Nolen, 2018). The approach adopted follows the systematic step-by-step protocol described by Naeem et al. (2023), which has been shown to enhance the consistency, traceability, and replicability of qualitative findings while minimising the risk of researcher bias.

Analysis proceeded in three sequential stages. In the first stage, the documentary evidence gathered through desk research was systematically reviewed and coded against the four sub-questions. This produced the structured description of implementation outcomes, governance, and administrative capacity for each country presented in Chapter 4.

In the second stage, the interview transcripts were subjected to a two-pass coding process. Firstly, a deductive code framework was applied, derived directly from the thematic categories in the interview guide: governance and coordination, administrative capacity, EPR, separate

collection, enforcement, and future policy evolution. This ensured systematic coverage of the research questions across all five interviews. Secondly, an inductive reading of the transcripts identified themes that emerged from the expert testimony beyond the pre-defined categories.

In the third stage, the secondary and interview findings were synthesised in a cross-case comparative analysis. This stage moved from description to explanation, examining which political, institutional, and administrative factors could account for the observed divergence in implementation outcomes between Greece and Spain. The analysis drew on the MLG framework, and the PEER outlined in the literature review. Where interview evidence is cited directly in the text, speaker codes are used (e.g., GR-CEE1, ES-CEE2) to preserve participant anonymity while enabling the reader to assess the institutional source of a given claim.

Like all qualitative comparative research, this study operates within certain boundaries that must be acknowledged. The interview sample of five experts is small, and its composition is asymmetric, with two for Greece and three for Spain, partly reflecting the difficulty of securing access to regional and municipal officials within the available timeframe. Several questions in the interview guide were not fully addressed in the primary data, either because of time constraints during the focus group or because they fell outside the direct expertise of available respondents. Where such gaps exist, the analysis relies exclusively on secondary sources and acknowledges the absence of primary corroboration.

Additionally, the findings from two cases cannot be straightforwardly generalised to the broader population of EU MS; however, generalisation is not the primary ambition of this design. The thesis instead aims for analytical generalisability: the proposition that the causal mechanisms identified in Greece and Spain are relevant to understanding implementation variation across a wider range of EU MS sharing similar governance traditions and socio-economic profiles.

Finally, it is worth noting that this thesis was produced with the assistance of Claude, a large language model developed by Anthropic (Anthropic, 2026). AI assistance was used for drafting and structural revision of written sections, based on analysis, arguments, and source material developed independently by the author. All theoretical frameworks, empirical findings, interview data, citations, and conclusions are the sole intellectual product of the author.

4. Comparative Analysis of Waste Management Implementation in Greece and Spain

This chapter executes the methodological framework set out in Chapter 3 to answer the four research sub-questions through within-case and cross-case analysis.

4.1 The Evolution of Implementation: Evidence from EU Monitoring Cycles

A static view of recent years may obscure whether each country is converging on or diverging from EU targets; this section therefore traces their implementation trajectories through the Commission's EIR cycles and EWRs. Figure 1 illustrates the persistent EU-wide gap between packaging waste generated and recycled, providing the broader context against which both countries' implementation trajectories are assessed in this section.

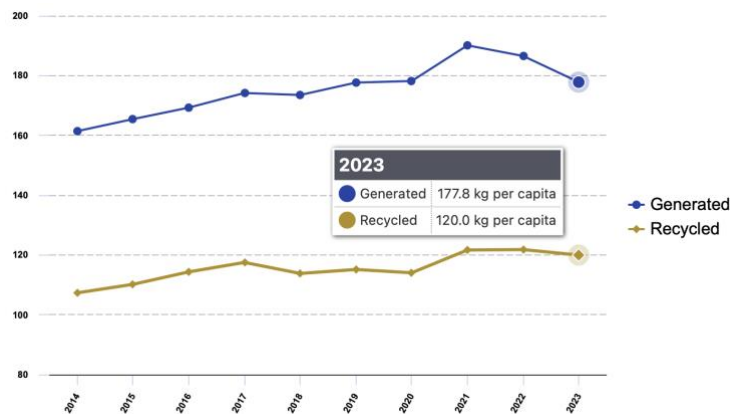


Figure 1: Packaging waste generated and recycled, EU (Eurostat, 2025)

In Greece's situation, the monitoring cycles indicate a path marked by persistent stagnation, structural challenges, and a continued reliance on landfilling. The 2017 EIR marked illegal landfilling as the top priority for the nation, highlighting the severity of its non-compliance with EU waste regulations (Directorate-General for Environment, 2017a). Despite the 2019 EIR recognising the establishment of the National Waste Management Plan (ESDA), actual advancements were minimal (Directorate-General for Environment, 2019a). At that time, about 80% of municipal waste was still ending up in landfills, a percentage significantly higher than the EU's average of 24%. Additionally, the 2018 EWRs officially classified Greece as being at risk of not achieving the 2020 goal of recycling 50% of municipal waste (Directorate-General for Environment, 2019a).

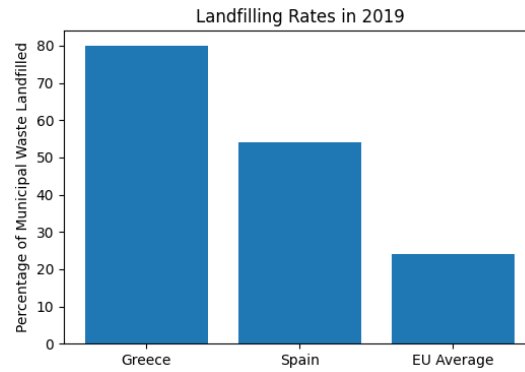


Figure 2: Comparison of the proportion of municipal waste sent to landfill in Greece and Spain against the EU average in 2019 (Author, 2026)

Figure 2 captures this disparity at a national level: in 2019, Greece landfilled around 80 percent of its municipal waste compared to roughly 54 per cent in Spain. By the 2022 monitoring cycle, it was clear that the progress remained inadequate. The EIR described trends in the waste sector as “very slow” and, in some respects, even regressive compared to previous years (Directorate-General for Environment, 2022a). Greece also encountered a new infringement procedure in 2021 because it failed to ensure waste treatment before landfilling, and by that point its cumulative waste-related penalties, across the illegal landfill, hazardous waste, and waste-treatment cases, had surpassed €184 million (Directorate-General for Environment, 2022a, 2025a).

Most recent monitoring cycles, both the 2023 EWR and the 2025 EIR, suggest that the country risks failing to meet the 2025 target of 55% for municipal waste recycling³, as well as the 65% target for packaging waste recycling (Directorate-General for Environment, 2023, 2025a). In response, Greece informed the Commission in 2023 of its plans to delay these targets until 2030.

Spain, on the other hand, presents a slightly different situation. The EIR cycles of 2017 and 2019 pointed out shortcomings in separate waste collection systems and a lack of coordination between the central government and Autonomous Communities (ACs) (Directorate-General for Environment, 2017b, 2019b). Spain continued to depend substantially on landfilling, with 54% of municipal waste landfilled in 2019, more than twice the EU average (Directorate-General

³ Whether Greece ultimately meets or misses the 2025 municipal waste recycling target will not be confirmed until MS formally submit their 2025 recycling data to Eurostat. The 2025 EIR draws on data up to 2024; its assessment that Greece “is on a course to miss” the target reflects current trajectories rather than confirmed outcomes.

for Environment, 2019b). Like Greece, the 2018 EWR flagged Spain as being at risk of not achieving the 2020 recycling targets.

A notable change occurred during the 2022 monitoring cycle, when Spain enacted significant legislative reforms aimed at aligning its national waste policy with circular economy principles (Directorate-General for Environment, 2022b). These reforms included the endorsement of the Spanish Circular Economy Strategy 2030 and the adoption of Law 7/2022 (Jefatura de Estado, 2022) concerning waste and contaminated soils. The new legislation introduced various fiscal measures, such as taxes on non-reusable plastics and landfill disposal, to encourage recycling and prevent waste. Spain had already fallen short of the 2020 goal of recycling 50% of municipal waste, managing only 38% at that time, a gap that in part prompted the 2022 legislative reforms described above (Directorate-General for Environment, 2022b).

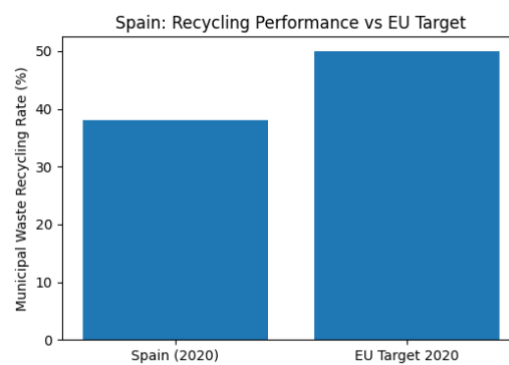


Figure 3: Spain's recycling performance in relation to the EU 2020 municipal waste recycling target (Author, 2026)

The 2023 EWR kept Spain in the “at risk” category regarding its ability to meet the municipal waste targets for 2025 (Directorate-General for Environment, 2023). In contrast to Greece, Spain did not pursue a postponement of the deadlines. However, the 2025 EIR noted that no significant decoupling had occurred between waste generation and economic growth (Directorate-General for Environment, 2025b). Furthermore, Spain became subject to a new infringement process in 2024 for its failure to meet the 2020 recycling targets (Directorate-General for Environment, 2025b).

In Greece, the primary barriers are structural and infrastructural. The country faces an estimated annual environmental investment gap of 1.12% of GDP (Directorate-General for Environment, 2025a). Spain also confronts a considerable total environmental investment gap, estimated at approximately €10.8 billion (Directorate-General for Environment, 2025b).

Figure 3. Timeline of EU Monitoring Cycles and Key Developments in Waste Management Implementation in Greece and Spain (2017–2025)



Source: Author's elaboration based on European Commission – Environmental Implementation Review (2017, 2019, 2022, 2025) and Early Warning Reports (2018, 2023).

Figure 4: Timeline of EU Monitoring Cycles and Key Developments in Waste Management Implementation in Greece and Spain based on European Commission - Environmental Implementation Review (2017, 2019, 2022, 2025) and Early Warning Reports (2018, 2023) (Author, 2026)

4.2 The Case of Greece

This section analyses Greece across five themes that correspond to the research sub-questions: implementation outcomes; governance structures and inter-ministerial coordination; administrative capacity; technology integration; and adaptation to evolving legislation.

Greece's environmental pathway within the EU has consistently shown a significant gap between formal law adoption and actual implementation. Analysing this situation through the frameworks of MLG and the PEER, Greece serves as a vital case study for what Efthymiou et al. (2026) refer to as "rational non-compliance": a phenomenon where structural fragmentation, inadequately funded local administrations, and a PEER that has historically accepted illegal waste practices collectively hinder the effective execution of EU waste legislation that Greece itself accepted when the targets were adopted at EU level.

4.2.1 Implementation Outcomes

Greece's implementation of the WFD has produced results that are consistently among the least effective within the Union⁴. Although Greece generates slightly less municipal solid waste compared to the EU average, 509 kg per capita compared to the 527 kg of the EU-27 average, the treatment methods used for that waste remain fundamentally misaligned with the waste hierarchy outlined by EU law (Directorate-General for Environment, 2025a; WWF, 2024). Approximately 80 per cent of municipal waste treatment in Greece still involves landfilling (Directorate-General for Environment, 2025a), a statistic that experts in the country acknowledge is "contrary to the directives" (GR-CEE1, Personal Communication, 2026).

The most frequently cited indicators of recycling performance confirm the depth of this underperformance. According to primary interview evidence, Greece's Circular Material Use Rate (CMUR) is around 6 per cent, half of the EU average, which is about 12 per cent, while the municipal waste recycling rate reaches a maximum of 20 per cent, again approximately half of the Union-wide average (GR-CEE1, Personal Communication, 2026).

The ongoing issue of illegal landfills is one of the most emblematic manifestations of this implementation gap. Greece's record of financial sanctions imposed by the CJEU is notable: the country has faced fines for non-compliance related to both municipal and hazardous waste for over ten years (GR-CEE1, Personal Communication, 2026; GR-CEE2, Personal Communication, 2026). Regarding illegal landfills, Greece paid approximately €71 million over eleven years, one component of the broader cumulative penalties noted in Section 4.1 (Directorate-General for Environment, 2022a; Efthymiou et al., 2026; European Commission, 2024).

In terms of the PEER, this pattern exhibits a structural logic: for a significant portion of this period, the periodic financial penalties for operating a non-compliant landfill were considerably lower than the projected costs of closure and remediation, providing insufficient incentive to comply. Efthymiou et al. (2026) characterise this as an economically rational, if environmentally destructive, calculation, that nonetheless holds only within a linear economic

⁴ While the EGD has introduced additional policy ambitions and legislative reforms since 2019, many of these measures have only recently entered into force or are still being transposed; their effects on implementation outcomes therefore remain limited at this stage.

logic. From a circular economy perspective, where waste is a resource, landfilling also foregoes the economic value of recoverable secondary materials, making non-compliance less rational than it appears.

Another sign of implementation failure is the delay in updating regional waste management plans. While MS were obliged to revise their plans under the amended WFD by mid-2020, Greece remains, as of this research, the only MS that has not updated any of its regional waste plans (GR-CEE2, Personal Communication, 2026).

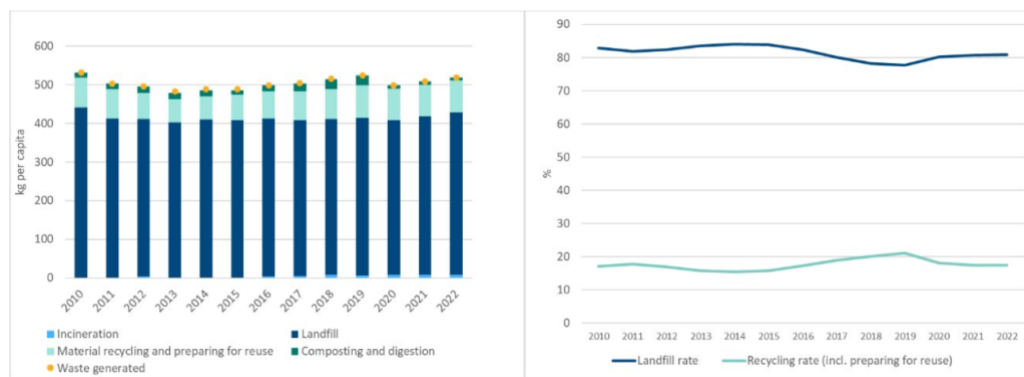


Figure 5: Greece's municipal waste management (left) and rates of recycling (incl. preparing for reuse) and landfill (right), 2010-2022 (Eurostat, 2026)

The municipal waste recycling rate stands at approximately 17 per cent, less than half of the EU average, as shown in Figure 5 (European Environment Agency, 2025a; Eurostat, 2025). The Extended Producer Responsibility governance aspect reflects these challenges. Greece's packaging EPR scheme remains poor: the packaging waste recycling rate fell from 54 per cent in 2021 to 43 per cent in 2022, a drop that may partly reflect the delayed disruptions to waste collection and reporting systems caused by the COVID-19 pandemic, remaining well below the 65 per cent target for 2025, as shown in Figure 6. The 2023 EWR flags Greece as at risk of missing both targets, and the 2025 EIR identifies underdeveloped EPR enforcement as a contributing factor. The absence of financial penalties for underperforming schemes removes the accountability pressure that drives improvement elsewhere.

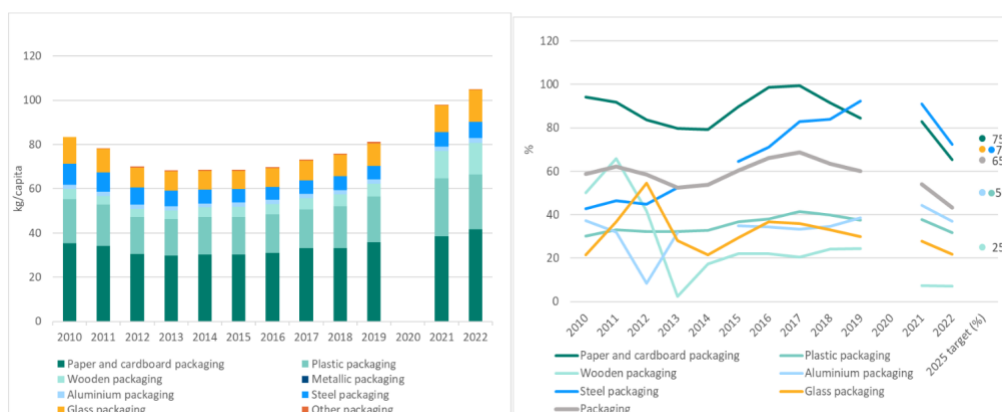


Figure 6: Greece's packaging waste generation (left) and recycling rates (right), 2010-2022 (Eurostat, 2025)

Regional Perspective. This national underperformance conceals significant variation between Greek regions. The drag on the national figures is concentrated in Attica, which houses roughly 35 per cent of the population and whose municipalities (Hellenic Statistical Authority, 2023), including the Municipality of Athens, record single-digit recycling rates while around 80 per cent of the region's waste is directed to the single Fyli landfill (Kallianos & Dalakoglou, 2022; Mitsikas & Aravossis, 2017). At the other extreme, the few cases of relative success share a common feature: the presence of a functioning supra-municipal body able to integrate collection and treatment. West Macedonia operates the only fully constructed and operational integrated municipal waste system in the country, a public-private partnership combining Mechanical Biological Treatment (MBT) with ten transfer stations that diverts some 60,000 tonnes annually from landfill (European Commission, 2019a), while in Central Macedonia the consolidation of fourteen separate agencies into a single regional FODSA⁵ created the administrative mass that most Greek territories lack (FODSA, 2024). The island of Tilos, certified as Greece's first Zero Waste municipality with recycling and composting rates near 90 per cent, completes the picture, but tellingly its results were delivered through an external private operator and the South Aegean regional waste agency rather than through municipal capacity (Mission Zero Academy, 2023).

⁵ FODSAs (*Φορείς Διαχείρισης Στερεών Αποβλήτων*, in English, Regional Associations of Solid Waste Management Agencies) are public law legal entities, one per administrative region, responsible under Law 4555/2018 for the construction and operation of waste treatment facilities, landfills, and mechanical biological treatment plants. Their institutional and financial separation from municipalities, which bear responsibility for collection, is a structural source of the coordination failures discussed in this section.

4.2.2 Governance Structures and Inter-ministerial Coordination

The Greek waste sector suffers from persistent horizontal and vertical fragmentation (GR-CEE2, Personal Communication, 2026), a significant risk identified by Hooghe and Marks (2001) in decentralised governance systems that can lead to coordination shortcomings that compromise policy coherence, even when individual entities fulfil their legally mandated roles.

At the central level, waste governance responsibilities are divided among at least three different ministries: the Ministry of Environment and Energy, which formulates national strategy and oversees the implementation of EU directives; the Ministry of Interior, which monitors the country's municipalities and plays a crucial role in local infrastructure regulation; and the Ministry of Development, which allocates most of the EU cohesion and structural funds relevant to waste (Council of Europe, 2017; GR-CEE2, Personal Communication, 2026; GR-CEE1, Personal Communication, 2026). This dispersion is compounded by a governance deadlock between municipal and regional authorities. While municipalities are legally responsible for waste collection and source separation, they often lack the authority, financial transfers, or treatment options necessary to fulfil those responsibilities for waste treatment, which are managed by FODSAs (European Court of Auditors, 2025; GR-CEE1, Personal Communication, 2026). Therefore, municipalities cannot implement separate bio-waste collection due to the absence of regional composting facilities, while regional organisations hesitate to invest in infrastructure without proof of adequate separately collected materials (European Court of Auditors, 2025). Neither level possesses the institutional capacity or political motivation to resolve this deadlock independently, and the central government has not consistently applied the coordination mechanisms needed to address it.

Regional Perspective. Moreover, Greece's governance struggles stem from its fragmented territorial system, with 325 municipalities displaying vast differences in population, resources, and administrative capacity (Council of Europe, 2017). Across the 325 municipalities the obligation to collect waste sits with the municipal tier while treatment competence sits with the regional FODSAs, so the few territories that escape the deadlock are those that built an integrating body spanning both levels (European Court of Auditors, 2025; GR-CEE1, Personal Communication, 2026). Central Macedonia is the clearest case: consolidating fourteen agencies into a single regional FODSA created the supra-municipal authority to plan collection and

treatment together, which fragmented territories such as Attica, where responsibility remains dispersed around the single Fyli site, structurally lack (FODSA, 2024; Kallianos & Dalakoglou, 2022). The concentration of people in the Athens–Attica region and the presence of 227 inhabited islands present significant challenges (Efthymiou et al., 2026; GR-CEE2, Personal Communication, 2026). As Logothetis et al. (2025) illustrate in their study of Chalki Island in the Southeast Aegean, small island communities lack the necessary capacity and means for effective waste management, especially during seasonal tourism peaks.

4.2.3 Administrative Capacity

A recurring barrier to EGD implementation in Greece is the lack of administrative capacity across all tiers of governance (GR-CEE2, Personal Communication, 2026; GR-CEE1, Personal Communication, 2026). The 2025 EIR country report reaffirms findings that have appeared in significantly similar forms in each prior review cycle: failures in inter-ministerial coordination, delays in the transposition of subsidiary waste legislation, and limited enforcement capabilities within environmental agencies are persistent and mutually reinforcing weaknesses (Directorate-General for Environment, 2025a).

The aspect of EU funding absorption related to this capacity issue is particularly revealing. A consistent observation in both primary and secondary evidence is that substantial amounts of EU cohesion funding allocated for waste management in Greece go unutilised during programming periods. As noted by an expert with extensive institutional knowledge regarding Greece's performance within EU frameworks, this unutilised funding is eventually reallocated, not because the requirements it was meant to fulfil have been satisfied, but due to "insufficient administrative capacity" to design, approve, and carry out the relevant projects (GR-CEE2, Personal Communication, 2026).

Moreover, transitioning to a circular economy in waste management requires a different skill set in public administrations (ES-CEE2, Personal Communication, 2026). Greece faces challenges, including limited administrative knowledge, fewer professional development resources, and a governance structure with weak local capacity incentives (Directorate-General for Environment, 2025; Featherstone, 2011; GR-CEE2, Personal Communication, 2026). Many municipalities lack the specialised personnel needed for effective waste management (GR-CEE1, Personal Communication, 2026). As a result, available financial resources are often used

to meet immediate compliance needs rather than to build a long-term institutional framework, contributing to ongoing reliance on illegal landfills and failure to meet 2020 recycling targets, as noted in the 2025 EIR.

Regional Perspective. The disparity in capacity deficits varies significantly across regions, with unspent EU funds highlighting areas lacking the necessary expertise. Smaller, isolated regions, like Chalki in the Southeast Aegean, struggle to gather staff for effective systems, often overwhelmed by tourist influxes. Success in some regions relies on external capacity rather than local expertise; for instance, Tilos achieved nearly 90 percent recycling through an outside operator and the South Aegean agency, while West Macedonia centralises expertise at a supra-municipal level (European Commission, 2019a; European Union, 2021; Mission Zero Academy, 2023).

4.2.4 Technology Integration

Technology integration in Greek waste management has historically favoured end-of-pipe solutions, primarily landfilling, with a recent policy orientation towards Mechanical Biological Treatment and, controversially, incineration, over upstream innovation in waste prevention, separate collection infrastructure, and material recovery technologies (WWF, 2024).

Moreover, although bio-waste separate collection is mandated by law in Greece due to the revised WFD and Law 4819/2021 (European Environment Agency, 2025), it has not been effectively implemented, a pattern reflected also across many MS, because there are insufficient regional composting and anaerobic digestion facilities to handle separately collected bio-waste (GR-CEE1, Personal Communication, 2026). This infrastructural deficiency sustains the governance deadlock described earlier: municipalities cannot implement separate collection without treatment facilities to absorb the waste feedstock, and without separate collection, there is no justification for investing in treatment infrastructure.

In terms of waste sorting technology, Greece has been slower to embrace AI-assisted optical sorting systems that have enhanced the quality and cost-efficiency of material recovery in more advanced MS. The roughly thirty mechanical sorting centres in Greece process co-mingled waste from the single-bin collection system used by the EPR scheme, a method that consolidates plastic, metal, glass, and paper into one collection stream to be sorted mechanically

(GR-CEE1, Personal Communication, 2026). This method is technologically and economically deficient compared to source-separated collection, yielding lower-quality secondary materials.

Regional Perspective. The single-bin co-mingled system and around thirty sorting centres operate nationally, but the lack of composting and anaerobic digestion plants, responsibilities of regional authorities, hinders the bio-waste mandate (GR-CEE1, Personal Communication, 2026). Effective treatment only occurs in areas with supra-municipal bodies, as seen with West Macedonia's MBT facility and the Tilos system (European Commission, 2019a; Mission Zero Academy, 2023). For remote regions, factors like scale and seasonality complicate waste management, making mainland solutions difficult to implement (Logothetis et al., 2025). Thus, technology integration in Greece is primarily a regional-infrastructure issue rather than one of equipment.

4.2.5 Adaptation to Evolving Legislation

The path of EU waste legislation has evolved in approach since the initiation of the EGD: the 2018 modification to the WFD, the PPWR, and the updated WFD, which mandates EPR schemes for textiles and footwear, along with binding targets for reducing food waste (Directorate-General for Environment, 2025). The EU is increasingly moving from directives towards directly applicable regulations⁶, which leaves less room for implementation gaps to emerge at the transposition stage. For a country already facing difficulties in meeting the obligations of earlier legislative measures, this progressive legislative expansion presents significant challenges and opportunities.

Greece's official record of legislative transposition, by itself, does not fully convey the extent of these challenges. As noted by GR-CEE2, Greece rarely encounters issues with transposing legislation on paper; transposition is usually adequate. What is absent is effective implementation: failures in governance and insufficient administrative capacity (Personal Communication, 2026). Indeed, while the Greek state has generally aligned its national laws

⁶ The shift from directives to directly applicable regulations was among the recommendations of Letta (2024) in his report *More than a Market*, submitted to the Commission. In the domain of waste, however, the EGD had already begun this transition ahead of that report.

with EU directives within the set deadlines, the operational infrastructure necessary to enforce those transposed regulations has consistently lagged significantly.

The PPWR represents both a significant adaptation challenge and a structural opportunity for Greece. Unlike the previous Packaging Directive, which allowed flexibility in national implementation and thereby permitted Greece's compliance gaps to persist, the PPWR is a directly applicable regulation that standardises obligations without requiring national transposition (Directorate-General for Environment, 2025a). This shift demands that Greece restructure its underperforming EPR system rather than simply absorbing norms into national law, a considerable administrative undertaking (Stunell et al., 2025; ES-CEE2, Personal Communication, 2026). Yet the more fundamental change is that the PPWR places direct legal and financial responsibilities on economic operators (producers, importers, and PROs) rather than routing obligations through MS administrative machinery (Directorate-General for Environment, 2025a). Where Greece's public governance has repeatedly failed to enforce compliance, economic incentives embedded in the regulation may prove more effective: eco-modulation fees, recycled content obligations, and reuse targets create market-level pressures that do not depend on municipal capacity or inter-ministerial coordination to take effect.

Regional Perspective. The shift from directives to directly applicable regulations carries a distinctive regional implication for Greece. Because the regional tier holds administrative tasks but no legislative competence, sub-national authorities have never been able to anticipate or exceed EU obligations. This is why the PPWR's reliance on economic operators rather than administrative machinery, and therefore placing obligations directly on producers and PROs, partially bypasses the fragmented regional tier whose missing composting and sorting infrastructure has blocked the bio-waste mandate (Directorate-General for Environment, 2025a; GR-CEE1, Personal Communication, 2026). The isolated successes, West Macedonia, the consolidated Central Macedonia FODSA, and Tilos, show that integration is achievable, but because none can legislate, they cannot scale their model without central action.

Table 5 in [Appendix D](#) summarises the main factors and structural obstacles identified earlier.

4.3 The Case of Spain

Spain, like Greece, is a Southern European MS with a decentralised institutional structure, yet it has shown a significantly more proactive involvement with the EGD and the revised EU waste governance framework. Nevertheless, Spain still fails to meet mandatory EU recycling targets, with widely diverging regional performances. Catalonia merits particular attention, having pioneered organic waste collection, a landfill tax, and door-to-door collection (DDC) (Saldivia-Gonzatti et al., 2022; Waste Agency of Catalonia, 2018). It serves as the benchmark for evaluating other Spanish regions and as a governance laboratory relevant to the thesis's comparative focus. Each subsection will conclude with a regional focus of Catalonia.

4.3.1 Implementation Outcomes

Spain's performance in waste management is marked by an ongoing gap between legal commitments and tangible operational results (Directorate-General for Environment, 2025b). Although the recycling rate has risen to approximately 43 per cent, it still falls below the current EU average of 49 per cent, and the legally mandated 2025 target of 55 per cent (ES-CEE1, Personal Communication, 2026).

Landfilling continues to be a primary waste treatment method in many regions of the country. According to primary expert testimony, landfill rates were over 60 per cent from 2000 to 2007 but have decreased to around 40–45 per cent, as Figure 7 below illustrates. This progress is tangible, yet Spain is still far from the required landfill limit of 10 per cent by 2035 (ES-CEE2, Personal Communication, 2026). Although not enshrined in legislation, Spain's CMUR adds to this scenario: at 8.5 per cent, it is below the EU average of about 12.2 per cent and has declined from its peak of 9.4 per cent recorded in 2022 (European Environment Agency, 2024). However, these overall statistics mask a more varied territorial reality. Spain's recycling rate for municipal solid waste was 34.7 per cent in 2019, but Catalonia and the Valencian Community achieved the 50 per cent threshold set by the national Waste Law at that time (Saldivia-Gonzatti et al., 2022).

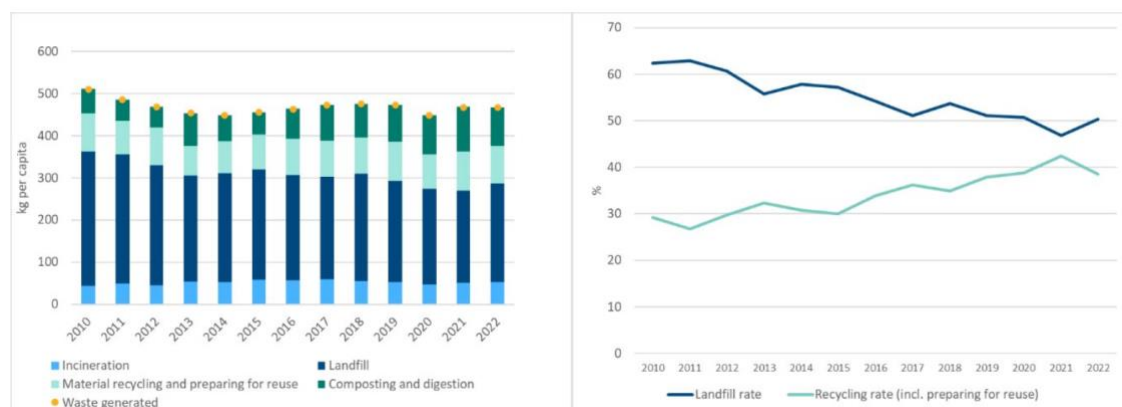


Figure 5: Spain's municipal waste management (left) and rates of recycling (incl. preparing for reuse) and landfill (right), 2010-2022 (Eurostat, 2026)

The situation with packaging waste is more promising. Recycling has improved significantly under the EPR framework, reaching around 69 per cent in 2022 (Figure 8), though administrative concerns remain over the comprehensiveness of the generation data used to verify this figure (Directorate-General for Environment, 2022b, 2025b). Certain material streams, such as plastics, aluminium, and paper, still fall short of their individual targets, and the country continues to rely on mechanical biological treatment of mixed waste, whose outputs will not count toward recycling targets under the updated WFD, creating urgent pressure to improve separate collection (Directorate-General for Environment, 2025b). The country has thus enacted some of the EU's most ambitious national waste legislation, yet its execution record significantly lags the benchmarks that legislation aims to achieve.

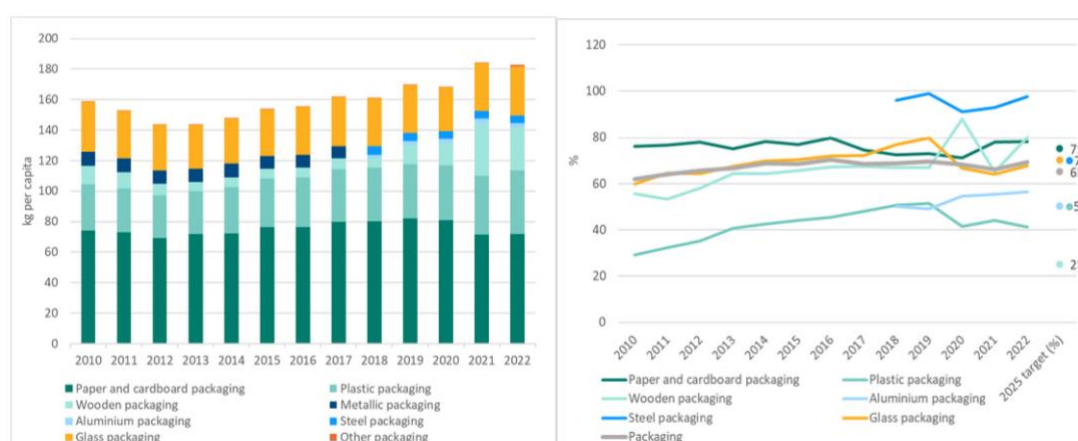


Figure 6: Spain's packaging waste generation (left) and recycling rates (right), 2010-2022 (Eurostat, 2025)

Catalonia. Relative to the broader national framework, Catalonia's performance is notably stronger, but it still falls short of EU targets. The region averages a separate collection rate of about 47 per cent, with figures varying between 20 and 90 per cent across different municipalities, resulting in a recycling rate of around 34 to 35 per cent (ES-CEE3, Personal Communication, 2026). Catalonia did not achieve the 2020 EU goal of 50 per cent recycling and is unlikely to reach the 55 per cent target by 2025. As depicted in Figure 9 below, the progress made from 1993 to 2023 shows notable improvement, yet the region is still significantly away from meeting the EU 2035 objectives of 65 per cent recycling, and less than 10 per cent landfill (ES-CEE3, Personal Communication, 2026). The area has made significant strides, but there remains a substantial distance to cover (ES-CEE3, Personal Communication, 2026).

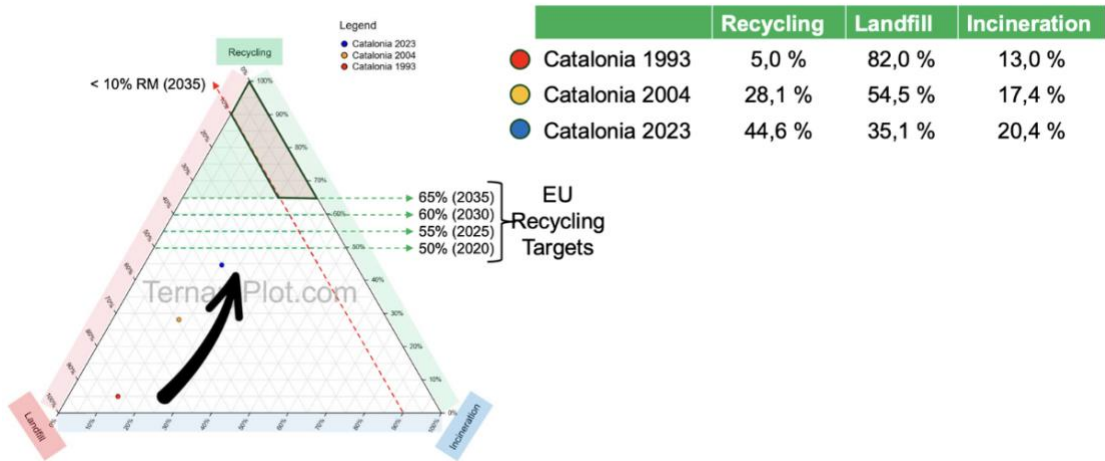


Figure 7: Catalonia's municipal waste management trajectory, 1992-2023: recycling, landfill, and incineration rates (Agència de Residus de Catalunya, 2026)

4.3.2 Governance Structures and Inter-ministerial Coordination

The structure of Spain's waste policy demonstrates both the positive and negative impacts of decentralisation. The country's "quasi-federal" institutional framework allocates operational responsibilities for waste management among the national Ministry for the Ecological Transition and the Demographic Challenge (MITECO)⁷, seventeen ACs, and more than 8,000 municipalities (Sobrino-García, 2025; ES-CEE1, Personal Communication, 2026). While

⁷ MITECO (Ministerio para la Transición Ecológica y el Reto Demográfico) manages the official Spanish register for the calculation, reduction, and offsetting of carbon emissions. Companies use MITECO parameters to calculate their footprint and obtain official seals such as "Cálculo" and "Cálculo y Reduzco" (Ministerio para la Transición Ecológica y el Reto Demográfico, 2026).

MITECO is tasked with implementing EU directives and creating national framework plans, the ACs possess primary regulatory and operational authority over waste within their jurisdictions, and municipalities are responsible for collection and initial sorting at the local level. This multi-tiered system fosters significant regional autonomy and agency in designing implementations but concurrently leads to coordination deficits and accountability issues (ES-CEE2, Personal Communication, 2026) that Hooghe and Marks (2001) describe as inherent to decentralised governance systems.

The effects of this structure are apparent in Spain's implementation landscape. An expert closely involved with this governance issue noted that the Ministry struggles to compel autonomous regions to enforce legislation as it lacks direct enforcement authority. This challenge also exists within the regions, especially for smaller municipalities that have limited capacity (ES-CEE2, Personal Communication, 2026). The Coordination Committee on Waste and its associated enforcement working group are institutional responses aimed at addressing this challenge, but coordination mechanisms have not yet reconciled the fundamental conflict between the national legislative framework and the political autonomy of regions (Directorate-General for Environment, 2025b; ES-CEE1, Personal Communication, 2026; ES-CEE2, Personal Communication, 2026).

The reality of governance in central and southern Spain, however, is significantly different from that in the northern regions. Advanced collection systems carry high financial and logistical costs. Villages in certain areas of central and southern Spain can be located 80–100 kilometres apart, making DDC collection costs high (ES-CEE2, Personal Communication, 2026). Consequently, a “two-speed” implementation scenario emerges where leading regions function under a distinctly different performance model compared to lagging areas, a structural characteristic of Spanish waste governance (Directorate-General for Environment, 2025b; ES-CEE1, Personal Communication, 2026; ES-CEE2, Personal Communication, 2026).

A notable tension within Spain's MLG framework is the central government's move towards centralisation, seen as a limitation by regional stakeholders. The Spanish Constitution and regional Statutes of Autonomy recognise environmental issues like waste management as shared competencies, allowing ACs to adopt stricter regulations (ES-CEE3, Personal Communication, 2026). However, as noted by a representative from the Catalan administration,

over the last decade, they have seen a more centralised perspective of Spain (ES-CEE3, Personal Communication, 2026). This centralisation has led to institutional conflicts, particularly with Catalonia's PRECAT2020⁸ waste management programme facing legal challenges for exceeding national standards (ES-CEE3, Personal Communication, 2026). Ultimately, a framework designed to support regional ambition is increasingly perceived as a constraint on meeting EU requirements.

Island territories introduce an additional layer of governance complexity. Spain's Balearic and Canary Islands have small resident populations and significant seasonal waste spikes due to tourism, leading to high logistical costs for waste collection and transport to mainland facilities (Mena-Nieto et al., 2021; Santamarta et al., 2023). Research suggests that meeting EU targets will require substantial investment, which is currently inadequate given their population size.

Catalonia. Catalonia's governance role within the Spanish framework is unique across three aspects: constitutional authority, institutional structure, and policy consistency. The Statute of Autonomy of Catalonia formally acknowledges joint authority in environmental issues, granting the explicit right to create additional protective regulations, a legal basis that other ACs have in theory, but which Catalonia has applied more consistently. The difference with the national government is striking; the 1991 Amending Directive on waste (91/156/EEC) was only implemented by Spain in 1998, several years after the deadline set by law, whereas Catalonia did it in 1993 (García et al., 2021; ES-CEE3, Personal Communication, 2026). Catalonia exemplifies a scenario where sub-national institutional capability has come to replace, rather than enhance, central state actions. These dynamics boost regional effectiveness but lead to jurisdictional tensions with Madrid, as illustrated by the PRECAT2020 court case, in which the Spanish central administration challenged the programme's packaging waste EPR targets because they exceeded obligations established under national law. An additional dimension of this jurisdictional tension is its single market implication: if Catalonia applies different EPR fees or end-of-waste criteria from other ACs, it creates administrative fragmentation that raises compliance costs for producers operating across regions. This is precisely the problem the

⁸ PRECAT2020 (*Programa de Prevenció i Gestió de Residus i Recursos de Catalunya 2013–2020*) was Catalonia's regional waste management and prevention programme covering the period 2013 to 2020, adopted by the Generalitat de Catalunya (Agència de Residus de Catalunya & Generalitat de Catalunya, 2020).

forthcoming Circular Economy Act seeks to address at EU levels (European Commission, 2026b).

4.3.3 Administrative Capacity

Compared to Greece, Spain has much stronger capabilities in waste management, featuring a more unified legislative framework and advanced monitoring systems. Financial resources are substantial: Spain is the second-largest recipient of the RRF, with hundreds of millions in ERDF⁹ funding also allocated to circular economy projects, and the country faces an estimated annual environmental investment gap of €10.8 billion, suggesting the constraint is not the absence of funding but the capacity to deploy it effectively. Of this gap, €2.3 billion per year relates specifically to the circular economy and waste management infrastructure (Directorate-General for Environment, 2025b, 2025a; García et al., 2021).

Therefore, both funding and expertise are significant, but the main limitation is the absence of technical expertise at the regional and local levels and severe understaffing in environmental agencies (ES-CEE2, Personal Communication, 2026; ES-CEE3, Personal Communication, 2026; Directorate-General for Environment, 2025b). Thus, according to ES-CEE3, even though the transfer of information was tried, it is insufficient without ongoing political commitment and institutional support within the receiving administration, and even well-targeted technical assistance does not lead to operational changes. Indeed, the transition from waste management focused on collection and disposal to a circular economy requires different skills in public administrations. Experts noted that while environmental agencies once needed small teams for permit approvals, they now require staff who understand eco-design, secondary materials, industrial assessments, and supply chain monitoring. This change has led to structural understaffing and challenges in attracting qualified professionals. Additionally, political unpredictability can disrupt long-term strategies, further compromising administrative continuity (ES-CEE2, Personal Communication, 2026).

The gap in capacity is most pronounced among Spain's smallest municipalities due to its fragmented municipal structure, resulting in many local authorities lacking the ability to manage complex collection systems or enforce EPR obligations effectively (ES-CEE2,

⁹ European Regional Development Fund (European Commission, 2026c).

Personal Communication, 2026; Directorate-General for Environment, 2025b). While the *mancomunitat*¹⁰ model helps by pooling resources among small municipalities, these consortia often lack the necessary managerial capacity and political collaboration (Saldivia-Gonzatti et al., 2022).

Catalonia. Catalonia's administrative capacity is uniquely robust within the Spanish framework, but its fundamental principles present a model that can be adapted elsewhere. The Waste Agency of Catalonia (ARC)'s staff of 250 represents a cumulative investment in expertise over three decades (Waste Agency of Catalonia, 2018; ES-CEE3, Personal Communication, 2026). The Agency was established in 1991, the same year Catalonia created Spain's first regional Environment Ministry, specifically to implement the regulatory structure that would emerge with the 1993 Catalan waste law (ES-CEE3, Personal Communication, 2026). Over the years, ARC has built specialised knowledge in areas such as biowaste management, traceability systems, compost quality control, EPR oversight, the design of economic instruments, and the facilitation of cooperation with municipalities. Importantly, the institutional framework provides direct technical and political assistance to municipalities (Saldivia-Gonzatti et al., 2022), acknowledging that many local governments, especially the smaller ones, may not have the technical staff needed to independently design and manage complex collection systems (ES-CEE3, Personal Communication, 2026). This blend of regional institutional concentration and proactive municipal support sets Catalonia apart from ACs that function through smaller, less specialised environmental departments located within broader ministries (Directorate-General for Environment, 2025b). Still, even Catalonia's capabilities are limited: as noted by ES-CEE3, the technical requirements of the changing EU framework consistently exceed the capabilities of municipal administrations, and the reliance of long-term technical strategy on sustained political support constitutes a structural weakness (Directorate-General for Environment, 2025b; European Environment Agency, 2025b).

¹⁰ Catalan *mancomunitats* are voluntary intermunicipal associations that pool resources across small municipalities to deliver services — including door-to-door collection and shared sorting infrastructure — that no single municipality could sustain alone. Established under Catalan regional law, they hold genuine operational authority to coordinate collection, treatment, and infrastructure across municipal boundaries (Saldivia-Gonzatti et al., 2022).

4.3.4 Technology Integration

Spain has adopted a broader and more diverse portfolio of waste management technologies than Greece. The Basque Country, Navarra, and parts of Galicia and Valencia demonstrate that DDC collection, when introduced in areas with appropriate population density and complementary treatment infrastructure, can substantially elevate separate collection rates above national averages (Saldivia-Gonzatti et al., 2022; ES-CEE2, Personal Communication, 2026). However, technological innovation, while necessary, is not sufficient to resolve the underlying governance and infrastructure deficits that constrain Spain's transition. As ES-CEE3 emphasised, technology can help, but systemic factors (governance, infrastructure, collection systems) are much more decisive.

At the national level, Spain is in the process of deploying a Deposit Return System (DRS) for beverage containers, a significant infrastructural investment that is expected, based on the German experience of achieving markedly higher recovery rates through its own DRS, to substantially increase capture rates for the relevant packaging streams (ES-CEE2, Personal Communication, 2026). The DRS rollout, however, illustrates the implementation challenges discussed in the preceding subsections. Spanish law has established the obligation to implement a DRS for cans, plastic bottles, and beverage cartons under three litres before November 2026, following the failure to meet the 70 per cent separate collection target for single-use plastic beverage bottles (Directorate-General for Environment, 2025b). As ES-CEE3 reported, the timeline is widely regarded as unachievable.

A structural weakness that cuts across technological approaches is the continued heavy reliance on MBT plants for mixed waste processing (Directorate-General for Environment, 2025b). As noted, the outputs of MBT processing will cease to count towards EU recycling targets under the revised regulatory framework from 2027, a regulatory change that creates a pressing and time-limited imperative to expand source-separated bio-waste collection and composting capacity before the MBT contribution is reclassified (European Environment Agency, 2025b; Directorate-General for Environment, 2025b; European Parliament and the Council, 2018). This transition requires not only physical infrastructure investment, but the public communication and citizen engagement work necessary to change household sorting behaviour,

a dimension that Spain's twenty-year sustained awareness-raising effort has made progress on but has not yet completed (ES-CEE2, Personal Communication, 2026).

Emerging waste-to-resource technologies offer further potential, though their scaling has proven challenging. The case of Enerkem's Ecoplanta project in Tarragona, Catalonia, is illustrative: a gasification technology that converts carbon-rich non-recyclable municipal waste, including plastics, rubber, textiles, and paper, into methanol (Enerkem, 2025; Repsol, 2025). The Ecoplanta trajectory spans approximately seventeen years, revealing the political, regulatory, and financial alignment required to deploy such infrastructure within the Spanish governance environment, and illustrating the gap between technological readiness and operational deployment that characterises advanced waste-to-resource innovation across the EU (ES-CEE3, Personal Communication, 2026; European Commission, 2022).

Catalonia. Catalonia's experience of DDC constitutes the most extensively documented sub-national technological success in the Spanish waste sector. Initiated in 2000, following Italian rather than German practice, the system had been deployed in 339 municipalities by September 2025, covering approximately 897,000 inhabitants, with a further 129 municipalities in preparation (ES-CEE3, Personal Communication, 2026). The performance differential against conventional road-container collection is substantial, as shown in Figure 10 below. ARC's monitoring data across all 947 Catalan municipalities show that DDC delivers 2.5 times more biowaste, 20 per cent more paper-cardboard, 50 per cent more glass, and twice as much packaging per inhabitant per year, while simultaneously reducing residual waste by a factor of 2.4 (Agència de Residus de Catalunya, 2026). These gains extend to material quality: biowaste collected by DDC carries an average impurity rate of 4.7 per cent compared to 13.9 per cent under road container collection, a threefold differential that directly affects the viability of the composting and anaerobic digestion plants that receive the material. These figures translate not only into higher recycling rates but into higher quality recyclate, since DDC enables better identification of contamination at source. The Catalan experience also corrects a common assumption about scale: while DDC is harder to implement in large cities, it is not impossible; for instance, Milan, Brussels, and Munich operate DDC systems in dense urban settings (ES-CEE3, Personal Communication, 2026).

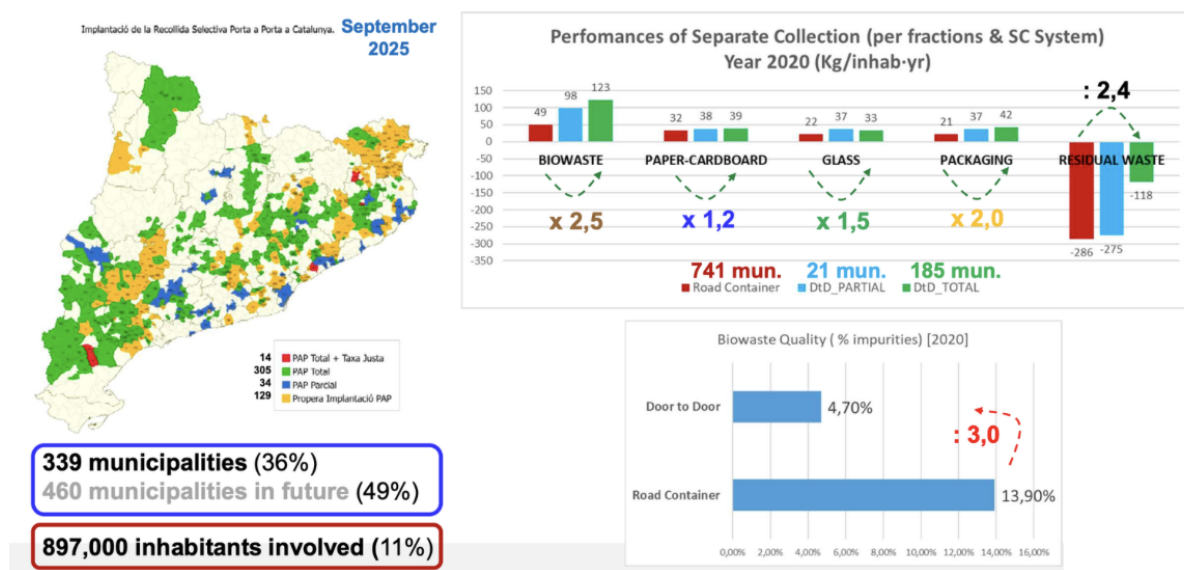


Figure 8: Performance differentials between door-to-door and road container collection in Catalonia by waste fraction (Agència de Residus de Catalunya, 2026)

4.3.5 Adaptation to Evolving Legislation

Spain has shown a notable level of formal legislative responsiveness to the changing EU waste governance framework, which is more favourable when compared to most Southern European MS (Directorate-General for Environment, 2025b; Sobrino-García, 2025). The implementation of Law 7/2022 on waste and contaminated soils for a circular economy marks a major milestone in this context (Jefatura de Estado, 2022). This law implements the updated WFD and the Single-Use Plastics Directive¹¹ into national legislation, introduces a national tax on landfill and incineration, mandates separate collection for textiles and hazardous household waste, and includes prevention goals and reuse preparation measures that, in certain aspects, exceed the EU legal requirements at the time of its enactment (ES-CEE2, Personal Communication, 2026; Directorate-General for Environment, 2025b). The Spanish waste law 7/2022 includes significant advancements, as noted by ES-CEE3, which highlighted that it reflects innovations from the unapproved Catalan waste law. Thus, the national legislation shows both Spain's own ambitions and the influence of regional policies, further complicated by the political context of its approval.

¹¹ Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment, in force since July 2021, bans a range of single-use plastic items for which sustainable alternatives exist, including cutlery, plates, and cotton bud sticks, and establishes EPR obligations and separate collection targets for products such as beverage bottles (European Parliament and the Council, 2019).

The political economy surrounding this adaptation reveals significant tensions. The transfer of obligations from Law 7/2022 from the national level to regional and local tiers has not progressed uniformly: a study by Sobrino-García (2025) shows that over 60 per cent of local regulations have yet to be revised to align with the new mandates within the designated timeline, reflecting the same gap between ambitious legislation and effective administration that characterises Spain's broader implementation issues. The provisions related to the landfill tax illustrate this dynamic well: although the national tax allows regions to determine their own rates and allocate revenues for waste infrastructure development, the effective impact of the tax heavily relies on regional political motivation and local enforcement capability (ES-CEE1, Personal Communication, 2026; Sobrino-García, 2025).

Moreover, Spain's participation in the PPWR highlights its capacity to adapt legislation efficiently, as the direct application of this regulation reduces time and resource delays associated with transposition issues. However, Spain faces challenges due to its established national EPR framework, requiring significant changes to existing PROs and fee structures. The fragmented EPR governance complicates adaptation; EPR systems must obtain authorisation from their ACs and negotiate individual agreements with each of the seventeen of them. This results in delays and inconsistencies, as seen in Catalonia's advanced standards versus the reluctance of EPR systems to accept differing criteria due to varied ACs requirements. The underlying political economy exacerbates this fragmentation, reflecting broader issues within the EU (Dolan, 2026; Stunell et al., 2025). This internal fragmentation also has a single market dimension: divergent EPR fees and end-of-waste criteria across Spain's seventeen ACs mirror the same administrative burden that producers face when operating across MS.

The extension of EPR to textiles and footwear under the updated WFD presents a significant challenge for adaptation, with a transposition deadline of twenty months (Directorate-General for Environment, 2025b). Spain's existing EPR framework for packaging, batteries, and electronic equipment provides a foundation for textile EPR, supported by Law 7/2022 (Santamarta et al., 2023). However existing EPR schemes face significant issues, including stagnant fees for businesses and failure to meet recycling targets. Transparency is also a concern, with discrepancies between ministerial data and EPR system figures. Moreover, eco-

modulation, although endorsed in Law 7/2022, has yet to be implemented (ES-CEE3, Personal Communication, 2026).

Catalonia. Catalonia's pattern of adjusting its legislation shows an early alignment with EU regulations that Spain has only recently started to follow. As seen in Figure 11 below, pivotal moments in Catalan waste management occurred 14 to 25 years before similar measures were introduced at the national level in Spain. The 1993 Catalan waste law required municipalities with populations exceeding 5,000 to separate biowaste, a requirement established 25 years ahead of the EU's 2018 WFD revision (ES-CEE3, Personal Communication, 2026). The proposed Catalan waste law, which has been pending in the regional parliament across three legislatures, is being closely monitored at the national level, with certain provisions already included in Law 7/2022 prior to its adoption by Catalonia (ES-CEE3, Personal Communication, 2026). Each fiscal milestone triggered a significant and lasting increase in the number of municipalities implementing separate biowaste collection, reaching 731 by 2012 (Agència de Residus de Catalunya, 2026).



Figure 9: Catalonia's key policy milestones in waste governance, 1996-2022 (Agència de Residus de Catalunya, 2026)

This data supports the hypothesis that economic instruments are crucial for changing municipal waste governance in Catalonia. The DRS exemplifies this: Catalonia researched, trialled, and gained legal approval for its regional implementation (ES-CEE3, Personal Communication, 2026). This highlights a contradiction in multi-level governance where a region with the expertise and motivation to lead is hindered by the need for national or EU approval for tools it could have deployed earlier. The tax refund model that forms the basis of Catalan

environmental taxation, depicted in Figures 12 and 13 below, illustrates the most notable fiscal innovation in this governance journey and is further explained in [Appendix E](#).

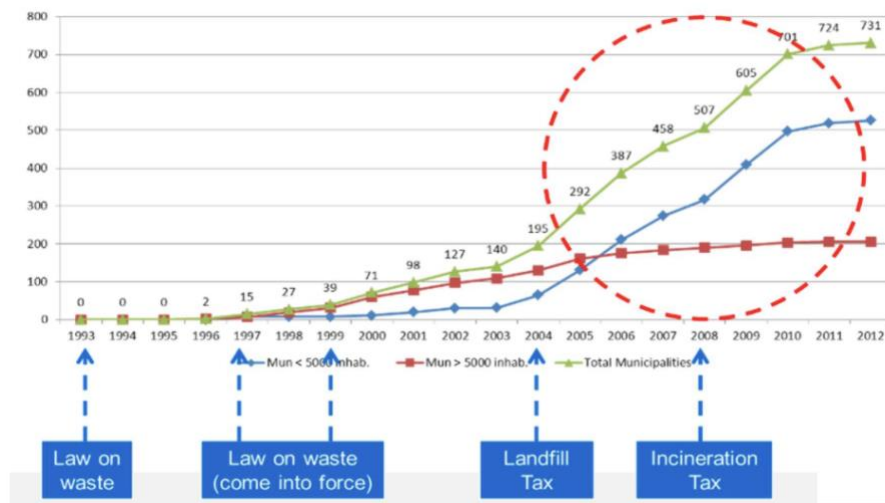


Figure 10: Catalonia's environmental taxation and quality-based tax refund model 1 (Agència de Residus de Catalunya, 2026)

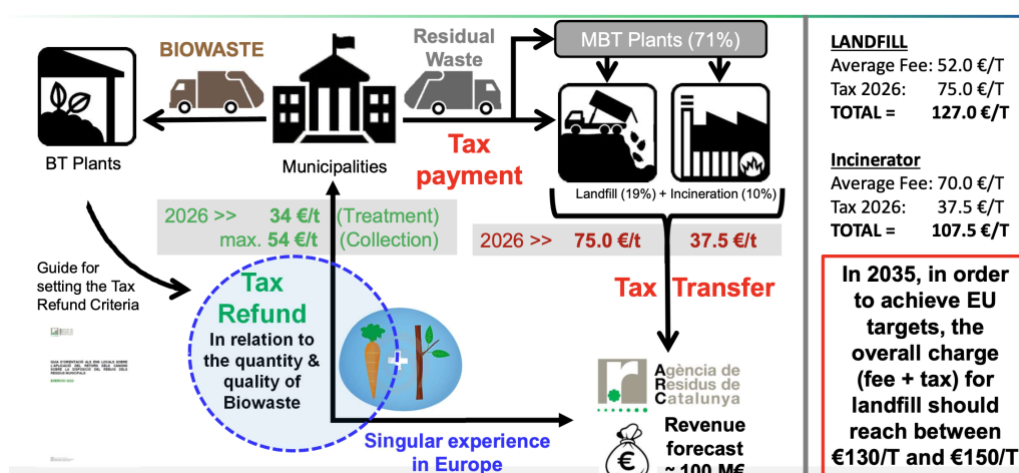


Figure 11: Catalonia's environmental taxation and quality-based tax refund model 2 (Agència de Residus de Catalunya, 2026)

The drivers and barriers identified for Spain are summarised in Table 6 in [Appendix D](#).

4.4 Cross-case Comparison

This section brings 4.2 and 4.3 together, treating Greece and Spain as two variations on a shared structural condition. It analyses the convergence and divergence of the previously discussed sections between the two countries.

Both countries are established EU MS, governed by the same WFD, Landfill Directive, and PPWR, legislations that they have transposed into national law with a fair degree of accuracy; Greek experts emphasised that the issue is rarely about transposition, but rather about the practical application on the ground instead of the legal framework (GR-CEE2, Personal Communication, 2026; GR-CEE1, Personal Communication, 2026). They also function under decentralised, multi-layered governance, distributing waste responsibilities across national, regional, and local levels. These shared characteristics are significant for what they eliminate as possibilities: if the legislation were insufficient, both nations would struggle in the same areas, which the evidence does not support; if decentralisation were the sole influential factor, Spain's coordinating institutions would show no impact, yet they clearly do. Consequently, the common framework limits the explanation to factors that operate within that system rather than aspects of its design.

A second noteworthy convergence is evident: professionals from both nations pinpoint the same solutions. The Spanish expert recommended stringent landfill taxes, fees on virgin materials, efficient DRS, bio-waste segregation, and capacity-building initiatives before enforcement (ES-CEE2, Personal Communication, 2026); Greek experts likewise independently identified similar strategies, making recovery cheaper than disposal, DRS modelled after Germany, source prevention, and incentives for municipalities meeting targets (GR-CEE1, Personal Communication, 2026). In both scenarios, the issue is not a lack of awareness regarding effective measures; it is the structural ability to implement those measures. Consensus on the assessment, despite differing outcomes, intensifies the enigma: the answer lies not in differing understandings of the problem but in the circumstances that either facilitate or hinder the activation of established solutions.

Both systems are also confronted with the same impending challenges posed by the evolving circular-economy agenda. The PPWR includes purposely vague provisions that allow for varied national interpretations, and both nations run fragmented EPR schemes with eco-modulation still too underdeveloped to align producer fees with upstream design. The upcoming legislative cycle will impose identical requirements on two disparate systems, and without addressing the underlying capacity disparity, it risks widening instead of narrowing the implementation gap.

The most evident distinction lies in the results. Greece disposes of almost 80 per cent of its municipal waste in landfills, recycles at most 20 per cent, and has a CMUR close to 6 per cent,

roughly half the EU average (GR-CEE1, Personal Communication, 2026); Spain has increased its municipal recycling from approximately 39 to 43 per cent, reports a packaging recycling rate near 69 per cent (although the EEA profile suggests this may be overstated), and has a CMUR around 8.5 per cent (ES-CEE1, Personal Communication, 2026; European Environment Agency, 2025a). Both countries fall short of targets and have encountered infringements; the distinction is not between compliant and non-compliant but rather between two systems positioned at different stages on a common trajectory of underperformance. What provides analytical significance is the structural context behind the disparity: Spain boasts a regional leader. Catalonia's DDC, treatment infrastructure, and longstanding landfill tax illustrate domestically that EU goals are achievable, fostering policy learning and institutional pressure that escalate to the national level (Saldivia-Gonzatti et al., 2022; ES-CEE1, Personal Communication, 2026). In contrast, Greece's comparable successes: Tilos, West Macedonia, the consolidated Central Macedonia FODSA, remain isolated and, in the Tilos case, externally driven, so they generate no equivalent national reform pressure: each depends on a coordinating body or outside operator that the rest of the country's territories, above all Attica, do not possess. The result is that no local evidence scales into a credible argument for a reform coalition to argue that compliance is achievable rather than merely aspirational.

The governance disparity is most pronounced in one shared requirement: separate bio-waste collection. Spain has commenced its implementation; Greece cannot execute it at all because the responsibility for collection lies with municipalities, while composting and treatment are managed by underdeveloped regional authorities, resulting in a deadlock where neither level can proceed without the other. This contrast is particularly revealing because the coordination issue is not inherently unsolvable: Spain has addressed the same challenge through intermunicipal partnerships that consolidate collection and treatment across smaller municipalities and through the ARC, which plays a cohesive role between the levels (Saldivia-Gonzatti et al., 2022; ES-CEE3, Personal Communication, 2026). Catalonia serves as a diagnostic lens for Greece: overcoming the coordination failure does not necessitate a different formal structure, both are decentralised, but requires intentional institutional investment in agencies that function between tiers. Greece has not pursued this.

The comparison also brings to light an enforcement paradox that is not apparent when examining each case in isolation. Both countries have experienced infringement and penalties;

however, Greece has incurred two distinct sets of fines for illegal landfills and hazardous waste for over ten years, potentially a record in Europe (GR-CEE2, Personal Communication, 2026), without rectifying the fundamental issues. When considered together, these cases illustrate that enforcement without capacity-building leads to a *compliance trap*, where fines become an ongoing expense rather than a catalyst for institutional reform; the Spanish expert explicitly cautioned that initiating infringement before stakeholders can adjust fosters anti-EU sentiment rather than progress (ES-CEE2, Personal Communication, 2026). The fines imposed on Greece do not indicate ineffective enforcement; rather, they demonstrate what results when enforcement is not supported by the capacity and funding necessary for compliance to be practical.

EPR exhibits a similar trend. Both employ packaging systems, both show subpar performance, yet the distinction lies in their structure: Greece's scheme achieves only about 20 per cent circularity after twenty-five years, lacking penalties for noncompliance (GR-CEE1, Personal Communication, 2026), which the Greek expert explicitly contrasted with Belgium, where failing schemes incur fines, while also advocating for a unified body to replace the current fragmentation. Spain's PROs demonstrate significantly better performance for marketable materials, such as glass, metals, batteries, and electronics (ES-CEE2, Personal Communication, 2026). This comparison highlights what EPR needs, and Greece lacks: an accountability framework where underperformance incurs costs. Market incentives and penalties should work together, not as alternatives; without either, a scheme functions only in name.

Finally, another difference lies in the engagement with evolving EU laws. Both countries transcribe laws; however, Spain also anticipates regulatory changes. Law 7/2022 progressed ahead of the EU's own prevention, reuse-preparation, and eco-modulation objectives (ES-CEE2, Personal Communication, 2026), while Catalonia's landfill tax and DDC systems were implemented before both national and EU interventions (ES-CEE1, Personal Communication, 2026). This anticipatory capability arises from the same institutional conditions that account for Spain's superior outcomes: the ARC produces policy evidence, and the mancomunitat model demonstrates effectiveness at scale, enabling Spain to contribute ideas upward rather than merely accept obligations. In contrast, Greece introduced a landfill tax in 2012–2013 but delayed its implementation for a decade, and even now, it does not fully collect the revenues (GR-CEE1, Personal Communication, 2026; GR-CEE2, Personal Communication, 2026). The

tool that proved transformative in Catalonia remained inactive in Greece for ten years; the core lesson from the comparison is that policy instruments do not automatically lead to effectiveness; their impact relies on the institutional and political context of their enactment, and Greece has not established the necessary conditions for activation.

5. Discussion

The comparison revealed that both countries operate under a decentralised structure. According to MLG, the distribution of authority among European, national, regional, and local levels is a fundamental characteristic of EU waste policy, embedded in the subsidiarity principle and in the directive instrument that delegates the means of implementation to MS and, within those, to their sub-national levels. Consequently, fragmentation is prevalent in both cases and cannot serve as a distinguishing factor by itself. However, the critical difference lies deeper, in the way in which decentralisation is practised by each country, specifically, in the distribution of legislative and regulatory authority, rather than mere administrative duties, across different levels.

In Spain, decentralisation involves a real devolution of legislative authority. The ACs do not simply implement national policy; each has its own legislation, created within the national framework but capable of exceeding it. The arrangement is “*quasi-federal*”, with the central administration transposing directives and crafting national plans while substantive operational and regulatory powers reside with the regions. This is why Catalonia was able to introduce its own landfill tax long before a national equivalent, establish a regional regulatory authority in the ARC, and implement an ambitious waste programme in advance of both national and EU frameworks. The *mancomunitats* exist for the same reasons: the regional level holds the legal authority to create and empower entities that consolidate collection and treatment across smaller municipalities. Therefore, the task-specific institutions that enable Spain to manage its fragmentation are not merely the result of efficient administration but are, in fact, outcomes of devolved legislative power.

Greece has a formally decentralised framework of a fundamentally unique nature. Its thirteen regions and municipalities carry out operational duties, municipalities manage collection and sorting, while regions oversee treatment capabilities, yet the legislation, regulations, and establishment of obligations remain centralised, primarily within the Ministry of the Interior and the Ministry of Environment, with EU funding overseen by the Ministry of Development. This represents a decentralisation of responsibilities without a transfer of legislative authority, leading to a situation where, if coordination fails between levels, no intermediary entity possesses the legal power to address it. EU responsibilities are communicated through an administrative process, the central government directing the lower tiers to act, rather than

through a legislative approach where sub-national authorities create their own binding regulations in alignment with EU standards. The administrative method is significantly weaker due to the centre's lack of means to enforce compliance at lower levels: even in Spain, the ministry finds it challenging to compel regional compliance, and similarly, regions struggle with municipalities, where direct enforcement authority is absent. This issue is exacerbated in Greece, where sub-national levels are unable to legislate to bridge this gap themselves.

The deadlock surrounding Greek bio-waste, viewed through this lens, constitutes not just a coordination issue but also a failure of competencies. The responsibility for collection lies with municipalities, whereas the composting facilities they depend upon are under regional jurisdiction, and since neither level holds the authority to legislate across this division or compel action from the other, the obligation remains unmet. In Spain, a similar division is reconciled by the *mancomunitat*, which is a structure that the regional level can establish; however, Greece lacks this equivalent power at the level where the deadlock manifests. This same rationale clarifies why EU funding, concentrated at the national level, does not reach the municipalities that need to utilise it: the system is missing both the pathways and the empowered intermediary organisations that, in Spain, facilitate the transfer of resources and authority between levels. MLG effectively highlights this disparity by mapping where competencies reside and identifying the absent connective institutions; however, it reaches a limit in its explanation. MLG can demonstrate that Spain delegated legislative competencies and established integrating bodies while Greece did not, but it cannot explain why, nor why some regions in Spain chose to leverage their competencies to take the lead while others did not. To address that question, one must investigate the political economy.

This distinction is also visible within Greece itself. While national performance is often presented as a uniform failure, the regional evidence suggests that outcomes vary according to the presence or absence of institutions capable of coordinating across governance levels. This internal variation reinforces rather than complicates the central argument: Greek performance rises precisely where an integrating institution exists to bridge the municipal-regional divide, and collapses where, as in Attica, scale, siting conflict, and the absence of such a coordinating tier leave municipalities individually responsible for an outcome none can deliver alone. The same pattern recurs across the regional perspectives examined earlier: the few territories with effective governance and treatment technology are consistently served by an integrating body

above the municipal level. In contrast, the dispersed Attica region and the islands, lacking such support, underperform in all areas.

The PEER understands implementation outcomes through the lens of the distribution of costs and benefits, along with the incentives these create. Consequently, the capacity differences discussed in Chapter 4 are not external factors but are rather products of the system. ES-CEE2 (2026) highlighted that investments in waste lead to outcomes that are “largely invisible”, noting that their success lies in waste reduction not being observable; this captures a central challenge of the sector: upfront costs contrasted with delayed benefits that lack strong political impact. This imbalance puts waste management at a disadvantage when competing for resources and skilled personnel in both countries; the distinction lies in each system’s ability to address this issue. Furthermore, it provides a reasonable explanation for what the author identifies as a *compliance trap*. Greece has incurred two sets of EU fines for more than a decade without addressing the underlying issues that cause them. Under Article 260 TFEU, these fines are paid by the central government; there is no established mechanism obliging it to pass the cost on to the regional or municipal authorities whose operational failures often generate the underlying breach, which further weakens the incentive for structural reform at the level where implementation actually occurs. The existing evidence does not clarify the internal political considerations behind this trend, but the political-economy framework offers a coherent interpretation: in situations where administrative capacity is weak, treatment facilities are lacking, and the political advantages of waste investment are spread out, recurring fines may be viewed as an acceptable cost instead of a catalyst for structural reform. This remains a theoretically supported inference rather than a proven conclusion, but it aligns with the interview findings and with ES-CEE2’s caution that enforcement preceding adequate capacity breeds resentment rather than progress, a pattern the decade-long record of Greek fines seems to reflect.

The political economy surrounding markets clarifies the varying effectiveness of EPR. PROs are effective for high-value materials but struggle with packaging because recovery relies on the market worth of secondary materials; in situations where value is lacking, recovery necessitates financial support or a mandate. Existing literature indicates that centralised, well-managed systems with enforceable penalties for underachievers outperform fragmented or voluntary initiatives (Aliya Dimarizkya et al., 2025; Dolan, 2026). Greece highlights this negatively: a scheme providing advice without consequences lacks the necessary pressure to

maintain low-value recovery, while Spain's eco-modulation under Law 7/2022 seeks to alter the incentives upstream.

The political economy perspective also reinforces the competence argument. While devolved legislative authority is essential, it is not sufficient for regional leadership: all ACs possess broadly similar powers, yet only a few, most notably Catalonia, have used this authority to take a leading role. Comparative evidence suggests a coherent explanation: the combination of a strong industrial base, greater financial capacity, a well-established tradition of civic engagement, and sustained political commitment created conditions in which the capacity and incentives to exercise devolved authority reinforced one another. This generated a process of positive feedback, whereby early successes fostered expertise, confidence, and an institutional foundation that enabled further reforms. Over time, this leadership extended beyond the regional level, ultimately leading to reforms at the national level, including Law 7/2022, and increasing the visibility of Spanish practices within EU policy debates (ES-CEE2, Personal Communication, 2026). Greece, in contrast, lacking both a leading region and the positive reinforcement it generates, sees even accepted instruments stall, as illustrated by the decade-long delay of its mandated landfill tax. However, the evidence limits a strong interpretation of PEER. The lower performance of central and southern Spain is significantly affected by geography, scattered settlements and a climate detrimental to composting, rather than a lack of political will among regional governments. Similarly, technological decisions are constrained by these factors: DDC, which is key to Catalan success, is only cost-efficient where population density and proximity to facilities exist and becomes excessively expensive in the sparse interior regions. The technology dimension reinforces this interpretation as Spain's capacity to deploy DDC at scale, develop a DRS, and begin bio-waste separation reflects the same institutional conditions that explain its broader implementation advantage. By contrast, Greece's continued reliance on co-mingled collection and mechanical biological treatment is not a technological choice but a symptom of the governance and capacity constraints that prevent the adoption of more effective alternatives. Thus, capacity is partially contingent on structural conditions that cannot be simplified to political choices, and the PEER is most convincing not as a single-cause explanation but as a framework for understanding how incentives shape the outcomes derived from specific conditions.

This final observation leads to the more extensive question that the findings raise emphatically, particularly regarding the fourth sub-question: whether a uniform legislative approach in

Europe aligns with the diverse realities it must engage with. EU waste legislation establishes common, binding targets and increasingly detailed obligations based on assumptions about conditions, such as economies of scale, administrative competence among municipalities, and sufficient population densities to support separate collection, that are not applicable across much of Southern Europe. Both countries are home to numerous small municipalities, sparsely populated interiors, and island regions where small populations, seasonal tourism peaks, and high transport costs make compliant separate collection structurally more expensive than the legislation anticipates. The Greek mandate for fragmented municipalities to establish separate collection without having the resources to do so, as well as the ineffectiveness of requiring bio-waste collection when treatment facilities are non-existent, are reflective of the same inconsistency: obligations tailored to one administrative context applied to another. The move toward directly applicable regulations exacerbates this contradiction. The PPWR, which enforces “a single suit for everyone” after two decades during which MS developed divergent national systems based on their unique circumstances, illustrates the challenges of using uniform instruments in diverse environments. Notably, MS participate in co-decision and may seek derogations if well motivated; that underperforming states have not systematically done so arguably reflects the same capacity gaps that impede implementation itself. What may be effective in a densely populated, thriving market and administratively competent environment might be impractical in a fragmented one, and the escalating complexity of the EGD has been shown to disproportionately burden underperforming MS, widening rather than closing the divergence.

The potential impact of the evolving EGD on this established pattern is genuinely uncertain based on existing evidence. An optimistic interpretation is plausible: the shift towards instruments targeted at operators and producers — eco-modulation, requirements for recycled content, and binding obligations for those who introduce products into the market — can be seen as an effort to embed compliance within the market instead of relying on the inconsistent administrative hierarchy, thus minimising the significance of weak municipal capacity. For a country like Greece, this presents a partial relief from its governance challenges. However, the findings urge caution against excessive optimism. Regulation at the operator level still assumes the existence of secondary materials markets, standardised end-of-waste criteria, and verification capabilities that weaker administrations lack; it does not effectively eliminate the implementation gap but rather shifts it from the transposition of regulations to the establishment

of the markets necessary for those regulations to be effective. The gap reemerges at a different point, with the *simplification* agenda adding to the uncertainty by jeopardising the regulatory stability essential for long-term investment. The implication is that the EGD is unlikely to bridge the implementation gap purely through uniform regulations. The evidence suggests a need for a differentiated approach, one that aligns obligations with territorial and administrative contexts, invests in the integrating institutions and inter-municipal metrics required by small and fragmented systems, and prioritises capacity-building as a prerequisite for compliance rather than a subsequent measure. The multiplicity of national EPR schemes also burdens producers operating across several MS; while fee harmonisation is unlikely, the forthcoming Circular Economy Act is considering partial remedies such as a single digital registration platform.

These insights enable a direct response to the central research question. This question inquired about the political, institutional, and administrative elements that account for the differences in how Greece and Spain have implemented the Waste and Landfill Directives. The disparity is not attributed to the common legislation or the mere fact of decentralisation, which both nations experience, but rather to the nature of the competencies each country devolves and the political-economic circumstances that influence their utilisation. Spain successfully implements genuine legislative devolution to its regions, coupled with task-specific integrating institutions, while Catalonia has a regional political economy that has transformed devolved authority into leadership and self-reinforcing reform. In contrast, Greece assigns administrative tasks without granting the legislative authority necessary for its regions and municipalities to address coordination issues, operating within a political economy where the diffuse advantages of waste investment and the acceptance of recurring penalties have solidified a self-reinforcing *compliance trap*. The key factor is the ability to convert shared obligations into effective systems, a combined result of how authority is distributed, and whether the involved actors possess the resources and motivation to act on it.

The findings broadly support political-economy explanations while refining them in two ways. They show that the relevant political economy is sub-national as well as national, since the decisive conditions operated at the regional scale in Catalonia, implying that the PEER must be applied in a multi-level register rather than treating the MS as the unit of analysis. And they show that capacity is partly structural, constrained by geography and settlement in ways political will cannot fully override. Neither framework suffices alone: MLG maps the

distribution of competence but cannot explain why integrating institutions emerge or why devolved power is used, while PEER explains incentives and capacity but presupposes the structural map MLG provides. Their explanatory force lies in combination. In both respects, the thesis confirms the direction suggested by the comparative EPR literature: that governance architecture and accountability structures are as determinative as legal obligations, while grounding that proposition in a more granular institutional analysis than cross-national quantitative studies can provide.

Finally, the comparison reframes the uneven implementation of the EGD more broadly. The familiar East–West framing is incomplete: two Southern European states of comparable wealth, EU vintage, and formal governance structure diverge as sharply from one another as either does from the Northern frontrunners (Catarinella & Kram, 2025). Uneven implementation is therefore not primarily a matter of geography, wealth, or membership duration, but of the institutional and political-economic conditions that determine administrative capability, conditions that vary within MS as much as between them. The policy lesson is twofold: the EU's support must be directed not only at financing infrastructure but at incentivising and enabling MS to develop the integrating institutions, devolved competences, and accountability architectures that allow infrastructure to be used; and the legislative approach itself must become more sensitive to the realities through which it is refracted. Common legislation, however ambitious, does not produce common outcomes. The EGD will make a difference in places such as Greece only if it ceases to presume the capacities on which its success depends and begins instead to build them.

These conclusions must be read against the limitations: a small, asymmetric interview sample (two Greek and three Spanish experts, non-regional for Greece), supplemented by desk research where primary evidence was thin. The claim is therefore analytical rather than statistical, that the mechanisms identified here (competence distribution, the *compliance trap*, and the feedback dynamic of regional leadership) are relevant to EU MS sharing similar governance traditions and socio-economic profiles, not that they generalise to all. These constraints define the argument's scope rather than undermining it.

6. Conclusion

This thesis explored the reasons why Greece and Spain, two Southern European MS governed by the same EU waste legislation, have shown significantly different outcomes in implementation. The discrepancy cannot be ascribed to the legislation, as both countries transposed it adequately, nor to decentralisation, which is common to both, but rather to the nature of the powers each transfer to regions and the political-economic circumstances that influence their usage. Spain effectively combines authentic legislative devolution with specific integrating institutions, and in Catalonia, a regional political economy has transformed devolved power into ongoing leadership. In contrast, Greece decentralises administrative responsibilities while maintaining centralised law-making, resulting in sub-national entities lacking the authority to address the coordination challenges that emerge. The source of this issue lies in national constitutional architecture, a factor that uniform EU legislation cannot provide.

The relevance of these findings spans both academic and policy implications. From an academic standpoint, the thesis adds to a body of work that has disproportionately researched Eastern versus Western differences, illustrating that there is sharp internal variation within Southern Europe that this framing tends to obscure, and that identical EU regulations lead to unequal results because the governance conditions facilitating them are unequal. It also enhances the theoretical frameworks it utilises: the political economy of environmental regulation should be considered at the sub-national level, and multi-level governance analysis needs to examine the constitutional integrity of devolved powers rather than simply assess their distribution. From a policy perspective, the EU's transition from directives to directly enforceable regulations, such as the PPWR, can be read as acknowledgement that shared goals cannot be met when implementation is subject to national discretion and pace.

The current trajectory of the EU's policy agenda directly addresses the shortcomings highlighted by this research. EPR is being intensified through eco-modulation, which connects producer fees to product recyclability and incorporates the polluter-pays principle upstream. Landfill charging has shown effectiveness where applied, but the possibility of a standardised EU-wide tax is hindered by the need for unanimous consent; hence, the impending Circular Economy Act is pushing MS toward their own approaches, whether that be a levy or a cap-and-trade (European Commission, 2026b). Most significantly, demand-side measures, such as

recycled-content requirements for PET bottles and public procurement mandates for recycled fibres, aim to generate market demand through single-market legislation, incentivising lower performers to improve as a matter of economic opportunity rather than administrative command. These actions are in response to the Letta and Draghi reports and represent the Clean Industrial Deal's contribution to the transition toward a circular economy (Draghi, 2024; Letta, 2024).

The central lesson is that shared legislation does not create uniform outcomes; instead, it interacts with national and regional capabilities that the Commission has often assumed rather than developed. The potential of the new demand-side and producer-level instruments lies in their ability to function effectively where governance is lacking; however, their drawback is that they remain dependent on the secondary-materials markets and institutional frameworks whose uneven advancement this thesis has aimed to clarify. For the EGD and its successors to promote convergence instead of reinforcing divergence, the Union must use its available levers (funding conditionality, technical assistance, and regulatory incentives) to support those foundational elements (integrating institutions, devolved powers, accountability structures) as intentionally as it establishes goals. Several questions continue to be unanswered: whether the mechanisms identified here function similarly in other comparable countries like Portugal and Italy; whether demand-side instruments genuinely address the implementation gap or merely shift it elsewhere; and whether the conditions for regional policy leadership can be purposefully created rather than just allowed to develop naturally. These are issues that this thesis cannot solve, but the framework it creates is well-positioned to explore further.

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7. Appendices

Appendix A

Interview Guide: Explaining the EGD Implementation Gap, focusing on Waste Management

The goal is to understand what the drivers of the difference in implementation of the EGD are, specifically regarding the circular economy and waste management.

0. Interview Objective

This interview is conducted as part of a master's thesis at the Centre International de Formation Européenne (CIFE), within the master's programme in Global Economic Governance and Public Affairs.

The research examines why EU Member States display significant variation in implementing shared waste management obligations, specifically the Waste Framework Directive, the Landfill Directive, and packaging waste legislation. The central aim is to understand what political, institutional, financial, technical and administrative factors explain these differences, and what lessons can be drawn to improve the coherence and effectiveness of EU sustainability governance.

The interview will explore themes including governance and coordination across administrative levels, administrative capacity and resource allocation, the role of extended producer responsibility and separate collection obligations, and the broader political and socio-economic environment shaping implementation.

Your insights and professional experience are highly valuable in providing a deeper understanding of these dynamics. You are encouraged to elaborate on any aspects you consider particularly relevant to the topic.

All responses will be treated confidentially and used solely for academic purposes. In line with data protection and privacy considerations, participants' identities will not be disclosed without prior consent. The interview guide is shared in advance for transparency, and a consent form outlining the terms of participation will be provided alongside this document via email.

1. Opening Questions

- What is your current role, how many years of experience in the field do you have, what is your area of expertise?
- In broad terms, how would you describe the current state of waste management implementation in your country? What is working well and where the most significant gaps remain?

- What would you say are the biggest structural challenges and constraints in meeting the waste management policies and legal targets in your country?
- What would be some recommendations and best practices to be able to overcome these obstacles?

2. Governance & Institutional Coordination (RQ2)

Focus: Investigating whether the difference in outcomes is due to how national and regional bodies communicate with each other.

- **For Both:** EU Waste obligations are transposed at national level but largely delivered at regional and municipal level. In your country, how effectively does responsibility flow between those levels, and where do the most significant coordination failures tend to occur?
- **For Both:** The Packaging and Packaging Waste Regulation (PPWR) is directly applicable across Member States and introduces specific requirements such as eco-design standards and extended producer responsibility (EPR). In your view, what challenges still arise in ensuring its effective implementation across national and regional levels?
- **For the Spanish Expert:** Spain's implementation is described as unbalanced, with some regions like Catalonia meeting targets while others fall behind. From your experience, what has driven higher success rates in regions?
- **For the Greek Expert:** Greece relies heavily on landfilling and is at risk of missing reuse and recycling targets. The 2023 Early Warning Report highlights administrative coordination as a key challenge. Could you describe what this looks like in practice? For instance, is it primarily a problem of municipal and regional coordination (for example between central ministries and local waste authorities), or does it stem more from short and unsynchronised political cycles that disrupt long-term waste planning?

3. Administrative Capacity & Resource Allocation (RQ3)

Focus: Testing if the barrier is technical expertise, staffing, or funds.

- **For Both:** Is the lack of progress in certain areas due to a lack of funding, or a lack of trained personnel capable of managing complex circular economy infrastructure?
- **For the Greek Expert:** The 'Greece 2.0' plan allocates 37.5% of its budget to climate objectives. In this context, is waste management considered as one means to deliver on climate objectives? Why hasn't this financial commitment yet overcome the structural obstacles in waste management enforcement?
- **For the Spanish Expert:** How much does staffing stability and technical expertise influence the long-term success of waste strategies compared to short-term political cycles?

3.1 Extended Producer Responsibility (EPR)

Focus: Assessing how the legislative requirements on EPR have been implemented and its impact on waste financing and governance.

- **For Both:** From your country's experience, how effectively have Producer Responsibility Organisations (PROs) managed to channel EPR fees into actual recycling and waste management infrastructure?
- **For Both:** Do you think that PROs should cover costs of things such as reuse as well as recycling, and is their transparency a problem?
- **For Both:** Do you think eco-modulation will improve recyclability and the performance of targets in recycling?
- **For Both:** Do you think that EPR is useful in covering costs for economic operators?
- **For Both:** The fragmentation of EPR registration requirements across 27 national schemes is cited as an administrative burden. Do you see this as a barrier to compliance in your country, and what reforms would, in your view, improve the coherence of EPR across the EU?
- **For the Greek Expert:** Given Greece's structural challenges in waste enforcement, has the financial mechanism of EPR (where producers bear costs for the waste stage of their products) helped to address the funding gap in waste management?
- **For the Spanish Expert:** Spain has made more progress in extended producer responsibility schemes, particularly in packaging (EEA – circular economy profiles). What institutional arrangements or political factors have enabled this, and what lessons could be shared with countries that are lagging?

4. Political Drivers & Socio-Economic Constraints (RQ1)

Focus: Understanding the internal pressures shaping uneven implementation.

- **For the Both:** Do you see certain technologies or approaches as potential “game-changers” for improving waste management outcomes, or is progress more dependent on systemic factors such as collection, infrastructure, sorting capacity, and governance?
- **For Both:** Why do you think this best practice hasn't been easily replicated across other Mediterranean regions with similar socio-economic conditions?

4.1 Separate Collection Obligation (SCO)

Focus: Evaluating whether the SCO introduced under revised EU waste legislation represents a structural game-changer for national waste governance.

- **For both:** The Waste Framework Directive establishes separate collection as a legal obligation for Member States, covering streams such as paper, metal, plastic, glass, bio-waste, and under the 2025 revision, textiles. Is the separate collection obligation genuinely transformative for waste governance in your country, or are the necessary collection infrastructure and public participation mechanisms still lagging?
- **For both:** Separate collection depends heavily on citizen behaviour as well as municipal infrastructure. What has been the role of local government, education campaigns, and enforcement in making separate collection work in practice?
- **For the Greek Expert:** Greece has historically relied on residual mixed-waste collection and landfilling. Has the EU's separate collection obligation prompted a meaningful reorganisation of municipal waste systems, or are implementation gaps still significant?
- **For the Spanish Expert:** Research in Catalonia shows that door-to-door collection significantly improves sorted waste rates. Is the separate collection obligation creating conditions for national replication of such models, or does regional variation in political will and administrative capacity remain the key constraint? Why do you think this model has not been more easily replicated across other Spanish regions or other Mediterranean countries?

5. Future Policy Evolution & Simplification (RQ4)

Focus: Assessing the impact of administrative and regulatory burden of EU waste directives and the consequences of evolving legislation.

- **For Both:** EU waste legislation has accumulated significantly over recent decades. In your experience, what is the practical regulatory and administrative burden this creates for the authorities responsible for implementation, particularly at the regional level? Is the volume and complexity of obligations itself a barrier to effective delivery?
- **For Both:** Does the fragmentation of administrative areas in your country prevent the economies of scale needed to make collection, sorting and processing systems work efficiently?
- **For Both:** How will the drive to speed up permitting procedures affect environmental protections and public participation in your country's waste management projects?

5.1 Enforcement & Policy Instruments

Focus: Examining whether the implementation gap is a failure of enforcement.

- **For Both:** When you look at the implementation gap in waste management, do you think the core problem is fundamentally one of enforcement rather than a gap in the legislation itself? Is the issue that Member States are not held sufficiently accountable for missing targets?

- **For Both:** In your view, is simply setting a target, without binding economic instruments, an adequate policy approach? Or do you think that EU-level tools such as extended producer responsibility schemes, landfill levies, and deposit return systems are necessary to create the right incentives for real behavioural and infrastructural change? What combination of instruments do you think is most effective in your national context?
- **For Both:** How important is product design and recyclability as part of the solution? Do upstream requirements (such as eco-design standards mandating that products be easier to disassemble, repair, or recycle) address causes of poor waste outcomes that enforcement of downstream collection and sorting targets simply cannot reach?

5.2 The Evolution Beyond the EGD

Focus: Assessing whether the shift from the EGD's broad sustainability framework towards the Clean Industrial Deal and the forthcoming Circular Economy Act represents the right direction for EU circular economy governance, and whether it can deliver on the ground in lagging regions.

- **For Both:** The EU's circular economy agenda has evolved considerably since the original European Green Deal. Now, with the Clean Industrial Deal and the forthcoming Circular Economy Act, the emphasis is shifting towards integrating circular economy goals with industrial strategy and introducing demand-side instruments such as landfill levies. In your opinion, is this evolution the right direction? Does framing circularity as an industrial and competitiveness issue rather than primarily an environmental obligation make it more or less likely to deliver real improvements in waste management in your country or region?

Appendix B

Interview Declaration of Participation and Consent Form

Research Title: Explaining the EGD Implementation Gap: A Comparative Study of Waste Management in Greece and Spain

Research Question: *“What political, institutional, financial, technical and administrative factors explain the variation in waste management implementation among EU Member States, with a focus on Greece and Spain?”*

Purpose of the Research: The purpose of this research is to examine why EU Member States display significant variation in implementing shared waste management obligations, specifically under the Waste Framework Directive, the Landfill Directive, and packaging waste legislation. The study aims to identify the political, institutional, financial, technical and administrative factors that drive these differences, and to draw lessons for improving the coherence and effectiveness of EU sustainability governance. The research is conducted as part of a master’s thesis at the Centre International de Formation Européenne (CIFE), within the Master’s Programme in Global Economic Governance and Public Affairs.

Interview Process: The researcher will conduct semi-structured interviews with experts and practitioners to gather insights on national and regional implementation experiences, governance structures, administrative capacity, policy design, and enforcement mechanisms in Greece and Spain. Participants’ expertise will be used to develop a deeper understanding of why implementation outcomes differ between Member States and what lessons can be drawn for EU sustainability governance.

Consent Agreement:

1. **Voluntary Participation:** Your participation in this study is entirely voluntary, there is no obligation to participate.
2. **Right to Withdraw:** You have the right to withdraw from the study at any time, for any reason, without having to explicate them. In this case, all the data related to your interview will be deleted and not utilised in the study.
3. **Interview Methods:** Interviews may take place by video call utilising platforms such as Google Meet or Microsoft Teams.
4. **Recording and Data Handling:** Interviews will be recorded for reliability and transcription purposes. The recordings will be deleted once the study is complete.
5. **Data Analysis:** The data collected from the study will be coded using a thematic analysis and referred to in the study.

6. **Confidentiality:** Your responses will be treated as confidential, and no personal data will be disclosed in the report without your prior consent. Where anonymity is requested, you will be referred to by a *Participant Code* or pseudonym rather than your name or institutional affiliation.

Consent Statement: By signing below, I acknowledge that I have read and understood the information provided above. I consent to participate in this study and to the collection, assessment, and display of data gathered during the interview(s). I consent to the use of audio recordings throughout the interview(s). I accept that my participation is voluntary, and I retain the right to withdraw my permission at any time without consequence.

Participant's Signature: _____

Participant's Name (Printed): _____

Date and location: _____

Appendix C

Thematic Coding Framework

The following table presents the thematic coding framework developed for the qualitative analysis of expert interviews. Eight overarching themes were identified, each disaggregated into specific codes that capture the key analytical dimensions emerging from the interview data.

Table 5: Thematic Coding Framework (Author, 2026)

Themes	Codes
State of waste management implementation	Country performance overview
	Structural challenges and constraints
	Best practices and recommendations
Governance and institutional coordination	Multi-level governance and decentralisation
	Inter-ministerial and inter-level coordination
	Regional disparities and territorial factors
	PPWR implementation challenges
Administrative capacity and resource allocation	Funding and EU absorption capacity
	Staffing and expertise gaps
Extended Producer Responsibility (EPR)	PRO effectiveness across waste streams
	Eco-modulation as design incentive
	Transparency and PRO accountability
	Online marketplaces and EPR coverage gaps
	Accountability and fragmentation of schemes
	Catalan-Spanish legislative tension
Separate Collection Obligation (SCO)	Infrastructure and implementation gaps
	Door-to-door collection and regional models

Themes	Codes
	Citizen engagement and education
Political drivers and socio-economic constraints	Technology and game-changers
	Mediterranean replication of best practice
	Secondary materials market volatility
	Geography, climate, and social acceptance
	Upstream prevention and consumption
Enforcement and policy instruments	Enforcement vs. implementation gap
	Economic instruments (landfill tax, DRS)
	Ecodesign and upstream product requirements
Future policy evolution and simplification	Regulatory burden and simplification risks
	Clean Industrial Deal and Circular Economy Act
	Social dimension and urban circularity

Appendix D

Table 6: Greece's Drivers of Progress and Structural Barriers summary (Author, 2026)

Dimension	Drivers of Progress	Structural Barriers
Implementation Outcomes	External pressure from CJEU infringement procedures and escalating financial penalties has compelled gradual closure of illegal landfills and revision of national waste strategies (Efthymiou et al., 2026; GR-CEE1, Personal Communication, 2026).	Landfilling accounts for ~80% of municipal waste treatment; recycling rate at ~20% and material circularity rate at ~6%, both approximately half the EU average. Greece is at risk of missing the 2025 (55%) and 2035 (10% landfill) targets (Directorate-general for Environment, 2023; GR-CEE1, Personal Communication, 2026).
Governance and Coordination	RRF conditionalities and EU cohesion fund requirements impose implementation milestones, functioning as a partial substitute for domestic enforcement capacity (Zisis, 2022).	Chronic horizontal and vertical fragmentation across three ministries, thirteen regional bodies, and 325 municipalities generates a 'circularity of blame' and a bio-waste governance deadlock. Central government retains financial control without ensuring flow to operational actors (GR-CEE1, Personal Communication, 2026; GR-CEE2, Personal Communication, 2026).
Administrative Capacity	Nominal financial commitments through “Greece 2.0” and EU structural funds provide a resource base, when absorbed, for	Pervasive under-capacity at all tiers, quantitative (understaffing) and qualitative (skills mismatch). Low EU fund absorption rates. Monitoring and enforcement

	infrastructure development (Zisis, 2022).	structures remain weak. Local authorities lack specialised staff to design or operate integrated waste management systems (Directorate-General for Environment, 2025a); GR-CEE2, Personal Communication, 2026; GR-CEE1, Personal Communication, 2026).
Technology Integration	Innovative approaches exist (e.g., zero-waste thermal co-processing; anaerobic digestion); EU funding has supported some sorting centre construction (Sikalidis & Emmanouil, 2019).	Reliance on co-mingled collection and MBT plants rather than source-separated streams. Composting and biogas infrastructure absent at scale. AI-assisted sorting systems underemployed. Industry engagement with circular technologies remains superficial (Trigkas et al., 2020; GR-CEE1, Personal Communication, 2026).
Adaptation to Evolving Legislation	Formal transposition of successive WFD amendments and Law 4819/2021 demonstrates nominal legislative responsiveness. Derogation provisions have been used to negotiate extended attainment timelines (Directorate-general for Environment, 2023).	Repeated postponement of economic instruments (landfill tax legislated 2012, applied 2022–2023); PAYT schemes nascent; regional waste plans not updated since 2020. PPWR's direct applicability and expanded EPR obligations under revised WFD represent a step-change in compliance demands that existing governance structures are ill-equipped to absorb (GR-CEE1,

		Personal Communication, 2026; de Sadeleer, 2025).
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Table 7: Spain's Drivers of Progress and Structural Barriers summary (Author, 2026)

Dimension	Drivers of Progress	Structural Barriers
Implementation Outcomes	National recycling rate improved from ~39% (2020) to ~43% (2022); packaging recycling reached ~69%; landfill rates reduced from >60% (2000–2007) to ~40–45% (ES-CEE2, line 10). Catalonia: 47% separate collection, 34–35% recycling; closure of 1,000+ uncontrolled landfills since 1993 (ES-CEE3, Personal Communication, 2026).	Spain missed the 2020 50% recycling target, triggering an infringement procedure. CMUR at 8.5%, below the EU average of ~12.2%. At risk of missing the 2025 (55%) and 2035 (10% landfill) targets. Spain overall recycling below 20%. Catalan landfill still at 31% versus 10% target (Directorate-general for Environment, 2023; ES-CEE3, Personal Communication, 2026).
Governance and Coordination	Regional autonomy permits Catalan policy innovation under the Statute of Autonomy. ARC provides specialised institutional infrastructure (250 staff). National Waste Coordination Committee established. <i>Mancomunitat</i> model aggregates small-municipality capacity (ES-CEE1, Personal Communication, 2026; ES-CEE3, Personal Communication, 2026).	<i>Quasi-federal</i> structure creates a 'two-speed' implementation model. MITECO lacks direct enforcement power over ACs or municipalities. Over 8,000 municipalities of highly unequal capacity. Creeping centralisation tendencies generate jurisdictional friction (e.g., PRECAT2020 court challenge). Island territories face disproportionate burdens (Hooghe & Marks, 2001; ES-CEE2, Personal Communication, 2026; ES-CEE3, Personal Communication, 2026).

Administrative Capacity	Spain is the second-largest RRF beneficiary; hundreds of millions in ERDF and RRF resources allocated to circular economy. ARC's 30-year accumulation of technical expertise. Catalan model of regional technical assistance to municipalities (ES-CEE1, Personal Communication, 2026; ES-CEE3, Personal Communication, 2026).	Structural understaffing in technical expertise, not funding, is the binding constraint at regional and local level. Capacity-building transfer to other ACs has had limited operational impact. Structural understaffing in environmental agencies for circular economy roles. Cascading of Law 7/2022 obligations incomplete at municipal level. Political volatility can override technical strategy (ES-CEE2, Personal Communication, 2026; ES-CEE3, Personal Communication, 2026; Sobrino-García, 2025).
Technology Integration	Catalan DDC system operating in ~450 municipalities and 1 million inhabitants, delivering 2.5× more biowaste, 20% more paper, 50% more glass, 20% more packaging, with 2.4× residual reduction. ENERKEM gasification project under development; consolidation of small landfills underway. National DRS in legislative deployment (ES-CEE3 Personal Communication, 2026; ES-CEE2, Personal Communication, 2026).	Heavy reliance on MBT plants whose outputs will not count from 2027. Composting and anaerobic digestion capacity insufficient outside leading regions. DRS deployment for November 2026 widely regarded as unachievable. ENERKEM scaling delayed 14+ years. 'Smart closed containers' classified as equivalent to DDC despite quality-control gap (ES-CEE3, Personal Communication, 2026).
Adaptation to Evolving Legislation	Law 7/2022 among the most ambitious national waste legislation in the EU, partly informed by draft	Operational implementation of Law 7/2022 at local level is uneven. EPR governance

	Catalan law. Catalonia anticipated EU obligations by 25 years (e.g., 1993 biowaste collection mandate). National landfill tax and textile EPR legislative basis established. PPWR direct applicability welcomed by leading regional administrations (Jefatura de Estado, 2022; ES-CEE3, Personal Communication, 2026).	fragmentation within Spain, schemes authorised in Madrid but must negotiate with each of 17 ACs separately. PROs powerful and resistant to adapting fee structures and operational standards to meet the varying requirements of individual ACs. Eco-modulation implementation essentially absent. Online marketplace imports create EPR coverage gaps. Regulatory 'simplification' narrative generates investment uncertainty (ES-CEE2, Personal Communication, 2026; ES-CEE3, Personal Communication, 2026; Dolan, 2026).
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Appendix E

The Catalan's tax refund model

Source: ES-CEE3, Personal Communication, 2026

One of the most inventive policy tools enacted in Catalonia to enhance waste management effectiveness is its landfill and incineration tax refund model. Introduced alongside the Catalan landfill tax in 2004 and the incineration tax in 2008, this system integrates economic penalties for waste disposal with financial rewards for recycling and separate collection. This mechanism has been a pivotal factor in Catalonia's superior waste management performance relative to numerous other Spanish regions.

The model functions through a dual incentive framework frequently referred to as a “stick and carrot” strategy. Municipalities are required to pay a tax when residual waste is disposed of in landfill or incineration facilities. Over the years, these taxes have been gradually increased to make disposal options pricier and thus less appealing. By 2026, municipalities will pay €75 per tonne of waste sent to landfill and €37.5 per tonne for waste sent to incineration facilities. Coupled with treatment fees, the total disposal cost can surpass €120 per tonne for landfill operations.

However, unlike many other tax systems, the revenues generated from this model do not go into the general government budget. Rather, the Waste Agency of Catalonia collects the tax revenues and redistributes them to municipalities that effectively implement separate collection systems. The refunds depend on both the quantity and quality of the separately collected waste, especially biowaste. Municipalities can receive compensation for treatment costs along with additional payments for collection activities, providing a direct financial reward for improved waste separation performance.

This refund mechanism aligns financial incentives with the waste hierarchy outlined by the EU. Disposal through landfill and incineration becomes increasingly expensive, while prevention, separate collection, recycling, and biological treatment turn into financially appealing alternatives. ES-CEE3 characterized the system as a “stick and carrot” strategy, where municipalities incur taxes for disposal while being reimbursed for pursuing sustainable waste

management practices. He also likened the mechanism to a “Robin Hood” model, since revenues generated from landfill and incineration are redirected toward prevention, recycling, and recovery initiatives.

The tax refund mechanism has significantly contributed to enhancing separate collection and recycling performance in Catalonia. ES-CEE3 further remarked that European institutions have showcased the Catalan model to other nations as an exemplary instance of how economic instruments can facilitate the transition toward higher recycling rates and decreased landfill use. Thus, the Catalonia case exemplifies how economic incentives can work in tandem with regulatory measures to motivate municipalities to embrace more sustainable waste management practices.