

DEFENSE ENVIM THESIS TOPICS

POST-MASTER ®

INTERNATIONAL ENVIRONMENTAL MANAGEMENT ENVIM
ACADEMIC YEAR 2023-2024

NOVEMBER 6TH, 7TH AND 26TH
DECEMBER 3RD, 4TH





The Post-Master EnvIM is designed for young graduates holding a master's degree or young professionals who wish to complete their curriculum with a specialization for ecological transition, to be part of the management of environment and energy issues and solutions, in an international context.

Participants in this training program, which is based on an innovative and practical pedagogy, will have the rare opportunity to study from local and international projects, thanks to the wealth of many case studies, and to the industrial partners and experts.

EnvIM is the result of a 16 years of experience with international and european partners, leading to the International Post-Master's Degree from MINES Paris PSL, Mastère Spécialisé certified by Conférence des Grandes Ecoles CGE.

EnvIM program is offered in english language. Participants can benefit from the variety of backgrounds of students coming from various countries and various initial academic pathways, creating a multi cultural context for studying together and sharing experiences.

The program deals with all the challenges for ecological transition, using systemic approaches and tools for decision makings, a rich generalist pathway on environmental management. This programme is designed for professionnall project in relation with international challenges of environmental issue.

Participants can benefit from the variety of backgrounds of students coming from various countries and various initial academic pathways, creating a multi cultural context for studying together and sharing experiences. The common core program deals with all the challenges for ecological transition, using systemic approaches and tools for decision makings. They will learn and apply new knowledge's, unfolding new abilities, depending on their aspiration during 6 month internship in a company.

This document presents the 18 professional thesis topics for the 2023 - 2024 Promotion of the post-master. The defense thesis will take place at the École des Mines de Paris, 60 boulevard Saint-Michel, from 6 to 26 November 2024, then on 3rd and 4th December according to the schedule.

INTRODUCTION



DEFENSE ENVIM THESIS TOPICS POST-MASTER® INTERNATIONAL ENVIRONMENTAL MANAGEMENT ENVIM ACADEMIC YEAR 2023-2024



November 6th 2024

L312

Alexandre SCHAMBERGER - *SETEC*

8h45

To what extent can project managers respond to the current challenges of the circular economy, particularly regarding reuse and demountable/adaptable design, and what strategies and tools should they adopt to anticipate future regulatory requirements and align their projects with the ambitions of the extended circular economy on the territorial scale ?

Zhao LIU - *Crédit Agricole Assurance - Pacifica*

10h

Pathway to Net Zero for Insurance Companies : a Study on Insurance-Associated Emissions of Home Insurance in France.

Éva TAVARES - *SETEC International - Lima*

15h45

Highways of progress and paths of conflict: between development, controversy and unequal environmental and social impacts.

November 7th 2024

L120

Tanguy LARCHER - *EDF LAB Saclay*

11h30

What business model would make investing in rooftop PV and battery storage profitable for residential clients ?

DEFENSE ENVIM THESIS TOPICS POST-MASTER® INTERNATIONAL ENVIRONMENTAL MANAGEMENT ENVIM ACADEMIC YEAR 2023-2024



November 26th 2024

L120

Nour EL KOREK - *Danone*

10h

Adopting SAI framework to enhance sustainability outcomes for water and biodiversity within the private sector: the case of Danone.

Haocheng YANG - *REXEL*

11h15

Raw material assessment of Rexel France : quantification, risks and opportunities with wood and copper.

December 3rd 2024

L312

Mateo DELAVEAU - *URBANOMY*

9h30

The voluntary sector and the challenge of decarbonization.

Victoire DUMONT- *RE(SET)* - **Confidential**

10h45

Deploying Industrial and Commercial Packaging Reuse.

Martin BERNARD - *DECATHLON Water Sport Center* - **Confidential**

13h30

Recycling of soft PVC-based products : stakes, technologies and applications.

Xingci CHEN - *Céline* - **Confidential**

14h45

Sustainable Architecture in the Luxury Industry : Integrating Sustainability, Supplier Partnerships, and Consumer Behavior for Long-Term Growth.

Dylan GORDON - *FracTracker Alliance*

16h

Remote Sensing and GIS-Based Characterization of Hydrocarbon and Hazardous Gas Emissions in the Marcellus Shale: Insights for Mitigation and Prevention.

THÈSES PROFESSIONNELLES

MASTÈRE SPÉCIALISÉ EEDD PARCOURS EXECUTIVE MANAGEMENT GLOBAL DE LA RSE ET DU DÉVELOPPEMENT DURABLE (RSEDD)

2023-2024



December 4th 2024

L312

9h

Lucie LAMBRETH - *BL Evolution*

How can financial actors effectively build pragmatic and ambitious biodiversity strategies ?

10h15

Cordélia PELLETIER DE CHAMBURE - *QUANTIS* - **Confidential**

How is sustainability integrated into the innovation process within the private sector for consumer goods (food & beverage, fashion & cosmetics)?

11h30

Aurélie BRUNSTEIN - *Réseau Action Climat*

Prospective Study on the Decarbonisation of the French Primary Steel Industry.

15h45

Elie MATAR - *SUEZ SA*

Key Factors Influencing the Success of Waste Management in the Middle East: Regulatory, Cultural, and Environmental Perspectives with Lessons from Global Practices.



**Alexandre
SCHAMBERGER**

Engineer
in Energy
and Environmental
Engineering

INSA Lyon

To what extent can project managers respond to the current challenges of the circular economy, particularly regarding reuse and demountable/adaptable design, and what strategies and tools should they adopt to anticipate future regulatory requirements and align their projects with the ambitions of the extended circular economy on the territorial scale ?

This study focuses on the role of the Engineers (MOE in French) and Owner's Representative (AMO in French) in implementing the Circular Economy in the building construction and deconstruction sector and will be structured in two main parts: an analysis of operational challenges and an exploration of methodological tools for an extended circular economy.

The first part will focus on the operational challenges faced by MOEs and AMOs in implementing circular economy. For SETEC, it is important to have a clear vision of these obstacles in order to effectively integrate circular economy concepts into their projects. This section will begin with an analysis of the current legislative and regulatory framework impacting the activities of MOE/AMO. The question of how future legislation and regulations will evolve will also be addressed, based on the notions of "weak circularity" and "strong circularity" (Aggeri, 2023). We will explore how extended circularity could transform current practices by adopting more innovative methods such as "design for deconstruction", requiring greater investment in terms of financial resources, time and training.

The second part will focus on the methodologies and tools that can be developed to anticipate regulatory changes and scale up their projects to the extended circular economy. An analysis of the current tools used by SETEC will be carried out, which we will describe as surface performance (Ntsondé and Aggeri, 2022).

The new regulatory framework introduced by the European Commission, the EU Taxonomy, will be analyzed. This framework pushes towards a more ambitious and integrated circular economy, encouraging deeper performativity. We will examine the activities recognized as eligible by the EU Taxonomy, and the new methodologies and tools it introduces. The work of CAP2030 will also be analyzed.

This work currently focuses on defining a framework of indicators for the circular economy, focusing on eco-conception in the construction sector. An interim version was provided to SETEC as part of an initial testing phase, aimed at gathering feedback from experts to improve and refine the indicator framework. The aim in this work is to identify what construction methods and indicators are going to be used in the future, in order for SETEC to be prepared. This analysis will be illustrated by a number of case studies to provide a better understanding of the challenges and opportunities facing players in the sector.

Contractualization during the project design phase will also be discussed. Contractualization is an important lever for the effective implementation of circular economy in projects. Information from the scientific literature on innovative best practices will be incorporated to suggest improvements to SETEC.

This thesis aims to provide a clear vision of the challenges and opportunities of the circular economy, as well as practical tools to overcome them. By acculturating teams to the principles of the circular economy and proposing concrete, adaptable solutions, SETEC will not only be able to meet current regulatory requirements but will also have a clear vision of future regulatory and technical innovations in the sustainable construction sector.



**Zhao
LIU**

Pathway to Net Zero for Insurance Companies : a Study on Insurance-Associated Emissions of Home Insurance in France

PENN Multi-
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Master of
Environmental
Studies

University
of Pennsylvania

China

The insurance industry faces significant challenges in aligning with global net-zero targets, particularly due to the complexities associated with insurance underwriting, notably Scope 3 emissions—those indirect emissions that occur throughout a company's value chain (PwC, 2024).

This study seeks to address the pivotal question: How can insurance companies accurately measure and reduce insurance-associated emissions to align with net-zero goals? The context of this research is rooted in the increasing regulatory pressures and societal demands for the insurance sector to play a more effective role in climate change mitigation.

Previous studies have highlighted the difficulties in quantifying Scope 3 emissions, particularly for insurance companies, where indirect emissions often overshadow direct operational emissions (Accounting for Sustainability, 2024). The complexity is further exacerbated by the lack of standardized methodologies tailored to the insurance industry. Recent developments, such as the introduction of the Partnership for Carbon Accounting Financials (PCAF) standards and the Corporate Sustainability Reporting Directive (CSRD), underscore the need for industry-specific approaches to emissions accounting. (SBTi, 2023)

The objective of this study is to clarify the definitions of Scope 3 emissions and discuss what should be covered in Scope 3 reporting for insurance companies. Additionally, the study aims to demonstrate a Scope 3 emission calculation methodology using the case of home insurance in France, covering emissions linked to both the management of insurance claims and insurance portfolios. What distinguishes this study from prior research is its focus on home insurance—a sector for which no previous standards or guidelines exist, unlike the more established guidelines for commercial and personal car insurance lines (PCAF, 2022b).

The study will be conducted within a defined perimeter, focusing on the French home insurance market, with a specific emphasis on data sourced from regulatory bodies such as ADEME (Agence de l'Environnement et de la Maîtrise de l'Énergie) and other industry-specific databases. The expected outcomes include a preliminary framework for Scope 3 emission calculation in home insurance and practical recommendations for emission reduction strategies tailored to the French market.

However, challenges such as data availability and accuracy, particularly in estimating emissions related to insurance claims management, may arise. This work is unprecedented in France. At the author's institution, Crédit Agricole Assurance, where the team is also exploring methods to calculate and estimate the underwriting emissions of home insurance portfolios in collaboration with several partners. To mitigate these risks, the study will utilize proxies and draw upon existing standards and guidelines from other industries, such as commercial and personal car lines, to develop a method for calculating emissions for home insurance.

By grounding the study in relevant bibliographic references, including recent advancements in (greenhouse gases) GHG accounting standards, the latest regulatory developments, and ongoing efforts related to net-zero goals within the insurance industry, this research aims to contribute significantly to the fields of carbon accounting and net-zero targets within the insurance sector

Crédit Agricole Assurances – Pacifica – Paris



**Eva
TAVARES**

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Highways of progress and paths of conflict : between development, controversy and unequal environmental and social impacts.

The development of highway infrastructure has been considered as a symbol of progress by contributing to economic growth, connectivity and development. However, these projects often spark controversy due to their environmental and social impacts, particularly in the last decades.

This study, titled Highways of progress and paths of conflict: between development, controversy and unequal environmental and social impacts, aims to critically examine the different perceptions and realities surrounding highway projects in both developed and developing countries.

The first part of the study focuses on societal perceptions and controversies through two key case studies : the A69 project in France, representing current trends toward low-carbon development and anti-urbanization movements, and another similar highway project in a developing country (to be defined).

These cases illustrate the contrasting arguments and discourse surrounding the debate on highway infrastructure, particularly in light of growing environmental concerns. Moreover, structural differences between highway networks in developed and developing countries will be analyzed, highlighting disparities in road density, integration with public transportation systems, to give a better understanding/ context of the difference of perception.

The study also explores the long-term economic benefits of such projects, including increased foreign investment, improved local business competitiveness, and enhanced access to essential services such as education and healthcare.

The second part of the research investigates the environmental and social impacts of highway projects, focusing on the case of the Nueva Carretera Central (NCC) in Peru. As a national priority for developing transport infrastructure, the NCC presents a unique case to study both its benefits and its environmental and social costs. The project's environmental and social impacts will be analyzed against the planned innovative approaches aimed at mitigating them. By comparing the NCC to similar international projects, the study will evaluate the effectiveness of planned mitigation measures versus the actual outcomes, acknowledging the massive scale and unavoidable destruction of the NCC despite these efforts.

Finally, the research delves into the financial dynamics underpinning highway projects, investigating who ultimately benefits from these large-scale investments. Financial stakeholders, including investors and governments, profits from tolls and taxes, while local communities often bear the burden of environmental degradation, loss of agricultural land, and disrupted livelihoods... This section will analyze the unequal distribution of economic benefits and environmental and social costs, critically assessing the role of policymakers, investors, and corporations in managing these imbalances.

Expected findings from this study include a nuanced understanding of the controversial role highway projects play in fostering development while simultaneously exacerbating environmental and social inequalities. Recommendations will focus on more equitable strategies for future infrastructure projects, balancing progress with sustainable development goals



**Tanguy
LARCHER**

Engineer

INSA Bourges

What business model would make investing in rooftop PV and battery storage profitable for residential clients ?

As the global community faces the big challenge of climate change, the necessity for a sustainable and resilient energy production mix has never been more pressing. Increasing the share of renewable energy sources (RES) in the energy mix has significant implications for energy systems, particularly regarding the need for energy storage and flexibility.

Indeed, the increased share of RES in the electricity mix introduces intermittency, which must be balanced with flexibility for the grid or "grid flexibility". Supporting grid flexibility can involve notably demand response programs, smart grids, and grid modernization.

However, the economic and regulatory framework structures the implementation of this grid flexibility, as well as the pace of RES deployment.

The current European regulations and policies encourage the development of distributed renewable energy sources, such as rooftop PV. In this context, distributed flexibility solutions such as stationary batteries (BESS) and/or electric vehicles, could become relevant investments.

This situation raises multiple questions. Specifically, our team was asked to focus on residential consumers : what business model would make investing in rooftop PV + BESS profitable for residential clients? (i.e. How will EDF create and capture value in this scenario)

Hence, we performed a techno-economic analysis in order to compare business models and identify the economic and technical parameters affecting their profitability. To support our analysis, we compared our results within different markets: France, Belgium, Italy and the UK.

In this study the first step was to collect information to paint a picture of the technical, regulatory and economic framework. This allowed us to identify the theoretically relevant business models, as well as the key parameters which shape them. The next step consisted in looking for the value of the identified parameters in the different countries.

One structuring parameter was the households' electricity consumption. Therefore, we looked for representative for residential households' consumption among 5,000 simulated load curves.

At the heart of this work, we built several Excel tools (one per country), which computes financial KPIs for an investment in PV + BESS by a residential consumer, such as the NPV, IRR, savings on the electricity bill, etc.

Per my suggestion, we also coded programs in python to compute results from the simulated load curves. Finally, we compared the KPIs' results between the business models and between the countries, together with several sensitivity analysis. This brought out profitability thresholds, according to which we were able to rank the proposed business models.

EDF LAB Saclay



**Nour
EL KOREK**

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Adopting SAI framework to enhance Sustainability Outcomes for water and biodiversity within the private sector : the case of Danone

The critical limits of several planetary boundaries, including freshwater use and biodiversity integrity, have been exceeded. This indicates that vital resources essential to our ecosystem urgently require protection and restoration. Simultaneously, global, and EU-level actions are being implemented to address these issues by strengthening mandatory regulations and promoting the adoption of voluntary reporting frameworks.

In this context, and from a double materiality perspective, rigorous efforts need to be put in place to accelerate sustainable interventions and mitigate negative impacts on water and biodiversity, especially within the scope of the private sector. With more rigid reporting requirements looming in the nearby future, it is important for private actors to anticipate these changes by countering rapidly their environmental impacts.

Danone, a leading global food, and beverage company is committed to enhancing its sustainability efforts through its comprehensive sustainability roadmap, "Danone Impact Journey," which focuses on three pillars: health, nature, people, and communities, driving sustainable impact by 2030. Danone has taken several key approaches to improve its sustainability performance in the areas of water and biodiversity.

This is evident in the Danone Impact Journey Report on Water, which outlines the company's 2030 strategy for water preservation at both global and local scales. The implementation of water stewardship projects is central to this strategy, aiming to generate positive water impacts within the landscapes where Danone operates.

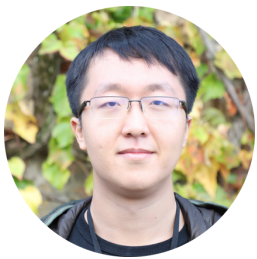
However, water stewardship projects face numerous challenges, ranging from a lack of relevant data to financial and technological barriers that limit their implementation in certain contexts. Given their complexity and importance, adopting the right methodology to drive the implementation of these projects is key to achieving their nature related ambitions.

Integrating scientific principles and methods can be an effective approach for businesses to drive water stewardship projects. The Sustainable Agriculture Initiative Platform for agriculture regeneration, also known as SAI, is a coalition of member companies in the food & Beverage sector aiming to accelerate the spread of sustainable agriculture practices, focusing mainly on regenerative agriculture.

They developed a framework process flow to facilitate the development of local regenerative agriculture transition plans for suppliers and farmers. Given the above, this thesis proposal suggests assessing the role of SAI in potentially facilitating the implementation of water stewardship projects at the level of Danone's agriculture supply chain.

The secondary aim of this thesis is to evaluate its effectiveness in driving measurable outcomes for nature and, potentially understanding the limitations and drivers that influence its implementation.

DANONE - Paris



**Haocheng
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Raw Material assessment of Rexel France : quantification risks and opportunities with wood and copper

As a prominent French electronic distributor, Rexel occupies a unique position as a bridge between customers and manufacturers, allowing the company to play a crucial and advantageous role in reducing environmental impact across its value chain. Simultaneously, the environmental impact of its products could also affect the profitability of the group from both directions, making a sufficient management of it especially demanding.

Along with the development and application of the tools such as the Carbon Tracker, Rexel, a prominent French electronic distributor, has established a leading position in comprehensively understanding the carbon footprint of the products it sells while actively pursuing its ambitious goal of sustainability. However, there remains a notable gap regarding the raw material consumption and natural resource depletion within the company's product portfolio.

Considering the impact of the life cycles of certain materials, such as copper and aluminium, that the company lives upon, and the growing tension in supply as a result of energy transition, raw material poses great environmental as well as business threat no less than carbon footprints.

Considering the background of a dynamic legal framework as a result, this study seeks to bridge that gap by developing a methodology that combines sales data, logistics information, as well as Product Environmental Profile (PEP) to provide an estimation of the quantity of raw material consumed, in order to offer Rexel a clearer picture of its resource use and potential areas for improvement.

With a risk mapping, the study reveals that two specific materials--copper and wood-- stand out in terms of both quantity and highly concentrated usage in certain products. Copper, being a key component in electrical products especially in cables, and wood, commonly used in packaging and infrastructure, are critical to the group's operations, but the over-dependency on these materials makes the company vulnerable to price volatility, foreseen inefficient supply, regulatory shifts, and unnecessary costs.

In light of these findings, this study recommends that Rexel consider strategic measures to mitigate its over-dependence on the two materials. These measures could include diversifying supply sources, exploring alternative materials, and promoting reverse logistics. By addressing these vulnerabilities, Rexel can enhance its resilience against material shortage and price spikes ensuring more stable and sustainable operations.

REXEL - Paris



**Mateo
DELAVEAU**

Engineer in Energy
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The voluntary sector and the challenge of decarbonization.

The fight against climate change is a major issue of our time, requiring concerted action from all sectors of society, including the voluntary sector. As governments and businesses take steps to reduce their carbon emissions, non-profit associations are also faced with the need to integrate decarbonation into their strategies. This thesis examines the following problem :
“Decarbonization: obstacle or opportunity for the associative world ?”

Based in particular on a practical case I had the opportunity to work on during my internship, it explores the specific challenges and opportunities faced by associations in the context of the ecological transition.

The first part of this study looks at the particular challenges that decarbonization imposes on associations. Time constraint is an essential factor to have in mind, with regulatory deadlines fast approaching, forcing associations to react swiftly.

At the same time, they have to navigate an often unclear and uncertain regulatory framework, which complicates the implementation of long-term strategies. Sector-specific constraints, such as limited financial and extra-financial resources, volunteering, and the complexity of reconciling environmental objectives with their core missions, add a further layer of difficulty.

The second chapter explores the construction of the ecological transition for non-profit organizations. This section first looks at the legitimacy of the transition, highlighting the issues at stake and the specific features of the associative sector. It then explores the levers and opportunities available to support this transformation. Finally, it looks at the feasibility of this transition, both financially and structurally, while highlighting exemplary initiatives.

This second section is partly based on the carbon accounting of the Foyer Notre-Dame des Sans Abris, a non-profit organization based in the Lyon metropole area. This case study does not replace in-depth research but adds a more concrete dimension to the subjects covered.

Finally, the third chapter analyzes the place of associations in the global decarbonization movement, examining their interactions with other sectors and their potential to become leaders in this field. Cross-sector synergies are essential to maximize the impact of decarbonization initiatives (someone’s scope 1 is someone’s else scope 2 and 3!).

Associations can play a central role in mobilizing communities and influencing public policy, thanks to their proximity to citizens and their ability to raise awareness and educate on climate issues.

In short, this thesis aims to demonstrate that, far from being a mere obstacle, decarbonization offers a unique opportunity for the associative world to reassert its key role in the ecological transition and make a significant contribution to a sustainable future.

URBANOMY – Paris



**Victoire
DUMONT**

Master of Public
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Deploying Industrial and Commercial Packaging Reuse.

As a new Extended Producer Responsibility (EPR) Scheme is set to be implemented in France starting 1st of January 2025 for industrial and commercial packaging (ICP), a new financial stream will be unlocked to support the supply chain in reducing, reusing, and recycling the deposit of 7.3 million tonnes of ICP. This study will focus on the reuse of ICP packaging.

Currently, 50 to 53% of ICP is estimated to be reused. That's more than one over two though we observe a strong heterogeneity in reuse performance among ICP types. Multiple obstacles to ICP reuse have been identified in the ADEME prefiguration study for ICP EPR scheme published in 2024, including the need for more knowledge of existing solutions and the lack of coordination between stakeholders.

This study aims to provide ICP users with an operational playbook on deploying industrial and commercial packaging reuse and aims at addressing those two challenges.

We will focus on ICP which will be covered by the new EPR scheme and will first analyze the current state of ICP reuse based on the literature review, which enables to establish the list of 50 ICPs expected to be covered by the new EPR scheme which will define precisely the perimeter of the study, this list being validated by ADEME.

Then, will be identified the different types of ICP users based on their regulatory obligations as well as economic and logistic constraints, then a focus on identifying the stakes of ICP reuse for each type of users based on regulation, market analysis and impact studies.

Then, a set of 50 targeted interviews of ICP manufacturers, service providers powering reuse and users addressing or using the ICP identified will enable the identification of the drivers, existing solutions, and restraining factors for reuse.

All the service providers and manufacturers sourced for the interview which power ICP reuse will be gathered in a digital platform. This platform will be designed for ICP users to tackle the problem of need for knowledge of existing solutions and will be delivered with a step-by-step methodology on ICP reuse rollout for each user type.

RE(SET) - Paris



**Martin
BERNARD**

Recycling of soft PVC-based products : stakes, technologies and applications.

Polyvinyl chloride, also called PVC, is the third most widely used synthetic plastic polymer derived from petroleum, obtained in a powder or granulate form, before being transformed into soft or rigid components. Particularly, the global volume of “soft” PVC components is increasing steadily in the natural world, and its toxicity is significantly higher than that of other plastic components. This is notably linked to its inherent chlorine content and high amount of additives, risking to be liberated during the manufacturing and end-of-life phases.

Thus, the traditional disposal of non-biodegradable soft PVC wastes causes serious environmental issues. In this context, the recycling option appears as an interesting alternative.

In this context, great progress has been made concerning PVC recycling regulations over the past decades. In France particularly, an updated framework known as Extended Producer Responsibility (EPR), put in place from 2022 a new product category, including notable soft PVC products. Thus, these regulations contribute to the collection development of such post-consumer products through eco-organisms, but not always to an effective disposal.

For instance, while diverse technologies and innovations have already proven an effective mechanical recycling of any mono-material soft PVC product, it isn't the case of multi-material soft-PVC based products, included in this study perimeter. Indeed, separating the PVC part from other components (such as metals, plastics, textile), being technically feasible, still represents a challenge nowadays. This is amongst others what is specific in this study and what will be brought to it. Therefore, in this paper, we propose to study how to develop a semi-closed-loop recycling flow for multi-material soft PVC products, while considering the main challenges it implies for a distributor : a case study within Decathlon company will contribute to the answer.

The main reason for this study reflects the company needs and benefits for a dedicated recycling project, to be deepened through this internship, while fulfilling the requirements for the Post-master. Thus, the associated study objectives are intrinsically linked to this project.

First, the aim will be to understand a specific collection flow organization when addressing a recycling project, particularly when an ERP is involved. In this way, both qualitative and quantitative findings are expected, by identifying and characterizing the available feedstock of Decathlon products that will be used for the project, as well as studying stakes and opportunities to increase this feedstock.

The second objective will be to identify, validate, and consolidate the best technical solutions for soft PVC automated sorting, avoiding manual steps requirements. In order to do this, a global literature review of the current technologies available will be performed, combined with an overview of the current key players in this sector. The main technologies identified will then be compared, both before and after being tested on Decathlon's products. Simultaneously, a last objective will be to identify integration pathways of recycled PVC, with a methodology to validate them, as well as outlets applicable to Decathlon's products.

Finally, the main obstacle I might be facing is related to the time required for the organization and realization of the experimental part. However, by anticipating and optimizing each step of the project, this obstacle will be overcome

Decathlon Water Sport - Hendaye



**Xingci
CHEN**

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China

Sustainable Architecture in the Luxury Industry : Integrating Sustainability, Supplier Partnerships, and Consumer Behavior for Long-Term Growth

The luxury industry has often been criticized for greenwashing and lacking actual sustainability initiatives. However, as one of the forward-thinking brands within the largest luxury group, LVMH, CELINE is taking concrete steps to address such concerns.

This paper examines the implementation of sustainability within the luxury industry, focusing on CELINE's architectural practices and integration of sustainability within several stakeholders, including cross-functional departments, suppliers, and consumers.

The paper begins by contextualizing the evolving role of sustainability in luxury, exploring industry-wide initiatives, and analyzing sustainable architecture and related strategies in different brands.

Particularly, CELINE's architectural sustainable solutions have been introduced and analyzed, including the implementation of existing initiatives and innovation ideas for future projects. CELINE not only focused on aligning with LVMH's LIFE 360 strategy, but also committed to developing innovative initiatives and striving to be a pioneer in sustainability within the luxury industry.

The study also links sustainability to consumer behavior and branding, underscoring its influence on brand perception and marketing opportunities. The findings offer valuable insights into how luxury brands can integrate sustainability, suppliers, and evolving consumer expectations to achieve long-term success.

LVMH, Céline



**Dylan
GORDON**

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in Applied
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US Citizen

Remote Sensing and GIS-Based Characterization of Hydrocarbon and Hazardous Gas Emissions in the Marcellus Shale : insights for Mitigation and Prevention.

Pennsylvania's energy landscape is shaped by a complex network of energy operations, which have played a significant role in the United State's industrial history and continues to influence its economic landscape today. In recent decades, the focus has shifted from coal to natural gas.

The state's historical and ongoing reliance on these industries has led to widespread concerns about hazardous gas emissions, which are often difficult to monitor due to the dispersed and remote nature of many facilities.

Traditional ground-based monitoring methods are often insufficient for capturing the full scope of hazardous gas emissions, particularly in areas that are hard to access or cover vast geographic extents. While these industries have fueled the state's development, they have also left behind a legacy of pollution and underreporting of emissions.

This study aims to monitor energy infrastructure and assess emission patterns from oil, gas, and petrochemical development from the Marcellus Shale in Western Pennsylvania (United States) and provides a model for identifying high emitting point sources and leakage of hydrocarbon and hazardous gasses.

Emissions such as methane, carbon monoxide, sulfur dioxide, nitrogen dioxide, formaldehyde, and aerosol have been collected using satellite data from the European Space Agency's Sentinel-5 TROPOMI spheric Monitoring Instrument (TROPOMI), and Google Earth Engine, a cloud based geospatial analysis platform, has been employed to process of key pollutants over the Pennsylvania segment of the Marcellus, Utica, and Upper Devonian Shale Formations.

By integrating this data with the geographic locations of oil and gas infrastructure such as wells, pipelines, and hydrocarbon reservoirs , spatial analyses have identified high emission areas, and attribute probable causes of atmospheric emissions to high emitting point sources.

The findings will contribute to understanding the environmental impact of these activities and guide the development of targeted mitigation strategies. Ultimately, this project aims to support more sustainable practices and inform environmental policy in Pennsylvania's energy sector and highlight areas of concern for future mitigation measures.

FracTracker Alliance - Philadelphia (USA)



**Lucie
LAMBRETH**

Master
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option Mathematics
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École Centrale Lyon

How can financial actors effectively build pragmatic and ambitious biodiversity strategies ?

Nature is declining globally at a rate unprecedented in human history and this decline is expected to accelerate: transformative changes are needed to restore and protect nature (IPBES, 2019). To tackle this issue, recently, there has been a rapid development of regulations (Kunming-Montreal GBS, CSRD, Article 29 LEC in France), as well as an increase in awareness and a rapid development of voluntary frameworks for companies to take biodiversity into account, as they play a key role.

Companies, particularly financial institutions, need to meet these demands and define visionary biodiversity strategies, but they are not yet mature on the topic.

This study will focus on the financial sector (banks, insurance companies and investment funds) and how to build a biodiversity strategy.

The objectives are to provide an overview and a comparison of the different existing tools to establish a biodiversity diagnostic (meaning the assessment of dependencies, impacts, risks and opportunities for a financial institution), a biodiversity strategy, and to assess this approach with concrete study cases and discuss the results.

BL Evolution has already written a guide on the building of biodiversity strategy and other consulting firms have also written articles or guides on the topic, from a theoretical angle.

The aim of the study is to be more concrete, to rely on study cases and concrete applications, and to focus on operational implementation.

To achieve these goals, a review of scientific and grey literature (including BL Evolution publications) will be used for the theoretical part. The application side will rely on study cases published in the literature, previous consulting missions performed by BL Evolution, interviews of colleagues and clients and missions and studies currently ongoing in the consulting firm.

The main challenge and risk for this study is that the research question is broad which will require good time management and framing with the tutor. The obstacles encountered might be the unavailability of clients and issues related to confidentiality.

But the strong expertise of BL Evolution on biodiversity topics and the availability of colleagues will be an asset. This study will be a personal opportunity to improve skills and an opportunity for BL Evolution to get in touch with previous clients, to produce

BL Evolution



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Master of Sciences
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How is sustainability integrated into the innovation process within the private sector for consumer goods (food & beverage, fashion & cosmetics) ?

In today's fast-changing business world, innovation teams aim to de-risk ideas that help the organization grow profitably. This requires using filters throughout the innovation process to screen potential projects, starting broadly and narrowing down to the best opportunities.

A key filter is sustainability, which is increasingly important due to stakeholder, regulatory, and consumer demands. Integrating sustainability is both a moral and strategic priority, driving long-term value and competitive advantage. However, it requires a clear definition of sustainability, tools to measure it, and methods to ensure it's applied consistently at every stage of innovation.

This leads us to the following research questions: How can sustainability be integrated and prioritized as a core criterion driving decision in the innovation process, ensuring it is considered equally alongside feasibility and profit? And what key performance indicators (KPIs), tools, and methods are essential at each stage to measure sustainability ?

The specific study objectives & perimeter are how sustainability can be a main criteria for innovation in the consumer goods sector (food & beverage, fashion, and cosmetics) and assess KPI, tools and methods to measure sustainability through relevant materialities for the consumer market and provide examples.

This study will highlight a potential contradiction between innovation, which traditionally aims to drive growth by creating new products and markets, and sustainability, which advocates for a more restrained approach to consumption. This presents a strategic shift for companies, where resilience should become the guiding principle instead of profit and market growth.

The goal of innovation should transition from merely introducing new products to enhancing existing ones, making them less resource-intensive while managing risks and balancing key criteria such as feasibility and cost.

Primary data will come from anonymized data from several missions in the consumer goods sector, alongside a formal interview with the Global Innovation Lead and informal discussions with the innovation team and experts.

Secondary data will include internal documents and past client deliverables, all anonymized, while desk research will involve reviewing scientific articles and reports on integrating sustainability into innovation for consumer goods.

Through qualitative analysis are explored how innovation can be a core criterion in the innovation process and more broadly in an organization' strategy. An LCA tool will be developed to calculate reduction potentials on selected materialities for a fictional products providing quantitative data.

QUANTIS - Paris



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Prospective Study on the Decarbonisation of the French Primary Steel Industry.

The primary steel industry, which relies heavily on coal, is extremely energy and carbon-intensive. Between 2015 and 2019, steel production in France contributed an average 5% (ADEME, 2024) to the country's carbon footprint, with 96% of these emissions coming from ArcelorMittal and Saint-Gobain PAM (ADEME, 2024). In 2023, Saint-Gobain's primary steel emissions were only 3.4% of those from ArcelorMittal (Based on emissions reported by both companies to the EU-ETS). Therefore, this study focuses solely on decarbonising these operations in France, a critical step for the country's overall decarbonisation.

In 2022, the French government requested the 50 highest-emitting industrial sites to implement decarbonisation roadmaps. ArcelorMittal announced targets to reduce greenhouse gas emissions in France by 35% by 2030 (compared to 2015 levels) and achieve net-zero emissions by 2050 (ArcelorMittal, 2023).

However, its decarbonisation strategy remains uncertain (particularly concerning the use of certain technologies). Utilising the TIMES energy systems model, this study aims to assess whether this strategy is sufficient to meet climate objectives and evaluate the consistency of the companies' announcements.

This prospective modelling work also aims to establish the optimal decarbonisation trajectory in terms of costs needed to achieve climate objectives. It seeks to answer the following question : what are the technological, temporal, and economic conditions required to achieve this industry's decarbonisation objectives ?

This question is also addressed by Ademe's steel sector transition plan, which targets the entire steel sector, including high-quality primary steel and recycled steel. In contrast, this study specifically focuses on the primary steel industry.

The aim is to provide a detailed description that the Centre de Mathématiques Appliquées de Mines Paris PSL can use in a comprehensive model of French industry, offering an overall view of the energy and materials required for French industry's ecological transition.

Given that 56% of France's coal consumption (ADEME, 2024) occurs in the steel industry, it is essential to estimate a realistic exit date for metallurgical coal in France. This prospective study aims to determine a feasible phase-out timeline, considering the availability of abatement solutions and economic factors.

In summary, this work aims to produce emission trajectories by optimizing the use of available abatement technologies over time, considering their cost and energy requirements. The main challenge lies in accurately defining steel production technologies, including future ones, which currently lack comprehensive information.

Consequently, the modelling relies on simplifying assumptions for certain processes. Moreover, the results of these prospective studies heavily depend on the assumptions made. Therefore, it will be necessary to critically evaluate these results and conduct sensitivity analyses on the least robust assumptions.

Réseau Action Climat - Paris



**Elie
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Key Factors Influencing the Success of Waste Management in the Middle East: Regulatory, Cultural, and Environmental Perspectives with Lessons from Global Practices

This thesis discusses sustainable waste management strategies in the Middle East, setting the scene with a complete understanding of the region's unique waste landscape, particularly in the United Arab Emirates (UAE) and Saudi Arabia (KSA).

These countries are facing fast urbanization alongside a rapid increase in per capita waste generation. They are also facing environmental drawbacks of traditional landfilling practices and dumpsites affirming the pressing need for sustainable and effective waste management.

The study sets the scene by exploring the current waste landscape within this region while understanding the legal, technical and cultural perspectives. The study explores regulations, recyclable markets, waste composition, demographic influences, and waste-related emissions and proposes solutions accordingly.

The research is framed within a strategic approach that prioritizes waste reduction, followed by effective segregation, and the deployment of advanced treatment facilities. This study draws on European Mechanical Biological Treatment (MBT) models and adapts them for local Middle Eastern contexts. By tailoring these models to the Middle Eastern climate, labor market, and culture, the study optimizes waste treatment, resource recovery, and energy generation while stressing the importance of composting and anaerobic digestion.

Moreover, key findings emphasize the role of MBTs in stabilizing organic waste and recovering recyclables such as plastics and metals. Nonetheless, these adaptations require a clear understanding of local waste composition, local demographics and regulatory frameworks to enhance operational sustainability.

In addition to that, to assess the greenhouse gas impact of the different waste management approaches, the study models three scenarios in Abu Dhabi: traditional landfilling, landfilling combined with an Energy-from-Waste (EfW) facility, and integrated operations of a Material Recovery Facility (MRF) and EfW in the UAE.

The findings conclude that combining MRF and EfW facilities with improved landfill management achieves significant emission reductions compared to landfilling alone, aligning with Abu Dhabi's environmental goals. By diverting recyclables and optimizing the waste-to-energy process, the proposed system could reduce emissions by up to 87% from baseline levels.

In brief, this research advocates for a waste management strategy focused on reduction, recovery, and infrastructure development tailored to local demographic and technical characteristics.

It provides actionable insights for Middle Eastern policymakers to consider within their waste management strategies. This approach fosters a circular economy and aligns with national and international environmental objectives, while offering a scalable, realistic and sustainable model for effective waste management across the region.

SUEZ SA – Paris



This document presents the abstracts of the professional theses defended at École des Mines de Paris
for the Post-Master International Environnement Management EnvIM.
Defense thesis topics – November 2024 version.

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