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The EU Taxonomy as a tool for green fiscal policymaking: The case of Belgium

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J'autorise la consultation de ce mémoire

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Executive summary

A. Introduction

Climate change, provoked by human activity, poses an existential threat to humanity. To maintain temperatures in limits congruent with the objectives set in the Paris Agreement, we must act now. Financial markets, through their role of resource allocators, are key to secure a smooth transition to a sustainable economy. However, the financial industry currently does not fulfil this mission. To face this issue, the European Commission elaborated an *Action Plan* to finance green projects. The cornerstone of this plan is the EU Taxonomy, a framework that provides a clear definition of "sustainable" activities. Although the main purpose of the EU Taxonomy is to tackle greenwashing in financial markets, it can be used for policymaking too. This thesis assesses whether the EU Taxonomy can be used for green fiscal policymaking and puts forward proposals on how it can be used to reform the Belgian tax system.

The *Literature review* gives an introduction on the EU Taxonomy and green fiscality. The *Sectorial Priorities* part gives an overview of the most carbon intensive activities in Belgium and the actions we should prioritise to reach carbon neutrality. The *Proposals* section shows how the EU Taxonomy covers these priorities and gives ideas on how to reform the Belgian tax system using it. Finally, the *Conclusion* outlines the key observations made.

B. Literature review

1. The EU Taxonomy

The EU Taxonomy, part of the *Action Plan: Financing Sustainable Growth*, is one of the tools developed by the European Commission to facilitate funding for green projects. The EU Taxonomy, entering into force in 2022, offers a definition of what is a "sustainable" activity based on six environmental objectives: climate change mitigation, climate change adaptation, protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection of biodiversity and ecosystems. For an economic activity to be considered as "sustainable", it must significantly contribute to one of the six objectives, while not significantly harming any of the others and respecting social safeguards. Technical criteria

are set for each eligible activity to assess the contribution of an activity to the objectives as well as the "Do not significantly harm" principle. Some organisations have already tried to use the EU Taxonomy, with overall positive results, proving that the framework is functional. However, a lack of data and the difficulty to map some activities have been pointed out. Some criticism has been voiced on three main grounds: no difference made between companies with zero environmental impact and those with negative impact, insufficient stringency of some criteria, and inclusion of certain technologies, such as nuclear power.

2. Green fiscality

Negative externalities and the optimal manner to reduce them have long been a subject of debate among economists. The market failure they represent needs to be addressed with policies to achieve optimal resource allocation. Two main types of instruments are recurrent in the literature. Pigouvian taxes are taxes that polluters must pay to the state. The tax should be equal to the cost of the pollution, so that the externality is fully born by the polluter. Such taxes can in some cases lead to positive non-environmental effects, in which case a "double dividend" is realised. Coasian instruments take the form of "rights to pollute" that are exchanged freely among economic actors. This type of approach has been adopted by the European Commission for carbon emissions reduction, setting up the largest Emissions Trading Scheme. This system currently only applies to industrial activities. While environmental taxes only represent a small fraction of tax revenues in Belgium, it might be about to change as the Belgian government has agreed to green its fiscality during the current legislature.

C. Sectorial priorities

Greenhouse gas emissions from non-industrial sources come from three main sectors in Belgium: buildings, transports, and agriculture. The forestry and land-use sector is also important because of its carbon absorptions. In all three sectors, behavioural changes are needed. We need to reduce the amount of space we heat, the distance we travel by car, and the quantity of meat we eat. Nevertheless, infrastructure and technological improvements also have a key role to play. It is important that we renovate our buildings to reduce their energy consumption and that we shift from combustion engine cars to zero tailpipe emissions vehicles. The carbon balance in the agriculture sector could be significantly improved by implementing

responsible management practices. Increasing the land area dedicated to forest, along with improved management practices, could significantly enhance carbon absorption. Finally, transversal ameliorations could accelerate the decarbonisation of the Belgian economy: scaling up circular and sharing economy, boosting research and development in transition sectors, and facilitating the funding of SME's with green business models.

D. Proposals

The priorities identified in the previous sections are linked to EU Taxonomy activities. Then, we analyse the fiscal treatment of these activities and propose adaptations when possible.

Behaviours are ill-addressed by the EU Taxonomy. Indeed, the framework is rather production-oriented than consumption-oriented. It is therefore difficult to base a fiscal instrument aimed at changing behaviours, reducing meat consumption for example, on the EU Taxonomy. By contrast, the EU Taxonomy can be useful for technological changes as well as for infrastructure development. We propose using the EU Taxonomy to create fiscal instruments incentivising green practices for building renovations, freight transport, low-emissions vehicles, research and development. We also put forward the idea of using the EU Taxonomy in a systemic tax reform, by linking either the withholding tax rate or the corporate tax rate to the alignment with the EU Taxonomy. We recommend including the sectors covered by the EU's *Emissions Trading Scheme* in such systemic reform to account for non-climate environmental objectives.

E. Conclusion

Using the EU Taxonomy for green fiscal policymaking enables to consider other factors than carbon emissions. It also presents some disadvantages, such as the difficulty of dealing with behaviours. Fiscal instruments may also be inadequate to address some economic activities due to existing regulation or high dependence on public investment. The limits of this thesis include the lack of quantitative estimations, the focus limited to Belgium and climate, and the fact that the distributive impacts of the proposed measures have been little addressed. How fastidious – when possible - the prediction of green policies impact may be, postponing them might be dangerous: climate change does not wait.

I. Introduction

Our environment has been under unprecedented pressure over the last decades. Climate change, caused by greenhouse gases emissions from anthropogenic origin, is likely to pose an existential threat to humanity. Month after month, we are witnessing the consequences of Climate Change: temperature and precipitation records are being broken all over the world, storms and hurricanes become more and more frequent, and events that were once happening every century are now happening every decade. The Intergovernmental Panel on Climate Change (IPCC) estimates that human activity has already caused a warming of approximately 1.0°C since the beginning of the 20th century, and that we shall attain 1.5°C by 2050 if the trend of rising emissions continues. Such warming would entail consequences such as accelerated loss of ecosystems, increased severity and frequency of extreme weather and climate events including draughts, heavy precipitations, and hot extremes. These consequences would be made even worse if global warming was to attain 2°C. However, there is still hope: past emissions alone are unlikely to cause a global warming of 1.5°C (IPCC, 2018). We stand with a chance to invert the trend.

To do so, we need to significantly decrease our carbon emissions as soon as possible. All economic sectors will need to get involved and to transform themselves. Humanity will have to rethink the way it moves, eats, houses, and lives in a short period of time. Finance, with its decisive influence on the economy, has the ability to make this transformation possible. The European Commission understood the importance of finance and dedicated an important part of its *Green Deal* to the financing of the transition. Among the initiatives aimed at accelerating the transition of the financial system, one appeared as the cornerstone of the European Commission's *Action Plan*: The Taxonomy Regulation. The purpose of the Taxonomy Regulation (referred to as "EU Taxonomy" in this thesis) is to help investors make informed investment decisions regarding environmental impact. This is particularly important since the number of investment products labelled as "green" has been rising dramatically in the last few years. Unclear criteria for such labelling make it difficult for investors to evaluate the impact of their portfolio and open the door for greenwashing. The EU Taxonomy will offer criteria for an economic activity to be considered as environmentally "sustainable". While this is of high

interest for financial actors, having a clear definition of what is a sustainable activity may also be useful for other purposes.

Green fiscality has long been subject for debate in Belgium and abroad. The idea is seductive: using taxes would allow to enforce polluters to pay for the negative externalities resulting from their activity. However, several factors have made difficult the implementation of green taxes. Currently, environmental taxation is still a minor part of the Belgian tax system. Non-fiscal instruments have also been implemented at the international level, such as *Emissions Trading Schemes* that allow for a pricing of carbon emissions. The current Belgian government has agreed to implement a fiscal instrument that would discourage polluting practices, and in particular the burning of fossil fuels, as part of a broader fiscal reform.

This thesis brings together the two topics, the EU Taxonomy and green fiscality, together. Its objective is to determine whether the EU Taxonomy can be used to build fiscal policies and to propose ways to use it to reframe the Belgian fiscal system in order to achieve the climate objectives set in the Paris Agreement.

The *Literature Review* is separated in two parts, the first one is dedicated to the EU Taxonomy and the second one to green fiscality. In the part dedicated to the EU Taxonomy, we first give an overview of the genesis of the EU Taxonomy and its role in the European Commission's *Action Plan: Financing Sustainable Growth*. Then, we dive in the practical details of the EU Taxonomy: How does it work? Who needs to comply? Finally, we analyse the receival of the EU Taxonomy by third parties. We start by detailing the experiences of organisations and researchers that have tried to use the EU Taxonomy, before gathering the feedback received on the design of the EU Taxonomy, the eligible activities, and the criteria for being considered as "sustainable". The second part of the *Literature Review* addresses green fiscality. We start by describing the pathway that made externalities a major economics topic, from Adam Smith's theory to contemporary economists. We then outline the types of environmental fiscal tools that policymakers have at their disposal, before describing the current international situation of economic instruments aimed at reducing human pollution. Lastly, we depict the current situation in Belgium, starting from the existing fiscal system to the current political climate and the government's agreement.

The *Methodology* section describes the method used in the construction of the proposals made.

The *Sectorial Priorities* part of this work defines the emissions-reducing actions that Belgium should prioritise to achieve the climate objectives. We start by presenting the current sectorial repartition of greenhouse gas emissions in Belgium. Then, we depict the opportunities for decarbonisation in the sectors associated with the highest shares of emissions[1]: buildings, transports, and agriculture. We also address the land-use and forest sector, whose potential as carbon-absorber is currently underused. Finally, we briefly address other sectors and topics that are transversal to all sectors, such as research and development.

The *Proposals* will address each of the priorities identified earlier. For each of them, we try to make a link with the EU Taxonomy, analyse any existing particular fiscal treatment and give ideas on how to adapt the fiscal treatment using the EU Taxonomy when it is possible. Afterwards we give some ideas for higher scale fiscal reforms using the EU Taxonomy, including reforms of the corporate tax and withholding tax frameworks.

Finally, we conclude by drawing key lessons learned on the use of the EU Taxonomy for drafting of fiscal policies, some limitations of the reasoning conducted in this thesis and by opening doors for future research on the topic.

[1] As explained in the thesis, the industry is not addressed because it is already covered by the EU Emissions Trading Scheme.

II. Literature review

A. The EU Taxonomy

1. Background

The European Commission published its *Action Plan: Financing Sustainable Growth* in March 2018. The aim of this action plan, as described in the document, is threefold: "(1) Reorienting capital flows towards sustainable investments to achieve sustainable and inclusive growth; (2) Managing financial risks stemming from climate change, resource depletion, environmental degradation and social issues; and (3) fostering transparency and long-termism in financial and economic activity". The first objective relates to what has been called the *green funding gap* (or *green financing gap*) in recent literature. The *green funding gap* can be defined as the difference between the investment needed for the economy to transit to a sustainable economy and the current level of investments. While the concept is mainly used in green energy-related literature (Jacobsson & Jacobsson, 2012; Taghizadeh-Hesary & Yoshino, 2020; Yoshino et al., 2019), it has also been used for other environment-related topics, such as marine resource protection (Quintão Lages Vilhena de Carvalho, 2015) or biodiversity (Arlaud et al., 2018). The European Commission estimated the gap to EUR 180 billion yearly to achieve its climate and energy goals of 2030 in its Proposal for a Directive of the European Parliament and of the Council amending Directive 2012/27/EU on Energy Efficiency (*Proposal for a Directive of the European Parliament and of the Council Amending Directive 2012/27/EU on Energy Efficiency*, 2016). The European Investment Bank was less optimistic in its previsions, with an estimated yearly figure of EUR 270 billion (European Investment Bank, 2016). To address those objectives, the European Commission set out a portfolio of ten actions it intended to pursue.

The centrepiece of the *Action Plan* is the Taxonomy Regulation, which has been adopted in June 2020 (Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the Establishment of a Framework to Facilitate Sustainable Investment, and Amending Regulation (EU) 2019/2088 (Text with EEA Relevance), 2020). It directly tackles (1) and (3) of the aforementioned *Action Plan*'s objectives, while it is also a key piece of the Commission's strategy to tackle (2). The purpose of the Taxonomy Regulation is to classify

economic activities for investment purposes, by introducing EU-wide standards defining which economic activity qualifies as "sustainable". The Taxonomy is considered necessary for two of the proposals mentioned in the *Action Plan*: Financial product standards and sustainability-adapted prudential rules[2]. It is also considered as complementary with other levers of actions for sustainability: private investment and public action (See Figure 1 for the comprehensive assessment of the role of the EU taxonomy in the *Action Plan*).

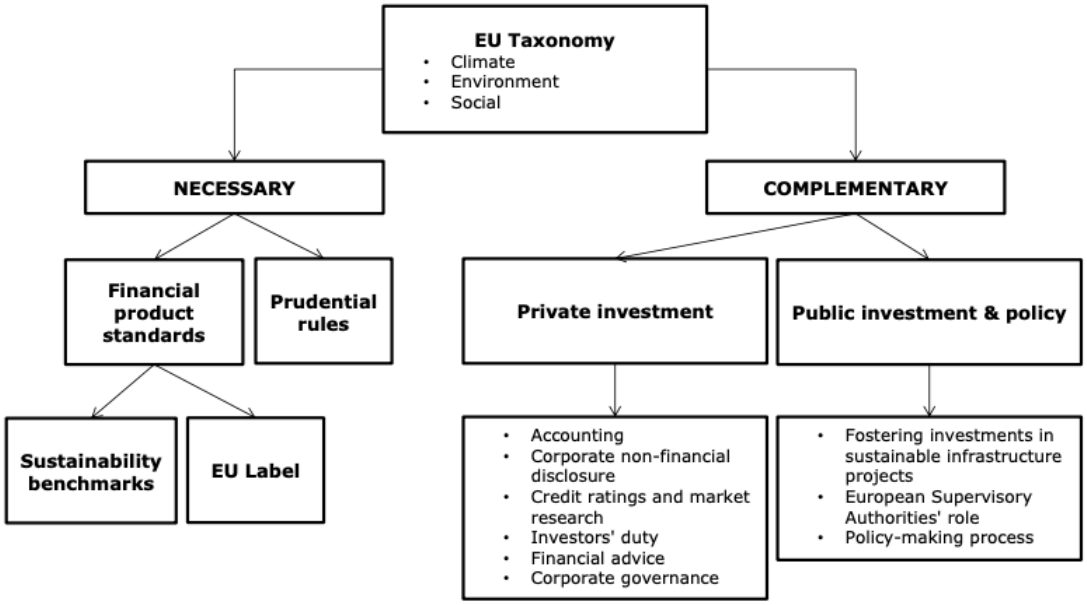

Figure 1: Role of the EU taxonomy in the Action Plan (Source: Action Plan)

To create the Taxonomy Regulation, the European Commission relied on two consecutive external bodies, the Technical Expert Group on sustainable finance and the Platform on sustainable finance.

The Technical Expert Group on sustainable finance (TEG) was set up in 2018 to assist the European Commission in the development of the Taxonomy, but also in the construction of an EU green bond standard and on metrics for climate-related disclosures. It was composed of 35 members, most of whom were representing organisations (including NGO's, companies, trade unions and universities). These members were supported by invited members from the

[2] This refers, notably, to the adaptation of capital requirement ratios of the banking and insurance industries to better account for Climate-Related Risks (CRR).

major EU bodies related to economics and/or environment (European Commission, 2018). The TEG's mandate ran from July 2018 to September 2020.

The Platform on sustainable finance has taken over the mission of the TEG to advise the European Commission on the development of the Taxonomy. It will also be responsible for the monitoring and reporting on capital flows towards sustainable investments and will advise the Commission on other sustainable finance policy topics (Platform on Sustainable Finance, 2021). The Platform is composed of 57 members[3]. Those members will be separated in subgroups to cope with the variety of tasks and subtasks (See Figure 2 for the structure of the Platform and missions of the subgroups), depending on each member's area of expertise. Amongst these subgroups, the Technical Working Group will be split between different teams that will each have one sector of focus. The members have received a mandate of two years, renewable at the European Commission's discretion.

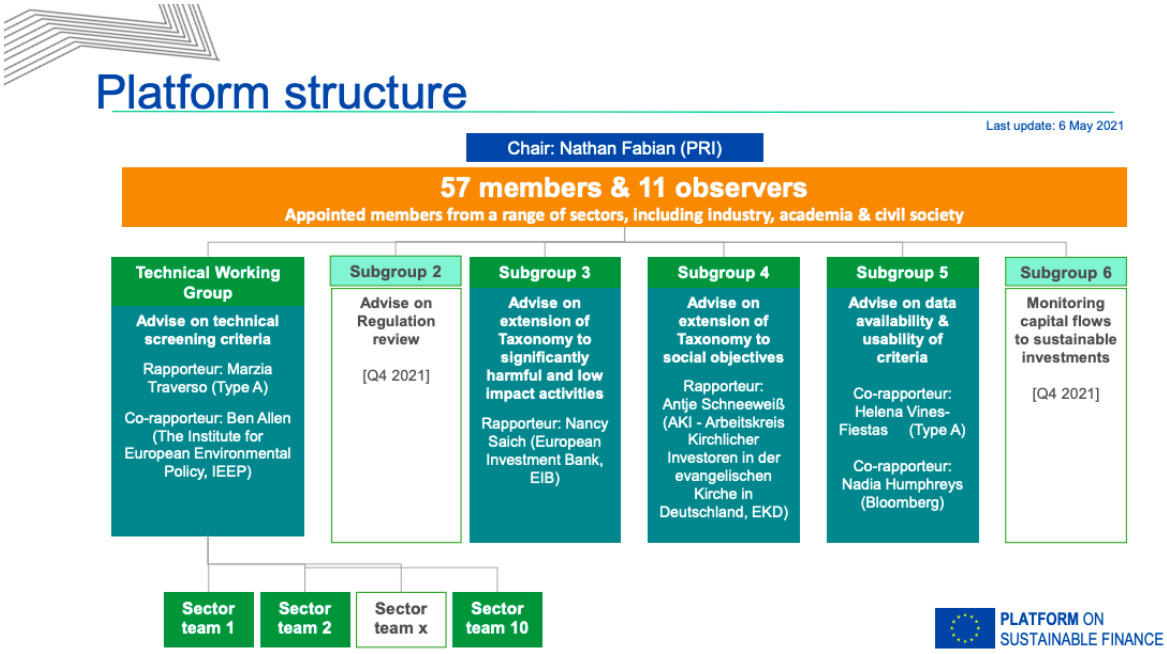

Figure 2: Structure of the Platform (Source: Platform on sustainable finance)

[3] 50 members have been appointed after a public call for applications and have been selected based on their personal experience and expertise, with a focus on diversity of profiles. The seven remaining members are representing European public entities (European Environment Agency, the European Investment Bank, the European Investment Fund, the three European Supervisory Agencies and the European Agency for Fundamental Rights).

2. Framework of the EU Taxonomy

To assess the environmental sustainability of economic activities, the European Commission laid out six environmental objectives:

- Climate change mitigation: stabilising the greenhouse gas concentration in the atmosphere to a level consistent with the temperature objectives set by the Paris Agreement.
- Climate change adaptation: reducing climate-related risks of adverse impact on people, nature, and assets.
- Sustainable use and protection of water and marine resources: improving the status of water bodies, both in surface and groundwater, and preserving the water bodies already having a good status.
- Transition to a circular economy: transitioning to a circular economy by preventing, re-using, and recycling waste.
- Pollution prevention and control: improving levels of water, air and soil pollution and preventing (or reducing) pollutant emissions other than greenhouse gasses.
- Protection and restoration of biodiversity and ecosystems: achieving the good condition of ecosystems, protecting ecosystems that are already in good conditions, and protecting, restoring, and conserving biodiversity.

The NACE (Nomenclature des Activités Économiques dans la Communauté Européenne) classification system has been used to distinguish economic activities. However, as the system does not include some activities that do have an important impact on the environment, the TEG expects it to be adapted over time to become more comprehensive. Among the NACE economic activities, the TEG selected the activities that could play a role either in climate change mitigation or in climate change adaptation. For each of the selected activities, the TEG has issued thresholds -the so-called technical screening criteria- for the first two objectives. The Technical Working Group of the Platform on sustainable finance is expected to publish the technical screening criteria for the other four criteria by Q3 2021, with the purpose of these criteria being adopted by year-end 2021.

To be considered as environmentally sustainable under the EU Taxonomy, an economic activity must meet four criteria:

- Significantly contribute to at least one of the six objectives;
- Do not significantly harm any of the other objectives[4] (DNSH);
- Comply with minimum social safeguards[5];
- Comply with the technical screening criteria described in the Taxonomy Regulation[6].

The Taxonomy Regulation considers three types of activities as potentially "Taxonomy-aligned": own performance, enabling activities and transitioning activities (Och, 2020).

Own performance relates to those economic activities that directly impact positively the environment. For example, the installation of solar panels to produce renewable energy directly has an impact on climate change mitigation and is therefore eligible to be Taxonomy-aligned.

Enabling activities are the ones that do enable other economic activities to have a substantial contribution to one of the six objectives, while not substantially harming one of the objectives itself. This could include, for example, the manufacturing of pieces necessary to build solar panels. An additional condition to be eligible in this category is that the economic activity cannot lead to a lock-in in assets that undermine one of the environmental objectives.

Transitioning activities are those activities that, while not having a direct positive contribution to the environment, emit significantly less greenhouse gasses than the current industry standards. For an activity to be considered under this category, three conditions need to be met: (1) There must be no commercially feasible alternative activity that emits significantly less greenhouse gas; (2) The activity must be significantly better environment-wise compared to the current industry standards; (3) The activity must not result in a lock-in into carbon intensive assets.

[4] This is to be assessed on the whole life cycle of the products and/or services of the economic activities.
[5] To meet this criterion, the economic activity must comply with the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights.
[6] The technical screening criteria are meant to assess the contribution of economic activities to the six objectives. This last criterion is therefore not a supplementary criterion.

3. Scope of application of the EU Taxonomy

The EU Taxonomy is addressed to three types of organisations: member states, financial market participants providing financial products and companies required to publish a non-financial report under the Non-Financial Reporting Directive[7] (NFRD).

Member states will have to adapt their legislation to take the EU Taxonomy into account when defining an "environmental activity", meaning that the requirements and definitions will be aligned under all member states. The states may continue to use the existing labels and create new ones, at the condition that the labels are made compliant with the EU Taxonomy.

Financial market participants that offer financial products will have to disclose at the product level the share of Taxonomy-aligned products in their portfolio. As part of the NFRD, they will have to disclose the sustainability risk as well as the potential adverse ESG impact of their investment products. Moreover, the participants offering products "with sustainability as an objective" or "that promote, among others, environmental or social characteristics" will be obliged to use the Taxonomy for their assessment and to explain how and to what extent they do.

The large companies mentioned in the NFRD will have to report which of their activities have environmental objectives and which policies are implemented environmental-wise. The Taxonomy Regulation requires them to do this using the EU Taxonomy's framework.

4. Testing the Taxonomy

Although the first technical screening criteria for climate change mitigation and adaptation have only been finalized in April 2021, some organizations and researchers have started to try to use the EU Taxonomy as from 2020, using the criteria proposed by the TEG in the technical annex of its final report. These tests have differing purposes: assessing the ease of use of the Taxonomy, comparing it to existing frameworks, estimating the current alignment of an industry or even, for some companies, already using it for their environment-related disclosures.

[7] This mainly includes listed companies, large companies (>500 employees), insurances, banks, and public interest companies.

Climate Strategy and Climate Company, two major climate-related firms have conducted an analysis of the application of the EU Taxonomy. They studied the process of using the Taxonomy for three types of interested parties: projects and cities, companies and funds, and public funds. While they underline some areas for improvement – need for practical guidance, clear alignment of NACE codes with the classifications currently used by market data providers and more clarity for some sectors where the application remains complex (incl. buildings and land-use), among others – their main conclusion is that the timing is right for a full transition to the EU Taxonomy. They also conclude that the EU Taxonomy is ready to replace the Rio Markers, the metric currently used to assess the climate impact of public projects, with the key advantage of being able to also consider environmental aspects other than climate (e.g. biodiversity or water pollution) in the assessment (Climate Strategy & Climate Company, 2020).

Principles for Responsible Investment (PRI)[8], an UN-supported investor group with more than US$100trn of assets under management, has gathered 35 case studies of its members trying to use the EU Taxonomy. More than three quarters of the participating investors are European, with the remainder coming from the US. Among the challenges faced by investors, three categories emerge: sourcing and matching data, adaptation and the creation of a Taxonomy process (PRI, 2020).

Researchers from the Climate Policy Department at DIW Berlin have been able to estimate that 80% of the EU greenhouse gas emissions were covered by the EU Taxonomy. However, in carbon-intensive sectors such as Industry and Transportation and Storage, only a part of the emissions were covered by the EU Taxonomy (Schütze et al., 2020).

The European Commission has conducted a test application of the Taxonomy for climate change mitigation on 101 "green" UCITS funds. While 53% of the total revenue of portfolio companies was not eligible (mostly due to the neutral impact of their sector of activity), 33% of the revenues were eligible. The remainder could not be mapped in one of the NACE sectors. The report estimates that around 11% of total fund assets were invested in companies whose revenue was more than 50% aligned with the Taxonomy (Berendsen et al., 2020).

[8] PRI was also a member of the TEG.

The global services company EY tried to assess the pipeline of green projects in the EU and whether the EU Taxonomy would be useful to select those projects. This research has been conducted in the context of the post-covid recovery plans. It identified 1,000 projects municipal, public and privately promoted projects, needing a total of €200bn of public and private investment. 57% of these projects are EU Taxonomy-aligned, while the remaining 43% are in eligible sectors and show clear benefits but did not provide sufficient information. The main Taxonomy-related conclusions is that the Taxonomy can indeed be used for project selection and that it offered the advantage of being able to take into account non-climate environmental factors with a proper assessment (EY, 2020).

Vigeo Eiris, a global company specialized in ESG assessments, has started screening companies to assess whether their activities are Taxonomy-aligned. Using the technical screening criteria of the technical annex to the TEG's final report, they were able to screen 1587 European companies at three different levels: activity, company, and portfolio. However, the lack of available data forced them to use proxies, especially for the DNSH and social safeguards assessment. Their analysis shows considerable variations in Taxonomy alignment between sectors. Although the majority of companies are performing one of the Taxonomy activities, only a restricted fraction of those companies meet the technical screening criteria for a consequent share of their activities (Vigeo Eiris, 2021).

Acciona, a Spanish conglomerate specialized in infrastructure and renewable energy, is one of the few companies already reporting using the EU Taxonomy, using the criteria proposed by the TEG. In its 2021 report, it discloses the repartition in economic activities of its revenue, CAPEX and EBITDA, and the percentage of each of these activities that is Taxonomy-aligned (Acciona, 2021).

5. Reactions

The EU taxonomy has generated reactions from all kinds of interested parties, from academia and civil society to industry actors and financial institutions. While there have been reactions at all stages of the process since the publication of the Action Plan in 2018, we will here focus on the reactions following the adoption of the Taxonomy Regulation and its first delegated acts on climate change mitigation and adaptation, respectively in June 2020 and in April 2021.

Some critics have been made regarding the companies required to report under the NFRD and EU Taxonomy. It has been shown that the labour intensity of an activity is not a good indicator of the carbon intensity. The requirement for all companies with more than 500 employees to report under the NFRD is therefore considered as irrelevant by the researchers, who suggest adding a criterion related to the carbon intensity of the activity (Schütze & Stede, 2020). The Alliance for Corporate Transparency, a group of NGOs including WWF and Oxfam, points out the fact that the exclusion of the private and small companies could put them at a competitive disadvantage compared to larger companies for the allocation of the sustainability-oriented funds (Alliance for Corporate Transparency, 2021). This limited scope might also increase the burden on financial market participants, forcing them to use own or third-party data to assess the greenness of their investments in smaller entities. This kind of issue may also arise when European financial market participants invest in foreign companies. (Och, 2020).

Another criticism that has been made is that no difference is made between the criteria for project level and those for the company level. Indeed, one might expect that the ambition in terms of emission reduction would be higher for new investments than for existing assets and activities. Indeed, new investments are likely to impact the environment on the long run, while existing assets are to be phased out more rapidly. Too low criteria for new investments could open the door to only marginal improvements, resulting in lock-ins[9] into carbon intensive assets (Mattauch et al., 2015; Schütze et al., 2020; Schütze & Stede, 2020).

The need for a clear pathway to carbon neutrality for transition activities has also been mentioned in the literature. While it is the case for some activities, such as passenger cars, such pathways are already available – thermic engine cars will be phased out of the eligible activities progressively – it is not the case for other sectors responsible for an important part of emissions, including building renovation and basic materials sector. This is particularly problematic since the breakthrough innovations needed to reduce emissions are typically capital-intensive. The lack of incentive to invest in these innovations could therefore make the inclusion of transition activities counterproductive (Schütze et al., 2020; Schütze & Stede, 2020).

[9] Erickson et al. (2015) define carbon lock-in as « the tendency for certain carbon-intensive technological systems to persist over time, 'locking out' lower-carbon alternatives, and owing to a combination of linked technical, economic, and institutional factors ».

The Institute for European Environmental Policy (IEEP), a sustainability think tank, issued a response to the publication of the Delegated Acts. Its remarks relate to three sectors: agriculture, forestry, and bioenergy. Two main topics within the agriculture sector, crops and livestock, were addressed separately. For crops, the IEEP recommends replacing the Delegated Acts' criterion of requiring monitoring emissions and removals using best available data by either a means-based approach (i.e. the land manager must implement a set of "essential" management practices) or a results-based one (i.e. the land manager must demonstrate that it achieves a positive carbon impact compared to a baseline defined for a given farm). For livestock, the IEEP salutes the fact that livestock is only considered as a transition activity, which could limit the extent of carbon lock-ins and avoid discouraging the development of alternatives to meat. It also pleads for the reinstatement of the possibility to demonstrate improvements in emissions or removals by livestock managers.[10] The institute calls for more stringent criteria for the forestry sector, in order to ensure that the contributions made by Taxonomy aligned actors are significant. For the bioenergy sector, while the IEEP welcomes that all bioenergy activities are transitional, it raises the issue of the supply chain. Indeed, the supposed positive contribution of energy generation using biomass depends on how the biomass itself is produced. If the biomass were to be produced in a manner that significantly emits greenhouse gas, or prevents optimal carbon sequestration, it could seriously hinder the significant positive contribution of the bioenergy production. The IEEP recommends requiring the biomass to be sourced from a Taxonomy-aligned producer for the bioenergy activity to be eligible (IEEP, 2020).

Some criticism also arises because no difference is made between sectors that have a limited environmental impact (e.g. the pharma sector) and the activities that do have a significant negative impact (e.g. the oil sector). Several papers have raised the idea of implementing a parallel "brown" taxonomy, to facilitate negative screening by investors (Fitch Wire, 2020; Schütze & Stede, 2020). This is particularly relevant considering that negative screening has been shown to be one of the most popular types of ESG policy among institutional investors (Amel-Zadeh & Serafeim, 2018). The ECB is also favourable to such a taxonomy, underpinning that it would help financial institutions to map the transition risk on their balance sheets (Giuzio et al., 2019). This idea has also gained support from academia. The degree to

[10] This option was initially available in the TEG report for both livestock and crops but was withdrawn in the Delegated Act.

which companies unlikely to be aligned will report towards the EU Taxonomy is highly uncertain. These companies not reporting might reduce the degree of use of the EU Taxonomy by investors, as it would make negative screening more difficult (Esposito et al., 2020; Och, 2020). According to the EBA, the Platform on sustainable finance is already working on such a "brown" taxonomy (EBA, 2021).

Some voices have raised concerns about the technical screening criteria. Finance Watch, a Brussels-based NGO and member of the Platform on sustainable finance has released a statement following the publication of the EU Taxonomy Climate Delegated Act in April 2021. Finance Watch estimates the criteria for some activities to be insufficient and not science-based, in particular those related to forestry, bioenergy and gas. It also questions whether nuclear power falls under the DNSH criterion. More generally, the NGO voices its concerns about the influence of political and economic interests in the legislative process (Finance Watch, 2021). In an editorial, Olivier De Schutter, UN Special Rapporteur on extreme poverty and human rights, and Philippe Lamberts, co-president of the Greens/EFA party at the European Parliament, emphasize the issue of the inference by industry lobbies in the process. They regret the inclusion of gas and nuclear power in the EU Taxonomy, calling for science-based targets (Lamberts & De Schutter, 2021).

The inclusion or not of nuclear power in the EU Taxonomy was subject to debate. The issue, along with the inclusion of natural gas as an energy source, is particularly relevant for Belgium as it was decided that Belgium would progressively phase out its nuclear power plants, replacing them notably with gas infrastructures. The supporters of the inclusion of nuclear energy argued that nuclear energy must be considered as similar to renewable sources due to its low carbon insensitivity and that nuclear had a key role to play in the transition to a low-carbon economy. The fact that nuclear energy is currently the most important source of low-carbon electricity in the EU along with the maturity of the technology, as opposed to other energy technologies (e.g. hydrogen), were also arguments for the inclusion. Opponents opposed that nuclear energy could lead to environmental and health disasters, with the examples of Chernobyl and Fukushima, and that the use of nuclear energy created waste management issues, with massive amounts of radioactive waste (Schulz, 2020). The TEG did not emit any final recommendation, mentioning that the DNSH criteria were to be explored more. The European Commission's Joint Research Center was invited to analyse the issue and to present a technical

report on the DNSH aspects of nuclear energy. The main conclusion of this report was that nuclear energy does not represent more of a danger to human health and the environment than other sources of energy already included in the EU Taxonomy and that the risks related to the production of nuclear energy could be addressed with appropriate protocols. The researchers conclude that nuclear energy can meet the DNSH criteria and may therefore be included in the EU Taxonomy with proper technical screening criteria (European Commission Joint Research Centre, 2021). The issue is still under scrutiny by the European Commission, with two independent bodies reviewing the Joint Research Center's report and a decision is expected by end-2021 at the latest, considering that the EU Taxonomy takes effect in January 2022 (European Commission, 2021b; Reuters, 2021a).

The same debate goes on for natural gas. While some consider it as sustainable due to its potential in the exit of the more carbon-intensive oil and coal, some others deem it unsustainable as it emits significantly more CO_2 than renewables and nuclear, and also emits methane, a worse greenhouse gas climate-wise (Reuters, 2021b). The complementary Delegated Act, due by the European Commission later this year, will cover natural gas and related technologies as a transitional activity (European Commission, 2021b).

Piebalgs & Jones (2021) regret the difference of treatment of different energy stocking methods in the EU Taxonomy, insisting on how much impact the Taxonomy could have in the relative development of technologies. Energy stocking is crucial for the development of low-carbon energy sources, since renewable energy sources are often intermittent (e.g. One can only generate solar electricity when the sun shines). The researchers regret that closed loop pumped-hydro storage[11] is excluded from the Taxonomy as they do believe that this technology has a key role to play to support the development of renewable energy in Europe.

[11] Pumped-hydro storage is the technology that allows to store energy by stocking water uphill. There are two main ways to pump water: either open-loop, where the system of water storage is permanently connected to a naturally flowing water source (e.g. a river), and closed-loop, where the water is not issued from a natural source but is pumped in front. While no difference is made in the existing EU regulation, the EU Taxonomy only includes closed-loops systems as eligible (Piebalgs & Jones, 2021).

B. Green fiscal policy

1. Environmental externalities and economic theory

In *An Inquiry into the Nature and Causes of the Wealth of Nations*, Adam Smith defined three basic factors of production: labour, land, and capital (Smith, 1776). His theory[12] is still used by classical economists, land remaining one of the three elements enabling economic development. The concept of externalities appeared for the first time in the end of the 19th century. At first, the economists interested themselves to positive externalities. While Sidgwick studied externalities occurring at the micro-level (i.e. lighthouses benefitting to boats that do not take part in their construction) (Sidgwick, 1901), Marshall showed that externalities were also occurring on a systemic basis, where the market generates positive effects for single economic agents, with the example of the industrial development benefitting to a company (Marshall & Guillebaud, 1961). Pigou, a former pupil of Marshall, introduced the concept of "negative externalities", using the example of fires ignited in fields due to sparks from locomotives. In that case, farmers were not able to get compensated for their loss, while the train companies were able to make profit. He defined externalities as the difference between the "social net product" and the "private net product" (Pigou, 1932).

The importance of land as an economic factor, along with the complexity of the issue, explains the arousal of economists' interest for environmental externalities. As those negative externalities made it impossible to achieve an optimal resource allocation and resulted in a market failure (Bator, 1958), a regulatory intervention measuring the external cost of pollution is necessary. Economists have used different approaches to try and find a regulatory solution for this problem. Two main economic approaches laid the ground for most policy proposals.

Pigou proposed to introduce environmental taxes that economic actors generating pollution would have to pay to the state[13]. The amount of taxes to be paid would depend on the amount of damage made on the environment. Theoretically, the tax should be equal to the externality, so that, when added to the marginal private cost, it equals the marginal social cost. Therefore, the social and private interest would be realigned. The economic agents would then

[12] Smith's theory was later completed and revisited by David Ricardo and Robert Malthus. Together, those three authors form the basis of the classical economic theory.
[13] This type of taxes is often referred to as "Pigouvian taxes" in the literature and will be so in this thesis.

adjust their behaviour, decreasing the quantity of goods produced (or consumed) and reducing the amount of pollution generated (Pigou, 1932).

Coase adopted a position that is antagonist to Pigou's. Indeed, he believes that a tax could lead to a suboptimal allocation of resources and a non-Pareto efficient equilibrium[14]. He is therefore opposed to Pigouvian taxes. He states that externalities are reciprocal by nature and therefore should be settled by a negotiation between the polluter and the victim of the pollution. Coase believes there should be "rights to pollute" that could be freely exchanged amongst economic agents. The underlying idea of this proposal that the overarching goal of a policy should not be to reduce pollution to a maximal extent but to bring it to a level that is optimal for all economic agents (Coase, 1960). Coase's theory, now considered as one of the most important in environmental economics, has received some criticism because of its strong assumptions, notably the absence of transaction costs, and the fact that some economic agents may be benefitting and suffering from pollution at the same time (Di Giulio, 2008).

The two views have been largely discussed in the literature. An advantage of environmental taxation may be that it could generate positive overall effects (outside of the positive environmental effects) if the revenues of the tax are used to reduce other distortionary taxes. This idea, known as the "double dividend hypothesis" was first introduced by Pearce. The first - "green" – dividend is the reduction in negative environmental impact by the targeted economic agents, while the second – "blue" – dividend is the decrease in overall tax system costs, and resulting enhanced economic efficiency (Pearce, 1991). While the double dividend hypothesis is contested, it has been shown that the revenues from a revenue-neutral environmental tax were better used by reducing other distortionary taxes than by being returned in lump-sums to economic agents (Goulder, 1995). The realisation of the "double dividend hypothesis" depends on the relative importance of two counteracting effects generated by the introduction of environmental taxes:

- "Revenue recycling" is the effect made by the redistribution or tax cuts of a revenue-neutral environmental tax. It stimulates the economy and is at the basis of the double dividend principle.

[14] A situation can be described as Pareto-efficient when there is no other situation that would improve the well-being of one of the economic agents without reducing the well-being of one other economic agent.

- "Tax-interaction" is the effect caused by the environmental tax: as prices for products are higher due to the tax, it acts as an indirect tax on labour. It is especially high if the existing taxes on labour are high.

The "revenue recycling" effect needs to be more important than the "tax-interaction" effect for the double dividend to be verified (Goulder, 2013).

While the realisation of the double dividend hypothesis has often been considered as unrealistic in normal conditions, several researchers have questioned the necessity of achieving a double dividend for the rationale of environmental taxes implementation to hold. Indeed, the initial purpose of environmental taxation being to protect the environment, non-environmental benefits are not needed for the objective to be attained (Bovenberg, 1999; Zhou et al., 2020). Austrian researchers have also shown that the realisation of a double dividend is possible with carefully drafted policies of CO_2 taxation, but that the choice of revenue recycling creates a trade-off[15]. They show that the economic impact of CO_2 taxes depends on the recycling of the tax revenue: while labour tax cuts[16] boost employment and efficiency, they lead to a less equitable situation. VAT cuts are efficient and lead to greater equity but have no impact on employment. Lump sum payments are the less efficient but most equitable option. Environmental taxation is also likely to provide an incentive for companies to invest in green technologies (Kirchner et al., 2019).

2. Instruments at the policymakers' disposal

The instruments that can be used to internalize externalities fall under two main approaches (Mastellone, 2014):

- The command-and-control approach: the state directly intervenes in the economy, establishing standards and/or thresholds that must be met by an economic activity. If an economic agent does not meet those, he will be punished, in general by a fine.
- The market-based approach: the state lets the economic agents free of their behaviour but sets incentives for agents to reduce their pollution and/or gives them an obligation

[15] The research is based on simulations made for Austria, a country that presents economic similarities with Belgium (i.e. it is a small developed country part of the European market).
[16] Researchers have investigated the effects based on a reduction of employers' social contributions in the industries affected by the new tax, effectively reducing the cost of labor.

to reduce their pollution by a certain amount, without precising how they should reduce this pollution. Both the approaches of Pigou and Coase fall under this category.

Among the market-based instruments, the OECD identifies five types of tools to be used by governments (OECD, 1989):

- Environmental taxes (or eco taxes), amongst which Pigouvian taxes,
- Subsidies,
- Deposits,
- Penalties imposed on persons whose production or consumption has a negative impact on the environment,
- Emissions trading, which introduces actual "rights to pollute" that economic players can directly bargain amongst themselves. This derives directly from Coase's approach.

Most existing environmental taxes can be separated in three categories (Mastellone, 2014): Energy taxes, transport taxes, and pollution or resource taxes. This latter group is further divided into two subcategories: levies payable by persons that carry out polluting productive activities, or by real property owners in relation to waste disposal; and levies that are aimed at taxing those energy resources that emit greenhouse gas into the atmosphere (for example, carbon taxes).

3. Existing international regulations

The signing of the Kyoto Protocol in 1997 has shown that the international community considered emissions trading as the most efficient international economic tool for the reduction of greenhouse gas emissions. Indeed, the signatories promised to set up emissions-trading schemes as part of their engagements to reduce greenhouse gas emissions. The choice of the Coasian approach can be explained by the fact that states are sovereign about fiscality, making it difficult to create an international fiscal framework (Bohm, 1999).

In 2005, the EU created its own Emissions-Trading Scheme, which instantly became the largest emissions trading framework (It will be referred to as EU ETS in this thesis). The

EU ETS allows the EU to put a cap on greenhouse gas emissions for participating industries[17]. The players within those industries would then receive or buy "emission allowances", exchangeable on a free market. The mechanism – and the realisation of Coase's theorem - guarantees that emission reductions will be made where they are the less costly to achieve. It was estimated that 30% of total greenhouse gas emissions would be covered by the scheme by 2010 (Convery, 2009). The mechanism mainly concerns large companies in high polluting and heavy industries (e.g. energy, primary materials, chemicals), as well as intra-Europe aerial transport since 2012. The scope might be broadened in the future as part of the European Green Deal. In 2019, 11,000 installations were covered in the system, representing 40% of total greenhouse gas emissions and 45% of CO_2 emissions in the participating countries. While some of the emissions allowances are given for free to companies to protect their competitivity vis-à-vis international competitors, a growing fraction of the allowances are auctioned, applying the "polluter pays" principle. The proceeds from the auctions are used to finance the functioning of the system, and the remainder is used by member states, with a minimum of 50% financing climate-related projects (European Commission, 2020; Service public fédéral Santé publique, Sécurité de la Chaîne alimentaire et Environnement, 2020). It is estimated that the EU ETS allowed for a reduction of about 1.2 billion tons of CO_2 between 2008 and 2016, or 3.8% of total EU CO_2 emissions over the period (Bayer & Aklin, 2020).

However, by progressively putting a higher price on carbon for producers within the reach of ETS by increasing the share of auctioned allowances, the EU ETS may hinder their competitivity compared to foreign producers. An editorial, co-signed by several finance, environment or foreign affairs ministers from France, Spain, Luxemburg, Austria, Denmark, The Netherlands, Slovakia, Lithuania, and Czech Republic, insists that this also poses a problem of carbon leakage: the companies active in countries without an efficient carbon market will still be able to freely emit greenhouse gases. This would make the EU ETS inefficient, as the emissions would then only be displaced, and hurt the EU economy. The ministers call for an EU Carbon Border Adjustment Mechanism that would prevent this carbon leakage by putting local and foreign competitors on an equal footing (Blümel et al., 2021). A mechanism of this

[17] The scope of the EU ETS extends a bit further than the EU since Iceland, Norway, Liechtenstein, and the United Kingdom have joined the 27 EU countries in the system. Switzerland has its own emission-trading system, that could potentially be linked to the EU ETS in the future.

kind is under preparation by the European Commission, as a proposal for a directive is planned for the second quarter of 2021 (European Commission, 2021a).

Besides the Europe-wide EU ETS, many European countries have implemented fiscal policies aimed at reducing greenhouse gas emissions (Kwilinski et al., 2019)[18]. Those measures generally proved to be effective, as they do reduce the amount of CO_2-equivalent emissions. It is however necessary for the taxes to exceed a certain threshold to influence the behaviour of economic agents (Aydin & Esen, 2018). The ratio of environmental taxes on GDP in the EU 27 has remained relatively stable over the last ten years, at a level of around 2.5%, representing 6% of the total tax revenues. More than three quarters of environmental taxes are taxes on energy, while transport taxes account for around 20%. Pollution and resources taxes remain marginal in the EU27[19] (Eurostat, 2021b).

In Sweden, a carbon tax was introduced in the beginning of the 1990's. This carbon tax was part of a broader tax shift that reduced the tax burden on labour. The carbon tax was adapted to the EU ETS, the companies included in the EU ETS being no longer subject to the carbon tax. The introduction of the carbon tax was accompanied by measures addressing the distributional problems, notably tax reductions for low- and middle-income households, and the transition, with aid schemes for the switch to renewable heating for example. The Swedish governments estimates that 95% of Swedish carbon emissions are covered either by the carbon tax or the EU ETS. In 2019, Sweden extended its environmental fiscality to non-carbon environmental issues, with taxes on single-use plastic bags and pesticides (Sweden Ministry of Finance, 2021). It has been shown that the carbon tax implemented in Sweden has helped the country achieve its CO_2 emissions reduction objective, although other instruments besides carbon taxation also played an important role (Shmelev & Speck, 2018).

Luxemburg has decided to introduce a carbon tax as from 2021, with a price tag of EUR 20 for each ton of carbon emitted. The tax will mainly target fuels, oil, and gas. It is expected that this tax will allow the country to reduce its CO_2 emissions by 11% compared to the no-tax scenario (STATEC, 2020).

[18] Some countries also adopted fiscal measures aimed at reducing environmental pollutions other than greenhouse gas emissions, but generally at a lower scale.
[19] The Netherlands is the only country where pollution taxes represent more than 10% of environmental taxes, accounting for more than one third of the total pollution taxes in the EU.

While environmental taxation often results in a reduction of the targeted pollution, it is necessary that these policies are carefully drafted. Indeed, it has been shown that environmental taxes can foster inequalities. Indeed, when taxes are levied on commodities such as electricity or car fuel, the low-income households, which spend a larger share of their disposable income on such commodities, are penalized compared to wealthier ones. Nikodinoska & Schröder (2016) have studied the distributional effects of the car fuel tax in Germany and concluded that the tax eventually increased inequalities. A simulation analysis for various OECD countries has also put forward the fact that taxes on heating fuels and electricity are "clearly regressive" distribution-wise, although there are differences from a country to another (Flues & Thomas, 2015). A major environmental tax reform in the EU could not be regressive if the tax-and-benefits system is adapted carefully (Ekins et al., 2011). Vandyck & Van Regemorter (2014) show that in Belgium, the policymakers would face an equity-efficiency dilemma when using the revenues of a potential increase in oil excises[20].

The impact of environmental taxation on households' income raises the question of the political acceptability of those taxes. France has recently experienced the problem of difficult social acceptation of environmental taxes. The *gilets jaunes* movement, sparked by an increase in fuel tax, showed the world that the issues of inequalities and environmental protection were inseparable and that trying to deal with them in a separate manner could lead to great social unrest (Kinniburgh, 2019). The public generally has a low acceptance for taxation as an instrument for behavioural change (Baranzini et al., 2014). This is notably because the public does not always perceive the environmental effects of the policies (Dresner et al., 2006). Other causes for this low social acceptance include the coerciveness of environmental taxes and psychological factors such as fiscal illusion (Baranzini et al., 2014; Houdek & Koblovský, 2015). Some sociological factors such as level of education, environmental awareness and trust in the governmental institutions explain the difference in political acceptance from one region to another. Studies have found that some design options of green fiscal policies could positively influence the political acceptation of such taxes. Earmarking the revenues of the tax to the environment significantly helps to drive support from the population but can pose problems of

[20] It is of the authors' point of view that the policy measures aimed at reducing inequalities created by environmental taxation should be restricted in time and forward-looking. Such measures should take the form of professional rehabilitation, and training programmes for the workers of those sectors that would be severely impacted by the economic transition rather than "no-strings-attached" long-term compensation schemes. The scientific literature on the topic is however currently rather restricted to our knowledge.

economic efficiency (i.e. in some cases the resulting allocation of resources might be suboptimal). Policymakers thus need to find the right balance. Other policy characteristics increasing acceptance include low complexity, extensive communication on both environmental and budget benefits (e.g. emphasizing the decreases in labour taxes that result from the implementation of the new tax), and the implementation of a "trial period" (Bachus et al., 2019; Baranzini & Carattini, 2017).

4. The Belgian case

Belgium is one of the European countries with the highest CO_2 emissions per capita. Among the 27 countries of the EU, only the Netherlands, Luxemburg and Czech Republic do worse. What is even more worrying is that overall CO_2 emissions per capita have not structurally decreased since the aftermath of the financial crisis of 2008. Industry, energy and transport are the three main emitters of CO_2 in the country (Eurostat, 2021a; Joint Research Centre (European Commission) et al., 2020).

Eurostat indicates that, in 2019, Belgium was the third EU country with the highest tax-to-GDP ratio (45.9%), although it was also the country with the strongest decrease from 2018 (-1.2%). It remains significantly higher than the EU27 average of 41.1%. This is partly explained by the taxes on individual (or household) income and net social contributions, which amount to 31.5% of GDP, compared to the EU27's average of 27.2% (Eurostat, 2020). Belgium's tax system uses environmental taxation to a similar extent as the rest of the EU, with environmental taxes representing 6% of total tax revenues, in line with the EU-27 average. However, this - non-weighted - average is to be used carefully as it is significantly lowered by the low use of environmental taxes by large economies such as Germany, France, and Spain. In fact, Belgium is the twentieth country when comparing the environmental taxes on total taxes ratio (Eurostat, 2021b).

The OECD compared the effective carbon rate among its member countries. The effective carbon rate is defined as: "the sum of taxes and tradeable permits that effectively put a price on carbon emissions". The point of reference was the price of EUR 60 per ton of equivalent CO_2 emitted, that is estimated to be the required carbon price for a decarbonization in line with the Paris Agreement (High-Level Commission on Carbon Prices, 2017; Kaufman et al., 2020). Belgium ranks poorly compared to other European countries, with only 34% of

emissions priced at least at EUR 60, compared to 69% in Luxemburg, 55% in France or 50% in the Netherlands (OECD, 2021).

The OECD, in its evaluation of Belgian tax system, is critical of the current fiscal situation in Belgium. The organization estimates that taxation is too heavily weighted towards labour, harming growth and employment. The narrow base and numerous exemptions of value added taxes limit the efficiency of revenue collection. Environment-wise, it estimates that fossil fuels are taxed at a too low rate in non-transport sectors. In non-transport sectors, fossil fuels are taxed at a low level, which potentially weighs on environmental outcomes. It also recommends to introduce a carbon tax for non-EU ETS sectors, and to introduce support measures for the poor households that would be the most affected by such a tax (OECD, 2020). The same institution suggests in its policy brief for Belgium to lower social security contributions for low wages, and to finance this modification by using less distortive taxes such as environmental taxes (OECD, 2021a). Koźluk (2021) insists that the Belgian environmental objectives should be attained by using environmental taxes. If these taxes were to create negative distribution effects, those should be addressed in the tax benefit system, but the author deems them insufficient to justify environmental inaction.

The National Bank of Belgium also pleads for a greening of the fiscality to complete the EU ETS. However, it insists that this shift must be Europe-wise because the domestic products would be disadvantaged compared to the foreign ones, on which Belgium is not allowed to raise import taxes. It also mentions the fact that such a tax shift should be accompanied by support for lower-income households and companies in sectors negatively affected (National Bank of Belgium, 2021b).

"We will need a debate over a greener fiscality"

Pierre Wunsch, Governor, National Bank of Belgium (2021a)

The situation might be about to change. The current Belgian government, formed end-September 2020, has set ambitious goals regarding the protection of the environment. It has also shown its will to reform the Belgian tax system, and to use it in the transition to a more

sustainable economy. The Belgian federal government agreement from September 2020 states that:

- "The government is preparing a vast tax reform. (…) This reform will meet the government's commitments contained in the present governmental agreement, such as (…) supporting climate ambitions";
- "The new tax system should also contribute to meeting the climate and environmental objectives set out in this governmental agreement governmental agreement";
- "The burden on labour will be reduced";
- "Through a broadening of the tax base, sustainable financing of this relief will be ensured. It is therefore a shift in the tax burden. The overall tax burden will not increase because the measures of the tax reform must be balanced, reasonably taking into account the feedback effects".

Fiscality will be analysed with the purpose of making it more climate and environment friendly. The government will use the « polluter-payer » principle and aim at discouraging the use of fossil fuels, by the instauration of a fiscal instrument. The purpose is to have a budget-neutral instrument that will be part of a broader fiscal reform. The competitivity of businesses and the purchase power of households will need to be preserved, through accompaniment policies. The government will also engage itself at the European and international level to deal with the issue of the taxation of the aerial sector (Belgian Federal Government, 2020).

III. Methodology

The literature review above defines the scope of the issue addressed in this thesis. It also details the design, objectives, and industry and civil society receival of the European Union Taxonomy of financial products. Finally, it describes the theoretical background of environmental taxation, the current situation in Europe and the current political climate vis-à-vis green fiscality in Belgium. While the literature addresses the question on how the EU Taxonomy might help redirect private and public funds towards sustainable investments, no article answers the question of whether and how the EU Taxonomy could be used by governments, and in particular the Belgian one, to redesign their fiscal framework with the purpose of successfully transitioning to a green economy. This question is particularly relevant since one of the EU Taxonomy's purposes is to help drafting public policies and that the Belgian Government is currently researching tools to green its fiscal policy.

A. Research question and scope

As mentioned above, the first question to be addressed in this thesis is whether the EU Taxonomy can be helpful for the redesign of green fiscal policies in Belgium. The need for improvement of the Belgian tax system and the direction towards a greener fiscality has been underpinned by several institutions and is now subject to a political consensus in Belgium, as seen in the literature review. This thesis will therefore not address the question of the relevance of introducing green fiscal instruments. The objective of this work is to emit proposals for improvement of Belgian fiscal system based on the EU Taxonomy.

The scope of the proposals made in this thesis will be the same as defined in the Belgian Federal Government agreement, namely to be budget neutral, and to preserve both the competitivity of businesses and the purchase power of households, with some accompaniment policies where needed. Given that the EU ETS will most probably remain active in the medium term at least, sectors covered by the EU ETS will not be directly addressed.

B. Methodological framework

Now that the question has been defined, let us address the methodology used to answer it. Given that the objective of this thesis is not to offer a description of the current situation, nor an explanation, or even a prediction of the future, most scientific methodologies are not adapted. The purpose of this thesis is to define a strategy, and we therefore needed to have a methodology of action.

It has been decided to use the framework of the Theory of Change. Brest (2010) defined the Theory of Change as "a specific type of methodology for planning, participation, and evaluation that is used in companies, philanthropy, not-for-profit and government sectors to promote social change. Theory of Change defines long-term goals and then maps backward to identify necessary preconditions.". The Theory of Change is fairly recent in the scientific literature, but is increasingly used in NGO's and social enterprises (Taplin & Clark, 2020). It is also being more and more used in the proposal-based scientific literature (Feger & Mermet, 2020).

The reasons for choosing the Theory of Change are multiple:

- The Theory of Change starts with a long-term goal to define the actions that need to be pursued to achieve that goal. It allows to evaluate intermediary actions against their impact on the long-term goal.
- It is policy-oriented rather than dissertation oriented. It allows to define the success conditions of actions (i.e. in this case of fiscal measures), rather than arguments for or against an action.
- As it is originally conceived for co-creation between several actors giving arguments for or against the actions taken, it allows to expose different perspectives. Each of the proposals made in this thesis will therefore be discussed, and its pros and cons will be assessed.

C. Practical implementation

The long-term goal of the proposals made in this thesis is to help Belgium's economy to switch to an economic system that is consistent with the long-term environment-related

goals set by the Belgian government. In the *Sectorial priorities* part of this thesis, we start by identifying, by sector, the priorities for emission reduction, which represent the middle run objectives of the Theory of Change, as their fulfilment is a precondition for a carbon-neutral Belgian economy. In the *Proposals part,* we assess whether a fiscal instrument would be appropriate for each sector and priority identified, whether the EU Taxonomy could help in the creation of such instrument and provide a high-level assessment of how the current Belgian fiscal regime could be adapted to provide incentives for companies to green their activities. Finally, we also give some ideas of how the EU Taxonomy could be used for a revision of the overall Belgian tax system. These ideas are potential inputs for the Theory of Change framework.

IV. Sectorial priorities

The greenhouse gas emissions in Belgium have different sources (FPS Public Health - DG Environment, 2021a). One could separate them between those related to industry, most of which are already priced relatively efficiently with the EU ETS (see above), and those that result from transports, heating, agriculture, waste, and other sources (See Figure 3 for the repartition of emissions among economic sectors).

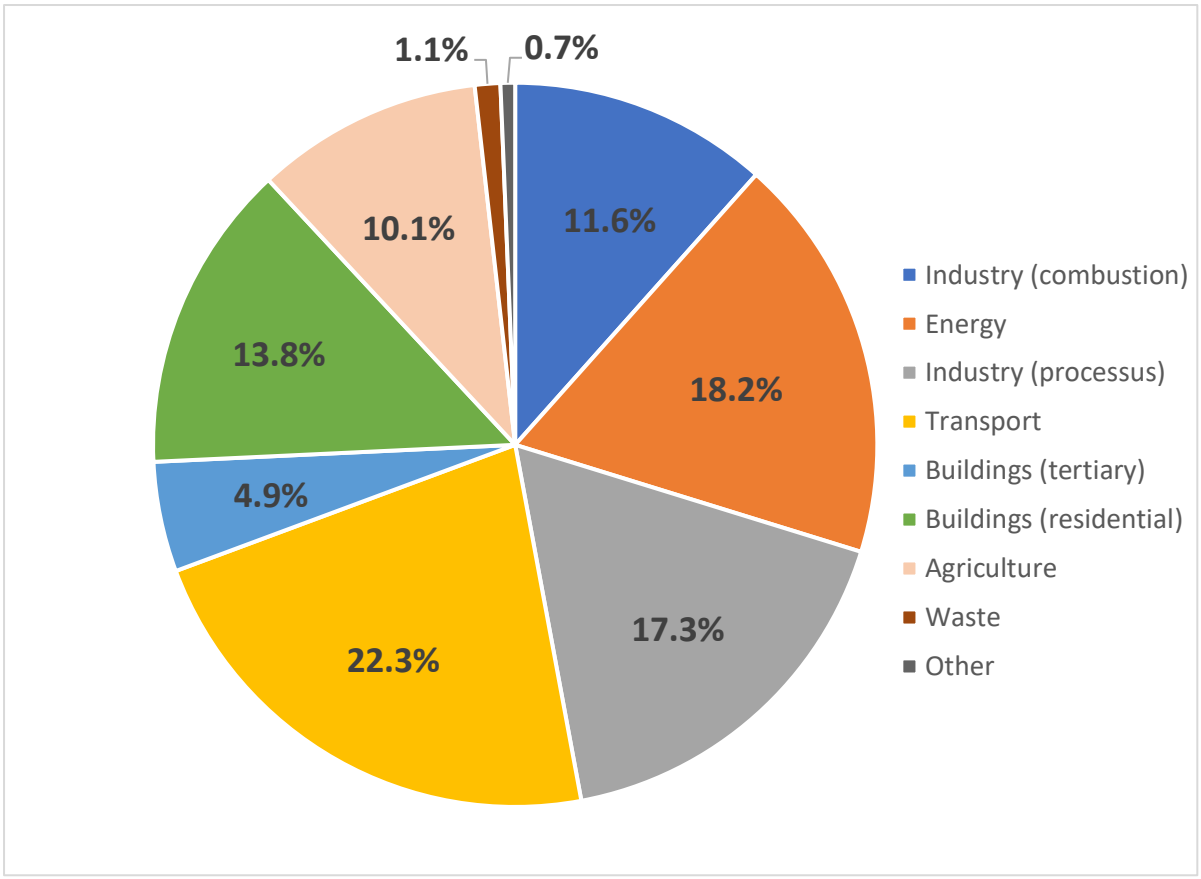

Figure 3: Repartition of greenhouse gas emissions among economic sectors in Belgium in 2019
Source: FPS Public Health - DG Environment (2021a)

Given the fact that the industry and energy sectors are already subject to the EU ETS and will continue to be for the foreseeable future, it is highly unlikely that the sectors will be significantly affected by a potential green fiscal reform at a national scale. These sectors will therefore not be addressed directly in this thesis. Furthermore, some activities which do not

emit significant amounts of greenhouse gas still have an important role to play in the transition to a greener economy. Research and development for new green technologies and education are key if we are to achieve the goals we set ourselves. Forestry and land use, a sector which is currently a net absorber of greenhouse gas, represents 1% of our total greenhouse gas emissions. Although this figure might not seem significant, it might become more important in the future. First, with improved land use and forestry management, the absolute amount of emissions absorbed could increase in the future. Second, as we progress towards the objectives of emissions reduction in the other sectors, the relative importance of the absorption by forestry and land use will mechanically grow.

"*Systemic changes are needed across all sectors to reach climate neutrality*"

FPS Public Health, 2021

In this part, the different sectors will be reviewed on the basis of two reports from the FPS Public Health - DG Environment, (2020, 2021b), "*Vision and strategic workstreams for a decarbonised Belgium by 2050*" and "*Scenarios for a climate neutral Belgium in 2050*". These reports establish scenarios and levers for each of the key sectors to achieve climate neutrality in Belgium by 2050. The reports underpin different challenges for each sector, insisting that new ambitious policies need to be adopted quickly if we are to achieve this objective: "Systemic changes are needed across all sectors to reach climate neutrality, which will only be attained through the deployment of ambitious policies and measures that target both behavioural, societal and technological breakthroughs.". Estimations presented state that while it is almost unachievable for the industry and agriculture sector to become climate neutral by 2050, it is important that the other sectors do so, and that emissions absorption technologies are developed to complement the forestry and land use absorptions.

A. Buildings

For the building sector to become climate neutral by 2050, we need to progress on four main axes: behaviour, building renovation, energy sources and circularity of materials. Those axes relate, on the one side to reduction in energy demand from buildings, and to decarbonisation of this energy on the other side.

Behavioural changes are the one improvement which could lead to the largest reduction in energy demand for the building sectors. These behavioural changes are to be made on three different levels: space, heating and cooling, and appliances. Space improvements relate to reduction in the living space per person, and to a reduction in the proportion of this space that is heated. Besides the living space, the issue of space is also important for non-living areas such as offices, schools, hospitals, among others. It is also more energy-efficient for households to live in apartments in compact dwellings. Heating and cooling relate to the way we regulate temperature in dwellings, as well as the amount of hot water we use. Appliances relate to the way we use our electronic devices. Energy demand for those can be significantly reduced through improved efficiency, but the potential absolute reduction in less important than for the two aforementioned behavioural changes. If we do not achieve those behavioural changes to a sufficient extent, we will need to compensate by drastically increasing the ambition for other axes.

The renovation of our buildings is also key for reducing the energy demand. The rate of renovation of the buildings will need to triple, along with an increase in the depth of renovations: marginal improvements are not sufficient to reach carbon neutrality. The total floor surface of buildings needs to stabilise, while new constructions need to decrease compared to current levels, although some renovations will need full destruction and re-building. This renovation effort could set us on track for a 40% reduction of energy demand in buildings.

Currently, more than half of the energy consumed in buildings in Belgium is through fossil fuels, while electricity (around one third of total) and biofuels make up the rest. Fossil fuels will need to be phased out by 2050, while electricity is expected to represent more than 80% of total energy consumed at that time. Other energy vectors, such as biomass and hydrogen are likely to play a more important role. Heat pumps and other ambient energy-related technologies could also be solutions.

The massive renovation of the buildings mentioned above, along with the construction of new buildings, will require a consequent amount of materials. While the construction of new buildings is especially intensive in steel, and to a lesser degree in cement and ceramic, renovations require five times less material per m^2, and present a more mixed repartition in materials. The scenarios for a climate neutral building sector in 2050 present a reduction of two thirds of the total amount of materials compared to the current situation. Material efficiency will be key as the production of materials is usually highly carbon intensive. Circularity will also be important, especially in the renovation of buildings.

B. Transport

To decarbonize the transport sector by 2050, we have three major levers to use: societal and behavioural changes impacting individuals, a shift from road transport for freight, and technological shifts and innovations reducing the carbon intensity of the transports.

The way society and companies will be organised in 2050 will inevitably impact the way people displace themselves. For example, the adoption of home working could significantly reduce the need for transport related to commuting, while the extent of urban sprawling will impact the distances travelled by commuters. A modal shift is also needed to decrease the proportion of travels made by cars, and to favour public transports (notably thanks to new technologies allowing for more multi-modality such as Mobility as a Service) and active (e.g. bike, foot) and semi-active (e.g. e-bikes) modes. An increase in the occupancy rate (number of passengers per car) and in the utilisation rate (number of kilometres per car per day), due to growth of the sharing economy, would lead to a reduction in the number of cars overall.

The way we transport goods is an important factor of energy demand in the transport sector. While it is expected that the demand for freight transport will increase in the coming decades, the reliance on trucks for this activity will need to decrease. Rail and inland waterways should become more important, while active modes could solve the last-mile issue in some cases. This shift, associated with higher loading and utilisation rate of trucks, should lead to a 50% reduction in the number of trucks needed by 2050.

Behaviours have the most important role to play in reducing the carbon emissions from transports, most importantly by reducing distances. Nevertheless, technological changes could

also play a role. Fossil fuel powered vehicles are to be phased out and replaced by cars mostly running on electricity and hydrogen, with a large majority of battery electric cars, and trucks running on electricity (with a majority of fuel-cell electric trucks) and alternative fuels (hydrogen, e-fuels or biofuels).

C. Agriculture

Although it is unlikely for agriculture to become carbon-neutral by 2050, drastic reductions in emissions are still expected. Among the levers to decarbonise the sector, diets take an important place, while improved practices of animal feeding and agroecology are to play an important role.

Reducing food waste and changes in diets are key objectives to achieve better environmental performance in the agricultural sector. Decreasing meat consumption is particularly important: direct emissions from animals resulting from their digestion is the most important source of greenhouse gas emissions in the agricultural sector. Moreover, the production of feed necessitates vast amounts of lands, which could be freed up for carbon-absorbing purposes. This is true for both Belgian-sourced feed and imports, which have an important carbon impact abroad. It is also useful to remind that animal-based food production requires more energy than plant-based equivalents.

Better feed management would significantly reduce the enteric emissions from livestock. Alternative sources of protein for animals, such as algae or insects, could also reduce the demand for traditional sources, such as soy or corn.

A shift in the agricultural practices to a generalisation of agroecology and agroforestry, with a drastic reduction in the use of chemical entrants (e.g. pesticides, fertilizers), which should be phased out by 2050. This would help reducing the amount of emissions generated by agricultural soils. The potential reduction in yields could be compensated by dietary shifts and improved food waste management.

D. Forestry and land use

The forestry and land use sector is of the utmost importance in the natural carbon cycle by continuously exchanging carbon with the atmosphere. This sector has the particularity of having the potential of acting as a carbon sink, sequestering more carbon than it emits, effectively compensating for those sectors that would still emit greenhouse gas by 2050. Nevertheless, in 2017, the sector absorbs 92% less carbon than it did in 1990. For forests and soils to be able to absorb as much carbon as we need, we must take some drastic actions.

Afforestation and reforestation are substantial for the decarbonisation of our economy. Increasing the proportion of land covered by forests would create new carbon sinks, providing negative emissions. Land freed up by agriculture could be used to create forests, resulting in carbon being stocked in the biomass and the forest soil. There needs to be a balance between the use of the forests for biomass harvesting (e.g. wood production), maximising the storage of carbon and preserving biodiversity.

Forest is not the only type of land use that does absorb carbon. Other uses, such as permanent grasslands, peatlands, and wetlands, can play the same role. The way we manage croplands is also important. By limiting soil degradation, we can at the same time improve carbon sequestration and increase soil fertility and productivity.

E. Other sectors and transversal matters

As explained earlier, the energy sector being part of the EU ETS, it does not call for additional taxation to correctly internalize the price of carbon emissions. This point is however only valid for the energy production and storage happening in large installations. As large operators are currently responsible for a vast majority of the energy production and storage, this distinction might seem unsignificant. The development of renewable sources of energy, however, will necessitate local energy networks with production and storage capabilities to deal with the inherent intermittency of renewable sources of energy. For example, solar panels installed on housing facilities by citizens or smart car batteries that would push electricity back to the grid when needed have a key role to play in the energy transition but are not covered by the EU ETS. These types of installations might need appropriate fiscal measures.

The carbon impact of the industry sector would be significantly reduced if circular economy and sharing economy became the new normal. Indeed, the reduction in demand for materials would mechanically reduce the volume of extraction[21], manufacturing, and transformation of materials and the greenhouse gas emissions related. While this could not be directly included in the industry, it will impact massively the industry-related carbon emissions. The implementation of these would not necessarily lead to value destruction in the industry, as new business models and new definitions of product value could create value.

Research and development of new technologies will be crucial to achieve carbon neutrality. Innovations are needed in all sectors, from air transport to construction or renewable energy. Innovation should not have a sole focus on technology, but also on the social impact of the introduction of these technologies, ensuring that citizens are able to take profit from the new technologies to achieve a lower carbon footprint along with improved (or at least constant) welfare.

To foster this innovation, it is also important to stimulate competition by making sure that SME's developing innovating innovative green products and business models have a favourable environment for their growth, including funding possibilities. A strategy aimed at developing green finance in Belgium is necessary to achieve the transition to a sustainable economy.

[21] Extraction mainly impacts Belgium's indirect emissions as materials are mainly extracted abroad.

V. Proposals

The *Sectorial priorities* part of this thesis allowed us to identify, for each of the sectors with consequent carbon emissions that are not currently addressed by the EU ETS, key levers that could be used for the transition to a low-carbon economy. In this section, we assess whether these levers could be covered by the EU Taxonomy, using EU Taxonomy Climate Delegated Act that was approved in principle by the European Commission on the 21st of April 2021 and was formally adopted on the 4th of June 2021 (European Commission, 2021). As explained earlier, this Delegated Act only concerns the two first environmental objectives of the EU Taxonomy, namely climate change mitigation and climate change adaptation, while the other criteria are only screened based on the DNSH principle. Given that our analysis mainly concerns the climate change mitigation objective, this does not harm the usefulness of the reasoning, except for those interactions between climate mitigation and the other objectives (e.g. the protection and restoration of biodiversity and ecosystems, the transition to a circular economy) described earlier. For the levers for which the EU Taxonomy is applicable, we then propose adaptations to the current Belgian fiscal regime applied to the activity to hasten its transition. The purpose is to provide incentives to economic actors to behave in a way that would help the Belgian economy become carbon neutral. All information regarding the current fiscal regimes is sourced from either the FPS Finance's website, or the regions'.

A. Buildings

The first lever that was identified for the transition of the building sector was related to behaviours of individuals: reducing one's area of living and working space, in particular the heated space; improved practices of heating and cooling; and better use of appliances. The EU Taxonomy cannot be used at the moment for this lever for two main reasons: the difficulty of measuring behaviours and the fact that the EU Taxonomy was framed for organisations and not for individuals.

The second lever was the renovation of buildings. The EU Taxonomy covers one activity for the renovation of existing buildings, which relates to major renovations, but also one activity for "Installation, maintenance and repair of energy efficiency equipment", which relates to

minor renovations that have the purpose of improving energy efficiency, such as improvement of insulations.

For the first activity, either it meets the national requirements for being qualified as "major renovation", which results in a reduction of final energy demand of 50 to 80% (Toleikyte et al., 2016), or proves that the renovation achieves an energy demand reduction of at least 30%, which was criticised, as seen in the *Literature Review* (Schütze & Stede, 2020). The criteria for DNSH notably include the circular economy requirement for at least 70% of the used and destructed materials to be prepared for reuse, recycling and other material recovery. Currently, all individuals that renovate their habitation have[22] the right to pay a reduced rate of V.A.T. (i.e. 6% instead of 21%) on the renovation expenses. While regions have the possibility to enforce the renovations to respect some environmental standards, those are not uniform. The EU Taxonomy could play a role by conditioning the reduced V.A.T. rate to the compliance with its criteria, that would then be uniform in all regions. Another option could be to act on the cadastral income, with reductions for those buildings complying with the norms or mark-ups for those that do not comply[23]. For that purpose, there is an EU Taxonomy activity for the "Acquisition and ownership of buildings" that gives energy demand criteria for a building to be considered as contributing to climate change mitigation. These criteria might also be used to incentivise building owners to renovate their buildings. By influencing the withholding property tax for example, such a measure would increase the value differential between "green" and traditional buildings. Companies making investments targeted at saving energy can currently receive a tax credit of 13.5% on these expenses[24]. It is at the regions' discretion to decide what qualifies as "energy saving". The EU Taxonomy could help uniformise the definition, as well as add requirements for other environmental matters. Given that the rate of renovation needs to accelerate quickly, as seen earlier, an idea might be to increase the tax credit for companies, or the other way around, to enforce a flat tax on these companies whose buildings do not comply with the standard PEB for example. The expected increase in the renovation rate, and therefore in the number of renovations could compensate for the lower tax

[22] Under certain non-environmental related conditions (e.g. the habitation must be at least ten years old and must solely be used as residence).
[23] In this case, particular attention should be given to the financial ability of lower-income households to pay for the renovations. Targeted measures may be needed to support them in order to avoid creating a punitive measure. An example is the MEBAR premium in Wallonia, which supports low-income households that invest to improve the energy use in their homes (Région Wallonne, 2021).
[24] SME's have the right to a 25% tax credit until end-2022.

rate (or higher deductibility) on renovations, especially by considering the return effects (e.g. labour taxes on the construction workers). It is important to bear in mind that tax actions alone might not be sufficient to enable a significant increase in the number of renovations. Indeed, there is a manpower shortage in the construction sector in all regions of Belgium (Regnier, 2021; SPRB Economie-Emploi, 2021; VDAB, 2021). This issue could be tackled with appropriate immigration and/or training policies.

The reasoning for the major building renovations holds for the minor renovations as no difference is made between the two in the Belgian fiscality. Two minor differences are to be highlighted:

- For the minor renovations, the EU Taxonomy does not have DNSH criteria for circular economy and water protection, which hinders its usefulness as a reference point.
- In Wallonia, individuals isolating their roof receive a 30% tax credit. This tax credit has been suppressed in the other two regions.

The third lever, decarbonizing the energy used in buildings, has a dedicated activity in the EU Taxonomy: "Installation, maintenance and repair of renewable energy technologies". The only environmental criterium for this activity to be considered as sustainable is to install one of the listed technologies (solar panels, heat pumps or wind turbines, among others). However, as the criteria are trivial, we do not deem it useful to use the EU Taxonomy to adapt the fiscality on renewable energy installations in buildings. The case of the companies performing this activity will be discussed later as part as a broader reasoning.

The last lever for the building industry to become carbon neutral was the circular economy in building renovation and construction. While this has been addressed for the renovations in the dedicated part, there also exists one economic activity "Construction of new buildings" in the EU Taxonomy. This activity has strict criteria to be considered as having a significant contribution to climate change mitigation[25]. The criteria concerning circular economy and water protection are akin to their building renovation counterpart. A fiscal instrument encouraging new "green" building constructions might lead to an increase in new constructions, whereas the

[25] The buildings must notably have a Primary Energy Demand (PEB) at least 10% lower than the standard for Nearly-Zero Energy Building (NZEB).

objective should be to reduce the number of constructions. A non-fiscal possibility for using the EU Taxonomy in this case could be to enforce new buildings to respect the criteria set by the EU Taxonomy. This might have a double positive effect: a decrease in the number of new constructions and an increased environmental sustainability of those buildings.

B. Transport

The first lever for decarbonizing the Belgian transport sector is a change in individual behaviours: doing more homeworking, modal shifts and better use of the cars. In a similar way to the buildings sectors, the EU Taxonomy is not perfectly adapted to act on behaviours. As "homeworking" is not an economic activity *per* se, it is not addressed in the EU Taxonomy. The realisation of the modal shift depends notably on the development of public infrastructure (public transports, but also bike-adapted infrastructure). Some fiscal measures that incentivise citizens to shift from cars are already being put in place, notably in the case of company mobility: the favourable fiscal regime for company cars is progressively being phased out and replaced with other mobility options, such as the mobility budget, offering the opportunity for companies to replace their fuel-powered company cars with an array of options their employees can choose from (FPS Employment et al., 2021). Diesel and other cars fuels are taxed up to 150% of their base price to discourage their use (V.A.T. included) (FPS Economy, 2021). Other examples include the kilometric taxation for cars currently under review in the Brussels region (Belga, 2020), and the higher threshold for the exoneration of bike allowances compared to car allowances for companies (FPS Finance, 2015b). There are also non-fiscal incentives being implemented by public authorities, such as the bike-train programme of the NMBS/SNCB[26] (SNCB, 2021).

The second lever identified is to move away from road to transport goods. There are two main candidates for the replacement of the road transport: rail and inland waterways.

The EU Taxonomy includes one activity for rail: "Freight rail transport". The two main requirements are that the trains and wagon have zero direct tailpipe CO_2 emissions (it is allowed

[26] The NMBS/SNCB is the Belgian national train company.

to only have zero tailpipe[27] emissions when running on a track with necessary infrastructure and to use a conventional engine when the track is not adequately equipped) and not to serve for the transport of fossil fuels. In the shift towards zero-emissions rail freight, we deem it important to differentiate two effects: the shift from road freight to rail freight and the shift from traditional rail freight to zero tailpipe emissions rail freight. It is important to note that in Belgium, most trains are already running on electricity and/or batteries (Heyndrickx & Boschmans, 2020), which suggests that the shift to zero tailpipe emissions train has already happened. The transition from road freight to rail freight has however not yet happened, since 74% of goods were still forwarded by road in 2018 (Belgian Rail Freight Forum, 2019). While the criteria for the activity of freight rail transport might not be so relevant on its own (i.e. a vast majority of trains already respect the criteria), the criteria might be very relevant when used in comparison with their freight road transport counterpart. Indeed, the criteria for the "Freight transport services by road" also impose to attain zero tailpipe emissions, except for trucks exceeding 7.5 tons, for which they must respect the standards for "low-emission heavy-duty vehicles"[28] when it is not technically or economically possible to reach zero tailpipe emissions. In this case, they are considered as a "transitional activity" in the EU Taxonomy. As this is much more complicated to attain for trucks than for trains, basing a legislation on the EU Taxonomy standard would favour freight by rail. In Belgium, the freight by rail must currently pay access rights for each travelled kilometre, while trucks must pay a kilometric tax that is dependent on their weight and their CO_2 emissions standard. A solution could be to equalise the ton-kilometric price for trucks and train that do respect the EU Taxonomy to a lower amount than the current fee. A way to finance this tax might be to raise the taxes on those trucks and trains that do not respect the EU Taxonomy, especially the most polluting ones. This could have two main positive effects: helping the freight sector to shift towards an increased use of the rail and accelerate the phasing out of the most polluting trucks. Investments in infrastructure will be needed in some cases to increase the capacity of the railways. However, those investments could remain limited as the network is currently vastly underutilised (Belgian Rail Freight Forum, 2019).

[27] The distinction between zero emissions and zero tailpipe emissions is important because the production of electricity is still a net emitter of greenhouse gas (i.e. A train running on electricity indirectly emits greenhouse gases).

[28] The standards enforce a CO_2 emissions reduction of at least 50% compared to the average of all vehicles in its group registered in the 2019 reporting period.

While rail transport is ideal for long distances, fluvial transport has the advantage of often being close or in city centres. Inland waterways are currently vastly underutilised, meaning that an increase in boat traffic would not provoke congestion on the network. The EU Taxonomy activity "Inland freight water transport" has similar criteria to the "Freight transport services by road". For fluvial transport to be considered as sustainable under the EU Taxonomy, the tailpipe CO_2 emissions must be reduced to zero, or, until 2025, emissions of CO_2 per tonne at least 50% lower than the average reference value for heavy duty vehicles. In the latter case, the activity will be considered as "transitional". Ships transporting fossil fuels cannot be considered as sustainable. Since the activity is to be considered as a substitute to the rail and road freight transport, a common fiscal regime based on tailpipe emissions could lead to the most environmentally and economically efficient option to be adopted by the market. A ton-kilometric tax, taking into account whether the freight activity complies with the EU Taxonomy, could be introduced, which would replace the different regimes in place. As explained above, such a tax could lead to both a modal shift towards rail and inland waterways, and improvements in the environmental footprint of the different transport modes.

The last lever we identified to reduce the carbon footprint of the transport sector was the technological developments and shift that would reduce the carbon intensity of the sector. We will here focus on the technological shift and address the research and development related matters later in this thesis. The technological shift in the transport sector mainly concerns the replacement of fossil-fuel based engines by less polluting technologies. While the electric cars are the most prominent new technology, some other technologies such as hydrogen or biofuels could play a role, especially for trucks. While the case of trucks has been discussed with the other freight transport methods, lets us discuss the case of cars. The "Transport by motorbikes, passenger cars and light commercial vehicles" activity of the EU Taxonomy requires for cars to have zero tailpipe emissions by end-2025 to be considered as sustainable. Until then, cars emitting up to 50gCO_2/km are eligible as "transitional" activities. Currently, in Belgium, there are several taxes for individuals purchasing and using a car. First, at the time of the purchase, one must pay the V.A.T. for 21% of the price of the car and a registration fee. The registration fee is managed by the regions. In Flanders, the tax depends on the environmental characteristics of the car (CO_2 emissions, horsepower, and EURO standard) and the age of the vehicle. In the other two regions, it only depends on the horsepower and the age of the vehicle. Then, car owners must pay an annual circulation tax, that is also managed by the regions. The circulation

tax is based on CO_2 emissions, horsepower and EURO standard in Flanders, while it is only based on the horsepower in Wallonia and Brussels. While electric vehicles owners are exonerated of the circulation and registration taxes in Flanders, they must pay a minimal amount in Brussels and Flanders. These add to the fuel taxes we mentioned before. As mentioned earlier, the Brussels region is considering replacing the circulation and registration taxes by a kilometric tax. This tax would consider the environmental characteristics of the vehicles, but also the distance travelled and the time at which the travels take place. While the EU Taxonomy has the advantage to enable to control for environmental factors other than greenhouse gas emissions, it only differentiates between very low-emission cars, which are currently a tiny minority, and other cars. If taxes were to be introduced based on the EU Taxonomy, this may prevent the progressive phasing out of the cars with the highest level of emissions, as the regulation does not allow to discriminate them from the cars with relatively low emissions that do not fit with the criteria of the EU Taxonomy. For this reason, we deem it preferable to keep a system that allows for more precision. The criteria of the EU Taxonomy could however be used to create a category of cars that should be taxed at the lowest level, which would create incentives for constructers to act on the other environmental factors. This is particularly important because the production phase of electric vehicles is the most pollutive, and that the negative environmental impact could be tackled by an improved end-life management (ADEME, 2016).

Another important part of the emissions related to transport in Belgium is the international maritime and aerial transport[29]. It is however not accounted for in the emissions repartition presented above. The fiscal regime to be applied to this category of transport is to be discussed in international discussions since the risk of fiscal dumping is particularly high, especially in a small country like Belgium. If the Belgian government decided to implement a tax on kerosene, for example, airline companies could easily circumvent it by filling up their airplanes in neighbouring cities such as Frankfurt or Amsterdam. Such a tax, both for airplanes and ships, is currently being discussed at the European Union level (Lamer, 2021). As it does not fall under national competencies, it will not be further discussed here.

[29] Domestic aerial transport is quasi-inexistant in Belgium due to the small size of the country. It represents only 0.05% of emissions of the Belgian transport sector.

C. Agriculture

When addressing the agriculture-related part of this thesis, we faced an issue: the European Commission decided to remove the criteria for agriculture from the Delegated Regulation pending further progress in the negotiations regarding the Common Agricultural Policy (CAP), to be coherent with the criteria of the CAP. In order to cope with this issue, it was decided to use the criteria from the Technical Annex of the final report on EU Taxonomy of Technical Expert Group on sustainable finance (2020). Given that the recommendations of the TEG for the criteria of the other sectors were in general followed by the European Commission for the drafting of the Delegated Act, we deem those criteria to be acceptable proxies for the actual criteria that will be published after the finalisation of this thesis.

When analysing the levers for the decarbonisation of the agricultural sector in Belgium, we first mentioned a change in diets: in particular, we need to decrease the overall meat[30] consumption in Belgium. The EU Taxonomy, in the "agriculture" part, does give criteria for the production of meat, through the "Livestock production" activity, but does not address meat consumption. While we will discuss the opportunity of introducing economic instruments based on the EU Taxonomy for meat production further in this part, the TEG acknowledged that the current version of the regulation can be helpful for a shift in diets: "*At this point, the Taxonomy cannot address such* (dietary) *shifts, but can only point to significant short-term potential associated with efficiency gains*". It is also acknowledged in the Technical Annex of the TEG final report on EU Taxonomy that improving the management practices of livestock is not sufficient to reach the 2050 objectives: "(…) *It is noted that for absolute emissions from agriculture to continue decreasing beyond a certain point and to move towards net-zero targets by mid-century, reduced emissions intensity will need to be coupled as soon as possible with commensurate changes in consumption patterns and overall reduced per-capita consumption of livestock products, especially certain beef, lamb and dairy products"* (Technical Expert Group on sustainable finance, 2020). While taxes on meat could be an efficient policy instrument to reduce meat consumption, they could have an important regressive impact and therefore face low social acceptance (Francken, 2021; McLachlan, 2018).

[30] We use the term "meat" to simplify, but the issue extends to other animal-based products, with the production of dairy products having an important environmental impact as well.

Improvements in the way we produce meat might however allow us to significantly reduce our carbon footprint. The "Livestock production" activity of the EU Taxonomy, which can only be "transitional"[31], sets up three objectives to be attained by a livestock production activity to be considered as having a substantial impact on climate change mitigation: avoiding or reducing greenhouse gas emissions with appropriate management practices, maintaining and increasing existing carbon stocks for at least 20 years, and not producing on certain types of land (wetlands, forests and peatlands). The two first criteria might either be attained by adopting and maintaining "essential management practices" or by demonstrating the impact on emissions/stocking of carbon. DNSH criteria are particularly stringent for the "Pollution prevention and control" objective. We could imagine introducing a differentiated V.A.T. rate for animal products that have been produced according to the EU Taxonomy: "conventional" meat rate of V.A.T. could jump from 6% to 12%, with the "sustainable" meat remaining at a rate of 6%. Nevertheless, one must bear in mind that for meat, and European agriculture in general, the CAP is the one most important tool to achieve change. The policy offers nearly 60 billion euros in help to farmers, that is conditioned on several factors, some of which are related to environment protection (European Commission, 2021c). The importance of the CAP in the revenue of farmers, coupled with the low financial means of farmers, makes an important number of farms dependent on the CAP for their survival (Détang-Dessendre & Guyomard, 2020). Considering that the help of the CAP for a farm is granted for several years, the reform of the CAP for the 2021-2027 period will be particularly important. In that sense, the political agreement for a CAP aligned with the EU's environmental objectives is to be considered as a step in the right direction (European Commission, 2021d).

Some differences are to be made between livestock and crop production: first, the two activities linked to crop production in the EU Taxonomy, "Growing of perennial crops" and "Growing of non-perennial crops", can be considered as full-fledged "sustainable" and not only as a "transitional" activity. Second, the dietary shift we mentioned earlier would increase the quantity of crops needed to feed human beings[32], making improvements in the environmental performance of such production especially important for the future. The criteria of the EU Taxonomy for the crop growing activities are roughly the same as for livestock production. The

[31] As explained earlier, even with the best practices, livestock production remains an important emitter of greenhouse gas.
[32] This effect might be counteracted by the decrease of the quantity of feed needed to produce animal products.

main difference is the particular attention given to biodiversity protection in the DNSH criteria. In a similar fashion to what we described for the animal products, the main instrument to influence the shift towards more sustainable modes of agriculture lies in the design of the CAP, particularly the environmental standards to be adopted by European farmers.

D. Forest and land-use

Afforestation and reforestation[33] could help us achieve climate neutrality thanks to their carbon-absorbing potential. The EU Taxonomy included the two activities, with dedicated criteria to ensure that the new (or restored) forests absorb as much carbon as possible, while not harming the other environmental objectives. For afforestation and reforestation activities to align with the EU Taxonomy, the project leader must establish:

- An afforestation plan[34] and subsequent forest management plan: The former is a plan for the first five years (at least), until the area reaches the status of forest as described in national law[35]. The forest management plan takes over from the moment the area reaches the status of forest. These documents give details about the afforestation project, notably in terms of species, impact on soils and existing carbon sinks, management goals, measures taken to protect the good condition of the forests ecosystems, etc.
- A climate benefit analysis: A strong scientific analysis showing that the afforestation will lead to more (net) carbon absorption than the "business-as-usual" scenario.
- A guarantee of permanence: A legal guarantee that the area will remain a forest (e.g. classification as protected area) and the commitment of the operator that any reduction in the climate benefit will be compensated by another forest activity within the forestry sector.

[33] The EU Taxonomy also included a "Forest management" activity and a "Forest conservation" activity, which are not discussed further in this thesis. The criteria for these activity are roughly the same as for forest restoration, the main difference being the eligible activities.
[34] The afforestation plan is only required for the afforestation activity, since reforestation happens on areas having already obtained the status of forest.
[35] If the status does not exist under national law, the reference is the UN Food and Agriculture Organisation (FAO) definition of forest.

- An audit: Within two years of the start of the project, and every ten years thereafter, national relevant authorities or an independent third-party verifier must verify the compliance with EU Taxonomy criteria (including DNSH).
- And a group assessment: the compliance with EU criteria may be conducted as part of a grouped audit with other forests that are sufficiently homogeneous and related.

The DNSH criteria give a particular importance to biodiversity protection, notably through the preservation of natural habitats and the exclusions of non-native invasive species, and to pollution prevention. Since silviculture operators are classified under the agricultural tax regime, they do not have to pay V.A.T. on their sales, therefore preventing any V.A.T.-related measure. The fiscal aspects of the silviculture having been little addressed by the literature, and the rest of the fiscality on the sector being conventional, we will address it as part of a broader reasoning in the *Other sectors and transversal matters* part.

The EU Taxonomy also includes a "Restoration of wetland" activity. Its criteria are similar to the ones for forest restoration, with some relevant adaptations. As the EU Taxonomy does not link this activity to any NACE code or economic activity, it seems unlikely that for-profit organisations undertake this activity. Investment in this area will thus probably be limited to public investment and philanthropy, reducing the scope for fiscal measures.

E. Other sectors and transversal matters

In this part, we start by discussing the other sectors, before jumping to transversal matters and systemic tax reforms.

The first lever we discussed for the other sectors was the creation of renewable energy generation and storage capacity by citizens. This was discussed in the "Buildings" part of this chapter, with the following conclusion: while a fiscal instrument encouraging the installation of renewable energy related technologies in housing facilities could be helpful in the transition, the EU Taxonomy, due to the triviality of its criteria, would not be helpful in creating such instrument.

The second point of reflexion, the transition to a circular economy, has not been addressed directly by the first Delegated Act of the EU Taxonomy. However, it is included in the EU Taxonomy through the DNSH criteria and criteria for substantial contribution to the transition

to circular economy will be published by end-2022. The use of the EU Taxonomy rather than methods based on carbon only for the development of fiscal (or other economic) instruments allows to consider the impact on circular economy and other objectives. In the case of industry, where currently only the carbon emissions are being accounted for in the EU ETS, implementing environmental safeguards and incentives for a switch towards a circular economy could be impactful.

Research and development of low carbon technologies is also one of the activities considered as potentially achieving a substantial impact on climate change mitigation. Two types of research fall under the scope of the EU Taxonomy:

- The research that enables one of the other activities included in the EU Taxonomy either to significantly reduce its environmental impact, by reducing its carbon footprint for example, or to achieve greater scalability, by providing cheaper solutions for example.
- The research related to carbon-capture technologies, solutions, processes, or business models.

The current Belgian tax system provides incentives for innovation, with no discrimination being made for the sector. The principle is that 85% of the net innovation revenue is tax deductible. The net innovation revenue is defined as the gross innovation revenue (part of the price of products attributable to R&D, licence fee, sale of patent, …) minus the eligible innovation spending. Our proposition is to make the net innovation revenue of Taxonomy-aligned R&D 100% tax deductible, to incentivise even more R&D in domains that may be profitable for society, for example more efficient renewable energy technologies. A possible way to compensate this budget-wise would be to reduce the deductibility of other innovation revenue to 80%.

The question of the fiscal treatment of green finance is non-trivial. First, because of the European principle of free circulation of capital: Belgian companies might be (partially) owned by foreign investors, while Belgian investors are able to invest in foreign companies. Second because basing green finance fiscal rules on the EU Taxonomy might restrict funding opportunities for SME's that do not report under the EU Taxonomy. A possibility would be to reduce the withholding tax for dividends and interests arising from the investment in companies

operating one or several EU Taxonomy-aligned activities. The Belgian withholding tax rate is of 30%. The tax reduction would be applied proportionally to the share of the investee's activity that is aligned with the EU Taxonomy. For example, someone receiving a dividend of €100 from a company, which has 60% of its activity aligned with the EU Taxonomy, would be taxed at 20%[36] on €60 and at 30% on €40, resulting in an effective withholding tax rate of 24%. This could also be applied to funds and other structures allowing individuals to invest in companies and organisations operating Taxonomy aligned activities. We recommend using the distinction made in EU Taxonomy between CAPEX and OPEX, and revenues: while the proportion of CAPEX and OPEX made in EU Taxonomy-aligned activities determines the proportion of debt financing that can be qualified as sustainable, equity financing level of sustainability is to be determined by the percentage of revenue resulting from EU Taxonomy aligned activities. There might also be discussions on activities considered as transitional under the EU Taxonomy. Should they qualify for such tax reduction? Should a particular regime be applied? We recommend using an intermediary regime: if "Own performance" and "enabling" activities see their dividends and interests taxed at 20%, we could tax "transitional" activities at a rate of 25% for example. A problem arising from this reasoning is that activities having no significant impact on the environment, such as education, would be taxed at the same rate than heavy polluters, such as the meat industry. A solution might come from the "brown" taxonomy that is currently under discussion, as discussed earlier. By using this "brown" taxonomy, we could increase the withholding tax rate for the most polluting companies.

We could also act at a more systemic level by linking the corporate tax rate to the environmental performance of companies. The EU Taxonomy would allow us to discriminate virtuous companies from the rest. Applying a similar reasoning to the one we used for the withholding tax, we could set the corporate tax rate at a lower level. The problem of decreasing tax revenues could be solved by increasing the corporate tax rate for those activities that are not aligned with the EU Taxonomy.

Implementing such systemic fiscal measures implies that all companies would be impacted, even those companies that are not required to report under the EU Taxonomy, including SME's. For those companies, as long as the fiscal instrument implemented remains only positive (i.e. a tax reduction for the "responsible" companies), we suggest to invite companies that would be

[36] This rate is given as an example.

beneficiaries of the tax reduction to report on a voluntary basis, possibly in a simplified format. If negative fiscal instruments were to be implemented (i.e. tax increase for polluting companies), a sector-by-sector approach could be followed in order to avoid enforcing all companies to report. Another possibility would be to only apply such negative fiscal measures to companies that do have to report under the EU Taxonomy.

One could ask the question of how to deal with the sectors covered by the EU ETS. While the greenhouse gas emissions from these activities are already priced by the system, not including them in the tax reform would prevent providing them with an incentive to adapt their activities to other environmental objectives. This could become even more problematic in the future if some industrial activities were to qualify as sustainable under the EU Taxonomy thanks to a substantial contribution to non-climate criteria. We recommend including the industry in the systemic tax reforms proposed hereabove for two reasons: (1) as long as the reform is mainly "positive" (i.e. the activities not complying with the EU Taxonomy are not taxed at a significantly higher rate than before), it will only provide an extra incentive for companies to transition to low-carbon business models, without harming significantly their competitivity; (2) this will prevent facing an issue with industrial activities that are not (anymore) significant emitters of greenhouse gas but that produce other types of pollution. The presented tax reforms, thanks to the non-climate DNSH criteria from the EU Taxonomy, would give them an incentive to reduce the other pollutions resulting from their activities.

VI. Conclusion

This thesis has put forward several proposals to use the EU Taxonomy as a tool for the greening of the Belgian tax system. The sector-by-sector focus helped us to determine whether the EU Taxonomy could be useful to adapt the existing fiscal legislation, in which cases a fiscal tool was appropriate and where the EU Taxonomy could potentially be useful for non-fiscal policies. We then proposed ways of using the EU Taxonomy for reforming the fiscal regime in place both at a sectorial and systemic level.

Several conclusions can be drawn from the reasoning we made for the different sectors and for the transversal matters.

Firstly, we noticed that the DNSH criteria for environmental objectives other than "climate change mitigation", along with the social safeguards, were a key asset of the EU Taxonomy. Those criteria open the door for environmental policies that are not solely focused on reduction of greenhouse gas emissions, but that do comprehensively consider other environmental factors. Hence, the triviality of the DNSH criteria for certain activities (e.g. installation of renewable energy devices in buildings) significantly hinders the usefulness of using the EU Taxonomy in policies.

Secondly, we observed that the EU Taxonomy was in general inadequate to deal with the necessary individual behavioural changes. Indeed, being mainly business-oriented, it fails to properly address some of the behavioural levers. This is notably the case for the reduction in meat consumption and modal shift in personal transport. Although the EU Taxonomy might enable the transition to less polluting modes of meat production and cars, it currently cannot influence the meat consumption per capita, or the proportion of travels made by car.

Thirdly, some sectors are already highly dependent on public action or subject to a regulation aimed at reducing their carbon emissions. It is for example the case for the agriculture sector, where the CAP is the single lever that can have the greatest impact. The industry and energy sectors also fall into this category due to their inclusion in the EU ETS. While it may be interesting to include these sectors in a broader green fiscal framework, that would include other environmental factors and provide an additional incentive, it may also hurt their international competitivity. If such measure were to be introduced, attention should be given to the overlap

with existing regulations and to the uniformization of the criteria to lessen the amount of red tape companies must go through.

Finally, the fact that, in Belgium, some fiscal matters are delegated to regions makes it difficult to undertake action at the federal level. As we saw, this is the case for cars and buildings. Although this does not prevent regional action, a lack of uniformity would certainly result in a lower economic efficiency, especially in the case of cars.

This thesis also presents some limitations, that can serve as departure points for future research on the matter.

Such a quantitative analysis, conducted based on simulations for example, could be useful to estimate the budgetary and environmental impact of the measures, as well as their distributional effects and the influence they may have on the overall economic efficiency.

Redistributive and more generally revenue recycling measures have also been little addressed in this thesis. These measures are key to the public acceptation of fiscal policies, as well as to their effectiveness. Hence, a thorough analysis of these should be conducted.

This thesis mainly addressed the "climate change mitigation" criteria of the EU Taxonomy. The "climate change adaptation" criteria have already been set but were not considered relevant for the writing of this thesis given the latter's objective of creating a fiscality that would protect the environment more efficiently. The remaining criteria should be published by the end of 2021. The number of non-climate green fiscal policies is relatively restricted, and the EU Taxonomy could be helpful for such measures.

The sectorial analysis was conducted with a focus on Belgium. Studies with a broader focus, or that would allow to compare with other countries could complete our analysis.

Finally, the evolving nature of regulation, along with the current focus of the EU institutions on climate change, means that the landscape might significantly change in the coming months. In particular, the "Fit for 55" package, that was presented by the European Commission on the 14th of July 2021, includes several propositions that could impact several of the matters covered in this thesis, including the EU ETS and a "Carbon Border Adjustment Mechanism" (European Commission, 2021e).

Predicting the impact of fiscal measures is a complex exercise. So is the drafting of policies that need to be fair, economically efficient, budget-neutral and that create a significant

impact on our carbon emissions. Nevertheless, we cannot afford to wait until green policies are proved to tick all boxes: by then, it might already be too late.

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