4i TRACTION
innovation · investment
infrastructure · integration

Monitoring and evaluating climate investments in the EU: Conceptual framework and case studies

Ciarán Humphreys, Institute for Climate Economics (I4CE)

Work Package 5
This report Is part of deliverable D5.3
31 March 2024

Document information	
Project name:	4i-TRACTION
Project title:	Transformative Policies for a Climate-neutral European Union (4i-TRACTION)
Project number:	101003884
Duration	June 2021 – May 2024
Deliverable:	D5.3: Report on assessment of key EU governance frameworks
Work Package:	WP5: Governance for a climate-neutral EU
Work Package leader:	Vrije Universiteit Brussel (VUB)
Task:	5.3: Assessment of EU governance frameworks
Responsible author:	Ciarán Humphreys, Institute for Climate Economics (I4CE)
Peer reviewed by / on	Reviewer 1: Sébastien Postic, I4CE Reviewer 2: Kati Kulovesi, University of Eastern Finland
Planned delivery date:	31/01/24
Actual delivery date:	31/03/24

Dissemination level of this report		
PU	Public	X

Suggested citation

Humphreys, Ciarán (2024): Monitoring and evaluating climate investments in the EU: Conceptual framework and case studies. Institute for Climate Economics; Paris.

Acknowledgements

The author would like to thank Julie Evain, Sébastien Postic, Anuschka Hilke, Kati Kulovesi and Brendan Moore.

Disclaimer

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003884.

Abstract

Aligning the investment landscape with climate goals will be necessary to achieve net-zero greenhouse gas emissions. Therefore, monitoring this alignment is an important part of climate governance. This paper examines the existing landscape for climate finance monitoring in the EU and proposes potential future avenues for its improvement. To do so, it first outlines a conceptual framework for effective climate investment monitoring.

The paper then moves to an analysis of three case studies. These case studies are then analysed against an adapted set of 4i-TRACTION criteria (Moore et al., 2023) (overall effectiveness, including transformative impact, and implementation effectiveness) and categorised based on the types of investment/finance they monitor and the role they play in the climate investment monitoring landscape (informer, advisor or watchdog).

Table of Contents

List of tables

List of figures

Abbreviations

Abbreviation	Name
ADEME	French Agency for the Ecological Transition
CAN	Climate Action Network
CIM	Clean Investment Monitor
E3G	3rd Generation Environmentalism
ECNO	European Climate Neutrality Observatory
EIB	European Investment Bank
ERDF	European Regional Development Fund
EU	European Union
GHG	Greenhouse Gases
I4CE	Institute for Climate Economics
IRA	Inflation Reduction Act
MIT	Massachusetts Institute of Technology
OECD	Organisation for Economic Co-operation and Development
PV	Photovoltaic
SNBC	Stratégie Nationale Bas-Carbone (French Decarbonisation Strategy)
WWF	World Wildlife Fund

Executive summary

Monitoring and evaluating investments are an important part of any successful climate governance architecture. Aligning the investment landscape (whether that be at the level of the household, businesses, governments, or multinational financial institutions) with climate goals will be necessary to achieve net-zero greenhouse gas emissions. The EU already has several mechanisms in place to monitor climate finance (such as the European Investment Bank annual investment report and European Structural and Investment Funds tracking exercise), yet this architecture can be improved to maximise the transformative impact that such a monitoring can achieve in terms of accelerating climate action.

To inform future work on proposals for improving the EU governance architecture for climate investment monitoring, this paper describes and qualitatively analyses three case studies. These include both governmental and non-governmental, European, and non-European examples. These case studies are then analysed against an adapted set of 4i-TRACTION criteria (Moore et al., 2023) (overall effectiveness, including transformative impact, and implementation effectiveness) and categorised based on the types of investment/finance they monitor and the role they play in the climate investment monitoring landscape (informer, advisor, or watchdog).

To ensure that finance is aligning with climate goals, an effective investment monitoring system should ensure that a wide range of investments are covered. However, the case studies highlight a clear trade-off between scope and granularity/availability of data, which poses a challenge when trying to design or reform the European investment monitoring system. Having a "one stop shop" to track all finance in the economy may not be feasible, so exploring how to better target, harmonise and coordinate a range of monitoring platforms is important. The resources devoted to investment monitoring is also a factor in effectiveness, with public institutions best placed to conduct granular assessments. Investment monitors should seek to have a comprehensive picture not only in terms of geographical scope or types of finance monitored, but also in covering all environment-related finance, including "brown" investments and investments that relate to areas of environmental action broader than climate mitigation. Finally, to have the most impact on climate finance policy, climate investment monitors should be explicitly connected to the EU policy process and the public sphere, or interface with actors that can serve that role.

1. Why monitor climate investment?

Achieving the EU's ambitious climate targets will require significant private and public investment across the European economy(European Council, 2023). It will also require changes in investments with climate-adverse effects (fossil fuels or energy intensive technologies) that must be reduced (International Monetary Fund, 2023). We have a range of data outlining that the EU is currently falling short on climate investment. The European Investment Bank (EIB) states that there is a need for investment of €1 trillion a year in the EU to reduce greenhouse gas emissions 55% by 2030, including public and private investment, and across the whole economy (European Investment Bank, 2023). That is an increase in overall investment of €356 billion annually when compared to the period 2010–2020. In short, climate investment needs to change both in magnitude and composition, or Europe risks missing its climate goals.

The abovementioned EIB assessment of the climate investment gap is a form of climate investment monitoring. To complement this, and to effectively send signals to policymakers and the private sector on redirecting and rescaling investments to align with climate goals, a robust climate governance architecture, with granular and comprehensive investment monitoring, has a critical role to play (Duwe, Evans, Velten, et al., 2022).

2. Design principles for climate investment monitoring and evaluation

What kind of investments should be tracked by a climate investment monitoring platform? How should such a platform be designed? And how should the roles in a climate governance structure for investment monitoring be shared between national/international institutions and civil society, to have the most impact on aligning climate finance with climate action? These questions and design principles will support this case study in analysing the studied monitoring exercises.

This section builds on the work surrounding the design of the European Climate Neutrality Observatory conducted by German think tank Ecologic and French counterpart I4CE (Duwe, Evans, Velten, et al., 2022).

2.1 Types of finance to be monitored

To capture the alignment of finance and investment with climate goals, it is helpful to assess as wide a scope of the economy as possible. However, in practice, the wider the scope becomes, the more implementation issues may arise, due to lack of sufficient resources devoted to a project. There is therefore, theoretically speaking, a trade-off between depth (granular tracking of investments) and breadth (whole-of-economy scope).

Broadly, investments and finance monitored fall under one of three categories: end investments, public finance, and private financial flows (Duwe, Evans, Velten, et al., 2022). In all three categories, it is optimal if current investments and historical and projected trends are explicitly measured against climate goals. An example of this would be measuring the current levels of investment and the annual rate of change against the projected annual investment needed to achieve the EU's 2030 emissions reduction target. Such an approach is useful as it contextualises the data captured in the monitoring and sends a clear signal to institutions that changes to investment are required.

Climate investment monitoring not only categorises the types of investment as outlined below, but also categorises the investment based on climate or environmental impact. Investments that are assessed positively are "green", and those that are assessed negatively are "brown". Yet this is not a strict binary, and monitoring efforts (including the EU Taxonomy (Platform on Sustainable Finance, 2022) are increasingly considering "transition finance", those investments with either an unclear, less significant, or fluctuating climate impact. Assessment methodologies which can move away from the green/brown binary can provide significant value to end users of the data, both in highlighting investments in transition ("yellow") and investments which create significant environmental harm ("red") (Merle et al., 2022).

2.1.1 End investments

End investments refer to expenditure by households and companies, to acquire fixed capital which will then be used for many years (for example renewable energy systems or electric vehicles). Since only a fraction of fixed capital is replaced each year, ensuring that purchases occurring now are climate aligned is essential for ensuring eventual economy-wide decarbonisation (Talebzadehhosseini et al., 2019).

To truly capture the picture of how investments of this type are contributing to climate action overall, it is important not only to monitor "green" investments, but also climate harmful, or "brown" investments (and ensure that there is a granularity in the assessment of the range of investments along this scale). If investments in an economy are to be consistent with climate goals, overall investments should become greener, with brown investments diminishing.

2.1.2 Public finance

Public finance refers to the range of budget investment, tax policy measures, off-budget programs and other similar measures which represent the public contribution to climate action (Duwe, Evans, Velten, et al., 2022). Since these measures do not always involve direct investments in assets, such as in the case of subsides supporting private companies, it is important to note that the category "public finance" does not only include public investments in assets (such as infrastructure), but also financial flows (United Nations Development Program, 2009), such as tax

revenues and expenditures. Just as with end investments, both green and brown public investments and financial flows should be assessed.

Beyond monitoring green and brown public investments into the economy (in the form of infrastructure or subsidies, for example), it is also important to monitor the activities of promotional banks and public financial institutions in supporting the green transition. Furthermore, an analysis of how public funds leverage private investment can contribute to a better understanding of the true climate impact of government policy.

2.1.3 Private financial flows

Financial flows (or capital flows) refer to financial transactions such as the issuance of bonds and loans on the primary markets or the purchase/sale of stocks on secondary markets. The link between the real economy and primary markets is more concrete (as companies and citizens are directly involved) than that of secondary markets (with transactions taking place between investors and financial institutions), but both can have a significant impact on the wider investment environment. Compared to investments, private financial flows therefore have a more complex link with the real economy – yet are nonetheless an important indicator of the broad alignment of investment with climate goals.

Two dynamics are of particular importance to track in terms of financial flows. The first is, as with the previous types, whether financial flows go towards climate goals and are diverted from harmful industries and investments. The second is measuring the cost of capital for low-carbon investments, as climate investments are often more capital-intensive than fossil alternatives.

Private financial flows are difficult to track, given that much of the data is protected and the final climate impact hard to quantify. Tracking them poses a significant challenge for climate governance.

2.2 Types of financial monitor

Climate investment monitors can be categorised as one of three types: informer, advisor, and watchdog (Duwe, Evans, Kessler, et al., 2022 al.). An *informer* tracks and synthesises data on climate investments, largely without analysis of those results. An *advisor* assesses the actual or projected impact of current investment and provides policy recommendations to remedy trends deemed to be in need of action. A *watchdog* combines the two previous types, monitoring the financial landscape and warning policymakers if progress is deemed to be falling below the levels required to reach climate goals.

In practice, there is significant overlap between the three functions. Despite this, the three categories still represent three distinct approaches to the monitoring of climate investment.

2.2.1 Informer

The Informer role focuses on information provision, most often through a public database presenting data to key stakeholders and the wider public. No further analysis is provided, but the existence of such a database empowers other stakeholders to operationalise the data to support policy and political goals. Furthermore, the role of the informer in assessing which investments count as green or brown, and defining the scope of investments covered in any monitoring exercise, can have significant influence over the future transformative impact of its outputs, as what is considered "green", for example, can significantly impact future efforts to align finance with decarbonisation goals. If any analysis is provided, it is at the data level and without judgement, for example by highlighting trends.

The tasks associated with an Informer include data and assumptions checking, data treatment and standardisation, and data aggregation. It may also be tasked with collecting new data, with a targeting of existing reporting gaps. An example of an Informer output at EU level is the EIB's Investment Report (European Investment Bank, 2023).

2.2.2 Advisor

Advisors provide qualitative and quantitative assessments of how investments are supporting progress towards climate neutrality. Evaluations can either be forward- or backward-looking, focusing on projected impacts of investment policies or actual impacts.

The Advisor role is particularly distinguished by the formulation of evidence-based policy recommendations, which follow from the analyses mentioned above. These could include gap analyses of what is missing from the current policy mix, regional or country-specific recommendations, or deep-dive reports on the role of certain financial instruments.

Since Advisors are inherently linked to the development of public policy proposals, they are often best used as monitors for public investment, as this type of investment is most sensitive to policy effects. However, private end investments and financial flows could be incorporated into a more holistic analysis, with an approach, for example, looking at how public investment can mobilise private capital or banking regulation can redirect financial flows (Duwe, Evans, Velten, et al., 2022). An example of the Advisor role can be seen in the Science Based Targets Initiative, whose analysis supports companies in setting their transition plans (Science Based Targets Initiative, 2023).

2.2.3 Watchdog

A Watchdog focuses on the gap between current levels of investment and the investment required to reach climate goals or another relevant benchmark. Investments are monitored in a similar way to an Informer, but the comparison against a benchmark means that the Watchdog

complements this monitoring with an analysis and judgement call of whether such investment trends are sufficient.

Unlike an Advisor, who would then propose concrete policy recommendations, a Watchdog will instead raise the alarm when the monitored investments are judged insufficient. This involves a clear communications outreach to the target audience (typically government officials or civil society). The particular focus on outreach is what distinguishes Watchdogs from the other two types (Duwe, Evans, Velten, et al., 2022). While Watchdogs are less common than the other two types, one example to highlight is European think tank E3G's Public Bank Climate Tracker Matrix, which monitors and assesses the investment of public and development banks (Third Generation Environmentalism, 2023).

3. EU climate investment monitoring & policies governing climate investments

Tracking public and private climate investment in the European economy is challenging. Monitoring the totality of public and private investment at EU level is a function which no one institution completely fulfils. The below table (Figure 1), based on insights from previous research (Duwe, Evans, Velten, et al., 2022), outlines some existing EU monitoring mechanisms, and classifies them based on the informer/advisor/watchdog typology introduced in section 2.

Table 2: Existing EU Institutions that act as climate finance monitors.

Institution	Indicator	Monitor Type	Finance Type	Geographical Scope	Relevant Initiative
European Investment Bank (EIB)	Data on annual climate investment	Informer	Private end investments, some public investments	EU level	EIB annual Investment Report
Eurostat	Data on annual green share of EU Gross Fixed Capital Formation	Informer	Private end investments	Unknown	Eurostat Environmental accounts
European Commission	Guidelines to support the definition of green investments	Advisor	Private end investments	EU level	EU Taxonomy of sustainable activities

European Structural and Investment Funds	Level of green investment from the European Regional Development Fund and the Cohesion Fund	Informer	Public Finance	Member States benefiting from the ERDF and Cohesion Fund	"Climate tracking of EU Structural and Investment Funds" report
European Commission	Guidelines for national green budgeting exercises	Advisor	Public Finance	Member-State level	Green Budget Reference Framework

Source : Duwe, Evans, Velten, et al., 2022

Furthermore, a wide range of European policies and initiatives contribute to the objectives against which the climate-alignment of finance can be assessed. On the level of objective setting, the EU's net-zero transition objective in relation to finance and investment is encapsulated in three plans (Duwe, Evans, Velten, et al., 2022):

1. The first of these is the **European Green Deal Investment Plan** (Alfonso, 2020). Presented in 2020, the plan seeks to mobilise €1 trillion in the decade 2020–2030 and establish an enabling framework for institutions and private investors to increase green investment.
2. This is complemented by the €750 billion **NextGenerationEU plan** (European Commission, 2022), which includes a €672.5 billion Recovery and Resilience Facility to support Member States. NextGenerationEU has a 37% mandated share of investment into the green transition and climate-friendly measures, in the form of grants and loans provided to EU countries. Furthermore, the entire plan must respect the principle of 'do no harm', in line with EU sustainable finance rules.
3. The third pillar governing the EU's objectives regarding climate finance is the **Action Plan on Financing Sustainable Growth** (European Commission, 2018), consisting of ten reforms around three objectives: reorienting capital flows towards sustainable investments, mainstreaming sustainability into risk management, and fostering transparency and a long-term perspective in financial activity.

The objectives outlined in these three plans are then translated into a range of overlapping policy processes at EU level (Duwe, Evans, Velten, et al., 2022). In some instances, these objectives have been "locked in" to concluded policy processes. For example:

- The current **multiannual EU budget**, which covers the period 2021–2027. In addition to the budgetary commitments made in relation to the three plans, the Commission has proposed that 25% of the overall funding should contribute to climate action.
- The updated **Cohesion Policy** outlining the use of European Structural and Investment Funds.
- The goals and modalities of **InvestEU.**

Beyond these Commission-driven processes, the strategies and operation frameworks of some of the public financial institutions also play a significant role in how climate investment is implemented:

- The **EIB's** Group Climate Bank Roadmap 2021-2025 (European Investment Bank, 2020) lays out how it will support the European Green Deal. Additionally, the EIB has updated its Energy Lending Policy (European Investment Bank, 2019) to directly support the energy transformation.

The governance of the EU Action Plan on Financing Sustainable Growth connects to a wide range of policy processes:

- The **Directorate General for Financial Stability, Financial Services and Capital Markets Union** plays a lead role in the implementation of the ten components of the Sustainable Finance Action Plan.
- The **Platform on Sustainable Finance** is an expert advisory group advising the Commission on sustainable finance policies, with a focus on the further implementation of the EU Taxonomy.
- The **EU Taxonomy** establishes a classification of environmentally sustainable economic activities and is a cornerstone of the EU's governance of sustainable finance.
- The **European Central Bank** (European Central Bank, 2023) also plays a pivotal role, both in how it mainstreams climate concerns into its own activities and how it manages the macroprudential architecture for banks within the Union.
- The EU Commission, together with partners, has founded the **International Platform on Sustainable Finance** (European Commission, 2021)**,** to support the mobilisation of private capital towards sustainable objectives.

This overview shows the complexity of processes, institutional strategies and different policies which make up the European architecture surrounding climate finance.

4. Introduction to case studies and assessment methodology

4.1 Case Studies

The European governance architecture for guiding and conducting investment tracking is, as we have seen in the previous section, wide ranging and complex. While there are many institutions, such as the EIB and European Commission, that do partially fulfil the role of investment monitor for different kinds of investments and different sectors of the economy, this landscape could stand to be improved, either by reforming existing mechanisms or introducing new ones at EU level.

To explore how these reforms could be implemented (which will be the subject of a future paper), this paper now turns to three case studies. By examining the objectives, design, performance of these case studies with reference to the European landscape outlined in section 4 and the design principles explained in section 3, it is expected that these case studies will generate useful learnings ("do's" and "don'ts") which can then inform the recommendations proposed in a forthcoming paper.

This paper will examine 3 case studies, each offering different potential insights:

- **French Green Budgeting:** The French government began assessing the climate impact of its national budget in 2020. This "green budgeting exercise" examines the full range of budget lines across six environmental criteria[1], assessing whether their impact is positive, mixed, or negative to the environment. This case study allows us to examine how a government can monitor its own spending and integrate an assessment of climate impacts into the legislative process.

- **The European Climate Neutrality Observatory (ECNO):** In 2023, ECNO was launched by a consortium of European NGOs and think tanks[2] to monitor Europe's progress towards climate neutrality. It has an economy-wide, cross-sectoral scope, with an analysis of 13 building blocks. Finance is one of these 13 building blocks, and investment tracking plays a part in other areas of the assessment as well. This case study offers an opportunity to examine investment tracking on a EU-wide scale, as well as how this monitoring can be integrated with monitoring of other sectors.

- **The Clean Investment Monitor:** Launched in 2023 by Rhodium and the Massachusetts Institute of Technology (MIT), the Clean Investment Monitor tracks investments in clean technologies in the United States of America (USA). The Clean Investment Monitor

[1] Climate change mitigation, climate change adaptation, water resources management, circular economy/waste management, pollution, and biodiversity.
[2] The organisations in the consortium are Ecologic Institute, Climact, Institute for Climate Economics, New Climate Institute and Reform Institute.

monitors cleantech investment both before and after the entry into force of the Inflation Reduction Act, a policy which has accelerated US cleantech investment (Worland, 2023). This case study offers an opportunity to investigate the methodology of a granular analysis of one sector and its related investments.

4.2 Methodology

The three outlined case studies will be analysed against the below criteria in Section 5. Section 6 will then seek to bring together insights that have arisen from the analysis and explore their usefulness for future recommendations for improvement of the European governance architecture for climate investments.

The assessment is a qualitative assessment adapted from already existing 4i-TRACTION assessment criteria (Moore et al., 2023). Each case study has been assessed by examining available resources outlining the development and methodology of the investment monitoring structure, and then using the assessment criteria as a framework to assess the case, in the interest of generating broader insights into the design of a climate investment monitoring architecture for future policy-design efforts at EU level. The criteria are as follows:

- **Overall effectiveness:** This criterion concerns itself with the analysis of the strengths and weaknesses of the case study in carrying out its own stated goals, in the methodology used by the case study, but also, as a result of its effectiveness and ambition, its contribution to the development of long-term thinking and transformative change. The analysis may include some of the following aspects:
    - **Long-Term Impact:** Investigate the case study's capacity to drive enduring and transformative change in the context of climate investments. This includes examining its ability to influence policy development, societal behaviour, and business practices over the long run.
    - **Accountability and Transparency:** Evaluate the level of transparency in decision-making processes, resource allocation, and reporting mechanisms. Assess the accountability of the case study to stakeholders, including the public, funders, and affected communities.
    - **Stakeholder Engagement:** Gauge the extent to which the case study engages with diverse stakeholders, including governments, businesses, civil society, and international organizations. The effectiveness of multi-stakeholder collaboration in achieving climate investment goals is a key consideration.
    - **Impact of analysis:** Assessing, where possible, the impact and transformative effect of the analysis and insights which the monitoring provides.

- **Implementation effectiveness:** A key element of understanding how the insights from these case studies can apply to recommendations for a European architecture is to consider how (un)successfully they have been implemented. This will look at the evidence surrounding the resources allocated to the case study and whether their results are delivered to a schedule which maximises their impact.

- **Type of investments tracked:** Based on the typology outlined in Section 2.1, which kind of investments are monitored in this case study? End investments, public finance, private financial flows, or a combination of these?

- **Type of financial monitoring:** Based on the typology set out in Section 2.2, which type of financial monitoring does the case study conform to? Does it fulfil those criteria fully, or only partially?

The results from analysis along these criteria will allow for the comparison of the case studies examined in section 6.

5. Case studies

This section will describe, categorise, and analyse the three chosen case studies. The categorised case studies are summarised below (table 2).

Table 3: Case studies.

Institution	Indicator	Monitor Type	Finance Type	Geographical Scope	Relevant Initiative
French Green Budgeting Exercise	Monitoring of climate impact of government budget	Informer	Public Finance	France	Member State government
European Climate Neutrality Observatory	Various climate finance indicators benchmarked against EU climate targets	Watchdog	Public Finance, Private End Investments, Financial Flows	EU	Civil society consortium
Clean Investment Monitor	Investment in selected clean technologies	Informer	Private End Investments	United States of America	Collaboration between consultancy and academia

5.1 French green budgeting exercise

5.1.1 Background

The French government has, since 2019, undertaken an annual exercise to monitor and assess how its public spending aligns with both national, European, and international climate goals. While far from being the only country which has incorporated the monitoring of green public expenditure into its budget cycle (Postic et al., 2020), France's approach merits particular study due to its use of a methodology which not only assesses "green" spending, but also "brown" spending which is deemed harmful to the environment, as well as broadening its scope beyond climate mitigation to assess other relevant factors.

The genesis of this approach came in the early 2000s, culminating in the 2006 publication of a "Budget Jaune" (yellow budget) (French Ministry of Economy, 2005). This initial exercise focused solely on mapping the areas of French public spending which was deemed supportive of climate goals. Efforts to improve this monitoring function accelerated following the 2017 "Paris Collaborative on Green Budgeting", a French initiative which arose from the One Planet Summit that year held for the first time in the French capital (OECD, 2023). Coupled with this multilateral effort, domestic pressures from the "gilets jaunes" in 2018/19 against carbon taxation helped to create the political conditions for the French administration and civil society to seek to improve the monitoring of the climate impact of public spending (de Guigné, 2019), and with it public understanding and acceptance of climate-progressive fiscal policy.

This culminated in the 2019 "Proposition of a method for green budgeting" (Waysand et al., 2019), which included a full budget assessment as a prototype. This methodology was then employed to conduct the 2020 "Report on the environmental impact of the state budget" (French Ministry of Economy, 2020a), which looked ahead at the 2021 budget under debate by the French Parliament. This exercise has since been repeated on an annual basis (with the analysis of the 2024 budget published in October of 2023 (French Ministry of Economy, 2023a), with revisions to the methodology made each year with the structured input of French NGOs and think tanks (Postic & Fetet, 2020).

5.1.2 Monitoring approach

The French green budget seeks to rate all proposed public expenditure for the forthcoming year to deliver an analysis of how public spending contributes to France's decarbonisation goals. It assesses climate performance based on how it contributes not only to climate mitigation, but also to five other indicators: climate change adaptation, water resources management, circular economy/waste, pollution abatement and biodiversity/sustainable land use.

The French approach to monitoring climate spending differs from that taken by the EU in the monitoring of its own budget and programs such as the Recovery and Resilience Facility. Whereas

the EU focuses largely on tracking spending that it assesses as "green" (Heilmann et al., 2021), the French green budgeting exercise assesses all state budget expenditures and taxes and grades them positively or negatively on their diverse climate impacts (along the six axes outlined above).

Each budget item is graded individually across the six indicators outlined above, with a colour code of green (favourable impact), brown (unfavourable) or grey (neutral). The green assessment is broken down into three subsections: favourable but controversial (investments with short term benefits but potentially harmful long-term consequences, due, for example to technology lock-in), favourable, and very favourable (targeted climate spending). Each of these 5 ratings (3 positive, 1 neutral, 1 negative) are then assigned a numerical value from 3 to -1. The final score across all six indicators results in a favourable, unfavourable, neutral or mixed assessment of the budget line as a whole (French Ministry of Economy, 2023a of Economy, 2023a).

Figure 1: Reporting design of the French Green Budget

Green Tagging in Detail

Budget appropriations	2021 BB	Climate (Mitigation)	Climate (Adaptation)	Water	Waste	Pollution	Biodiversity	Classification
P135 Regulations, technical policies and construction quality	€218.4m	●	●	○	○	○	○	Favourable
P147 Urban renewal and quality of life improvements	€15.0m	●	●	○	○	○	○	Favourable
P162 Local activities under the National Chlordecone Action Plan	€3.0m	○	○	○	○	●	●	Favourable
P162 Coastline 21 Plan	€4.4m	○	●	●	○	○	●	Favourable
P162 Water – Agriculture in Brittany	€2.0m	○	○	●	○	●	●	Favourable
P162 Waterway clean-up in Pays de la Loire	€0.7m	○	○	●	○	●	●	Favourable
P135 Support for first-time homebuyers – land take share	€2.1m	●	○	○	○	○	●	Unfavourable
P135 Town planning and development	€242.5m	○	○	○	○	●	○	Favourable
P162 Fire and rescue service in Wallis et Futuna	€1.3m	●	●	●	●	●	●	Favourable

Source: French Ministry of Economy, 2020b

Because of the nature of the national budget (with significant spending on non-climate budget lines such as social security, pensions, and education), most expenditure budget lines (76%) are categorised as neutral. Due to lack of data, or the inability to quantify the climate impact of French contributions to EU-level funds, 16% of expenditures have also been classified as "unlisted". 7% of the budget was classified as favourable, 1% mixed and 2% unfavourable (French Ministry of Economy, 2023a). Similar data is not available for the monitoring of taxes.

5.1.3 Assessment

The French green budgeting exercise is best described as an **informer**-type monitoring instrument, with a focus on **public finance**. However, in its judgement of the climate impact of specific types of spending, it also incorporates elements from an **advisor**-type, although it does not provide the kind of policy advice typically expected of this type of instrument. When assessing its **effectiveness** against its overall goal – monitoring the climate impact of the French national budget, it should be considered effective. The detailed analysis across the full range of budget lines, with an approach that incorporates not only climate mitigation but other important aspects of environmental action, means that it can provide a granular assessment of how the French budget contributes to or harms environmental action, and the potential trade-offs between different environmental objectives.

The dual nuance of examining both climate positive and negative effects and individually assessing the impact on a range of indicators also allows for a detailed understanding of whether a particular measure will be truly "green". For example, the "car scrapping bonus" (part of a larger subsidy to support the purchase of clean vehicles) is rated positively overall, with a favourable but controversial rating for mitigation (+1) and a favourable rating for pollution (+2) but a negative score for waste (-1) due to its effect of shortening the lifespan of passenger vehicles (French Ministry of Economy, 2021). Such a nuanced assessment allows policymakers and civil society to better understand the true climate impact of an investment with more nuance than a simple "green or not" approach would yield.

In terms of **accountability and transparency**, the case study also comes out positively, with granular results published annually in the flagship report and as publicly available online data (French Ministry of Economy, 2023b). **Stakeholders** outside of the ministries who lead the drafting of the document are also integrated into various stages of the process. Independent experts (such as I4CE and ADEME) are involved or consulted in the ongoing methodological development and reform, multilateral institutions such as the European Commission and the OECD are consulted, and the French media ecosystem and climate NGOs (WWF, CAN Europe) are involved in the dissemination of results following publication (Postic, 2022).

Crucially, French parliamentarians are both the key audience of the exercise and important participants in turning its assessments into policy impact. Due to the **implementation effectiveness** of the cycle of annual production of the flagship report, which is a collective effort of the Ministries of Economy, Ecological Transition and the General Secretariat to the Treasury and Budget Directorate (as well as the civil society organisations mentioned above), the completed report is delivered to parliamentarians ahead of the negotiation of the next year's annual budget. The report acts as a tool to help legislators identify and prioritise environmental spending, and by highlighting both positive and negative impacts of spending lines, can give climate-progressive parliamentarians the information basis necessary to propose amendments to the budget proposal. Several MPs have in recent years made explicit reference to the findings of the exercise in their

statements in the budget debate, lending credence to the finding that the case study is having some impact in the future fiscal policy of France (Postic, 2021).

However, what is less clear is the true **transformative impact** that the green budgeting exercise is having. While France has announced a further €7 billion of green investment in its 2024 budget (Messad, 2023), it is not possible to draw a clear causal link between the exercise and this acceleration of domestic climate investment. This is arguably a function of its role as informer, as it is not designed to directly feed into investment policy developments.

5.1.4 Conclusion

The case study falls short of having a truly transformative impact on French climate investment because of its original design. The green budget report seeks to analyse the proportion of green and brown spending in the budget, making it clearly a monitoring exercise. However, it does not go one step further, in turning that analysis into policy recommendations or providing insights into what its findings mean for the contribution of the national budget to achieving net-zero. France has a national climate reference scenario, the National Low Carbon Strategy (SNBC), but it does not refer to it when conducting its green budget exercise (Postic & Fetet, 2020)**.** In effect, this means that the case study successfully answers the question "how much green spending is there?", without then using that data to advance the discussion on "how much green spending is needed?". This hampers the green budgeting exercise's impact in contributing to a truly transformative green public investment strategy in one of Europe's largest economies.

If transformative impact is to be improved, that is not necessarily to imply that such a translation exercise of monitoring into future recommendations needs to be incorporated into the Green Budgeting Exercise itself (although this would be an option). A separate process of interpretation and development of policy recommendations could be attached to the release of the report, conducted either by government or civil society (Nicol, 2021).

5.2 The European Climate Neutrality Observatory (ECNO)

5.2.1 Background

Launched in 2023, the European Climate Neutrality Observatory (ECNO) is an independent monitoring institution that seeks to track European progress towards climate neutrality across the whole of the economy. This monitoring includes a section dedicated to finance, as well as other sectoral analyses (such as on clean technologies) which incorporate a monitoring of data associated with sector-specific public and private investment. ECNO is managed and updated by a consortium of European think tanks and research organisations (Velten, Calipel, et al., 2023).

ECNO arose from a concern that existing European public and private monitoring and governance efforts across the sectors of the economy are not sending sufficiently strong signals to

policymakers to accelerate climate action. To address this gap, ECNO was conceived as a "one-stop-shop", bringing together diverse monitoring efforts across a range of sectors and making use of a range of indicators, to act as a check on overall structural progress towards the net-zero goal (Duwe, Evans, Kessler, et al., 2022).

To do this, ECNO has assesses thirteen "building blocks", sectors of the economy and other policy fields deemed important to track when assessing sectoral and overall progress towards net-zero. This analysis was published in a first flagship report in June of 2023, with future publications expected to be released on an annual basis (Velten, Calipel, et al., 2023).

5.2.2 Monitoring approach

ECNO takes an economy-wide approach to climate monitoring. To do so, it monitors Europe's progress towards climate neutrality across thirteen "building blocks". Six of these are focused on sectors of the economy (electricity, buildings, mobility, agrifood, carbon dioxide removal and industry) while the other seven are cross-cutting (governance, just transition, finance, cleantech, lifestyles, adaptation, and external action). Not all the building blocks are concerned with investment monitoring.

The 13 sectors are assessed against one or several core objective(s), determined by the organising consortium, with the assessment broken down into sub-levels of assessment ("enablers") and assessment metrics ("indicators"). These metrics are judged against EU sectoral targets and goals (where available). Moving from the most granular level to a more macro level, the assessment of each metric feeds upwards into the progress assessment of each sub-level, and again into the assessment of progress towards that building block's objective(s). This methodology will be examined in more detail in the following paragraphs.

Given the diversity of sectors analysed by ECNO, the monitoring is structured in a harmonised template but with different indicators and measures of success (Velten, Schöberlein, et al., 2023). This allows for a harmonised assessment methodology, which would otherwise prove difficult. Each building block is structured along core objectives, which guide the assessment of whether a building block is adequately playing its part in the overall progress to net-zero. These objectives are further broken down into enablers – supporting conditions needed to meet the objectives of a building block, the drivers and barriers of progress as assessed by the research organisations which form the consortium behind ECNO. At a further level of granularity, progress along these objectives and enablers is measured by a chosen range of indicators.

The indicators provided in this context are specific data series used to assess the historical progress and current status of the enablers and objectives. This allows ECNO to compare past trends with the necessary future developments towards a decarbonised continent. However, determining what is a "necessary development" in any given field depends on an understanding of how each indicator contributes to achieving climate neutrality.

To do this, ECNO evaluates the progress made in the past by comparing it to the EU's own goals, using the official targets and benchmarks outlined in EU strategic planning documents. When numerical data is not available, qualitative information from official EU documents and relevant literature is employed to gauge how well an indicator is progressing and contributing to the goal of achieving climate neutrality.

The building block for finance, the principal focus of this case study, takes as its objectives the closing of the EU climate investment gap (the difference between current levels of green public and private investment and those required to achieve net-zero) and the phase-out of "climate-hostile finance" in the EU (such as investments in fossil fuel assets and GHG-intensive industries such as aviation) (Velten, Calipel, et al., 2023). The indicators underpinning this analysis are the size of the EU climate investment gap (based on EIB analysis) and an overall analysis of "brown" investment in the EU (for which, according to the flagship report, there is currently insufficient data).

The analysis of European finance's progress to net-zero is expanded with a range of other enablers and indicators, aiming to assess public spending (climate and fossil fuel subsidies), the use of carbon taxation and carbon taxation revenues, and alignment of the banking system with the EU's climate goals (through a measure of banks with "sound transition plans" and the share of banking loans that are aligned with the Paris Agreement). Progress on these indicators is then judged to be either "on track", "too slow", "far too slow", or moving in the "wrong direction".

Across all sectoral building blocks, the ECNO methodology seeks to measure progress on indicators against a benchmark set out in EU targets and compare the absolute annual change of the past development with the required annual change to meet the benchmark. The ratio between those two values reveals how on or off track any given indicator is. Where such a benchmark cannot be established, past developments are compared to a desired direction and magnitude of change with reference to "non-official EU benchmarks and expert judgement" (Velten, Schöberlein, et al.,).

The indicators in the ECNO finance monitoring building block all fall under this latter category. Furthermore, for three out of the six indicators in the building block, the assessment cannot be fully undertaken due to a lack of available data. These indicators are public climate subsidies, share of banks with a sound transition plan, and share of new banking loans aligned with the Paris Agreement.

5.2.3 Assessment

ECNO is a **watchdog**-type monitoring instrument, with its analysis of investment trends judged against projected needs for the green transition, and culminating in warnings that certain areas of progress are, to different degrees, moving too slowly. Between its finance, cleantech, and just transition building blocks, the types of investment monitored are particularly broad, covering all three categories of **public finance** (as part of the climate investment gap, climate-hostile finance,

R&D support to cleantech and subsidies to households), **end investments** (which are a factor in the climate investment gap, climate-hostile finance, and private investment in cleantech) and **financial flows** (in the tracking of Paris-aligned loans). This broad scope comes at the cost of data availability and granularity, with clear data gaps in the assessment.

In terms of **transparency**, ECNO outlines its assessment methodology in detail, through the release of its flagship report and a methodology document. It also makes a clear effort to ensure that its findings and recommendations are publicly available and clearly presented (Velten, Schöberlein, et al., 2023). The results are also publicly available on a website (European Climate Neutrality Observatory, 2023). The results of the assessment and the reasons for selection of certain indicators are explained across these various documents. However, at times the selection criteria for one indicator dataset are not entirely clear, and any deeper explanation of the rationale or the ability for interested parties to access the datasets themselves is not provided. This may make it challenging for other civil society organisations or institutional actors to interrogate the findings themselves.

Given the consortium nature of the ECNO project, the monitoring process necessarily involves a range of European **stakeholders** in the research community. It also actively engages the media, through press releases and events (New Climate Institute, 2023), as well as outreach towards policymakers. However, from the point of view of investment tracking, there is no evidence that certain key stakeholders have been engaged in the creation and dissemination of the assessment, namely European banks (with reference to ECNO's tracking of financial flows) or businesses/investors (such as cleantech investors and innovators).

The **impact** of ECNO's analysis is, given its recent launch, difficult to gauge. In October 2023 (four months after the launch of ECNO), the Commission released a first-of-a-kind EU Climate Action Progress Report (European Commission, 2023a). By tracking the progress of the European Union towards climate neutrality across a range of data points and policy efforts, the report represents a similar effort to that advocated for and adopted by ECNO. However, drawing a clear link between ECNO and this latest effort from the Commission is not possible. To truly judge the impact of ECNO's current and future reporting it would be important to monitor if ECNO's work is explicitly referenced in future monitoring publications published by the EU institutions or in public statements from those same institutions.

Such impact will depend on the continuing **implementation effectiveness** of ECNO. Although the first ECNO report was not connected to an explicit political moment or process, future editions of the ECNO report are expected to be timed to coincide with key moments of the EU calendar.[3] The resources of the research organisations which produce the assessment, judging by the successful release of the first report, should be sufficient to maintain this publication schedule and therefore increase policy impact in future.

[3] This is judged by the timed release of the ECNO report on cleantech finance, which was timed and explicitly connected to the European Parliament's vote on the Net Zero Industry Act (Humphreys, 2023a, 2023b).

However, indications in the first report do raise some doubts as to whether the currently dedicated resources are sufficient. Significant data gaps in the finance building block show the limitations of a civil-society driven approach, since such organisations may lack the human resources to fully source all required data on an annual basis, the financial resources to purchase access to relevant datasets (which are often released on a pay-to-access basis by consultancies and private research organisations), or the institutional access to data which organisations such as the European Commission or OECD benefit from. Therefore, there is a clear risk that persistent data gaps mean that the monitoring of finance's progress towards net-zero outlined in the ECNO structure and methodology will be hampered in the medium term, undercutting the impact of ECNO's analysis. However, the data gaps do not entirely detract from ECNO's impact as a watchdog. It is able to point to multiple areas where progress is not in line with climate ambition while also calling for a general improvement in the data landscape for key metrics (which is in itself a useful conclusion that can be drawn from this kind of investment monitoring).

5.2.4 Conclusion

If ECNO's analysis continues to suffer from data gaps over the long term, this could have negative implications for the **transformative impact** of ECNO going forward. A watchdog's function as a warning system to policymakers is only as effective as the clear data trends that it can point to, without which recommendations are built on inferences and more susceptible to bias. Nonetheless, ECNO's approach does hold potential for future transformative impact. If the approach of monitoring finance across all three kinds of finance set out in Section 2 can be effectively socialised and incorporated by better resourced institutional actors, ECNO could play a role in the significant improvement of the monitoring of investment in support of climate action. However, at this stage, it remains to be seen if such an influence will occur.

5.3 Clean Investment Monitor

5.3.1 Background

The Clean Investment Monitor (CIM) monitors investments in the manufacture and deployment of cleantech in the USA. It is a joint project of the Rhodium Group and MIT's Center for Energy and Environmental Policy Research.

The CIM arose from the political context of the Biden administration's increasing public support for cleantech, as part of a step-change in US climate policy. In 2021 and 2022, three major pieces of legislation were passed that provide public investment and tax incentives to accelerate private investment in US cleantech: the Inflation Reduction Act (IRA), the Infrastructure Investment and Jobs Act, and the CHIPS and Science Act. The CIM was conceived in the wake of these policies, based on the insight that while many *ex ante* analyses of the projected impact of the IRA and other legislation on green investment had been released (Badlam et al., 2022), there was a lack

of granular monitoring of the actual public and private investments in cleantech in the US, making assessing the actual success of the much-lauded measures difficult (Bermel et al., 2023b).

The CIM records both public and private investments across a wide spectrum of clean technologies and their associated components. To establish a historical context for evaluating recent investment trends, the CIM encompasses all investments in the covered technologies made since 2018. This leads to a database that comprises roughly 20,000 individual facilities, 3 million registered zero-emission vehicles, 20 million heat pump sales, and 4.5 million distributed electricity generation or storage installations (Bermel et al., 2023b).

5.3.2 Monitoring approach

To narrow the scope of potential cleantech investments which can be monitored, the CIM limits its monitoring to those technologies which are eligible for tax incentives under the IRA (Bermel et al., 2023a). These include solar PV, wind, batteries, critical minerals, hydrogen electrolysers, nuclear energy, heat pumps, carbon capture, and zero-emission vehicles. Technology investments are classified as either manufacturing (investments in new or an expansion of existing manufacturing capacity), energy and industry (investments in the deployment of technologies related to reducing the emissions of bulk production of energy or industrial goods), and retail (investments in retail purchase and installation of technologies which reduce the emissions of households and businesses). Residential building energy efficiency investments outside of heat pump installations are not included in the analysis, even though some of these investments are supported by the IRA.

The CIM tracks both past and future (i.e. commitments yet to be realised) investments. Investments are categorised as in one of the following states: intended (based on company announcements, but for which specific project outlines are not yet confirmed), announced (announcement of a new or expanding facility tied to a specific location), under construction, operating, or cancelled/closed. For manufacturing datapoints, investment, production capacity, and employment values are included in the database entry where available, or when unavailable estimated based on other similar investment entries.

Data is gathered through a variety of sources. For manufacturing and energy/industry, investments at the individual project level are compiled through a combination of third-party databases, company announcements, financial filings, and news reports. For retail data, the CIM makes use of aggregate state-level data, rather than project/purchase level data. This aggregate-level data is used to estimate investment amounts. These tracked investments are added to a regularly updated database available online (Rhodium Group, 2023) and presented in an annual report (Bermel et al., 2023b).

One element of the CIM's approach to presenting its data is that the distinction between public investment and private end investments in the analysis is not clear. Judging by the online database and report, the results presented track only private investments, even if the CIM is clear in stating

that it "catalogs public and private investments" (Bermel et al., 2023b). This discrepancy is not addressed in any of the publications associated with the CIM.

5.3.3 Assessment

The CIM is a clear example of an **informer**-type monitoring platform, with its focus on aggregating data and presenting it clearly in its database and report. While it does purport to monitor both **public finance** and **private end investments**, in practise it only presents data on the latter, with a clear focus on investments by businesses and consumers in the clean technologies it analyses.

Its **implementation effectiveness** in this role is high, no doubt supported by the significant resources which the Rhodium Group and the well-funded Massachusetts Institute of Technology can devote to the topic (although any specific indications of how it is staffed or financed are not available). The data is presented clearly on the website and allows stakeholders to download and interact with it, empowering users to draw their own inferences and drill down into specific subsets as desired. Therefore, in terms of plugging the data gap it identified at its inception (Bermel et al., 2023b), the CIM is successful.

It is **transparent** with regards to its methodology and the presentation of its sources and findings. However, it does not give stakeholders access to its specific process on estimating investments or other datapoints where data is unavailable for any one project, making it difficult for other experts and stakeholders to interrogate these assumptions. Indeed, there is no evidence of any **stakeholder engagement** on the part of the organisations behind CIM, which, while perhaps consistent with its role as an Informer, does limit its impact in shaping the American debate on climate action.

5.3.4 Conclusion

Without any direct outreach to stakeholders, and absent any evidence of references by policymakers or other stakeholders at this stage, the **transformative impact** of the CIM is hard to gauge. So far, it has been low, but if in future the profile of the CIM were to grow in the United States, it could conceivably be significant, being operationalised by policymakers and civil society to craft a positive narrative around the impact of US climate policy or a warning should the positive trends seen currently begin to slow or reverse. However, without a clear reference to US climate goals, or a direct examination of how public investment is catalysing this wave of private spending (both currently lacking from the database or report), this narrative will be more difficult to surface, potentially weakening the long-term transformative impact of this investment monitor. How its data will be used by other organisations could also make the difference in determining its long-term transformative impact

6. Conclusion and best practices for transformative investment monitoring

European climate investment monitoring, given its economy-wide scope, is a challenging undertaking – and perhaps one that cannot be fulfilled by any one platform, as the trade-off between scope and granularity emerges from all three case studies. However, as seen in section 4, some EU institutions are already partially fulfilling this investment monitor role. The three case studies examined in section 5 can give us some insights that will support our future recommendations for how the EU's existing architecture can be improved, to ensure both a granular and wide coverage for future investment monitoring.

The **US Climate Investment Monitor** is a good example of an Informer-type monitoring platform. Its comprehensive and publicly accessible dataset is an asset to a wide range of stakeholders. However, its transformational impact on policy processes in the US is weakened precisely because it fulfils this Informer role to a tee. Stakeholders are not actively engaged, and there is no attempt to provide insights into how policies are or are not impacting climate investments and contributing to the wider decarbonisation of the economy.

France's green budgeting exercise shows that a well-resourced state institution can conduct a wide-ranging yet granular analysis, with clear value for policymakers and civil society. Broadening its assessment beyond climate mitigation, as well as analysing both climate positive and negative investments, means that the data gives a strongly nuanced assessment of environmental impact. As it is conducted by a trusted institutional actor, the exercise is a good example of how external stakeholders can be explicitly involved in the process, and how the results can be meaningfully integrated into the legislative cycle. However, by not connecting the analysis of the results to any official climate strategy or making a judgment on how the assessed budget contributes to France achieving net-zero, the green budgeting exercise falls short on transformative impact.

The **European Climate Neutrality Observatory** is, in its design as a whole-economy Watchdog, the one best suited to spearhead transformational change with its investment monitoring. However, it faces challenges in implementation effectiveness, as it lacks the resources and access to data necessary to turn its design into a repository of granular, actionable data.

In summary, due to limitations in resources or design, none of the case studies provide an entirely effective example of a platform for monitoring and analysis of climate investment. This demonstrates the difficulty of having one governance platform which provides comprehensive investment monitoring, and highlights that a "one stop shop" design for climate investment monitoring at EU level may not be best placed to deliver transformative impact. A more effective approach would see a range of monitoring platforms that are well-coordinated and targeted to provide a collective impact, while being strongly embed in civil society and the policymaking sphere to ensure their analysis is best translated into transformative impact.

In that context, the case studies provide several lessons that can help guide future reforms:

1. To be of transformative impact, climate investment monitors should seek to cover a wide range of investments, across all three types (end investments, public finance, and private financial flows). Since this may not be feasible, multiple complementary monitors may be required.
2. Climate investment monitors should be well-resourced, with good access to granular data. Public institutions are therefore a good option to fulfil the role.
3. Climate investment monitors should monitor both green and brown investments (along a gradated scale) and examine a range of climate impacts beyond climate mitigation.
4. To have the most impact on climate finance policy, climate investment monitors should be explicitly connected to the policy process, integrate a range of stakeholders into its functioning, and create a clear outreach strategy.

7. References

Badlam, J., Cox, J., Kumar, A., Mehta, N., O'Rourke, S., & Silvis, J. (2022). *The Inflation Reduction Act: Here's what's in it*. https://www.mckinsey.com/~/media/mckinsey/industries/public%20and%20social%20sector/our%20insights/the%20inflation%20reduction%20act%20heres%20whats%20in%20it/the-inflation-reduction-act-heres-whats-in-it_final.pdf?shouldIndex=false

Bermel, L., Chen, J., Deese, B., Delgado, M., English, L., Garcia, Y., Houser, T., Khan, A., Larsen, J., Stewart, N., & Tavarez, H. (2023a). *The Clean Investment Monitor: Methodology*.

Bermel, L., Chen, J., Deese, B., Delgado, M., English, L., Garcia, Y., Houser, T., Khan, A., Larsen, J., Stewart, N., & Tavarez, H. (2023b). *The Clean Investment Monitor: Tracking Decarbonization Technology in the United States*.

D'Alfonso, A. (2020). *European Green Deal Investment Plan: Main elements and possible impact of the coronavirus pandemic*. https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/649371/EPRS_BRI(2020)649371_EN.pdf

de Guigné, A. (2019). *La France va se doter d'un budget vert*. Le Figaro Online. https://www.lefigaro.fr/conjoncture/la-france-va-se-doter-d-un-budget-vert-20190925

Duwe, M., Evans, N., Kessler, L., & Hainault, H. (2022). *Working Paper on a European Climate Neutrality Observatory (ECNO) Introduction and Chapter 1-Scope*.

Duwe, M., Evans, N., Velten, E.K., Thie, J.-E., Oldenburg, C., Kessler, L., Cochran, I., & Hainaut, H. (2022). *Working Paper on a European Climate Neutrality Observatory (ECNO) Chapter 2-Status quo and gap analysis*.

European Central Bank. (2023). *Climate change and the ECB*. Https://Www.Ecb.Europa.Eu/Ecb/Climate/Html/Index.En.Html.

European Climate Neutrality Observatory. (2023). *European Climate Neutrality Observatory*. https://climateobservatory.eu/

European Commission. (2018). *Action Plan: Financing Sustainable Growth*. http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1483696687107&uri=CELEX:52016SC0405.

European Commission. (2021). *Factsheet - International Platform on Sustainable Finance*. https://europa.eu/!CP69YX

European Commission. (2022). The EU as an Issuer: The NextGenerationEU Transformation. *EU Budget Policy Briefs*. https://doi.org/10.2761/591643

European Commission. (2023). *EU Climate Action Progress Report 2023*. https://climate.ec.europa.eu/system/files/2023-10/com_2023_653_en_0.pdf

European Council. (2023). *Climate change: what the EU is doing*. European Council. https://www.consilium.europa.eu/en/policies/climate-change/#:~:text=Waste%3A%20%2D34.9%25-,Financing%20the%20EU's%20climate%20transition,instrument%20on%20climate%2Drelated%20projects.

European Investment Bank. (2019). *EIB energy lending policy - Supporting the energy transformation*. https://www.eib.org/attachments/strategies/eib_energy_lending_policy_en.pdf

European Investment Bank. (2020). *EIB Group Climate Bank Roadmap 2021-2025*. https://www.eib.org/en/publications/the-eib-group-climate-bank-roadmap

European Investment Bank. (2023). *Investment Report 2022/23: Resilience and Renewal in Europe*. https://doi.org/10.2867/6394

French Ministry of Economy. (2005). *Projet de loi de finances pour 2006*. https://www.budget.gouv.fr/sites/performance_publique/files/farandole/ressources/2006/pap/pdf/jaune2006_environnement.pdf

French Ministry of Economy. (2020a). *Rapport sur l'impact environnemental du budget de l'État*. https://www.budget.gouv.fr/files/uploads/extract/2021/PLF_2021/rapport_IEE.PDF

French Ministry of Economy. (2020b). *Report on the Environmental Impact of the Central Government Budget*. https://www.budget.gouv.fr/documentation/file-download/8632

French Ministry of Economy. (2021). *Rapport sur l'impact environnemental du budget de l'etat*. https://www.economie.gouv.fr/files/files/2021/Rapport_impact_environnemental_budget_Etat_2022.pdf?v=1633948985

French Ministry of Economy. (2023a). *Rapport sur l'impact environnemental du budget de l'État*. https://presse.economie.gouv.fr/12102023-rapport-sur-limpact-environnement-du-budget-de-letat/

French Ministry of Economy. (2023b). *Budget Vert*. French Green Budget Data Visualiser. https://datavision.economie.gouv.fr/budget-vert/67157095?view=Toutes%20missions%20confondues

Heilmann, F., Lehne, J., Moelter, H., Wehnert, T., & Pranter, M. (2021). *Is the EU Recovery and Resilience Facility Enabling a Green Recovery?* https://www.e3g.org/news/is-the-eu-recovery-and-resilience-facility-enabling-a-green-recovery/

Humphreys, C. (2023a). *Is European cleantech on track for net zero?* https://climateobservatory.eu/sites/default/files/2023-11/ECNO%20Cleantech%20Briefing%20November%202023.pdf

Humphreys, C. (2023b). *Cleantech divide looms in Europe*. Euractiv. https://www.euractiv.com/section/energy/opinion/cleantech-divide-looms-in-europe/

International Monetary Fund. (2023). *Fossil Fuel Subsidies*. International Monetary Fund. https://www.imf.org/en/Topics/climate-change/energy-subsidies

Velten, E.K., Calipel, C., Duwe, M., Evans, N., Felthöfer, C., Hagemann, M., Hecke, J., Kahlen, L., Lalieu, S., McDonald, H., Pelekh, N., Pellerin-Carlin, T., Pestiaux, J., Ramotowski, K., Schöberlein, P., Schritt, H., Śniegocki, A., Stefańczyk, A., & Tarpey, J. (2023). *State of EU progress to climate neutrality: An indicator-based assessment across 13 building blocks for a climate neutral future*. https://climateobservatory.eu/sites/default/files/2023-06/ECNO_Flagship%20report%20-%20State%20of%20EU%20progress%20to%20climate%20neutrality_June%202023.pdf

Velten, E.K., Schöberlein, P., Gilon, T., & Hecke, J. (2023). *Framework and methodology for progress measurement*. https://climateobservatory.eu/sites/default/files/2023-06/ECNO_Methodology_Paper_June%202023.pdf

Merle, C., Cobat, F., Brisson-Felix, A., Topin, Y. W., & Camarcat, R. (2022). *Extended Taxonomy: in betweenness and elitism softening*. https://app.natixis.simplebo.net/site/T_rRFifyaz6SK8y7TKR4rw/api-website-feature/files/download/12428/extended_taxonomy_in_betweenness_and_elitism_softening_natixis_gsh.pdf

Messad, P. (2023). *French energy and climate transition to receive €7 billion top-up in 2024*. Euractiv. https://www.euractiv.com/section/politics/news/french-energy-and-climate-transition-to-receive-e7-billion-top-up-in-2024/

Moore, B., Oberthür, S., Mähönen, M., Duwe, M., Koegel, N., Evans, N., von Homeyer, I., Kulovesi, K., Kampman, B., Hilke, A., & Varis, K. (2023). *Transformative procedural climate governance: Mechanisms, functions, and assessment criteria*.

New Climate Institute. (2023). *ECNO: State of European Progress Towards Climate Neutrality*. New Climate Institute. https://newclimate.org/resources/publications/ecno-state-of-eu-progress-to-climate-neutrality

Nicol, M. (2021). *Environmental Budget Assessment: Let's complete them*. Institute for Climate Economics. https://www.i4ce.org/en/green-budgets-working-to-complete-them-climat/

OECD. (2023). *Paris Collaborative on Green Budgeting*. OECD. https://www.oecd.org/environment/green-budgeting/#:~:text=The%20OECD%20Paris%20Collaborative%20on,climate%20and%20other%20environmental%20goals.

Platform on Sustainable Finance. (2022). *The Extended Environmental Taxonomy: Final Report on Taxonomy extension options supporting a sustainable transition*.

Postic, S. (2021). *The Good, the Bad and the Unclear Environmental Budget Tagging-From communicating national effort to improving budgetary performance*. www.i4ce.org

Postic, S. (2022). Green Budgeting in France & roles for civil society (Slide Deck). In *I4CE*.

Postic, S., & Fetet, M. (2020, October 5). *France's Green Budget: What's Next?* I4CE. https://www.i4ce.org/en/budget-vert-de-la-france-et-maintenant/

Postic, S., Lecuyer, O., & Doherty-Bigara, J. (2020, September 21). *"Green Budgeting": Paths to Creating Real Added Value*. Ideas 4 Development. https://ideas4development.org/en/green-budgeting-paths-real-added-value/

Rhodium Group. (2023). *Clean Investment Monitor*. Clean Investment Monitor. https://www.cleaninvestmentmonitor.org/

Science Based Targets Initiative. (2023). *Science Based Targets*. https://sciencebasedtargets.org/

Talebzadehhosseini, S., Scheinert, S. R., & Garibay, I. (2019). *Growing green: the role of path dependency and structural jumps in the green economy expansion*.

Third Generation Environmentalism. (2023). *E3G Public Bank Climate Tracker Matrix*. https://www.e3g.org/matrix/

United Nations Development Program. (2009). *Methodology Guidebook for the Assessment of Investment and Financial Flows to Address Climate Change*.

Waysand, C., Roucher, D., Alexandre, S., Tordjman, F., & Stroeymeyt, L. (2019). *Green Budgeting : Proposition de méthode pour une budgétisation verte*. https://igedd.documentation.developpement-durable.gouv.fr/documents/Affaires-0011438/012741-01_rapport-publie.pdf;jsessionid=64A6DA9BB80AE3FB785875FFDB1E5AD5Worland, J. (2023). *How the Inflation Reduction Act Has Reshaped the U.S.—and The World*. Time Magazine Online. https://time.com/6304143/inflation-reduction-act-us-global-impact/

About the project

4i-TRACTION – innovation, investment, infrastructure and sector integration:
TRAnsformative policies for a ClimaTe-neutral European UnION

To achieve climate neutrality by 2050, EU policy will have to be reoriented – from incremental towards structural change. As expressed in the European Green Deal, the challenge is to initiate the necessary transformation to climate neutrality in the coming years, while enhancing competitiveness, productivity, employment.

To mobilise the creative, financial and political resources, the EU also needs a governance framework that facilitates cross-sectoral policy integration and that allows citizens, public and private stakeholders to participate in the process and to own the results. The 4i-TRACTION project analyses how this can be done.

Project partners

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement **No. 101003884**.