

WORKING PAPER

Believe it or not: Psychological Bias, ESG, and Investor Preferences

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Despite numerous pledges to achieve carbon neutrality and more than a decade of scrutiny of what is now known as green finance, capital continues to flow into fossil fuel companies. Meanwhile, investment in renewable energy remains insufficient, highlighting the need to understand the factors that shape investment decisions. Existing research has primarily focused on retail investors, paying limited attention to professional investors and even less to their investments in fossil fuel companies. Addressing these gaps, this paper surveys professional investors (149 responses) and studies their decision-making processes in the energy sector. To analyse whether investors value information related to the low-carbon transition of energy firms, a Multiple Discrete-Continuous Extreme Value (MDCEV) model is employed for the first time in sustainable finance literature. The results show that investors recognise climate-related opportunities and are willing to invest in renewable energy, yet they continue to allocate significant capital to fossil fuel companies. Factors such as professional roles, investment experience, and resistance-to-change bias influence their willingness to exclude fossil fuels from their portfolios. The results highlight that perfect information alone is insufficient to redirect capital away from fossil fuels and that climate policies should be more incentivising to accelerate the transition.

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Executive summary

Since the Paris Agreement in 2015, the financial industry has been positioned as a core lever of the low-carbon transition: capital must be reallocated away from CO₂-intensive activities toward low-carbon activities. While many financial institutions commit publicly to carbon neutrality by 2050, capital flows toward fossil fuels remain persistent. A key narrative used by financial actors is that transition to a low-carbon economy cannot occur without the financial resources of the fossil fuel industry, and divestment would risk being counterproductive to that transition if it is realised too fast. There is, therefore, a blurred line between investors who genuinely aim to engage fossil fuel companies in a low-carbon transition and those who maintain fossil fuel financing primarily because it continues to be profitable.

This blurred line was even stronger before 2020, as European companies had no legal obligation to disclose climate-related information. To increase transparency and better monitor European firms' efforts towards low-carbon transition, the European Union has deployed a series of regulations making mandatory climate disclosures. The implementation of these regulations is grounded in the theory that enhanced access to comparable climate data will act as a signal to investors, which would end by shifting capital to greener firms.

Since 2020, the mandatory framework has thus improved access to climate information; the aim is now to understand whether it has led to changes in professional investors' behaviours in the energy sector. This research paper investigates whether investors value information about the low-carbon transition strategies of fossil fuel companies when making investment decisions. Particularly, the objective is to determine if investments in fossil fuel companies are conditional on efforts in developing low-carbon activities, and not on financial returns only. To respond to this research question, a survey using a choice experiment setting was conducted between April and October 2024, generating 149 responses from financial experts working in asset management companies.

Key results :

- 1) Climate information is valuable to investors who already have strong preferences for green energy firms.
- 2) All investors perceive climate-related opportunities associated with investments in green energy.
- 3) However, better access to climate information does not change investors' behaviours regarding investments in fossil fuels, a sector still not perceived as a climate-related risk for most investors.
- 4) Preferences among investors are highly heterogeneous, influenced by factors such as cognitive bias, institutional and geographical environments.

Policy implications :

- 1) Mandatory climate disclosures are necessary to monitor firms' progress toward the low-carbon transition; however, they are not enough to shift capital allocation.
- 2) Capital allocation of non-banking financial institutions in sectors contributing to climate change must be more constrained by the financial authorities.
- 3) Mandatory climate-related risk assessment could improve the risk perception of non-banking financial institutions regarding climate change and, therefore, has the potential to induce changes in investment behaviours.

1 Introduction

In 2020, global investments in green energy surpassed those in the fossil fuel industry for the first time. In recent years, the pace of renewable energy investment has accelerated significantly, with annual spending on clean energy projects nearing \$2 trillion, almost double the total expenditure on new oil, gas, and coal supply (IEA 2024). In this context, private capital plays a crucial role alongside public funding, as financial flows must be redirected from fossil fuels to renewable energy (IEA 2021). Since 2015, and following Mark Carney’s speech (Bank of England 2015) highlighting the role of finance in the low-carbon transition, financial actors have increasingly recognised the concept of double materiality, which recognises that climate change poses systemic risks to the financial sector, while financial decisions, in turn, shape climate outcomes (P. Krueger, Sautner, and Starks 2020). Over the past decade, net-zero alliances, such as the Net-Zero Asset Management Initiative and the UN Principles for Responsible Investment, have expanded, with a growing number of financial institutions committing to climate-aligned investment strategies.

Nonetheless, despite this positive trend and financial markets’ efforts to adopt greener practices, global energy demand continues to rise. Fossil fuels still met two-thirds of additional demand in 2023 and continue to attract significant investment, as long as renewable energy investment in Europe remains insufficient: annual investments in green energy must increase by 2.7% to 3.7% of EU GDP by 2030 to meet climate targets (ECB 2025). As a result, the financial sector still plays a significant role in funding fossil fuels: though a slight downward trend in fossil fuel financing was observed between 2021 and 2023, this trend has reversed since 2024 (Banking on Climate Chaos Coalition 2025).

‘Don’t divest fossil fuels, stay in the game’ were the words of BlackRock’s CEO, Larry Fink, who argues that divestment (i.e, excluding fossil fuel companies from the investment universe) is inefficient. Instead, he advocates for shareholder stewardship, engaging directly with firms to drive change (Vereckey 2021). From this perspective, the transition to a low-carbon economy cannot occur without the financial resources of the fossil fuel industry, and divestment would risk being counterproductive to that transition, reflecting an ongoing debate about the financing of the fossil fuel industry between engagement and exclusion.

Divesting from fossil fuels has two implications. First, for investors pursuing low-carbon transition objectives, divestment limits their ability to influence companies’ transition strategies through shareholder engagement. Second, for all investors, it reduces the investment universe and may restrict access to an industry that has historically been profitable, potentially lowering portfolio returns. Notably, between 2011 and 2016, as the energy sector underperformed in the market, some investors were more inclined to divest from it, since doing so did not entail major financial drawbacks (Trinks et al. 2018; Halcoussis and Lowenberg 2019). Since 2022, however, the opposite has been true: the energy sector has recorded substantial gains (Murray 2022), challenging investors’ preferences for the low-carbon transition. This suggests that discourses and strategies may shift in response to the economic context, with monetary incentives playing a decisive role- potentially undermining the transition away from fossil fuels and the objective of keeping reserves unexploited.

There is, therefore, a blurred line between investors who genuinely aim to engage fossil fuel companies in a low-carbon transition and those who publicly pledge to do so but are primarily motivated by the prospect of profiting from thriving fossil fuel activities. This leads us to the central research question of this paper: whether professional investors value information on the low-carbon transition of fossil fuel companies. More specifically, it examines the types of information investors respond to when evaluating energy firms and decide to include them in financial products such as mutual funds. While no fossil fuel company can yet be considered green (i.e., relying exclusively on renewable energy sources), some have adopted climate transition plans and begun diversifying their activities, for instance by investing in renewable power generation or biofuel production. Are investors attentive to such signals?

Existing studies have predominantly been conducted at the fund level, asking respondents which mutual funds they would be willing to invest in. However, the decision processes through which fund managers select the underlying firms included in these funds remain unexplored. One plausible explanation for this gap is that previous survey research has focused primarily on retail investors rather than professional investors, thus providing limited insight into institutional decision-making. Past research has shown that investors are willing to allocate capital to financial products with sustainable attributes (i.e. products demonstrating strong environmental, social, and governance (ESG) performance). However, this literature does not examine whether such preferences imply a simultaneous reduction in investments in unsustainable products. This question is particularly salient in the energy sector, where allocations to renewable energy have increased while investments in fossil fuels persist. Finally, most studies rely on ESG scores to assess the sustainability profile of financial products, overlooking other relevant and more detailed indicators for the low-carbon transition, such as low-carbon revenue and capex alignment metrics as proposed by the EU Taxonomy, a European framework implemented in 2020 providing a standard definition of green activities¹.

To address these research gaps, a survey was conducted among professional investors, yielding 149 responses. It includes a multiple discrete-continuous extreme value (MDCEV) experiment to examine how investors consider firms' low-carbon transition characteristics in the energy sector- a method applied here for the first time in sustainable finance, to our knowledge. In the experiment, investors allocate an investment budget among energy firms differing in financial and non-financial attributes, allowing us to identify which of them most influence investment choices in this sector. Given the persistent status quo in energy investment, the survey also explores the role of cognitive biases. Transitioning away from fossil fuels requires investors to forgo short-term profits and anticipate long-term risks; resistance to this shift underscores the role that behavioural factors may play in the transition. Therefore, the survey also includes a psychometric scale (i.e., a method used to measure a latent construct) measuring resistance-to-change bias.

Finally, four hypotheses were pre-registered on the website AsPredicted² before conducting the survey. In this experiment, we define investors with green preferences as those who do not invest in firms deriving revenue from fossil fuel activities (i.e, those that exclude fossil fuel from their investment universe). We hypothesised first that the proportion of investors with green preferences would

¹EU Green Taxonomy website

²AsPredicted: Hypotheses registration

be marginal compared to those investing in fossil fuels. The validation of this hypothesis depends on how ‘marginal’ is defined. If it refers to fewer than 50% of respondents, then the hypothesis is validated. However, if a stricter definition is used, for example, fewer than 5%-then the hypothesis is not validated. Overall, the findings indicate that investors with green preferences do not represent the majority of the surveyed population. Second, we expected that the indicator provided by the EU Taxonomy, namely low-carbon capex, would not significantly influence investment choices, and the results of this survey confirm this hypothesis. Third, we hypothesised that firms combining strong financial performance with a high ESG score would be preferred by investors, but the data do not support this assumption. Finally, we hypothesised that investors who continue to invest in firms with substantial fossil fuel exposure would exhibit greater resistance to change, as measured by the scale. This hypothesis is only partially validated, as the bias appears to influence investment behaviour in a complex manner that affects both green-leaning and brown-leaning investors.

The paper is organised as follows. Section 2 reviews the literature, Section 3 describes the experimental design, and Section 4 presents the results. Section 5 presents the policy implications, and Section 6 provides the conclusion.

2 Literature Review

The literature on sustainable finance has sought to understand investors’ motivations for sustainable investing. To investigate these preferences, several studies have used experimental settings or qualitative methods (Bachmann, Meyer, and Krauss 2024; Löfgren and Nordblom 2024; Bauer et al. 2024). Among these, discrete choice experiments (DCE) have become widely accepted for studying individual preferences. DCE is a multi-attribute choice method in which alternatives (i.e, choice options) are described by a set of characteristics referred to as attributes (Adamowicz, Louviere, and Swait 1998). DCE are based on Lancaster’s value theory (Lancaster 1966), which states that a consumer’s utility is derived not from the product itself but from its attributes. To understand how individuals value environmental attributes, DCE was first applied by Adamowicz, Louviere, and Williams (1994) in a study of Canadian rivers that evaluated the recreational and ecological amenities associated with improvements in water quality. Since then, DCEs have been increasingly used in environmental economics and sustainable finance (Bassen et al. 2019; Lagerkvist et al. 2020; Barber, Morse, and Yasuda 2021; Rozkov and Idema 2023; Gottlieb and Edenbrandt 2024; Harasheh, Bouteska, and Manita 2024; Muñoz-Muñoz et al. 2025; Holzheu and Wekhof 2025).

DCEs assume that goods are perfectly substitutable and mutually exclusive (i.e., choosing one option implies forgoing all others), which is not representative of the decision-making process in the financial industry, where investors diversify their portfolios to minimise risk exposure (Markowitz 1952). To address this limitation, several studies in sustainable finance have adapted the DCE format into continuous choice experiments with budget allocation (Gutsche, Wetzel, and Ziegler 2023; Seifert et al. 2024; Filippini, Leippold, and Wekhof 2024; Meyer 2024). However, these adaptations sacrifice the repeated-choice structure that characterises DCEs, as only one choice scenario is usually presented. Surprisingly, the literature has largely overlooked an existing model explicitly designed

to allow continuous choices within choice experiments, the MDCEV model proposed by Bhat (2008), originally developed within the field of transportation economics. Rather than treating choices as independent, the MDCEV model introduces parameters that capture satiation effects in preferences across choice scenarios, making it both conceptually original and more complex to implement. To our knowledge, MDCEV has been used only in transportation economics (Tapia et al. 2020; Palma et al. 2021; Wang, Ye, and Bierlaire 2025), but it remains largely unexplored in other areas of economics. By adapting it to the context of sustainable finance, this paper contributes to extending its methodological relevance beyond its original field of application.

Most studies on investors' sustainable preferences focus on retail investors (Heeb et al. 2023; Giglio, Maggiori, Stroebel, Tan, et al. 2023), leaving a significant research gap regarding professional investors' preferences. In Europe, 14% of exchange-traded share activity is realised by retail investors³, representing a relatively marginal segment compared to other investor categories. They are more frequently studied because they are easier to access, whereas professional investors, such as fund managers, are busier and challenging to reach. In preparing this survey, several panel providers were contacted to explore the possibility of accessing a sample of professional investors; however, none were able to offer a suitable panel, underscoring the challenges of reaching this population. Moreover, the few papers investigating professional investors' preferences often fail to differentiate between professional investor types and consider them as a single category (Bauer et al. 2024; Amel-Zadeh and Serafeim 2018; Masini and Menichetti 2013). This paper aims to address this issue by first examining professional investors and, second, focusing on professionals working in investment departments of asset management companies. The asset management industry has become a strategic segment of the financial sector, with assets under management rising from \$36 trillion in 2005 to \$124 trillion in 2024 worldwide (Boston Consulting Group 2025; Galanti and Le Quéré 2020). This sharp rise highlights the growing reliance of institutional investors (e.g., pension schemes, insurance companies) on asset managers as intermediaries to channel investments into the real economy. Asset managers are thus regarded as investment experts and act as a bridge between investors and the real economy; understanding their decision-making process is therefore crucial (Ahmad, Ibrahim, and Tuyon 2017; Suto and Toshino 2005).

In addition to being investment experts, professional investors are individuals, and like other human beings, they are influenced by cognitive biases (Eber 2020; Tadjeddine 2013; Kahneman and Tversky 1979; Simon 2000). Although financial theory suggests that, when all information is available, professional investors make rational decisions, empirical evidence shows that their investment decisions are influenced by cognitive biases (Kudryavtsev, Cohen, and Hon-Snir 2013; Aren, Aydemir, and Şehitoğlu 2016; Ahmad, Ibrahim, and Tuyon 2017; Viale et al. 2018). Though they must adhere to institutional investment policies, professionals also face trade-offs and make decisions based on their personal assessment of each situation. In particular, a fund manager's success depends on past choices and the ability to implement innovative investment strategies. Individual factors are therefore essential, and prior research on investors' sustainable preferences has shown that biases such as altruism and environmental values can significantly influence decision-making (Seifert et al. 2024;

³Reuters, 2024

Gutsche, Wetzel, and Ziegler 2023; Saravade, Weber, and Vitalis 2025; Heeb et al. 2023; Bauer et al. 2024; Hartzmark and Sussman 2019; Matallín-Sáez et al. 2022). Given the limited shift away from fossil fuels, this paper investigates whether cognitive biases act as barriers to the transition, with particular attention to the resistance-to-change bias as conceptualised by Oreg (2003). This study contributes to the literature on cognitive biases in sustainable finance, complementing prior work that has examined such biases using psychometric scales integrated into surveys (Muñoz-Muñoz et al. 2025; Gutsche, Wetzel, and Ziegler 2023).

Prior research has examined investors’ preferences by measuring green preferences through environmental, social, and governance (ESG) dimensions, as captured by the ESG scores (Amel-Zadeh and Serafeim 2018; Hartzmark and Sussman 2019; Pedersen, Fitzgibbons, and Pomorski 2021). The use of this indicator has become mainstream (Revelli 2017) despite criticisms highlighting the lack of standardisation of this metric and, more broadly, raising questions about what can be defined as sustainable activities (Gangi et al. 2022; Berg, Koelbel, and Rigobon 2022). To ensure that green preferences are measured accurately and not conflated with ESG preferences, this paper utilises indicators proposed by the EU Taxonomy to monitor firms’ greenness, such as low-carbon capital expenditure (capex) and revenue. The value added by the EU Taxonomy is to provide a clear definition of which activities are green, avoiding misleading communication and reducing information asymmetry between firms and investors (Claringbould, Koch, and Owen 2019; Alessi et al. 2020; Gangi et al. 2022; Beerbaum and Puaschunder 2018; Paccès 2021; Schütze et al. 2020). The EU Taxonomy is relatively new, and there is limited research on its effectiveness in reallocating investments (De Angelis and Monasterolo 2024).

Finally, past research on investors’ green preferences adopted a multi-sectoral approach, i.e., not investigating a specific sector (Riedl and Smeets 2017; Lagerkvist et al. 2020; Apostolakis et al. 2018; Auzepy, Bannier, and Gärtner 2024). However, the energy sector, the most CO₂-intensive, requires greater attention. The industry faces increasing pressure from stakeholders (NGOs, market authorities) urging investors to divest from it (Braungardt, Bergh, and Dunlop 2019; Urgewald 2024). This practice, however, is not widely adopted among investors, as it reduces the investment universe and thus diversification opportunities (Amel-Zadeh and Serafeim 2018). This study will hence focus on this industry, trying to understand how preferences are articulated for this economic sector.

3 The survey

The survey was validated by the Ethics Board at Paris Dauphine University. Each respondent consented to their responses being used within an academic context and was assured of anonymity. No direct incentives were given to the respondents; however, for each participation, a donation of 5€ was made to an organisation that trains and provides medical assistance dogs at no cost to people with disabilities. Furthermore, pledging honesty in surveys has been shown to improve response accuracy; therefore, respondents were asked to promise to provide honest answers (Jacquemet et al. 2019). On average, respondents took 12 minutes to respond.

3.1 The model setting

The survey is designed as a choice experiment estimated through the MDCEV model (Bhat 2008). The MDCEV is a stochastic formulation of the classical consumer utility maximisation problem under a budget constraint, in which individuals allocate continuous consumption across multiple alternatives. Conceptually, it generalises the multinomial logit to the multiple-discrete-continuous case while allowing for corner solutions.

The individual utility function is specified as:

$$U(x) = \sum_{k=1}^K \psi_k \frac{\gamma_k}{\alpha_k} \left(\left(\frac{x_k}{\gamma_k} + 1 \right)^{\alpha_k} - 1 \right)$$

where $\psi_k = \exp(\beta_k z_k + \varepsilon_k)$,

ψ_k is the baseline utility of good k ,

β_k and z_k are vectors of parameters and attributes, and ε_k captures unobserved factors,

γ_k and α_k are satiation parameters.

The function $U(x)$ is increasing, concave, and continuously differentiable. The parameters γ_k and α_k determine the satiation profile: while ψ_k shifts baseline preference for alternative k , a lower α_k implies faster diminishing marginal utility with allocation, and a higher γ_k results in less satiation effect in the consumption of alternative k . Empirically, γ_k and α_k are typically not estimated simultaneously due to identification constraints: this paper estimates γ_k while fixing α_k .

3.2 A labelled choice experiment

In this choice experiment, respondents are asked to choose between four alternatives, which reveal the relative importance of each and the trade-offs they are willing to make. To build the choice experiment, an efficient design was realised based on a multinomial logit model using the NGENE software. Prior estimators were estimated after a DCE pilot conducted among students in the last year of their master in Asset Management at the Paris-Dauphine University. The experimental design comprises 18 choice scenarios, which are divided into six blocks. Accordingly, each respondent in the survey completed six choice scenarios - a number selected to ensure sufficient variation for analysis while minimising cognitive fatigue.

In this labelled MDCEV design, respondents allocate a given investment budget across three firms. The firms share the same set of characteristics but differ in attribute levels, and each firm is labelled by its revenue composition across energy sources. An opt-out alternative was proposed, allowing investments to be allocated to a monetary fund. Table 1 presents the four labelled options used in the choice experiment, along with their revenue breakdowns by energy source, descriptions that are kept fixed across the six choice scenarios.

Firms	Oil & Gas	Gas	Coal	Renewable Energy
Integrated Oil & Gas Company Brown	98%	-	-	2%
Power Producer Grey	-	56%	21%	23%
Green Energy Producer Green	-	-	-	100%
Opt-out Option	-	-	-	-

Table 1: Revenue breakdown of alternatives per energy source

To facilitate the analysis, the integrated oil and gas firm is referred to as the *Brown firm*, the power producer as the *Grey firm* and finally the green energy producer as the *Green firm*.

While the labels of the investment options remained constant across the six choice tasks, each firm was described by six attributes with levels that varied randomly between scenarios. There are three financial indicators: price-to-earnings ratio (PER), return on equity (ROE), and dividend yield (calculated as dividend per share divided by the price per share). The latter are defined based on eight semi-structured interviews with fund managers at large asset management companies; these three indicators were the most frequently cited by financial professionals. The PER is widely used in listed markets, while ROE serves as a standard corporate finance indicator applicable to both listed and unlisted markets. Dividends also provide valuable information, especially in the energy sector. Established energy firms often distribute high dividends to investors, whereas newer renewable energy firms tend to pay lower dividends due to their capital-intensive nature. The findings from these interviews show that the most relevant financial information varies by investment strategy (growth vs. value) and asset class. This reflects a trade-off between a value investment strategy, which involves investing in well-established companies, and a growth investment strategy, which consists of investing in firms expected to gain market share.

Levels of financial attributes are calibrated using representative values of firms in the Euro STOXX 600 across the following industries: electric utilities, integrated oil & gas, oil & gas exploration and production, multi-utilities, and renewable electricity. The financial data was sourced from the LSEG Database.

Three non-financial indicators are also introduced in the choice experiment. As the use of ESG scores has become a market practice, each firm’s ESG score is provided to offer a general overview of its extra-financial performance. As ESG scoring is an industry-based metric, a highly polluting firm can achieve a good score if it performs better than its peers, which is insufficient to measure a low-carbon transition pathway. Therefore, to translate firms’ efforts toward business diversification into green activities, a measure of low-carbon capital expenditures (capex) is included. Only the Green firm has a fixed capex of 80% for all scenarios. The two other firms have low-carbon capex values ranging from 2% to 60%. Low-carbon capex is relevant in the energy industry, as it measures the extent to which a firm introduces green energy sources through capital investments. Finally, the last attribute indicates whether the firm has introduced a low-carbon transition plan. This topic has gained increasing attention in recent years, particularly since the deployment of the Science-Based Targets Initiative (SBTi)⁴.

⁴<https://sciencebasedtargets.org/>

To identify which attributes investors value when investing in the energy sector, the attribute levels are randomly assigned across scenarios. Except for the Green firm’s capex, each firm could take any level of all attributes. This randomisation ensures that, if respondents are motivated solely by financial returns, they would choose each option with equal probability, since the attribute levels were independent of the firm labels. The objective of this design is twofold: first, to know whether the firm label, reflecting its energy mix, influences investment decisions; and second, to identify which extra-financial attributes drive the decision-making process. Information regarding the survey’s dissemination and other materials regarding the choice experiment are available in the Appendix A.

Attributes	Brown Firm	Grey Firm	Green Firm
Price-to-Earnings Ratio (PER)		5% 13% 23%	
Return on Equity (ROE)		7% 12% 25%	
Dividend Yields		0.5% 3.5% 7%	
ESG Score		AAA AA A	
Low-carbon Capex		2% 20% 60%	80%
Low-carbon Transition Plan		Yes Not specified by the firm	

Table 2: Attributes and randomly assigned levels

3.3 Psychometric scale and sociodemographic questions

After completing the choice experiment, respondents answered questions about their roles in the financial institutions where they work, the characteristics of these institutions (size and location), and, finally, sociodemographic questions (age, gender, and experience).

The last part of the survey incorporates the 17-item psychometric scale developed by Oreg (2003) to measure resistance-to-change (RC) bias. The scale has been validated across 17 nations by Oreg et al. (2008). For the French version of this survey, the validated French adaptation by Angel and Steiner (2013) was used. This scale assesses RC bias across 17 statements on a 6-point Likert scale, grouped into four latent factors, and asks individuals to indicate their level of agreement. The four latent factors used are routine seeking, emotional reaction, short-term focus, and cognitive rigidity. The average of the 17 items provides the individual’s RC level, ranging from 0 to 5.

When applied to the studied sample of investors, the average scale score was very low, 1.8 out of 5, indicating either that respondents are highly open to change or that the scale as a whole is a poor explanation of the RC bias. Statistical tests (i.e., chi-square test, RMSEA, and CFI) indicated that, overall, the scale’s theoretical foundation did not provide a good fit with the sample. The scale was not used as a single variable; instead, the four latent factors were used separately. See Appendix B for more details.

3.4 Participants

The mailing list was partially compiled with the assistance of Hexagone, a Paris-based financial intermediary company. Additional contacts were sourced using Apollo.io, a sales intelligence and engagement platform. Despite receiving institutional support, engaging financial professionals proved challenging. The French journal Funds Magazine featured the survey in its newsletter for several weeks, generating only one response. Similarly, the Paris House of Finance and the CFA Society France distributed the survey to their members but received only one response. Some additional responses were collected via LinkedIn.

The survey was designed using EngineSurvey⁵ and distributed via email to professional investors between April and October 2024. The number of obtained responses is 157, but falls to 149 after data cleaning. The response rate varies depending on the reference perimeter. In total, over 17,000 emails were sent, yielding a response rate of 0.81%. When considering only the emails that were opened, the response rate increases to 1.46%, and it reaches 2.5% when based on the number of individuals who clicked on the survey link. This latter figure is consistent with response rates typically reported in the investor survey literature, which often range between 2% and 4% (Giglio, Maggiori, Stroebel, and Utkus 2021; Bauer et al. 2024).

50% of respondents are investors working for European Asset Managers, while the remaining work for French Asset Managers. France is a key player in the European asset management sector, accounting for 24% of total assets under management across Europe (AFG 2022), which demonstrates the relevance of including French Asset Managers in the sample.

Table 3 indicates that the majority of respondents either work in asset management (AM) companies or investment funds. 78% of respondents are male, which is representative of the gender proportion in investment teams in finance (Kaddouri 2024; Revue d'économie financière 2025). The age distribution is generally balanced between 25 and 55, with the most significant number of respondents in the 25–35 age group.

A substantial share of the respondents, 71.2%, are directly involved in investment management teams (analysts, directors, fund managers), including 56% who are fund managers or investment directors. A minority of respondents work on very short-term projects, while the majority focus on long-term objectives. Additionally, 10% of respondents consider themselves experts in the energy sector. The financial institutions (FIs) where respondents are employed vary significantly in size: responses are gathered from employees at large, medium, and small institutions alike. Finally, based on these summary statistics, the sample appears representative of the asset management industry, as it includes fund managers and analysts working at institutions of varying sizes and a balanced range of experience levels.

⁵<https://surveyengine.com/>

Distribution of Respondents by FIs	Percentage
Asset management company	74.5
Investment funds	13.42
Bank	5.37
Asset owner	3.36
Other	3.36
Gender Distribution	
Man	80.54
Woman	16.79
Prefer not answer	2.69
Age Range of Respondents	
Over 65 years old	2.69
Between 55 and 65 years old	12.75
Between 45 and 55 years old	27.52
Between 35 and 45 years old	20.81
Between 25 and 35 years old	30.87
Under 25 years old	4.70
Prefer not answer	0.67
Position/role	
Fund Manager	38.26
Investment / Risk / Financial Analyst	16.11
Investment and/or Management Director	12.75
Financial and ESG Analyst	6.04
Member of the Socially Responsible Investment (SRI) Team	9.40
Other	5.37
CEO	4.02
Other Director	2.68
Active Investment Horizon	
More than 5 years	45.64
Between 3 and 5 years	36.91
Between 1 and 3 years	11.41
Less or equal to a year	6.04
Energy Expertise	
The respondent is specialised in the energy sector	10.90
Size of the FIs Where Respondents Work	
Greater than 100 billion euros	21.48
Between 50 and 100 billion euros	4.70
Between 15 and 50 billion euros	15.44
Between 5 and 15 billion euros	16.78
Between 3 and 5 billion euros	3.36
Between 1 and 3 billion euros	7.38
Between 500 million and 1 billion euros	12.08
Less than 500 million euros	16.11
Prefer not to answer	2.68
Registration Country of the FIs Where Respondents are Working	
France	50.33
Eurozone (excluding France, Ireland, and Luxembourg)	16.78
UK	10.74
Switzerland	6.72
Luxembourg	6.04
North America	4.70
Europe	2.01
Ireland	1.34
Other	1.34

Table 3: Sample characteristics

4 Results

This section presents the results of the experiment. It is organised into subsections to guide the reader through the MDCEV model’s main findings and discuss pre-registered hypotheses, which are the following:

1. The presence of investors with green preferences, who refrain from investing in fossil fuels, is marginal compared to those investing in fossil fuels.
2. Investors who continue to invest in firms with substantial exposure to fossil fuels exhibit a higher resistance to change, according to the scale.
3. Firms exhibiting both high financial performance and a strong ESG (Environmental, Social, and Governance) score are preferred over others.
4. The indicator provided by the European Green Taxonomy, specifically the low-carbon capex, is insignificant in influencing investors’ investment choices.

The first subsection offers an analysis of the baseline utilities for each option in the experiment. Subsequently, a cluster analysis identifies distinct investor profiles, followed by a discussion of the satiation parameters and the influence of firm attributes on investment decisions.

A mixed MDCEV model (Bhat 2008) with a gamma profile and no outside good is estimated using the Apollo R package (Hess and Palma 2019). Since a gamma-profile is estimated, all α parameters were set to zero, making the γ parameters the sole representation of satiation effects. The final model was selected based on the lowest Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) (see Appendix C). Following the recommendations of Hess and Palma (2019), the scale parameter of the Gumbel distribution is fixed at one due to the absence of price variation.

Table 4: Mixed MDCEV with a Gamma Profile with clusters

Parameter	Estimate	Standard Error	t-ratio	
Baseline utilities (mean estimates)				
Baseline utility Brown	-2.7041	0.3954	-6.8	***
Baseline utility Grey	-3.1934	0.5161	-6.2	***
Baseline utility Green	1.3879	0.4127	3.4	***
Baseline utility Opt-Out	0 (fixed)			
Baseline utilities heterogeneity (standard deviations)				
σ_{Brown}	-1.2708	0.2188	-5.8	***
σ_{Grey}	1.8677	0.2772	6.7	***
σ_{Green}	0.7852	0.3071	2.6	**
Satiation parameters				
γ_{Brown}	1.9781	0.1148	17.2	***
γ_{Grey}	1.9160	0.1313	14.6	***
γ_{Green}	1.6535	0.1947	8.5	***
$\gamma_{\text{Monetary fund}}$	1.1387	0.1412	8.1	***
Cluster analysis				
Cluster A : Brown	3.4692	0.4370	7.9	***
Cluster A : Grey	3.1595	0.5435	5.8	***
Cluster A : Green	-0.1380	0.4094	-0.3	
Cluster C : Brown	3.0232	0.4488	6.7	***
Cluster C : Grey	3.5429	0.5906	6.0	***
Cluster C : Green	0.1755	0.3838	0.5	
Firms' attributes (mean estimates)				
ROE	0.0011	0.0040	0.3	
Low-carbon Capex	0.0014	0.0016	0.8	
Firms' attributes heterogeneity (standard deviations)				
σ_{roe}	0.0354	0.0117	3.0	**
$\sigma_{\text{Low-carbon capex}}$	0.0151	0.0027	5.6	***
<i>sig</i>	1 (fixed)			
α_{Brown}	0 (fixed)			
α_{Grey}	0 (fixed)			
α_{Green}	0 (fixed)			
LL(final)	-8128.66			
AIC	16297.32			
BIC	16393.63			

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.1 Baseline utilities

In the MDCEV model, the baseline utility represents the constant term in each utility function, reflecting the initial attractiveness of a choice (i.e, inherent preferences) and explains how frequently it is selected. Baseline utilities of each option are expressed relatively to the neutral option, the Opt-Out, whose baseline utility is fixed to zero. Accordingly, the baseline utilities estimated for the Brown, Grey, and Green options are expressed relative to the utility of choosing the Opt-Out option.

Examining the results in Table 4, the alternative with the highest baseline utility is the Green. Investors in the sample derive a higher utility from choosing the Green firm than from selecting the Opt-Out option, which is represented by an investment in a monetary fund. In contrast, for the overall sample, the utilities associated with the Brown and Grey firms are lower than those of the Opt-Out option. Overall, respondents choose the Green option more frequently than the others, indicating an apparent sensitivity to climate-related investment opportunities. Notably, in this experiment, all firms are presented with the same financial characteristics, which are randomly assigned to them, meaning that, all else being equal, investors favour the green option.

In a mixed MDCEV model, the standard deviation parameters of the baseline utilities (σ_{Brown} , σ_{Grey} , and σ_{Green}) capture heterogeneity in investors' preferences. The results of the present model indicate that baseline utilities for each firm vary across respondents. The baseline utilities of the Brown and Grey firms are negative relative to the Opt-Out option; however, their corresponding standard deviation parameters are highly significant, indicating a greater dispersion of preferences compared to the Green firm. This suggests substantial heterogeneity in how respondents value the Brown and Grey options in this experiment.

If initial results show that investors perceive climate-related opportunities, the heterogeneity in preferences for the Brown and Grey options indicates that not all investors perceive climate-related risks. As mentioned previously, one main issue with the transition to a low-carbon economy is that, despite increasing investment in renewable energy (IEA 2024), capital continues to be allocated to fossil fuels. Specifically, this pattern is observed in this experiment, where most investors still allocate capital to brown firms.

Type of green investors	% of sample
Choice not to invest at all in the Brown firm (only)	20.39
Choice not to invest at all in the Grey firm (only)	12.50
Choice not to invest at all in both Brown and Grey firms	15.79

Table 5: Green investors in the sample

Table 5 shows that a share of investors in the sample display some forms of green preferences. 20% of them refused to invest in the Brown firm, which derives 98% of its revenue from oil and gas activities. Another 12% choose not to invest in the Grey firm, which generates 56% of its revenue from natural gas, 23% from renewable energy, and 21% from coal. Not investing in firms deriving

more than 10% of their revenue from coal is a recommendation made by the NGO Urgewald⁶, a guideline supported by the French Market Authorities (AMF and ACPR 2024). Accordingly, the survey was designed to test whether coal-related revenues exceeding this threshold send a signal to investors. The presence of coal in the Grey firm’s energy mix likely sent a negative signal to some investors, as fewer than 30% of respondents chose not to invest in it. Although investors tend to exhibit some forms of green preferences, only 15.79% of them decided not to invest in either the Brown or the Grey firm, showing consistent green preferences by excluding all firms involved in fossil fuel activities.

4.2 Three categories of investors

To address heterogeneity, a cluster analysis was conducted to investigate the existence of distinct groups of investors within the sample. Clusters were defined using the principal component analysis (PCA) based on the four latent factors from the resistance to change (RC) scale and each participant’s average investment in the four alternatives (Brown, Grey, Green, Opt-Out). Finally, a three-cluster solution was chosen using the K-means algorithm, with the number of clusters determined via the elbow method. Further details on the clustering methodology are provided in Appendix D.

4.2.1 Investment behaviours

Table 8 below presents the average allocation per alternative for all clusters, along with their sizes. Cluster A is the largest, making up 42% of the population, followed by Cluster B (34%), and Cluster C (24%).

Cluster	Investment Brown	Investment Grey	Investment Green	Investment Opt-Out	% of sample
A	27.33%	23.63%	37.30%	11.74%	42.1%
B	4.47%	4.75%	71.13%	19.65%	33.6%
C	23.05%	24.07%	44.00%	8.89%	24.3%

Table 6: Investment profile for each cluster

Reading note: On average, respondents in Cluster A allocated 27.33% of their available budget to the Brown firm, 23.63% to the Grey firm, 37.30% to the Green firm, and 11.74% to the Opt-Out option. This cluster accounts for 42.1% of the sample.

Cluster B is the one that allocated the most capital to the Green firm on average. Consistent with the baseline utilities, all clusters chose to invest, on average, more times in the Green option. According to Table 7, 70% of green investors (i.e., those who never allocated investments to fossil fuels) comprise Cluster B. Clusters A and C are only sensitive to the Grey option, as some of their individuals do not invest in this option during the six choice scenarios.

⁶<https://www.coalexit.org/>

Group	Cluster A	Cluster B	Cluster C
No Investment in Brown	0.00%	13.73%	0.00%
No Investment in Grey	14.06%	11.76%	10.81%
No Investment in both Brown and Grey	0.00%	47.06%	0.00%

Table 7: Green investors and clusters

Considering these elements, it is possible to compute disaggregated baseline utilities for each cluster. The baseline utility of each cluster is obtained by adding the estimated interaction term for that cluster to the reference baseline utility, with Cluster B serving as the reference group (i.e., the baseline utilities reported in Table 4).

Cluster	Baseline Utility - Brown	Baseline Utility - Grey	Baseline Utility - Green
A	0.7651	-0.0339	1.3879
B	-2.7041	-3.1934	1.3879
C	0.3191	0.3495	1.3879

Table 8: Baseline utility for each cluster

Reading note: Clusters A and C exhibit a higher utility from investing in the Brown firm than from choosing the Opt-Out option. In contrast, Cluster B shows a negative utility for the Brown firm and therefore prefers the Opt-Out option.

As interactions with the Green option are not significant, we consider that all clusters have the same baseline utility for this alternative. Regarding other options, the story is different for Clusters A and C, as allocating capital into the Brown firm generates a positive utility, which is not the case for Cluster B. Finally, only Cluster C has a positive utility regarding investment in the Grey firm, whereas Clusters A and B prefer to choose the monetary funds.

4.2.2 Profiling clusters

Based on previous analysis, Cluster A is associated with a positive utility for investing in the Brown firm, and Cluster C is also, but with a higher utility when considering investment in the Grey firm. It is therefore crucial to understand the profiles of investors behind these clusters.

Firstly, clusters are distinguishable based on their geographical distribution. The latter information is based on the financial institution’s registration place. As some asset management firms are international, they may have offices worldwide; however, the registration place is where it is legally binding, reflecting potential cultural and legal differences between asset management firms.

Cluster	France	Europe excluding France	Other
A	47%	50%	3%
B	71%	24%	5%
C	27%	71%	2%

Table 9: Geographical Distribution of Clusters

It is noticeable that clusters have different geographical characteristics. Cluster B, which is associated with strong environmental preferences, is primarily composed of individuals working in financial institutions registered in France. While 47% of individuals in Cluster A are employed by institutions registered in France, the number falls to 27% for Cluster C. Prior studies have demonstrated the impact of cultural and institutional factors on decision-making (Claudio and Gallo 2025) and how institutional pressures can shape preferences for renewable energy investments (Masini and Menichetti 2013). Cultural and institutional factors might therefore explain differences in investment behaviour across clusters.

Cluster	Energy Experts	Fund Manager/Investment Director	Financial Analyst	SRI Team	ESG & Financial Analyst	Other
A	11%	58%	16%	6%	3%	17%
B	16%	51%	16%	14%	10%	10%
C	3%	59%	16%	11%	5%	8%

Table 10: Individuals' Roles per Clusters

While all clusters are primarily composed of fund managers or investment directors, the share of such roles is slightly lower in Cluster B. As shown in Table 3, individuals working in Socially Responsible Investment (SRI) teams - that is, those responsible for environmental, social, and governance (ESG) policies within financial institutions - represent less than 10% of the sample. Therefore, although these individuals do not constitute a significant share of respondents, they are still the most present in Cluster B. Additionally, Cluster B comprises the highest proportion of individuals who consider themselves energy experts.

Cluster	Less 5 years	5 to 10 years	10 to 15 years	15 to 20 years	More 20 years	No Response
A	19%	28%	5%	3%	44%	2%
B	22%	22%	8%	10%	37%	2%
C	16%	35%	16%	8%	22%	3%

Table 11: Years of Experience by Cluster

Overall, Clusters A and B are mainly composed of financial experts with more than twenty years of experience, whereas Cluster C includes a higher proportion of individuals with five to ten years of experience. These results align with past studies on renewable energy investments, demonstrating that more experienced investors are more inclined to invest in renewable energy (Masini and Menichetti 2013).

Cluster	Less 1 year	1 to 3 years	3 to 5 years	More than 5 years
A	9%	12%	44%	34%
B	4%	10%	27%	59%
C	5%	11%	38%	46%

Table 12: Investment Horizon by Cluster

The majority of respondents work on an investment horizon beyond three years; only 11% declared that they work on a temporal horizon between one and three years, and 6% have a horizon of less than a year. It appears that most individuals working on a short-term horizon are more represented in Cluster A.

4.2.3 Cognitive bias

Turning to the role of latent factors, Table 13 reveals a clear upward trend in resistance-to-change factors across clusters: except for cognitive rigidity, all latent factors increase with the cluster numbering. Cluster C, for example, exhibits stronger emotional reactions than Cluster A and displays the highest overall resistance to change.

Cluster	Routine seeking	Emotional reactions	Short-term focus	Cognitive rigidity	Total
A	1.04	1.44	0.75	2.65	5.88
B	1.41	2.16	1.38	2.79	7.74
C	2.17	2.55	2.30	2.47	9.49

Table 13: Average score of RC latent factors per cluster (out of 5)

Across all factors, the fourth factor, labelled Cognitive Rigidity on the scale, displays the highest mean. This factor is composed of the following four items:

- I often change my mind (*item originally reverse-coded as a cognitive check; reversed back for consistency in analysis*).
- I don't change my mind easily.
- Once I've come to a conclusion, I'm not likely to change my mind.
- My views are very consistent over time.

This latent factor highlights the confidence individuals have in their opinions. Such confidence may also reflect strong convictions in investment practices-whether among green investors, who are more prevalent in Cluster B, or among those with stronger brown preferences. Notably, previous literature has shown that investors often display overconfidence, particularly towards greener investments (Trinarningsih, Damayanti, and Rosdaliva 2025). Overall, Cluster A appears more open to change, while Cluster C shows greater rigidity.

The pre-registered hypothesis that investors who are more resistant to change tend to invest more in brown firms warrants discussion, as resistance to change biases influence both greener and browner preferences. Each latent factor of the resistance-to-change scale contributes to the cluster, indicating that responses on the scale influence investment decisions. However, the influence of this bias is not straightforward: both Cluster A and Cluster C invest in fossil fuel companies, yet the former is the most open to change, while the latter is the most resistant. The cluster of green investors lies between these two extremes.

4.3 Satiation Parameters

Previous results demonstrated that most investors predominantly chose the Green option. The strength of the MDCEV model lies in its ability to capture not only the discrete choice of investors but also the continuous dimension of choice. Specifically, the model accounts for the intensity of allocations through the satiation parameter γ .

While the baseline utility explains how frequently an option is selected, the satiation parameters capture the rate at which marginal utility decreases as investment in that option increases. Higher values of γ imply that marginal utility decreases more slowly, leading to larger allocations to the selected option. In our findings, the Green option exhibits the highest baseline utility, which explains why it is chosen more frequently. However, the γ parameters are higher for the Brown and Grey alternatives, suggesting that once selected, these options receive relatively larger allocations, thus reflecting a more vigorous intensity of investment. Therefore, investors tend to allocate capital across a broad range of assets. While they invest in renewable energy and view this sector as a new investment opportunity, they also avoid narrowing their portfolios by excluding specific sectors - notably fossil fuels - to which they continue to allocate substantial amounts of capital. Finally, the satiation parameter of the Opt-Out option is the lowest, emphasising its role as the default choice.

These results nuance the pre-registered hypothesis: green investors are not a minority - they represent about one-third of the sample if Cluster B is taken as the reference - but they still do not constitute the majority of investors. In particular, roughly two-thirds of investors continue to display brown preferences, even though investment in renewable energy is steadily increasing.

4.4 Firms' attributes

None of the attributes used in the experiment to define each investment alternative is statistically significant in the econometric tests. Return on equity (ROE) and low-carbon capital expenditures (capex) exhibit no significant average effects, despite having significant standard deviation parameters (σ_{roe} and $\sigma_{\text{Low-carbon capex}}$). This suggests that these attributes may have influenced the decisions of some respondents; however, the effect appears to be limited, given the relatively small magnitude of the estimated heterogeneity.

These findings confirm the pre-registered hypothesis that low-carbon capital expenditures (capex) do not have a direct impact on investors' choices in the energy sector, even though they signal a firm's commitment to transitioning away from fossil fuels. By contrast, no evidence was found to support the pre-registered hypothesis that either a favourable ESG score or strong financial performance would shape investment decisions.

Since none of the financial attributes conveyed a negative signal about firm performance, respondents appear to have allocated their budgets primarily based on the information provided about each firm’s energy mix, thereby highlighting the role of prior beliefs. Extra-financial indicators seem to have played only a limited role, or, if they did matter, no single indicator made a consensus among respondents. Instead, the description of firms’ revenue breakdowns by energy source emerged as the most influential signal, suggesting that investors relied on this information to infer the firm’s profile.

5 Policy Implications

The results of the choice experiment indicate that most investors are willing to allocate capital to renewable energy, sending a positive signal regarding support for the sector. At the same time, the findings reveal that resistance to fossil fuel divestment remains strong, as a majority of investors continue to invest in fossil fuels, consistent with current global trends in energy sector investment.

Overall, the evidence suggests that investors rely on prior beliefs when making investment decisions. Indicators reflecting firms’ progress towards decarbonisation do not influence behaviour in this experiment. Thus, even when presented with perfect information, investors do not systematically reallocate funds toward low-carbon assets—except for those with strong climate convictions, who were already reluctant to invest in fossil fuels before the experiment.

These patterns may reflect a limited understanding of the financial risks associated with fossil fuels. Specifically, these risks arise when investors fail to fully anticipate the effects of emerging climate policies, which would reduce the profitability of carbon-intensive firms and lead to portfolio losses (Battiston, Monasterolo, et al. 2021). European investors remain directly and indirectly exposed to the fossil fuel sector, meaning that abrupt or uncertain climate policy changes could generate significant portfolio losses, with broader repercussions for the financial system and the economy as a whole (Battiston, Mandel, et al. 2017).

The institutional environment shapes perceptions of climate-related transition risks, and current investment practices remain embedded in structures that favour fossil fuels, thereby influencing how these risks are perceived (Ameli et al. 2020; Greenwood and Warren 2022; Thomas et al. 2022). Bounded rationality, prior beliefs, information, and experience shape financial decisions and, consequently, risk perceptions (Muñoz-Muñoz et al. 2025; Heeb et al. 2023). As long as optimism persists about the economic benefits of the fossil fuel industry, disengagement from the sector is unlikely (Schimpf et al. 2022; McDonnell, Rempel, and Gupta 2022; Christophers 2019). This optimism is closely tied to public policy, which has sent mixed signals to financial markets since the Paris Agreement was signed. Despite numerous pledges of carbon neutrality, fossil fuel subsidies reached \$7 trillion in 2022 (around 7% of global GDP), while in Europe and Central Asia they accounted for 4.4% of GDP in 2023, up from 3.7% in 2015 (Black et al. 2023). These mixed signals are reinforced by growing uncertainty around climate policies, which has intensified since 2024 in the context of the ESG backlash and the EU Omnibus packages. Political shifts following elections, frequent policy adjustments, unclear government positions, and contested debates over new measures all contribute to uncertainty, shaping perceptions of transition risks and, ultimately, the trajectory of green investments (Berestycki et al. 2022).

All the more so as climate risks are already materialising. For instance, physical risks have become evident in the insurance sector, with natural disasters generating \$144 billion in losses in 2024, marking the fifth consecutive year of insured losses exceeding \$100 billion (Swiss Re Institute 2024). While the asset management sector is not directly exposed to such losses, the interconnectedness of financial markets makes it indirectly vulnerable, particularly as physical risks are expected to intensify.

To mitigate these risks, regulated climate metrics and standardised reporting are essential for redirecting financial flows, particularly in a context where sustainable investing continues to suffer from heterogeneous practices, as highlighted both in this experiment and in the literature (Giglio, Maggiori, Stroebel, Tan, et al. 2025; Bingler and Colesanti Senni 2022; Lam and Wurgler 2024; Huang et al. 2024). The EU has strengthened disclosure requirements to improve transparency on climate-related information, which should send a strong signal to markets. The theoretical rationale behind mandatory reporting is that it reduces information asymmetry regarding climate risks. If financial markets act rationally once provided with perfect information, investors should, in principle, shift capital away from fossil

fuels and towards low-carbon assets (Ameli et al. 2020; Christophers 2019; McDonnell, Rempel, and Gupta 2022). In this sense, greater transparency should not only monitor investment practices but also encourage more profound structural change, thereby going beyond mere disclosure requirements.

Yet, in practice, such measures are necessary but unlikely to be sufficient to halt investors' exposure to the fossil fuel industry and to bring investment practices in line with climate objectives (Ameli et al. 2020). One crucial issue to consider is the separation between non-financial reporting services and investment services within financial institutions. When interviewed about the EU Green Taxonomy, some fund managers admitted they knew little about it and suggested the question should be directed to colleagues responsible for non-financial reporting. This raises the question of whether non-financial disclosures are merely compliance documents or are actually used by decision-makers within financial institutions (Greenwood and Warren 2022).

Finally, reforms to the Sustainable Finance Disclosure Regulation (SFDR), scheduled for autumn 2025, are still under discussion. Several stakeholders have recommended distinguishing between climate funds and transition funds, a step we view as essential given the challenges in identifying firms actively engaged in their transition. The main challenge, however, will be to determine which indicators should define transition funds. One possible candidate is the evolution of low-carbon capital expenditures (capex) over time, which would be consistent with EU Taxonomy requirements. Going beyond indicator standardisation and to enforce long-lasting structural change, some have argued that decarbonisation strategies should be legally binding (McDonnell and Gupta 2024). In contrast, others suggest embedding incentives within financial institutions, for instance, by linking fund managers' remuneration schemes to decarbonisation objectives (Ameli et al. 2020). Finally, in designing policies, policymakers should look beyond asset owners, such as banks and insurance companies, to also include other influential financial market actors, including asset managers, index providers, and proxy advisory firms, who play a significant role in shaping investment practices (McDonnell and Gupta 2024).

6 Conclusion

This study demonstrates that professional investors recognise climate-related opportunities, as they are generally favourable towards investing in the renewable energy sector. Nonetheless, the findings also reveal that while investing in green solutions, investors continue to allocate capital to fossil fuel companies, suggesting that this sector remains well perceived and continues to attract investment - thereby jeopardising the transition away from fossil fuels.

The survey also highlights the presence of a subset of investors with green preferences. It identifies several characteristics associated with a greater willingness to exclude fossil fuels from the investment universe, including investment experience, roles within financial institutions (FIs), geographical location, and prior beliefs. Moreover, the resistance-to-change bias appears to influence investment behaviour, shaping preferences towards both green and brown energy in distinct ways.

Several limitations should be acknowledged. Engaging professional investors is challenging, and the relatively small sample size ($n=149$) remains the primary constraint. Future research should aim to replicate the experiment with a larger sample, ideally with institutional support, to improve response rates and the robustness of findings. The use of a charitable donation as an incentive may also have introduced selection bias, favouring more altruistically oriented respondents.

While prior research on green investment preferences has primarily focused on retail investors, this study contributes to the literature by examining professional investors, particularly in the energy sector, a domain critical to the low-carbon transition. The application of the MDCEV model provides a richer understanding of investment decision-making across multiple options. In particular, the inclusion of satiation parameters enables the measurement of diminishing marginal utility, offering novel insights into how professional investors allocate capital and the trade-offs underpinning their decisions. By shedding light on the determinants of professional investors' preferences in the energy sector, this study contributes to a deeper understanding of the drivers that may either hinder or accelerate the transition towards a low-carbon economy.

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A Survey distribution and other information

A.1 Received emails

Object: Contribute Your Expertise to Academic Research on Investment Trends

Hello {first name} {family name},

We kindly invite you to participate in a **10-minute academic survey**, which allows you to share your expertise as a financial professional. The project is led by researchers from Paris Dauphine University and the Climate Economic Chair (Louis Bachelier Institute), both based in Paris.

Participation is entirely **voluntary and anonymous**. The data collected will be used solely for academic purposes, under a tight confidentiality protocol. We do not foresee any risks associated with participating in this project.

This survey targets **finance professionals** (financial analysts, fund managers, investors, etc.) in Europe. Its primary goal is to determine whether there are any consensual energy investment practices or if they depend on specific factors.

Additionally, for each participation, **€5 will be donated to a charity** that trains medical assistance dogs to help children with disabilities.

Take the survey in English: [link](#)

Take the survey in French: [link](#)

Our academic research paper will be made available to all respondents who register on this list: <https://forms.gle/ehhm4tJxEsTjcTUA8>.

Thank you for your consideration and time.

Sincerely,

Lou Wander

PhD Candidate, Paris Dauphine University-PSL, Climate Economics Chair

LinkedIn Page: <https://www.linkedin.com/in/louwander/>

As part of this research, the Université Paris Dauphine-PSL, as the data controller, informs you that your personal data will be processed only within the scope of this project, in accordance with the provisions of the GDPR (cf. Article 6.1.a). The only personal data collected are name, first name, professional email address, and position. These data will be destroyed at the end of the project, no later than the end of 2024. You have the right to access, rectify, object to, and erase your details, which can be exercised with the data protection officer of Université Paris Dauphine-PSL at the following addresses: Université Paris Dauphine-PSL – DPO, Place de Lattre de Tassigny 75775 Paris Cedex 75775, and by email at dpo@dauphine.psl.eu. Click on this link to stop receiving future e-mails: [Unsubscribe](#)

A.2 Description of the choice experiment task

Case study

This study aims to gather the opinions of investment specialists.

Within an SFDR 8 fund, you are to allocate **100 million euros among 3 energy companies from the STOXX600**. It is assumed there **are no liquidity issues**. You also have the alternative to place the money in a **monetary UCITS**.

The budget allocation choice is up to you: you can allocate the entire budget to a single alternative or allocate the budget across a few or all the alternatives in the proportions you see fit. The final allocation must equal 100% of the total budget.

In total, you will face 6 questions where you will need to allocate financial resources among these 4 alternatives (please fill in all fields, including adding 0).

The elements in navy blue are criteria that may vary depending on the scenarios presented. The **elements in bold black** are fixed characteristics for all scenarios.

Each new question is independent of the previous ones.

	Integrated oil and gas company	Power producer	Green energy producer	Other
Breakdown of revenue by activity	- Oil & gas: 98 % - Coal: 0 % - Renewable energy (RE) : 2%	- Gas: 56 % - Coal: 23 % - RE: 21 %	- Oil & gas: 0 % - Coal: 0 % - RE: 100 %	Money-market UCITS
Price-to-Earnings Ratio (P/E Ratio)	23	13	5	
Return on Equity (ROE)	12%	7%	25%	
Dividend Yield	3,5%	7%	0,5%	
ESG scoring	A	AA	AAA	
Low-carbon Capex (aligned with the EU taxonomy)	20%	2%	80%	
Decarbonization plan defined to achieve carbon neutrality by 2050	Not specified by the firm	Yes	Not specified by the firm	
How would you allocate 100 million euros considering the 4 investment alternatives? The total must equal 100% (please enter values between 0 and 100, and indicate 0 where applicable).				
				0%

Figure 1: Example of one choice card

A.3 Cognitive fatigue and Pilot

The survey was structured into three parts: the first involved a discrete-continuous choice experiment; the second section gathered sociodemographic and job-related information; and the third section employed a 17-item psychometric scale to measure resistance to change and cognitive bias. This sequence was strategically chosen to minimise cognitive fatigue between the experiment and the psychometric assessment. If interested in the results of the survey, respondents had the opportunity to register to receive the final results.

Coefficients from a pilot study of 27 Master's students in Asset Management at the University Paris-Dauphine PSL served as priors.

A.4 Additional information of the survey communication

Qualtrics was used for the email distributions. On average, Apollo.io enabled contact with over 17,000 investment specialists across Europe.

The first communication campaign was launch in April 2024. In addition to the initial email, three follow-up emails were sent. The number of emails opened for each dispatch is as follows:

- First email in April: 599
- Second email in May: 518
- Third email in June: 784

- Fourth email in July: 425

A second communication campaign was executed using a commercial tool, Apollo.io, a comprehensive sales intelligence and engagement platform. This tool facilitated the efficient sourcing and management of professional contact details from a diverse array of industry specialists. On average, Apollo.io enabled contact with over 17,000 investment specialists across Europe. It was ensured that individuals contacted in the first campaign were not included in this second campaign. During the second campaign, the follow-up emails were sent at shorter intervals. The number of emails opened for each dispatch:

- First email on August 22: 10,146
- Second email on September 3: 10,024
- Third email on September 10: 5,742
- Fourth email on September 18: 7,386
- Fifth email on October 8: 5,614

Regarding RGDP compliance, all email addresses were deleted once the survey was concluded.

For comparison, the French Public Bank for Investments (BPI France), a well-established and renowned institution within the financial community, conducted a survey in 2024 on the adaptation of SME and intermediate-sized enterprise executives to climate change. They received 300 responses from a pool of 65,000, equating to a response rate of 0.6%, which they reported as unusually low (*L'adaptation des PME et ETI au changement climatique* 2024). This highlights the current challenges associated with conducting such surveys.

B The psychometric scale

B.1 Presentation of the scale

Psychometrics is a field that encompasses theories and techniques aimed at measuring personal characteristics and their impact on behaviours. Personality traits, being latent constructs, cannot be directly observed. To address this, psychometrics employs methods such as scales that gather self-reported data from individuals to quantify specific variables. Each scale is composed of multiple items, which respondents complete using a Likert scale. These responses are scored and interpreted based on established psychological theories and research. This rigorous methodology ensures that scales accurately provide quantitative evaluations of abstract traits and psychological states, including intelligence, personality, attitudes, and emotional states (Robins, Fraley, and R. F. Krueger 2009).

Presentation of items of the RC scale developed by Oreg (2003):

Latent Factor 1: Routine Seeking

1. I generally consider changes to be a negative thing.
2. I'll take a routine day over a day full of unexpected events any time.
3. I like to do the same old things rather than try new and different ones.
4. Whenever my life forms a stable routine, I look for ways to change it.
5. I'd rather be bored than surprised.

Latent Factor 2: Emotional Reactions

1. If I were to be informed that there's going to be a significant change regarding the way things are done at school, I would probably feel stressed.
2. When I am informed of a change of plans, I tense up a bit.
3. When things don't go according to plans, it stresses me out.
4. If one of my professors changed the grading criteria, it would probably make me feel uncomfortable even if I thought I'd do just as well without having to do any extra work.

Latent Factor 3: Short-term focus

1. Changing plans seems like a real hassle to me.
2. Often, I feel a bit uncomfortable even about changes that may potentially improve my life.
3. When someone pressures me to change something, I tend to resist it even if I think the change may ultimately benefit me.
4. I sometimes find myself avoiding changes that I know will be good for me.

Latent factor 4: Cognitive Rigidity

1. I often change my mind.
2. I don't change my mind easily.
3. Once I've come to a conclusion, I'm not likely to change my mind.
4. My views are very consistent over time.

B.2 Statistical description of the scale

Table 14: Means of each scale items

Item 1.1	Item 1.2	Item 1.3	Item 1.4	Item 1.5
1.1476510	1.9395973	1.4496644	2.9328859	0.9395973
Item 2.1	Item 2.2	Item 2.3	Item 2.4	
1.9395973	1.9127517	2.2483221	1.7315436	
Item 3.1	Item 3.2	Item 3.3	Item 3.4	
1.4496644	1.1677852	1.4630872	1.3087248	
Item 4.1	Item 4.2	Item 4.3	Item 4.4	
2.9328859	2.3959732	2.4563758	2.8389262	

B.3 Statistical fits

To measure resistance to change bias, respondents' answers were averaged based on a six-item Likert scale (from 0 to 5), with higher scores indicating a greater resistance to change. To ensure the validity and reliability of the scale, several statistical tests were conducted. Since the psychometric scale used in this research has been previously validated in the literature, only a confirmatory factor analysis (CFA) was performed. Given that kurtosis and skewness revealed that the data were not normally distributed, the Weighted Least Squares Mean and Variance adjusted (WLSMV) estimator was employed for the CFA.

Table 15: Statistical Tests of the Psychometric Scale

Chisq	SRMR	RMSEA	CFI	TLI	Raw Alpha
1213.22	0.075	0.1044	0.9644	0.9571	0.82
Chisq scaled	SRMR scaled	RMSEA scaled	CFI scaled	TLI scaled	
1199.843	0.075	0.1044	0.899	0.916	

The internal consistency of the scale was assessed using Cronbach's alpha, which exceeded 0.8, indicating good reliability.

The Chi-square test was used to assess how well the empirical data fit the theoretical model. The test rejected the null hypothesis, suggesting a poor model fit. While Chi-square is known to be sensitive to sample size, in this case, where the sample consists of only 150 respondents, such a high Chi-square value reinforces the indication of poor fit.

The Root Mean Square Error of Approximation (RMSEA), which is not affected by sample size and evaluates model fit in the population, was found to be 0.1044. As this exceeds the commonly accepted threshold of 0.08, it suggests a poor fit between the data and the model.

Another absolute fit index, the Standardised Root Mean Square Residual (SRMR), was examined and found to be 0.078, which is close to 0.08 and thus suggests a reasonable fit. Additionally, two comparative fit indices, the Tucker-Lewis Index (TLI) and the Comparative Fit Index (CFI), were used to assess the reliability of the scale relative to a model without predefined structures. The TLI value of 0.957 and the CFI value of 0.9644 exceed the recommended threshold of 0.95, suggesting a strong fit. However, when considering the scaled CFI and TLI-adjusted for non-normality and small sample sizes-these values fell below the acceptable threshold, reinforcing the evidence of poor model fit.

Based on these statistical tests, the scale as a whole was not considered a valid standalone measure of resistance to change. However, as will be demonstrated in the following results, some individual items from the scale were included in the econometric analysis. Additionally, the average score on the scale was 1.82 out of 5, which is below the midpoint of 2.5.

C Results of other MDCEV estimations

C.1 Results of the MDCEV with all attributes

Table 16: MDCEV with all attributes

Parameter	Estimate	Standard Error	t-ratio	
Baseline utility Brown	-0.09707	0.24399	-0.4	
Baseline utility Grey	-0.22123	0.25262	-0.9	
Baseline utility Green	1.27948	0.33954	3.8	***
γ_{Brown}	2.79622	0.10617	26.3	***
γ_{Grey}	2.90785	0.10246	28.4	***
γ_{Green}	2.39760	0.19075	12.6	***
γ_{Monetary}	2.04838	0.13445	15.2	***
PER	-0.00053	0.00428	-0.1	
ROE	0.00118	0.00544	0.2	
Dividend Yields	-0.00175	0.00860	-0.2	
ESG Score A	-0.01171	0.05335	-0.2	
ESG Score AAA	-0.10700	0.05725	-1.9	*
Low-carbon Capex	-0.00187	0.00147	-1.3	
Decarbonisation Plan	0.02987	0.03912	0.8	
<i>sig</i>	1 (fixed)			
α_{Brown}	0 (fixed)			
α_{Grey}	0 (fixed)			
α_{Green}	0 (fixed)			
Baseline utility Monetary Fund	0 (fixed)			
LL(final)	-8716.88			
AIC	17461.76			
BIC	17529.18			

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

C.2 Results of the Mixed MDCEV with all attributes

Table 17: Mixed MDCEV with all attributes

Parameter	Estimate	Standard Error	t-ratio	
Baseline utility Brown	0.01250	0.30719	0.0	
Baseline utility Grey	-0.29296	0.33371	-0.9	
Baseline utility Green	1.71197	0.38993	4.4	***
σ_{Brown}	-1.75035	0.18301	-9.6	***
σ_{Grey}	2.05074	0.21092	9.7	***
γ_{Brown}	2.07870	0.11441	18.2	***
γ_{Grey}	1.99871	0.13083	15.3	***
γ_{Green}	2.09143	0.20352	10.3	***
γ_{Monetary}	21.85039	0.14713	12.6	***
PER	-0.00459	0.00485	-0.9	
ROE	-0.00280	0.00575	-0.5	
Dividend Yields	-0.01152	0.01067	-1.1	
ESG Score A	-0.03707	0.05770	-0.6	
ESG Score AAA	-0.11638	0.06518	-1.8	*
Low-carbon Capex	-0.00305	0.00169	-1.8	*
Decarbonisation Plan	-0.00086	0.04196	0.0	
<i>sig</i>	1 (fixed)			
α_{Brown}	0 (fixed)			
α_{Grey}	0 (fixed)			
α_{Green}	0 (fixed)			
Baseline utility Monetary Fund	0 (fixed)			
LL(final)	-8390.56			
AIC	16813.12			
BIC	16890.17			

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

C.3 Results of the Final Model without clusters

Table 18: Final mixed MDCEV without clusters

Parameter	Estimate	Standard Error	t-ratio	
Baseline utility Brown	-0.80691	0.30652	-2.6	**
Baseline utility Grey	-0.88837	0.35153	-2.5	***
Baseline utility Green	1.26673	0.27643	4.6	***
σ_{Brown}	2.05279	0.29199	7.0	***
σ_{Grey}	-2.29765	0.36631	-6.3	***
γ_{Brown}	2.01379	0.11590	17.4	***
γ_{Grey}	1.96016	0.13438	14.6	***
γ_{Green}	1.68891	0.19638	8.6	***
γ_{Monetary}	1.13778	0.14389	7.9	***
ROE	-0.00226	0.00395	-0.6	
σ_{ROE}	0.03341	0.01114	3.0	**
Low-carbon Capex	0.00068	0.00232	0.3	
$\sigma_{\text{Low carbon Capex}}$	-0.01674	0.00282	-5.9	***
<i>sig</i>	1 (fixed)			
α_{Brown}	0 (fixed)			
α_{Grey}	0 (fixed)			
α_{Green}	0 (fixed)			
Baseline utility Monetary Fund	0 (fixed)			
LL(final)	-8235.28			
AIC	16496.56			
BIC	16559.16			

Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

D Clustering methodology

D.1 Realising the PCA

In order to realise the principal component analysis in two dimensions, at first all variables available were used: investment decisions, socio-demographic information regarding respondents and finally items from the resistance to change scale. Finally, only the following variables were found usefull to define the two principal components:

- Investment in the brown firm (oil&gas).
- Investment in the grey firm (electric utility).
- Investment in the green firm.
- Items 14, 15, 16 and 17 from the resistance to change scale.

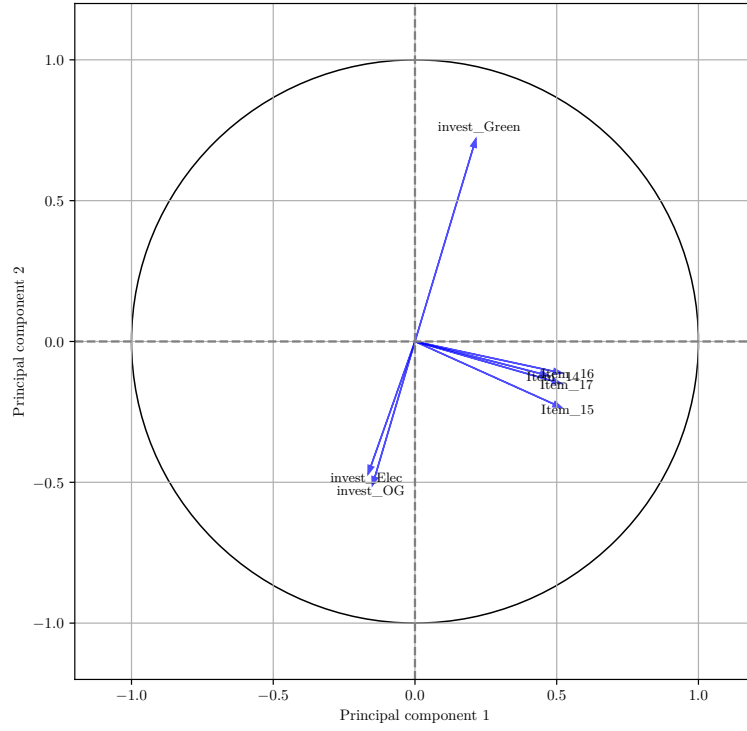


Figure 2: Correlations Circle (CPA)

D.2 Determining clusters

Then, once the two dimensions of the PCA were defined, they were used to define clusters. Using the elbow method to define the number of clusters, 3 clusters seem to be an adequate number.

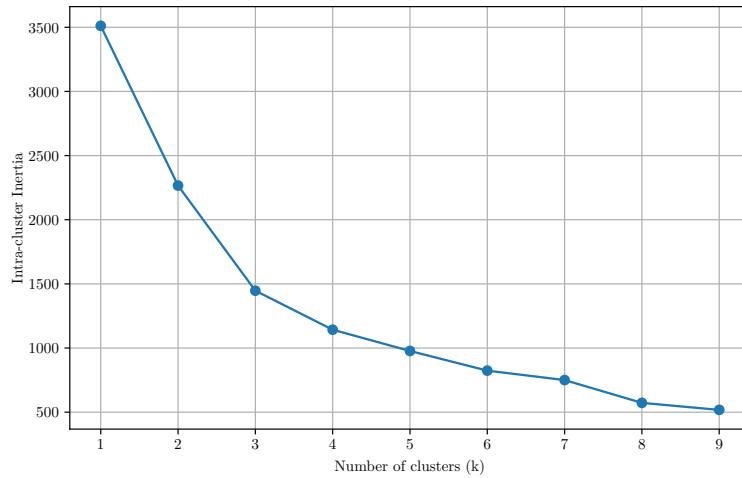


Figure 3: Elbow method to determine optimal k

Graphically, three clusters are observable for the studied sample.

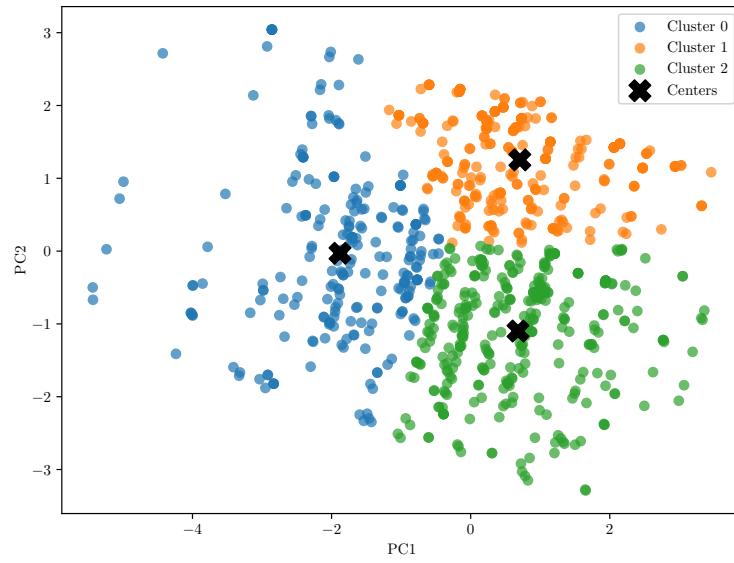


Figure 4: Clustering ($k=3$) on the CPA space

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