Objective vs. Perceived Corporate Greenness: Do Individuals Understand Corporate Sustainability Information?*

Kornelia Fabisik[a] Sebastian Rink[b]

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Abstract

We investigate whether individuals correctly interpret corporate sustainability disclosures using a pre-registered survey experiment. We provide novel evidence that individuals can meaningfully differentiate emissions of firms along a greenness scale, even though their assessments exhibit a central tendency bias. This leads to overestimation of greenness among browner firms and underestimation among greener firms, with the bias disproportionately stronger for greener firms. We observe this bias even among finance professionals and sustainability experts. As a result, firms' financial incentives to invest in emissions reductions may be attenuated. However, we also demonstrate that some disclosure design features improve individuals' differentiation ability.

JEL classification: Q50, Q53, Q54

Keywords: Carbon Emissions, Sustainability Reporting, Subjective Greenness, Greenness Error, Information Processing

[a]**University of Bern, CEPR, Frankfurt School of Finance & Management (Visiting Professor)**; email: kornelia.fabisik@unibe.ch.

[b]**Frankfurt School of Finance & Management**; email: s.rink@fs.de.

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1. Introduction

To date, sustainable finance research has focused on corporate carbon dioxide (CO_2) emissions from the viewpoint of pricing (e.g., Bolton and Kacperczyk (2021)), data quality (e.g., Busch, Johnson, and Pioch (2022)), importance of climate risks for institutional investors (e.g., Krueger, Sautner, and Starks (2020)), investment preferences (e.g., Heeb, Kölbel, Paetzold, and Zeisberger (2023)), effect of climate-related international treaties on firms (e.g., Berg, Ma, and Streitz (2023); Duchin, Gao, and Xu (2025)), among others. However, the extent to which individuals can accurately assess the magnitude of corporate carbon emissions remains largely understudied. Our paper fills this gap by conducting a series of randomized survey experiments designed to directly address this question.

Both policy and academic discussions largely assume frictionless transmission from corporate carbon disclosures to informed stakeholder decisions. We take a step back and ask whether a key latent underlying assumption holds: namely, that individuals can accurately process and interpret such information. Alternatively, the complexity of emissions data may exceed individuals' cognitive and interpretive capacities, resulting in noisy interpretations. This question is central to evaluating the effectiveness of current initiatives, such as European regulatory efforts focused on corporate carbon disclosure, as their success ultimately depends on whether more and better data translate into better-informed decisions. Otherwise, these initiatives risk being less effective than originally envisioned.

We address the research question in a randomized pre-registered survey experiment.[1] We collected responses from a total of 3,437 participants, each of whom consecutively evaluated the "greenness" level of three firms in highly variable settings, resulting in 10,311 firm-level assessments. Our sample contains representative samples of both the United States and the United Kingdom, as well as students, retail investors, finance professionals, and sustainability experts.

We test two hypotheses. First, the *Sustainability Differentiation Hypothesis* posits that indi-

[1]For preregistration details, see https://aspredicted.org/224362.pdf (Wharton's AsPredicted.org) and https://www.socialscienceregistry.org/trials/17056 (AER RCT Registry).

viduals do not merely introduce random noise when evaluating the environmental performance of firms, but are, in fact, capable of systematically distinguishing green from brown companies on the basis of emissions data. Second, we test the *Central Tendency Hypothesis*, which suggests a behavioral friction where individuals overestimate the greenness of brown companies and underestimate it for green ones. If this hypothesis holds, it implies a fundamental market distortion as green firms may fail to reap the full rewards of decarbonization.

To evaluate these hypotheses, we designed a survey experiment in which participants were asked to consecutively rate three companies on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." Each participant was sequentially exposed to climate-related information for three firms operating in markedly different contexts (varying in terms of industry, temporal aspect, and context information), without the option to revisit or revise any prior evaluation. Based on this information, the participants had to make an assessment of the firms' greenness level. We then compared this *Perceived Greenness* to the *Objective Greenness*.

We determined the *Objective Greenness* based on historical Scope 1 emissions data partitioned into quintiles, the midpoints of which defined the greenness values shown to survey participants for their assessment.[2] We chose CO_2 emissions as the central measure of corporate greenness for a number of reasons. First, CO_2 emissions and climate change are widely discussed in policy, public, and financial domains, making the concept familiar and easily interpretable for survey participants. Second, in contrast to environmental, social, and governance (ESG) ratings (Berg, Kölbel, and Rigobon, 2022), they are an objectively quantifiable indicator of environmental performance, enabling comparability across firms, sectors, and jurisdictions. Third, CO_2 metrics are embedded in existing market mechanisms such as carbon pricing schemes and emissions trading systems, as well as in disclosure regimes, which directly link the environmental performance of firms with financial outcomes.

We modified the experimental conditions with respect to how information was presented to identify conditions for effective presentation and disclosure design. The participants were randomly shown carbon emissions either in absolute terms (as tonnes of carbon dioxide equiv-

[2] We used emissions from the year 2022, which at the time of survey preparation was the most recent year for which complete information was available.

alent (tCO_2e)), in relative terms (as tCO_2e per USD 1 million of revenue), or in terms of a number of representative household equivalents. In some settings, we presented this information without additional context, while others included supplementary emissions data, such as summary statistics (industry median, average, min-max range) or past-year emissions. We exclusively increased and never decreased the amount of information presented along the three assessments to minimize potential learning effects. Additionally, our sampling strategy allowed us to examine whether finance professionals and sustainability experts systematically differ in their ability to differentiate corporate greenness relative to students or the general public.

In addition, we substantially tested for robustness. A high-powered incentive condition offered an additional payment for each correct response. Also, we varied the industry context across three sectors: automobile, apparel, and utilities. We selected these industries to capture a broad spectrum of emission profiles, ranging from sectors with high Scope 1 emissions to those with more substantial Scope 3 emissions.[3] We further varied the intertemporal framework of the information, presenting emissions data in either the past or the future tense. We also introduced a placebo setting where participants differentiated firm size (in terms of total book assets) instead of greenness (in terms of carbon emissions) to test whether our findings are specific to sustainability data or just an artifact of individuals' general assessment of firm data.

Our survey experiment provides several findings that are novel relative to the existing literature. First, we find that individuals have the ability to distinguish greener from browner companies. Rather than merely generating random noise, they are capable of performing a coarse differentiation among categorical levels of greenness. We formally assess participants' ability to differentiate corporate greenness, e.g., by constructing receiver operating characteristics and computing the corresponding area under the curve (AUC).[4] In the pooled sample comprising 10,311 responses, we obtain an AUC of 69.11%, providing strong evidence for the individuals' ability to discriminate between different levels of corporate greenness. Retail investors exhibit

[3]For example, in the automobile industry, the Scope 3 emissions typically exceed Scope 1 emissions by orders of magnitude. For definitions of scopes, see: "Scopes 1, 2 and 3 Emissions Inventorying and Guidance," https://www.epa.gov/climateleadership/scopes-1-2-and-3-emissions-inventorying-and-guidance, accessed on November 1, 2025.

[4]An AUC of 50% corresponds to a random prediction, while an AUC of 100% corresponds to a perfect prediction.

the strongest ability to differentiate firms' greenness, achieving an AUC of 72.31%.

Second, we find a pronounced central tendency which is asymmetrical: there is a stronger tendency to underestimate the greenness of green companies than to overestimate the greenness of brown companies. This pattern suggests that companies that improve their emissions performance may receive less recognition than warranted, thereby weakening the potential reputational or market benefits of becoming greener. In equilibrium, such an asymmetry could undermine the incentives of firms to invest in emissions reductions, particularly if stakeholders systematically fail to perceive improvements in environmental performance. In real-world settings, this effect is likely to have substantially more pronounced consequences than those illustrated here, as our quintile-based approach does not fully reflect the highly skewed distribution of corporate carbon emissions observed in practice.

Third, we demonstrate that context matters to individuals when assessing corporate greenness. The context-free presentation of absolute corporate carbon emissions is among the least effective presentation formats for individuals to differentiate corporate greenness levels. We show that presenting relative corporate carbon emissions or corporate carbon emissions as household equivalents improves the ability of individuals to distinguish greenness levels of firms. Adding sectoral context such as industry median improves this ability even more. Interestingly, however, context does not always help. Presenting real company names rather than fictitious ones appears to distort respondents' ability to differentiate. Work-related sustainability expertise or working in the financial industry does not lead to a stronger differentiation ability. Finally, the common disclosure practice (or even requirement) of presenting past-year emissions and subsequent improvements does not alter the assessment either.

Our findings are highly robust. They are applicable across three very different industries (automobile, apparel, and utilities) and in the various countries of survey experiment execution (United States, United Kingdom, Germany, and Switzerland). Additionally, different intertemporal contexts and incentive schemes do not systemically alter our findings. The participant characteristics show surprisingly little correlation with the ability to differentiate corporate greenness levels. Finally, our findings appear to be specific to corporate sustainability data as our placebo setting yields very different results.

Our research is part of a small but growing body of work that uses experimental methods to study sustainability-related questions (e.g., Heeb et al., 2023; Bonnefon, Landier, Sastry, and Thesmar, 2025; Edmans, Gosling, and Jenter, 2025). To our knowledge, we are the first to test whether individuals can accurately assess the magnitude of corporate carbon emissions. We mainly contribute to three strands of the literature. First, we contribute to the literature on the real effects of ESG disclosure. Recent equilibrium models and empirical studies posit that carbon emissions are increasingly priced by markets (e.g., Pástor, Stambaugh, and Taylor, 2021; Bolton and Kacperczyk, 2021, 2023; Aswani, Raghunandan, and Rajgopal, 2024). A critical, yet untested, assumption in these frameworks is that the transmission mechanism is frictionless, that is, once data is released, market participants correctly update their priors. We invalidate this assumption. By documenting that individuals struggle to fully distinguish green from brown firms based on standard Scope 1 emissions disclosures, we identify a specific information friction that might impede the market's ability to discipline firms.

Second, we provide micro-foundational evidence to behavioral finance regarding belief formation under complexity. While the literature on limited attention and salience is well-established (e.g., Hirshleifer and Teoh, 2003; DellaVigna, 2009; Bordalo, Gennaioli, and Shleifer, 2020), there is limited understanding of how agents process the specific, high-dimensional quantitative signals typical of ESG disclosure. We bridge this gap by isolating an asymmetric central-tendency bias in the processing of environmental data. Unlike general noise, we show that agents systematically compress the perceived difference between leaders and laggards, a mechanism consistent with theories of coarse thinking (Mullainathan, Schwartzstein, and Shleifer, 2008). This adds nuance to our understanding of ESG decision-making by retail investors. While prior studies show that retail investors value sustainability in their investment decisions (e.g., Riedl and Smeets, 2017; Hartzmark and Sussman, 2019; Bauer, Ruof, and Smeets, 2021), we show that their ability to process specific ESG data might hinder the full expression of these green preferences.

Finally, our study advances the asset pricing literature on ESG measurement and aggregation. Previous work attributes the ambiguous pricing of green assets to the divergence of rating agencies (Berg et al., 2022; Brandon, Krueger, and Schmidt, 2021; Christensen, Serafeim,

and Sikochi, 2022) or the noise in self-reported corporate data (Bingler, Kraus, Leippold, and Webersinke, 2022). We propose a third, overlooked source of noise: the investors' perceptual error. Even if rating agencies agreed and data were perfect, our results suggest that the *Greenness Error*, the gap between *Objective Greenness* and *Perceived Greenness*, would persist due to cognitive constraints. In the context of ESG-efficient frontier by Pedersen, Fitzgibbons, and Pomorski (2021), this perceptual friction can distort portfolio choice and equilibrium asset prices.

The paper is structured as follows. In Section 2, we present our hypotheses. In Section 3, we present the survey design and provide sample summary statistics. In Section 4, we present the analyses and discuss the findings. We conclude in Section 5.

2. Hypotheses

Accurate perceptions of corporate environmental performance are essential for sustainability information to be reflected in consumer choices and financial markets. Given the novelty of these data, it cannot automatically be assumed that individuals can easily interpret them. However, recent equilibrium models and empirical studies assume a frictionless transmission mechanism in which, once data are released, market participants correctly update their priors (e.g., Pástor et al., 2021; Bolton and Kacperczyk, 2021, 2023; Aswani et al., 2024). This conceptual tension provides the primary impetus for formulating our first hypothesis.

Hypothesis 1 (Sustainability Differentiation Hypothesis): *Individuals are able to distinguish greener from browner companies.*

However, even if individuals can coarsely differentiate firms according to their sustainability, accurate price discovery requires perceiving the magnitude of differences. The literature on belief formation under complexity suggests that evaluations of high-dimensional firm attributes are subject to systematic processing costs (e.g., Hirshleifer and Teoh, 2003; Barro, 2006; DellaVigna, 2009; Bordalo et al., 2020). When agents map complex signals onto bounded scales, they often rely on heuristics that result in compression. Applied to sustainability data,

this implies a regression to the mean: individuals may overestimate the greenness of brown companies, while underestimating the greenness of green companies.

Hypothesis 2 (Central Tendency Hypothesis): *Individuals exhibit a central tendency: they tend to overestimate the greenness of brown companies and underestimate the greenness of green companies.*

We examine the hypotheses in distinct subsamples, as we posit that individual characteristics influence the ability to differentiate between different levels of greenness. In particular, we expect finance professionals and sustainability experts to benefit from their greater familiarity with ESG-related information and, consequently, to exhibit enhanced ability to differentiate corporate greenness.

Testing these hypotheses enables us to establish whether agents merely form noisy perceptions of sustainability or whether they are capable of accurately assessing corporate greenness. Providing evidence for *Hypothesis 1* would indicate that individuals possess an inherent ability to contextualize corporate sustainability information despite its relative novelty. However, if *Hypothesis 2* cannot be rejected, we would show evidence for cognitive constraints that could generate frictions between disclosed sustainability data and market reactions. This could distort asset pricing and attenuate corporate greenness efforts, particularly if finance professionals and sustainability experts exhibited this bias.

3. Study Design

3.1. Pre-registration

Before starting any data collection, the survey experiment was pre-registered on Wharton's AsPredicted.org platform under the number 224362 on April 22, 2025. For preregistration details, see https://aspredicted.org/224362.pdf. As outlined in the original pre-registration, the study design anticipated a potential extension to additional samples, subject to resource availability. Following the receipt of additional research funding, we expanded the sample and conducted additional robustness analyses, and pre-registered this extension in the AEA RCT Registry (sub-

mitted on October 20, 2025, approved on October 23, 2025, and launched immediately following approval.) All materials are available at https://www.socialscienceregistry.org/trials/17056 in the AEA RCT Registry (AEARCTR-0017056). In the paper, we refer to the Wharton-registered main survey as Phase I and to the AEA RCT Registry extension as Phase II.

3.2. Survey Instructions and Paths

In the survey, each participant assessed the greenness of three companies. The welcome screen (shown in Figure IA1 in the Internet Appendix) introduced the study as focusing on corporate greenness and informed participants that they will be rating company greenness on a five-point scale ranging from 1 ("Not green at all") to 5 ("Very green").[5] We refer to this assessment as *Perceived Greenness*. For clarity, the scale labels were presented not only on the welcome screen but also alongside each of the three questions.[6] The experiment had the following structure: (i) background questions; (ii) randomized treatment; and (iii) questions on the information usefulness and potential additional information needs. The background questions were a set of demographic, sustainability-related, and attitudinal questions.[7] Subsequently, participants were randomly assigned to one of several experimental paths, in which they were shown the companies' emissions information in different formats. The structure and content of all experimental paths are detailed in Table 1. Our survey design enables us to examine whether participants' ability to accurately assess corporate greenness depends on (i) the industry in which the company operates, (ii) the temporal framing of emissions data (past vs. future tense), (iii) the provision of anchor values (industry median and minimum/maximum range), and (iv) the emissions measurement format (absolute, relative, or household-equivalent terms). The survey also included additional dimensions for robustness checks (see Section 4.4).

[Table 1 here]

The survey covered three industries: "Apparel," "Automobile," and "Utility." Phase I included paths 1-15, while Phase II expanded the design and involved paths 1-32. As shown in

[5] In designing the landing page, as well as in further survey design, we followed the best practices outlined by Stantcheva (2023).

[6] See Figure IA5 or Figure IA4 in the Internet Appendix for a visualization.

[7] See Figure IA2 for the list of questions, and Table IA1, together with Table IA2 in the Internet Appendix for the summary of responses.

Table 1, in Phase I, all company names were fictional. The company names were standard in the first twelve variations (*AstraFabric Co.* in the "Apparel" industry questions, *Velronic Motors* in the "Automobile" industry questions, and *Voltara Power Corp.* in the "Utility" industry questions.) In the information setting using "Household" option (paths 13-15), the company names were varied between *Voltara Power Corp.*, *Currenta Utilities Inc.* and *Lumina Works Inc.* to mitigate potential learning effects. Under the "Absolute" information treatment, the survey participants were shown emissions in tCO_2e. Under the "Relative" information treatment, the survey participants were shown emissions in tCO_2e per USD 1 million of revenue. Under the "Household" information treatment, the survey participants were shown absolute emissions expressed as household equivalents (corporate emissions divided by annual emissions of a typical German four-person household). The three main survey experiment questions had the following structure: Question 1 (labeled "Past") corresponded to a framing condition, where the information was presented in the past tense ("emitted"). Question 2 (labeled "Future") corresponded to a framing condition, where the information was framed in the future tense ("plans to emit"). Question 3 (labeled "Compare") corresponded to a framing condition, which also used past-tense framing but added context by providing reference values. The reference value used was either industry median, or the minimum-maximum range.[8] See Figure 1 for the distribution of participants across the treatment paths.

The survey administered to respondents in Phase I adopted a World Economic Forum (WEF)-style layout, mirroring the visual format commonly used in WEF videos on platforms such as LinkedIn, see the Internet Appendix (Figure IA4) for an example. We incorporated this picture-based design to increase respondent engagement and completion rates. This approach provided additional visual context and matched a presentation style familiar to both students and finance professionals on professional networking platforms.[9] The use of visuals in surveys in economics and finance is not novel; it has previously been employed in randomized online survey experiments, e.g., by Kuziemko, Norton, Saez, and Stantcheva (2015).

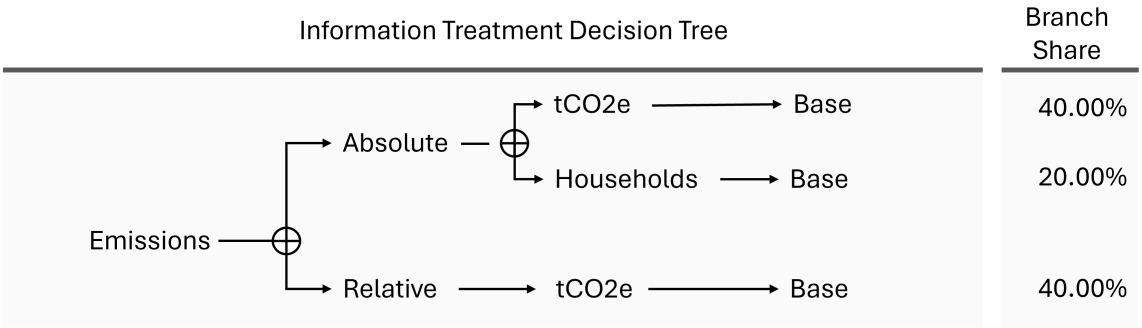
[8] In a robustness analysis, we substituted the term *median* with the term *average*, but retained the original *median* value.

[9] See, e.g., https://www.linkedin.com/posts/mandylin1_10-emerging-technologies-in-this-wef-report-activity-7373073648137670656-Fsi-/ (accessed on November 18, 2025). The layouts for each industry used in our study are illustrated in Figure IA3 in the Internet Appendix.

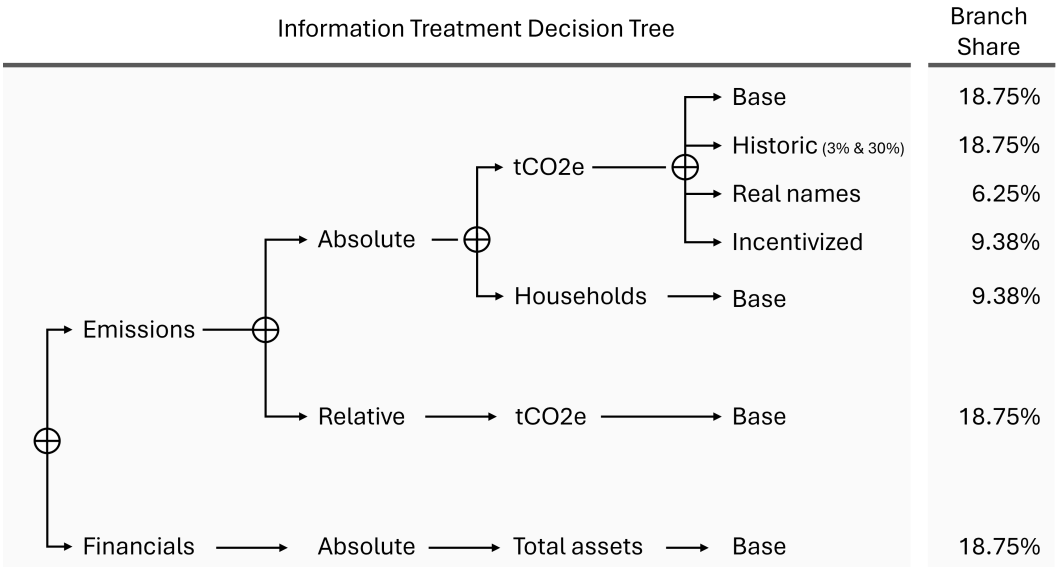
Figure 1: Information Treatments

The figure presents the information treatments employed in our survey design for the two survey phases. The absolute emissions were shown to the survey participants in tCO_2e or based on the annual emissions of a typical four-person German household. Additional variations in the second survey phase included the use of "historic" emissions, where participants were shown a 3% or a 30% reduction in emissions in the year of interest compared to the previous year, the use of real instead of fictional names, and an incentivized setting where participants were rewarded for identifying the correct quintile. The relative emissions were shown to the survey participants in tCO_2e per USD 1 million of revenue. In the second survey phase, some participants were additionally treated with financial information instead of emission-based information. Those participants were shown total book assets in billion USD and asked the rate the size of the company compared to the market. The branch shares are reported for the allocation algorithm. The final sample slightly deviates from those shares due to attrition and exclusion of participants as a result of attention checks. N_G represents the number of participants in the greenness setting and N_S in the firm size setting.

(a) First Survey Phase ($N_G = 902$)



(a) Second Survey Phase ($N_G = 2,535, N_S = 584$)



The survey administered to respondents in Phase II was presented in plain text without background images because the general public may be less familiar with WEF-style videos and the Prolific participant pool is known for maintaining high levels of attention without the need for additional visual stimuli. In Phase II, we incorporated a screening question to verify participants' baseline understanding of one industry by requiring respondents to define the functional role of a utility company within the economy. Because no visual materials were shown in this version of the survey, this question served as a knowledge check (see Figure IA5 in the Internet Appendix for a survey path).

3.3. Greenness Information

To construct *Objective Greenness*, we rely on historical Scope 1 emissions data from Refinitiv (now part of LSEG).[10] We use emissions from the year 2022, which at the time of survey preparation was the most recent year for which complete information was available. For each industry, we sort firms by their emissions and divide the distribution into quintiles. We then compute the midpoint of each quintile; these midpoint values serve as our Q1–Q5 benchmarks reported in Table 2. Because lower emissions imply greater greenness, we invert the scale to obtain an *Objective Greenness* measure ranging from 1 to 5. Under this encoding, the midpoint of the lowest-emissions quintile (Q1) maps to a score of 5, or "Very green (5)," whereas the midpoint of the highest-emissions quintile (Q5) maps to a score of 1, or "Not green at all (1)." Throughout the paper, we refer to this constructed variable as *Objective Greenness*. In addition to the quintile midpoints, we also extract the median as well as the minimum and maximum values of the underlying distributions. These statistics were shown as supplementary reference points in the "Compare" data-framing condition of the survey.

[Table 2 here]

[10] In light of the findings by Berg, Fabisik, and Sautner (2020), we benchmark the data against other providers such as Trucost, and conclude that our greenness measure is not sensitive to the choice of data source.

3.4. Survey Administration and Incentives

The experiment was administered in two phases that took place in April and October 2025. For expositional clarity, we refer to the first phase as Phase I and the second phase as Phase II. The first phase targeted university students and finance professionals, whereas the second phase sampled a representative cross-section of the general population in the United States and the United Kingdom. The survey was set up in the academic online survey tool SoSci.

3.4.1. Administration of the Survey Experiment to Students

We recruited students from six universities in Germany and Switzerland. The delivery modes and corresponding fieldwork dates are summarized in Table A2 in the Data Appendix. The recruitment was largely carried out in a classroom setting, where the instructor or the study team member read the instructions aloud, and students accessed the online survey through a QR code or a web link. The sample also includes a small proportion of student responses (22.75%) obtained from the survey distributed electronically during online lectures, without face-to-face interaction.

Participants received a fixed incentive of €2, or CHF 2 for respondents in Switzerland, upon completion. This amount was determined based on the statutory minimum wage in Germany, where the majority of student responses come from (€12.82 per hour in Germany in 2025).[11] Incentive payments were administered independently of the survey to ensure anonymity, with online participants completing a separate form that was not linked to their survey responses. Response rates in lecture-based recruitment settings consistently exceeded 90%, resulting in 633 student responses, of which 489 were collected through classroom-based administration and 144 through the online mode.

[11] "Minimum wages," https://www.destatis.de/EN/Themes/Labour/Earnings/Minimum-Wages/_node.html, accessed on January 2, 2025.

3.4.2. Administration of the Survey Experiment to Finance Professionals

Our sample of finance professionals was obtained through outreach at finance industry conferences, distribution through professional newsletters, and targeted institutional contact, as detailed in Table A2 in the Data Appendix. Among finance professionals, we were able to identify a subgroup whose day-to-day responsibilities involve working with sustainability-related data. Including this subgroup enables us to examine whether perceptions and interpretations of sustainability information are systematically higher among these sustainability experts. Distribution channels included professional associations such as the CFA Societies in Switzerland, Germany, and Slovakia, Swiss Training Center for Investment Professionals (Ausbildungszentrum für Experten der Kapitalanlage (AZEK)), Frankfurt School Executive Education, Association of German Public Banks (Bundesverband Öffentlicher Banken Deutschlands (VÖB)), and the Association for Environmental Management and Sustainability in Financial Institutions (Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten (VfU)). Additional outreach occurred via LinkedIn where we contacted sustainable finance professionals via InMail. Survey invitations were delivered through email and newsletters or, in the case of the CFA Society Switzerland, during an in-person ESG conference in Zurich.

The response rates were substantially lower compared to the student sample and varied substantially between delivery channels (between 3.4% and 13.4% in the online settings). This is in line with similar surveys in the field such as 8-12% for Edmans, Gosling, and Jenter (2024), 4.3% for Mccahery, Sautner, and Starks (2016) and 6.5% for Gompers, Gornall, Kaplan, and Strebulaev (2020). We collected 269 responses from professionals. The largest number of responses (58) were collected at the in-person conference. Participation was voluntary and all respondents were informed about the anonymity of their responses prior to the start of the survey. Unlike students, finance professionals were not offered direct monetary compensation. In this sample, incentives were either absent or provided only indirectly. For indirect incentives, we pledged to donate to charitable organizations based on survey participation, either at the individual or group level, as described below. For the individual-level incentive design, we followed Edmans et al. (2025). To illustrate the different incentive conditions applied within

the finance professionals sample, three cases are described as follows: (1) In the in-person conference setting, a QR code was displayed with the message, "Your response counts! If 70% of you respond, we'll donate 300 CHF to the Swiss Red Cross."; (2) in the case of the German banking and sustainability associations, no incentives were offered; and (3) for responses obtained through the CFA Society Germany newsletter, participants were informed that each completed survey would result in a €10 donation to the German Red Cross, resulting in a total donation of €390.

3.4.3. Administration of the Survey Experiment to the Representative Population, Including the Retail Investor Subsample

We used Prolific to elicit responses from the general population, obtaining a sample that approximates the demographic composition of the wider population. Prolific, together with Amazon Mechanical Turk, constitutes one of the principal online platforms used for experimental survey research in economics and finance.[12] We collected data between October 23 and 24, 2025, consistent with the filed pre-registration. We took advantage of Prolific's option to draw nationally representative samples and conducted the survey experiment with respondents from the United States and the United Kingdom. The final samples are representative with respect to political affiliation, as well as sex and age. We included political affiliation, as perceptions of sustainability-related topics may differ across the political spectrum. In the United States, for instance, the interpretation of ESG factors under the Employee Retirement Income Security Act (ERISA) has varied across administrations, with the incorporation of sustainability criteria in 401(k) investment decisions being permitted or constrained depending on the governing administration (see e.g., US Department of Labor (2015)). Finally, we determined the retail investor status using the question "Are you currently investing in the stock market?", which was not included in the survey administered to students and finance professionals, as students

[12]The platform has been widely used by influential research papers such as e.g., Andries, Bianchi, Huynh, and Pouget (2025); Bonnefon et al. (2025); Butera, Metcalfe, Morrison, and Taubinsky (2022); Chen and Hwang (2022); Enke, Graeber, and Oprea (2023); Germann, Mertes, Weber, and Loos (2024); Gödker, Jiao, and Smeets (2025); Merkle and Ungeheuer (2025); Nielsen and Rehbeck (2022); Quispe-Torreblanca, Gathergood, Loewenstein, and Stewart (2025).

typically do not invest and finance professionals can be assumed to have market exposure.[13]

3.4.4. Sample Attrition

In Phase I of the survey, the initial sample comprised 955 respondents. After a cumulative attrition rate of 5.55%, the final sample included 902 students and finance professionals. Table A3 in the Data Appendix reports the question-by-question attrition breakdown. In Phase II of the survey, the U.S. sample comprised 1,466 completed surveys, and the U.K. sample comprised 1,146. We excluded responses that did not meet either of the following two criteria. First, we dropped participants who could not adequately describe what a utility company does (31 and 26 respondents in the U.S. and U.K. samples, respectively).[14] Second, we removed those who did not pass the attention check (10 respondents each in the U.S. and U.K. samples).[15] This yields a final sample of 1,425 U.S. and 1,110 U.K. respondents, corresponding to an attrition rate of 2.80% and 3.14%. As in Phase I, Table A3 in the Data Appendix provides the question-by-question attrition breakdown for Phase II.

In total, we collect responses from 3,437 participants (902 in Phase I and 2,535 in Phase II), each of whom evaluates the greenness of three different firms, resulting in 10,311 firm-level greenness assessments.

3.4.5. Control Variables

In this section, we describe the set of covariates included as controls in the regression analyses. These variables capture respondent characteristics and contextual factors that may influence participants' *Perceived Greenness* assessments. We control for demographic attributes (*Age*, *Female*, *University Degree*), environmental attitudes (*Climate Awareness*, *Sustainability Exposure*), and socioeconomic conditions (*High Budget*). We further include *Current Mood* and *Life Attitude* as controls capturing respondents' attitudinal characteristics at the time of the

[13] Robustness checks indicate that assigning retail investor status based on the respondent group would be reasonable and would not affect our results. Nevertheless, in the main analysis, we refrain from making this assumption and restrict the sample to observations with non-missing investor status.

[14] We asked: "Please describe, in one sentence or a few simple bullet points, what a utility company does."

[15] As an attention check, we include a LinkedIn question that asks: "Were you invited to this survey via LinkedIn?".

survey. Finally, we add industry indicators to adjust for systematic differences between sectors in the survey design.

The variable *Age* reports the participants' self-reported age. The dummy variable *Female* takes on a value of 1 if the participant's self-reported gender is female, and 0 otherwise. *Climate Awareness* is measured on a five-point Likert scale, with 5 indicating the highest awareness. *University Degree* is a dummy variable that takes on a value of 1 if the participant holds a university degree, and 0 otherwise. *Current Mood* is measured on a five-point Likert scale, with 5 indicating a better mood. *Life Attitude* is measured on a five-point Likert scale, with 5 indicating a more optimistic life attitude. *Sustainability Exposure* is measured on a five-point Likert scale, with 5 indicating the highest possible extent to which participants self-report being exposed to environmental sustainability topics in their work, studies, or personal life. The dummy variable *High Budget* takes on a value of 1 if the participant reports having more than €3,500 available per month in total, including regular fixed expenses and potential private saving plans, and 0 otherwise. More details on the variable definitions can be found in the Data Appendix in Table A1.

3.4.6. Sample Summary Statistics

In the following, we present summary statistics for the control variables, see Table 3. The average participant is 41.62 years old, 48% of our sample is comprised of women, and 55% has a university degree. On average, respondents tend to agree to a high extent with the statement "Climate change is a serious problem that needs to be solved" (with the mean score of 4.21 on a five-point Likert scale). Such high levels of concern are consistent with documented increases in public attention to climate change (Choi, Gao, and Jiang, 2020). Overall, participants display a rather positive life attitude as well as current mood, with mean scores of 3.72 and 3.84, respectively, both measured on a five-point Likert scale. The sustainability exposure variable, which is based on the question "To what extent are you exposed to environmental sustainability topics in your work, studies, or personal life?" measured on a five-point Likert scale ranging from "Not at all (1)" to "Extensively (5)" has a mean of 3.03. Finally, 32% of the sample fall into the category of having more than €3,500 (approximately $4,048 or £3,043; exchange

rates as of October 23, 2025) available per month in total, including regular fixed expenses and potential private saving plans.[16]

[Table 3 here]

4. Empirical Results

This section reports the results of empirical tests of the *Sustainability Differentiation Hypothesis* (Section 4.1) and the *Central Tendency Hypothesis* (Section 4.2), followed by additional analyses (Section 4.3) and robustness tests (Section 4.4).

4.1. Main Result: Sustainability Differentiation Hypothesis

We begin by evaluating the *Sustainability Differentiation Hypothesis*. If individuals can differentiate greener from browner firms, firms with higher *Objective Greenness* should receive higher *Perceived Greenness* scores.

We first compute the mean and standard deviation of *Perceived Greenness* for each level of *Objective Greenness*. The statistics are shown in Table 4, first for the full sample (Panel A) and then separately for each of the three information treatments ("Past" in Panel B, "Future" in Panel C, and "Compare" in Panel D). All panels of Table 4 show a clear positive association between *Objective Greenness* and *Perceived Greenness*: as *Objective Greenness* increases, the mean level of *Perceived Greenness* rises monotonically. For example, in the pooled sample (Panel A), the mean *Perceived Greenness* is 2.16 for firms with an *Objective Greenness* score of 1 ("Not green at all") and corresponds to 3.21 for firms with a score of 5 ("Very green"). In addition, we observe that the within-group standard deviations exhibit minimal variation across *Objective Greenness* levels. This pattern holds throughout all panels, suggesting that differences in greenness assessments are primarily attributable to shifts in mean perceptions rather than to changes in their dispersion.

[Table 4 here]

[16] Please note that the survey participants in the U.S. and U.K. sample were provided with the exchange rate information.

Second, we estimate ordered logit and probit models to provide a more formal test of the *Sustainability Differentiation Hypothesis*. We estimate the regressions with *Perceived Greenness* as the dependent variable and *Objective Greenness* as the independent variable:

$$\textit{Perceived Greenness}_i = \beta_0 + \beta_1 \cdot \textit{Objective Greenness}_i + \boldsymbol{\gamma} \cdot \mathbf{X}_i + \delta_j + \varepsilon_i, \tag{1}$$

where the term $\mathbf{X}_i$ denotes a vector of control variables capturing participant characteristics, with associated coefficients $\boldsymbol{\gamma}$; δ_j represents industry fixed effects; and ε_i is the error term. Because the framing of the statement may affect respondents' subjective assessments, we present our estimates separately for each framing condition and information treatment.

We report the results in Table 5 by framing condition (Past, Future, and Compare) and in Table 6 by information treatment (absolute, relative, and household-equivalent terms). In both tables, odd-numbered columns report specifications without controls, while even-numbered columns include the full set of controls. Across all models, the coefficient on *Objective Greenness* is strictly positive and statistically significant at the 1% level, meaning that greener firms are more likely to receive higher *Perceived Greenness* evaluations. In logistic regressions, the estimated coefficient β_1 ranges from 0.235 to 0.738 depending on the specification. This implies that a one-unit increase in *Objective Greenness* increases the chances of receiving a higher *Perceived Greenness* rating between 26.5% and 109%. Comparing specifications with and without controls shows that the coefficient on *Objective Greenness* changes only marginally, suggesting that the estimated relationship is not sensitive to the inclusion of controls. In probit regressions, coefficients range from 0.133 to 0.425, indicating a positive and economically meaningful effect of *Objective Greenness* on the participants' latent propensity to assign higher *Perceived Greenness* ratings.

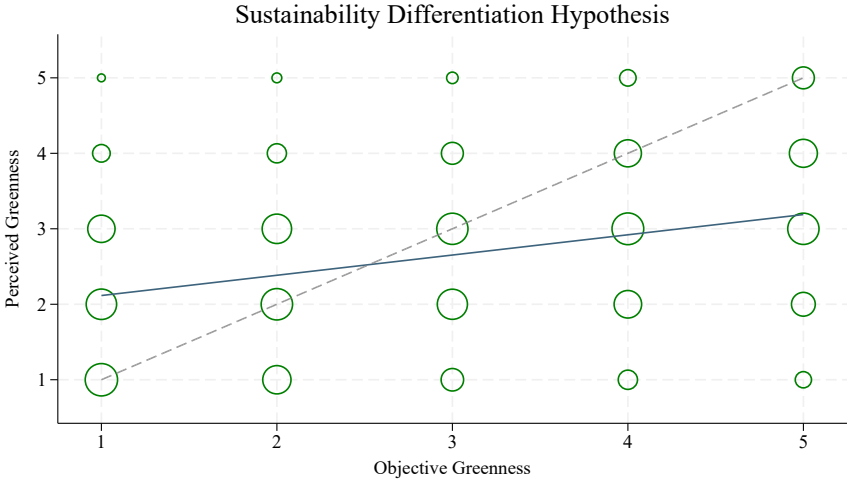
[Table 5 and Table 6 here]

We visualize this relationship in Figure 2, which plots *Objective Greenness* on the x-axis and *Perceived Greenness* on the y-axis. Each bubble in the figure represents a unique combination of the two, with bubble size reflecting the fraction of respondents assigned to that combination. The dashed 45-degree line denotes perfect differentiation, where *Perceived Greenness* aligns exactly with *Objective Greenness*. The solid line in the plot depicts the fitted values from a

weighted linear regression of *Perceived Greenness* on *Objective Greenness* estimated in the full sample of participants (10,311 responses). The fitted regression line has a slope of 0.27, which is substantially flatter than the 45-degree benchmark, illustrating that while *Perceived Greenness* increases with *Objective Greenness*, participants do not fully differentiate between greener and browner firms.

Figure 2: Perceived Greenness vs. Objective Greenness

The figure presents the relation between *Objective Greenness* and *Perceived Greenness* in the full survey sample. The *Objective Greenness* (on the x-axis) and the *Perceived Greenness* (on the y-axis) are measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." Each bubble in the figure represents a unique combination of *Objective Greenness* and *Perceived Greenness*. The size of each bubble reflects the fraction of respondents with each combination of assigned *Objective Greenness* and the stated *Perceived Greenness*. The dashed 45-degree line represents the scenario in which individuals can perfectly distinguish between greener and browner companies. The full sample includes 3,437 participants, for a total of 10,311 responses.



Third, we compare the distributions of *Perceived Greenness* across groups using the non-parametric Mann-Whitney *U* test (Wilcoxon rank-sum test). For this purpose, we exclude firms with an *Objective Greenness* score of 3 and classify the remaining firms as green or brown. Firms with *Objective Greenness* scores of 4-5 are defined as green, while those with scores of 1-2 are defined as brown. We then compare the *Perceived Greenness* ratings assigned to these two groups to assess whether participants distinguish objectively greener from browner firms.

We find that *Perceived Greenness* ratings are significantly higher for objectively green firms,

irrespective of the sample analyzed. In the pooled sample, the average *Perceived Greenness* is 3.07 for green firms and 2.26 for brown firms. The results of the Mann–Whitney U test shown in Column 1 of Panel A.1 of Table 7 indicate that the difference in the distributions of *Perceived Greenness* ratings between the two groups is highly statistically significant ($p < 0.001$) in support of the *Sustainability Differentiation Hypothesis*.

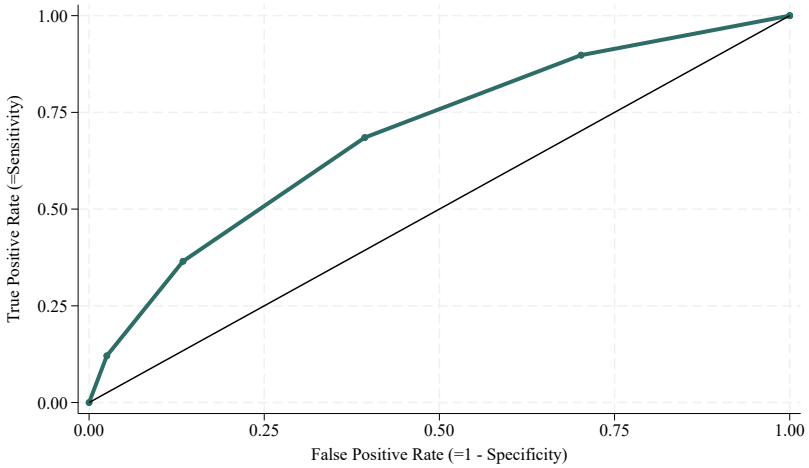
Fourth, we assess the model's discriminatory power using a Receiver Operating Characteristic (ROC) analysis. Specifically, we construct ROC curves and compute the Area Under the Curve (AUC), which is closely related to the Mann-Whitney U statistic. It represents the probability of correctly identifying the good case when comparing a randomly chosen good case and a bad case (Hanley and McNeil, 1982). An AUC of 50% corresponds to a random prediction, while an AUC of 100% corresponds to a perfect prediction. It is a widely used and intuitive metric to evaluate the predictive accuracy of binary classifiers (e.g., Berg, Burg, Gombović, and Puri, 2020; Kölbel, Leippold, Rillaerts, and Wang, 2022; Fuster, Goldsmith-Pinkham, Ramadorai, and Walther, 2022). Following Iyer, Khwaja, Luttmer, and Shue (2016), an AUC of around 60% is typically considered good performance in information-sparce environments, while values exceeding 70% are desirable in information-rich settings.

The coefficients for the discriminatory performance of *Perceived Greenness* are reported in Panel A.2 of Table 7. Figure 3 shows an AUC of 0.6911, indicating that there is a 69.11% probability that a randomly chosen objectively green firm receives a higher subjective rating than a randomly chosen objectively brown firm. The value is greater than 0.5 (random guessing), so this result supports the hypothesis that participants can meaningfully differentiate greener firms from browner firms.

[Table 7 here]

Figure 3: Sustainability Differentiation Hypothesis: Area Under the Curve (AUC)

The figure presents the receiver operating characteristic (ROC) curve and the corresponding area under the curve (AUC) for *Perceived Greenness* ratings. Firms with *Objective Greenness* scores of 4 or 5 are coded as objectively green (1), and those with scores of 1 or 2 as objectively brown (0); firms with a score of 3 are excluded. It plots the fraction of true positives out of the positives (TPR = true positive rate) vs. the fraction of false positives out of the negatives (FPR = false positive rate). The diagonal line represents the ROC curve under random guessing, corresponding to an AUC of 0.5. A higher AUC indicates greater accuracy in distinguishing green from brown firms based on subjective assessments. The sample consists of a total of 8,302 responses by 3,414 unique participants.



4.2. Main Result: Central Tendency Hypothesis

Next, we examine whether sustainability perceptions exhibit a central tendency. Specifically, we test whether individuals compress toward the center of the scale, resulting in an overestimation of the greenness of brown firms and an underestimation of the greenness of green firms.

First, we compare mean errors in the assessment of firm greenness between objectively green and brown firms, which allows us to assess whether misperceptions show a central tendency. Table 8 reports the results of two-sample *t*-tests comparing the *Greenness Error* between objectively green and objectively brown firms.[17] We find that, in the pooled sample (Column 1), the mean *Greenness Error* is strongly negative for objectively green firms (-1.43) and positive for objectively brown firms (0.75). The difference in the mean *Greenness Error*

[17]We classify firms with an *Objective Greenness* score above 3 as objectively green and firms with a score below 3 as objectively brown.

between the two groups is -2.18 and is highly statistically significant ($p < 0.001$). Interestingly, we observe an asymmetry in the bias: the mean underestimation of objectively green firms is nearly twice as large in magnitude as the mean overestimation of objectively brown firms. Consistent with this result, we find that the absolute *Greenness Errors* are larger for objectively green firms (1.51) than for objectively brown firms (1.01), although these results are not reported for brevity. The magnitude and direction of these errors provide clear evidence of a central tendency in sustainability perceptions, consistent with *Hypothesis 2*. In addition, they hint at an asymmetry between perceptions of brown and green firms.

Second, we complement this descriptive evidence with a model-based approach using ordered probit and ordered logit regressions, in which *Greenness Error* serves as the dependent variable, *Objective Greenness* is the main independent variable:

$$Greenness\ Error_i = \beta_0 + \beta_1 \cdot Objective\ Greenness_i + \boldsymbol{\gamma} \cdot \mathbf{X}_i + \delta_j + \varepsilon_i, \tag{2}$$

where all variables are defined as in Equation 1, with the exception of the *Greenness Error*, which is defined above.

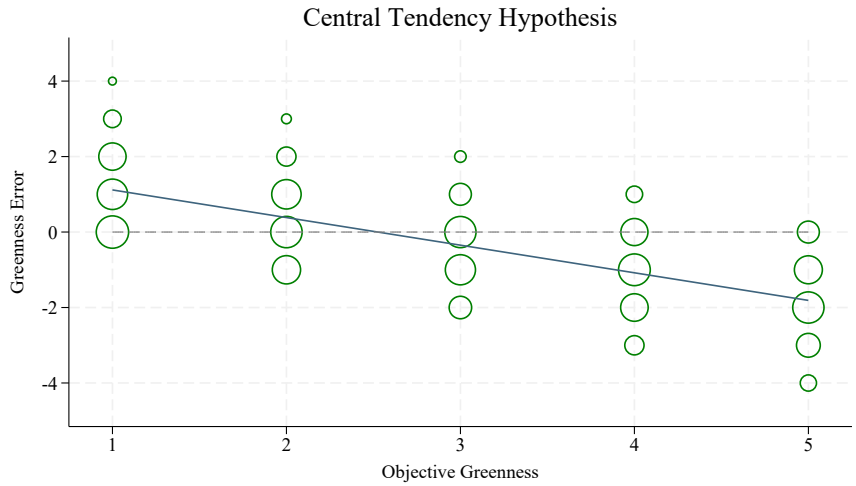
Table 9 reports ordered logit and probit estimates separately by framing condition (Past, Future, and Compare), while Table 10 reports ordered logit and probit estimates separately by information treatment (absolute emissions, relative emissions, and emissions expressed in household equivalents). Odd-numbered columns report specifications without controls; even-numbered columns include the full set of controls. We find that across all specifications, the coefficient on *Objective Greenness* is negative and statistically significant at the 1% level. In the regressions in Table 9 split by framing condition, the estimated coefficients range from -1.873 to -0.698. In the regressions split by the information treatment, the coefficients on *Objective Greenness* range from -1.208 to -1.067 (Table 10). The similarity of coefficients across information treatments indicates that our findings hold for emissions framings in absolute, relative, and household-equivalent terms. Additionally, across all specifications, the magnitude of the coefficient changes only marginally when control variables are included, suggesting that the relationship is not sensitive to participant characteristics.

[Table 8, Table 9 and Table 10 here]

We additionally visualize this relationship in Figure 2, which plots *Objective Greenness* on the x-axis and *Greenness Error* on the y-axis. Each bubble represents a unique combination of *Objective Greenness* and *Greenness Error*, with bubble size reflecting the fraction of respondents exhibiting that combination. The dashed 0-degree line denotes perfect differentiation, where *Perceived Greenness* equals *Objective Greenness*, and thus *Greenness Error* equals zero. The solid line depicts fitted values from a weighted linear regression of *Greenness Error* on *Objective Greenness*, estimated in the full sample of participants. The fitted regression line has a slope of -0.73, which deviates substantially from the 0-degree benchmark, consistent with the central tendency in greenness assessments.

Figure 4: Objective Greenness vs. the Greenness Error

The figure presents the relation between *Objective Greenness* and *Greenness Error* in the full survey sample. The *Objective Greenness* (on the x-axis) is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The *Greenness Error* (on the y-axis) is calculated as *Perceived Greenness* minus *Objective Greenness*, where the *Perceived Greenness* is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." Each bubble in the figure represents a unique combination of *Objective Greenness* and *Greenness Error*. The size of each bubble reflects the fraction of respondents with each combination of assigned *Objective Greenness* and resulting *Greenness Error*. The dashed 0-degree line represents the scenario in which individuals can perfectly distinguish between greener and browner companies. The full sample includes 3,437 participants, for a total of 10,311 responses.



Third, we estimate multinomial logit models in which the dependent variable, *Bias Type*, captures whether participants underestimate objective greenness, assess it accurately, or overestimate it. *Bias Type* takes the value -1 when *Perceived Greenness* is lower than *Objective*

Greenness (underestimation), 0 when *Perceived Greenness* and *Objective Greenness* are equal (accurate perception), and 1 when *Perceived Greenness* exceeds *Objective Greenness* (overestimation). We report the results in Table 11.[18] Panel A reports predictive margins relating *Bias Type* to *Objective Greenness* classifications, estimated both without and with the inclusion of control variables. Results are shown separately for objectively brown and objectively green firms.[19]

[Table 11 here]

We find a strong and asymmetric pattern of misperception. The greenness of objectively green firms is substantially more likely to be underestimated. In the specification without controls, the probability of underestimation is 76.10% for green firms compared to 12.88% for brown firms, while the probability of accurate perception is lower for green firms (19.54%) than for brown firms (32.82%). In contrast, the greenness of objectively brown firms is predominantly overestimated, with a predicted probability of overestimation of 54.30%, compared to only 4.36% for green firms. The inclusion of control variables leaves these patterns unchanged. In general, the findings suggest that misperceptions are not stochastic in nature but exhibit systematic directionality and asymmetry. Green firms tend to be perceived as less green than they objectively are, whereas brown firms tend to be perceived as greener than they objectively are, with these bias effects being more pronounced among objectively green firms.[20]

Several individual characteristics are statistically significantly associated with perception bias. Higher levels of *Climate Awareness* are associated with an increased probability of underestimating greenness and a decreased probability of overestimating it, indicating that respondents with greater environmental awareness exacerbate the asymmetry. Individuals with a *University Degree* exhibit a similar pattern. *Life Attitude* is positively associated with

[18] Our results remain unchanged in a setting that permits both overestimation and underestimation of greenness, in which firms with a score of 2 are classified as brown and firms with a score of 4 as green.

[19] As before, we classify firms with *Objective Greenness* scores of 4-5 as objectively green and those with scores of 1-2 as objectively brown, excluding firms with a score of 3.

[20] For completeness, Panel B of Table 11 reports multinomial logit estimates underlying the predictive margins in Panel A. *Green* is an indicator variable that takes a value of 1 if *Objective Greenness* is greater than or equal to 4, and 0 otherwise. As in Panel A, Panel B excludes firms with a score of 3. The results show that greenness of objectively green firms is substantially more likely to be underestimated and substantially less likely to be overestimated relative to accurate perception.

overestimation, indicating that those respondents project their positivity on the behavior of firms. Importantly, the inclusion of control variables leaves the signs of the key coefficients unchanged.[21]

Taken together, our analyses provide evidence for a central tendency bias in individuals' perceptions of corporate greenness. Objectively brown firms tend to be evaluated as greener, whereas objectively green firms tend to be evaluated as insufficiently green. Surprisingly, we identify an asymmetric pattern: this perceptual bias is more pronounced in evaluations of green firms. This asymmetry may attenuate the incentives for firms to decarbonize, as the undervaluation or insufficient acknowledgment of environmental performance may not be fully reflected in firms' market valuations and long-term business outcomes. In the real-world context, this effect will likely have far more substantial implications than those depicted in this manuscript, because our quintile-based method does not fully capture the strongly skewed distribution of corporate carbon emissions observed in practice.[22]

4.3. Additional Results

In the following, we present additional analyses to investigate how framing conditions and information treatments, and respondents' characteristics.[23] Our main inference is based on formally testing differences in sensitivity using interaction-based ordered logit regressions; see Equation 3. In particular, we focus on the interaction coefficient β_3 and assess whether differentiation ability differs between groups using Wald tests. For brevity, we do not report the

[21] While the multinomial framework highlights discrete shifts in the direction of bias, it does not impose structure on how perception errors evolve along the greenness scale. To further assess whether misperceptions follow a central-tendency pattern, we complement this analysis with a piecewise linear specification. While not reported for brevity, we estimate a piecewise linear regression that distinguishes between objectively green and objectively brown firms as above. The piecewise specification captures heterogeneity in slopes across the greenness scale. We find that perception errors vary systematically in a manner consistent with central tendency. The estimated slopes are economically meaningful and statistically significant on both segments (-0.77 for objectively brown firms and -1.46 for objectively green firms), reinforcing our earlier finding on effect asymmetry.

[22] In our sample, the mean of 3.54 million tCO_2e exceeds the median of 27,268 tCO_2e by a factor of 130. The underlying distribution of corporate carbon emissions is characterized by extreme right-skewness (60.06) and kurtosis (3,777.71).

[23] Figure 1 presents the fraction of the sample allocated to each of these tests.

full set of test statistics, but instead summarize and discuss the results for β_3 in the text.[24]

$$Perc.\ Green._i = \beta_0 + \beta_1 \cdot Obj.\ Green._i + \beta_2 \cdot G_i + \beta_3 \cdot \left(Obj.\ Green._i \times G_i\right) + \boldsymbol{\gamma} \cdot \mathbf{X}_i + \delta_j + \varepsilon_i, \quad (3)$$

where G_i stands for group and denotes an indicator variable that varies between our tests and captures the respective setting. The other variables are defined as in Equation 1.

4.3.1. Information Treatment: Benchmarking of Emissions Information

First, we examine whether providing additional contextual information helps respondents improve their sustainability differentiation ability. To this end, we compare two samples. The sample labeled "Past" corresponds to the framing condition, in which emissions information was presented in the past tense (i.e., "emitted"). The sample labeled "Compare" corresponds to the framing condition, which also used past-tense framing but presented emissions information relative to a reference level. The reference level was defined as either the sample median, average, or minimum-maximum range, depending on the condition. We pool these variants in the following analysis and also examine them separately in additional robustness tests.[25]

We find a pronounced difference in sustainability differentiation across the two conditions. When emissions information is presented relative to a reference benchmark, the relationship between *Objective Greenness* and *Perceived Greenness* is steep, with a slope close to one ($\beta_3 = 0.93$). By contrast, when emissions are presented in simple past-tense levels without a benchmark, the relationship is substantially flatter ($\beta_3 = 0.18$). The difference in sensitivity across the two conditions is highly statistically significant (Wald $\chi^2(1) = 485.95$, $p < 0.001$). Notably, participants demonstrated an explicit awareness of the importance of benchmarking information. In response to an open-ended question regarding additional informational needs, nearly half of the respondents explicitly requested such benchmarking information (see the Internet Appendix for more information).

[24] However, we report results for all major sample splits in Table 7, Table 8, and Table 12, which are referenced throughout the text when discussing whether the main findings hold.

[25] As already outlined, in one sample, we provided the mean instead of the median, but the values were the same as shown in Table 2, it was only the wording that was different.

4.3.2. Information Treatment: Absolute vs. Relative Emissions

Following recent work on the pricing of absolute versus relative carbon metrics (e.g., Bolton and Kacperczyk, 2023, 2021; Aswani et al., 2024), we test whether the format in which emissions information is presented affects perceptions. Specifically, we examine whether individuals' ability to differentiate corporate greenness levels depends on the use of absolute versus relative carbon emissions.

Under relative emissions framing, β_3 is 0.37, whereas under absolute emissions framing the relationship is flatter ($\beta_3 = 0.26$), showing statistically significant differences (Wald $\chi^2(1) = 6.50$, $p = 0.011$). From a policy perspective, these findings suggest that scaling emissions by firm revenues facilitates more accurate differentiation between firms based on environmental performance than reporting absolute emissions alone.

4.3.3. Information Treatment: Absolute vs. Household-Equivalent Emissions

In this analysis, we examine whether the units in which emissions are presented affects respondents' sustainability differentiation ability. Here, we capture emissions information either in absolute terms (tCO_2e) or expressed as the annual emissions of a typical four-person German household. The household-equivalent framing was intended to provide a more familiar and intuitive scale for interpreting emissions magnitudes as it is used regularly in newspapers and sustainability communications.

We find a sharper sustainability differentiation under the household-based framing. When emissions are expressed in household-equivalent terms, the slope relating *Objective Greenness* to *Perceived Greenness* is steeper ($\beta_3 = 0.40$) than when they are expressed in absolute units ($\beta_3 = 0.26$). The difference in sensitivity across the two conditions is statistically significant (Wald $\chi^2(1) = 6.41$, $p = 0.011$).[26] These findings suggest that the units used to disclose emissions materially affect stakeholders' ability to distinguish firms by objective environmental performance, making those units a central policy concern.

[26] We do not document any statistically significant difference between relative and household framings (Wald $\chi^2(1) = 0.12$, $p = 0.733$).

4.3.4. Information Treatment: Provision of Prior-Year Emissions Information

In order to more accurately replicate real-world sustainability reporting practices, we present emissions data in conjunction with the corresponding information from the previous year to a subset of respondents within the absolute emissions path. We tested two scenarios: a modest reduction in corporate carbon emissions year-over-year of 3% and a substantial reduction of 30%.

We do not find statistically significant differences in the sensitivity of *Perceived Greenness* to *Objective Greenness* when participants were exposed to these reductions relative to the control group (Wald $\chi^2(1) = 1.66$ for 3% and 1.62 for 30%; $p = 0.20$ for both cases). In general, the patterns are highly similar across the two scenarios, suggesting that neither mild nor substantial corporate carbon emissions reductions meaningfully affect participants' assessments of greenness levels. This finding substantiates our argument that systematic misperceptions of greenness might attenuate firms' incentives to undertake investments in decarbonization.

4.3.5. Respondent Characteristics: Sustainability Expertise

We further hypothesize that sustainability experts would more accurately distinguish between greener and less green firms than non-experts as they are more likely to work with related data on a regular basis.[27] Interestingly, we find no statistically significant differences between sustainability experts and non-experts (students) in the sensitivity of *Perceived Greenness* to *Objective Greenness* (Wald $\chi^2(1) = 1.01$, $p = 0.31$).

4.3.6. Respondent Characteristics: Retail Investors

When comparing retail investors to non-investors, we find suggestive evidence that retail investors are better at assessing a firms' *Objective Greenness*. The interaction between investor status and *Objective Greenness* is positive and marginally significant (Wald $\chi^2(1) = 3.46$, $p = 0.063$), indicating that *Perceived Greenness* increases more steeply with *Objective Greenness*

[27] We classify respondents as sustainability experts if they have professional finance experience and select the highest sustainability exposure category (5, "Extensively") in the survey question: "To what extent are you exposed to environmental sustainability topics in your work, studies, or personal life?" measured on a five-point Likert scale ranging from "Not at all" (1) to "Extensively" (5).

for retail investors. However, the magnitude of this difference is modest, suggesting that retail investor status alone does not fundamentally alter how respondents process corporate environmental performance.

4.3.7. Respondent Characteristics: Finance Professionals

In contrast, we find no statistically significant differences between finance professionals and non-finance professionals in how *Perceived Greenness* aligns with *Objective Greenness*. In particular, the sensitivity of *Perceived Greenness* to *Objective Greenness* does not differ between the two groups, as indicated by an insignificant interaction between finance professional status and *Objective Greenness* (Wald $\chi^2(1) = 1.25$, $p = 0.263$).

4.4. Robustness

Our results are robust to a large set of robustness tests.

[Table 12 here]

4.4.1. Incentive Strength: Performance-Based Compensation

Flat compensation may generate lower effort relative to performance-based compensation, which could attenuate the accuracy of assessments. To address this concern, we examine whether introducing performance-based compensation in the U.S. sample (administered in Phase II of the survey) affects respondents' evaluations by introducing performance-based incentives. Under this incentive scheme, participants could earn an additional £2 for each correct response, allowing them to quadruple their total payout, thus providing strong incentives for careful evaluation. There were 296 participants in this condition, yielding a total of 888 responses (see paths 21-23 in Table 1).

We find that, even under strong performance-based incentives, respondents do not exhibit greater alignment between *Perceived Greenness* and *Objective Greenness* relative to flat compensation (Wald $\chi^2(1) = 0.01$, $p = 0.92$). Thus, limited effort is unlikely to drive our

findings.[28]

4.4.2. Information Treatment: Actual versus Fictional Company Names

We also conducted a version of the survey in which fictional company names were replaced with actual firms. We used *Volkswagen* and *Volvo*, which differ substantially in their objective environmental performance: Volkswagen falls into the "Not green at all" category (*Objective Greenness* score of 5), whereas Volvo ranks among the greener firms (with an *Objective Greenness* score of 2).

We find that the results are qualitatively unchanged between the survey versions with fictional and actual company names, see e.g., Table 8. However, we find that the relationship between *Objective Greenness* and *Perceived Greenness* differs significantly (Wald $\chi^2(1) = 5.32$, $p = 0.021$). The interaction between *Objective Greenness* and the real-name indicator is negative and statistically significant (β_3 = -0.13), indicating that the sensitivity of *Perceived Greenness* to *Objective Greenness* is weaker when real firm names are used. This finding is unexpected, as we deliberately selected Volkswagen as a prototypical "brown" company, given its involvement in the diesel emissions scandal, and Volvo as a brand that invested relatively early in electric vehicles. Accordingly, we had anticipated observing no or the opposite effect. Thus, this finding indicates that pre-existing beliefs or brand-related associations beyond sustainability aspects may attenuate respondents' reliance on disclosed emissions information, potentially constraining real firms' ability to fully capture the benefits associated with climate initiatives.

4.4.3. Information Treatment: Average versus Median

The concept of the median may be less familiar to some parts of the general population. To address this concern, we re-ran the analysis using amended wording in which the term median is replaced with average, while keeping the numerical values equal to the median. This design allows us to assess whether explicitly referring to the median affects participants' responses.

[28] In the performance-based incentives group, responses were distributed as follows. Of all participants, 111 respondents (37.5%) did not answer any of the three questions correctly. Another 128 respondents (43.2%) answered one question correctly, 51 respondents (17.2%) answered two questions correctly, and only six respondents (less than 1%) answered all three questions correctly.

We find that our main findings hold (see e.g., Table 8). The interaction between *Objective Greenness* and the average-wording indicator is not statistically significant (Wald $\chi^2(1) = 1.87$, $p = 0.171$), indicating no meaningful impact of the wording conditions. As such, the results support the use of the median in sustainability communications.

4.4.4. Information Treatment: Past vs. Future Emissions Framing

The temporal framing of emissions information may affect the respondents' mapping between the *Objective Greenness* and *Perceived Greenness*. Participants were presented with two temporal framing conditions: a past-tense framing, in which emissions were described as having been "emitted," and a future-tense framing, in which emissions were described as "plans to emit."

When comparing both framing conditions, we find a difference in sensitivity. The relationship between *Objective Greenness* and *Perceived Greenness* is significantly flatter in the past-tense framing (Wald $\chi^2(1) = 40.26$, $p < 0.001$). For visual inspection of the slopes, please see Figure IA6 and Figure IA7 in the Internet Appendix.

We propose two non-mutually exclusive explanations for this finding. From an economic perspective, forward-looking disclosures may attract greater attention and induce higher cognitive effort because they relate to outcomes that are still malleable, whereas historical emissions may be perceived as fixed and therefore less informative for prospective evaluations. From a study design perspective, the effect may reflect a learning or adaptation process, as past-oriented framings were consistently presented before future-oriented framings.

4.4.5. Instruction Compliance: Use of External Aids

A concern for the robustness of our findings might be the use of external aids by participants, which may inflate their differentiation abilities. We explicitly told participants on the welcome screen that this study aims to assess their own knowledge and that they should refrain from using external aids. Nevertheless, we asked participants in Phase II of the survey whether they used external aids. This question was presented before the exit screen with the intention of eliciting self-reported use of external resources during the task.

Prior research suggests that such self-reports can be informative. For example, Höglinger and Jann (2018) show that participants tend to be reasonably honest when asked post-survey whether they relied on additional aids during a task. In our sample, self-reported reliance on such aids is rare with only 59 respondents (2.33% of the Phase II sample). While general findings hold for this small subgroup, we find limited evidence that the use of external aids improves sustainability differentiation. The interaction between *Objective Greenness* and the indicator for self-reported use of external aids is positive but only marginally statistically significant at the 10% level (Wald $\chi^2(1) = 3.41$, $p = 0.065$). Given the very limited incidence of self-reported use of external aids in the sample, these estimates should be interpreted with caution.

Even if respondents had attempted to rely on readily available external aids, such as AI-based tools, these would have been unlikely to improve performance. To assess this possibility, we evaluated greenness assessments generated by ChatGPT around the time of the study, which were neither accurate nor reliable. In addition, ChatGPT experienced significant outages and degraded performance on October 23, 2025, which coincided with the period when the majority of U.S. responses were collected, further limiting its availability as an external aid.[29]

4.4.6. Outcome variable: Firm Size

Lastly, to assess whether our findings are specific to corporate greenness, or whether similar results would arise simply due to the question framing or other design features of the study, we re-ran the survey in the U.S. sample using corporate size as a placebo outcome variable. Instead of evaluating firms' environmental performance, participants were shown information on firms' total book assets and asked to assess company size. Figure IA1 in the Internet Appendix presents a screenshot of the instructions shown to participants in this robustness survey. The resulting sample consists of 584 respondents, resulting in 1,752 firm-level assessments.

We compare the distribution of assessment errors between corporate-greenness and corporate-size surveys. In the corporate-greenness survey, the error term is defined as *Perceived Greenness* minus *Objective Greenness*. In the corporate-size survey, the error term is defined analogously

[29] "Is ChatGPT down today? What happened and when will it be back?," https://en.as.com/latest_news/is-chatgpt-down-today-what-happened-and-when-will-it-be-back-f202510-n/, accessed on October 23, 2025.

as *Perceived Size* minus *Objective Size*. All perceived and objective measures are analogously recorded on a five-point Likert scale ranging from "Not green at all/Very small (1)" to "Very green/large (5)."

Figure A1 presents histograms of the error distributions for both samples, showing the fraction of respondents in each response-error category. The figure reveals clear differences in the shape of the error distributions between corporate greenness and corporate size, indicating that participants' assessment errors vary systematically across outcome domains. A two-sample Wilcoxon rank-sum test rejects equality of distributions between the two survey samples (z = -26.67, $p < 0.001$), with substantially higher errors in the corporate size survey. This suggests that our findings are not artifacts of question framing or other design features.

5. Conclusion

We examine a core, but underexplored condition for effective sustainability disclosure: whether individuals can correctly interpret emissions data and use them to assess corporate greenness. Using a large-scale pre-registered survey experiment with more than 10,000 firm-level evaluations, we tested individuals' ability to distinguish greener from browner firms (*Sustainability Differentiation Hypothesis*) and the presence of perception biases (*Central Tendency Hypothesis*).

We find strong support for both. Consistent with the *Sustainability Differentiation Hypothesis*, individuals can meaningfully distinguish greener from browner firms when given emissions data, with economically relevant accuracy and especially strong performance among retail investors. Differentiation improves significantly when emissions are contextualized with industry-relative benchmarks, underscoring the importance of information design.

Supporting the *Central Tendency Hypothesis*, participants compress greenness assessments toward the middle of the scale, leading to overestimation of the greenness of objectively brown firms and, more pronounced underestimation of the greenness of objectively green firms. Consequently, stakeholders may fail to fully recognize improvements in environmental performance by greener firms and the environmental damage caused by browner firms.

We also show that disclosure framing and context can enhance differentiation, but have limits. Expressing emissions in relative terms or as household equivalents improves performance, whereas adding real company names worsens it, indicating that brand associations can override the informational signal conveyed by the data. Neither professional finance and sustainability expertise nor historical emissions trends improve accuracy, challenging the view that more experience or temporal data automatically leads to better judgments.

These findings suggest that without careful information design, better data might not fully produce the intended market and stakeholder responses. The observed biases may cause greener firms to receive too little credit for climate initiatives and browner firms to face too few sanctions for poor environmental performance, thereby weakening incentives to decarbonize. To ensure emissions data serve as an effective basis for decision-making, disclosure design must prioritize formats that enhance, rather than obscure, the ability of stakeholders to differentiate corporate greenness.

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Table 1: Overview of Survey Paths

The table provides an overview of the possible pathways across the three questions, presenting 32 possible survey paths of which the first fifteen were used in all both phases of the survey and the remaining paths only for the survey among representative populations in the UK and the US (Phase II). Under the "Absolute" information treatment, the survey participants were shown emissions in tCO_2e. Under the "Relative" information treatment, the survey participants were shown emissions in tCO_2e per USD 1 million of revenue. Under the "Household" information treatment, the survey participants were shown absolute emissions expressed based on the annual emissions of a typical four-person German household. Under "Absolute (Trend)" participants received Scope 1 emissions of the firm for t_{-1} as well, either with a 3 (paths 16-18) or a 30 (paths 30-32) percentage points reduction in emissions. Participants receiving the information treatment "Assets" were shown total book asset data instead of emission data. Under the "Relative (Median)" information treatment, the survey participants were shown emissions in tCO_2e per USD 1 million of revenue along with the median emissions in a given industry. Under the "Relative (Min-Max)" information treatment, the survey participants were shown emissions in tCO_2e per USD 1 million of revenue along with the minimum and maximum emissions in a given industry. Paths 21-23 were designated for incentivized runs. The three industries are "Apparel," "Automobile," and "Utility." The company names were standard in the first 12 variations ("AstraFabric Co." for "Apparel,""Velronic Motors" for "Automobile", and "Voltara Power Corp." in the "Utility" industry. In the information setting using "Household" option, the company names were varied between Standard ("Voltara Power Corp."), and Variation 1 ("Currenta Utilities Inc.") and Variation 2 ("Lumina Works Inc."). The table contains the following abbreviations for better readability: "Auto" for Automobile, "Rel." for Relative, "Stand." for Standard, "Var. 1" for Variation 1, and "Var. 2" for Variation 2.

	Question 1 (Past)			Question 2 (Future)			Question 3 (Compare)		
Path	Information Treatment	Industry Name	Company Name	Information Treatment	Industry Name	Company Name	Information Treatment	Industry Name	Company Name
1	Absolute	Auto	Stand.	Absolute	Apparel	Stand.	Absolute (Median)	Utility	Stand.
2	Absolute	Auto	Stand.	Absolute	Utility	Stand.	Absolute (Median)	Apparel	Stand.
3	Absolute	Apparel	Stand.	Absolute	Utility	Stand.	Absolute (Median)	Auto	Stand.
4	Absolute	Apparel	Stand.	Absolute	Auto	Stand.	Absolute (Median)	Utility	Stand.
5	Absolute	Utility	Stand.	Absolute	Auto	Stand.	Absolute (Median)	Apparel	Stand.
6	Absolute	Utility	Stand.	Absolute	Apparel	Stand.	Absolute (Median)	Auto	Stand.
7	Relative	Auto	Stand.	Relative	Apparel	Stand.	Rel. (Median)	Utility	Stand.
8	Relative	Auto	Stand.	Relative	Utility	Stand.	Rel. (Min-Max)	Apparel	Stand.
9	Relative	Apparel	Stand.	Relative	Utility	Stand.	Rel. (Median)	Auto	Stand.
10	Relative	Apparel	Stand.	Relative	Auto	Stand.	Rel. (Min-Max)	Utility	Stand.
11	Relative	Utility	Stand.	Relative	Auto	Stand.	Rel. (Median)	Apparel	Stand.
12	Relative	Utility	Stand.	Relative	Apparel	Stand.	Rel. (Min-Max)	Auto	Stand.
13	Household	Utility	Stand.	Household	Utility	Var. 1	Household (Median)	Utility	Var. 2
14	Household	Utility	Var. 1	Household	Utility	Var. 2	Household (Median)	Utility	Stand.
15	Household	Utility	Var. 2	Household	Utility	Stand.	Household (Median)	Utility	Var. 1
	Additionally for representative population survey:								
16	Absolute (Trend)	Utility	Stand.	Absolute (Trend)	Utility	Var. 1	Absolute (Median)	Utility	Var. 2
17	Absolute (Trend)	Utility	Var. 1	Absolute (Trend)	Utility	Var. 2	Absolute (Median)	Utility	Stand.
18	Absolute (Trend)	Utility	Var. 2	Absolute (Trend)	Utility	Stand.	Absolute (Median)	Utility	Var. 1
19	Absolute	Auto	Var. 1	Absolute	Auto	Var. 2	Absolute (Median)	Auto	Stand.
20	Absolute	Auto	Var. 2	Absolute	Auto	Var. 1	Absolute (Median)	Auto	Stand.
21	Absolute	Auto	Stand.	Absolute	Apparel	Stand.	Absolute (Median)	Utility	Stand.
22	Absolute	Apparel	Stand.	Absolute	Utility	Stand.	Absolute (Median)	Auto	Stand.
23	Absolute	Utility	Stand.	Absolute	Auto	Stand.	Absolute (Median)	Apparel	Stand.
24	Assets	Auto	Stand.	Assets	Apparel	Stand.	Assets (Median)	Utility	Stand.
25	Assets	Auto	Stand.	Assets	Utility	Stand.	Assets (Median)	Apparel	Stand.
26	Assets	Apparel	Stand.	Assets	Utility	Stand.	Assets (Median)	Auto	Stand.
27	Assets	Apparel	Stand.	Assets	Auto	Stand.	Assets (Median)	Utility	Stand.
28	Assets	Utility	Stand.	Assets	Auto	Stand.	Assets (Median)	Apparel	Stand.
29	Assets	Utility	Stand.	Assets	Apparel	Stand.	Assets (Median)	Auto	Stand.
30	Absolute (Trend)	Utility	Stand.	Absolute (Trend)	Utility	Var. 1	Absolute (Median)	Utility	Var. 2
31	Absolute (Trend)	Utility	Var. 1	Absolute (Trend)	Utility	Var. 2	Absolute (Median)	Utility	Stand.
32	Absolute (Trend)	Utility	Var. 2	Absolute (Trend)	Utility	Stand.	Absolute (Median)	Utility	Var. 1

Table 2: Objective Greenness Measure

The table reports the quintile midpoints (where Q1 and Q5 represent the lowest quintile and the highest quintile, respectively) used as a basis for the objective greenness measure for each industry shown to survey participants as well as medians that were used as reference points complementing the objective greenness measure in the "Compare" data framing condition. The inverse of the scale was used to encode the *Objective Greenness* measure ranging from 1 to 5. To illustrate, the midpoint values of the lowest (Q1) quintile were mapped to an objective greenness score of 5, or "Very green (5)," while the midpoint values of the highest (Q5) quintile were mapped to an objective greenness score of 1, or "Not green at all (1)." The absolute emissions (Panel A) were shown to the survey participants in tCO_2e or based on the annual emissions of a typical four-person German household (Panel C). The relative emissions (Panel B) were shown to the survey participants in tCO_2e per USD 1 million of revenue. The same set of quintile midpoints was applied across all three data framing conditions (Past, Future, Compare).

Industry Name	Very green (5) Q1	Q2	Q3	Q4	Not green at all (1) Q5	Median
Panel A: Absolute Emissions						
Automobile	20,000	121,000	386,000	884,000	2,829,000	432,819
Apparel	1,000	7,000	22,000	50,000	1,592,000	18,000
Utility	61,000	749,000	3,486,000	13,505,000	106,637,000	3,353,070
Panel B: Relative Emissions						
Automobile	0.04	0.54	2.40	6.57	230.27	3.52
Apparel	0.09	0.52	1.36	12.82	4,076.83	0.99
Utility	2.56	40.57	152.39	947.13	12,798.81	154.66
Panel C: Household-Equivalent Emissions						
Utility	1,906	23,406	108,938	422,031	3,332,406	104,783

Table 3: Descriptive Statistics for Control Variables

The table presents descriptive statistics for the survey respondents. The sample includes all respondents in the greenness survey (N = 3,437). The column labeled "N" reports the number of participants; "Mean" reports the average value of the variable; "SD" reports the standard deviation; "Min" reports the minimum value; "P25" reports the 25th percentile; "Median" reports the median value; "P75" reports the 75th percentile; and "Max" reports the maximum value. The variable *Age* reports the participant's self-reported age. The dummy variable *Female* takes on a value of 1 if the participant's self-reported gender is female, and 0 otherwise. *Climate Awareness* is measured on a five-point Likert scale, with 5 indicating the highest awareness. *University Degree* is a dummy variable that takes on a value of 1 if the participant holds a university degree, and 0 otherwise. *Current Mood* is measured on a five-point Likert scale, with 5 indicating a better mood. *Life Attitude* is measured on a five-point Likert scale, with 5 indicating a more optimistic life attitude. *Sustainability Exposure* is measured on a five-point Likert scale, with 5 indicating the highest possible extent to which participants self-report being exposed to environmental sustainability topics in their work, studies, or personal life. The dummy variable *High Budget* takes on a value of 1 if the participant reports having more than €3,500 available per month in total, including regular fixed expenses and potential private saving plans, and 0 otherwise. More details on the variable definitions can be found in the Data Appendix in Table A1.

Variable	N	Mean	SD	Min	P25	Median	P75	Max
Age	3,437	41.62	16.92	0.00	25.00	40.00	56.00	85.00
Female	3,437	0.48	0.50	0.00	0.00	0.00	1.00	1.00
Climate Awareness	3,437	4.21	1.10	1.00	4.00	5.00	5.00	5.00
University Degree	3,437	0.55	0.50	0.00	0.00	1.00	1.00	1.00
Current Mood	3,437	3.84	0.86	1.00	3.00	4.00	4.00	5.00
Life Attitude	3,437	3.72	0.96	1.00	3.00	4.00	4.00	5.00
Sustainability Exposure	3,437	3.03	1.12	1.00	2.00	3.00	4.00	5.00
High Budget	3,437	0.32	0.47	0.00	0.00	0.00	1.00	1.00

Table 4: Perceived vs. Objective Greenness: Descriptive Statistics by Category

The table reports the mean and standard deviation of *Perceived Greenness* for each level of *Objective Greenness*, along with the number of observations in each group. The *Objective Greenness* and the *Perceived Greenness* are measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." Panel A shows the descriptive statistics of the full sample. The sample in Panel B labeled "Past" corresponds to the framing condition applied in Question 1, where the information was presented in the past tense (i.e., "emitted"). The sample in Panel C labeled "Future" corresponds to the framing condition applied in Question 2, where the information was framed in the future tense (i.e., "plans to emit"). The sample in Panel D labeled "Compare" corresponds to the framing condition applied in Question 3, which also used past-tense framing, but in the context of a comparison to a reference level.

Panel A: Full sample			
	Perceived Greenness		
Objective Greenness	Mean	Std. Dev.	N
1	2.16	1.06	2,068
2	2.35	1.08	2,079
3	2.61	1.08	2,009
4	2.93	1.13	2,101
5	3.21	1.17	2,054
Total	2.65	1.17	10,311
Panel B: Past			
	Perceived Greenness		
Objective Greenness	Mean	Std. Dev.	N
1	2.35	0.89	679
2	2.45	0.88	694
3	2.54	0.89	676
4	2.65	0.89	704
5	2.83	0.96	684
Total	2.57	0.92	3,437
Panel C: Future			
	Perceived Greenness		
Objective Greenness	Mean	Std. Dev.	N
1	2.22	1.10	691
2	2.47	1.13	703
3	2.60	1.13	670
4	2.75	1.13	686
5	3.11	1.12	687
Total	2.63	1.16	3,437
Panel D: Compare			
	Perceived Greenness		
Objective Greenness	Mean	Std. Dev.	N
1	1.91	1.13	698
2	2.12	1.17	682
3	2.69	1.18	663
4	3.37	1.22	711
5	3.70	1.23	683
Total	2.76	1.37	3,437

Table 5: Perceived vs. Objective Greenness by Framing Condition

The table reports estimates of ordered logistic regressions (Panel A) and ordered probit regressions (Panel B) where the dependent variable is the *Perceived Greenness*. The key independent variable is *Objective Greenness*. The *Objective Greenness* and the *Perceived Greenness* are measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The control variables include *Age*, *Female*, *Climate Awareness*, *University Degree*, *Current Mood*, *Life Attitude*, *Sustainability Exposure*, and *High Budget*, the definitions of which can be found in the Data Appendix in Table A1. The sample in the column labeled "Past" corresponds to the framing condition applied in Question 1, where the information was presented in the past tense (i.e., "emitted"). The sample in the column labeled "Future" corresponds to the framing condition applied in Question 2, where the information was framed in the future tense (i.e., "plans to emit"). The sample in the column labeled "Compare" corresponds to the framing condition applied in Question 3, which also used past-tense framing, but in the context of a comparison to a reference level. Standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Ordered logistic regressions						
Dependent variable:	Past		Future		Compare	
Perceived Greenness	(1)	(2)	(3)	(4)	(5)	(6)
Objective Greenness	0.239***	0.235***	0.326***	0.333***	0.730***	0.738***
	(0.023)	(0.023)	(0.022)	(0.023)	(0.026)	(0.026)
Age		0.006***		0.005**		0.002
		(0.002)		(0.002)		(0.002)
Female		-0.092		-0.133**		-0.057
		(0.064)		(0.062)		(0.063)
Climate Awareness		-0.203***		-0.169***		-0.088***
		(0.032)		(0.032)		(0.030)
University Degree		-0.184***		-0.203***		0.035
		(0.068)		(0.067)		(0.067)
Current Mood		0.030		-0.045		-0.053
		(0.047)		(0.046)		(0.046)
Life Attitude		0.148***		0.154***		0.087**
		(0.041)		(0.041)		(0.041)
Sustainability Exposure		0.152***		0.106***		0.033
		(0.033)		(0.032)		(0.031)
High Budget		-0.008		0.077		-0.005
		(0.073)		(0.072)		(0.071)
Apparel		0.201***		0.670***		0.337***
		(0.078)		(0.075)		(0.078)
Automobile		-0.214***		0.018		0.230***
		(0.075)		(0.074)		(0.073)
Observations	3,437	3,437	3,437	3,437	3,437	3,437
Pseudo R^2	0.012	0.026	0.021	0.038	0.089	0.092
Industry FE	No	Yes	No	Yes	No	Yes
Panel B: Ordered probit regressions						
Objective Greenness	0.135***	0.133***	0.190***	0.193***	0.422***	0.425***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)	(0.015)
Observations	3,437	3,437	3,437	3,437	3,437	3,437
Pseudo R^2	0.012	0.026	0.021	0.038	0.088	0.092
Industry FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Perceived vs. Objective Greenness by Information Treatment

The table reports estimates of ordered logistic regressions (Panel A) and ordered probit regressions (Panel B) where the dependent variable is the *Perceived Greenness*. The key independent variable is *Objective Greenness*. The *Objective Greenness* and the *Perceived Greenness* are measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The control variables include *Age*, *Female*, *Climate Awareness*, *University Degree*, *Current Mood*, *Life Attitude*, *Sustainability Exposure*, and *High Budget*, the definitions of which can be found in the Data Appendix in Table A1. The sample in the column labeled "Absolute" corresponds to the treatment under which the survey participants were shown emissions in tCO_2e. The sample in the column labeled "Relative" corresponds to the treatment under which the survey participants were shown emissions in tCO_2e per USD 1 million of revenue. The sample in the column labeled "Household" corresponds to the treatment under which the survey participants were shown absolute emissions expressed based on the annual emissions of a typical four-person German household. Standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Ordered logistic regressions						
Dependent variable:	Absolute		Relative		Household	
Perceived Greenness	(1)	(2)	(3)	(4)	(5)	(6)
Objective Greenness	0.443***	0.453***	0.421***	0.440***	0.567***	0.577***
	(0.027)	(0.028)	(0.027)	(0.028)	(0.042)	(0.042)
Age		-0.001		0.008***		-0.003
		(0.003)		(0.002)		(0.005)
Female		-0.254***		0.073		-0.174
		(0.085)		(0.079)		(0.129)
Climate Awareness		-0.077*		-0.106**		-0.248***
		(0.041)		(0.046)		(0.058)
University Degree		-0.143		-0.002		-0.452***
		(0.089)		(0.086)		(0.152)
Current Mood		-0.099		0.038		0.059
		(0.062)		(0.057)		(0.094)
Life Attitude		0.178***		0.111**		0.070
		(0.051)		(0.055)		(0.078)
Sustainability Exposure		0.054		0.062		0.155**
		(0.043)		(0.043)		(0.068)
High Budget		0.007		0.024		0.083
		(0.099)		(0.095)		(0.167)
Apparel		0.799***		0.784***		
		(0.077)		(0.079)		
Automobile		0.116		0.578***		
		(0.075)		(0.079)		
Observations	2,829	2,829	2,823	2,823	1,419	1,419
Pseudo R^2	0.038	0.055	0.034	0.050	0.059	0.072
Industry FE	No	Yes	No	Yes	No	Yes
Panel B: Ordered probit regressions						
Objective Greenness	0.260***	0.264***	0.243***	0.254***	0.329***	0.336***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.024)	(0.024)
Observations	2,829	2,829	2,823	2,823	1,419	1,419
Pseudo R^2	0.038	0.056	0.033	0.049	0.059	0.071
Industry FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 7: Sustainability Differentiation Hypothesis (Robustness)

The table reports results of Mann-Whitney *U* test (Panels A.1, B.1, and C.1), size of Area Under the Receiver Operating Characteristic (ROC) Curve, (Panels A.2, B.2, and C.2), estimates of ordered logistic regressions (Panels A.3, B.3, and C.3), and ordered probit regressions (Panel A.4, B.4, and C.4) for various sub-samples or branches in the survey. The key variables are *Objective Greenness* and the *Perceived Greenness* both of which are measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The Mann-Whitney *U* test excludes observations where the *Objective Greenness* equals 3, thereby focusing only on firms classified as objectively green (those with *Objective Greenness* > 3) or objectively brown (those with the *Objective Greenness* < 3). It tests whether the*Perceived Greenness* distributions are equal for the "Green" firms and for the "Brown" firms. The area under the curve (AUC) is displayed under the same greenness classification as the Mann-Whitney *U* test, i.e., the analysis does not include firms with *Objective Greenness* equal to 3. In the logit and probit regressions, the dependent variable is the *Perceived Greenness*. The key independent variable is *Objective Greenness*. Standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Participant Groups							
Panel A.1: Mann-Whitney *U* test							
	(1) Pooled	(2) Students	(3) Retail Investors	(4) Professionals	(5) Sust. Experts	(6) Climate Concerned	(7) High Budget
Green (*Obj. Green.* > 3)	3.07	2.97	3.16	3.09	3.00	3.04	3.14
Brown (*Obj. Green.* < 3)	2.26	2.45	2.18	2.32	2.32	2.15	2.23
Observations	8,302	1,784	3,179	653	262	4,576	2,624
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Panel A.2: Area Under the Receiver Operating Characteristic Curve							
AUC	0.691	0.628	0.723	0.687	0.664	0.704	0.710
Observations	8,302	1,784	3,179	653	262	4,576	2,624
Panel A.3: Ordered Logit Regressions							
Objective Greenness	0.435***	0.296***	0.513***	0.431***	0.381***	0.473***	0.472***
	(0.014)	(0.029)	(0.024)	(0.051)	(0.078)	(0.020)	(0.025)
Observations	10,311	2,226	3,945	807	321	5,661	3,267
Pseudo R^2	0.043	0.033	0.059	0.041	0.041	0.049	0.047
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel A.4: Ordered Probit Regressions							
Objective Greenness	0.255***	0.173***	0.300***	0.255***	0.229***	0.277***	0.280***
	(0.008)	(0.017)	(0.014)	(0.029)	(0.043)	(0.012)	(0.014)
Observations	10,311	2,226	3,945	807	321	5,661	3,267
Pseudo R^2	0.044	0.033	0.060	0.042	0.044	0.050	0.049
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Industries and Countries							
Panel B.1: Mann-Whitney *U* test							
	(1) Auto	(2) Apparel	(3) Utility	(4) USA	(5) UK	(6) DE	(7) CH
Green (*Obj. Green.* > 3)	3.02	3.28	2.97	3.11	3.07	3.00	2.99
Brown (*Obj. Green.* < 3)	2.21	2.37	2.21	2.23	2.12	2.51	2.35
Observations	2,699	2,229	3,374	3,420	2,694	1,369	727
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Panel B.2: Area Under the Receiver Operating Characteristic Curve							
AUC	0.687	0.717	0.679	0.702	0.723	0.621	0.660
Observations	2,699	2,229	3,374	3,420	2,694	1,369	727
Panel B.3: Ordered Logit Regressions							
Objective Greenness	0.424***	0.486***	0.417***	0.452***	0.536***	0.264***	0.393***
	(0.024)	(0.026)	(0.022)	(0.022)	(0.026)	(0.033)	(0.046)
Observations	3,362	2,765	4,184	4,266	3,333	1,701	909
Pseudo R^2	0.043	0.048	0.040	0.048	0.063	0.025	0.038
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Panel B.4: Ordered Probit Regressions							
Objective Greenness	0.251***	0.285***	0.243***	0.266***	0.315***	0.154***	0.230***
	(0.014)	(0.015)	(0.013)	(0.013)	(0.015)	(0.019)	(0.026)
Observations	3,362	2,765	4,184	4,266	3,333	1,701	909
Pseudo R^2	0.044	0.049	0.040	0.049	0.064	0.024	0.037
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: Incentives and Information Treatments							
Panel C.1: Mann-Whitney *U* test							
	(1) Incentives	(2) MinMax	(3) Median	(4) Average	(5) Real Names	(6) YoY Δ -3%	(7) YoY Δ -30%
Green (*Obj. Green.* > 3)	2.99	3.28	3.55	3.68	2.92	2.98	3.06
Brown (*Obj. Green.* < 3)	2.17	2.53	1.94	1.90	2.23	2.22	2.32
Observations	717	385	1,277	229	480	701	736
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Panel C.2: Area Under the Receiver Operating Characteristic Curve							
AUC	0.684	0.665	0.819	0.841	0.663	0.681	0.674
Observations	717	385	1,277	229	480	701	736
Panel C.3: Ordered Logit Regressions							
Objective Greenness	0.410***	0.450***	0.819***	1.019***	0.335***	0.373***	0.424***
	(0.052)	(0.062)	(0.042)	(0.116)	(0.060)	(0.049)	(0.049)
Observations	888	473	1,590	294	597	864	891
Pseudo R^2	0.038	0.070	0.108	0.179	0.042	0.034	0.052
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel C.4: Ordered Probit Regressions							
Objective Greenness	0.239***	0.262***	0.466***	0.557***	0.208***	0.227***	0.252***
	(0.030)	(0.035)	(0.023)	(0.062)	(0.033)	(0.028)	(0.028)
Observations	888	473	1,590	294	597	864	891
Pseudo R^2	0.038	0.070	0.106	0.173	0.043	0.036	0.054
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: Greenness Error by Framing Condition, Cohort, Information Treatment, Industry, and Country

The table reports results from two-sample *t*-tests comparing the *Greenness Error* of firms classified as objectively green (*Objective Greenness* > 3) and objectively brown (*Objective Greenness* < 3). The *Greenness Error* is calculated as *Perceived Greenness* minus *Objective Greenness*, where the *Perceived Greenness* is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." *Objective Greenness* is measured on the same scale. For each subsample, the table reports the mean *Greenness Error* for green and brown firms, their difference, the two-sided p-value, and the sample sizes (N_{Green} and N_{Brown}).

	(1) Pooled	(2) Past	(3) Future	(4) Compare	(5) Absolute	(6) Relative	(7) Household
Mean (Green)	-1.43	-1.75	-1.57	-0.96	-1.51	-1.33	-1.25
Mean (Brown)	0.75	0.90	0.85	0.52	0.66	0.89	0.74
Difference	-2.18	-2.65	-2.42	-1.48	-2.17	-2.22	-1.99
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N_{Green}	4,155	1,388	1,373	1,394	1,108	1,169	548
N_{Brown}	4,147	1,373	1,394	1,380	1,138	1,113	592
	(1) Students	(2) Retail Investors	(3) Professionals	(4) Sust. Experts	(5) Climate Concerned	(6) High Budget	(7) University Degree
Mean (Green)	-1.52	-1.33	-1.38	-1.48	-1.45	-1.35	-1.36
Mean (Brown)	0.96	0.69	0.82	0.84	0.65	0.72	0.67
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N_{Green}	896	1,620	332	129	2,282	1,334	2,278
N_{Brown}	888	1,559	321	133	2,294	1,290	2,279
	(1) Incentive	(2) MinMax	(3) Median	(4) Average	(5) Real Names	(6) YoY Δ -3%	(7) YoY Δ -30%
Mean (Green)	-1.51	-1.20	-0.92	-0.86	-1.58	-1.50	-1.48
Mean (Brown)	0.67	1.04	0.44	0.42	0.69	0.72	0.81
Difference	-2.18	-2.24	-1.36	-1.28	-2.27	-2.22	-2.29
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N_{Green}	360	193	630	121	238	345	387
N_{Brown}	357	192	647	108	242	356	349
	(1) Auto	(2) Apparel	(3) Utility	(4) USA	(5) UK	(6) DE	(7) CH
Mean (Green)	-1.39	-1.43	-1.49	-1.52	-1.21	-1.49	-1.47
Mean (Brown)	0.74	0.61	1.01	0.73	0.86	0.69	0.85
Difference	-2.12	-2.03	-2.50	-2.25	-2.08	-2.18	-2.32
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N_{Green}	1,721	1,342	687	1,689	1,124	1,342	367
N_{Brown}	1,699	1,352	682	1,685	1,105	1,357	360

Table 9: Objective Greenness vs. Greenness Error by Framing Condition

The table reports estimates of ordered logistic regressions (Panel A) and ordered probit regressions (Panel B) where the dependent variable is the *Greenness Error*. The key independent variable is *Objective Greenness*. The *Objective Greenness* is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The *Greenness Error* is calculated as *Perceived Greenness* minus *Objective Greenness*, where the *Perceived Greenness* is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The control variables include *Age*, *Female*, *Climate Awareness*, *University Degree*, *Current Mood*, *Life Attitude*, *Sustainability Exposure*, and *High Budget*, the definitions of which can be found in the Data Appendix in Table A1. The sample in the column labeled "Past" corresponds to the framing condition applied in Question 1, where the information was presented in the past tense (i.e., "emitted"). The sample in the column labeled "Future" corresponds to the framing condition applied in Question 2, where the information was framed in the future tense (i.e., "plans to emit"). The sample in the column labeled "Compare" corresponds to the framing condition applied in Question 3, which also used past-tense framing, but in the context of a comparison to a reference level. Standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Ordered logistic regressions						
Dependent variable:	Past		Future		Compare	
Greenness Error	(1)	(2)	(3)	(4)	(5)	(6)
Objective Greenness	-1.823***	-1.873***	-1.213***	-1.261***	-0.698***	-0.702***
	(0.036)	(0.037)	(0.024)	(0.025)	(0.020)	(0.020)
Age		0.006***		0.005**		0.002
		(0.002)		(0.002)		(0.002)
Female		-0.095		-0.142**		-0.069
		(0.065)		(0.066)		(0.066)
Climate Awareness		-0.207***		-0.178***		-0.095***
		(0.032)		(0.034)		(0.032)
University Degree		-0.188***		-0.217***		0.041
		(0.069)		(0.070)		(0.071)
Current Mood		0.033		-0.045		-0.053
		(0.048)		(0.048)		(0.048)
Life Attitude		0.149***		0.162***		0.089**
		(0.042)		(0.043)		(0.044)
Sustainability Exposure		0.156***		0.112***		0.037
		(0.034)		(0.034)		(0.033)
High Budget		-0.007		0.080		-0.007
		(0.075)		(0.076)		(0.075)
Observations	3,437	3,437	3,437	3,437	3,437	3,437
Pseudo R^2	0.283	0.293	0.173	0.188	0.079	0.082
Industry FE	No	Yes	No	Yes	No	Yes
Panel B: Ordered probit regressions						
Objective Greenness	-1.042***	-1.068***	-0.737***	-0.760***	-0.451***	-0.453***
	(0.019)	(0.019)	(0.013)	(0.013)	(0.011)	(0.011)
Observations	3,437	3,437	3,437	3,437	3,437	3,437
Pseudo R^2	0.286	0.296	0.185	0.198	0.093	0.096
Industry FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 10: Objective Greenness vs. Greenness Error by Information Treatment

The table reports estimates of ordered logistic regressions (Panel A) and ordered probit regressions (Panel B) where the dependent variable is the *Greenness Error*. The key independent variable is *Objective Greenness*. The *Objective Greenness* is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The *Greenness Error* is calculated as *Perceived Greenness* minus *Objective Greenness*, where the *Perceived Greenness* is measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The control variables include *Age*, *Female*, *Climate Awareness*, *University Degree*, *Current Mood*, *Life Attitude*, *Sustainability Exposure*, and *High Budget*, the definitions of which can be found in the Data Appendix in Table A1. The sample in the column labeled "Absolute" corresponds to the treatment under which the survey participants were shown emissions in tCO_2e. The sample in the column labeled "Relative" corresponds to the treatment under which the survey participants were shown emissions in tCO_2e per USD 1 million of revenue. The sample in the column labeled "Household" corresponds to the treatment under which the survey participants were shown absolute emissions expressed based on the annual emissions of a typical four-person German household. Standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A: Ordered logistic regressions						
Dependent variable:	Absolute		Relative		Household	
Greenness Error	(1)	(2)	(3)	(4)	(5)	(6)
Objective Greenness	-1.161***	-1.208***	-1.140***	-1.171***	-1.067***	-1.101***
	(0.027)	(0.029)	(0.029)	(0.030)	(0.040)	(0.042)
Age		-0.001		0.008***		-0.002
		(0.003)		(0.003)		(0.005)
Female		-0.269***		0.075		-0.185
		(0.089)		(0.083)		(0.135)
Climate Awareness		-0.079*		-0.111**		-0.262***
		(0.043)		(0.048)		(0.061)
University Degree		-0.149		-0.009		-0.447***
		(0.093)		(0.090)		(0.158)
Current Mood		-0.097		0.041		0.069
		(0.065)		(0.059)		(0.099)
Life Attitude		0.183***		0.118**		0.067
		(0.052)		(0.057)		(0.082)
Sustainability Exposure		0.057		0.065		0.164**
		(0.045)		(0.045)		(0.071)
High Budget		0.003		0.026		0.067
		(0.102)		(0.099)		(0.174)
Apparel		0.835***		0.818***		
		(0.082)		(0.083)		
Automobile		0.103		0.593***		
		(0.077)		(0.082)		
Observations	2,829	2,829	2,823	2,823	1,419	1,419
Pseudo R^2	0.165	0.180	0.160	0.174	0.150	0.162
Industry FE	No	Yes	No	Yes	No	Yes
Panel B: Ordered probit regressions						
Objective Greenness	-0.699***	-0.722***	-0.689***	-0.704***	-0.647***	-0.659***
	(0.015)	(0.015)	(0.016)	(0.016)	(0.022)	(0.022)
Observations	2,829	2,829	2,823	2,823	1,419	1,419
Pseudo R^2	0.175	0.190	0.170	0.183	0.161	0.171
Industry FE	No	Yes	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Table 11: Perception Bias in Greenness: Predictive Margins and Multinomial Logit Estimates

The table reports the results of multinomial logit models examining perception bias in greenness. The variable *Bias Type* is the dependent variable and captures the direction of perception bias in greenness assessments: -1 when *Perceived Greenness* is lower than *Objective Greenness* (underestimation), 0 when they are equal (accurate perception), and 1 when *Perceived Greenness* exceeds *Objective Greenness* (overestimation). Panel A presents predictive margins from the multinomial logit model, showing the estimated probabilities of underestimation, accurate perception, and overestimation for objectively brown and green firms. Panel B reports the corresponding multinomial logit coefficient estimates, which underlie these predicted probabilities. Panel A reports estimates of *Bias Type* on *Objective Greenness* indicators with and without control variables. The control variables include *Age*, *Female*, *Climate Awareness*, *University Degree*, *Current Mood*, *Life Attitude*, *Sustainability Exposure*, and *High Budget*, the definitions of which can be found in the Data Appendix in Table A1. In Panel B, standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Dependent variable:	No Controls		With Controls	
Bias Type	Brown	Green	Brown	Green
Panel A: Predictive Margins				
Underestimate	12.88%	76.10%	12.84%	76.14%
Accurate	32.82%	19.54%	32.77%	19.52%
Overestimate	54.30%	4.36%	54.38%	4.34%
Panel B: Multinomial Logit Regression				
	Underestimate (vs. Accurate)		Overestimate (vs. Accurate)	
	(1)	(2)	(3)	(4)
	No controls	With Controls	No controls	With Controls
Green	2.295***	2.317***	-2.005***	-2.043***
	(0.066)	(0.067)	(0.090)	(0.092)
Age		-0.002		0.000
		(0.002)		(0.002)
Female		0.094		-0.044
		(0.064)		(0.067)
Climate Awareness		0.081**		-0.145***
		(0.033)		(0.032)
University Degree		-0.165**		-0.276***
		(0.070)		(0.071)
Current Mood		-0.006		-0.036
		(0.046)		(0.047)
Life Attitude		-0.063		0.099**
		(0.041)		(0.042)
Sustainability Exposure		-0.035		0.056*
		(0.031)		(0.032)
High Budget		0.004		-0.030
		(0.074)		(0.076)

Table 12: Central Tendency Hypothesis (Robustness)

The table reports predictive margins from multinomial logit models estimating the probability of underestimating, accurately perceiving, or overestimating company greenness (Panels A.1, B.1, and C.1), as well as estimates from ordered logistic (Panels A.2, B.2, and C.2) and ordered probit models (Panels A.3, B.3, and C.3). In Panels A.1, B.1, and C.1, observations where the *Objective Greenness* equals 3 are excluded, thereby focusing only on firms classified as objectively green (those with *Objective Greenness* > 3) or objectively brown (those with the *Objective Greenness* < 3). In Panels A.2, A.3, B.2, and B.3, the dependent variable is *Perceived Greenness*, and the key independent variable is *Objective Greenness*. Both variables are measured on a five-point Likert scale ranging from "Not green at all (1)" to "Very green (5)." The control variables include *Age*, *Female*, *Climate Awareness*, *University Degree*, *Current Mood*, *Life Attitude*, *Sustainability Exposure*, and *High Budget*. The variable definitions can be found in the Data Appendix in Table A1. In the ordered logit and probit regressions, standard errors clustered at the participant level are reported in parentheses. ***, **, and * indicate statistical significance of the underlying coefficient at the 1%, 5%, and 10% levels, respectively.

Panel A.1: Probabilities of Over-, Accurate-, and Underestimation (Multinomial Logit Predictions)							
	(1) Pooled	(2) Students	(3) Retail Investors	(4) Professionals	(5) Sust. Experts	(6) Climate Concerned	(7) High Budget
Green (Overestimated)	4.34	3.58	4.93	4.54	4.88	4.34	5.13
Green (Accurate)	19.52	17.66	21.68	19.78	19.12	19.07	21.04
Green (Underestimated)	76.14	78.75	73.39	75.68	76	76.6	73.83
Brown (Overestimated)	54.38	62.6	51.14	57.05	59.15	50.1	52.76
Brown (Accurate)	32.77	28.83	34.66	32.95	28.88	34.5	33.65
Brown (Underestimated)	12.84	8.57	14.21	9.99	11.97	15.4	13.59
Observations	8,302	1,784	3,179	653	262	4,576	2,624
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel A.2: Ordered Logit Regressions							
Objective Greenness	-1.168***	-1.354***	-1.090***	-1.257***	-1.265***	-1.106***	-1.125***
	(0.015)	(0.034)	(0.023)	(0.057)	(0.087)	(0.019)	(0.026)
Observations	10,311	2,226	3,945	807	321	5,661	3,267
Pseudo R^2	0.169	0.203	0.155	0.185	0.197	0.157	0.158
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel A.3: Ordered Probit Regressions							
Objective Greenness	-0.702***	-0.803***	-0.657***	-0.745***	-0.758***	-0.669***	-0.675***
	(0.008)	(0.018)	(0.012)	(0.030)	(0.046)	(0.010)	(0.014)
Observations	10,311	2,226	3,945	807	321	5,661	3,267
Pseudo R^2	0.179	0.212	0.165	0.195	0.207	0.168	0.169
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B.1: Probabilities of Over-, Accurate-, and Underestimation (Multinomial Logit Predictions)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Auto	Apparel	Utility	USA	UK	DE	CH
Green (Overestimated)	4.53	6.06	3.06	4.94	4.03	4.35	1.97
Green (Accurate)	19.07	23.05	17.49	20.53	19.35	18.02	19.5
Green (Underestimated)	76.4	70.89	79.44	74.53	76.63	77.62	78.54
Brown (Overestimated)	51.41	59.6	53.2	53.57	48.73	65.02	58.7
Brown (Accurate)	35.7	30.88	31.78	31.87	37.23	26.92	31.37
Brown (Underestimated)	12.89	9.51	15.02	14.57	14.04	8.06	9.93
Observations	2,699	2,229	3,374	3,420	2,694	1,369	727
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B.2: Ordered Logit Regressions							
Objective Greenness	-1.162***	-1.149***	-1.199***	-1.106***	-1.137***	-1.387***	-1.321***
	(0.026)	(0.028)	(0.023)	(0.022)	(0.026)	(0.040)	(0.053)
Observations	3,362	2,765	4,184	4,266	3,333	1,701	909
Pseudo R^2	0.166	0.165	0.175	0.157	0.166	0.207	0.197
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	No	No	No	Yes	Yes	Yes
Panel B.3: Ordered Probit Regressions							
Objective Greenness	-0.695***	-0.690***	-0.720***	-0.669***	-0.681***	-0.817***	-0.783***
	(0.014)	(0.015)	(0.012)	(0.012)	(0.014)	(0.021)	(0.028)
Observations	3,362	2,765	4,184	4,266	3,333	1,701	909
Pseudo R^2	0.176	0.175	0.186	0.168	0.176	0.215	0.205
Industry FE	Yes	No	No	No	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel C.1: Probabilities of Over-, Accurate-, and Underestimation (Multinomial Logit Predictions)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Incentives	MinMax	Median	Average	Real Names	YoY Δ -3%	YoY Δ -30%
Green (Overestimated)	5.36	9.23	9.19	6.47	3.19	4.64	3.66
Green (Accurate)	18.78	26.01	32.79	37.70	19.12	18.90	16.12
Green (Underestimated)	75.86	64.76	58.02	55.83	77.69	76.45	80.22
Brown (Overestimated)	48.89	67.82	36.23	38.49	50.60	50.53	57.89
Brown (Accurate)	35.09	25.47	43.65	38.91	36.52	34.39	27.26
Brown (Underestimated)	16.02	6.70	20.12	22.6	12.88	15.08	14.85
Observations	717	385	1,277	229	480	701	736
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel C.2: Ordered Logit Regressions							
Objective Greenness	-1.114***	-1.065***	-0.686***	-0.659***	-1.394***	-1.233***	-1.285***
	(0.049)	(0.062)	(0.030)	(0.070)	(0.074)	(0.054)	(0.054)
Observations	888	473	1,590	294	597	864	891
Pseudo R^2	0.158	0.169	0.080	0.114	0.208	0.179	0.202
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel C.3: Ordered Probit Regressions							
Objective Greenness	-0.672***	-0.648***	-0.441***	-0.424***	-0.809***	-0.734***	-0.762***
	(0.026)	(0.033)	(0.017)	(0.039)	(0.039)	(0.028)	(0.028)
Observations	888	473	1,590	294	597	864	891
Pseudo R^2	0.168	0.177	0.092	0.121	0.215	0.190	0.212
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

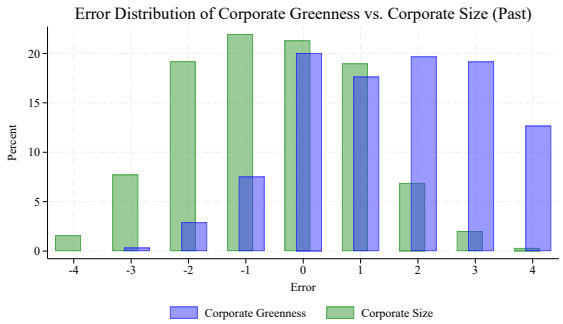
Appendix A: Data Appendix

Figure A1: Error Distribution: Corporate Greenness vs. Corporate Size Samples

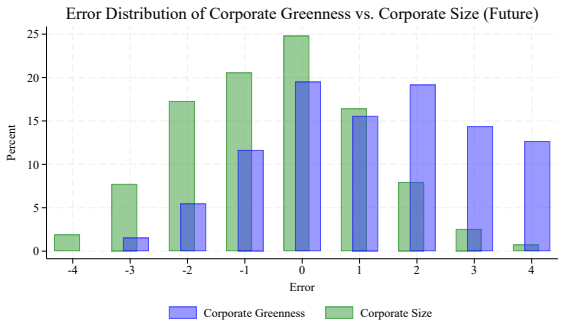
The figure presents the distribution of the assessment error. For the corporate-greenness survey, *Error* is defined as *Perceived Greenness* minus *Objective Greenness*. For the corporate-size survey, *Error* is defined analogously as *Perceived Size* minus *Objective Size*. *Perceived Greenness*, *Objective Greenness*, *Perceived Size*, and *Objective Size* are all on a five-point Likert scale ranging from "Not green/large at all (1)" to "Very green/large (5)." The histogram displays the fraction of the sample falling into each response-error category. The subfigure labeled "Pooled" includes all responses (Questions 1-3). The subfigure labeled "Question 1" corresponds to the framing condition, where the information was presented in the past tense (e.g., "emitted"). The subfigure labeled "Question 2" corresponds to the framing condition, where the information was framed in the future tense (e.g., "plans to emit"). The subfigure labeled "Question 3" corresponds to the framing condition, which also used past-tense framing, but in the context of a comparison to a reference level. The corporate-size survey was administered to a representative U.S. sample in Phase II. For comparability, we likewise limit the corporate-greenness survey to the Phase II sample, which consists of representative households from the U.S. and the UK. The corporate-size survey comprises 584 participants (for a total of 1,752 responses in the "Pooled" sample), whereas the corporate-greenness survey covers paths 1-6 and includes 582 participants (for a 1,746 total responses in the "Pooled" sample). As detailed in Table 1, both samples employed an identical question wording and information set (absolute values in the past and future tense with information on the median provided in Question 3) but were in the different contexts.

Pooled

Question 1 (Past)



Question 2 (Future)



Question 3 (Compare)

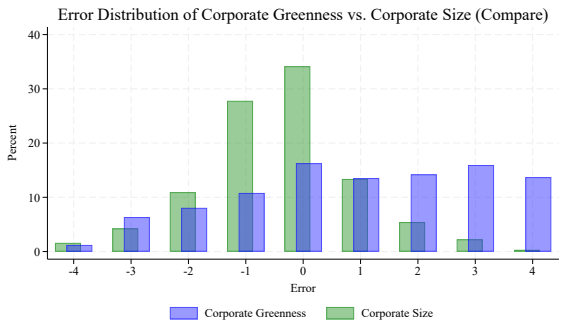


Table A1: Variable Definitions

This table presents the definitions of variables elicited in the survey or constructed from participants' responses. The variables that were used as control variables in the analyses are in italics.

Variable	Description
High Budget	A dummy variable, which takes on a value of 1 if the participant states to have more than €3,500 available per month in total, including regular fixed expenses and potential private saving plans, and 0 otherwise.
Age	Participant's self-reported age.
Climate Awareness	Answer to the question "How strongly do you agree with the statement "Climate change is a serious problem that needs to be solved?" on a five-point Likert scale from "Not at all (1)" to "Completely (5)."
Current Mood	Answer to the question "How would you describe your mood right now?" on a five-point Likert scale from "Very bad (1)" to "Very good (5)."
Country	Participant's self-reported current country of residence.
Female	A dummy variable, which takes on a value of 1 if the participant chooses *Female* from among the options *Female*, *Male*, and *Diverse*, and 0 otherwise.
Highest Education	Answer to the question "What is highest degree or level of schooling that you have completed so far?," which included the following answer choices: *High school*, *Bachelor degree*, *Master degree*, and *Doctorate*.
Income	Answer to the question "Approximately how much money do you have available per month in total (in €), including your regular fixed expenses and potential private saving plans?," which included the following answer choices: < *€500*, *€500 - €1,500*, *€1,501 - €2,500*, *€2,501 - €3,500*, *€3,501 - €4,500*, *€4,501 - €8,000*, *€8,001 - €12,000*, and > *€12,000*.
Life Attitude	Answer to the question "How would you generally describe your outlook on life?" on a five-point Likert scale from "Very pessimistic (1)" to "Very optimistic (5)."
Objective Greenness	Measure based on scope 1 emissions from the year 2022 and converted to quintiles, the midpoints of which were used to create a scale corresponding to "Not green at all (1)" to "Very green (5)."
Occupation	Answer to the question "What is your occupation?," which included the following answer choices: *Bachelor student*, *Master student*, *Self-employed*, *Employee (academic)*, *Employee (professional)*, *Retired*, *Unemployed*, and *Other*.
Perceived Greenness	Answer to the question "How green do you think this company is" on a five-point Likert scale from "Not green at all (1)" to "Very green (5)."
Sustainability Exposure	Answer to the question "To what extent are you exposed to environmental sustainability topics in your work, studies, or personal life?" on a five-point Likert scale from "Not at all (1)" to "Extensively (5)."
University Degree	A dummy variable, which takes on a value of 1 if the participant holds a university degree, i.e., chooses the option *Bachelor degree*, *Master degree*, or *Doctorate* in the question regarding the highest degree or level of schooling that the participant has completed so far, and 0 otherwise.

Variable	Description
LinkedIn	A dummy variable aimed at verifying that participants attention, which takes on a value of 1 if the participant replied "Yes" to the question “Were you invited to this survey via LinkedIn?,” and 0 otherwise.
Utility Company	An open-ended question in the version of the survey administered to the general public designed to assess participants’ knowledge of one of the three industries referenced in the survey (“Please describe, in one sentence or a few simple bullet points, what a utility company does.”).

Table A2: Survey Delivery to University Students and Finance Professionals

The table reports the modes of survey administration for the student and finance professional samples. Panel A summarizes the student sample, which comprises 633 responses. It provides information on students' university affiliation, field of study, level of study, the mode of survey delivery, and the survey date. Panel B presents the professional sample, consisting of 269 responses. For students, the survey was conducted on the date indicated in the table, whereas for professionals, responses were collected over the two-week period following the date of delivery. VfU stands for Verein für Umweltmanagement und Nachhaltigkeit in Finanzinstituten.

Panel A: Survey Delivery to University Students				
University	Study Area	Level	Delivery	Date
Frankfurt School of Finance & Management	Finance	Graduate	E-mail	May 11, 2025
Justus Liebig University Giessen	Business	Undergraduate	In-class	April 24, 2025
University of Bern	Finance	Undergraduate	In-class	May 22, 2025
University of Hamburg	Business	Undergraduate	Online (lecture)	May 16, 2025
University of Kassel	Business	Undergraduate	Online (lecture)	May 21, 2025
University of Lausanne	Finance	Undergraduate	In-class	May 12, 2025

Panel B: Survey Delivery to Finance Professionals		
Professional Body	Delivery	Date
AZEK	E-mail	June 17, 2025
Bundesverband Öffentlicher Banken Deutschlands (VÖB)	E-mail	May 18, 2025
CFA Society Germany	E-mail	August 15, 2025
CFA Society Slovakia	E-mail	June 12, 2025
CFA Society Switzerland	Conference	May 20, 2025
Frankfurt School Executive Education	E-mail	May 12, 2025
LinkedIn Outreach	Direct Messaging	May 6, 2025
VfU	Newsletter	June 2, 2025

Table A3: Sample Attrition

The table reports stepwise attrition throughout the survey for the two phases. Phase I (Students and Professionals) corresponds to the subset not recruited via Prolific; Phase II (General Public) corresponds to the subset recruited via Prolific. Phase II numbers do not include firm size robustness checks. In each panel, "N reached" is the number of participants who reached the step; "Lost" is the count missing on the given variable (i.e., lost at that step); "Step attrition" is Lost / N reached; "Remaining" is number remaining after removing NAs at the step; "Cumulative attrition" is the share of the original sample lost up to and including the step; and "Remaining % of initial" is remaining / initial sample size.

Phase I: Students and Professionals (Initial sample size: 955)						
Step	N reached	Lost	Step attrition	Remaining	Cumulative attrition	Remaining % of initial
(1) Demographics	955	7	0.73%	948	0.73%	99.27%
(2) First Greenness Assessment	948	24	2.53%	924	3.25%	96.75%
(3) Second Greenness Assessment	924	8	0.87%	916	4.08%	95.92%
(4) Third Greenness Assessment	916	7	0.76%	909	4.82%	95.18%
(5) Post Treatment	909	7	0.77%	902	5.55%	94.45%
Phase II: General Public (Initial sample size: 2,725)						
Step	N reached	Lost	Step attrition	Remaining	Cumulative attrition	Remaining % of initial
(1) Demographics	2,725	83	3.05%	2,642	3.05%	96.95%
(2) First Greenness Assessment	2,642	12	0.45%	2,630	3.49%	96.51%
(3) Second Greenness Assessment	2,630	5	0.19%	2,625	3.67%	96.33%
(4) Third Greenness Assessment	2,625	6	0.23%	2,619	3.89%	96.11%
(5) Post Treatment	2,619	7	0.27%	2,612	4.15%	95.85%
(6) Attention Check	2,612	77	2.95%	2,535	6.97%	93.03%