# Check the Box: Does Information on the Existence of Public Climate Disclosure Reduce Federal Suppliers' Emissions?

Shushu Jiang
Shushu.jiang@nus.edu.sg

Rachel Xi Zhang
rachelzhang@nus.edu.sg

National University of Singapore

April 24, 2024

**Abstract**

We examine the effect of the first regulation seeking federal suppliers' climate information on reducing suppliers' carbon emissions. In 2016, the U.S. federal government implemented FAR 52.223-22, which requires certain suppliers to represent *whether* and *where* they have public disclosure of greenhouse gas emissions. Using novel data on suppliers' representations, we find a greater reduction in emissions among suppliers after making the disclosure representation, compared to those without the representation. This finding is robust to different designs that mitigate endogeneity concerns. We further show that the effect is stronger when suppliers are more concerned about losing federal contracts and when contracting officers can better process suppliers' climate disclosures using information obtained by the representation. Our evidence highlights how a simple check-the-box representation can alter government suppliers' pollution behaviors—economically reliant firms respond to increased perceived risks of carbon emissions when their government customers can more easily process their climate disclosures.

---

## 1. Introduction

Climate change is a complex societal problem, as profit-maximizing private actors do not fully internalize the social costs of their greenhouse gas (GHG) emissions (Stern 2006). Regulators have faced considerable resistance to implementing punitive carbon taxes (Carattini et al., 2018). On the other hand, governments have increasingly utilized their procurement power to incentivize corporations to cut down GHG emissions (World Economic Forum 2022), leveraging their bargaining power as the largest buyer of the corporate sector (Sahadi 2012). Despite growing interest, how governments can improve the efficacy of green public procurement remains unclear. In this paper, we examine the role of the *first* regulation seeking federal suppliers' climate information in reducing suppliers' carbon emissions.

On December 19, 2016, the U.S. federal government, through its Federal Acquisition Regulations (FAR), implemented FAR 52.223-22 (the GHG representation). FAR 52.223-22 is a simple check-the-box requirement; it requires bidders that received more than $7.5 million in federal contracts in the previous federal fiscal year to make a representation on whether and, if so, where they publicly disclose GHG emissions and reduction goals prior to submitting a bid. Since President Obama's Executive Order 13514 broadened the green procurement framework in 2009, the U.S. federal government has expressed environmental preferences in choosing suppliers (Light and Orts, 2017; Brill, 2020). However, it is not obvious whether the GHG representation per se can meaningfully reduce suppliers' emissions. First, similar to many Obama-era environmental initiatives, the GHG representation lacks teeth –it does not require suppliers to supply GHG information or bind them to specific reduction targets. Neither does it impose specific enforcement measures.[1] Second, President Trump's announcement to exit

---

[1] In contrast, subsequent climate proposals by FAR incorporated relevant enforcement mechanisms. For instance, on November 14, 2022, FAR issued a new proposal, titled "Disclosure of Greenhouse Gas Emissions and Climate-Related Financial Risk (Federal Acquisition Regulation, 2022). The new proposal not only requests certain suppliers to provide GHG disclosures and reduction goals but also sets out specific procedures for individual contracting officers to determine whether a supplier is in compliance.

the Paris Agreement on June 1, 2017, created uncertainty over the extent to which sustainability is prioritized in federal procurement. Finally, the GHG representation might not meaningfully alter contracting officers' costs of analyzing suppliers' emissions. For disclosing suppliers, their GHG information was likely publicly available prior to the regulation.[2]

On the other hand, the GHG representation is the *first* time across *all* agencies that the federal government formally requested GHG information in a contractual provision. Despite the political uncertainty over climate change issues during the Trump Administration, FAR 52.223-22 was never revoked and remained codified to date. Further, government agencies continued to make emission reduction progress afterward. Federal procurement adopts a "best value" approach that allows contracting officers to award bidders other than the lowest priced bidder or the highest technically rated bidder, as long as it aligns with the best interest of the government (FAR 15.101-1). This approach enables sustainability factors to be incorporated into procurement evaluation (U.S. General Services Administration, 2015). By codifying GHG information into federal-wide acquisition regulations, the GHG representation sends a salient signal of the government's intention to reduce procurement emissions to both contracting officers and suppliers.[3] Contracting officers, using information obtained through the representation, pay more attention to suppliers' emissions in bidder selection, contract monitoring, and re-contracting. Second, wide heterogeneity exists in whether, where, and how firms disclose climate information (Christensen et al., 2021), which often creates difficulty for capacity-constrained contracting officers to evaluate (Warren, 2014). The GHG representation can reduce contracting officers' information processing costs in evaluating suppliers' GHG emissions, as they 1) determine whether suppliers disclose GHG information, 2) locate such

---

[2] We provide more detailed discussions on the availability of public GHG information in Appendix E.
[3] Consistently, the federal government stepped up sustainable procurement efforts and implemented several initiatives after 2016. While none of these initiatives are federal-wide, they mark concrete steps taken by the federal government to reduce procurement emissions (see Section 2.1 for more detailed discussion).

information, and 3) retrieve it. Finally, the GHG representation is part of the mandatory certification and representation process that a supplier needs to make at least on an annual frequency (FAR 4.12). Through this process, managers of federal suppliers become more aware of the potential consequences of their firms' carbon emissions (Kothari et al., 2023). Anticipating that the government will take action (either now or in the future) with the readily available GHG information, suppliers may start reducing pollution (Christensen et al., 2021).

We gather government contracts from the official open data source of federal spending information (USAspending.gov) and GHG emissions from Trucost and merge the data with the Compustat universe. We restrict our sample to three years before and after the implementation of the GHG representation in 2016. This procedure yields 390 unique government suppliers and 2,046 firm-year observations. Next, we gather novel data on each supplier's historical GHG representations, as well as the identity of the individual contracting officer approving each contract, from the System for Award Management (SAM.gov). Based on its response to FAR 52.223-22, we construct indicator variables on whether a supplier provides the GHG representation and whether it states that it has public GHG disclosure. We also obtain information on the supplier's public GHG disclosure websites, as stated in their representations.

A few important patterns emerge. 11.8% of suppliers in our sample provide the GHG representation. Within this group, 61.9% are mandatory representations, as the supplier's total contract value exceeds the $7.5 million threshold. We also note that another 8.6% of suppliers fail to provide the GHG representation despite exceeding the $7.5 million threshold. The relatively high non-compliance rate is consistent with the lack of enforcement mechanisms in FAR 52.223-22, making the extent of its effectiveness in reducing suppliers' emissions an ultimate empirical question. 9.6% of suppliers indicate in the representation that they have public climate disclosure, and 7.7% provide a valid website link, which we verified as having an accessible archive on the Wayback Machine prior to the representation date.

We first explore the effect of making the GHG representation on suppliers' emissions with a difference-in-differences design. We use log-transformed combined Scope 1 emissions (operational emissions) and Scope 2 emissions (energy consumption emissions) as our main measure of emissions. Throughout our analyses, we include firm and year-fixed effects to hold constant time-invariant firm characteristics and time trends.[4] We find that suppliers reduce emissions by 12.9% more in the years when they make the GHG representation relative to those that do not provide the representation. We find similar results if we focus on the subset of suppliers that provide the representation because they are mandated to do so, as the decision to make voluntary representations might be correlated with other factors that affect emissions. Our findings are robust when we use decile ranks of emissions or log-transformed emission intensity (emissions scaled by revenues or cost of goods sold) as the dependent variable. These results consistently suggest that making the GHG representation significantly increases federal suppliers' perceived risks of carbon emissions and motivates them to emit less.

The fact that we observe both "voluntary representations" and "mandatory no-representations" poses two validity threats. First, an omitted time-varying firm characteristic (e.g., shareholder environmental pressure) could be correlated with the likelihood of both making the GHG representation and reducing emissions. Second, concerns over reverse causality exist—firms expecting to reduce emissions may be more likely to make the GHG representation. We address these concerns using a battery of archival evidence, further supplemented with institutional knowledge from interviewing two federal procurement officials. First, we use the mandate—firms with estimated total contract values above the threshold—as an instrument for the actual GHG representation. The assignment of suppliers into mandated and not is based on the aggregated value of all contracts realized during the

---

[4] In Section 4.1, we use alternative designs to address the recent concerns over potential biases from staggered treatments in two-way fixed effects models (Cengiz et al., 2019; Goodman-Bacon, 2021; Baker et al., 2022; Breuer and de Haan, 2023).

previous fiscal year, making it difficult to precisely manipulate this threshold. Our results remain unchanged. Second, we examine the emissions of firms that voluntarily make the GHG representation. If reverse causality drives our results, we expect to observe the strongest emission reductions among these firms. Yet, we do not document significant emission reductions among voluntary firms. Third, we examine changes in emissions around the first time firms started to represent and find no evidence that emission reduction began in the pre-period. In addition, once firms start making the GHG representation, they continue doing so in later years, inconsistent with managers discretionarily making the representation only in years when they (expect to) reduce emissions. Fourth, we use entropy balancing matching to control for observable differences between firms that make and those that do not make the GHG representation, including total contract size, and our results remain unchanged. Finally, based on our interviews with two federal procurement officials, we believe that it is unlikely that suppliers strategically misrepresent, as it could result in a federal offense and a loss of all future contracts. Instead, unintentional miscalculations are likely as FAR 52.223-22 was the only provision that utilizes the $7.5 million threshold in the FAR representation processes. We provide a detailed discussion in Internet Appendix IA.

Next, we investigate the mechanisms through which the GHG representation might motivate suppliers to reduce emissions. Our cross-sectional analyses exploit variations at the firm, contract, and contracting officer levels, yielding the following insights. First, suppliers are motivated by economic incentives to reduce emissions. We document greater emission reductions among suppliers relying more on the federal government as a customer (proxied by the percentage of revenue from federal contracts and the disclosure of the federal government as a major customer) and suppliers that face greater competition and uncertainty in securing future contracts (measured using the degree of competitive bidding and the variability of historical revenue from federal contracts). Second, we show that emission abatement

strengthens when the GHG representation helps to reduce contracting officers' information processing costs to a greater extent. We find greater emission reductions when the information provided in the representation is more useful (when firms provide a valid link to their public GHG disclosure and reduction goals) and when contracting officers are able to compare emissions among their portfolio of suppliers. Finally, we exploit variations in contracting officers' capacity to monitor each procurement contract and document greater reductions when officers are less capacity-constrained.

Finally, we investigate the operational feasibility of emission reductions and the associated financial impacts. Suppliers can make use of existing low-cost abatement opportunities, including LED lighting, insulation retrofits, and motor systems efficiency, to reduce financial burdens (McKinsey, 2009). Consistently, our results suggest that suppliers focus on Scope 2 emission reductions, which can be achieved relatively quickly through green energy purchases and energy-saving campaigns. In addition, we do not find that firms scale back production, increase production costs, or experience a drop in gross margins or accounting returns, consistent with prior literature (Downar et al., 2021). Finally, we show that emission reductions are associated with a greater likelihood of receiving future contracts and receiving larger future contracts, suggesting that tangible economic benefits motivate suppliers and may offset the potential adverse financial impacts associated with carbon abatement costs.

We acknowledge the possibility that the GHG representation could induce suppliers to change their disclosure behavior, including providing more GHG information. While we verify that the availability and the content of suppliers' GHG disclosure websites (as indicated in the representation) remain largely unchanged around the first time that a supplier makes the representation (Appendix E), we cannot fully rule out this possibility due to the difficulty in accurately measuring all dimensions of climate disclosure. Nevertheless, we believe that the body of our analyses provides corroborative evidence that the GHG representation, by reducing

the federal customers' information processing costs and increasing suppliers' perceived costs of carbon emission, induces suppliers to reduce emissions.

Our study contributes to several streams of literature. First, it sheds light on how government procurement alters corporate policies. An emerging literature has demonstrated how government contracting has economic consequences on firms' operational and financing decisions (Dhaliwal et al., 2016; Cohen and Li, 2020; Goldman, 2020; Cohen et al., 2022). Recent studies further show that firms contracting with governments have incentives to reduce carbon emissions and improve their ESG performance (Flammer 2018; Even-tov et al. 2022). Our results suggest that the government can better convey its environmental preference and reduce supply chain emissions through a check-the-box regulation on suppliers' climate disclosure. This finding carries policy implications as governments seek to leverage public procurement to reduce corporation emissions as an alternative to punitive taxes and penalties.

Second, our study contributes to the literature on the real effects of CSR disclosure regulations. Regulations that change the production, dissemination, and presentation of CSR information can affect how stakeholders process the information, which in turn induces real changes in firms' CSR activities (Roychowdhury et al., 2019; Christensen et al., 2021; Kothari et al., 2023). Several recent studies document consistent evidence, with a focus on investors (Christensen et al., 2017; Jouvenot and Krueger, 2020; Downar et al., 2021; Yang, Muller, and Liang, 2021). Exploiting the regulation that collects information on federal suppliers' public climate disclosure, our study demonstrates the role of customers in this feedback effect of disclosure regulations. Relatedly, we highlight the benefit of readily accessible public GHG disclosures as financial regulators worldwide start to implement mandatory GHG disclosure standards.

Finally, our study contributes to the literature on disclosure processing costs to the decision context of supplier-customer contracts. Specifically, we document the magnitude to which a reduction in information processing frictions can affect the actions of federal suppliers. While earlier work focused on the implications of processing costs for users of financial information in the capital markets (see Blankespoor et al., 2020, for a review), researchers know little about how these costs affect other decision-makers. Information processing frictions can be pervasive in the government setting, in which the force of arbitrage is not as powerful as in equity markets (Wilson, 2019; Duguay et al., 2023; Even-Tov et al., 2023). By documenting the role of information processing costs among contracting officers in green public procurement, we answer the call by Blankespoor et al. (2020) to study the effects of disclosure processing frictions beyond the capital markets.

## 2. Institutional Background and Literature

### 2.1 The federal procurement process and FAR 52.223-22

The Federal Acquisition Regulations codify the U.S. federal government procurement procedures. When an agency decides to purchase a good or service, a contracting officer will post a public request for proposals, and bidders can submit offers. Government contracts are often contested, with an average of 16 competing bids and only 13% of contracts receiving single bids in our sample. FAR sets out various guidelines for conducting diligence on potential vendors. The contracting officer oversees the procurement process, including posting the initial request for proposal, evaluating bids, selecting the supplier, and monitoring the contractor's adherence to requirements and standards (Spenkuch et al., 2023; FAR 1.620-1). Federal procurement adopts a "best value" approach; the contracting officer has the discretion to award bidders based on best alignment with the interest of the government, potentially incorporating other dimensions in addition to price and technical rating (FAR 15.101-1).

In 2009, President Obama's Executive Order 13514 broadened the green procurement framework, which established the baseline for reducing GHG emissions. On March 19, 2015, President Obama issued Executive Order 13693 that advocates Federal leadership in sustainability and carbon emissions. On May 25, 2016, the Department of Defense (DoD), General Service Administration (GSA), and National Aeronautics and Space Administration (NASA) proposed to request a representation of vendors' GHG emissions and reduction goals in federal procurement. On November 18, 2016, FAR 52.223-22, titled Public Disclosure of Greenhouse Gas Emissions and Reduction Goals-Representation, was announced, and it was implemented on December 19, 2016.

FAR 52.223-22 consists of a two-part question list. In the first part (FAR 52.223-22 (a)), *all* entities must check a box on whether they received $7.5 million or more in federal contracts during the previous federal fiscal year or received less than $7.5 million but still want to make a representation on climate disclosure. If an entity checks "yes," SAM.gov will then require the entity to answer two mandatory follow-up questions (FAR 52.223-22 (b)). The first is whether the entity itself or through its immediate owner or highest-level owner, publicly discloses GHG emissions or emission reduction goals. If the answer is yes, the system further asks for the URL of the GHG disclosure (FAR 52.223-22 (c)). Appendix B provides more details, and Figure 1 provides an illustration.

A few details of FAR 52.223-22 are worth noting. First, it is not a disclosure mandate (i.e., it does not require entities to disclose their emissions, publicly or privately), nor does it bind entities to specific reduction targets. Instead, the GHG representation helps contracting officers locate, access, and process suppliers' GHG information. Second, it introduces a threshold: entities that received $7.5 million or more in federal contract awards in the prior federal fiscal year must make the representation. It is unlikely that suppliers can precisely manipulate the $7.5 million threshold. The initial value awarded for each contract often

involves external factors (e.g., the extent of competition at bidding and the types of contracts). After the initial award, both the federal government and the contractors could exercise options, as specified in the initial contract, to alter the value and the scope of the contract during the life of the project. Therefore, the frequent modifications mean that the realized value of a contract is often beyond the bidder's control. In addition, federal suppliers usually receive multiple contracts in a year, making it difficult for them to control the realized total award value. Moreover, FAR 52.223-22 was announced on November 18, 2016, and took effect on December 19, 2016. The quick implementation timeline suggests that there is little room for pre-emption among suppliers. Third, FAR 52.223-22 did not include specific enforcement measures to assign responsibilities should suppliers fail to make the representation, although intentional misrepresentation under FAR entails high potential penalties that could result in fines, penalties, and mischarging costs (FAR 31.205-15).

While the simple "check-the-box" representation required by FAR 52.223-22 might initially appear to have little teeth, it was the *first* time in a *federal-wide* move that mandatory provisions related to suppliers' public GHG emission disclosure were included in federal procurement, sending a clear signal of the government's determination to reduce upstream emissions to all parties involved in the procurement process. Unlike a profit-maximizing private entity, the U.S. federal government has a clear mandate to promote sustainable procurement as President Obama's Executive Order 13514 in 2009 made both government and supplier GHG reduction a federal agency priority (Light and Orts, 2017; Even-tov et al., 2022).

President Trump's announcement to exit from the Paris Agreement in June 2017 created some uncertainty over the extent to which environmental preferences are prioritized in federal procurement. Notably, The Trump administration withdrew a subsequent FAR proposal that called for "environmental performance and sustainability factors" to be included "to the maximum extent practicable for all applicable procurements". However, Partisan cycles may

have limited interference with civil bureaucrats' actions for the following reasons. First, the GHG representation itself has remained effective as a codified FAR procedure to date. The US's official exit from the Paris Agreement, after a three-year delay from the initial announcement, was short-lived for 107 days between November 4, 2020, and February 19, 2021. Second, prior literature shows that the bulk of the federal government resembles a Weberian bureaucracy that is largely insulated from political interference (Spenkuch et al., 2023). In fact, federal agencies not only continued to reduce direction GHG emissions from 2018 to 2021, [5] but also promoted green procurement. For instance, the Alliant 2 Governmentwide Acquisition Contract (GWAC) was launched in 2018. This is a $75 billion multiple-award program that specifically required contractors to track and reduce emissions in performing the contracts. Finally, institutional knowledge and our interviews with GSA officials confirm that federal agencies have been using the information gathered from the GHG representation to track suppliers' progress.[6] For example, the information gathered by the GHG representation is used in subsequent rulemaking. For example, a recent 2022 FAR proposal, which requests suppliers to provide GHG disclosures and set science-based targets, specifically discussed suppliers' GHG representations (Federal Acquisition Regulation, 2022).

*2.2 External stakeholder's processing of CSR information and real effects*

CSR information can alter firms' real polluting activities. This is because external stakeholders (e.g., investors, creditors, suppliers, customers, and employees) can use public CSR information to exert pressure on managers in the form of voice (e.g., environmental shareholder proposals) or the threat of exit (e.g., terminating businesses, reducing consumption, or divesting holdings). Firms, in turn, are induced to alter their pollution in response to *actual* or *anticipated* stakeholder pressure (Christensen et al., 2021). Recent empirical evidence shows

---

[5] https://www.sustainability.gov/government_data.html
[6] For example, see https://www.gsa.gov/blog/2021/10/01/manage-your-ghg-emissions-to-stay-competitive-in-the-federal-marketplace.

that there are real effects associated with how CSR information is aggregated for, disseminated to, and accessed by stakeholders (Christensen et al., 2021). For example, Christensen et al. (2017) examine the Dodd-Frank mine-safety disclosure provisions. They find that requiring firms to disclose mine-safety information in SEC filings, which increased public awareness of the piece of information that is already publicly available elsewhere, improved mine safety.

In the realm of GHG emissions, several studies have analyzed disclosure mandates that improved the dissemination of prior-available GHG information to a broad audience. Information processing frictions are likely substantial as wide heterogeneity exists in where and how firms disclose this information. They can include a section in their financial reports, have a dedicated sustainability report, or disclose on external platforms. It is often costly for external stakeholders to 1) learn that the disclosure exists (awareness), 2) obtain the relevant report and extract the pertinent information (acquisition), and 3) analyze the implications (integration) (Blankespoor et al., 2020). As a result, reducing the costs of processing GHG information can meaningfully alter how stakeholders (and how firms perceive stakeholders) use this information. Yang, Muller, and Liang (2021) study the effect of the U.S. Greenhouse Gas Reporting Program on electric power plants. Presenting already available information on a centrally accessible platform resulted in a 10% reduction in emission intensity for treated plants. Similarly, Jouvenot and Krueger (2020) and Downar et al. (2021) examine a setting where listed companies in the U.K. have to include Scopes 1 and 2 GHG emissions in annual financial reports since 2013. Both studies focus on firms that disclosed GHG information before the regulation and document reductions in emissions ranging from 8% to 21%, depending on different designs and control groups. Our study extends this literature by examining changes in suppliers' emissions when their GHG information is made more available to one important stakeholder, i.e., an environmentally inclined large customer.

*2.3 CSR information processing among contracting officers at federal agencies*

Recent empirical evidence shows that regulators often rely on firms' public disclosures (Armstrong et al., 2010; Bozanic et al., 2017; Li and Wang, 2022). Compared to requesting information privately, public disclosure entails greater scrutiny by other stakeholders, including institutional investors (Dyck et al., 2019; Cohen et al., 2022; van Benthem et al., 2022), lenders (Choy et al., 2023; Houston and Shan, 2022; Wang 2023), employees (Greening and Turban, 2000), and nongovernmental organizations (Rodríguez et al. 2016). However, in the specific setting of government procurement, contracting officers often face substantial costs in processing suppliers' public disclosures, particularly as capacity and resources are constrained (when contracting officers have limited attention and face a large number of suppliers) and when bureaucracies prevent the elimination of (information) frictions (Wilson, 2019).

The GHG representation required that suppliers indicate the availability of public emission disclosures that followed a consistently applied standard and quantitative reduction goals. The specificity of the requirement reduces contracting officers' cost of searching for (i.e., the existence of disclosure), acquiring (i.e., the location of disclosure), and integrating suppliers' GHG information. For instance, while firms might already publish (on their website) or disclose (through a third-party vendor such as the Carbon Disclosure Project) GHG emissions, it remains difficult for contracting officers to map the legal entity or subsidiary that contracts with the government to the ultimate parent with GHG disclosures. And the GHG representation effectively reduces such search and acquisition costs. The GHG representation can further reduce the integration costs if a contracting officer can benchmark emissions among several suppliers. Moreover, the GHG representation that we study is the *first* time the government, in a federal-wide movement, requested climate information during procurement solicitations. It, therefore, marks a salient step taken by the federal government toward reducing procurement emissions. The GHG representation directs contracting officers to pay more attention to

suppliers' GHG information, which may lead them to allocate more effort towards green procurement by either selecting cleaner suppliers or pressuring suppliers to pollute less. Suppliers with more at stake, i.e., those relying more on federal contracts and those with greater uncertainty in securing future contracts, are more motivated to reduce emissions as they perceive higher risks associated with carbon emissions after making the representation.

**3. Sample and Main Variables**

*3.1. Greenhouse gas emissions*

We obtain carbon emissions data from Trucost, which collects, standardizes, and validates GHG emissions data from various company disclosures. When emissions data is unavailable, Trucost estimates GHG emissions based on global fuel use or a proprietary input-output model based on government census and survey data, industry data, and statistics and national economic accounts (S&P Global, 2020). Since Trucost significantly expanded its coverage in 2016 to include many medium- and small-cap firms, we use firms that have been covered by Trucost since before 2016 as the main sample to mitigate concerns that Trucost's data expansion explains our results.[7] We measure the total GHG emissions related to a firm's production as the natural logarithm of the sum of Scopes 1 and 2 emissions (Log(*GHGEmission*)) (Lewandowski, 2017; Jouvenot and Krueger, 2021).[8] Scope 1 emissions are direct emissions from sources owned by the firm. Scope 2 emissions are indirect emissions from energy consumption.

*3.2. Government contracts and the main firm-year sample*

We download all federal procurement contracts for federal fiscal years 2012 to 2021 from USAspending.gov, which is the official source of spending data for the federal

---

[7] In Internet Appendix Table IA5, we show that our results are not sensitive to this choice. We also address concerns that Trucost estimates GHG emissions for some companies where reported data is not available.
[8] Since no firms in our sample report zero combined Scopes 1 and 2 emissions, we avoid performing a Log (1+) transformation, given the econometric issues documented by Cohn et al. (2022) and Chen and Roth (2023).

government, resulting in 47,054,292 contracts. The federal fiscal year runs from October 1 through September 30. We merge the contract data with the Compustat universe by matching the name of a contractor's parent company with company names in Compustat (variable *CONM*). Specifically, we first use a Python fuzzy name-matching package that removes punctuation and legal business suffixes and replaces non-ASCII characters.[9] We retain observations with a matching score greater than 90 (out of 100) and manually verify each match. This procedure results in 11,730,122 Compustat-merged contracts.

From the Compustat-merged contracts, we construct the following firm-year measures of government contracts. For a given firm-year observation, *GovContractValue* is the total contract award value, and *GovContractN* is the total number of contracts received during the year. We focus on government suppliers by only keeping firm-year observations with a positive *GovContractValue*. The sample starts in 2013 and ends in 2020 because we retain observations in the three years before and after the implementation of the GHG representation.[10] After merging with GHG emissions from Trucost and requiring data on controls and at least two observations per firm, our main sample consists of 2,046 firm-year observations, corresponding to 390 unique firms for 10,478,466 contracts from the federal years 2012 to 2021. We winsorize all continuous variables at the top and bottom percentile.

Table 1 presents the descriptive statistics of contract-level data for the firms in our sample. On average, a government contract is worth $20,269 and has a maturity of 136 days. Each contract receives an average of 16 offers; only 13% of contract awards receive only one bid. As shown in the Internet Appendix Table IA1, the Department of Defense (DOD) is the

---

[9] We obtain the name_matching package from https://github.com/DeNederlandscheBank/name_matching.
[10] Throughout the document, year refers to each firm's respective fiscal year, unless otherwise stated. The federal fiscal year ends on September 30, while many firms' fiscal years end in a different month. Therefore, for firms ending their fiscal years in December or any month from January to May, our sample period starts from 2013 and ends in 2019, with year 2016 being the FAR implementation year. For firms ending their fiscal years from June to November, the sample period starts from 2014 and ends in 2020, with the year 2017 being the FAR implementation year.

largest agency, with a 79% share in contract value, followed by the Department of Veterans (VA) (5%) and the General Services Administration (GSA) (4%).

*3.3. GHG representation*

We collect data on GHG representation from SAM.gov, the official website of the U.S. federal government that processes and stores entity registration information for any entities that wish to do business with the government. Registered entities on SAM.gov must complete electronic annual representations and update the representations as necessary or at least annually (FAR 4.12). Since December 19, 2016, FAR 52.223-22 has been included in the list of representations on SAM.gov.

It is important to note that FAR 52.223-22 is applied at the entity level. SAM.gov defines a unique entity based on "a separate legal entity associated with a separate physical address" and subsequently assigns it a unique entity identifier (UEI).[11] Consequently, many firms contract with federal agencies under multiple entities. The 390 firms in our main sample have 3,558 UEIs from the federal years 2017 to 2021. Because manually collecting all current and historical GHG representations these entities make is prohibitively time-consuming, we proceed in two steps. First, we sample 598 UEIs and instruct our research assistants to manually collect all current and historical GHG representations made by them.[12] We verify that, once an entity starts to make the GHG representation, it will continue making it in subsequent years.[13] Based on this observation, we proceed to the second step. We gather the current representation made by the remaining UEIs using SAM.gov Get Opportunities public API.[14] For UEIs that

---

[11] Throughout this document, we use the terms "company," "firm," and "supplier" interchangeably to refer to a unique Compustat GVKEY and "entity" to refer to a unique UEI.

[12] For each unique firm (i.e., GVKEY) in our sample, we choose the UEI with the largest contract value so that we can manually verify the entity that the firm most frequently contracts with the federal agencies. In addition, we select up to three randomly selected UEIs for each firm. Appendix C provides more details.

[13] Some UEIs that do not provide GHG representation in their most recent representation may have made the representation in the past. However, we observe that this is the case for only 0.31% of UEIs (among the 598 UEIs that we manually verified). Further, at the firm-year level, no firms stop making the GHG representation once they have started doing so. Additionally, omitting such cases biases against our findings.

[14] We thank SAM.gov for providing us with public access.

have made the GHG representation in the current period, we instruct our research assistants to collect all of the historical representation data to determine the precise time the entity starts to represent. Appendix C provides step-by-step documentation of the collection procedure.

We construct the following variables based on the collected GHG representations. *GHGRep* equals one if any of a firm's UEIs make the GHG representation in a given year and zero otherwise. As shown in Figure 1 of Appendix B, an entity is considered to have made the GHG representation if it answers "yes" to FAR 52.223-22 (a). Next, we determine whether the GHG representation made by a UEI is mandatory or voluntary in nature. We estimate the total contract value for each UEI in a given federal year by summing up the value of all contract awards. A UEI is considered to be mandatory if its total contract value in the previous federal fiscal year before the representation submission date is $7.5 million or more and voluntary otherwise. At the firm-year level, *GHGRep(Mandatory)* indicates whether any of a firm's UEI provides a mandatory GHG representation.[15] In addition, we exploit variation in the *content* of the information provided by firms conditioning on having made the GHG representations. Once a UEI answers "yes" to FAR 52.223-22 (a) (and thus is considered to have made the GHG representation), it could then either state "yes" or "no" when asked about whether it, through itself or its immediate owner or highest-level owner, discloses GHG emission information and/or reduction goals (FAR 52.223-22(b)). *GHGRepDiscl* is an indicator variable that takes the value of one if a firm, through any of its UEIs, has provided a link to its public disclosure of emissions or reduction goals (see Figure 1). Finally, we examine the *quality* of the information provided, conditioning on having provided website links. SAM.gov is designed such that all UEIs will have to enter non-missing information on a website link should they

---

[15] In Internet Appendix IA, we provide further discussions on entities' compliance with the GHG representation. It is also worth noting that the proportion of entities that exceed or just exceed the $7.5 million threshold exhibit a general upward trend after 2016 (Internet Appendix Table IA2), inconsistent with firms strategically allocating the total contract values among entities to stay below the threshold and avoid making the GHG representation.

have entered "yes" in FAR 52.223-22(b). However, the system cannot verify whether the link points to a valid web location. To verify the validity of the link provided at the time of the representation, we use the Wayback Machine to determine whether the link was accessible in the past year before the representation date (*GHGRepDisclValid*).

*3.4. Contracting officer identity*

Contracting officers are the individuals who can use information elicited by the GHG representation to process suppliers' climate disclosures. To identify individual contracting officers, we obtain the email addresses of officers who approve the federal contracts from SAM.gov, following Spenkuch et al. (2023). We merge this information with the initial universe of contracts from USAspending.gov. This results in 43,778,071 unique contracts and 63,704 unique email addresses.[16] Similar to Spenkuch et al. (2023), we observe that some email addresses are likely administrative accounts that do not belong to an individual officer (e.g., ebs.sysadmin.dla.mil). We further require an email address to contain an "@" and a name that can be found in the top 5,000 most prevalent first names or last names according to the U.S. Census and the Social Security Account. We identified 47,629 individual officers responsible for 9,636,339 contracts from 256,749 UEIs. Appendix D provides detailed documentation.

Using information on the identity of contracting officers, we compute two measures relating to their costs for processing suppliers' GHG emissions. First, we calculate the number of UEIs that each contracting officer is responsible for in a given federal year as a measure of the officer's capacity constraints (*NUEICO*). On average, a contracting officer manages 56 contracts from 21 UEIs each year, with a total contract value of $14 million (Internet Appendix Table IA3). Second, we estimate the extent to which the GHG representation helps a

---

[16] The number of contracts is larger than that in our regression sample, as presented in Table 1. This is because we consider all contracts that a contracting officer is responsible for, instead of only contracts from firms in the Compustat/Trucost merged universe, when computing measures related to the officer's information processing.

contracting officer compare GHG emissions among suppliers that he/she manages. Specifically, we calculate the percentage of UEIs with the GHG representation, out of all UEIs that an officer manages and with available records on SAM.gov in a given year (*PctUEIGHGRep*).[17]

## 4. Research Design and Main Results

### 4.1. The GHG representation and government suppliers' GHG emissions

We estimate the following OLS model at the firm-year level to examine the effect of making the GHG representation on federal suppliers' GHG emissions:

$Log(GHGEmission)_{i,t}$ = $\beta_0$ +$\beta_1$ $GHGRep_{i,t}$ or $GHGRep(Mandatory)_{i,t}$ + $\beta_2$ $GovContractValue/Sales$ + $\beta_3 Log(Total Asset)_{i,t}$ + $\beta_4 Log(1+Age)_{i,t}$ + $\beta_5 ROA_{i,t}$ + $\beta_6 Leverage_{i,t}$ + $\beta_7$ $AssetGrowth_{i,t}$ + $\beta_8$ $Tangibility_{i,t}$ + $\beta_9 Log(1+AnalystN)_{i,t}$ + $\beta_{10} Log(1+InstN)_{i,t}$ + $\beta_{11}$ $Log(1+SRIProposalN)_{i,t}$ + $\beta_{12} GRIReport_{i,t}$ + $\beta_{13} PriorGHGPubDiscl_{i,t}$ + Firm FE + Year FE +$\varepsilon_{i,t}$. 
(1)

The dependent variable is log-transformed combined Scopes 1 and 2 GHG emissions. The independent variables of interest are *GHGRep* and *GHGRep(Mandatory)*. *GHGRep* estimates the average effects of making the GHG representation on emission reductions. Because there could be concerns that voluntary representers make the representation because they intend to reduce emissions, we use *GHGRep(Mandatory)* as an alternative variable. It focuses on suppliers who have made the representation because they exceeded the mandatory threshold of $7.5 million. We control for time-varying firm characteristics, including firm size, age, ROA, leverage, asset growth, tangibility, and analyst coverage. *ContractValue/Sales* is included to mitigate concerns that federal agencies exert more pressure on larger contractors to reduce emissions, regardless of whether there is a GHG representation. We include several control variables to mitigate the concern that other external stakeholder pressures might drive emission reductions. First, we control for shareholder pressure by including institutional ownership (*InstN*) and the number of social responsibility shareholder proposals

---

[17] Appendix D provides further details on how we collect the GHG representation for the UEIs that the contracting officers identified in our sample manage.

(*SRIPropsoalN*). We further include an indicator for whether a firm publishes sustainability reports in accordance with the Global Reporting Initiative (*GRIReport*) to mitigate concerns that firms' adoption of sustainability reporting frameworks results in greater external monitoring of its environmental activities.[18] Finally, we include an indicator for the availability of public disclosure prior to making the GHG representation, measured by whether Trucost obtained the firm's emission information in the previous fiscal year from a public source instead of estimation (*PriorGHGPubDis*).

Throughout the remainder of our empirical analyses, we include firm and year fixed effects to control for time-invariant firm characteristics and time trends, thus employing a within-firm model. The coefficient of interest, $\beta_1$, is the difference-in-differences (DiD) estimator. It captures the changes in emissions for suppliers after making the GHG representation (first difference) and relative to suppliers who do not represent (second difference). To the extent that suppliers expect that contracting officers will take actions (either in the form of monitoring in the current period or screening in the future), as the GHG representation facilitates their access to and processing of suppliers' climate disclosure, we expect to find a negative and significant $\beta_1$. In the main specification, we measure both emission outcomes and GHG representation variables contemporaneously to align with the contract duration observed in our sample, which is usually completed within a year (the mean duration is 136 days). In other words, we expect that suppliers will respond to current or anticipated pressures from the government actions in the year when they make GHG representation. In later analyses, we analyze treatment effects in the two-year window before and after the representation (Section 4.2). We cluster standard errors by firms.

---

[18] We thank the referee for this suggestion. In the Internet Appendix Table IA7, we further show that our results are robust in the subsample without social responsibility shareholder proposals or without GRI reports.

In Table 2 Panel A, we present the distribution of GHG representation (*GHGRep)* at the firm-year level. There was no *GHGRep* in the pre-period from 2013 to 2015 and 0.9% in 2016 (as FAR 52.223-22 was implemented in December 2016). We observe that 22.2% of firms made the GHG representation in 2017, with 21.2% making it for the first time (*FirstGHGRep*). The percentage of firms making the GHG representation increases gradually. In addition, in each year from 2017 and 2021, around 3% to 8% of firms start to make the GHG representation for the first time. This suggests that the "treatment" in our sample, i.e., *GHGRep*, is staggered over time, mitigating concerns over concurrent trends. We further find that, among the firm-years with the GHG representation, 62% provide the representation as mandated by FAR 52.223-22, and 81% state that they have public disclosure of GHG emissions or reduction goals. Panel B of Table 2 presents the descriptive statistics of the main variables, and the Internet Appendix Table IA4 provides additional descriptive statistics. The average firm has $35 billion in total assets. It receives $232 million in contract awards on average, about 1.6% of its total sales. The average yearly emissions of Scopes 1 and 2 are 3.46 million tonnes. 37.8% of firms provide GRI-standard sustainability reports.

Table 3 Panel A presents the OLS regression results of Equation (1). Columns 1 and 3 do not include any controls, and columns 2 and 4 include the full vector of control variables. Firm and year-fixed effects are included in all columns. Across all specifications, we find a negative and significant $\beta_1$, significant under the 5% or 1% significance levels, suggesting that suppliers reduce emissions when they provide GHG representations. The effect of making GHG presentations on emission reduction is economically significant, resulting in a reduction of absolute emissions by 12.9% ($1- e^{-0.138}$). [19] The effect is slightly larger among mandatory

---

[19] The economic magnitude comports with prior studies examining the effect of dissemination and aggregation of existing GHG information. Jouvenot and Krueger (2021) and Downar et al. (2021) examine the effect of The Companies Act 2013 in the United Kingdom on firms that already disclose GHG information. They document a reduction in emissions in the range of 8% to 16% and in emissions intensity between 10% to 21%.

suppliers, with a 13.8% reduction in emissions (1- $e^{-0.148}$), as these suppliers are more likely to be under the spotlight and face higher pressure to reduce emissions.[20] This finding supports our prediction that suppliers reduce emissions when making the GHG representation increases their perceived risks of carbon emissions.

In Table 3 Panel B, we re-estimate Equation (1) with several alternative measures of firms' GHG emissions. In our main specification, we log-transform absolute emissions, which is right-skewed.[21] In columns 1 and 2, we replace *Log(GHGEmission)* with a count-like transformation using decile-ranked emissions and use Poisson pseudo maximum likelihood regressions (Cohn et al., 2022). In columns 3–6, we use emission intensity measures by scaling absolute emissions with sales or costs of goods sold. Our results remain unchanged.

We also report several alternative specifications in the Internet Appendix Table IA5. First, one might be concerned that Trucost's emissions estimates for firms without public information are systematically biased. We re-estimate Equation (1) using a subsample of firms whose emission data is obtained directly from company reports by Trucost. In addition, we use alternative sources of emissions from the Carbon Disclosure Project (CDP), which surveys firms' emissions information. We continue to find that suppliers with GHG representations reduce emissions.[22] Second, while all firms have at least two observations in the main regression, 303 (331) control firms in our sample have never made the GHG representation and therefore have no variation in *GHGRep* (*GHGRep(Mandatory)*). To address the concern that these observations may bias our estimation (Breuer and de Haan, 2023), we drop them in estimating Equation (1) and find similar results. Third, recent literature suggests that

---

[20] Since the GHG representation, the $7.5 million threshold has been mentioned (but not yet implemented) in subsequent proposals related to green procurement. For instance, a subsequent FAR proposal after our sample period required entities receiving more than $7.5 million contract awards to disclose Scopes 1 and 2 GHG emissions (Federal Acquisition Regulation, 2022).

[21] In our sample, the mean value is 3.46 million tCO2e, and the median is 0.282 million tCO2e.

[22] Results are also robust when we further control for whether firms prepare climate disclosures in accordance with TCFD (Task Force on Climate-Related Financial Disclosures) guidelines, according to CDP reports.

heterogenous treatment effects may bias the estimates from staggered DiD regressions (Goodman-Bacon 2021; Baker et al., 2022). We thus conduct stacked regressions by stacking suppliers making the (mandatory) GHG representation for the first time in the same year with suppliers never making the GHG representation in our sample period (Cengiz et al., 2019). We continue to find that suppliers reduce emissions after they make the (mandatory) GHG representation for the first time. Lastly, we present two alternative samples. First, we exclude the year during which FAR 52.223-22 was implemented. Second, we include all firms with Trucost coverage, including those with incomplete coverage that did not span the entire same period (i.e., full Trucost sample). Our results remain unchanged in both cases.

### 4.2. Endogeneity concerns and mitigating strategies

The actual representation made by firms is not completely random. Firms below the $7.5 million threshold can make a voluntary GHG representation, and some firms above the $7.5 million threshold do not make the representation. This gives rise to two potential endogeneity concerns in our within-firm design. First, an omitted time-varying firm characteristic may explain both the decision to represent and emission reductions. For example, firms facing increasing social responsibility pressure from other stakeholders may start making the GHG representation and reduce emissions simultaneously. Second, concern about reverse causality exists. Firms may be more likely to provide the GHG representation when they expect to reduce emissions. Reverse causality should be more pronounced among voluntary suppliers and suppliers that do not provide GHG presentations, despite being subject to the requirement (i.e., with contract value above the $7.5 million threshold).

In this section, we outline four sets of analyses to mitigate these concerns, and, in the Internet Appendix IA, we discuss possible reasons for failing to make the GHG representation, which is unlikely to be strategic, based on institutional background and our interviews with two GSA officials. First, we use *Mandatory*—firms with entities that exceed the $7.5 million

threshold—as an instrument for the actual GHG representation. The premise is that the total contracting value received in the previous federal year is not completely within the suppliers' control—it could also be affected by external factors, such as allocated federal budgets, competitive bidding, and the extent of contract modifications (Broggard et al., 2021). As a result, it is unlikely that whether a supplier's total contract value in the previous federal year was above or below the $7.5 million threshold is correlated with its GHG emissions except through making the GHG representation (i.e., the exclusion criterion).[23] Using *Mandatory* as an instrument essentially estimates a local average treatment effect on the subset of firms who would only have made the GHG representation because of the mandatory requirement (Jiang 2017). We modify Equation (1) using the following two-stage least-squared (2SLS) estimation:

$$GHGRep_{i,t} \text{ or } GHGRep(Mandatory)_{I,t} = \beta_0 + \beta_1 \, Mandatory_{i,t} + Controls + Firm \, FE + Year \, FE + \varepsilon_{i,t}; \tag{2a}$$

$$Log(GHGEmission)_{i,t} = \beta_0 + \beta_1 \, Predicted \; GHGRep_{i,t} \text{ or } Predicted \; GHGRep(Mandatory)_{i,t} + Controls + Firm \, FE + Year \, FE + \varepsilon_{i,t}. \tag{2b}$$

Control variables follow those defined in Equation (1). $\beta_1$ in Equation (2b) identifies the local average treatment effect. The first-stage regression results (Table 4 Panel A columns 1 and 2) show that *Mandatory* is associated with a 36.9 (43.9) percentage point increase in having (mandatory) GHG representations (significant at the 1% level), supporting that it is a strong instrument for both *GHGRep* and *GHGRep(Mandatory)*. Columns 3 and 4 present the second-stage regression results of Equation (2b). We find that both *Predicted GHGRep* and *Predicted GHGRep(Mandatory)* are negative and significant under the 5% level, alleviating concerns over omitted variables and reverse causality.

---

[23] Another possible concern is that firms receiving larger contracts (and thus exceeding the $7.5 million threshold) have more financial resources to reduce emissions. However, *Mandatory* only captures a discontinuity in contract value at a specific threshold. In addition, we control for contract value throughout our analyses to mitigate the concerns that our results are driven by the size of federal contracts.

Second, we compare the emission reductions among (1) firms that exceeded the $7.5 million threshold and made the GHG representation (*GHGRep(Mandatory)*), (2) firms that did not and voluntarily represented (*GHGRep(Voluntary)*), and (3) firms that did not make the GHG representation, despite being subject to the requirement (*NoGHGRep(Mandatory)*). If the concern of reverse causality was true, we would expect that suppliers that reduce emissions to a greater extent are more likely to represent voluntarily, suggesting a more negative coefficient on *GHGRep(Voluntary)*. Table 4 Panel B presents the result. Inconsistent with the alternative explanation, the coefficient on *GHGRep(Voluntary)* is -0.09 and statistically insignificant (p-value is 0.113). The coefficient on *GHGRep(Mandatory)* is -0.193 and significant at the 1% level. This finding further corroborates our prediction that mandatory suppliers feel more pressure to reduce emissions as they face more scrutiny from the government. In addition, we do not observe significant changes in emissions among suppliers exceeding the threshold that did not make the representation (*NoGHGRep(Mandatory)*), highlighting that it is the representation but not the contractual threshold (or total contract size) per se that drives the observed emission reductions.

Third, we test for any pre-trend in emission reductions before suppliers start providing the GHG representation. We replace *GHGRep* in Equation (1) with indicators for the two years before, during, and two years after a firm's first GHG representation. As shown in Table 4 Panel C, none of the pre-first GHG presentation variables are significant at the 10% level. This suggests that firms did not change their emissions before making the GHG representation. Results are similar when we examine the emission trends before the first mandatory GHG representation. These results are inconsistent with both alternative explanations. It is unlikely that firms make the GHG representation because they have been reducing emissions regardless (i.e., reverse causality). In addition, if the firms' decision were strategic, we would expect them to make the GHG representation during the years that they anticipate greater reductions in

emissions and withhold in other years. However, we do not observe this. All firms in our sample, once they start making the representation, continue doing so in later years.

Lastly, we match firms with the GHG representation and those without, thus controlling for observable differences between them. We use entropy balancing to reweight firms without the GHG representation based on the means of variables likely to affect the decision of making the GHG representation, including contract value, firm size, institutional ownership, shareholder proposals, GRI reporting, and prior public GHG disclosure. We observe a similar distribution of these control variables between the two groups after entropy balancing matching (Internet Appendix Table IA6). Notably, we include contract size as a covariate to mitigate the concern that our results might be driven by suppliers with larger contracts, regardless of whether they make the GHG representation. Similarly, we reweight firms without a mandatory GHG representation. Table 4 Panel D presents the regression results of Equation (1) in the entropy-balanced sample. We continue to find that both *GHGRep* and *GHGRep(Mandatory)* have a negative and significant effect on emissions, and our interpretation remains unchanged.

## 5. Cross-sectional Results and Additional Analyses

### 5.1. Cross-sectional analyses based on suppliers' economic incentives

We predict that suppliers making the GHG representation are motivated by economic incentives to reduce emissions. Specifically, suppliers that 1) rely more on the federal government as a customer and 2) face greater uncertainty in securing contracts are more concerned about losing federal contracts. Therefore, they respond more to the GHG representation by altering their pollution, as they have more at stake when federal agencies take action using climate disclosure in their GHG representations. We develop two measures to capture the extent of reliance on the federal government as a customer. First, a supplier will rely more on the government if its contract value accounts for a higher percentage of its total sales than the sample median (*HighGovContractValue/Sale*). Second, we identify firms that

disclose the federal government as a major customer (*MajorGovCustomer*) in corporate communications. We collect disclosed customer information from Factset Revere, which gathers customer data from various company disclosures, including 10-K filings, conference calls, investor presentations, and company websites. A customer relationship is disclosed either because it crosses the 10% of total revenue threshold for segment disclosure, as specified in SFAS 131, or because the company voluntarily reveals a relationship as a business decision.

Next, we develop two measures for the extent of uncertainty in securing future federal contracts based on bidding competition and past contract variability. First, we calculate contract competition as the number of competing offers per bid and define that a supplier faces high contract uncertainty if less than 50% of its contract value in a given year is comprised of single-offer bids (*LowSingleBid*). We use the standard deviation of contract value divided by sales over the past five years as a proxy for contract variability and define suppliers in the highest quartile of the sample as those facing high uncertainty (*HighVariability*).

Panel A of Table 5 presents cross-sectional results based on government reliance. We re-estimate Equation (1) by replacing *GHGRep* with two separate indicators, essentially partitioning the treatment firms into those with high reliance (*GHGRep-HighReliance*) and low reliance (*GHGRep-LowReliance*), based on the cross-sectional variables defined above, respectively. We create similar partitions for firms making mandatory GHG representation: *GHGRep(Mandatory)-HighReliance* versus *GHGRep(Mandatory)-LowReliance*. In column 1, we find that the effect of the GHG representation in reducing emissions is concentrated (muted) among suppliers with a higher (lower) percentage of sales from federal contracts. In column 3, we observe that the effect of the GHG representation on emission reductions is negative and significant in both suppliers with major federal customers and those without, but the coefficient estimate on suppliers with major federal customers has a much larger magnitude (p-value on coefficient difference is 0.019). We observe similar results among firms making the mandatory

GHG representation in columns 2 and 4. These results suggest that suppliers relying more on federal contracts are more inclined to respond to current or anticipated government actions.

Panel B of Table 5 presents cross-sectional analyses by dividing firms with the GHG representation into high and low uncertainty of securing future contracts: *GHGRep-HighUncertainty* and *GHGRep-LowUncertainty*. Consistent with our expectation, we find a stronger effect among firms that face more competitive bidding and those with greater value variability in federal contracts received. The coefficient estimates are consistently negative and significant among suppliers with high uncertainty and are much larger (around two times) than those of low uncertainty firms (with one-sided $p$-values of difference in coefficients significant at the 10% level in three out of four columns). Overall, our results support that economic incentives are important mechanisms that motivate suppliers to reduce emissions.

*5.2. Cross-sectional analyses based on contracting officers' information processing*

The GHG representation helps the contracting officer access, retrieve, and compare emissions levels and reduction targets among suppliers. We expect the effects of the GHG representation in inducing suppliers' emission reductions to strengthen when the contracting officer can better use the information obtained. To examine the contracting officer's ability to process the information elicited by the GHG representation, we present two sets of tests based on 1) the usefulness of the information in the GHG representation and 2) the variation in the individual contracting officer's capacity constraints in processing this information as well as that person's ability to benchmark emissions. First, we examine the content of the information. A GHG representation is considered to provide more useful information to the contracting officer in accessing suppliers' environmental activities if it states the location of a firm's public disclosure of emissions and/or reduction goals. On the contrary, a representation stating no disclosure has little effect in reducing the contracting officer's information processing costs. Accordingly, we partition firms into those that provide disclosure (*GHGRepDiscl*) and those

28

that do not. Second, we verify whether the firm provides an accessible website link to its climate disclosure in FAR 52.223-22, a proxy for the quality of information. We use the WayBack Machine to evaluate whether a website link has been accessible historically in the past year before the representation date (*GHGRepDisclValid*).

Next, we exploit heterogeneities in how individual contracting officers may process the provided GHG information. We posit that the GHG representation is more useful to an individual officer who has a lower capacity constraint, such that the officer can use the information collected. This is measured by the number of unique entities an officer handles each year (*NUEICO*). We also predict that GHG information is more useful if a contracting officer can benchmark it against other suppliers in that person's portfolio when more firms in the portfolio make the representation. We construct a measure of the percentage of UEIs providing the GHG representation (*PctUEIGHGRep*). We create two firm-level indicators of whether a supplier's contracting officers have capacity constraints below the sample median (*LowNUEICO*) and a benchmarking ability above the sample median (*HighPctUEIGHGRep*).

Table 6 Panel A shows cross-sectional results based on the usefulness of information elicited by the GHG representation. We find that the effect of GHG representation is concentrated among suppliers providing the location of their public GHG disclosures and those providing accessible disclosure links. The coefficient estimates on *GHGRep* are only significant among firms when the information provided is more useful and are larger than those with less useful representations. *p*-values comparing coefficient differences are significant under the 10% level in three out of four specifications. This finding suggests that the disclosure content included in the GHG representation influences suppliers to reduce emissions, mitigating the concern that our results are driven by other concurrent changes in the federal acquisition regulations. We present the results of contracting officers' information processing in Table 6 Panel B. Consistent with the GHG representation being more useful to officers with

lower capacity constraints, we find that suppliers reduce more emissions when the contracting officer contracts with fewer entities, compared to the sample median, and when the contracting officer oversees more suppliers making the GHG presentation. *p*-values comparing coefficient differences are significant under the 5% level in three out of four specifications. Overall, the results in Table 6 show that the GHG representation reduces suppliers' emissions to a larger extent when it helps contracting officers better process suppliers' public GHG disclosures.

*5.3. Additional Analyses*

*5.3.1. Operational feasibility on emission reduction*

We further investigate how suppliers reduce their emissions. On the one hand, they may shift their Scopes 1 and 2 emissions to more opaque Scope 3 emissions, as the latter are harder to measure and monitor. On the other hand, suppliers may invest in emission abatement infrastructures. Alternatively, suppliers may exploit low-cost abatement opportunities, such as promoting energy efficiency through insulation retrofits and LED lighting, to reduce energy consumption (McKinsey 2009). Suppliers can also switch to renewable energy, whose costs have declined significantly in recent years.[24] Such actions can help reduce Scope 2 emissions. Table 7 presents the regression results of Equation (1) by replacing the dependent variable with Scopes 1, 2, and 3 emissions. We find the strongest reductions among Scope 2 emissions, with a coefficient estimate of -0.129 on *GHGRep*, significant under the 5% level. While we continue to find that suppliers reduce Scope 1 emissions, the coefficient estimate has a smaller magnitude (-0.08) and a *p*-value of 0.252. Results on *GHGRep(Mandatory)* are similar. This finding is consistent with the fact that Scope 2 emissions can be reduced relatively quickly by adopting clean energy and energy efficiency policies. We do not observe an increase in Scope 3 emissions, inconsistent with suppliers hiding their emissions along the supply chain.

---

[24] https://ourworldindata.org/cheap-renewables-growth

In Table 8, we provide additional evidence of GHG representations' overall impact on suppliers' financial performance. Suppliers may experience worse financial outcomes if they make costly abatement investments or are forced to reduce production. However, their financial performance may not be negatively affected if 1) they can exploit available low-cost abatement opportunities and 2) they can receive future contractual benefits from the government (see Section 5.3.2). Our results suggest that suppliers with GHG representation do not report a lower ROA or gross margin, nor do they reduce revenues or increase costs of goods sold. Our results suggest that suppliers do not appear to experience net financial costs when reducing emissions, consistent with prior literature (Downar 2021).[25]

### 5.3.2. Suppliers' future contractual benefits

To better understand suppliers' cost-benefit trade-offs in emissions reduction, we examine whether they could obtain (or expect to obtain) tangible benefits after making the GHG representation and reducing emissions. These benefits could either come from existing suppliers becoming more likely to receive future government contracts or to receive greater contract value. In Table 9, we regress one-year-ahead contract variables on *GHGRep* in the current year, including the probability of receiving government contracts (*FutureGovContract*), contract value over sales (*FutureGovContractValue/Sale*), and the number of contracts (*FutureGovContractN*). We find that suppliers are more likely to continue as government contractors and receive higher contract value and more contracts in the year after making the (mandatory) GHG representation. These results document the economic benefits of providing the GHG representation, which corroborates our prior findings that suppliers are motivated by economic incentives to reduce emissions.

---

[25] In addition, emission reductions can bring capital market benefits in the form of lower carbon transition risk premia (Bolton and Kacperczyk, 2023).

*5.3.3. Reduced information processing costs or enhanced disclosure*

We focus on a reduction in federal contracting officers' information processing costs as the main channel through which the GHG representation changes suppliers' emissions. An alternative channel is that the GHG representation increases the quantity and quality of public GHG disclosure, which in turn motivates suppliers to reduce emissions (Christensen et al., 2021). FAR 52.223-22 is explicit that it does not require suppliers to start making a GHG disclosure. Nevertheless, we attempt to illuminate whether there is a concurrent change in the availability and content of a public GHG disclosure in Appendix E. Using the GHG information website location provided by firms in the GHG representation, we investigate, using the Wayback Machine, whether there was a change in the availability of the content and the content when firms start to represent. Descriptive evidence suggests that over 90% of the website links existed at least 180 days before. The content of the website homepage remains similar when compared with a prior version, suggesting little change in either the availability or the content of the GHG disclosure because of the representation. However, we caveat that this analysis is descriptive, and is limited to firms with sufficient Wayback archives. We caution the readers that we cannot conclude that firms did not alter their disclosure after making the GHG representation. However, we believe that the extensive set of evidence here collectively points to the role of reducing GHG information processing costs in curbing emissions.

## 6. Conclusion

We examine whether suppliers reduce emissions when their federal customers start requesting information on their public climate disclosures. We explore a change in the U.S. federal government procurement that requires certain suppliers to represent whether and where they make a public GHG disclosure. Using data on the actual representations made by suppliers, we find that those making the representation decrease emissions more than those that do not. We perform extensive robustness checks to mitigate endogeneity concerns from omitted

variables and reverse causality. Further evidence shows that suppliers relying more on federal contracts and facing greater uncertainty respond more to the GHG representation, suggesting that they are motivated by economic incentives to reduce emissions. In addition, we do not find that suppliers experience adverse financial consequences when reducing emissions, likely because they can engage in cost-efficient abatement efforts and that they benefit from receiving more and larger government contracts in the future. Moreover, emission reductions are greater when contracting officers can better process suppliers' climate disclosure with the information in the GHG representation. Our evidence highlights how a reduction in customers' information processing costs can have real effects on suppliers' pollution.

While our setting is specific to government contracting, our results suggest that suppliers are motivated by economic incentives to reduce emissions when their public climate disclosure becomes easier to process for an environmentally inclined large customer. Our findings can inform GHG reduction in other supplier-customer relations when customers have greater bargaining power and when GHG information becomes more easily accessible to customers. This is particularly relevant with increasing societal pressure on firms to reduce pollution along their supply chain and as the SEC proposed new rules on mandating Scope 3 emissions for large public firms (SEC Release No. 33-11042). Our findings also speak to the growing debate on how governments can promote environmental stewardship through procurement. Recent empirical studies have examined whether U.S. and E.U. agencies' environmental preferences can increase suppliers' overall environmental-related disclosures and their environmental efforts (Even-Tov et al. 2022; Huang 2022; Yu 2022). Our results corroborate these findings and suggest that a contractual mechanism could promote greater environmental responsibility among government suppliers.

# References

Armstrong, C. S., Guay, W. R., & Weber, J. P. (2010). The role of information and financial reporting in corporate governance and debt contracting. Journal of accounting and economics, 50(2-3), 179-234.

Baker, A. C., Larcker, D. F., & Wang, C. C. (2022). How much should we trust staggered difference-in-differences estimates?. Journal of Financial Economics, 144(2), 370-395.

Blankespoor, E., deHaan, E., & Marinovic, I. (2020). Disclosure processing costs, investors' information choice, and equity market outcomes: A review. Journal of Accounting and Economics, 70(2-3), 101344.

Bolton, P., & Kacperczyk, M. (2023). Global pricing of carbon-transition risk. Journal of Finance, 78(6), 3677-3754.

Bozanic, Z., Hoopes, J. L., Thornock, J. R., & Williams, B. M. (2017). IRS attention. Journal of Accounting Research, 55(1), 79-114.

Brogaard, J., Denes, M., & Duchin, R. (2021). Political influence and the renegotiation of government contracts. The Review of Financial Studies, 34(6), 3095-3137.

Breuer, M., & deHaan, E. (2023). Using and interpreting fixed effects models. Available at SSRN.

Brill, E. (2020). A Comparative Analysis of Green Procurement Practices as a Framework for New Far Provisions Aimed at Combating Climate Change. Pub. Cont. LJ, 50, 623.

Carattini, S., Carvalho, M., & Fankhauser, S. (2018). Overcoming public resistance to carbon taxes. Wiley Interdisciplinary Reviews: Climate Change, 9(5), e531.

Cengiz, D., Dube, A., Lindner, A., & Zipperer, B. (2019). The effect of minimum wages on low-wage jobs. The Quarterly Journal of Economics, 134(3), 1405-1454.

Chen, J. and Roth, J., 2023. Log-like? identified ates defined with zero-valued outcomes are (arbitrarily) scale-dependent. Working Paper.

Chen, J., Su, X., Tian, X., Xu, B. and Zuo, L., 2023. The disciplinary role of major corporate customers. Available at SSRN 3588351.

Cho, Y.J., Kim, J., Yang, H. (2022). Corporate disclosure for green supply chains: evidence from Scope 3 emissions disclosure. Working Paper.

Choy, S., Jiang, S., Liao, S., & Wang, E. (2023). Public environmental enforcement and private lender monitoring: Evidence from environmental covenants. Journal of Accounting and Economics, 101621.

Christensen, H. B., Floyd, E., Liu, L. Y., & Maffett, M. (2017). The real effects of mandated information on social responsibility in financial reports: Evidence from mine-safety records. Journal of Accounting and Economics, 64(2-3), 284-304.

Christensen, H. B., Hail, L., & Leuz, C. (2021). Mandatory CSR and sustainability reporting: Economic analysis and literature review. Review of Accounting Studies, 26(3), 1176-1248.

Cohen, D., and Li, B. (2020). Customer-base concentration, investment, and profitability: The U.S. government as a major customer. The Accounting Review 95, 101–131.

Cohen, D., Li, B., Li, N., and Lou, Y. (2022). Major government customers and loan contract terms. Review of Accounting Studies 27, 275–312.

Cohen, S., Kadach, I., & Ormazabal, G. (2022). Why do Institutional Investors Request Climate Related Disclosures? Working Paper.

Cohn, J.B., Liu, Z. and Wardlaw, M.I., 2022. Count (and count-like) data in finance. Journal of Financial Economics, 146(2), pp.529-551.

Dai, R., Liang, H., & Ng, L. (2021). Socially responsible corporate customers. Journal of Financial Economics, 142(2), 598-626.

Dai, R., Duan, R., Liang, H. and Ng, L. (2022). Outsourcing climate change. Working Paper.

Darendeli, A., Fiechter, P., Hitz, J. M., & Lehmann, N. (2022). The role of corporate social responsibility (CSR) information in supply-chain contracting: Evidence from the expansion of CSR rating coverage. Journal of Accounting and Economics, 101525.

Dhaliwal, D., Judd, J. S., Serfling, M., and Shaikh, S. (2016). Customer concentration risk and the cost of equity capital. Journal of Accounting and Economics 61, 23–48.

Downar, B., Ernstberger, J., Reichelstein, S., Schwenen, S., & Zaklan, A. (2021). The impact of carbon disclosure mandates on emissions and financial operating performance. Review of Accounting Studies, 26(3), 1137-1175.

Duguay, R., Rauter, T., & Samuels, D. (2023). The impact of open data on public procurement. Journal of Accounting Research, 61(4), 1159-1224.

Dyck, A., Lins, K. V., Roth, L., & Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? International evidence. Journal of financial economics, 131(3), 693-714.

Even-Tov, O., She, G., Wang, L. L., & Yang, D. (2022). Government procurement and corporate commitment to climate change. Working Paper.

Even-Tov, O., Su, A., & Wang, K.P. (2023). Do information processing costs matter to regulators? Evidence from the U.S. shadow bank supervision. Working Paper.

EO 13514. Federal leadership in environmental, energy, and economic performance. Sec. 1, 74 Fed. Reg. 52117 (October 8, 2009). http://www.gpo.gov/fdsys/pkg/FR-2009-10-06/pdf/E9-24203.pdf.

EO 13693. Planning for federal sustainability in the next decade. 80 Fed. Reg. 15871. (March 25, 2015). http://www.gpo.gov/fdsys/pkg/FR-2015-03-25/pdf/2015-07016.pdf.

Federal Acquisition Regulation: Disclosure of greenhouse gas emissions and climate-related financial risk. 87 F.R. 68312 (proposed November 14, 2022). https://www.govinfo.gov/content/pkg/FR-2022-11-14/pdf/2022-24569.pdf.

Flammer, C., (2018) Competing for government procurement contracts: The role of corporate social responsibility. Strategic Management Journal, 39(5), pp.1299-1324.

Goldman J. (2020) Government as customer of last resort: The stabilizing effects of government purchases on firms. The Review of Financial Studies 33, 610-643.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. Journal of Econometrics, 225(2), 254-277.

Greening, D. W., & Turban, D. B. (2000). Corporate social performance as a competitive advantage in attracting a quality workforce. Business & society, 39(3), 254-280.

General Service Administration. (2015). Implementing sustainable procurement within U.S. government.

Houston, J. F., & Shan, H. (2022). Corporate ESG profiles and banking relationships. The Review of Financial Studies, 35(7), 3373-3417.

Huang, W. (2022). The role of government contracting in corporate environmental policies. Working Paper

Jiang, W. (2017). Have instrumental variables brought us closer to the truth. Review of Corporate Finance Studies, 6(2), 127-140.

Jouvenot, V., & Krueger, P. (2020). Reduction in corporate greenhouse gas emissions under prescriptive disclosure requirements. Working Paper.

Kothari, S. P., Zhang, L., & Zuo, L. (2023). 10. Disclosure regulation: past, present, and future. Handbook of Financial Decision Making, 215.

Lewandowski, S. (2017). Corporate carbon and financial performance: The role of emission reductions. Business Strategy and the Environment, 26(8), 1196-1211.

Light, S. E., & Orts, E. W. Public and private procurement in environmental governance. In Elgar Encyclopedia of Environmental Law (pp. 212-232). Edward Elgar Publishing.

Lu, H., Peng, Q.L., Shin, J.E., Yu, L.P. (2022). Migration of global supply chains: a real effect of mandatory ESG disclosure. Working paper.

McKinsey. (2009). Pathways to a low-carbon economy – Version 2 of the global greenhouse gas abatement cost curve. McKinsey & Company.

Ormazabal, G. (2018). The role of stakeholders in corporate governance: A view from accounting research. Foundations and Trends® in Accounting, 11(4), 193-290.

Roychowdhury, S., Shroff, N., & Verdi, R. S. (2019). The effects of financial reporting and disclosure on corporate investment: A review. Journal of Accounting and Economics, 68(2-3), 101246.

Rodríguez, J., C. Thomsen C., D. Arenas, and M. Pagell. (2016). NGOs' initiatives to enhance social sustainability in the supply chain: Poverty alleviation through supplier development programs. Journal of Supply Chain Management 52: 83-108.

S&P Global. (2020). Trucost Environmental Data Methodology Guide.

Sahadi, J. 2012. Cutting Washington could hit main street. Available at: https://money.cnn.com/2012/07/23/news/economy/federal-spending/index.htm

Schiller, C. (2018). Global supply-chain networks and corporate social responsibility. Working Paper.

She, G. (2022). The real effects of mandatory nonfinancial disclosure: evidence from supply chain transparency. The Accounting Review, 97(5), 399-425.

Spenkuch, J. L., Teso, E., & Xu, G. (2023). Ideology and performance in public organizations. Econometrica, 91(4), 1171-1203.

Stern, N. (2006). Stern Review: The economics of climate change.

van Benthem, A. A., Crooks, E., Giglio, S., Schwob, E., & Stroebel, J. (2022). The effect of climate risks on the interactions between financial markets and energy companies. Nature Energy, 7(8), 690-697.

Wang, L. L. (2023). Transmission effects of ESG disclosure regulations through bank lending networks. Journal of Accounting Research, 61(3), 935-978.

Wilson, J. Q. (2019). Bureaucracy: What government agencies do and why they do it. Hachette UK.

Warren, P. L. (2014). Contracting officer workload, incomplete contracting, and contractual terms. The RAND Journal of Economics, 45(2), 395-421.

World Econimic Forum. (2022). Green Public Procurement: Catalysing the Net-Zero Economy. https://www.weforum.org/publications/green-public-procurement-catalysing-the-net-zero-economy/.

Yang, L., Muller, N. Z., & Liang, P. J. (2021). The real effects of mandatory csr disclosure on emissions: Evidence from the greenhouse gas reporting program (No. w28984). National Bureau of Economic Research.

Yu, Z. H. (2022). Effects of firms' business ties with government on firm-Level climate change exposure. Working Paper.

**Appendix A: Variable Definitions**

| Measures of GHG Emissions | |
|---|---|
| Log(*GHGEmission*) (tCO2e) | The natural logarithm of the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). Scope 1 refers to GHG emissions that are owned or controlled by the company; Scope 2 refers to GHG emissions from the consumption of purchased energy by the company. *Source: Trucost* |
| *GHGEmissionDecileRank* | The decile ranking of the sum of Scopes 1 and 2 Greenhouse Gas emissions. *Source: Trucost* |
| Log(*GHGEmission/Sales*) (tCO2e/$m) | The natural logarithm of the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent) divided by revenue (in $ million). *Source: Trucost, Compustat* |
| Log(*GHGEmission/COGS*) (tCO2e/$m) | The natural logarithm of the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent) divided by costs of goods sold (in $ million). *Source: Trucost, Compustat* |
| Log(*GHGEmissionScope1*) (tCO2e) | The natural logarithm of Scope 1 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *Source: Trucost* |
| Log(*GHGEmissionScope2*) (tCO2e) | The natural logarithm of Scope 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *Source: Trucost* |
| Log(*GHGScope3UEmission*) (tCO2e) | The natural logarithm of upstream Scope 3 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *Source: Trucost* |
| **Measures of the GHG Representation** | |
| *GHGRep* | An indicator variable that takes the value of one if any of a firm's UEIs provides the GHG representation in a given fiscal year, and zero otherwise. *Source: SAM.gov* |
| *Mandatory* | An indicator variable that takes the value of one if any of a firm's UEIs has received over $7.5 million in total contract values in the prior federal year before its current GHG representation submission date, and zero otherwise. It takes the value of zero for fiscal years prior to December 19, 2016. *Source: SAM.gov, USAspending.gov* |
| *GHGRep(Mandatory)* | An indicator variable that takes the value of one if any of a firm's UEIs provides the GHG representation as a mandatory requirement in a given year, and zero otherwise. *Source: SAM.gov, USAspending.gov* |
| *GHGRep(Voluntary)* | An indicator variable that takes the value of one if all of a firm's UEIs that provide the GHG representation in a given year are voluntary in nature, and zero otherwise. *Source: SAM.gov, USAspending.gov* |
| *NoGHGRep(Mandatory)* | An indicator variable that takes the value of one if all of a firm's UEIs that received more than $7.5 million in the prior |

| | federal year do not make the GHG representation, and zero otherwise. It takes the value of zero for fiscal years prior to December 19, 2016.<br>*Source: SAM.gov, USAspending.gov* |
|---|---|
| *GHGRepDiscl* | An indicator variable that takes the value of one if a firm, through any of its UEIs, indicates that it has public disclosure of GHG emissions or reduction goals in the GHG representation, and zero otherwise.<br>*Source: SAM.gov* |
| *GHGRepDisclValid* | An indicator variable that takes the value of one if a firm, through any of its UEIs, provides a link to its public disclosure of GHG emissions or reduction goals in the GHG representation. In addition, this link has a valid and accessible archive on the Wayback Machine in the year before the representation date. It takes the value of zero otherwise.<br>*Source: SAM.gov, the Wayback Machine* |
| *FirstGHGRep* | An indicator variable that takes the value of one if a firm makes a GHG representation through any of its UEIs for the first time, and zero otherwise.<br>*Source: SAM.gov* |
| *FirstGHGRep(Mandatory)* | An indicator variable that takes the value of one if a firm makes a GHG representation as a mandatory requirement through any of its UEIs for the first time, and zero otherwise.<br>*Source: SAM.gov, USAspending.gov* |
| **Measures of Federal Government Contracts** | |
| *GovContract* | An indicator variable that takes the value of one if a firm's total federal contract value in a given fiscal year is positive, and zero otherwise.<br>*Source: USAspending.gov* |
| *CovContractValue* | The total federal contract value a firm receives (in $ million) in a given fiscal year.<br>*Source: USAspending.gov* |
| *GovContractValue/Sales* | The total federal contract value a firm receives (in $ million) divided by sales (in $ million) in a given fiscal year.<br>*Source: USAspending.gov, Compustat* |
| *GovContractN* | The total number of federal contracts a firm receives in a given fiscal year.<br>*Source: USAspending.gov* |
| *SingleBid* | The percentage of the value of single-bid contracts out of a firm's total federal contract value in a given fiscal year. A single-bid contract is one that has only received a single offer.<br>*Source: USAspending.gov* |
| *Variability* | The standard deviation of a firm's total federal contract value scaled by sales in the past five years.<br>*Source: USAspending.gov, Compustat* |
| *MajorGovCustomer* | An indicator variable that takes the value of one if a firm reports having at least one federal government customer in Revere, and zero otherwise.<br>*Source: Factset Revere* |

| | |
|---|---|
| NUEICO | The average number of unique entities that a firm's contracting officers are responsible for in a given federal year. When a firm has multiple contracting officers, a weighted average is applied when aggregating to firm-fiscal year level using contract value as weights. It is computed based on the following formula:<br><br>$NUEICO_{i,t} = \sum_{j \in N} \frac{ContractValue_{i,j,t}}{ContractValue_{i,t}} \times NumUEI_{j,c,t}$ where $i$ denotes firm, $j$ denotes contract, $c$ denotes contracting officer, $t$ denotes firm fiscal year. $N$ is the set of all contracts that firm $i$ received during fiscal year $t$. $NumUEI_{j,c,t}$ is the number of unique entities that contract officer $c$ for contract $j$ is responsible for over the federal fiscal year.<br>*Source: SAM.gov, USAspending.gov* |
| PctUEIGHGRep | The percentage of unique entities making the GHG representation in the current submission period for a contracting officer, weighted by the contract value when aggregating to firm-fiscal year level. It is computed based on the following formula:<br><br>$PctUEIGHGRep_{i,t} =$<br>$\sum_{j \in N} \frac{ContractValue_{i,j,t}}{ContractValue_{i,t}} \times PctGHGRep_{j,c,t}$, where $i$ denotes firm, $j$ denotes contract, $c$ denotes contracting officer, $t$ denotes firm fiscal year. $N$ is the set of all contracts that firm $i$ received during fiscal year $t$. $PctGHGRep_{j,c,t}$ is the percentage of entities with the GHG representation in their most current representation on SAM.gov that contract officer $c$ for contract $j$ is responsible for over the federal fiscal year.<br>*Source: SAM.gov, USAspending.gov* |
| **Control Variables** | |
| Log(*Total Asset*) | The natural logarithm of total assets in millions of dollars.<br>*Source: Compustat* |
| Log(1+*Age*) | The natural logarithm of one plus the number of years since a firm was covered by Compustat for the first time.<br>*Source: Compustat* |
| ROA | Net income divided by the average of the beginning and ending total assets.<br>*Source: Compustat* |
| Leverage | Long-term debt plus debt in current liabilities, divided by total assets.<br>*Source: Compustat* |
| AssetGrowth | The difference between ending total assets and beginning total assets divided by beginning total assets.<br>*Source: Compustat* |
| Tangibility | Net property, plant and equipment divided by total assets.<br>*Source: Compustat* |
| Log(1+*AnalystNum*) | The natural logarithm of one plus the number of analysts following.<br>*Source: IBES* |

| | |
|---|---|
| Log(1+*InstNum*) | The natural logarithm of one plus the number of institutional investors. <br> Source: Thomson 13F |
| Log(1+*SRIProposalN*) | The natural logarithm of one plus the number of social responsibility shareholder proposals. <br> *Source: ISS* |
| *GRIReporting* | An indicator variable that takes the value of one if a firm's sustainability report is published in accordance with the GRI guidelines. <br> *Source: Asset 4* |
| *PriorGHGPubDiscl* | An indicator variable that takes the value of one if Trucost reports obtaining a firm's emission data from public sources in the prior year. <br> *Source: Trucost* |
| **Other Variables** | |
| *GrossMargin* | Sales minus costs of goods sold divided by sales. <br> *Source: Compustat* |
| *Log(Sale)* | The natural logarithm of sales. <br> *Source: Compustat* |
| *Log(COGS)* | The natural logarithm of costs of goods sold. <br> *Source: Compustat* |

**Appendix B: FAR 52.223-22: Public Disclosure of Greenhouse Gas Emissions and Reduction Goals-Representation**

### 1. *FAR 52.223-22*

PUBLIC DISCLOSURE OF GREENHOUSE GAS EMISSIONS AND REDUCTION GOALS-REPRESENTATION (DEC 2016)

(a) This representation shall be completed if the Offeror received $7.5 million or more in Federal contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than $7.5 million in Federal contract awards in the prior Federal fiscal year.

(b) *Representation. [Offeror is to check applicable blocks in paragraphs (1) and (2).]*

(1) The Offeror (itself or through its immediate owner or highest-level owner) □ does, □ does not publicly disclose greenhouse gas emissions, *i.e.*, make available on a publicly accessible website the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.

(2) The Offeror (itself or through its immediate owner or highest-level owner) □ does, □ does not publicly disclose a quantitative greenhouse gas emissions reduction goal, *i.e.*, make available on a publicly available website a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.

(3) A publicly accessible website includes the Offeror's own website or a recognized, third-party greenhouse gas emissions reporting program.

(c) If the Offeror checked "does" in paragraphs (b)(1) or (b)(2) of this provision, respectively, the Offeror shall provide the publicly accessible website(s) where greenhouse gas emissions and/or reduction goals are reported:_____.

*Source: https://www.acquisition.gov/far/52.223-22*

### 2. *The process of making the FAR 52.223-22 representation on SAM.gov*

Registered entities on SAM.gov are required to complete an electronic annual representation in the SAM system and update the representations as necessary or at least annually (FAR 4.12). After December 19, 2016, all entities bidding for government contracts were required to answer a two-part question list related to FAR 52.223-22. Figure 1 provides a diagrammatic illustration.

The first part is described in FAR 52.223-22(a). Answering this question is *mandatory* for all entities registered on SAM.gov. This question states that an entity must check a box on whether it either received $7.5 million or more in federal contracts during the previous federal fiscal year or received less than $7.5 million but still wants to publicly disclose greenhouse gas emissions and reduction goals. If an entity checks "Yes" to this question, it will be prompted to answer (as a mandatory requirement to complete the representation process) two or three follow-up questions as described below. Therefore, we consider an entity that selects "Yes" ("No") to FAR 52.223-22(a) as having made (did not make) the GHG representation.

The second part involves two follow-up questions stated in FAR 52.223-22(b): whether the entity itself or through its immediate owner or highest-level owner, publicly discloses GHG emissions (FAR 52.223-22(b1)) or emission reduction goals (FAR 52.223-22(b2)). If an entity answers "Yes" to either question, SAM.gov further requires the entity to provide an available URL of their public disclosure of emissions or reduction goals under FAR 52.223-22(c). We

consider these entities to have provided the location of their public disclosure of emissions and/or reduction goals.
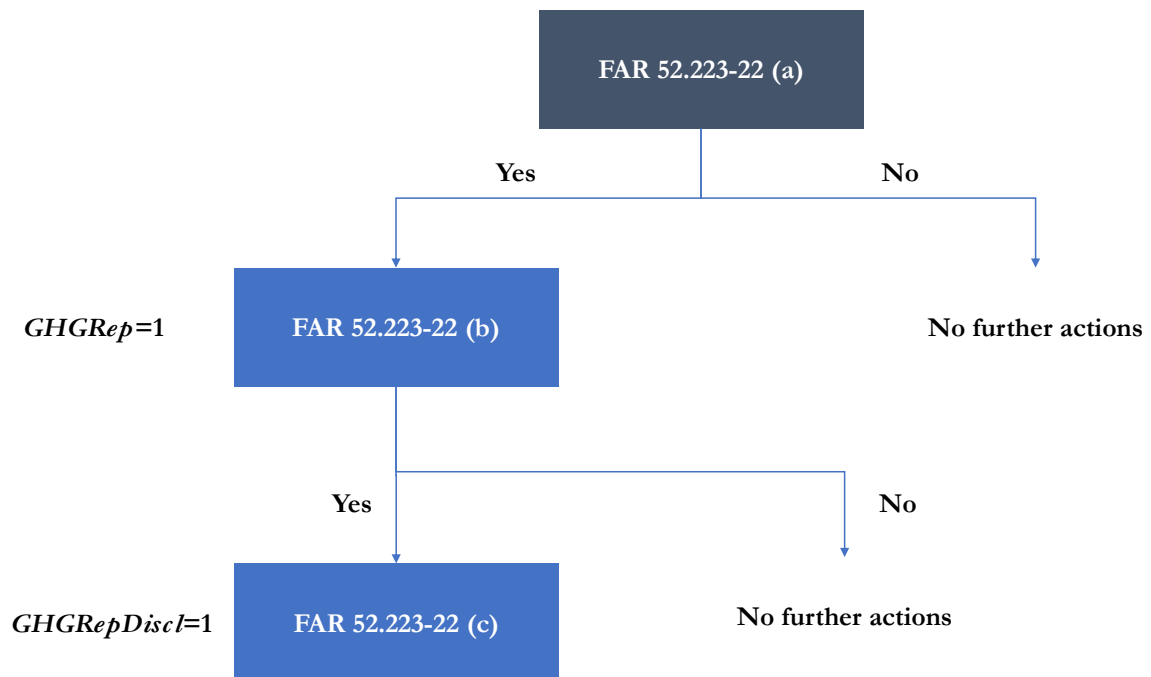


**Figure 1: A diagrammatic illustration of the process for making the GHG representation (FAR 52.223-22) on SAM.gov**

**Appendix C: Collecting Information on GHG Representation from SAM.gov**

We collect data on GHG representation from The System for Award Management (SAM.gov) for the 390 unique Compustat firms in the main sample. SAM.gov is an official website of the U.S. federal government that processes and stores entity registration information for any entities that wish to do business with the government. Since 2012, SAM.gov has been the single website for users (contracting officials, contractors, and the public) to access relevant information in the federal procurement process from start to finish.

It is important to note that SAM.gov defines a unique entity based on "a separate legal entity associated with a separate physical address" and subsequently assigns it a unique entity identifier (UEI).[26] Consequently, many firms contract with federal agencies under multiple UEIs. For example, each firm in our sample has, on average, 13 UEIs between federal years 2012 and 2021. In this document, we use the terms "company," "firm," and "supplier" interchangeably to refer to a unique Compustat GVKEY and use "entity" to refer to a unique UEI.

From SAM.gov, we collect the following information for all GHG representations made by entities between 2016 and October 2023, which is the date of the collection.

1. The submission date of the GHG representation
2. Whether a UEI makes the GHG representation by checking "Yes" under FAR 52.223-22(a)
3. Whether a UEI indicates that it has public disclosure of GHG emissions and reduction goals under FAR 52.223-22(b1) and FAR 52.223-22(b2)
4. The website location of public disclosures of GHG emissions and/or reduction goals provided by the entity under FAR 52.223-22(c), if any

Because manually collecting all current and historical GHG representations made by the entities in our sample entails a time-consuming process, we proceed in the following two steps.

We have a total of 3,558 UEIs for firms in our sample with contract awards from federal years 2017 to 2021. First, we sample up to four UEIs for each firm to conduct manual data collection. For each firm, we select 1) the UEI with the highest contract value (as we wish to identify the main entity that the firm conducts business with the federal government) as well as 2) up to three other randomly selected UEIs, if available. This procedure yields 598 UEIs. With the help of our research assistants, we collect the current and all historical GHG representations made after 2016 for 590 UEIs. The remaining UEIs do not have any registration information on SAM.gov. We aggregate individual representations to the UEI-federal year level. This yields a sample of 2,545 UEI-federal year observations. From this manual collection process, we verify an important feature of the GHG representation: once an entity starts making the GHG representation, it will continue doing so in subsequent years. In fact, only 8 (0.31%) of the sample stopped making the GHG representation at a later year. Based on this observation, we proceed to the second step.

Next, we use the SAM.gov Get Opportunities public API to query the most recent representation made by all remaining UEIs in our sample. If the query results suggest that the entity has made the GHG representation in the current period, we instruct our research assistants to collect all historical representations to determine the date that the entity starts to represent.

We construct the following variables based on the collected information on GHG representation. *GHGRep* equals one if any of a firm's UEIs make the GHG representation in a given year, and

---

[26] https://www.gsa.gov/system/files/To_Publish_-_FAQs_from_Unique_Entity_ID_Forum.pdf

zero otherwise. Next, we determine if the GHG representation made by a UEI is mandatory or voluntary in nature. We estimate the total contract value for each UEI in a given federal year by summing up the value of all contract awards. A UEI is considered to make a mandatory GHG representation if its total contract value in the previous federal fiscal year before the representation submission date is $7.5 million or more, and voluntary otherwise. At the firm-year level, *GHGRep(Mandatory)* indicates if any of a firm's UEI provides a mandatory GHG representation. In addition, we exploit variations in the content of the information provided by firms conditioning on having made the GHG representations: a UEI could either state "Yes" or "No" when asked about whether it, through itself or its immediate owner or highest-level owner, discloses GHG emission information and/or reduction goals (FAR 52.223-22(b)). *GHGRepDiscl* is an indicator variable that takes the value of one if a firm, through any of its UEIs, has provided a link to its public disclosure of emissions or reduction goals. Finally, we examine the quality of the information provided, conditioning on having provided website links. The system on SAM.gov is designed such that all UEIs will have to enter non-missing information on a website link should they have entered "Yes" in the previous question (i.e., FAR 52.223-22(b)). However, the system is not able to verify whether the website link provided is a valid and accessible web address. In order to verify if a link provided by the firm is valid at the point when the representation was made, we use the Wayback machine to determine whether the link was accessible in the past year before the representation date (*GHGLinkDisclValid*).

Below, we present three examples of the latest GHG presentations.

Example 1: Lockheed Martin Corporation, representation submitted on July 2, 2019 (*GHGRep*=1, *GHGRepDiscl*=1). See.
https://sam.gov/entities/view/H11HD5VHGHN3/repsAndCerts?status=Inactive&emrKeyValue=1692318~1562091896189556.

**Public Disclosure of Greenhouse Gas Emissions and Reduction Goals-Representation**

As prescribed in 23.804(b), insert the following provision:
Public Disclosure of Greenhouse Gas Emissions and Reduction Goals- Representation (Dec 2016)

(a) This representation shall be completed if the Offeror received $7.5 million or more in Federal contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than $7.5 million in Federal contract awards in the prior Federal fiscal year.

(b) Representation [Offeror is to check applicable blocks in paragraphs (b)(1) and (2).]
    (1) The Offeror (itself or through its immediate owner or highest-level owner) ☑ **DOES** , publicly disclose greenhouse gas emissions, i.e., makes available on a publicly accessible Web site the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.
    (2) The Offeror (itself or through its immedaite owner or highest-level owner) ☑ **DOES** , publicly disclose a quantitative greenhouse emissions reduction goal, i.e., make available on a publicly accessible Web site a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.
    (3) A publicly accessible Web site includes the Offeror's own Web site or a recognized, third-party greenhouse gas emissions reporting program.

(c) If the Offeror checked "does" in paragraphs (b)(1) or (b)(2) of this provision, respectively, the Offeror shall provide the publicly accessible Web site(s) where greenhouse gas emissions and/or reduction goals are reported:
**http: //www.lockheedmartin.com/us/who-we-are/sustainability.html)**
**http: //www.lockheedmartin.com/us/who-we-are/sustainability.html)**

Example 2: KBR Services, LLC, representation submitted on November 7, 2019 (*GHGRep*=1, *GHGRepDiscl*=0). See https://sam.gov/entities/view/YSQMHRS4HSC5/repsAndCerts?status=Inactive&emrKeyValue=1567323~1573054610973431.

**Public Disclosure of Greenhouse Gas Emissions and Reduction Goals- Representation**

As prescribed in 23.804(b), insert the following provision:
Public Disclosure of Greenhouse Gas Emissions and Reduction Goals- Representation (Dec 2016)

(a) This representation shall be completed if the Offeror received $7.5 million or more in Federal contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than $7.5 million in Federal contract awards in the prior Federal fiscal year.

(b) Representation [Offeror is to check applicable blocks in paragraphs (b)(1) and (2).]
   (1) The Offeror (itself or through its immediate owner or highest-level owner) , ⊗ **DOES NOT** publicly disclose greenhouse gas emissions, i.e., makes available on a publicly accessible Web site the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.
   (2) The Offeror (itself or through its immedaite owner or highest-level owner) , ⊗ **DOES NOT** publicly disclose a quantitative greenhouse emissions reduction goal, i.e., make available on a publicly accessible Web site a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.
   (3) A publicly accessible Web site includes the Offeror's own Web site or a recognized, third-party greenhouse gas emissions reporting program.

(c) If the Offeror checked "does" in paragraphs (b)(1) or (b)(2) of this provision, respectively, the Offeror shall provide the publicly accessible Web site(s) where greenhouse gas emissions and/or reduction goals are reported:
**(blank)**

Example 3: Xerox Corporation, representation submitted on February 26, 2020 (*GHGRep*=0, *GHGRepDiscl*=0). See https://sam.gov/entities/view/GFD7M3M5TAX1/repsAndCerts?status=Inactive&emrKeyValue=1113402~1582725535950799.

**Public Disclosure of Greenhouse Gas Emissions and Reduction Goals- Representation**

As prescribed in 23.804(b), insert the following provision:
Public Disclosure of Greenhouse Gas Emissions and Reduction Goals- Representation (Dec 2016)

(a) This representation shall be completed if the Offeror received $7.5 million or more in Federal contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than $7.5 million in Federal contract awards in the prior Federal fiscal year.

(b) Representation [Offeror is to check applicable blocks in paragraphs (b)(1) and (2).]

   (1) The Offeror (itself or through its immediate owner or highest-level owner) ☐ does, ☐ does not publicly disclose greenhouse gas emissions, i.e., makes available on a publicly accessible Web site the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.

   (2) The Offeror (itself or through its immedaite owner or highest-level owner) ☐ does, ☐ does not publicly disclose a quantitative greenhouse emissions reduction goal, i.e., make available on a publicly accessible Web site a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.
   (3) A publicly accessible Web site includes the Offeror's own Web site or a recognized, third-party greenhouse gas emissions reporting program.

(c) If the Offeror checked "does" in paragraphs (b)(1) or (b)(2) of this provision, respectively, the Offeror shall provide the publicly accessible Web site(s) where greenhouse gas emissions and/or reduction goals are reported:
**(blank)**

**Appendix D: Contracting Officer Identity**

We use the email addresses of the officer who approved a federal contract to identify the individual contracting officer responsible for overseeing the contract (Spenkuch et al., 2023), and thus, likely to process the supplier's GHG information.

First, we download information on who approved the contract on SAM.gov. The approval field usually indicates the email address of the approving contracting officer who is responsible for overseeing the contract. We also have the email address of the officer that prepared the contract. In 88% of cases, the preparing officer and the approving officer of a contract have identical email addresses. We merge it with the initial universe of contracts from USAspending.gov. Matching is based on contract award identifier, modification number, parent award identifier, and transaction number. This results in a match of 43,778,071 unique contracts (representing a 93% match rate) and 63,704 unique email addresses.

Similar to Spenkuch et al. (2023), not all email addresses can reasonably indicate the individual contracting officer. This happens when 1) the email address indicates a generic code representing a sub-agency (e.g., ebs.sysadmin.dla.mil) or 2) the email address lists a system email that cannot be traced back to an individual (e.g., 00.f.systemadmin@gsa.gov). To remove these anonymous email addresses, we require an email address to contain an "@" and a name can be found in the top 5000 most prevalent first names or last names according to the U.S. Census website and the Social Security Account. We obtain these common names from https://www.census.gov/topics/population/genealogy/data.html and https://www.ssa.gov/oact/babynames/limits.html.

From this procedure, we identified 47,629 individual officers who handled 9,636,339 contracts for 256,749 unique entities. In our sample, we successfully identified an individual contracting officer for 8.5% of Department of Defense (DoD) contracts versus 30% of non-DoD contracts. The matching rate is similar to Spenkuch et al. (2023), which used a slightly different sample. They identified the personal data of 32% of non-DoD services and works (excluding R&D) contracts from 2014 to 2019. As noted in Spenkuch et al. (2023), the percentage of contracts awarded by DoD with information on individual contracting officers is smaller than that of other federal agencies.

Using information on the identity of contracting officers, we compute two measures relating to their costs for processing suppliers' GHG emissions. First, we calculate the number of unique entities (i.e., UEIs) that each contracting officer is responsible for within a given federal year as a measure of the contracting officer's capacity constraints (*NUEICO*). Second, we estimate the extent to which the GHG representation helps a contracting officer to compare GHG emissions among suppliers that he/she manages. Specifically, we calculate the percentage of UEIs with the GHG representation, out of all UEIs with API extraction records that a contracting officer manages in a given year (*PctUEIGHGRep*). To calculate this measure, we gather the most current GHG representation for the near universe of UEIs on SAM.gov using the Get Opportunities API. Our procedure gathered the information for 182,091 UEIs, representing 70.9% of the 256,749 UEIs handled by contracting officers identified in our sample. Because of data constraints (i.e., we do not observe historical representations), we made the simplifying assumption to define GHG representation at the UEI level based on the most recent representation as recorded in SAM.gov.

**Appendix E: Processing of Existing Information versus New Information**

Since we have information on the actual representation made by suppliers, we investigate whether there is a change in the existence and the content of disclosure using the actual website location stated in their GHG representation.

Out of the 117 firms that provided the website locations of GHG public disclosure, we searched on the Wayback Machine for two archived versions of the website, made at different 180 days apart, to compare whether there is a change in availability or content. As Wayback does not archive websites every day, we require a valid archive within the 90-day period prior to the representation date. This archived website (i.e., base archive) approximates the content of the GHG public disclosure when the representation was made. For 66 firms, we are able to identify a base archive. We then analyze whether there was a change in disclosure content for these 66 firms around the first time they made the GHG representation.

*1. Existence*

To verify whether the website location for these firms existed before the GHG representation, we attempt to find a prior archive of the website on Wayback that is between 180 days to 2 years prior to the date of the base archive (i.e., prior archive). For 65 firms (65/66 = 98.5%) of the firms, we are able to identify a prior archive successfully. These results suggest that for over 95% of the firms, the GHG public disclosure they provided in the GHG representation existed at least 180 days prior to the base archive (which approximates the content of the public GHG disclosure in the representation). If we further restrict the criteria and require a prior version of the website to be at least 360 days before the date of the base archive, we are able to identify 54 firms (54/65 = 83.1%). These results suggest that it is unlikely firms started to provide GHG representations in response to the GHG representation.

*2. Similarity*

For the 65 firms with a prior version, we compute the cosine similarity of the base archive and the prior archive. The median (mean) score is 0.94 (0.83), consistent with little change in the website's content.

This analysis provides suggestive evidence that there has been little change in the availability or the content of public GHG disclosure as firms started to provide the GHG representation. It provides support that the GHG representation likely did not change the total amount of information available but the awareness, acquisition, and integration costs for processing this existing information.

*3. Caveat*

There are two caveats in this analysis. First, this analysis is limited to the 66 firms with a base archive on the Wayback Machine since the Wayback Machine does not store archives on a regular basis. For the remaining 51 firms without a base archive, this limitation restricts our ability to examine the change in the availability or the content of their public GHG disclosures. Second, in the content analysis, we are only able to compare the root domain of a website. This is because we had difficulty accessing most of the sub-domains of the website on the Wayback Machine since many of these sub-domains do not have accessible historical archives on the Wayback Machine (for example, links to external websites, links to a "contact us" form.). Therefore, we caution readers that we cannot fully tease out the new disclosure channel due to these inherent difficulties in measuring GHG disclosure.

**Table 1: Contract-level Descriptive Statistics**

This table presents the descriptive statistics of contract-level variables for U.S. federal government contract awards for firms in our sample from federal fiscal years 2012 to 2021 (i.e., October 1, 2011 to September 30, 2021). The table presents the total number of contracts (*ContractN*), the total value of contract awards (*ContractValue* in millions), the average value of contract awards (*AvgContractValue*), the average contract duration (*Duration* in days), the average number of offers per contract award (*OfferN*), the percentage of contracts that only receive one bid (*SingleOffer*).

| Federal Fiscal Year | ContractN | ContractValue($M) | AvgContractValue($) | Duration(Days) | OfferN | SingleBid(%) |
|---|---|---|---|---|---|---|
| 2012 | 399,973 | 20,410 | 51,030 | 329 | 64 | 34% |
| 2013 | 361,083 | 19,431 | 53,814 | 298 | 9 | 35% |
| 2014 | 383,658 | 20,270 | 52,836 | 284 | 9 | 33% |
| 2015 | 1,122,153 | 21,334 | 19,012 | 107 | 11 | 17% |
| 2016 | 1,298,028 | 21,575 | 16,621 | 93 | 8 | 18% |
| 2017 | 1,362,313 | 22,553 | 16,555 | 105 | 7 | 18% |
| 2018 | 1,459,403 | 23,661 | 16,213 | 97 | 18 | 7% |
| 2019 | 1,468,170 | 23,387 | 15,930 | 97 | 48 | 6% |
| 2020 | 1,361,293 | 21,685 | 15,930 | 161 | 26 | 6% |
| 2021 | 1,262,392 | 18,079 | 14,321 | 146 | 48 | 5% |
| Total | 10,478,466 | 212,388 | 20,269 | 136 | 16 | 13% |

**Table 2 Firm-year-level Descriptive Statistics**

**Panel A: Yearly Distribution of GHG Representation**

This panel presents yearly distributions of the percentage of firms making the GHG representation. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. *FirstGHGRep* indicates whether a firm makes the GHG representation for the first time. *FirstGHGRep(Mandatory)* indicates whether a firm makes the GHG representation as a mandatory requirement for the first time. *GHGRepDiscl* indicates whether a firm states that it has public disclosure of GHG emissions or reduction goals in the GHG representation. *GHGRepDisclValid* indicates whether a firm provides a valid link to its public disclosure of GHG emissions or reduction goals in the GHG representation.

| Year | N | GHGRep(%) | GHGRep(Mandatory)(%) | FirstGHGRep(%) | FirstGHGRep(Mandatory)(%) | GHGRepDiscl(%) | GHGRepDisclValid(%) |
|------|------|------|------|------|------|------|------|
| 2013 | 226 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2014 | 272 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 296 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 317 | 0.9% | 0.6% | 0.9% | 0.6% | 0.6% | 0.6% |
| 2017 | 306 | 22.2% | 14.1% | 21.2% | 13.4% | 17.3% | 13.7% |
| 2018 | 309 | 25.2% | 15.5% | 4.2% | 2.6% | 20.7% | 16.8% |
| 2019 | 284 | 27.8% | 16.5% | 2.5% | 2.1% | 23.6% | 18.3% |
| 2020 | 36 | 38.9% | 27.8% | 8.3% | 11.1% | 30.6% | 25.0% |
| Total | 2046 | 11.8% | 7.3% | 4.4% | 3.0% | 9.6% | 7.7% |

**Panel B: Descriptive Statistics on Firm Characteristics**

This panel presents the descriptive statistics of firm characteristics in our main firm-year sample. All variables are defined in Appendix A.

| | N | Mean | StdDev | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| **Measures of Emission** | | | | | | |
| Log(*GHGEmission*) | 2046 | 12.777 | 2.205 | 11.148 | 12.551 | 14.098 |
| Log(*GHGEmission/Sale*) | 2046 | 4.062 | 1.824 | 2.820 | 3.711 | 5.042 |
| Log(*GHGEmission/COGS*) | 2046 | 4.741 | 1.752 | 3.706 | 4.460 | 5.591 |
| Log(*GHGScope1Emission*) | 2043 | 11.781 | 2.669 | 9.763 | 11.489 | 13.322 |
| Log(*GHGScope2Emission*) | 2044 | 11.548 | 1.799 | 10.299 | 11.487 | 12.891 |
| Log(*GHGScope3UEmission*) | 2046 | 13.472 | 1.646 | 12.290 | 13.526 | 14.644 |
| **Measures of the GHG Rep** | | | | | | |
| *GHGRep* | 2046 | 0.118 | 0.323 | 0.000 | 0.000 | 0.000 |
| Mandatory | 2046 | 0.159 | 0.366 | 0.000 | 0.000 | 0.000 |
| *GHGRep(Mandatory)* | 2046 | 0.073 | 0.261 | 0.000 | 0.000 | 0.000 |
| *GHGRep(Voluntary)* | 2046 | 0.045 | 0.207 | 0.000 | 0.000 | 0.000 |
| *NoGHGRep(Mandatory)* | 2046 | 0.086 | 0.280 | 0.000 | 0.000 | 0.000 |
| *GHGRepDiscl* | 2046 | 0.096 | 0.295 | 0.000 | 0.000 | 0.000 |
| *GHGRepDisclValid* | 2046 | 0.077 | 0.266 | 0.000 | 0.000 | 0.000 |
| *FirstGHGRep* | 2046 | 0.044 | 0.206 | 0.000 | 0.000 | 0.000 |
| *FirstGHGRep(Mandatory)* | 2046 | 0.030 | 0.170 | 0.000 | 0.000 | 0.000 |
| **Measures of Federal Contracts** | | | | | | |
| *GovContractValue* | 2046 | 231.837 | 991.236 | 0.303 | 3.689 | 35.139 |
| *GovContractValue/Sales* | 2046 | 0.016 | 0.061 | 0.000 | 0.001 | 0.005 |
| *GovContractN* | 2046 | 1442.971 | 4562.299 | 10.000 | 56.000 | 395.000 |
| *SingleBid* | 2046 | 0.531 | 0.385 | 0.123 | 0.559 | 0.958 |
| *Variability* | 2040 | 0.004 | 0.012 | 0.000 | 0.000 | 0.002 |
| *MajorGovCustomer* | 2046 | 0.095 | 0.293 | 0.000 | 0.000 | 0.000 |
| *NCOUEI* | 1284 | 43.052 | 50.399 | 9.000 | 26.304 | 58.946 |
| *PctUEIGHGRep* | 1284 | 0.113 | 0.102 | 0.035 | 0.092 | 0.154 |
| **Other Control Variables** | | | | | | |
| Log(*Assets*) | 2046 | 9.249 | 1.527 | 8.201 | 9.038 | 10.222 |
| Log(1+*Age*) | 2046 | 2.845 | 0.212 | 2.773 | 2.890 | 2.996 |
| *ROA* | 2046 | 0.054 | 0.072 | 0.023 | 0.048 | 0.087 |
| *Leverage* | 2046 | 0.304 | 0.179 | 0.180 | 0.291 | 0.395 |
| *AssetGrowth* | 2046 | 0.072 | 0.201 | -0.013 | 0.044 | 0.106 |
| *Tangibility* | 2046 | 0.265 | 0.250 | 0.076 | 0.163 | 0.402 |
| Log(1+*AnalystN*) | 2046 | 2.224 | 0.815 | 1.946 | 2.435 | 2.757 |
| Log(1+*InstN*) | 2046 | 6.069 | 1.037 | 5.677 | 6.145 | 6.625 |
| Log(1+*SRIProposalsN*) | 2046 | 0.229 | 0.418 | 0.000 | 0.000 | 0.693 |
| *GRIReport* | 2046 | 0.378 | 0.485 | 0.000 | 0.000 | 1.000 |
| *PriorGHGPubDis* | 2046 | 0.517 | 0.500 | 0.000 | 1.000 | 1.000 |
| **Other Variables** | | | | | | |
| *GrossMargin* | 2046 | 1.555 | 2.720 | 0.372 | 0.614 | 1.407 |
| Log(*Sale*) | 2046 | 8.724 | 1.399 | 7.771 | 8.583 | 9.600 |
| Log(*COGS*) | 2046 | 8.028 | 1.613 | 6.956 | 7.995 | 9.059 |

**Table 3: The Effect of the GHG Representation on Suppliers' GHG Emissions**

**Panel A: Main Results**

This panel analyzes the effect of making the GHG representation on suppliers' emissions. It estimates Equation (1) using OLS:

$Log(GHGEmission)_{i,t} = \beta_0 + \beta_1 \, GHGRep_{i,t} \text{ or } GHGRep(Mandatory)_{i,t} + Controls + Firm\ FE + Year\ FE + \varepsilon_{i,t}$

*GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| **GHGRep** | -0.132** | -0.138*** | | |
| | (-2.349) | (-2.800) | | |
| **GHGRep(Mandatory)** | | | -0.130** | -0.148*** |
| | | | (-2.148) | (-2.801) |
| GovContractValue/Sale | | -0.372 | | -0.402 |
| | | (-1.085) | | (-1.202) |
| Log(*Assets*) | | 0.694*** | | 0.696*** |
| | | (9.074) | | (9.111) |
| Log(1+*Age*) | | -0.323 | | -0.304 |
| | | (-0.949) | | (-0.920) |
| ROA | | 0.369* | | 0.395** |
| | | (1.934) | | (2.062) |
| Leverage | | 0.314* | | 0.324* |
| | | (1.709) | | (1.754) |
| AssetGrowth | | -0.249*** | | -0.253*** |
| | | (-6.104) | | (-6.231) |
| Tangibility | | -0.067 | | -0.029 |
| | | (-0.196) | | (-0.083) |
| Log(1+*AnalystN*) | | -0.020 | | -0.028 |
| | | (-0.388) | | (-0.548) |
| Log(1+*InstN*) | | 0.029 | | 0.032 |
| | | (0.452) | | (0.502) |
| Log(1+*SRIProposalsN*) | | -0.028 | | -0.031 |
| | | (-0.696) | | (-0.787) |
| GRIReport | | -0.016 | | -0.017 |
| | | (-0.288) | | (-0.309) |
| PriorGHGPubDis | | -0.043 | | -0.044 |
| | | (-0.714) | | (-0.740) |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2046 | 2046 |
| Adjusted R-squared | 0.974 | 0.977 | 0.974 | 0.977 |

**Panel B Robustness Checks**

This panel estimates Equation (1) using alternative model specifications and alternative transformations of GHG emissions. Columns 1 and 2 estimate Poisson pseudo maximum likelihood regressions using decile-ranked combined scopes 1 and 2 emissions as the dependent variables. Columns 3 and 4 (5 and 6) report the OLS regression results using the natural logarithm of combined scopes 1 and 2 emission intensity, scaled by sales (costs of goods sold) as the dependent variables. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | *GHGEmission* DecileRank | | Log(*GHGEmission* /Sale) | | Log(*GHGEmission* /COGS) | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **GHGRep** | **-0.039*** | | **-0.138*** | | **-0.119** | |
| | **(-2.853)** | | **(-2.813)** | | **(-2.271)** | |
| **GHGRep(Mandatory)** | | **-0.029** | | **-0.150*** | | **-0.127** |
| | | **(-2.092)** | | **(-2.783)** | | **(-2.341)** |
| *GovContractValue/Sale* | -0.112 | -0.140 | 0.134 | 0.109 | 0.133 | 0.106 |
| | (-0.732) | (-0.931) | (0.371) | (0.297) | (0.322) | (0.253) |
| Log(*Assets*) | 0.203*** | 0.201*** | 0.040 | 0.043 | 0.148** | 0.150** |
| | (7.970) | (7.779) | (0.653) | (0.690) | (1.981) | (2.011) |
| Log(1+*Age*) | -0.002 | 0.008 | -0.121 | -0.103 | -0.062 | -0.047 |
| | (-0.018) | (0.079) | (-0.416) | (-0.361) | (-0.263) | (-0.203) |
| *ROA* | 0.104 | 0.113 | -0.239 | -0.213 | 0.247 | 0.269 |
| | (1.342) | (1.456) | (-1.559) | (-1.387) | (1.013) | (1.102) |
| *Leverage* | 0.101 | 0.103* | 0.280 | 0.291 | 0.248 | 0.256 |
| | (1.632) | (1.653) | (1.572) | (1.616) | (1.323) | (1.359) |
| *AssetGrowth* | -0.083*** | -0.084*** | -0.009 | -0.014 | -0.052 | -0.056 |
| | (-4.829) | (-4.866) | (-0.250) | (-0.377) | (-1.152) | (-1.247) |
| *Tangibility* | -0.049 | -0.037 | 0.132 | 0.170 | 0.218 | 0.251 |
| | (-0.550) | (-0.415) | (0.569) | (0.733) | (0.733) | (0.843) |
| Log(1+*AnalystN*) | -0.010 | -0.012 | -0.014 | -0.022 | -0.033 | -0.039 |
| | (-0.636) | (-0.780) | (-0.328) | (-0.505) | (-0.642) | (-0.776) |
| Log(1+*InstN*) | 0.022 | 0.023 | -0.021 | -0.018 | 0.004 | 0.006 |
| | (1.001) | (1.036) | (-0.465) | (-0.400) | (0.061) | (0.103) |
| Log(1+*SRIProposalsN*) | -0.009 | -0.009 | -0.037 | -0.041 | -0.052 | -0.055 |
| | (-1.202) | (-1.287) | (-1.232) | (-1.348) | (-1.117) | (-1.184) |
| *GRIReport* | 0.005 | 0.005 | -0.006 | -0.007 | -0.031 | -0.032 |
| | (0.420) | (0.409) | (-0.126) | (-0.152) | (-0.565) | (-0.584) |
| *PriorGHGPubDis* | -0.010 | -0.011 | -0.043 | -0.044 | -0.015 | -0.016 |
| | (-0.730) | (-0.810) | (-0.830) | (-0.859) | (-0.256) | (-0.277) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2046 | 2046 | 2046 | 2046 |
| Pseudo (Adjusted) R-squared | 0.319 | 0.319 | 0.974 | 0.974 | 0.961 | 0.961 |

**Table 4: Addressing Endogeneity Concerns**

**Panel A: *Mandatory* as an Instrumental Variable**

This panel analyzes the effect of the making GHG representation on suppliers' emissions using an instrumental variable approach and presents 2SLS coefficient estimates. Columns 1 and 2 present the first stage of estimating Equation 2(a). Columns 3 and 4 report the second stage of estimating Equation 2(b). In the first stage, *GHGRep* and *GHGRep(Mandatory)* are the dependent variables. *GHGRep* takes the value of one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. *Mandatory* serves as the instrument that captures (plausibly exogenous) variations in *GHGRep*. It takes the value of one if any of a firm's UEIs received over $7.5 million in total contract values in the prior federal fiscal year before its current GHG representation submission date, and zero otherwise. In the second stage, the dependent variable, *GHGEmission*, is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *PredictedGHGRep* (*PredictedGHGRep(Mandatory)*) is the predicted value of *GHGRep* (*GHGRep(Mandatory)*) from the first stage. Control variables are defined in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | *GHGRep* | *GHGRep(Mandatory)* | Log(*GHGEmission*) | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *Mandatory* | 0.369*** | 0.439*** | | |
| | (8.053) | (9.974) | | |
| *PredictedGHGRep* | | | -0.367** | |
| | | | (-2.164) | |
| *PredictedGHGRep(Mandatory)* | | | | -0.309** |
| | | | | (-2.164) |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2046 | 2046 |
| Adjusted R-squared | 0.569 | 0.582 | 0.977 | 0.977 |

**Panel B: Emission Outcomes of Voluntary GHG Representations and Failure to Make the GHG Representation Despite Mandatory Requirements**

This panel investigates the emission outcomes among firms who voluntarily make the GHG representation and firms who do not make the GHG representation despite being subject to the mandatory requirement. It modifies Equation (1) by replacing *GHGRep* with separate indicator variables for 1) firms who make the GHG representation as a mandatory requirement (*GHGRep(Mandatory)*), 2) firms who make the GHG representation voluntarily (*GHGRep(Voluntary)*), and 3) firms who do not make the GHG representation despite having an entity exceeding the mandatory threshold of \$7.5 million (*NoGHGRep(Mandatory)*). *GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). Control variables are defined in Equation (1). Firm and year-fixed effects are included. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. \*\*\*, \*\*, \* indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) |
|---|:---:|
| | (1) |
| *GHGRep(Mandatory)* | -0.193*** |
| | (-3.247) |
| *GHGRep(Voluntary)* | -0.090 |
| | (-1.588) |
| *NoGHGRep(Mandatory)* | -0.101 |
| | (-1.155) |
| Controls | Yes |
| Firm FE | Yes |
| Year FE | Yes |
| N | 2046 |
| Adjusted R-squared | 0.977 |

**Panel C: Coefficient Dynamics**

This panel investigates the effect of making the GHG representation on suppliers' emissions over time. It modifies Equation (1) by replacing *GHGRep* or *GHGRep(Mandatory)* with indicators for the two years before (*Pre2 and Pre1*), during (*Post0*), and two years after (*Post1 and Post 2*) the first year a firm makes the (mandatory) GHG representation (i.e., first treatment). In Column (1), a firm's first treatment is defined based on the first year that it makes the GHG representation (*FirstGHGRep*). In Column (2), a firm's first treatment is defined based on the first year that it makes the mandatory GHG representation (*FirstGHGRep(Mandatory)*). *GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). Control variables are defined in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | |
|---|---|---|
| First treatment defined by | *FirstGHGRep* | *FirstGHGRep(Mandatory)* |
| | (1) | (2) |
| *Pre2* | 0.028 | 0.005 |
| | (0.796) | (0.150) |
| *Pre1* | 0.034 | -0.010 |
| | (0.775) | (-0.231) |
| *Post0* | -0.080* | -0.173*** |
| | (-1.650) | (-3.453) |
| *Post1* | -0.133** | -0.165*** |
| | (-2.103) | (-2.602) |
| *Post2* | -0.142** | -0.185*** |
| | (-2.036) | (-2.842) |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |
| N | 2046 | 2046 |
| Adjusted R-squared | 0.977 | 0.977 |

**Panel D: Entropy Balancing Matching**

This panel estimates Equation (1) using an entropy-balancing matched sample. Specifically, we use entropy balancing to reweight firms without the (mandatory) GHG representation based on variables that likely affect the decision of (mandatory) GHG representation, including contract value, firm size, institutional ownership, shareholder proposals, GRI reporting, and prior public GHG disclosure. *GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | |
|---|---|---|
| | (1) | (2) |
| *GHGRep* | -0.116** | |
| | (-2.232) | |
| *GHGRep(Mandatory)* | | -0.108* |
| | | (-1.755) |
| Controls | Yes | Yes |
| Firm FE | Yes | Yes |
| Year FE | Yes | Yes |
| N | 2046 | 2046 |
| Adjusted R-squared | 0.980 | 0.983 |

**Panel A: Reliance on Government Contracts**

This panel investigates how economic reliance on government contracts affects suppliers' emission reductions after making the GHG representation. It modifies Equation (1) by partitioning *GHGRep* into 1) firms with high reliance on government contracts (*GHGRep-HighReliance or GHGRep(Mandatory)-HighReliance*) and 2) firms with low reliance on government contracts (*GHGRep-LowReliance or GHGRep(Mandatory)-LowReliance*). In columns 1 and 2, *HighReliance* is proxied by *HighContractValue/Sale*, which indicates if a firm's federal government contract value accounts for a higher percentage of total sales than the sample median. In columns 3 and 4, *HighReliance* is proxied by *MajorGovCustomer*, which indicates if a firm discloses the federal government as a major customer in corporate communications. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| *HighReliance* = | *HighGovContractValue/Sale* | | *MajorGovCustomer* | |
| | (1) | (2) | (3) | (4) |
| [1] *GHGRep-HighReliance* | -0.159*** | | -0.238*** | |
| | (-3.043) | | (-4.283) | |
| [2] *GHGRep-LowReliance* | -0.075 | | -0.116** | |
| | (-1.033) | | (-2.202) | |
| [1] *GHGRep(Mandatory)-HighReliance* | | -0.166*** | | -0.258*** |
| | | (-3.027) | | (-4.453) |
| [2] *GHGRep(Mandatory)-LowReliance* | | 0.047 | | -0.112* |
| | | (1.026) | | (-1.885) |
| *(2-tailed) p-value: [1]=[2]* | *0.243* | *0.000* | *0.019* | *0.025* |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2046 | 2046 |
| Adjusted R-squared | 0.977 | 0.977 | 0.977 | 0.977 |

**Panel B: Uncertainty in Government Contracts**

This panel investigates whether the uncertainty in receiving future federal contracts affects suppliers' emission reductions after making the GHG representation. It modifies Equation (1) by partitioning *GHGRep* into 1) firms with high uncertainty in receiving future contracts (*GHGRep-HighUncertainty or GHGRep(Mandatory)-HighUncertainty*) and 2) firms with low uncertainty (*GHGRep-LowUncertainty or GHGRep(Mandatory)-LowUncertainty*). In columns 1 and 2, *HighUncertainty* is proxied by *LowSingleBid*, which indicates if less than 50% of a firm's contract value in a given year are single offer bids. In columns 3 and 4, *HighUncertainty* is proxied by *HighVariablity*, which indicates if a firm's contract variability, defined as the standard deviation of the contract value as a percentage of sales over the past five years, is in the highest quartile of the sample. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| *HighUncertainty* = | *LowSingleBid* | | *HighVariability* | |
| | (1) | (2) | (3) | (4) |
| [1] *GHGRep-HighUncertainty* | -0.165*** | | -0.200*** | |
| | (-2.810) | | (-2.868) | |
| [2] *GHGRep-LowUncertainty* | -0.087** | | -0.096* | |
| | (-1.982) | | (-1.866) | |
| [1] *GHGRep(Mandatory)-HighUncertainty* | | -0.171*** | | -0.186** |
| | | (-2.744) | | (-2.582) |
| [2] *GHGRep(Mandatory)-LowUncertainty* | | -0.077 | | -0.103* |
| | | (-1.523) | | (-1.903) |
| *(2-tailed) p-value: [1]=[2]* | 0.099 | 0.157 | 0.115 | 0.236 |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2040 | 2040 |
| Adjusted R-squared | 0.977 | 0.977 | 0.977 | 0.977 |

**Table 6: Cross-Sectional Analyses Based on Contracting Officers' Information Processing**

**Panel A: The Information Content of the GHG Representation**

This panel investigates how the usefulness of the information in the GHG representation affects suppliers' emission reductions after making the GHG representation. It modifies Equation (1) by partitioning *GHGRep* into 1) firms with more useful information in the GHG representation (*GHGRep-HighUseful or GHGRep(Mandatory)-HighUseful*) and 2) firms with less useful information (*GHGRep-LowUseful or GHGRep(Mandatory)-LowUseful*). In columns 1 and 2, *HighUseful* is proxied by *GHGRepDiscl*, which indicates whether a firm indicates that it has GHG disclosure in the representation. In columns 3 and 4, *HighUseful* is proxied by *GHGRepDiscl Valid*, which indicates if a firm provides accessible website links to its GHG disclosure in the representation. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| HighUseful = | *GHGRepDiscl* | | *GHGRepDisclValid* | |
| | (1) | (2) | (3) | (4) |
| [1] *GHGRep-HighUseful* | -0.161*** | | -0.177*** | |
| | (-2.998) | | (-3.327) | |
| [2] *GHGRep-LowUseful* | -0.034 | | -0.071 | |
| | (-0.483) | | (-1.141) | |
| [1] *GHGRep(Mandatory)-HighUseful* | | -0.159*** | | -0.184*** |
| | | (-2.884) | | (-3.199) |
| [2] *GHGRep(Mandatory)-LowUseful* | | -0.056 | | -0.061 |
| | | (-0.435) | | (-0.857) |
| *(2-tailed) p-value: [1]=[2]* | *0.091* | *0.444* | *0.074* | *0.093* |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2046 | 2046 |
| Adjusted R-squared | 0.977 | 0.977 | 0.977 | 0.977 |

**Panel B: Contracting Officers' Information Processing**

This panel investigates how contracting officers' information processing ability affects suppliers' emission reductions after making the GHG representation. It modifies Equation (1) by partitioning *GHGRep* into 1) firms having contracting officers with high processing ability (*GHGRep-HighCOProcessing or GHGRep(Mandatory)-HighCOProcessing*) and 2) firms having contracting officers with low processing ability (*GHGRep-LowCOProcessing or GHGRep(Mandatory)-LowCOProcessing*). In columns 1 and 2, *HighCOProcessing* is proxied by *LowNUEICO*, which indicates if a firm's contracting officers manage fewer UEIs in a year than the sample median. In columns 3 and 4, *HighCOProcessing* is proxied by *HighPctUEIGHGRep*, which indicates if a firm's contracting officers have a higher percentage of UEIs in their portfolios making the GHG representation. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Requiring information on contracting officers' identity results in a reduction in sample size. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| HighCOProcessing= | *LowNUEICO* | | *HighPctUEIGHGRep* | |
| | (1) | (2) | (3) | (4) |
| [1] *GHGRep-HighCOProcessing* | -0.209*** | | -0.155*** | |
| | (-3.828) | | (-3.148) | |
| [2] *GHGRep-LowCOProcessing* | -0.067 | | -0.134** | |
| | (-1.258) | | (-2.014) | |
| [1] *GHGRep(Mandatory)-HighCOProcessing* | | -0.200*** | | -0.214*** |
| | | (-3.724) | | (-4.303) |
| [2] *GHGRep(Mandatory)-LowCOProcessing* | | -0.096** | | -0.082 |
| | | (-2.005) | | (-1.271) |
| *(2-tailed) p-value: [1]=[2]* | *0.028* | *0.046* | *0.775* | *0.047* |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 1284 | 1284 | 1284 | 1284 |
| Adjusted R-squared | 0.979 | 0.979 | 0.979 | 0.979 |

**Table 7: Emission Reduction Channels**

This panel investigates suppliers' emission reduction channels. We replace Log(*GHGEmission*) in Equation (1) with the log-transformed Scope 1 emissions (Log(*GHGScope1Emission*)), Scope 2 emissions (Log(*GHGScope2Emission*)), and Scope 3 upstream emissions (Log(*GHGScope3UEmission*)). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Firms with missing or zero emissions in the respective category are dropped from the regression. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | Log(*GHGScope1 Emission*) | | Log(*GHGScope2 Emission*) | | Log(*GHGScope3 UEmission*) | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *GHGRep* | -0.080 | | -0.129** | | 0.010 | |
| | (-1.147) | | (-2.051) | | (0.377) | |
| *GHGRep(Mandatory)* | | -0.093 | | -0.127* | | 0.022 |
| | | (-1.463) | | (-1.859) | | (0.839) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 2043 | 2043 | 2044 | 2044 | 2046 | 2046 |
| Adjusted R-squared | 0.971 | 0.971 | 0.946 | 0.946 | 0.986 | 0.986 |

**Table 8: The Effect of the GHG Representation on Suppliers' Financial Performance**

This panel examines the effect of making the GHG representation on suppliers' financial performance, including *ROA*, gross margin (*GrossMargin*), sales (Log(*Sales*)), and costs of goods sold (Log(*COGS*)). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Controls are all control variables included in Equation (1) except *ROA*. Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | *ROA* | | *GrossMargin* | | Log(*Sale*) | | Log(*COGS*) | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *GHGRep* | -0.006 | | -0.008 | | -0.024 | | -0.035 | |
| | (-1.278) | | (-0.063) | | (-1.602) | | (-1.416) | |
| *GHGRep(Mandatory)* | | 0.001 | | 0.087 | | -0.016 | | -0.036* |
| | | (0.267) | | (1.452) | | (-1.103) | | (-1.754) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 2046 | 2046 | 2046 | 2046 | 2046 | 2046 |
| Adjusted R-squared | 0.624 | 0.623 | 0.919 | 0.919 | 0.994 | 0.994 | 0.989 | 0.989 |

**Table 9: GHG Representation and Suppliers' Future Government Contracts**

This panel investigates the effect of making the GHG representation on federal suppliers' future government contracts. *FutureGovContract* equals one if a supplier's total federal contract value in the next fiscal year is positive, and zero otherwise. *FutureGovContractValue/Sale* equals the percentage of total government contract value divided by sales in the next year. Log(*FutureGovContractN*) is the natural logarithm of the number of government contracts in the next year. *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. In columns 3 to 6, firms without future government contracts are dropped from the sample. Controls are all control variables included in Equation (1). Firm and year-fixed effects are included in all columns. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed).

| Dependent Variable = | *FutureGov Contract* | | *FutureGov ContractValue/Sale* | | Log(*FutureGov ContractN*) | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *GHGRep* | 0.064*** | | 0.003 | | 0.157* | |
| | (2.685) | | (1.597) | | (1.816) | |
| *GHGRep(Mandatory)* | | 0.031 | | 0.004* | | 0.207** |
| | | (1.583) | | (1.676) | | (2.456) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 2046 | 2046 | 1927 | 1927 | 1927 | 1927 |
| Adjusted R-squared | 0.254 | 0.251 | 0.943 | 0.943 | 0.949 | 0.949 |

Internet Appendix for
**Check the Box: Does Information on the Existence of Public Climate Disclosure Reduce Federal Suppliers' Emissions?**

April, 2024

**Internet Appendix IA: Entity-level Compliance with the GHG Representation**
In the federal procurement process, a unique entity is defined as "a separate legal entity associated with a separate physical address" and is assigned a unique entity identifier (UEI). The requirement to make the GHG representation applies at the entity level. We provide further background on the status of compliance with the GHG representation at the UEI level, possible manipulation of the threshold, and the potential reasons for not making the GHG representation when an entity is mandated to do so.

    1.  *Entity-level statistics*

We investigate the status of making the GHG representation among the 6,842 entity-federal fiscal year level observations in our sample. Table IA2 Panel A provides the relevant statistics. For each federal fiscal year, we first determine if an entity is mandated by FAR 52.223-22 to make the GHG representation. An entity is considered mandatory in a given federal fiscal year after the GHG representation rule effective date if it has received over $7.5 million in aggregate contract value in the previous federal fiscal year (*Mandatory$_{UEI}$*). 26.5% of the observations are considered mandatory. Next, we indicate whether a mandatory entity has made the GHG representation (*GHGRep(Mandatory)$_{UEI}$*) or has not made the GHG representation (*NoGHGRep(Mandatory)$_{UEI}$*). Overall, 68.5% (18.2%/26.5%) of the mandatory entities make the GHG representation.

Next, because we use the $7.5 million threshold as the instrument for making the GHG representation in the instrumental variable design, we investigate potential manipulations around the threshold. Table IA2 Panel B shows that the average contract value, at the entity level, has increased gradually since 2014. The number of UEIs above the $7.5 million threshold remains fairly stable at around 16% in 2016 and 2017, before gradually increasing to 20.6% in 2020. Among UEIs with contract values between $6 million and $9 million ($1.5 million below or above the $7.5 million threshold), the proportion just above the threshold increased from 38.89% in 2015 and remains above 40% after 2017. These results suggest that it is unlikely that entities are strategically manipulating this threshold.

    2.  *Comparison within firms who made the GHG representation.*

Besides the battery of robustness analyses detailed in Section 4.2 to address concerns over the endogeneity associated with making the GHG representation, it is worth pointing out that some of our analyses rely on variations within firms that have made the GHG representation. This further mitigates concerns that our results are driven by the discretionary decision to make the GHG representation. There are variations in the extent to which the GHG representations reduce information processing costs. We develop tests that would be expected under information processing costs but are difficult to be explained by alternative theories. Specifically, in Table 6, we differentiate between complied firms that checked "Yes" and supplied website link (*GHGRepDiscl*) and complied firms that checked "No." These two types of firms are otherwise similar (i.e., surpassing the $7.5m in contract value and complying with the GHG representation). We expect to find a stronger result among disclosers if our proposed mechanism – that reduced information processing costs of GHG information reduces suppliers' subsequent emissions – is at play. Our results, presented in Table 6, show consistent evidence.

    3.  *Possible reasons for failing to make the GHG representation.*

We supplement empirical analyses with institutional background and insights from interviewing two GSA officials, which further shed light on why it is unlikely that firms intentionally misrepresent for reasons including their GHG emissions.

    a.  Intentional misrepresentation is unlikely, given the high costs associated.

The first step of the GHG representation, as stated in FAR 52.223-22(a), requires *all* contractors to explicitly state (by selecting either yes or no) whether they have received over $7.5 million in federal contract awards in the previous federal year (which makes it mandatory for them to provide the GHG representation). The exact language of the representation is presented below.

*Did [ENTITY_NAME] either receive $7.5 million or more in Federal contracts during the previous Federal fiscal year requiring it to publicly disclose greenhouse gas emissions and reduction goals or receive less than $7.5 million in Federal contracts during the previous Federal fiscal year but still want to publicly disclose greenhouse gas emissions and reduction goals?*

It is mandatory for all entities to answer this question. Therefore, it is not possible to misrepresent by omission. For an entity to misrepresent, it will need to make an explicit false representation, claiming that they have received less than $7.5 million in federal awards when they have received more. However,

the costs of doing this intentionally seem prohibitively high. First, federal agencies have (and suppliers are aware of) information on the amount of contract awards received by each entity, which is centrally stored on SAM.gov. False representation can be easily uncovered if federal agencies wish to do so, indicating a strong deterrence effect. Second, misrepresenting in order to obtain contracts could be subject to criminal prosecution under Section 1001, Title 18 of the United States Code (18 U.S. Code § 1001). Criminal penalties could include the imposition of a fine, imprisonment, or both. Other penalties include, but are not limited to, administrative remedies, such as suspension and debarment; ineligibility to participate in programs conducted under the authority of the Small Business Act; or civil liability under the False Claims Act.

    b.   Unfamiliarity with the $7.5 million threshold and difficulty in determining precise contract values.

As part of the FAR certification and representation process, suppliers need to make a list of over 70 mandatory representations annually. Among them, FAR 52.223-22 is the *only* representation that uses $7.5 million in total contract value as the cut-off. The calculation of total contract value in the previous federal year needs to be done by suppliers, which might be unfamiliar to them. In addition, the exact value of a federal contract might not have been determined at the time of signing (e.g., contracts involving cost-plus and time-and-materials arrangements). Therefore, suppliers might not be able to precisely determine their status prior to making the representation. Descriptive evidence suggests the same – entities with contract awards that are well above the threshold are more likely to make the GHG representation. To mitigate concerns that contract value is an omitted correlated variable, we include contract value as a control throughout all specifications. Further, we include contract size as a matching covariate to mitigate the concern that our results might be driven by suppliers with larger contract size, regardless of whether they made the GHG representation. As shown in Table 4 Panel D, our results remain unchanged using the matched sample.

**Internet Appendix IB: Definitions for Additional Variables in the Internet Appendix**

| **Firm-level** | |
|---|---|
| Log(*GHGEmissionExact*) (tCO2e) | The natural logarithm of the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent) if Trucost reports obtaining emission data exactly from company reports. *Source: Trucost* |
| Log(*GHGEmissionCDP*) (tCO2e) | The natural logarithm of the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent) from CDP reports. *Source: CDP* |
| *TCFDReport* | An indicator variable that takes the value of one if a firm incorporates the Task Force on Climate-related Financial Disclosures (TCFD) recommendations in its climate reports. *Source: CDP* |
| *PostFirstGHGRep* | An indicator variable that takes the value of one for years after and including the year that a firm makes the GHG representation for the first time, and zero otherwise. *Source: SAM.gov* |
| *PostFirstGHGRep(Mandatory)* | An indicator variable that takes the value of one for years after and including the year that a firm makes the mandatory GHG representation for the first time, and zero otherwise. *Source: SAM.gov* |
| **UEI-level** | |
| *Above7.5M* | An indicator variable that takes the value of one if a UEI has received total contract value over $7.5 million in a federal fiscal year, and zero otherwise. *Source: USAspending.gov* |
| *Around7.5M* | An indicator variable that takes the value of one if a UEI has received total contract value in between $6 million and $9 million in a federal fiscal year, and zero otherwise. *Source: USAspending.gov* |
| *JustAbove7.5M* | An indicator variable that takes the value of one if a UEI has received total contract value in between $7.5 million and $9 million in a federal fiscal year, and zero if a UEI has received total contract value equal or greater than $6 million and smaller than $7.5 million in a federal fiscal year. *Source: USAspending.gov* |
| **Contracting Officer-level** | |
| *COContractN* | The number of contracts that a contracting officer manages in a given federal fiscal year. *Source: SAM.gov, USAspending.gov* |
| *COContractValue* | The total value of contract awards (in millions) a contracting officer manages in a given year. *Source: SAM.gov, USAspending.gov* |
| *NUEICO* | The number of unique entities (UEIs) that a contracting officer manages in a given year. |

| | |
|---|---|
| | *Source: SAM.gov, USAspending.gov* |
| *PctUEIGHGRep* | The percentage of UEIs that have made the GHG representation in their most recent representation on SAM.gov, out of all UEIs that a contracting officer manages in a given federal year. *Source: SAM.gov, USAspending.gov* |

**Internet Appendix Table IA1: Agency-Level Descriptive Statistics**

This table presents the total number of government contracts (*GovContractN*), the total value of government contract awards (*GovContractValue*($M)) in millions, and the share of government contract value (*ValueShare*(%)) for top 10 federal agencies in terms of contract values.

| Federal Agency | GovContractN | GovContract Value($M) | ValueShare (%) |
|---|---|---|---|
| DEPARTMENT OF DEFENSE (DOD) | 9,409,869 | 166,774 | 79% |
| DEPARTMENT OF VETERANS AFFAIRS (VA) | 201,573 | 9,701 | 5% |
| GENERAL SERVICES ADMINISTRATION (GSA) | 408,298 | 9,287 | 4% |
| DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS) | 72,191 | 4,907 | 2% |
| DEPARTMENT OF JUSTICE (DOJ) | 163,112 | 3,362 | 2% |
| DEPARTMENT OF HOMELAND SECURITY (DHS) | 56,734 | 3,247 | 2% |
| NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) | 17,482 | 2,717 | 1% |
| DEPARTMENT OF TRANSPORTATION (DOT) | 14,670 | 2,364 | 1% |
| DEPARTMENT OF THE TREASURY (TREAS) | 14,742 | 1,645 | 1% |
| DEPARTMENT OF STATE (DOS) | 12,186 | 1,167 | 1% |

**Internet Appendix Table IA2: UEI-Year-Level Descriptive Statistics**
**Panel A: Descriptive Statistics on GHG Representation**
Panel A of this table presents the UEI-level descriptive statistics for the UEIs we collected the GHG representation from 2016 to 2020. *GHGRep* indicates whether a UEI makes the GHG representation in a given year. *Mandatory* indicates whether a UEI has received over $7.5 million in total contract value in the prior federal year. *GHGRep(mandatory)* indicates whether a UEI exceeds the mandatory threshold and makes the GHG representation in a given year.

|  | N | Mean | StdDev | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| *GHGRep* | 6,842 | 0.560 | 0.496 | 0 | 1 | 1 |
| *Mandatory* | 6,842 | 0.265 | 0.441 | 0 | 0 | 1 |
| *GHGRep(Mandatory)* | 6,842 | 0.182 | 0.385 | 0 | 0 | 0 |

**Panel B: Yearly Distribution of Government Contract Value**
Panel B of this table presents the yearly distribution of total federal contract value at the entity (UEI) level. We report the total number of UEIs (*N*), the total contract value received for each UEI (*ContractValue*), the percentage of UEIs with contract value above $7.5 million (*Above7.5M(%)*), the number of UEIs with contract value between $6 million and $9 million (*Around7.5M(N)*), and the percentage of UEIs with contract value between $7.5 million and $9 million out of the UEIs with contract value between $6 million and $9 million (*JustAbove7.5M(%)*).

| Federal Year | N | *ContractValue* | *Above7.5M*(%) | *Around7.5M*(N) | *JustAbove7.5M*(%) |
|---|---|---|---|---|---|
| 2012 | 3,040 | 37.75 | 15.39% | 63 | 52.38% |
| 2013 | 2,873 | 40.29 | 15.59% | 71 | 42.25% |
| 2014 | 2,714 | 38.93 | 16.03% | 64 | 43.75% |
| 2015 | 2,740 | 41.64 | 17.19% | 54 | 38.89% |
| 2016 | 2,499 | 49.15 | 16.45% | 59 | 38.98% |
| 2017 | 2,545 | 53.67 | 16.39% | 65 | 43.08% |
| 2018 | 2,430 | 57.59 | 18.60% | 56 | 46.43% |
| 2019 | 2,239 | 67.98 | 20.46% | 56 | 53.57% |
| 2020 | 2,003 | 89.22 | 20.62% | 53 | 45.28% |
| 2021 | 1,888 | 71.61 | 19.92% | 52 | 50.00% |

**Internet Appendix Table IA3: Contracting Officer Descriptive Statistics**
This table presents yearly descriptive statistics of the contracting officers. For each contracting officer, we report the number of contracts that a contracting officer manages in a federal year (*COContractN*), the total contract values that a contracting officer manages in a federal year (*COContractValue*), the total number of unique entities (UEI) that a contracting officer manages in a federal year (*NUEICO*), and the percentage of UEIs that make the GHG representation in their most recent representation on SAM.gov (*PctUEIGHGRep*).

| | N | Mean | StdDev | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| *COContractN* | 98,574 | 55.92 | 83.99 | 6.00 | 25.00 | 69.00 |
| *COContractValue ($ million)* | 98,574 | 14.07 | 38.22 | 0.15 | 1.76 | 9.45 |
| *NUEICO* | 98,574 | 21.40 | 30.04 | 3.00 | 10.00 | 27.00 |
| *PctUEIGHGRep* | 98,116 | 0.22 | 0.22 | 0.08 | 0.16 | 0.29 |

**Internet Appendix Table IA4: Descriptive Statistics for Additional Firm-Year Level Variables**

This table provides firm-year level descriptive statistics for additional variables.

| | N | Mean | StdDev | P25 | Median | P75 |
|---|---|---|---|---|---|---|
| *Emission*(*tCO2e million*) | 2046 | 3.457 | 8.890 | 0.069 | 0.282 | 1.327 |
| Log(*GHGEmissionExact*) | 712 | 13.535 | 2.253 | 11.730 | 13.442 | 15.408 |
| Log(*GHGEmissionCDP*) | 649 | 13.763 | 2.208 | 12.002 | 13.686 | 15.492 |
| *TCFDReport* | 649 | 0.028 | 0.164 | 0.000 | 0.000 | 0.000 |
| *Assets ($ billion)* | 2046 | 34.569 | 67.563 | 3,644 | 8.416 | 27.494 |
| *FutureGovContract* | 2046 | 0.915 | 0.278 | 1.000 | 1.000 | 1.000 |
| *FutureGovContract/Sale* | 1927 | 0.017 | 0.064 | 0.000 | 0.001 | 0.005 |
| Log(*FutureGovContractN*) | 1927 | 4.366 | 2.556 | 2.398 | 4.094 | 6.028 |

**Internet Appendix Table IA5: Alternative Specifications**
**Panel A: Addressing Concerns over Trucost Emission Data Quality**

This panel estimates equation (1) using alternative measures of emissions to address concerns over Trucost emission data quality. *GHGEmissionExact* is the combined Scopes 1 and 2 emissions from Trucost, where values are obtained directly from company reports. *GHGEmissionCDP* is the combined Scopes 1 and 2 emissions based on CDP reports. *GHGRep* equals one if any of a firm's UEIs make the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. *TCFDReport* takes the value of one if a firm incorporates the Task Force on Climate-related Financial Disclosures (TCFD) recommendations in its climate reports based on CDP reports. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels using a two-tailed test.

| Dependent Variable = | Log(*GHGEmissionExact*) | | Log(*GHGEmissionCDP*) | | Log(*GHGEmissionCDP*) | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| *GHGRep* | -0.129*** | | -0.135** | | -0.135** | |
| | (-2.863) | | (-2.143) | | (-2.145) | |
| *GHGRep(Mandatory)* | | -0.108** | | -0.125* | | -0.126* |
| | | (-2.528) | | (-1.747) | | (-1.747) |
| *TCFDReport* | | | | | -0.008 | -0.022 |
| | | | | | (-0.135) | (-0.372) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 712 | 712 | 649 | 649 | 649 | 649 |
| Adjusted R-squared | 0.994 | 0.994 | 0.986 | 0.986 | 0.986 | 0.986 |

**Panel B: Alterative Fixed Effects Models**
This panel estimates equation (1) using alternative fixed effects models. In column 1 (2), we drop singleton firms, which are firms without any changes in *GHGRep* (*GHGRep(Mandatory)*)) in the sample period. In columns 3-4, we perform analyses in a stacked sample that stacks first-time treated suppliers in year t with suppliers never making the GHG representation in our sample period (never-treated suppliers). Specifically, the stacked sample pools together five sub-samples, including (1) suppliers making the (mandatory) GHG representation in 2016 and never treated suppliers; (2) suppliers making the (mandatory) GHG representation in 2017 and never treated suppliers; (3) suppliers making the (mandatory) GHG representation in 2018 and never treated suppliers; (4) suppliers making the (mandatory) GHG representation in 2019 and never treated suppliers; (5) suppliers making the (mandatory) GHG representation in 2020 and never treated suppliers. *GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. *PostFirstGHGRep* equals one for years after and including the year that a firm makes the GHG representation for the first time, and zero otherwise. *PostFirstGHGRep(Mandatory)* equals one for years after and including the year that a firm makes the mandatory GHG representation for the first time, and zero otherwise. Firm and year fixed effects are included in columns 1 and 2. Stack-firm and stack-year fixed effects are included in columns 3 and 4. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels using a two-tailed test.

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *GHGRep* | -0.154** | | | |
| | (-2.047) | | | |
| *GHGRep(Mandatory)* | | -0.149** | | |
| | | (-2.072) | | |
| *PostFirstGHGRep* | | | -0.165*** | |
| | | | (-2.738) | |
| *PostFirstGHGRep(Mandatory)* | | | | -0.186** |
| | | | | (-2.549) |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | No | No |
| Year FE | Yes | Yes | No | No |
| Stack-Firm FE | No | No | Yes | Yes |
| Stack-Year FE | No | No | Yes | Yes |
| Sample | Drop singletons | | Stacked | |
| N | 545 | 384 | 9525 | 10370 |
| Adjusted R-squared | 0.984 | 0.990 | 0.975 | 0.975 |

**Panel C: Alternative Samples**
This panel estimates equation (1) using alternative samples. In columns 1 and 2, we drop the year that contains the date of the FAR 52.223-22 implementation date (i.e., the FAR year) from the main firm-year sample. In columns 3 and 4, we expand the sample to further include all firms covered by Trucost, regardless of whether Trucost coverage started before 2016. *GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels using a two-tailed test.

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *GHGRep* | -0.128** | | -0.125*** | |
| | (-2.335) | | (-2.966) | |
| *GHGRep(Mandatory)* | | -0.147*** | | -0.122*** |
| | | (-2.609) | | (-2.656) |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Sample | Exclude FARyear | | Full Trucost sample | |
| N | 1722 | 1722 | 2908 | 2908 |
| Adjusted R-squared | 0.974 | 0.974 | 0.983 | 0.983 |

**Internet Appendix Table IA6: Entropy Balancing Matching Statistics**
This table displays the descriptive statistics of matching covariates before and after entropy balancing matching (EBM).

| | *GHGRep*=0 (N=1,804) | | | *GHGRep*=1 (N=242) | | |
|---|---|---|---|---|---|---|
| | Mean | Variance | Skewness | Mean | Variance | Skewness |
| Before EBM on *GHGRep* | | | | | | |
| *ContractValue/Sale* | 0.01 | 0.00 | 7.39 | 0.05 | 0.01 | 2.95 |
| Log(*Assets*) | 9.14 | 2.25 | 0.34 | 10.08 | 2.14 | -0.28 |
| Log(1+*InstN*) | 5.99 | 1.12 | -3.16 | 6.63 | 0.41 | -0.46 |
| Log(1+*SRIProposalsN*) | 0.20 | 0.16 | 1.72 | 0.41 | 0.26 | 0.72 |
| *GRIReport* | 0.35 | 0.23 | 0.65 | 0.62 | 0.24 | -0.51 |
| *PriorGHGPubDis* | 0.48 | 0.25 | 0.08 | 0.79 | 0.17 | -1.42 |
| | | | | | | |
| After EBM on *GHGRep* | | | | | | |
| *ContractValue/Sale* | 0.05 | 0.02 | 2.86 | 0.05 | 0.01 | 2.95 |
| Log(*Assets*) | 10.08 | 2.20 | -0.02 | 10.08 | 2.14 | -0.28 |
| Log(1+*InstN*) | 6.63 | 0.38 | -0.54 | 6.63 | 0.41 | -0.46 |
| Log(1+*SRIProposalsN*) | 0.41 | 0.27 | 0.75 | 0.41 | 0.26 | 0.72 |
| *GRIReport* | 0.62 | 0.23 | -0.51 | 0.62 | 0.24 | -0.51 |
| *PriorGHGPubDis* | 0.79 | 0.17 | -1.42 | 0.79 | 0.17 | -1.42 |
| | | | | | | |
| Before EBM on *GHGRep(Mandatory)* | | | | | | |
| *ContractValue/Sale* | 0.01 | 0.00 | 7.26 | 0.07 | 0.02 | 2.31 |
| Log(*Assets*) | 9.15 | 2.26 | 0.32 | 10.44 | 1.75 | -0.39 |
| Log(1+*InstN*) | 6.01 | 1.09 | -3.16 | 6.78 | 0.37 | -0.80 |
| Log(1+*SRIProposalsN*) | 0.21 | 0.16 | 1.66 | 0.45 | 0.29 | 0.61 |
| *GRIReport* | 0.36 | 0.23 | 0.59 | 0.64 | 0.23 | -0.58 |
| *PriorGHGPubDis* | 0.49 | 0.25 | 0.03 | 0.83 | 0.14 | -1.73 |
| | | | | | | |
| After EBM on *GHGRep(Mandatory)* | | | | | | |
| *ContractValue/Sale* | 0.07 | 0.02 | 2.18 | 0.07 | 0.02 | 2.31 |
| Log(*Assets*) | 10.44 | 2.00 | -0.14 | 10.44 | 1.75 | -0.39 |
| Log(1+*InstN*) | 6.78 | 0.31 | -0.70 | 6.78 | 0.37 | -0.80 |
| Log(1+*SRIProposalsN*) | 0.45 | 0.28 | 0.62 | 0.45 | 0.29 | 0.61 |
| *GRIReport* | 0.64 | 0.23 | -0.58 | 0.64 | 0.23 | -0.58 |
| *PriorGHGPubDis* | 0.83 | 0.14 | -1.72 | 0.83 | 0.14 | -1.73 |

**Internet Appendix Table IA7: Additional Robustness Analysis**

This panel presents the results for the main analyses in two subsamples. Columns 1 and 2 report results in the subsample without social responsibility shareholder proposals. Columns 3 and 4 report results in the subsample without GRI reporting. *GHGEmission* is the sum of Scopes 1 and 2 Greenhouse Gas emissions (in tonnes of carbon dioxide equivalent). *GHGRep* equals one if any of a firm's UEIs makes the GHG representation in a given year, and zero otherwise. *GHGRep(Mandatory)* equals one if any of a firm's UEIs provides a mandatory GHG representation, and zero otherwise. Standard errors are clustered at the firm level. All variables are defined in Appendix A. t-statistics are reported in parentheses. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels using a two-tailed test.

| Dependent Variable = | Log(*GHGEmission*) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *GHGRep* | -0.119** | | -0.122** | |
| | (-2.260) | | (-1.987) | |
| *GHGRep(Mandatory)* | | -0.148*** | | -0.137* |
| | | (-2.716) | | (-1.849) |
| Controls | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| Sample | Without Shareholder Proposal | | Without GRI Report | |
| N | 1501 | 1501 | 1248 | 1248 |
| Adjusted R-squared | 0.975 | 0.975 | 0.972 | 0.972 |