The Real Effects of Environmental Activist Investing[†]

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This draft: November 2021
First draft: November 2019

Abstract

We study the real effects of environmental activist investing. Using plant-level data, we find that targeted firms reduce their toxic releases, greenhouse gas emissions, and cancer-causing pollution. Improvements in air quality within a one-mile radius of targeted plants suggest potentially important externalities to local economies. Reductions come through increased capital expenditures on new abatement initiatives. We also rule out alternative explanations including declines in production, reporting biases, and forms of selection. We provide evidence that firms respond to specific demands of the activist. Our study suggests that engagements are an effective tool for long-term shareholders to address climate change risks.

JEL classification: G23, G34, M14, Q50

Keywords: Activism, Environmental Social and Governance, Socially Responsible Investment, Corporate Social Responsibility, Pensions

[†]For helpful comments and suggestions, we thank Pat Akey, Sudheer Chava (discussant), Alan Crane, Alper Darendali (discussant), Nuri Ersahin, Mara Faccio (discussant), Vyacheslav Fos (discussant), Michael Gallmeyer (discussant), Nickolay Gantchev, Stuart Gillan, Xin Gu (discussant), Arpit Gupta, Matthew Gustafson (discussant), Amanda Heitz (discussant), Ravi Jagannathan, Wei Jiang, Sehoon Kim (discussant), Lisa Kramer (discussant), Ted Loch-Temzelides, Jean-Marie Meier (discussant), Narayan Naik, Lilian Ng (discussant), Kasper Meisner Nielsen, Shivaram Rajgopal, Ryan Riordan (discussant), Ishita Sen, Rik Sen (discussant), Henri Servaes, Sophie Shive (discussant), Manpreet Singh, Pablo Slutzky, Sumudu Watugala, James Weston, Qiping Xu, Bohui Zhang (discussant), and conference participants at Wellington Finance Summit, European Winter Finance Conference, UBC Winter Finance Conference, Asia-Pacific Corporate Finance Online Workshop, Finance in the Cloud IV, Econometric Society World Congress, Summer Research Conference (ISB), European Finance Association (EFA), Global Research Alliance for Sustainable Finance and Investment (Columbia), Political Economy of Finance Conference (Booth), Green and Ethical Finance (ADBI), Lone Star Finance Symposium (TAMU), Northern Finance Association (NFA), World Symposium on Investment Research (WSIR), FMA Annual Conference, Weinberg Center-ECGI Symposium, Midwest Finance Association (MFA), SFS Cavalcade North America, FMA Europe, the Second Sustainable Finance Forum, and the European Investment Forum (Cambridge), and seminar participants at the London Business School, Rice University (Jones), UNSW Business School, the University of Houston (Bauer), NHH Norwegian School of Economics and IESEG School of Management. We have also benefited from detailed discussions with Michael Garland, Assistant Comptroller of New York City, and both Hazel Crampton-Hays and Tian Weinberg from the Office of the Comptroller. We thank Sophie Shive and Margaret Forster for sharing their data. We thank Dejan Suskavcevic and Billy Xu for excellent research assistance. Varun Sharma thanks Wheeler Institute for funding. We also thank the Pacific Center for Asset Management at UCSD for their generous support. This article represents the views of the author(s) and not the Pacific Center for Asset Management. We thank the selection committees for awarding the best paper awards from the Moskowitz Prize for Outstanding Quantitative Research in Sustainable and Responsible Investing by the Kellogg School Management, the Best Paper in Corporate Finance and Financial Institutions at the FMA European Conference, and the European Investment Forum (Cambridge) Research Award for Best Paper.

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Environmental activism, which involves shareholders engaging management to improve a firm's environmental impact, has gained popularity among investors (Bauer, Ruof, and Smeets (2021); Dimson, Karakaş, and Li (2015); Hong, Karolyi, and Scheinkman (2020); Krueger, Sautner, and Starks (2020)). With investors further internalizing the negative externalities created by firms, it is essential to understand the real effects that environmental activism has on targeted firms, local economies, and shareholders.

There is limited research studying the real effects of environmental activism on pollution and the environment. On the one hand, there is a mature literature studying how activist shareholders can affect a firm's governance, as well as its financial and operational performance, with an aim of increasing their wealth.[1] On the other hand, there is a growing literature studying investor preferences for socially responsible investments, often reflected by active divestment campaigns.[2] However, between these two literatures, there remains an important gap in the understanding of the willingness and ability of activist long-term shareholders to influence corporate environmental behaviors, the impact that these efforts have on local economies, and the implications it has on firms' financial performance.

This paper fills these gaps by documenting the real effects of environmental activist investing on corporate environmental behaviors. It exploits the Boardroom Accountability Project (BAP) in a difference-in-differences specification to estimate the effectiveness of climate-focused engagements. Targeted firms respond by reducing their toxic releases, production-related emissions, and greenhouse gas emissions. These improvements have positive and important externalities for local economies. We find that an increase in operation-related abatement initiatives, and not changes to production, drive the decline in emissions. A commensurate increase in abatement-related capital expenditures negatively affect the firm's financial performance. Further, we provide evidence that firms respond to specific demands of the activist while ruling out alternative explanations including reporting biases and forms of selection. Finally, we consider the broader implications of our study in the context of the growing interest in environmental activism.

[1]A partial list of studies of activism by pension funds includes those by Nesbitt (1994), Smith (1996), Wahal (1996), Huson (1997), Carleton, Nelson, and Weisbach (1998), and Del Guercio and Hawkins (1999). For surveys of shareholder activism, see Karpoff (2001) and Gillan and Starks (2007).

[2]Empirical evidence on divestment and negative selection include those by Atta-Darkua and Dimson (2019); Becht, Franks, and Wagner (2019); Teoh, Welch, and Wazzan (1999). Theoretical studies of impact investing include those by Broccardo, Hart, and Zingales (2020); Chowdhry, Davies, and Waters (2018); Green and Roth (2021); Hart and Zingales (2017); Heinkel, Kraus, and Zechner (2001); Morgan and Tumlinson (2019); Oehmke and Opp (2020).

At its core, this paper provides novel empirical evidence on the trade-off investors face when maximizing stakeholder value. Previous research documents investors' strong preference for sustainability, resulting in them moving away from low-sustainability investments (Hartzmark and Sussman, 2019; Hong and Kacperczyk, 2009). At the same time, this preference for sustainability may come at the cost of lower future expected returns (Barber, Morse, and Yasuda, 2021; Bolton and Kacperczyk, 2021; Riedl and Smeets, 2017). This paper offers a counterpoint, suggesting that investors may maximize their total value through monitoring and engagement (Appel, Gormley, and Keim, 2016; Black, 1990; Broccardo, Hart, and Zingales, 2020). Further, our findings bring nuance to the basic tenet of economic theory that a firm should maximize shareholder value, and they have implications for current debates on the stakeholder primacy model (Bebchuk and Tallarita, 2020; Bhagat and Hubbard, 2020; Friedman, 1970; Hart and Zingales, 2017).

Can environmental activism bring about changes to corporate environmental behaviors? The answer to this question is unclear. On the one hand, improvements in sustainability can have benefits such as valuable product differentiation, insurance against event risk, lower cost of capital, and lower regulatory risk (Albuquerque, Koskinen, and Zhang, 2019; Chava, 2014; Hong and Liskovich, 2015; Servaes and Tamayo, 2013). On the other hand, changes through capital investments may be costly, symptomatic of agency conflicts, and potentially harmful to a firm's business operations (Cheng, Hong, and Shue, 2019; Fowlie, 2010; Lenox and Eesley, 2009). Further, if any changes do come about, it is necessary to understand the steps undertaken to achieve these changes, to evaluate the costs and benefits of such actions, and to study their impact on the local economy.

We answer these questions by studying the activist campaign brought forward by the Boardroom Accountability Project (BAP), initiated by the New York City Pension System (NYCPS).[3] We focus on the BAP campaign because it provides a nearly ideal setting to measure the efficacy of environmental activism. First, we observe the target selection procedure, typically unobserved in similar activism settings, that aids in determining the appropriate counterfactual firm in our empirical analysis. Second, we observe the interactions between the BAP campaign, investors, and the management, allowing us to shed light on potential mechanisms for our findings. Third,

[3]Initiated by the NYCPS, the BAP brought together influential investors, including the California Public Employees' Retirement System (CalPERS) and California Teachers' Retirement System (CalSTRS).

the setting of the BAP campaign is typical in terms of assets and ownership, likely making our results extendable to other activism settings.

We study the efficacy of the environmental activist campaign by the BAP in a difference-in-differences empirical setting to identify the real effects of environmental activism. Our empirical approach compares firms targeted by the BAP to counterfactual firms, identified using propensity score matching, in the same industry and with similar financial and sustainability characteristics. The within-industry matching allows us to control for aggregate industry-level trends, such as shocks to energy prices, that may differentially affect corporate environmental behaviors.

We use a diverse set of granular databases to provide a comprehensive view of the real effects of environmental activism to overcome measurement challenges that arise from relying on ratings (Berg, Koelbel, and Rigobon, 2020). From the Environmental Protection Agency (EPA) we measure plant level pollutive activity from the Toxic Release Inventory (TRI), and Greenhouse Gas Reporting Program (GHGRP). At the local community level, we measure the impact of pollution using the Integrated Risk Information System (IRIS), the Air Quality System (AQS) program, as well as the agency's Risk-Screening Environmental Indicators (RSEI) model, from the EPA. To quantify abatement-related initiatives at the plant level, we use the Pollution Prevention (P2) data from the EPA as well as data from the U.S. Energy Information Agency (EIA). We complement them with other standard databases, including Compustat, Center for Research in Security Prices (CRSP), Institutional Shareholder Services (ISS), and Thomson Reuters' ASSET4 database.

First, we provide evidence that environmental activist investing improves the environmental performance of targeted firms. Plants of targeted firms respond to campaigns by reducing their total toxic chemical releases, on average, by 13%. At the same time, we find that firms have a lower propensity to emit new harmful chemicals. Decomposing the source of reductions, we find that active on-site reduction in releases are the predominant drivers of overall improvements. Studying the medium of releases, we find that the improvements arise from reductions in stack-air emissions. Focusing on the type of air emissions, our estimates suggest that plants of targeted firms reduce their greenhouse gas emissions, including methane and nitrous oxide, two of the most lethal greenhouse gases.

Second, we find that these engagements have positive externalities on the local economies around plants of targeted firms. We find that reductions in cancer-causing chemicals drive baseline reductions in toxic releases. Using air quality monitor data within a one-mile radius around targeted plants, we find a significant drop in emissions affecting public health. Further, we use EPA's modeled estimates to capture the chronic human health risk at the local census block group level. Decomposing the effects, we find that firms reduce their pollution intensity by managing the toxic concentration and the number of harmful chemicals released. Overall, these results suggest that reductions in emissions around targeting seem to positively impact the local communities near plants of targeted firms.

Third, we show that plants achieve these reductions by focusing on abatement initiatives rather than a decline in production. In the short run, plants of targeted firms adopt operation-related abatement initiatives such as pursuing good operating practices and installing new measures to prevent spills and leaks. Moreover, we find a significant increase in abatement-related capital expenditures among plants of targeted firms. Consistent with these results, disclosures in sustainability reports of targeted firms corroborate that firms make these investments.

We next consider how investors perceive the activism campaign and how the improvements in environmental performance interact with firms' financial performance. First, we use an event study approach to understand how investors value environmental activism through proxy-access proposals. Focusing on a 3-day window around the date of exempt solicitation, the date most investors became aware of the proxy-access proposals introduced by the BAP, we find modestly negative equity returns. Our interpretation is that investors weigh the benefits of increased sustainability against increased costs associated with implementing them, with the change in stock price quantifying the net weakly negative effect. Second, we find that targeted firms experience lower profitability and operational efficiency around environmental activism. We are cautious in interpreting these results as the possible benefits (e.g., new customers, lower cost of capital) may take time to offset the costly investments in abatement technologies.

We perform a battery of robustness tests to provide further confidence in our results, documenting the drop in toxic chemical releases at the plant level. First, we rule out concerns regarding the sensitivity of estimates to propensity score matching inputs by including additional covariates such as (i) pre-target level of toxic releases, (ii) pre-target trend in toxic releases, (iii) plant-level toxic releases, and (iv) alternative industry classification. Second, we assuage concerns that the drop in emissions results from an increase in firms' offshoring production activities by focusing on the subsample of firms (i) in the utility sector where the likelihood of offshore production is relatively low and (ii) with low levels of offshoring identified using the textual measure of Hoberg and Moon (2017). The third test mitigates concerns that plant closures drive the drop in emissions by focusing on the subset (i) of firms where plants have continuously reported emissions throughout the sample period, (ii) excluding plants that do not report any emissions, and (iii) of firms that did not file for Chapter 11 bankruptcy. Fourth, we address concerns about the choice of scaling plant-level toxic releases in our baseline specification. While plant-level output is not available for all firms in our sample, we focus on utility plants, where generator data exists for plant-level output, and again find similar results. Fifth, we also consider alternative definitions and scaling metrics of our dependent variable and find similar results. Additional robustness tests address concerns related to: potential reporting biases to the TRI data and possible regulatory concerns at the industry and geographic region, among others. Overall, we find robust evidence of a drop in toxic chemical releases across these tests, coming from on-site emissions.

We present evidence that our results are most consistent with the view that boards are responding to the specific mandate of the activist campaign, instead of general attention drawn by the campaign. We establish this through three sets of evidence. First, we hand-collecting detailed interactions from regulatory filings and communication by the management to show that targeted firms indeed saw the campaign as a credible threat. Second, we show that firms targeted for non-environmental reasons do not improve their environmental behaviors around targeting. Third, we step outside our baseline sample and consider other pro-social campaigns of the BAP, as well as other environmental campaigns, and show that targeted firms respond to specific mandates of investors. These results, coupled with our baseline estimates, suggests that shareholders can impose their pro-social preferences onto firms.

While our results shed light on the efficacy of climate-focused engagements, it comes with important caveats and must be interpreted cautiously. First, the setting and the data are not well suited to evaluate the welfare consequences of engagements like the BAP. Such an analysis will need to evaluate the non-pecuniary benefits to stakeholders, investors in their entirety, and these benefits may take a longer time to materialize. Second, targeting by the BAP was not random, and hence any policy suggestive of random targeting to achieve environmental change is misguided. Instead, the results should be interpreted as: would the same changes have occurred if the BAP targeted these firms but remained passive in their demands.

This paper contributes to the fast-growing literature focusing on the interplay between finance and the environment. One strand of this research documents the improvements in financial and operational performance through engagements related to sustainability (Dimson, Karakaş, and Li, 2015, 2020; Doidge, Dyck, Mahmudi, and Virani, 2019). Other papers document a positive impact on firm value (Barko, Cremers, and Renneboog, 2017; Dyck, Lins, Roth, and Wagner, 2019). Our work complements these studies by documenting improvements in environmental performance in response to climate-focused engagements and highlights their effectiveness for long-term shareholders to address climate change risks at portfolio firms.

Our paper also contributes to the shareholder activism literature by uncovering the *direct channel* of sustainability campaigns. This study complements two concurrent working papers by Akey and Appel (2020); Chu and Zhao (2019) that study the externalities of hedge fund activism through an *indirect channel* whereby changes to a firm's governance structure and operations affect its environmental behaviors. These campaigns involve investors focused on improving the target firm's financial performance in the short-run, and thus improvements tend to stem from changes in operational efficiency instead of firms undertaking new abatement initiatives. In contrast, we focus on environmental activist campaigns, with our results coming from a direct channel, where long-term investors engage management by creating a credible threat, leading to improvements at targeted firms. Consistently, our results stem from firms undertaking new abatement initiatives instead of reducing their production.

Lastly, this study also fits into the literature examining the determinants of corporate environmental behaviors. Prior research has focused on the roles of financial constraints (Bartram, Hou, and Kim, 2021; Cohn and Deryugina, 2018; Goetz, 2018; Kim and Xu, 2021), listing status (Shive and Forster, 2020), supply chains (Schiller, 2018), and limited liability (Akey and Appel, 2021). This study contributes by showing that environmental activism has a significant impact on this behavior. Moreover, our empirical evidence aligns with theoretical research and provides new and important evidence for U.S. pension investing in public equities (Oehmke and Opp, 2020; Ramadorai and Zeni, 2020).

1 Boardroom Accountability Project

The New York City Pension System (NYCPS) publicly announced the Boardroom Accountability Project (BAP) on November 4th, 2014.[4,5] The goal of this campaign was to hold boards of the portfolio companies accountable to long-term shareholders and give pensioners a voice in oversight concerning climate change risks, board diversity, and excess CEO pay.[6] The BAP campaign aimed to increase the accountability of board members to shareholders by simultaneously filing proxy access proposals at portfolio firms, (see Appendix C). These proposals gave long-term shareholders the right to nominate directors on boards.

At the launch of the campaign, the comptroller emphasized this, as follows.

> *"Resolutions were filed at companies where we see risks associated with climate change, board diversity, and excessive CEO pay. Especially when it comes to the environment, business as usual is no longer an option. To effect true change, you need the ability to hold entrenched and unresponsive boards accountable, and that is what we are seeking to do." Stringer (2014)*

While the BAP targeted firms for multiple mandates, this study focuses on firms targeted for their approach to climate change risks, which was one of their most significant mandates. Accordingly, the BAP campaign targeted carbon-intensive firms because they failed to address climate change concerns adequately.

Our discussions with the New York City comptroller's office confirmed that the NYCPS did not announce in advance the BAP campaign and the identities of the targeted corporations. The campaign targeted firms based on their underlying carbon reserves, a proxy for their potential to contribute to climate change. We also confirm these aspects through Freedom of Information

[4]Throughout the paper, we align the date of targeting to the corresponding year of the annual shareholder meeting. Therefore the first wave of targeting corresponds to the 2015 shareholder meeting season.

[5]The New York City Pension System is a combination of five funds, namely: the New York City Employees' Retirement System, the Teachers' Retirement System of the City of New York, the New York City Police Pension Fund, the New York City Fire Pension Fund, and the New York City Board of Education Retirement System. NYCPS manages approximately $199 billion in assets under management. As of May 2019, the fund had around 29% of its assets allocated to U.S. public equities and was a long-term shareholder in more than 3,000 U.S. public companies. For more detail, please see New York City Comptroller website. Also, see Figure ID1 in Appendix D for a sample letter sent by the BAP.

[6]Note that the inclusion of climate risk consideration by the NYCPS is increasing among other institutional investors in general, as documented in an extensive survey conducted by Krueger, Sautner, and Starks (2020). As they document, investors' motivations for incorporating climate risks into their decision-making can be financial, nonfinancial, or both. Further, environmental activism campaigns such as the BAP differ from traditional shareholder activism, which solely focuses on improving the financial and operational performance of the targeted firm (Nesbitt, 1994).

Act (FOIA) requests and empirical tests.[7] Specifically, our tests rule out an association between carbon reserves and changes in pollutive activities before the campaign. Collectively, these facts suggest that neither anticipation nor the underlying selection criteria drive changes in targeted firms' environmental performance.

The BAP campaign provides a nearly ideal setting to measure the efficacy of environmental activism. First, we observe the underlying target selection criteria, unobserved in investor activism settings, which aids in determining the appropriate counterfactual. Second, the management did not anticipate the BAP campaign, and the governance-specific approach of using proxy-access proposals makes it different from targeting by shareholder proposals that are typically anticipated and impede managerial flexibility. Third, conversations with the Comptroller's office, FOIA requests, and evidence from regulatory filings help us better understand the BAP campaign's organization, the interaction between the firm and the activists, which ultimately helps us to shed light on the mechanisms driving our findings. Lastly, the NYCPS was not unique in terms of assets, ownership, or ability, potentially making the results extendable to other activism settings.

Throughout the paper, we focus on firms targeted by the BAP campaign instead of conditioning on campaign success. Our choice is motivated by the fact that the BAP campaign was very successful, characterized by high settlement rates with the management and immediate adoption of proxy access provisions by firms in their bylaws. Moreover, the few proposals that went to the ballot garnered strong support from shareholders with high passage rates, with firms eventual adopting a similar proxy-access provisions that the BAP and its partners put forward. The success was driven by the credible threat posed by the NYCPS and its partners as they coordinated their engagements, communicating with other shareholders, and attending the targeted firms' annual meetings (please see Section 6).

[7] Our ability to understand the target selection process and verify it through empirical tests confers an advantage in constructing appropriate counterfactual firms. This differs from the traditional shareholder activism literature which has relied solely on target selection model to construct the counterfactual (Brav, Jiang, Partnoy, and Thomas, 2008; Nesbitt, 1994).

2 Data and Empirical Strategy

2.1 Summary of Datasets

Our study combines data from the BAP with publicly available and commercial databases. We hand collect data on which firms were targeted and for what mandate from publicly available shareowner annual reports, provided on the NYC pension system's website. Further, we obtain the NYCPS portfolio composition from the Comptroller's office. Table 1 provides the summary of activism events by the year of the shareholder annual meeting (Panel A) and industry (Panel B). Out of 181 BAP firm mandates in our sample, 62 relate to environmental concerns. We align the targeting year in our study to coincide with the year of the annual shareholder meeting. Sectors are mutually exclusive, and are defined using the Fama-French twelve industry classification.

The composition of industries and the broad sample of firms targeted by the BAP for environmental reasons provides a near ideal sample to study the real effects of environmental activism. The environmental footprint of these firms are large, with the plants of targeted firms contributed roughly a quarter of the total emissions by all firms in the United States before the BAP campaign. Importantly, the energy and utility sectors are among the heaviest polluters across all industries (Hockstad and Hanel, 2018; Shive and Forster, 2020). Therefore, the collection of firms, related plants, and emissions makes it an ideal sample to study the effectiveness of environmental activist campaigns in addressing climate change risks at portfolio firms.

This study uses a diverse set of microdata to comprehensively characterize the real effects of environmental activist investing. From the Environmental Protection Agency (EPA), we use plant-level data on toxic chemical releases reported under the Toxic Release Inventory (TRI) program and greenhouse gas emissions reported under the Greenhouse Gas Reporting Program (GHGRP). We use historical plant ownership data from Shive and Forster (2020) to address the issue of changes in ownership.[8] To identify and characterize the health hazards of chemicals in our analysis, we use the data on the biological impact of chemicals reported under the Integrated Risk Information System (IRIS) program. We also measure the local intensity of pollution by using the EPA's Risk-Screening Environmental Indicators (RSEI) computation methodology. We measure abatement efforts through the data reported under the pollution prevention (P2)

[8] We thank Sophie Shive for sharing data from Shive and Forster (2020).

program. We capture the potential externalities around plants using outdoor air monitoring reporting to the Air Quality System (AQS) database. We use plant-level information on the output of existing generators and associated environmental equipment at power plants provided by the Energy Information Administration (EIA).

We complement data from the BAP by hand-merging the data with other standard databases, including Compustat, the Center for Research in Security Prices (CRSP), Institutional Shareholder Services (ISS), BoardEx, and Thomson Reuters ASSET4 database.

2.2 How did the BAP Select the Targeted Firms?

To better characterize the BAP's targeting criteria, we engaged in multiple phone calls with the NYC Comptroller's office, submitted FOIA requests, and collected data on the campaign. Guided by these interactions, we observed that the BAP selected firms, and not plants for targeting. As a result, we perform matching at the firm-level to mirror the BAP campaign, and to keep it closer to the ideal experiment.

Our conversations with the Assistant Comptroller of the NYCPS indicated that they used the Fossil Free Index to select firms for inadequate redressal of climate change risk. This list, which is compiled and maintained by the Carbon Underground 200 identifies the top 100 coal and the top 100 oil and gas publicly traded reserve holders globally, ranked by total carbon reserves.[9] This selection, which is discussed in depth below, is unrelated to pre-targeting changes in emissions.

Using a panel of Russell 3000 firms, the benchmark portfolio for the NYCPS, we verify the BAP's selection criteria by estimating a multivariate logistical regression that correlates firm characteristics with the likelihood of being targeted for environmental reasons. Our estimates suggest that targeted firms were larger, on average, and part of the Fossil Free Index (FFI). Figure 1 plots the coefficients of the estimates from the target selection model, while Table IA1 in Appendix A reports estimates from the analysis. These results suggest that the BAP is more likely to target firms that are part of the FFI. These results are consistent with our discussions and material received from the NYCPS, which indicates that a firm's rank on the FFI list was a driver for targeting. Further, our estimates suggest that larger firms have a higher likelihood of being targeted. Notably, firms with better environmental performance, measured by ASSET4 scores, are

[9] More information about this index can be found at http://fossilfreeindexes.com/faq/.

unrelated to targeting by the BAP. Similarly, governance characteristics such as board size and director independence are unrelated to targeting.

A plausible concern with the empirical strategy is that being featured on the FFI list proxies for the firms' potential for improvement. That is, firms with larger carbon reserves may have a greater potential to improve, and hence may already be reducing their pollution even before targeting. If firms were in the process of improving and the BAP precisely selected these firms, our analysis would overstate the effect of environmental activist campaigns.

We consider this possibility by studying the pre-targeting relationship between carbon reserves and total emissions and find no association. Figure IA1 plots carbon reserves against aggregate changes in toxic releases in the period before the targeting by the BAP. The x-axis depicts the total reported carbon reserves in place, a measure of potential to reduce emissions, quantified by the natural logarithm of gigatons of carbon dioxide, $\log(GtCO_2)$. The y-axis depicts the changes in firm-level toxic releases from 2010 and 2014, i.e., before the BAP began targeting firms. We find no relationship between carbon reserves, the basis of targeting, and changes in pollutive activities in the pre-period. This lack of relationship suggests that the potential for improvement does not proxy for actual improvements before targeting, thus alleviating concerns about the potential for improvements in pollution driving changes in the emissions we document.

2.3 Propensity Score Matching

Guided by the target selection model, we use a propensity score matching approach to identify counterfactual firms.[10] This approach is consistent with the activism literature (Brav, Jiang, and Kim, 2015; Brav, Jiang, Ma, and Tian, 2018). Importantly, we match firms from the same industry and those that are similar along financial and sustainability characteristics.

The within-industry matching allows us to rule out for aggregate industry-level trends that might explain any changes in pollutive activities around the campaign. For example, it helps us to mitigate concerns such as changes in oil prices affecting production activities, which ultimately

[10]An alternative approach is to compare firms targeted for environmental reasons in the BAP campaign to other firms targeted for non-environmental reasons in the BAP campaign. While helpful, these comparisons are less informative for at least two reasons. First, such comparisons cannot control for industry shocks that likely affect treated and control firms differentially. Second, the comparisons do not cleanly establish whether targeted firms' changes result from NYCPS's environmental mandate rather than being part of the BAP campaign or being targeted for proxy access. For these reasons, we analyze firms targeted for non-environmental reasons in subsection 6.2 to rule out concerns about general attention while establishing the importance of specificity of the BAP campaign in subsection 6.3.

impacts our outcomes through a different channel than environmental activism.

To construct the candidate counterfactual firms, we use the constituents of the Russell 3000 index, which closely matches the holdings of the NYCPS portfolio. We exclude firms that the BAP targeted for non-environmental reasons from our main sample. Thus, our baseline specification compares firms targeted for environmental reasons by the BAP to a counterfactual firm not targeted by the BAP but in the NYCPS's portfolio and in the same industry with similar financial and sustainability characteristics.

The propensity score estimation uses the following variables as matching covariates: firm size, return on assets, market-to-book ratio, and ASSET4 score.[11] We match each firm targeted for environmental reasons by the BAP in year t with another firm not targeted from the same year, within the same Fama-French 12-industry, and with the closest propensity score.[12] Studying the characteristics of our matching in Table IA2, we find that we find that the matched pair is statistically indistinguishable along important financial characteristics except for firm size, which is marginally significant at the 10% level.

2.4 Main Specification

We use a propensity score matched difference-in-differences empirical strategy that compares plants of firms that are targeted by the BAP to plants of a matched control firm within the same industry and similar financial and environmental performance.

Specifically, we estimate:

$$Y_{ict} = \beta_1 I\left(Post_{i,t}\right) + \beta_2 I\left(Post_{i,t}\right) I\left(Environment_i\right) + \delta_{ic} + \delta_{ct} + \varepsilon_{i,c,t}, \tag{1}$$

where c indexes a chemical or gas emitted by a plant i at time t. We include plant-chemical fixed effects (δ_{ic}) to control for time-invariant heterogeneity at the plant-chemical level. Chemical-year fixed effects (δ_{ct}) control for time-varying trends in specific pollutants. As additional robustness tests, we include industry-year fixed effects, defined using the primary four-digit SIC code for each plant, to control for time-varying heterogeneity at the industry level, and state-year fixed

[11]We use the ASSET4 score to capture firms' sustainability performance, see Dyck, Lins, Roth, and Wagner (2019) and cites therein.

[12]Our results are robust to the Fama-French 48-industry classification. See section 5 for more details.

effects to control for heterogeneity in location-specific differences in pollutive activity due to regulations. $I\left(Post_{i,t}\right)$ variable is a dummy variable and equals one for the firm-year following the first target year of the BAP. Throughout our analyses, we align the targeting year to the year of annual shareholder meeting. We use the first year after the BAP initiation as the pseudo-event year for the matched control firms. $I\left(Environment_i\right)$ is a dummy variable and equals one if the BAP targets the firm for environmental reasons. The primary coefficient of interest is β_2, which captures the within plant-chemical changes in behaviors following the targeting by the BAP. We take a sampling design approach and cluster standard errors at the firm-by-year level (Abadie, Athey, Imbens, and Wooldridge, 2017).[13] We also consider alternative clustering specifications at the firm level, firm and year level (double clustering), plant-level, plant and year level (double clustering), and a jackknife estimation method in section 5.

Because pollution is a function of productivity, we are careful in specifying our dependent variable, $Y_{i,c,t}$. Ideally, our baseline specification should use plant-level output as it closely relates to emissions at the plant level. However, due to data limitations, plant-level output is only available for utility firms in our sample. Therefore, we primarily consider this plant-level output when studying greenhouse gas emissions and in robustness Table IA3, to show that our results are robust to scaling chemical releases by plant-level output.

The extant literature takes two different approaches when measuring pollution. First, Akey and Appel (2021); Ben-David, Jang, Kleimeier, and Viehs (2021) use the logarithm of emissions without any scaling. Second, Ilhan, Sautner, and Vilkov (2021); Shive and Forster (2020) adds structure by scaling. Because pollution is a function of production, our baseline specification uses the natural logarithm of one plus the normalized toxic chemical release, $\log\left(1 + \frac{Release_t}{COGS_{t-1}}\right)$ as our dependent variable, $Y_{i,c,t}$. We use the logarithmic transformation to address issues related to skewness in emissions. As robustness tests, in Section 5, we also consider alternative scaling choices such as $Sales_{t-1}$, $TotalAssets_{t-1}$, and $COGS_t$ and not scaling as well.

[13]Given that we are interested in estimating the effects of environmental activism in the general population and not just in our sample, we take the approach suggested by Abadie, Athey, Imbens, and Wooldridge (2017). They propose a sampling design perspective to determine the level of clustering if clusters in the population of interest are not in the sample. In our setting, clusters of firm-year in different industries are of interest but excluded from the sample due to the nature of the BAP campaign. Further, there is variation in chemical usage both in the extensive and intensive margin, within a firm-plant-year triad. Hence, we take a conservative approach and cluster standard errors at the firm-by-year level, driven by these considerations.

3 The Real Effects of Environmental Activism

3.1 Improvements to Corporate Environmental Behaviors

3.1.1 Reduction in Toxic Chemical Releases

We use plant-level data from the EPA to measure the real effects of environmental activism. We uncover specific plant-chemical level changes by matching data from the Toxic Release Inventory (TRI) program provided by the EPA to the set of targeted and matched control firms. The TRI program captures how much of each chemical is released to the environment or managed and includes information about facilities that manufacture, process, or otherwise use these chemicals.

We begin by graphically evaluating if the reduction in toxic chemical releases are indeed a response to targeting by environmental activism. Plotting the coefficients relative to the year before targeting by the BAP, Figure 2 presents three pieces of evidence: First, it shows that there are no differential pre-trends in the pollutive activity between treated and control plants. This absence of pre-trends suggests that the BAP targeting did not, on average, coincide with the differential decline in chemical releases in the pre-period. Second, after the targeting, there is gradual and significant decrease in toxic emissions of plants between treated and control firms. Third, this improvement is persistent. As we show later in Section 3.3, operational improvements in the short-term and investments in abatement in the long term best explain these time patterns in environmental performance.

Next, we move to a regression framework to estimate the real effects of targeting by the BAP campaign on toxic releases. Estimates in Table 2 suggest that plants of targeted firms, on average, reduced their total toxic chemical releases. The point estimate in column (1) is 0.050, and is statistically significant at the 1% level. Economically, this represents a decrease of 13% (5.7%) relative to the sample mean (standard deviation). These results provide the first set of evidence of the important effects of environmental activism.

3.1.2 Reductions in on-site chemical releases

We consider the sources of reduction. In general, there are two ways plants can reduce their emissions. First, they can reduce their total emissions on-site. Second, they can transfer toxic chemicals to a geographically or physically separate facility, off-site.

Distinguishing between these two sources in Table 2, our estimates in columns (2) and (3) of Panel A suggest that an active reduction in on-site chemical releases, instead of off-site disposals, drives the baseline reductions. In further robustness tests, we find qualitatively similar results when normalizing by other firm-level and plant-level output measures. These results suggest that firms are not substituting to off-site plants but are instead reducing their total emissions. This evidence bolsters the argument that environmental activism, on average, can bring about real changes in corporate environmental behaviors, rather than changing the incentives of firms to substitute pollution either within-firm or across geographies (Bartram, Hou, and Kim, 2021; Ben-David, Jang, Kleimeier, and Viehs, 2021).

3.1.3 Reduction in Air Emissions

We also consider the media firms choose to reduce their toxic emissions. Firms can release chemicals through three media: air, water, or ground. The TRI database reports the total toxic chemical release for each category at the plant-chemical-year level. Given this, we estimate separate regression models for each medium at the plant-chemical level.

Estimates from Panel B of Table 2 suggest that the reductions are primarily coming from the curtailment of air emissions, particularly those associated with production. Column (1) suggests that the reductions in total emissions can be attributed to a significant decrease in stack air emissions. Columns (2) and (3) suggest that changes to fugitive air emissions (related to leaks or uncontrolled emissions) and surface water discharges (discharges to bodies of water) also respond to environmental activism.

3.1.4 Extensive Margin: Likelihood of Starting and Stopping the Usage of Chemicals

The prior analysis combines both the extensive and intensive margins ignoring the possibility of firms substituting across chemicals. Hence, we decompose our baseline results by considering if firms change their likelihood of starting or stopping the usage of harmful chemicals in response to the BAP campaign.

Focusing on the extensive margin of chemical usage, Table IA4 finds that plants of targeted firms, on average, have a lower likelihood of starting to use a chemical post targeting relative to the control set of plants. The dependent variable in column (1) is an indicator variable and takes the value of one if the plant reports releases from a chemical that it had not previously reported and is zero otherwise. We also consider the likelihood of a plant stopping its use of a chemical. That is, for each plant, we look at previously reported releases of a given chemical that it no longer emits and does not do so at a future point in our sample. Estimates from column (2) suggest that plants of targeted firms do not stop the use of chemicals differentially from control plants.

3.1.5 Reduction in Greenhouse Gas Emissions

We consider the types of greenhouse gas emissions (GHG) emissions firms choose to reduce. Some chemicals may contribute more significantly than others to climate change, especially GHG, which currently accounts for the largest portion of global warming and are known to harm the environment (Althor, Watson, and Fuller, 2016; Caldeira and Brown, 2019; Currie, Davis, Greenstone, and Walker, 2015). In the context of this study, the BAP's campaign focused on firms that failed to address climate change risks adequately, specifically GHGs. Thus, if the engagements succeeded, we should expect to see a decrease in GHG emissions.

We match GHG emissions data reported under the EPA's Greenhouse Gas Reporting Program (GHGRP) to the set of targeted and matched control firms. Within this data, greenhouse gas emissions are reported in metric tons of carbon dioxide equivalent (CO_2e). The data from this program covers plants that, in general, emit at least 25,000 metric tons of CO_2e per year. In aggregate, this makes up roughly 85 percent of the total GHG emissions from over 8,000 facilities in the United States. The GHGRP tracks and verifies relevant information from large GHG emission sources, fuel, and industrial gas suppliers, and CO_2 injection sites in the United States on an annual basis.

As before, GHG emissions are a function of productivity and need to be scaled. Following Shive and Forster (2020), to control for a measure of output at the plant-level which is more closely related to emissions than the firm-level measure, we rely on plant-level output data provided by the Energy Information Administration (EIA).[14] Hence, we normalize emissions in

[14]The EIA provides electricity generation data in survey Form EIA-923 on all U.S. utilities at the generator-level.

metric-tons-CO_2e by plant-level $Output_{t-1}$. Our main empirical specification estimates Equation 1 and uses the log $\left(1 + \frac{Emissions_t}{Output_{t-1}}\right)$ as our dependent variable, $Y_{i,c,t}$. Note, we take the ratio's natural logarithm to reduce skewness.

Estimates from Table 3 suggest that targeted firms, on average, reduce their emissions of lethal greenhouse gases. Interpreting the changes, column (1) of Table 3 suggests that methane emissions decreased by 7.2%.[15] Similarly, column (2) suggests that carbon dioxide emissions decreased by 6.8% but this is statistically insignificant. Further, column (3) suggests that nitrous oxide emissions decreased by 7%. As evident, these declines in emissions are economically meaningful and important given that methane and nitrous oxide are the two of the most lethal greenhouse gases.

We interpret these results as being consistent with the BAP's mandate to target firms for inadequately addressing climate risks and with the firm's direct response to environmental activism. Our results highlight that such engagements can improve corporate environmental behaviors. While the BAP did not dictate the nature of specific changes to be implemented, firms actively reduce their total toxic emissions, including those from air emissions, and lower their GHG emissions. These results are important given the significant costs imposed by toxic emissions on health outcomes (Chay and Greenstone, 2003) and worker productivity (Chang, Graff Zivin, Gross, and Neidell, 2016; Graff Zivin and Neidell, 2012).

3.2 Real Effects on the Local Economy

We study the potential externalities that the BAP campaign had on the local economies in which the plants of the targeted firms operate. We first characterize the chemicals based on their biological impact and quantify the effects they have on humans. Second, we measure the improvements to air quality within a one-mile radius of the plants of targeted firms. Third, we quantify the benefits to the local economies by considering the interactive effects between the population, the toxicity of emissions, and dosage.

We aggregate net generation, measured in megawatt hour (MWh) at the plant-level.

[15] The median is zero while the average is close to zero, making percent comparisons to the mean and median difficult.

3.2.1 Biological Impact of Chemicals

We begin our analysis by examining the reduction in the types of chemicals released by plants of targeted firms. While all chemicals reported by firms to the EPA under the TRI are hazardous, some chemicals may be more detrimental to humans than others. Given that firms have some flexibility, the engagements by the BAP could lead them to reduce the use of chemicals that were most harmful to humans. Alternatively, firms might reduce all types of chemical releases, irrespective of the potential harm to humans.

We rely on the Integrated Risk Information System (IRIS) program developed by the EPA to characterize the health hazards of chemicals. Specifically, we use its assessment of major chemicals and the effects resulting from chronic exposure to them, such as the primary systems affected, or tumor sites for cancer linked to chemical exposure (e.g., developmental, respiratory, urinary). We match each chemical in the TRI database to the IRIS database and identify whether a chemical in the TRI database poses potential harm to humans, and then create indicators for particular bodily systems affected by the chemical. Approximately half of the chemical observations in our sample are known to be harmful to humans.

Table 4 presents the results for the sample that consists of harmful chemicals. The estimates from column (1) suggest that the improvements primarily come from reductions in cancer-causing chemicals that affect respiratory systems. These results underline the importance of reductions in air emissions in the previous section. Additional estimates from Table 4 suggest significant reductions in chemicals affecting other body systems. Overall, the analysis indicates that the reductions in the release of cancer-causing chemicals, which pose severe threats to humans, drive the baseline reductions in pollutive activity.

3.2.2 Improvement in Air Quality Near Plants

We consider the real effects on the air quality around plants of firms targeted by the BAP. Since we find significant reductions in toxic releases and greenhouse gas emissions, we may find a detectable effect in the air quality near these plants.

We measure the changes in air quality by matching air quality monitors to the plants' locations. We rely on the EPA's air quality system (AQS) database, which records outdoor air quality at more than 80,000 monitoring stations across the United States (Heitz, Wang, and Wang, 2021). The EPA relies on these readings and sets National Ambient Air Quality Standards (NAAQS) for seven pollutants considered harmful to public health and the environment, referred to as criteria pollutants.[16] The key advantage of the AQS data is that it is not self-reported and is free from self-reporting biases. Further, it allows us to attribute targeting of firms and the real effects at the local level.

We follow Currie, Davis, Greenstone, and Walker (2015) and match monitor locations to the plants that are within a one-mile radius. We use daily averages of criteria gases and standardize them to have a mean of zero and a standard deviation of one. We estimate separate regression models for each of these gases, because we observe monitor readings for key criteria gases.

The estimates in Table 5 suggest that nearby air monitors detect the air quality improvements at plants of targeted firms. Columns (1) does not find a statistically insignificant change in carbon monoxide. However columns (2) and (3) suggest that both ozone and sulfur dioxide emissions decrease, on average, for plants of targeted firms. Further, column (5) shows a drop in particulates less than 2.5 μm. These estimates are robust to matching monitors within a 0.75-mile radius or a 1.25-mile radius.

These results suggest that the air quality in communities close to targeted firms' plants improves significantly. In conjunction with our results on the reduction of total toxic releases, stack air emissions, and greenhouse gas emissions, these results offer compelling evidence that BAP's campaign potentially improved air quality in the local economies.

3.2.3 Reduction in Intensity of Pollution

We consider how the intensity of pollution changes around the local economies of targeted plants. The intensity of pollution depends on the interaction of three factors: (i) the size of the affected population, (ii) the toxicity of pollution, and (iii) the quantity of emissions.

A key observation is that all changes to pollution do not have the same impact on local economies. Plants of targeted firms have choices in what steps they can take to reduce their emissions, and these decisions have important implications for stakeholders. One possibility is

[16] These gases are carbon monoxide (CO), lead (Pb), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM2.5 and PM10). The EPA provides daily averages at parts per million or parts per billion depending on the specific gas.

that firms may focus on reducing their emissions' intensity, accounting for the local population, toxicity, and dosage. Alternatively, they may focus on reducing a headline number, such as carbon dioxide emissions, without consideration of the local economy.

We rely on the EPA's RSEI computation methodology (EPA, 2019a), which calculates a unitless value that accounts for the size of the chemical release, the fate and transport of the chemical through the environment, the size and location of the exposed population, and the chemical's toxicity (Figure IA2, Panel A). Re-based to 2010 population levels, we use the RSEI scores aggregated to the census block group level and match it to the location of plants from the TRI database, Figure IA3.

Estimates from Table 6 presents evidence that firms decrease their pollution intensity at census block-group level. Plants of firms targeted by the BAP reduce their local environmental impact, as measured by RSEI scores. Decomposing the score, we find significant reductions in toxic concentrations at the intensive margin. Specifically, we find that firms reduce the number of harmful chemicals released and the total number of releases. These results provide further evidence of positive externalities arising from firms managing the impact of their pollution.

3.3 How Are Firms Achieving This Reduction?

We consider the steps taken by plants of targeted firms to improve their environmental behaviors. First, we focus on the waste-management strategies that are of high-impact undertaken by firms to reduce their chemical releases. Second, we consider new abatement initiatives plants undertake to reduce waste production. Lastly, we show that a decline in production does not drive the drop in chemical releases.

3.3.1 High-impact Waste Management

To better understand the changes firms make, we adopt the lens of the waste management hierarchy developed by the EPA. This hierarchy ranks environmentally preferred waste-management strategies (Panel B of Figure IA2) and acts as a pecking order. The EPA highlights that the most effective management method is the reduction of waste generation, while efforts such as recycling and waste treatment may be less effective.

Estimates in Panel A of Table 7 suggest that targeted firms focus their improvements on the most impactful activities by reducing the total amount of waste produced. Column (1) highlights that the production of waste, the sum of all non-accidental chemical waste generated at a facility, is decreasing.[17] Estimates from column (2) suggest that targeted firms also reduce pollution through less impactful activities, such as recycling and waste treatment, but to a far lesser degree. These results suggest that firms focus their efforts towards high-impact waste management strategies in response to environmental activism.

3.3.2 Abatement Initiatives: Operation Related and Capital Expenditures

We also consider whether firms undertake new operation-related abatement initiatives to reduce their toxic releases. Specifically, we focus on the abatement initiatives reported to the EPA's pollution prevention (P2) program. This program collects information to track progress in reducing waste generation. Given that we can only examine firms' responses in a short window of three years after targeting by the BAP, we expect efforts to be visible among new and immediate initiatives that the plants undertake to reduce pollution.

Panel B of Table 7 focuses on two of the most common operation-related abatement initiatives. Estimates from column (1) suggest that plants of targeted firms are implementing new spill and leak preventative initiatives. Examples of these initiatives include installing overflow alarms or automatic shut-off valves to prevent spills. Column (2) suggests that firms are also improving their operating practices. For example, plants institute procedures to manage their production schedules efficiently. Our most conservative estimates suggest that new abatement initiatives increase by roughly 30%, relative to the sample mean. In unreported analysis, we examine less common types of abatement. We find evidence of an increase in inventory management efforts. In contrast, estimates for other abatement types are statistically indistinguishable from zero, though such actions are relatively uncommon to begin with.

Further, we focus on plant-level capital expenditures related to abatement efforts such as emission control systems for nitrous oxide and sulfur dioxide. We accomplish this by focusing on utility plants. The key advantage is that the Environmental Information Agency (EIA) provides

[17] It is the sum of on-site environmental releases (minus quantities from non-routine, one-time events); on-site waste management (recycling, treatment, and combustion for energy recovery); and off-site transfers for disposal, treatment, recycling, or energy recovery EPA (2019b).

total plant-level expenditures over time broken down into capital expenditures and expenditures on operation and maintenance. We merge this rich source of data from the EIA with our sample to pin down the exact capital expenditures plants are undertaking in response to environmental activism. We scale plant level expenditures by lagged sales for meaningful interpretation and take the ratio's natural logarithm to reduce skewness. To control for differences in EPA regulation by location, we include EPA region-by-year fixed effects. In addition, we include the following plant-level controls that correlate with expenditures: *plant age* and *installed capacity*.

Estimates from column (1) of Table 8 suggest that plants increase their total capital expenditures on abatement initiatives. Estimates from column (2) suggest that this increase primarily comes primarily from new capital expenditures instead of maintenance. The estimate in column (2) is about three times larger relative to the sample standard deviation. In Appendix B, we find that consistent with our estimates, firms report making operation-related changes and investments in abatement technology. Overall our evidence suggests that the improvements to corporate environmental behaviors stem from both operational related abatement initiatives and new capital expenditures.

3.3.3 No Changes in Production

A natural alternative explanation is that a reduction in economic activity drives the decline in emissionsfirms that produce less mechanically release fewer emissions. Put differently, the reduction in toxic emissions stems from the decline in production in conjunction with increased abatement efforts.

While we do not observe actual production in the data, we consider the production ratio from the TRI database, (Akey and Appel, 2020), as our main dependent variable. The production ratio, defined for each plant's chemical usage, is the ratio of the quantity of output in any given year relative to the quantity of output in the previous year. An advantage of this measure is that it is output-based and available at a granular level.

We re-estimate Equation 1, and use the plant-chemical level production ratio as our main dependent variable. Estimates from column (1) of Table 9 suggest that growth in production did not change for targeted firms' plants relative to plants of control firms. Next, we consider only plants that consistently report each year since the start of the sample, as this helps us rule out alternative explanations such as plant closures or minimum reporting requirements that could drive changes in production. Column (2) presents estimates from this sub-sample and again finds no change in the production. These results provide the first set of evidence ruling out declines in production as an explanation for the drop in chemical releases.

As a second approach, following Akey and Appel (2020), we construct a proxy for total production by normalizing production to one in the first reporting year.[18] Specifically, we compute normalized production as:

$$CumulativeProduction_{i,c,t} = \prod_{t \neq 1}^{t} 1 \times \frac{QuantityProduced_{i,c,t}}{QuantityProduced_{i,c,t-1}} = \prod_{t \neq 1}^{t} 1 \times Production_{i,c,t}, \quad (2)$$

We use the cumulative production as our main dependent variable in Equation 1. Figure IA4 suggests that plants of targeted firms do not change their production around the targeting by the BAP. In our regression framework, column (3) of Table 9 also suggests that there is no relationship. Using the sample of plants that consistently report over our study period, estimates in column (4) again suggest that targeted plants do not change their production. These results indicate that decline in production is unlikely to drive the baseline reduction in total chemical releases.

Overall, the results suggest that targeted firms' plants increase their abatement activities rather than decrease production in response to environmental activist campaigns. These results contrast with and complement two concurrent papers (Akey and Appel, 2020; Chu and Zhao, 2019) that study the externalities of hedge fund activism. These papers document that improvements to environmental behaviors are a byproduct of changes to the firm's governance structure and operations. Since these campaigns involve investors focused on improving the target firm's financial performance in the short-run, improvements in their context stem from changes to operational efficiency instead of firms undertaking new abatement initiatives. In contrast, we focus on environmental activist campaigns, where long run investors engage management by posing a credible threat to improve a target's environmental performance.

[18]We replace the missing observations with one when defining this measure.

4 Financial Performance of the Targeted Firms

We study investor reaction to the BAP campaign and changes in the targeted firms' financial performance in response to environmental activism. First, we present evidence of a negative short-run equity response to the proxy-access proposals introduced by the BAP campaign. Second, we find that the environmental improvements are negatively related to the financial performance of targeted firms. We discuss the plausible caveats for each of these tests and limits to its interpretations.

4.1 Short-run Equity Response

We examine the market reaction to the proxy-access proposals introduced by the NYCPS to understand investor perceptions about environmental activism through such interventions. We measure the abnormal returns around the notice of exempt solicitation, the date on which most investors were reasonably aware of the proxy access proposal introduced as part of the activist campaign.

We identify the exact date for each targeted firm by using their SEC form PX14AG.[19,20] This approach confers two advantages. First, using form PX14AG allow us to determine the date on which investors are likely to learn about proxy-access proposals introduced by the NYCPS and their partners.[21] Second, focusing on the dates extracted from exempt solicitation allows us to precisely evaluate and attribute the investors' response to environmental activism through proxy-access proposals.

We conduct an event study around the date of exempt solicitation, hand-collecting key dates from form SEC PX14AG. In Table IA5, we report the results comparing the daily excess and abnormal equity returns three days around the exempt solicitation filed by NYCPS at targeted firms.

[19] Appendix Figure ID2, presents an example of the contents in form PX14AG for the firm Arch Coal Inc. which was targeted by the BAP campaign for environmental reasons.

[20] As a matter of deliberate choice, we do not use the announcement of the BAP campaign as our event to understand investor perception of environmental activism through proxy-access proposals. Specifically, the campaign announcement included firms targeted for environmental reasons and non-environmental reasons. Additionally, it contained value-relevant information regarding future commitment to issues by other institutional investors. These reasons make it difficult to isolate investor perceptions about environmental activism through proxy-access proposals cleanly.

[21] Previous research uses mailing date or filing date of the proxy statement (Gillan and Starks, 2000; Karpoff, Malatesta, and Walkling, 1996). However, these statements may contain other value-relevant information, making it hard to disentangle the effect of activism from other information that the investors become aware of.

The dependent variables, in percent, are the firms' daily excess returns (column 1), risk-adjusted returns using Capital Asset Pricing Model (column 2), risk-adjusted returns Fama-French three-factor model (column 3), while *Post* is an indicator variable for three days after the investor filling. Across all models, we find that targeting through proxy-access proposals is associated with negative returns. The estimates suggest that an average investor reacts negatively leading to 0.23% to 0.50% lower firm value.

We are careful when interpreting these results, given the weak statistical significance. A possible interpretation is that investors weigh the benefits of increased sustainability against increased costs associated with implementing them, with the change in stock price quantifying the net weakly negative effect. Another possible interpretation could be that the investors do not perceive pension fund activism as a value-enhancing event (Gillan and Starks, 2000; Karpoff, Malatesta, and Walkling, 1996). Either way, the results suggest that the average investor perceives environmental activism through proxy-access proposals as not value-enhancing.

4.2 Short-run Financial Performance

Next, we test whether the improvements to corporate environmental behaviors come at the expense of financial performance of target firms. Specifically, we focus on quantifying the net effect of environmental campaigns on the targeted firm's profitability, changes in operating income, and distress risk.

Estimates from Table IA6 suggest a negative relationship between environmental activism and measures of firm performance. Focusing on profitability, we find that targeted firms experience a relative decrease in financial performance after being targeted by the BAP campaign.[22] To rule out the possibility that these results are driven by the denominator, total sales, we study the operating income of firms. Column (2) of Table IA6 suggests that the logarithm of operating income decreases, on average, for targeted firms relative to matched control firms.

We additionally consider the change in downside risk of the firm. Recent research documents that engagement on environmental, social, and governance issues (ESG) may lower a firm's downside risk (Hoepner, Oikonomou, Sautner, Starks, and Zhou, 2019). Given this, we examine whether targeted firms experience a change in distress risk following the BAP campaign. We

[22]Profitability is defined as operating income before depreciation divided by total sales.

first consider the firm's z-score, a proxy for the distress risk implied by its accounting statement. Estimates from column (3) of Table IA6 suggest no meaningful deterioration in default risk, consistent with Chava (2014). In unreported analysis, we consider a market-based measure of default risk by using credit default swap spreads, and again do not find a change in this measure around targeting.

We are careful in interpreting the worsening in firm performance as confirmatory evidence of the substitution between sustainability performance and financial performance. Firms are undertaking capital expenditures upfront, but the benefits from socially responsible investments such as lower funding costs, lower regulatory costs, increased demand for products and services, or reduced litigation risk may take time to materialize.[23] Given this, our short window might be inadequate to capture the net benefits from investments in new abatement technologies in their entirety.

5 Robustness Tests

5.1 Robustness to Potential Reporting Biases in the TRI Database

While we find a robust decline in emissions, one potential concern is that reporting biases to the TRI database might instead drive the documented reduction in emissions (Panel A of Table 2). Firms may strategically misreport to the EPA TRI program and systematically report improvements after being targeted by the BAP. If so, the toxic release results will overstate the effect of environmental activism. In light of these concerns, we undertake additional robustness tests.

Our initial approach is to limit the analysis to the largest plants that emit above-median toxic chemical releases. This sample restriction confers a key advantage that such plants are less likely to misreport (Brehm and Hamilton, 1996). Estimates in row (10) of Table 10 show that the coefficients remain statistically significant and similar to our baseline estimates for this subsample.

As an additional approach, we reinterpret the evidence from outdoor air quality monitors near the plants of targeted firms (see Section 3.2.2). The key advantage of the AQS data over the

[23]Consistently, anecdotal evidence from XCEL's 2017 10-K filings captures the essence of this argument: "*The precise timing and amount of environmental costs, including those for site remediation and disposal of hazardous materials, are unknown.*"

TRI data is that it is not self-reported. Thus, our results suggesting that a significant decrease in criteria gases near the plants of targeted firms bolsters confidence that the documented decline in emissions is not an artifact of a reporting bias.

In light of these concerns, we reiterate several important points put forward by recent research by Akey and Appel (2020, 2021) suggesting that that plants are unlikely to misreporting to the TRI program. First, there is an incentive to report toxic releases truthfully, as misreporting to the agency may result in potential criminal penalties Greenstone (2003). Second, the EPA's periodic audits suggest that emission levels were within 3% of their reported levels for most industries (EPA (1998)). Third, there is no penalty for reporting higher levels of emissions. Fourth, misreporting does not stem from intentional evasion but instead typically arises from ignorance (Brehm and Hamilton (1996); De Marchi and Hamilton (2006)). These points, in conjunction with our robustness tests suggest that the baseline reduction in emissions is not an artifact of reporting biases to the TRI database.

5.2 Robustness To Empirical Specification

We perform a battery of robustness tests to provide further confidence in our results estimating the drop in toxic chemical releases at the plant-level (Panel A of Table 2). We report the results of each test in Table 10 with each row presenting the estimates from a separate regression. In all specifications, we find statistically significant and qualitatively similar reductions in on-site toxic chemical releases (column (5) of Table 10).

5.2.1 Alternative Inputs to Propensity Score Matching

We first consider the robustness to alternative inputs to the matching. Panel A of Table 10 presents results from this exercise. We first re-estimate our baseline specification on a propensity score matched sample that uses the pre-target *level* and *trend* of total toxic release as additional matching covariates. Estimates from row (1) and row (2) suggest that these tests are quantitatively similar to our baseline estimates. Estimates from row (3) matches chemical releases at the plant-level, in addition to firm-level covariates, and again finds similar results. We also consider an alternative industry classification by using the Fama-French 48 industry classification. Estimates from row (4) again find quantitatively similar results. Together, these results suggest that input choices to the matching approach do not affect our conclusions.

5.2.2 Ruling Out Alternative Explanations Through Sample Restrictions

One plausible explanation for our results is that plants reduce their toxic chemicals by offshoring their production. We alleviate such concerns by focusing on utility firms where electricity generation and transmission is harder to outsource, row (5), and exclude firms that have a high propensity for offshoring using the textual measure introduced by (Hoberg and Moon, 2017), row (6). Across both of these subsamples, the estimates are similar to our baseline estimates for on-site reductions.

We rule out the possibility that plant closures drive the changes. We re-estimate our baseline specification by excluding firms filing for Chapter 11 bankruptcy during our sample period in row (7), exclude plants reporting zero emissions to alleviate concerns that minimum reporting thresholds drive our results in row (8), and focus on plants that consistently report a positive amount of toxic release to the EPA throughout our sample in row (9). We rule out reporting biases to the TRI data, in row (10), as discussed in subsection 5.1. In these subsamples, we again find qualitatively similar results as our baseline estimates. These tests also mitigate concerns about the quality of reporting being affected by the expansion of coverage over time, the inclusion of new industries and chemicals, and changing minimum thresholds for reporting plants.

5.2.3 Alternative Scaling Metrics

We mitigate concerns that the results are sensitivity to the choice of scaling variable. We present alternative scaling choices in Panel C of Table 10. We first consider firm-level sales in row (11), total assets in row (12), and same-year $COGS_t$ in row (13), respectively. Estimates across the three rows suggest that the results are invariant to the choice of scaling parameter. Row (14) re-estimates our specification without any scaling variable, and again we find qualitatively similar results. Moreover, Table IA7 shows that our results are robust to defining our dependent variable as the share of total releases. In sum, these tests alleviate concerns that the choice of normalizing variable drives the toxic release result.

5.2.4 Ruling Out Regulatory Concerns

A potential concern is that environmental regulations differentially affect treated and control plants based on the nature of their activity or geographic region of operations. If this were the case, our baseline specification would be missing an important factor related to reforms at the state level, (e.g., cap and trade reforms, or subsidies), that would potentially lead to us overstating the response of plants to the activist campaign.

We address this concern in Panel D of Table 10. We control for underlying geographic variation in regulation by including *State* $\times$ *Year*, *Industry* $\times$ *Year*, and *State* $\times$ *Industry* $\times$ *Year* fixed effects in rows (15) through (17), respectively. Further, we also re-estimate our baseline specification by excluding plants located in California, row (18). Estimates from each of these specifications suggest that the underlying local variation in regulation does not drive our results.

5.2.5 Alternative Empirical Specifications

We present alternative empirical specifications in Panel E of Table 10. First, we also use a jackknife re-sampling technique to mitigate the possibility that outliers drive our results, row (19). We check for robustness to alternative clustering specifications, including firm-level, firm and year level (double clustering), plant-level, and plant and year (double clustering) in rows (20) through (23), respectively. Further, we consider whether the reductions in total releases are chemical-specific, row (24). Lastly, we also include controls for profitability, as a proxy of firm performance, row (25). Again, across all the specifications, we find that targeted firms' plants reduce their on-site emissions, in column (5).

6 Evidence of a Direct Channel

This section presents evidence that boards of firms targeted by the BAP campaign improved their corporate environmental behaviors in direct response to the specific demands of the activist investors, a direct channel, rather than responding to externalities of investing or non-environmental activist campaigns, an indirect channel.

We present evidence supporting the direct channel view. First, we establish that firms saw the BAP campaign as a credible threat. Second, we show that firms targeted for non-environmental reasons do not improve their environmental behaviors, thus alleviating concerns about general attention and, more broadly, that the indirect channel is driving our findings. Lastly, we step outside our baseline sample and consider other pro-social campaigns of the BAP, as well as other environmental campaigns, to show that the firms respond to specific demands of activist investors.

6.1 The BAP Campaign Presented a Credible Threat

This section presents evidence that boards of targeted firms saw the BAP campaign as a credible threat, a necessary condition for the direct channel to operate. We do so by first documenting our discussions with the NYC Comptroller's office and examining the shareholder support and adoption of proxy-access proposals put forward by the NYCPS through the BAP campaign. Next, we document management's opposition to the BAP campaign by studying regulatory filings of the targeted firms.

6.1.1 Discussions with the Comptroller's Office

We held discussions with the NYC Comptroller's office to understand the campaign and their interaction with targeted firms. Our conversations reveal that the size, coordination, and the low propensity to divest from targeted firms, presented a credible threat that was difficult for boards to ignore.[24] Specifically, the BAP was supported by three of the four largest pension funds in the United States (CalPERS, CalSTRS, and the NYCPS). With over $650 billion in assets under management, this group of investors was pivotal when voting on resolutions.

Importantly, the BAP campaign was well-organized. The NYCPS and its partners coordinated their engagements and attended the targeted firms' annual general meetings. The NYCPS and CalPERS collaborated on exempt solicitations, in which they sent letters to shareholders asking for their support on proxy-access proposals. Third, the BAP could, in principle, exert pressure through their voting on other proposals unrelated to proxy access. Fourth, the NYCPS, in its fiduciary role, has a low propensity to divest from its portfolio firms and makes the NYCPS more likely to engage, consistent with (Krueger, Sautner, and Starks, 2020; Sautner and Starks,

[24]Our conversations with the office of the Comptroller emphasized that the NYCPS redoubled its long-standing commitment to addressing climate change risk through company engagement. Additionally, the board of each of the five retirement systems includes union representatives who tend to be tuned in and responsive to member interests.

2021).[25] This evidence is consistent with research pointing to the ability of public pension funds to coordinate with other shareholders and garner broad support for their proposals (Gillan and Starks (2000); Levit and Malenko (2011)).

We examine empirically, where possible, the success rates of the proxy-access proposals put forward by the BAP. We study the average support level of proxy-access proposals by shareholders and whether proxy-access was ultimately implemented at targeted firms. Examining these outcomes allows us to gauge the credibility of these proposals to pose a threat, especially given their nonbinding nature. As a benchmark, we compare the support to other shareholder proposals at the same firm but not put forward by the NYCPS.

Studying support rates for proxy-access proposals, we find that the BAP campaign was highly influential in garnering support. As shown in rows (1) and (2) of Table IA8, we find that support rates for proxy-access proposals introduced by the BAP campaign are nearly twice as large, and the passage rates are nearly ten times larger. When comparing shareholder support on proxy-access proposals introduced at firms targeted at environmental reasons, row (3), and those made by other shareholders at these same firms, row (4), we again find similarly high support among shareholders for the proposals introduced by the BAP campaign. Lastly, rows (5) and (6) suggest that the more significant support for the BAP proposals holds even when we compare the outcomes to proxy-access proposals introduced at other firms by other investors.

We also examine whether firms preemptively settled and ultimately adopted proxy access after the BAP campaign. Using data from Shareowners Initiative Postseason Annual Report, we find that the firms targeted by the BAP exhibited relatively high settlement rates and ultimate adoption rates, suggesting that firms were highly responsive to the demands made. From Table IA9 row (1) studies all firms targeted by the BAP and finds that a significant fraction of proxy access proposals settled without a shareholder vote. Further, nearly 90% of proposals put forward by the BAP were adopted by the targeted firm. Similarly, in row (2), we find that firms targeted for their inadequate redressal of climate change risk had an even higher propensity to settle immediately and adopt these proposals without much change.

[25] One exception to this is gun manufacturers. The Assistant Comptroller also highlighted, through discussions, that divestment was difficult due to the fiduciary obligations of the funds. The system hired an external consultant to establish a basis for divesting from this industry to divest from gun manufacturers. Our discussions with the New York City Assistant Comptroller confirm that the NYCPS needs to establish a reasonable basis for divestment in its fiduciary role.

6.1.2 Management's Opposition to the BAP Campaign

We use regulatory filings of targeted firms to better understand management's opposition to proxy-access proposals. To this point, we hand-collect information from all definitive proxy materials filed on Schedule 14A in the SEC's EDGAR database (see Appendix D for examples). The 14A filings, a mandatory filing when a shareholder vote is required, list all proposals up for voting by shareholders at the annual meeting. Moreover, it presents management's view on proposals.

Studying the BAP campaign, we find that 55% of the targeted firms' management explain their opposition to proxy access in these filings.[26] We also find targeted letters by the management urging shareholders to vote. Further, the management settled immediately in the remaining 45% of the targeted firms and preemptively introduced a similar version of proxy-access as the initial proposal.

Further, we collected all shareholder proposal no-action requests, posted online by the SEC's Division of Corporation Finance.[27] They provide us with a rare opportunity to study management's resistance in the process (Bhandari, Iliev, and Kalodimos, 2021; Matsusaka, Ozbas, and Yi, 2021). Interestingly, targeted firms in their first year are most likely to use this defense tactic than others.

Both the actions of investors and management provide evidence of a direct channel. That is, management's active opposition to the BAP campaign obtained from regulatory filings and interactions with the comptroller's office suggests that the BAP presented a credible threat that lead to a successful engagement which led to firms responding to specific mandates of the investor.

6.2 Ruling Out the Indirect Channel

An alternative explanation could be that firms were responding because of the general attention drawn to them through the BAP campaign, instead of responding to the specific demands put

[26]Unfortunately, in our setting, we do not observe other forms of outreach such as in-person discussions or phone calls by management or their proxy solicitors.

[27]The division receives requests from companies to state its informal, non-binding views on whether it concurs that there is a legal basis to exclude shareholder proposals under Exchange Act Rule 14a-8 ("Rule 14a-8"). The staff responses to the no-action requests contain correspondence relating to the staff's response and the company's initial submission and any subsequent correspondence. In each case, the hyperlink will be available when the materials are posted on the SEC website, generally within a few business days of the staff's response. See Figure ID3 and Figure ID4 for examples of letters to the SEC and their decision.

forward by investors. This subsection presents two tests to rule out this indirect channel as the dominant force driving the improvements in environmental behaviors in our setting.

6.2.1 Does Targeting for Activism Drive the Improvements?

We re-estimate our baseline specification for the subsample of firms targeted by the BAP for non-environmental reasons.[28] Analysis of these firms allows us to examine whether targeting for activism drives the baseline reduction in emissions:

$$Y_{i,c,t} = \gamma_1 I\left(Post_{i,t}\right) + \gamma_2 I\left(Post_{i,t}\right) I\left(Other\ reasons_i\right) + \delta_{ic} + \delta_{ct} + \varepsilon_{i,c,t}, \tag{3}$$

where $I\left(Other\ reasons_i\right)$ is a dummy variable and equals one if the firm is targeted for other mandates by the BAP. These include excessive CEO pay, lack of board diversity, and inadequate political disclosure. The primary coefficient of interest is γ_2, which represents the *within* plant-chemical change in pollutive activity around targeting for mandates unrelated to the inadequate redressal of climate change risks.

Table IA10 presents estimates of Equation (3). Across columns 1 through 3, we find no evidence of changes in environmental behaviors around targeting. These results suggest that attention drawn to firms by the BAP alone do not drive the change in environmental behaviors, as shown in our baseline estimates.

6.2.2 Does Targeting for Proxy Access Proposals Drive the Improvements?

Another possibility is that unobserved factors associated with targeting for proxy access may drive these results. If so, the decision to target a firm for proxy access could instead explain the documented improvements brought by environmental activism, and would be suggestive of the indirect channel.

We address this concern by conducting a placebo test that re-estimates our baseline specification for the set of firms targeted for proxy access by investors (other than the NYCPS). We are careful to exclude firms that were targeted by the BAP from this sample. This sample attempts to hold constant unobserved factors that drive the decision to *target* firms for proxy access.

[28] These firms were excluded from our main sample.

Table IA11 reports the estimates from this exercise. This indicates that our results are unlikely to be driven by other unobservable factors whose effect we spuriously attribute to targeting by the BAP. Taken together, these results suggest that targeting does not indirectly drive the reduction in pollution. Instead, our evidence is most consistent with environmental activism operating along a direct channel, whereby targeted firms respond to the specific demands of the investors and change their environmental behaviors.

6.3 Do Targeted Firms Respond to the Activist's Specific Mandate?

We present two additional tests to show that firms are responding to the activist's specific mandates. First, we show that firms targeted for other pro-social mandates through the BAP (board diversity, excess CEO compensation), specifically respond along these dimensions, but do not change their environmental behaviors. Second, we step outside of the BAP to test other environmental campaigns and show that that firms are improving their corporate environmental behaviors around such campaigns. Taken together, these tests provide the robust evidence that firms respond to the specific demands of the activist instead of responding to the attention drawn to them by the campaign.

6.3.1 BAP Campaign: Board Diversity and Excess Pay Mandates

We first consider how targeted firms change their board composition in response to demands made under the board diversity mandate of the BAP. Estimates presented in Table IA12 establishes a consistent narrative to our baseline results, whereby targeted firms add new board members, that tend to be females, and from a minority background. Consistent with Barzuza (2019), column (1) suggests that firms are, on average, adding new individuals. Moreover, estimates from column (2) suggest that the female ratio, the fraction of females on board is increasing by one-third. When studying diversity, column (3) suggests that the HHI of nationality diversity is increasing. Similarly, when using the board member's country of origin, column (4) suggests the diversity of the board is increasing.

We next consider response of boards to the BAP's mandate to curtail excess CEO pay at targeted firms. Table IA13 shows that total CEO compensation and percent of excess compensation decreased for firms that were targeted by the BAP.[29] Moreover, the estimates suggest that the growth in compensation also slowed down; however, the estimates are imprecise and hence do not allow us to rule out that they are statistically different from zero. The estimates in column (1) suggest that targeting leads to a decrease in total compensation. Also, it leads to a curtailment in excess CEO pay, as reported in column (3). Furthermore, the results also suggest that targeting by the BAP better aligns CEO compensation with the firm's performance. Column (5) suggests that delta, the sensitivity of firm pay-to-performance, is increasing on average for targeted firms.[30] Given that firms targeted for non-environmental reasons did not change their environmental behaviors, but only responded to the activist specific mandates provides strong support that our baseline results operate through a direct channel.

6.3.2 Are These Effects Specific to the BAP campaign?

How generalizable are the results in the broader context of other environmental campaigns? It is essential to understand whether and how investors can target firms for sustainability mandates to catalyze specific changes to address their vulnerability to climate change.

We collect all shareholder proposals from the Institutional Shareholder Services (ISS) database submitted to firms over the same period. From this sample, proposals were categorized by hand on whether they related to an environmental mandate. To ensure the veracity of the matches, we relied on two independent research assistants. Using the resulting list of sustainability campaigns, we re-estimate our baseline specification and examine the effectiveness of these campaigns.

Estimates from these tests suggest that targeted firms respond to an activist investor's firm-specific sustainability mandate even outside of the BAP campaign. We re-run our baseline specification (Panel A of Table 2) and find similar results: plants of targeted firms, on average, reduced their total toxic chemical releases. Column (1) of Table IA14 suggests that targeted firms' plants respond by reducing their total toxic chemical releases. Estimates in columns (2) and (3) suggest that the active on-site reductions in chemical releases drive the baseline reductions in the total toxic chemical releases. Thus, firms are not substituting to off-site plants but instead reducing

[29] All numbers are deflated by consumer price index (2015) obtained from FRED St. Louis.

[30] For delta and vega, we extend the methodology from Coles, Daniel, and Naveen (2006, 2014); Core and Guay (2002).

their total emissions.

We are careful in interpreting this evidence. These campaigns are not a relatively clean setting, making it difficult to disentangle treatment effects from selection. Prior work finds that institutional investors file shareholder proposals after failed private negotiations with the management, and hence managers of the firm anticipate such proposals (McCahery, Sautner, and Starks, 2016). Moreover, these proposals are specific (e.g., disclosure), potentially reducing managerial flexibility in responding to them. In light of this, we take these findings as complementary to our baseline results, establishing that investors, beyond the BAP, can discipline firms' non-financial characteristics through firm-specific sustainability mandates.

7 Caveats and Interpretation

Our results come with important caveats and must be carefully interpreted in the context of our setting. Because the BAP did not target firms randomly, any policy prescription suggesting a random targeting of firms to improve their environmental impact is misguided. Instead, the results should be interpreted as the treatment effect on the treated: would the same changes have occurred if the BAP had selected identical target firms but remained passive in its demands? Further, this study does not lend itself to evaluating the welfare consequences of engagements like the BAP. Such an analysis would need to fully evaluate the non-pecuniary benefits for stakeholders, investors, and broader society. Instead, our study provides robust evidence that environmental activism leads to improvements in corporate environmental behaviors.

In light of these caveats, our results provide novel evidence on engagements for sustainability issues that may help overcome collective action problems, whereby engagements can only succeed if there is enough pressure on management. Our evidence suggests that a lead activist may be a necessary catalyst for a successful climate-focused campaign, and is consistent with a direct channel. Moreover, institutional investors' engagements provide a countervailing force to parts of the market that are difficult to monitor and regulate.

In our setting, environmental activists effectively impose their pro-social preferences on firms (Bénabou and Tirole, 2010). In the case of the NYCPS and the BAP, the pension funds' beneficiaries vote for trustees and thus represent their interests and preferences. While serving in a fiduciary role, these funds may also act as preference aggregators for the plans' beneficiaries.

Further, our results directly speak to the research evaluating the importance of proxy access rules as a means to address climate change risks. Prior studies have investigated the market's reaction to proxy access rules (Becker, Bergstresser, and Subramanian (2013); Cohn, Gillan, and Hartzell (2016)). More specific to the BAP, studies have evaluated changes in board diversity (Barzuza (2019)) and stock price reactions to the announcement of the BAP campaign (Bhandari, Iliev, and Kalodimos (2021)). Building on this research, our study presents new empirical evidence that proxy access rules, or the threat thereof, may not be sufficient to affect firms along multiple dimensions. Instead, proxy access gives long-term shareholders the ability to monitor and discipline investors effectively.

8 Conclusion

This paper documents that environmental activist investing positively affects the sustainability performance of targeted firms. We measure changes using highly detailed plant-level data and provide robust evidence that firms improve their environmental performance in response to climate-focused engagements. These result in positive externalities to the local economies of targeted plants. Ruling out alternative explanations, we show that the results are most consistent with the campaigns posing a credible threat to boards, with investors benefiting from monitoring and the threat of discipline. Overall, our findings have implications for the current debate regarding stakeholder governance and highlight the role of engagement in addressing climate change risks at firms.

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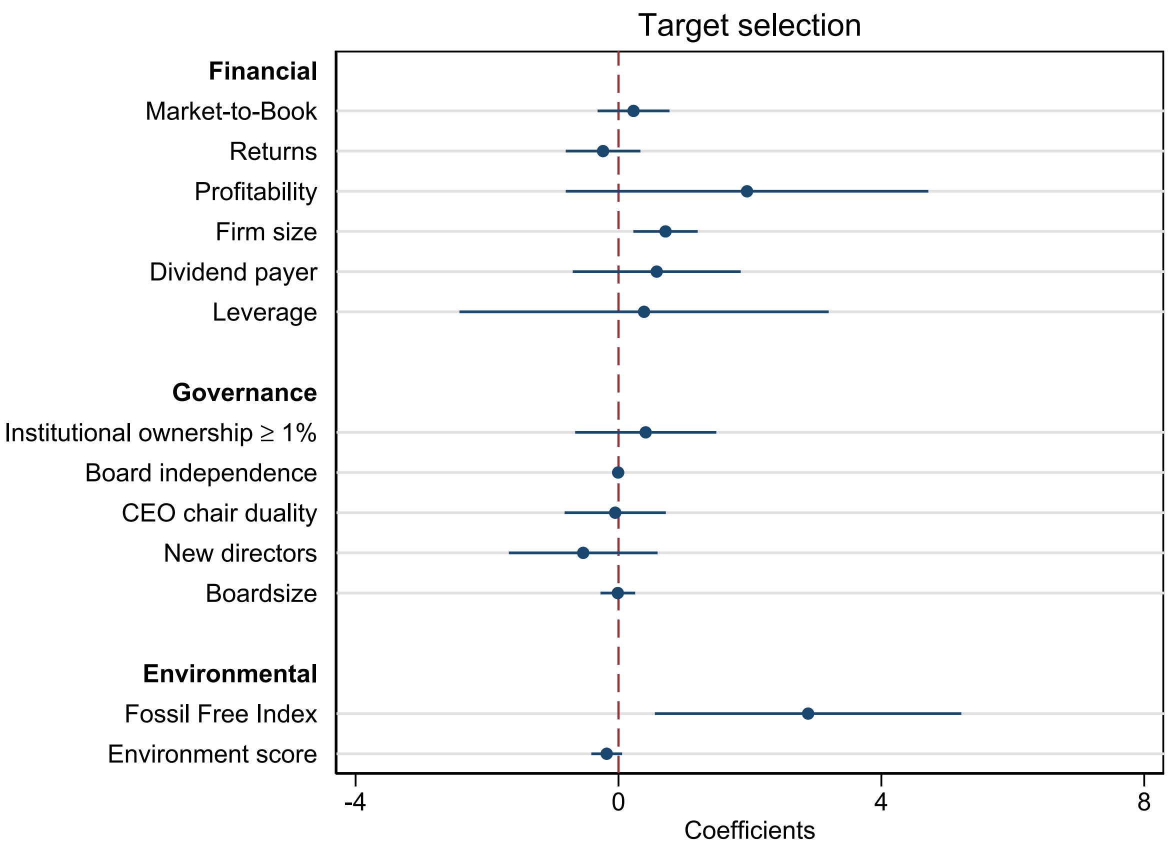


FIGURE 1: SELECTION INTO THE BOARDROOM ACCOUNTABILITY PROJECT

This figure plots the coefficients from a multivariate logistical regression relating firm characteristics that correlate with the likelihood of being targeted by the BAP for environmental reasons. We consider the following financial, governance, and environmental characteristics. *Market-to-Book* is the ratio of assets, defined as the market value of equity plus book value of debt over book value of assets. *Returns* is the stock return in the past 12 months. *Profitability* is the ratio of earnings before interest, taxes, depreciation, and amortization scaled by sales. *Firm size* is the natural logarithm of the book value of assets. *Dividend payer* is an indicator variable for the dividend paying firm. *Leverage* is the ratio of book value of debt divided by market value of equity plus book value of debt. *Institutional ownership* $\geq 1\%$ is an indicator variable for firms with one percent or more of outstanding shares held by institutional investors. *Board independence* is the fraction of independent directors on the board. *CEO chair duality* is an indicator variable for firms where the chairman and the CEO positions are held by the same person. *New directors* is the fraction of new directors added to the board each year. *Boardsize* is the number of directors sitting on the board each year. *Fossil Free Index* is an indicator of whether the firm is listed on the Fossil Free Index. *Environment score* is the standardized environmental score from Thomson-Reuters' ASSET4 database. Data Source: BoardEx, Compustat, Center for Research in Security Prices (CRSP), and Thomson Reuters' ASSET4 database.

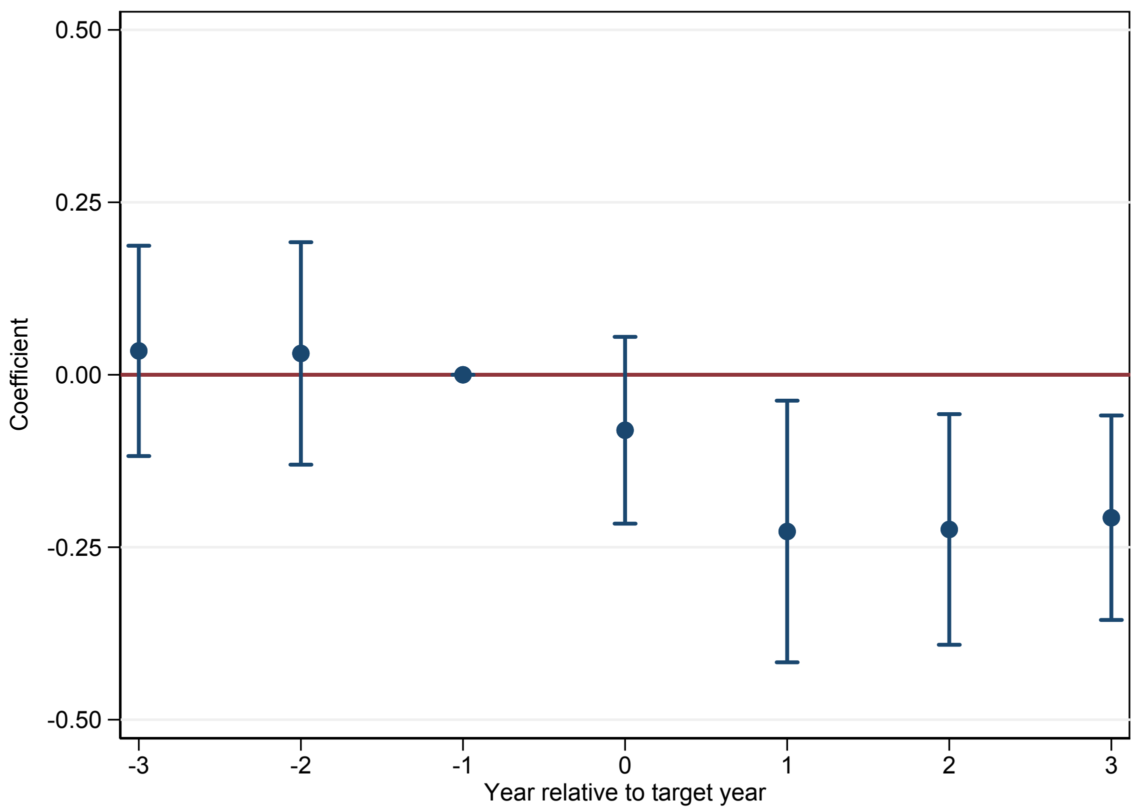


FIGURE 2: TOXIC CHEMICAL RELEASES AROUND ENVIRONMENTAL ACTIVISM

This figure plots coefficients from a propensity score matched difference-in-differences specification, where the dependent variable is the natural logarithm of one plus the total toxic release at the plant-chemical-year level. The horizontal axis is in event time relative to the year before targeting by the BAP. The estimated coefficients and their corresponding 95% confidence intervals correspond to the difference in the toxic chemical releases at plants of targeted firms to the toxic chemical releases at plants of propensity score matched control firms. Data Source: EPA Toxic Release Inventory (TRI).

TABLE 1: SUMMARY OF ACTIVISM EVENTS: FIRMS TARGETED BY THE BAP

This table provides a summary of activism events undertaken by the Boardroom Accountability Project (BAP) initiated by the New York City Pension System (NYCPS).Throughout the paper we align the date of targeting to the corresponding year of the annual shareholder meeting. Panel A reports the events by shareholder meeting year while panel B reports the events by industry using Fama-French 12 industrial classification. We identify activism events through publicly available data from the Boardroom Accountability Project. Specifically, we identify whether firms are targeted for their inadequate redressal of climate change risk (*Environment*) or if they are targeted for other reasons (*Others*) which include excessive CEO pay, lack of board diversity, inadequate political disclosure, and adherence to labor standards. We use the meeting year a firm is first targeted by the BAP as our event year and adjust for double-counting across categories. Sectors are mutually exclusive, and defined using the Fama-French twelve industry classification using SIC codes.

	Panel A: By shareholder meeting year		
First Year of Event	# of Firms	Environment	Others
2015	75	33	42
2016	26	7	19
2017	57	20	37
2018	23	2	21
Full Sample	181	62	119

	Panel B: By industry		
	# of Firms	Environment	Others
Consumer Nondurables	3	0	3
Consumer Durables	5	1	4
Manufacturing	7	0	7
Energy	30	27	3
Chemicals and Allied Products	6	0	6
High Tech	26	2	24
Tele and Communications	3	0	3
Utilities	25	22	3
Wholesale and Retail	19	5	14
Healthcare, Medical Equipment, and Drugs	10	0	10
Finance	32	1	31
Other	15	4	11
Full Sample	181	62	119

TABLE 2: REAL EFFECTS OF ENVIRONMENTAL ACTIVISM: PLANT-LEVEL EVIDENCE

This table reports the impact of environmental activism on toxic chemical releases. The regressions compare toxic chemical releases at plants of targeted firms to toxic chemical releases at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. Panel A reports toxic chemical releases by the location of release, i.e., on-site and off-site while panel B reports toxic chemical releases disaggregated by the medium of release, i.e., air and water. The dependent variable is the natural logarithm of one plus the release scaled by previous years' cost of goods sold. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI).

	Panel A: Toxic chemical release		
Dependent variable	Log(1+Release/COGS $_{t-1}$)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Post	0.003	0.006	0.005
	(0.043)	(0.038)	(0.011)
Post × Environment	-0.050***	-0.059***	0.005
	(0.019)	(0.015)	(0.007)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.82	0.83	0.73
Observations	59,983	59,983	59,983

	Panel B: Medium of release		
Dependent variable	Log(1+Release/COGS $_{t-1}$)		
	Stack air	Fugitive air	Surface water discharges
	(1)	(2)	(3)
Post	0.012	0.006*	0.001
	(0.015)	(0.003)	(0.002)
Post × Environment	-0.036***	-0.007***	-0.002**
	(0.008)	(0.002)	(0.001)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.81	0.77	0.73
Observations	59,983	59,983	59,983

TABLE 3: ENVIRONMENTAL ACTIVISM AND GREENHOUSE GAS EMISSIONS

This table reports the impact of environmental activism on greenhouse gas emissions. The regressions compare greenhouse gas emissions at plants of targeted firms to greenhouse gas emissions at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. The dependent variable is the natural logarithm of one plus the emissions scaled by previous years' output at the plant-level as reported to the Energy Information Administration (EIA). The emissions are broken down by greenhouse gas type: *Methane* (column 1), *Nitrous oxide* (column 2), and *Carbon dioxide* (column 3). *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Gas* and *Gas* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Greenhouse Gas Reporting Program (GHGRP) and Energy Information Administration (EIA).

Dependent variable	Log(1+Emissions/Output $_{t-1}$)		
	Methane	Nitrous oxide	Carbon dioxide
	(1)	(2)	(3)
Post	0.002*	0.002	0.002
	(0.001)	(0.001)	(0.015)
Post × Environment	-0.003**	-0.002*	-0.015
	(0.001)	(0.001)	(0.015)
Plant × Gas fixed effects	Yes	Yes	Yes
Gas × Year fixed effects	Yes	Yes	Yes
R^2	0.39	0.33	0.76
Observations	11,039	11,039	11,039

TABLE 4: BIOLOGICAL IMPACT OF CHEMICALS

This table reports the impact of environmental activism on toxic chemical release based on its potential harm to humans. The regressions compare chemical release at plants of targeted firms to chemical release at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. The dependent variable is the natural logarithm of one plus the total toxic chemical release scaled by previous years' cost of goods sold. Each column subsets the sample based on whether the chemicals are classified by the EPA's IRIS database as harmful to human health and breaking it down by the biological system they affect. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Integrated Risk Information System (IRIS).

Dependent variable	Log(1+Release/COGS $_{t-1}$)					
System affected	Respiratory	Developmental	Nervous	Hematologic	Urinary	Hepatic
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.073	0.033**	0.028*	0.026*	0.046	0.015
	(0.106)	(0.016)	(0.016)	(0.015)	(0.031)	(0.009)
Post × Environment	-0.076***	-0.035**	-0.028*	-0.024*	-0.023	-0.019*
	(0.022)	(0.014)	(0.015)	(0.013)	(0.015)	(0.010)
Plant × Chemical fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.92	0.88	0.92	0.90	0.91	0.95
Observations	5,632	3,600	7,761	2,920	3,235	2,248

TABLE 5: AIR QUALITY MEASURED BY AIR MONITORING STATIONS

This table reports the impact of environmental activism on air quality within one-mile of the plants of the targeted firms as measured by the EPA's air monitoring stations. The dependent variable is the standardized values of carbon monoxide (column 1), ozone (column 2), sulfur dioxide (column 3), nitrogen dioxide (column 4), and particulate matter <2.5 um (column 5) present in the areas around control and treated plants. *Environment* is a dummy variable indicating whether the plant belongs to the firm that was targeted by the BAP for environmental reasons. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Year* and *Plant* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Clean Air Act.

Dependent variable	Daily Average Measurement				
	Carbon monoxide	Ozone	Sulfur dioxide	Nitrogen dioxide	Particulate matter <2.5 μm
	(1)	(2)	(3)	(4)	(5)
Post	0.079*	-0.383	-0.097	0.163*	-0.083
	(0.044)	(0.376)	(0.089)	(0.091)	(0.095)
Post × Environment	0.084	-0.135**	-0.228***	-0.015	-0.179***
	(0.148)	(0.061)	(0.082)	(0.034)	(0.060)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Plant fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.22	0.13	0.26	0.40	0.18
Observations	32,767	27,769	85,556	26,864	47,778

TABLE 6: REDUCTION IN LOCAL POPULATIONS' EXPOSURE TO TOXICITY

This table reports the impact of environmental activism on the local populations' exposure to the toxicity of the chemical releases. The regressions compare the toxicity at census blocks of plants of the targeted firms to the census blocks of Russell 3000 Index firms in a propensity score matching difference-in-differences empirical setup. The dependent variables are the standardized values of the total score (column 1), toxic concentration (column 2), number of chemicals (column 3), and number of releases (column 4). The RSEI Score is a model implied risk-weighted measure of all chemicals and emissions released, as provided by the EPA. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Year* and *Census Block* fixed effects and are estimated using ordinary least squares (OLS) using standard errors clustered at the block level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Risk-Screening Environmental Indicators (RSEI) Model.

Dependent variable	Total score	Toxic Concentration	Number of Chemicals	Number of Releases
	(1)	(2)	(3)	(4)
Post × Environment	-0.197*	-0.257**	-0.255**	-0.295**
	(0.114)	(0.117)	(0.129)	(0.130)
Year fixed effects	Yes	Yes	Yes	Yes
Census Block fixed effects	Yes	Yes	Yes	Yes
R^2	0.06	0.07	0.08	0.14
Observations	3,040	3,040	3,040	3,040

TABLE 7: SOURCES OF REDUCTION AND PREVENTATIVE EFFORTS

This table reports the sources of reduction and preventative efforts undertaken by firms around environmental activism. The regressions compare these efforts at plants of targeted firms to sources of reduction and preventative efforts undertaken at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. Panel A reports the waste-management steps undertaken broken down by their impact, and panel B reports the preventative initiatives undertaken to reduce waste production broken down by categories, as provided by the EPA. The dependent variable in panel A is the natural logarithm of one plus the chemical release scaled by previous years' cost of goods sold. The release is broken down based on EPA's classification of production-related waste as *high impact* (column 1) and treatment works and recycling as *low impact* (column 2). The dependent variable in panel B is the natural logarithm of one plus the number of initiatives undertaken by the plants. The initiatives are grouped based on EPA's classification: *Spill and Leak Prevention* (column 1) and *Good Operating Practices* (column 2). *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI) and Pollution Prevention (P2).

	Panel A: Sources of reduction	
Dependent variable	Log (1+ Release/COGS $_{t-1}$)	
	High impact	**Low impact**
	(1)	(2)
Post	0.050	0.006
	(0.055)	(0.007)
Post × Environment	-0.121***	-0.011***
	(0.031)	(0.003)
Plant × Chemical fixed effects	Yes	Yes
Chemical × Year fixed effects	Yes	Yes
R^2	0.83	0.74
Observations	59,983	59,983

	Panel B: Abatement efforts	
Dependent variable	Log (1 + Number of initiatives)	
Initiative	Spill prevention	Operations
	(1)	(2)
Post	-0.002	-0.009*
	(0.002)	(0.005)
Post × Environment	0.006**	0.004*
	(0.003)	(0.002)
Plant × Chemical fixed effects	Yes	Yes
Chemical × Year fixed effects	Yes	Yes
R^2	0.92	0.91
Observations	42,065	42,065

TABLE 8: ABATEMENT EXPENDITURES

This table reports abatement expenditures for plants of targeted and matched control firms around the environmental activism campaign. The regressions compare expenditures as a fraction of firms' previous year cost of goods sold at plants of targeted firms to expenditures at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* and *EPA region* × *Year* fixed effects and are estimated using ordinary least squares (OLS). We also include plant-level controls that correlate with expenditures such as: *Plant age* and *Installed capacity*. Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: Energy Information Administration (EIA).

Dependent variable	Log(1+Expenditures/COGS $_{t-1}$)		
	Total	Capital	Operations & Maintenance
	(1)	(2)	(3)
Post	-0.005*	-0.006**	0.000
	(0.003)	(0.003)	(0.000)
Post × Environment	0.007**	0.007**	0.000
	(0.003)	(0.003)	(0.000)
Plant controls	Yes	Yes	Yes
Plant fixed effects	Yes	Yes	Yes
EPA region × Year fixed effects	Yes	Yes	Yes
R^2	0.59	0.55	0.65
Observations	1,161	1,161	1,161

TABLE 9: RULING OUT DECLINE IN PRODUCTION

This table examines changes in production around the targeting by the BAP. The regressions compares the growth (level) of production at plants of targeted firms to growth (level) of production at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. The dependent variable is the production ratio (columns 1 and 2) and normalized production (columns 3 and 4). Production ratio is defined as the quantity of output in any given year relative to the quantity of output in the previous year. Normalized production is a proxy for total production and is defined as the quantity of output in any given year relative to the quantity of output in the first year in our sample. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI).

Dependent variable	Production ratio		Normalized production	
	(1)	(2)	(3)	(4)
Post	0.014	0.040	0.001	0.021
	(0.042)	(0.041)	(0.021)	(0.022)
Post × Environment	-0.001	-0.012	-0.001	-0.005
	(0.018)	(0.017)	(0.011)	(0.010)
Plant × Chemical fixed effects	Yes	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes	Yes
Sample	Baseline	Continuous reporting	Baseline	Continuous reporting
R^2	0.25	0.16	0.25	0.18
Observations	40,704	27,849	40,704	27,849

TABLE 10: ROBUSTNESS CHECKS

This table provides further robustness around our main specification (Panel A of Table 2). The test are organised around five categories: alternative inputs to propensity score matching (Panel A), ruling out alternative explanations (Panel B), alternative scaling metrics (Panel C), ruling out regulatory concerns (Panel D), and alternative empirical specifications (Panel E). Row 1 reports the results after including the pre-target firm-level toxic emissions as an additional matching covariate. Row 2 includes the change in pre-target -level toxic chemical releases as an additional matching covariate. Row 3 reports the results after including the pre-target plant-level toxic emissions as an additional matching covariate. Row 4 reports the results where matching is done at Fama-French 48 classification. Row 5 restricts the sample to utility firms and emissions are scaled by previous years output at the plant-level. Row 6 reports the results for a regression where we exclude firms that are in top quartile in terms of offshoring. Row 7 reports the results for a regression where we exclude firms that that filed for Chapter 11. Row 8 reports the results where we exclude plants that do not emit regulated pollutants. Row 9 restricts the sample to plants that report to the EPA consistently since 2010. Row 10 restricts the sample to plants with above-median releases. Row 11 reports results with emissions scaled by previous years sales. Row 12 reports results with emissions scaled by previous years total assets. Row 13 reports results with emissions scaled by current years COGS. Row 14 reports results without normalizing the dependent variable. Row 15 reports results with the inclusion of *State* × *Year* fixed effects. Row 16 reports results with the inclusion of *Industry* × *Year* fixed effects. Row 17 reports results with the inclusion of *State* × *Industry* × *Year* fixed effects. Row 18 reports the results for a regression where we exclude firms and plants that are based in the state of California. Row 19 reports results with jackknifing re-sampling technique to rule out the disproportionate influence of outlier data points. Rows 20 to 23 report results using standard errors clustered at the firm-level, double-clustered at the firm and the year, clustered at the plant-level, and double-clustered at the plant and the year, respectively. Row 24 reports results with aggregated data at plant-level and only includes *Plant* and *Year* fixed effects. Row 25 reports results after inclusion of controls for firm performance, namely *Performance* and *Post* × *Performance*. All regressions (except row 24) include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects, not reported for brevity and are estimated using ordinary least squares (OLS). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

	Toxic chemical release								
	Total			On-site			Off-site		
	Post	Post × Env	Obs.	Post	Post × Env	Obs.	Post	Post × Env	Obs.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Alternative Inputs to Propensity Score Matching									
(1) Additional covariate: Firm-level chemical release	-0.003	-0.042**	49,552	-0.006	-0.050***	49,552	-0.003	0.012	49,552
	(0.053)	(0.020)		(0.047)	(0.016)		(0.014)	(0.008)	
(2) Additional covariate: ΔFirm-level chemical release$_{t-2,t-1}$	-0.001	-0.042**	49,472	-0.004	-0.050***	49,472	-0.000	0.012	49,472
	(0.053)	(0.020)		(0.047)	(0.016)		(0.014)	(0.008)	
(3) Additional covariate: Plant-level chemical release	-0.031	-0.020*	30,446	-0.022	-0.022**	30,446	-0.002*	-0.001**	30,446
	(0.021)	(0.011)		(0.020)	(0.010)		(0.001)	(0.001)	
(4) Industry: Fama-French 48 classification	0.015	-0.053***	56,912	0.013	-0.061***	56,912	0.007	0.004	56,912
	(0.044)	(0.019)		(0.039)	(0.015)		(0.011)	(0.007)	

Continued...

	Toxic chemical release								
	Total			On-site			Off-site		
	Post	Post × Env	Obs.	Post	Post × Env	Obs.	Post	Post × Env	Obs.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel B: Ruling Out Alternative Explanations									
Offshoring concerns									
(5) Utility firms	0.029*	-0.030**	15,558	0.024	-0.026**	15,558	0.003	-0.003	15,558
	(0.016)	(0.013)		(0.015)	(0.012)		(0.003)	(0.002)	
(6) Exclude high offshoring firm	-0.003	-0.063*	36,576	0.003	-0.082***	36,576	0.002	0.012	36,576
	(0.047)	(0.035)		(0.039)	(0.028)		(0.014)	(0.014)	
Plant closures									
(7) Exclude firms that filed for Chapter 11	0.026	-0.069***	57,447	0.018	-0.070***	57,447	0.015	-0.004	57,447
	(0.042)	(0.015)		(0.038)	(0.013)		(0.010)	(0.005)	
(8) Exclude zeroes	0.121	-0.056***	34,507	0.110	-0.057***	33,497	0.102*	-0.038***	12,212
	(0.096)	(0.015)		(0.091)	(0.015)		(0.060)	(0.012)	
(9) Plants continuously reporting	0.099	-0.078***	27,192	0.078	-0.073***	27,192	0.025	-0.009	27,192
	(0.088)	(0.018)		(0.077)	(0.017)		(0.020)	(0.007)	
Reporting biases									
(10) Large plants: Above-median releases	0.138	-0.067***	29,160	0.121	-0.066***	29,160	0.025	-0.007	29,160
	(0.108)	(0.018)		(0.099)	(0.017)		(0.023)	(0.008)	
Panel C: Alternative Scaling Metrics									
(11) Sales_{t-1}	0.004	-0.049***	59,983	0.008	-0.057***	59,983	0.004	0.004	59,983
	(0.033)	(0.017)		(0.029)	(0.013)		(0.009)	(0.006)	
(12) Total Assets_{t-1}	0.028	-0.052***	57,510	0.019	-0.049***	57,510	0.011***	-0.004**	57,510
	(0.021)	(0.010)		(0.022)	(0.010)		(0.004)	(0.002)	
(13) COGS_t	-0.025	-0.027	59,976	-0.021	-0.039***	59,976	0.003	0.007	59,976
	(0.037)	(0.019)		(0.034)	(0.015)		(0.011)	(0.007)	
(14) No scaling	0.822**	-1.410***	59,983	0.706*	-1.291***	59,983	0.237	-0.324**	59,983
	(0.412)	(0.315)		(0.371)	(0.274)		(0.171)	(0.141)	

Continued...

	Toxic chemical release								
	Total			On-site			Off-site		
	Post	Post × Env	Obs.	Post	Post × Env	Obs.	Post	Post × Env	Obs.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel D: Ruling Out Regulatory Concerns									
(15) State-year fixed effects	0.066	-0.076***	59,983	0.066	-0.073***	59,983	0.003	-0.006	59,983
	(0.046)	(0.022)		(0.041)	(0.018)		(0.009)	(0.008)	
(16) Industry-year fixed effects	-0.029	-0.033*	59,912	-0.020	-0.046***	59,912	-0.001	0.010	59,912
	(0.050)	(0.019)		(0.045)	(0.014)		(0.013)	(0.008)	
(17) State-industry-year fixed effects	0.056	-0.064***	59,888	0.047	-0.048***	59,888	0.010	-0.020***	59,888
	(0.044)	(0.014)		(0.038)	(0.014)		(0.010)	(0.005)	
(18) Excluding California	0.022	-0.073***	54,223	0.014	-0.074***	54,223	0.016	-0.004	54,223
	(0.043)	(0.016)		(0.039)	(0.014)		(0.010)	(0.005)	
Panel E: Alternative Empirical Specifications									
(19) Jackknife estimation	0.003	-0.050	59,983	0.006	-0.059**	59,983	0.005	0.005	59,983
	(0.050)	(0.031)		(0.043)	(0.026)		(0.016)	(0.013)	
(20) Clustering: Firm-level	0.003	-0.050	59,983	0.006	-0.059**	59,983	0.005	0.005	59,983
	(0.054)	(0.034)		(0.046)	(0.028)		(0.016)	(0.012)	
(21) Double clustering: Firm and Year	0.003	-0.050	59,983	0.006	-0.059*	59,983	0.005	0.005	59,983
	(0.034)	(0.032)		(0.028)	(0.027)		(0.014)	(0.013)	
(22) Clustering: Plant-level	0.003	-0.050**	59,983	0.006	-0.059***	59,983	0.005	0.005	59,983
	(0.045)	(0.025)		(0.039)	(0.023)		(0.015)	(0.008)	
(23) Double clustering: Plant and Year	0.003	-0.050*	59,983	0.006	-0.059**	59,983	0.005	0.005	59,983
	(0.030)	(0.025)		(0.027)	(0.022)		(0.012)	(0.010)	
(24) Aggregation at the plant-level	0.116	-0.545***	4,742	0.074	-0.322***	4,742	-0.012	0.022	4,742
	(0.187)	(0.137)		(0.106)	(0.075)		(0.059)	(0.048)	
(25) Controlling for firm performance	0.061	-0.069**	57,512	0.044	-0.063***	57,512	0.024**	-0.007	57,512
	(0.051)	(0.016)		(0.044)	(0.015)		(0.012)	(0.006)	

The Real Effects of Environmental Activist Investing

INTERNET APPENDIX
FOR ONLINE PUBLICATION

Appendix A Supplemental Figures and Tables

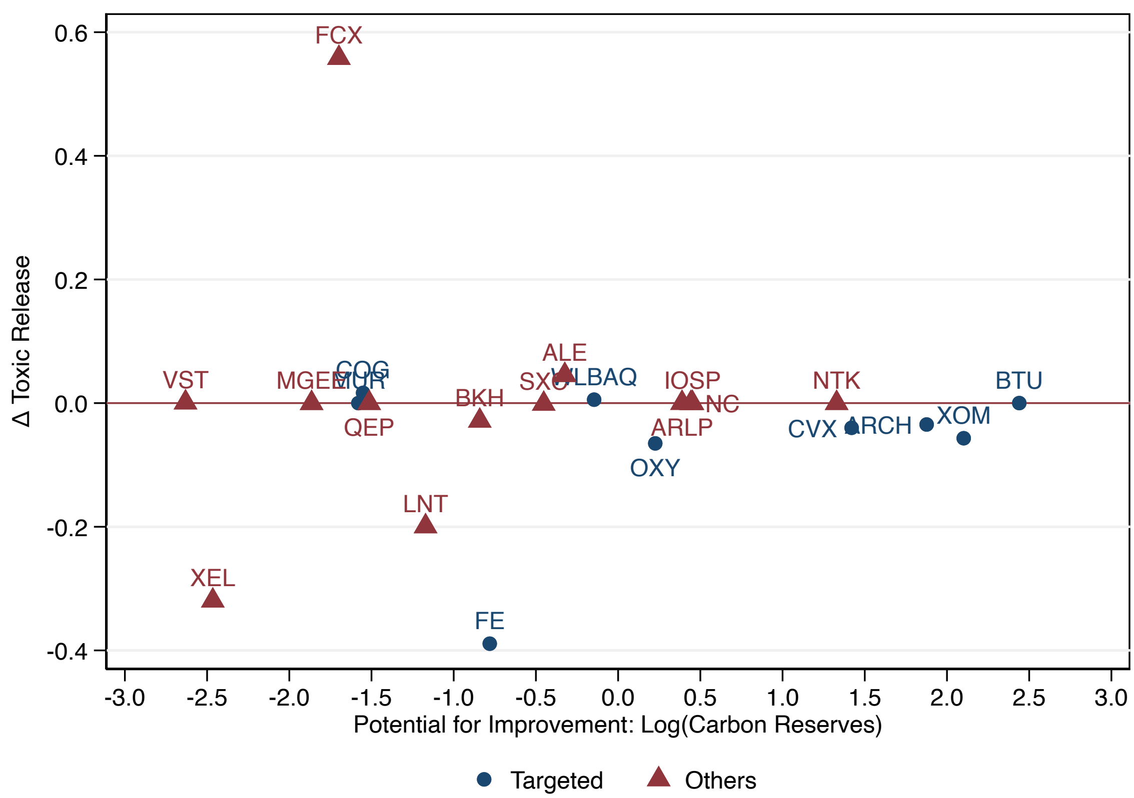
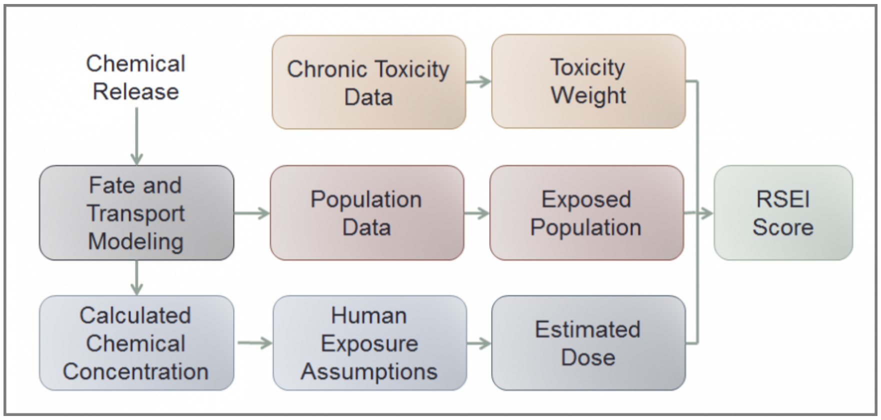


FIGURE IA1: LACK OF RELATIONSHIP BETWEEN POTENTIAL FOR IMPROVEMENTS AND ACTUAL IMPROVEMENTS BEFORE TARGETING

This figure plots the lack of relationship between the potential for improvements in targeted firms and the change in aggregate toxic chemical releases. The y-axis depicts the change in the total toxic chemical release from 2010 to 2014. The x-axis is the natural logarithm of total carbon reserves (in gigatons CO_2), as reported in the Fossil Free Index's Carbon Underground Report. The y-axis is the change in toxic release in the pre-period The blue circles are firms targeted by the BAP in their first year, and the red triangles are other U.S. public firms in the report. Data Source: Carbon Underground Report and EPA Toxic Release Inventory (TRI).

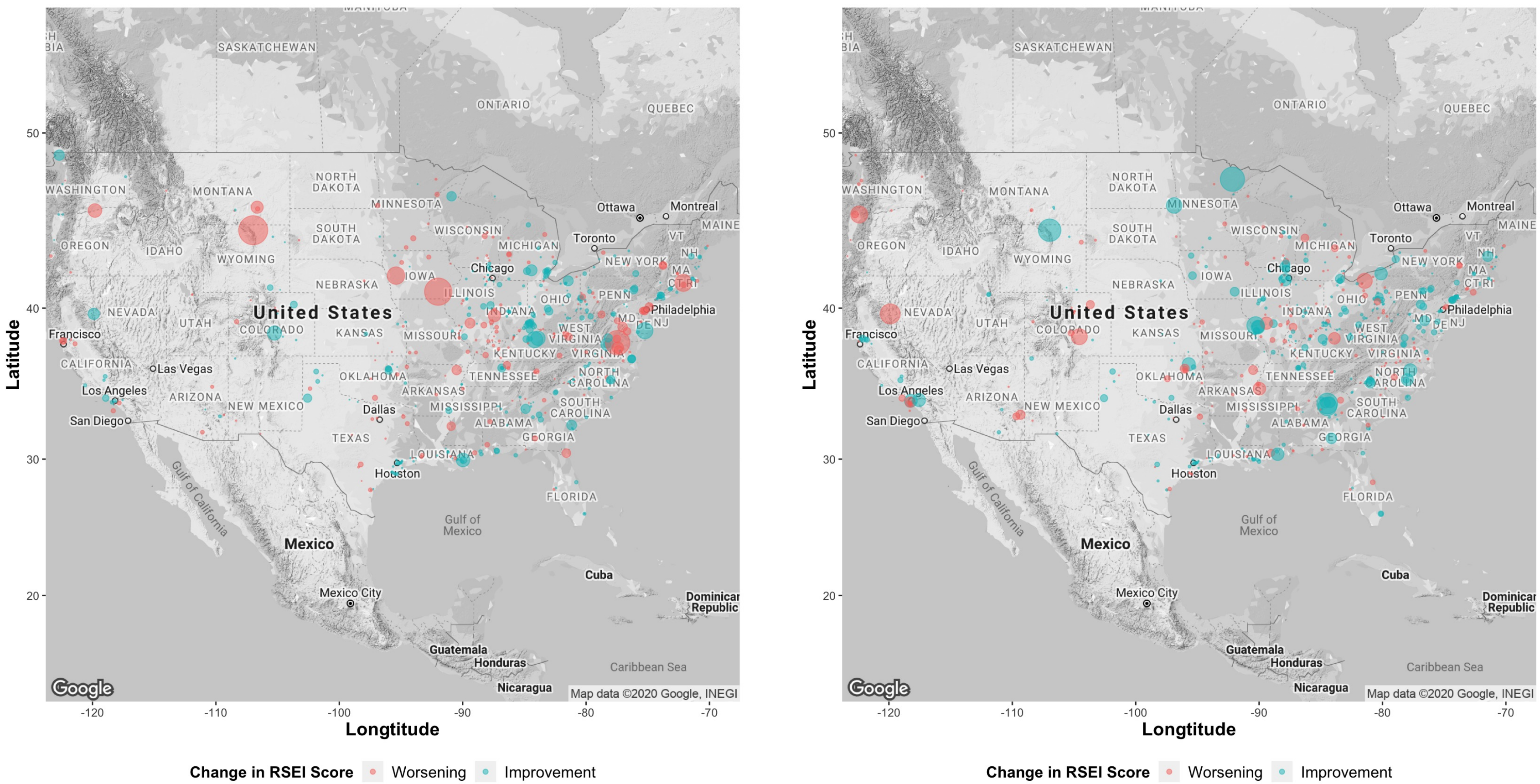


(a) Risk-Screening Environmental Indicators (RSEI) Model

(b) Waste Management Hierarchy

FIGURE IA2: ENVIRONMENTAL CONCEPTS FROM THE EPA

This figure presents two key environmental concepts used in this paper. Panel A describes the Risk-Screening Environmental Indicators (RSEI) Model computation methodology, as described by the EPA (2019a). A unitless value, the RSEI score accounts for (i) the size of the chemical release, (ii) the fate and transport of the chemical through the environment, and (iii) the size and location of the exposed population, and the chemical's toxicity. Panel B describes the waste management hierarchy, as described by the EPA (2019b), and ranks the management strategies from the most to the least environmentally preferred. Source reduction and reuse refers to reducing waste at the source, and is the most preferred strategy. Recycling/composition refers to activities related to collecting, sorting, and reprocessing items that would otherwise be considered waste. Energy recovery refers to the conversion of non-recyclable waste materials into useable energy. Treatment and disposal refers to the reduction of the volume and toxicity of waste through processing. Source: EPA.



(a) Pre-period

(b) Targeting-period

FIGURE IA3: CHANGES IN RISK-SCREENING ENVIRONMENTAL INDICATORS (RSEI) SCORES

This figure plots the relative change in RSEI scores at the local census block group level that contain at least one plant of the (i) target firm, or (ii) propensity score matched control firms in the sample. Panel (a) shows changes through the pre-period (2012–2014), and panel (b) shows changes through the targeting-period (2015–2017). The size of the circles represents the change in the score over the periods. The blue circle represents a reduction (improvement) in the RSEI score, whereas the red circle represents an increase (worsening) in the RSEI score. Data Source: EPA Risk-Screening Environmental Indicators (RSEI) Model.

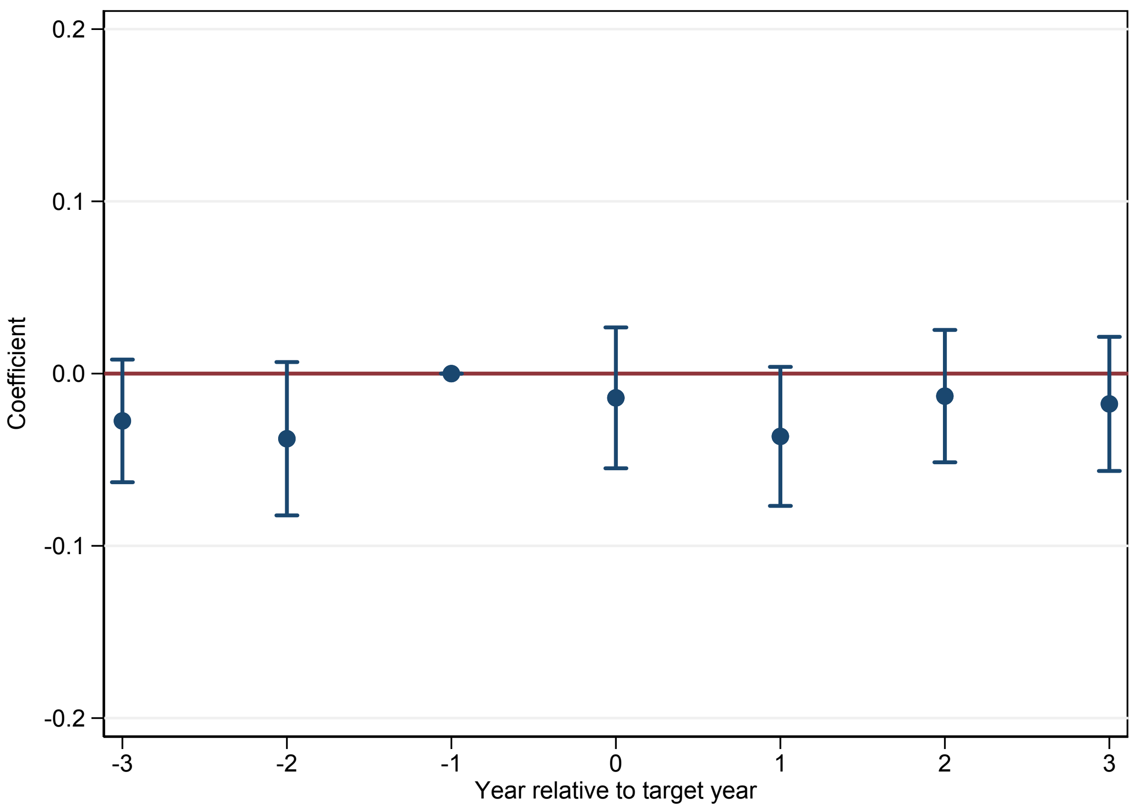


FIGURE IA4: PRODUCTION AROUND ENVIRONMENTAL ACTIVISM

This figure plots coefficients from a propensity score matched difference-in-differences specification, where the dependent variable is normalized production, defined as the quantity of output in any given year relative to the quantity of output in the first year in our sample at the plant-chemical-year level. The horizontal axis is in event time relative to the year of the targeting by the BAP. The estimated coefficients and their corresponding 95% confidence intervals correspond to the difference in the production at plants of targeted firms compared to the production at plants of propensity score matched control firms. Data Source: Data Source: EPA Toxic Release Inventory (TRI).

TABLE IA1: TARGET SELECTION

This table reports the coefficients from a multivariate logistic regression relating firm characteristics that correlate the likelihood of being targeted by the BAP for environmental reasons. The sample consists of all Russell 3000 Index firms from 2010 to 2013. The dependent variable is an indicator variable equal to one if the firm was targeted by BAP for environmental reasons. We consider the following financial, governance, and environmental characteristics. *Market-to-Book* is the ratio of assets, defined as the market value of equity plus book value of debt over book value of assets. *Returns* is the stock return in the past 12 months. *Profitability* is the ratio of earnings before interest, taxes, depreciation, and amortization scaled by sales. *Firm size* is the natural logarithm of the book value of assets. *Dividend payer* is an indicator variable for the dividend paying firm. *Leverage* is the ratio of book value of debt divided by market value of equity plus book value of debt. *Cash holdings* is the ratio of cash to book value of assets. *Institutional ownership* $\geq$ *1%* is an indicator variable for firms with one percent or more of outstanding shares held by institutional investors.*Board independence* is the fraction of independent directors on the board. *CEO chair duality* is an indicator variable for firms where the chairman and the CEO positions are held by the same person. *New directors* is the fraction of new directors added to the board each year. *Boardsize* is the number of directors sitting on the board each year. *Fossil Free Index* is an indicator of whether the firm is listed on the Fossil Free Index. *Environment score* is the standardized environmental score from Thomson-Reuters' ASSET4 database. All regressions include industry (Fama-French 12 classification) fixed effects and standard errors are clustered at the firm-level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data Source: BoardEx, Compustat, Center for Research in Security Prices (CRSP), and Thomson Reuters' ASSET4 database.

Dependent variable	$\mathbb{1}_{Environment}$			
	Coefficient	Odds ratio	Coefficient	Odds ratio
	(1)	(2)	(3)	(4)
Financial characteristics				
Market-to-Book	0.231	1.260	0.229	1.258
	(0.278)	(0.351)	(0.279)	(0.351)
Returns	-0.236	0.790	-0.235	0.791
	(0.270)	(0.213)	(0.290)	(0.229)
Profitability	1.946	7.004	1.956	7.074
	(1.400)	(9.802)	(1.407)	(9.956)
Firm size	0.715***	2.045***	0.716***	2.046***
	(0.250)	(0.511)	(0.250)	(0.512)
Dividend payer	0.577	1.782	0.582	1.790
	(0.651)	(1.161)	(0.652)	(1.167)
Leverage	0.389	1.476	0.390	1.476
	(1.425)	(2.103)	(1.433)	(2.116)
Cash holdings	-2.868	0.057	-2.890	0.056
	(2.759)	(0.157)	(2.758)	(0.153)
Governance characteristics				
Institutional ownership $\geq$ 1%	0.390	1.477	0.414	1.513
	(0.537)	(0.793)	(0.548)	(0.829)
Board independence	-0.005	0.995	-0.004	0.996
	(0.018)	(0.018)	(0.018)	(0.018)
CEO chair duality	-0.038	0.962	-0.050	0.951
	(0.389)	(0.374)	(0.393)	(0.374)
New directors	-0.549	0.578	-0.537	0.585
	(0.576)	(0.332)	(0.577)	(0.338)
Boardsize	-0.013	0.987	-0.010	0.990
	(0.134)	(0.132)	(0.135)	(0.133)
Environmental characteristics				
Fossil Free Index	2.888**	17.952**	2.886**	17.917**
	(1.195)	(21.445)	(1.190)	(21.313)
Environment score	-0.173	0.841	-0.179	0.836
	(0.115)	(0.096)	(0.120)	(0.100)
Year fixed effects	No	No	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	969	969	969	969

TABLE IA2: SUMMARY STATISTICS

The table presents the descriptive statistics for the sample. Panel A reports the key statistics at the plant-chemical or plant-gas level or firm-level for the pooled sample across all years in our sample. The sample spans 2010 to 2018. Panel B presents covariate balance tests for propensity score matching. Specifically, we compare the covariates used in matching across targeted and control firms. *Firm Size* is the natural logarithm of the book value of assets. *Profitability* is the ratio of earnings before interest, taxes, depreciation, and amortization scaled by sales. *Market-to-book* is the ratio of assets, defined as the market value of equity plus book value of debt over book value of assets. *Environment score* is the standardized environmental score from Thomson-Reuters' ASSET4 database. Toxic chemical release data are from the EPA Toxic Release Inventory (TRI) database, greenhouse gas emissions data are from the EPA Greenhouse Gas Reporting Program (GHGRP), environment score is from Thomson Reuters' ASSET4 database, and firm-level data are from Compustat and Center for Research in Security Prices (CRSP). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

	Panel A: Plant and firm characteristics, pooled sample			
	N	Mean	Median	Std. dev
	(1)	(2)	(3)	(4)
Log(1+Release/COGS $_{t-1}$)	59,983	0.391	0.001	0.886
Log(1+ On-site release/COGS $_{t-1}$)	59,983	0.342	0.000	0.833
Log(1+ Off-site release/COGS $_{t-1}$)	59,983	0.048	0.000	0.264
Log(1+ Methane/Output $_{t-1}$)	11,039	0.001	0.000	0.043
Log(1+ Nitrous oxide/Output $_{t-1}$)	11,039	0.002	0.000	0.040
Log(1+ Carbon dioxide/Output $_{t-1}$)	11,039	0.099	0.000	0.379
Log (Firm assets)	921	9.498	9.453	1.109
Profitability	921	0.098	0.098	0.137
Market-to-book	921	0.994	0.822	0.545
Environment score	921	0.002	-0.024	0.918

	Panel B: Covariate balance tests for propensity score matching		
	Control firms	Targeted firms	Difference
	(1)	(2)	(2) - (1)
Firm size	9.309	10.009	0.700*
Profitability	0.052	0.062	0.010
Market-to-book	0.898	1.005	0.107
Environment score	0.012	-0.000	-0.012

TABLE IA3: SCALING BY PLANT-LEVEL OUTPUT

This table reports the impact of environmental activism on toxic chemical releases. The regressions compare toxic chemical releases at plants of targeted firms to toxic chemical releases at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. Panel A reports toxic chemical releases by the location of release, i.e., on-site and off-site while panel B reports toxic chemical releases disaggregated by the medium of release, i.e., air and water. The dependent variable is the natural logarithm of one plus the release scaled by previous years' output at the plant-level as reported to the Energy Information Administration (EIA). *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI) and Energy Information Administration (EIA).

	Panel A: Toxic chemical release		
Dependent variable	Log(1+Release/Output $_{t-1}$)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Post	0.029*	0.024	0.003
	(0.016)	(0.015)	(0.003)
Post × Environment	-0.030**	-0.026**	-0.003
	(0.013)	(0.012)	(0.002)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.61	0.61	0.77
Observations	15,558	15,558	15,558

	Panel B: Medium of release		
Dependent variable	Log(1+Release/Output $_{t-1}$)		
	Stack air	Fugitive air	Surface water discharges
	(1)	(2)	(3)
Post	0.008	0.000	-0.001
	(0.005)	(0.000)	(0.001)
Post × Environment	-0.011**	-0.000	0.000
	(0.004)	(0.000)	(0.001)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.45	0.22	0.16
Observations	15,558	15,558	15,558

TABLE IA4: LIKELIHOOD OF STARTING AND STOPPING CHEMICAL USE

This table examines changes in the extensive margin of emissions. The regressions compare the likelihood of chemical use at plants of targeted firms to the likelihood of chemical use at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. The dependent variable in column 1, $\mathbb{1}_{Start}$, takes the value of one if a plant reports emissions from a chemical that it had not previously reported and is zero otherwise. The dependent variable in column 2, $\mathbb{1}_{Stop}$, takes the value of one in the first year where a plant that had previously reported emissions of a given chemical no longer does (and will not do so at a future point in our sample) and is zero otherwise. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI).

Dependent variable	$\mathbb{1}_{Start}$	$\mathbb{1}_{Stop}$
	(1)	(2)
Post	0.039**	-0.094*
	(0.016)	(0.052)
Post × Environment	-0.032***	0.013
	(0.012)	(0.019)
Plant × Chemical fixed effects	Yes	Yes
Chemical × Year fixed effects	Yes	Yes
R^2	0.61	0.60
Observations	59,983	59,983

TABLE IA5: STOCK PRICE REACTIONS TO TARGETING BY THE BAP CAMPAIGN

This table presents the impact of environmental activism on firms' equity returns. We report results comparing the daily excess and abnormal equity returns (in percent) of targeted firms three days before and three days after the New York City Pension Fund System (NYCPS) filed exempt solicitation at target firms. The dependent variables are the firms' daily excess returns (column 1), risk-adjusted returns using the Capital Asset Pricing Model (column 2), and risk-adjusted returns using the Fama-French three factor model (column 3). *Post* is an indicator variable for the period of three days after the investor filling. All regressions are estimated using ordinary least squares (OLS). Standard errors are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: CRSP and SEC Filings.

Dependent variable	Excess returns	Capital Asset Pricing model	Fama-French three factor model
	(1)	(2)	(3)
Post	-0.498*	-0.234	-0.265
	(0.284)	(0.285)	(0.263)
R^2	0.016	0.004	0.005
Observations	186	186	186

TABLE IA6: ENVIRONMENTAL ACTIVISM AND FIRM PERFORMANCE

This table reports the impact of environmental activism on firms' financial performance. The regressions report the change in firm performance of targeted firms around environmental activism by the BAP. The dependent variable in column 1 is, *Profitability*, defined as operating income before depreciation (OIBDP) scaled by sales (SALE) while in column 2, the dependent variable is, *Log (Operating income)*, defined as the natural logarithm of earnings before interest, taxes, depreciation, and amortization (OIBDP). To capture distress risk, column 3 reports changes to *Altman's Z-score*, defined as (3.3 × Pre-tax income + Sale + 0.6 × Market Value of Equity + 1.4× Retained Earnings + 1.2 × (Current Assets - Current Liabilities)) scaled by assets (AT). *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. All regressions include *Year* and *Firm* fixed effects and control for firm age and firm size. The regressions are estimated using ordinary least squares (OLS) using standard errors clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: Compustat and Center for Research in Security Prices (CRSP).

Dependent variable	Profitability	Log (Operating Income)	Altman's Z-score
	(1)	(2)	(3)
Post	-0.025	-0.180	-0.227
	(0.022)	(0.141)	(0.177)
Post × Environment	-0.032*	-0.243**	-0.117
	(0.018)	(0.104)	(0.138)
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
R^2	0.78	0.90	0.82
Observations	751	751	751

TABLE IA7: ROBUSTNESS TO ALTERNATIVE DEFINTIONS

This table reports the robustness to alternative definitions of the dependent variable. The regressions compare toxic chemical releases at plants of targeted firms to toxic chemical releases at plants of Russell 3000 Index firms in a propensity score matched difference-in-differences empirical setup. Panel A reports results, where the dependent variable is chemical releases aggregated by the medium of release and panel B, reports results where the dependent variable is the share of total chemical release. In panel A, the dependent variable is the natural logarithm of one plus the toxic chemical release scaled by previous years' cost of goods sold and in panel B, the dependent variable is the share ot total chemical release. *Total* is the aggregate across all types of emissions, such as ground, air, and water. *Ground*, consists of waste disposed into underground injection wells, landfills, or spills and leaks released to land. *Air* consists of stack air emissions (e.g., through a vent or duct) and fugitive emissions (e.g., evaporative losses). *Water* consists of releases to streams and other bodies of water. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the BAP targets the firm for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI).

	Panel A: Aggregated by medium of release			
Dependent variable	Log(1+Release/COGS $_{t-1}$)			
	Total	Air	Ground	Water
	(1)	(2)	(3)	(4)
Post	0.003	0.014	0.000*	0.001
	(0.043)	(0.018)	(0.000)	(0.001)
Post × Environment	-0.050***	-0.042***	-0.000	-0.002***
	(0.019)	(0.009)	(0.000)	(0.001)
Plant × Chemical fixed effects	Yes	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.82	0.80	0.62	0.72
Observations	59,983	59,983	59,983	59,983

	Panel B: Share of total releases		
	Air	Ground	Water
	(1)	(2)	(3)
Post	0.145***	0.000	0.006***
	(0.042)	(0.000)	(0.002)
Post × Environment	-0.188***	-0.000	-0.007***
	(0.039)	(0.000)	(0.002)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.70	0.62	0.63
Observations	59,983	59,983	59,983

TABLE IA8: VOTING OUTCOMES FOR SHAREHOLDER PROPOSALS

This table provides a summary of outcomes for the activism events undertaken by the Boardroom Accountability Project (BAP) initiated by the New York City Pension System (NYCPS). Specifically, it reports the average shareholder support and passage rate of the proposals put forward under the BAP campaign and proxy access proposals at other firms. For the BAP campaign, we identify outcomes through publicly available data from the Boardroom Accountability Project. Specifically, we identify whether firms are targeted for their inadequate redressal of climate change risk (*Environment*) or if they are targeted for other reasons (*Others*) which include excessive CEO pay, lack of board diversity, inadequate political disclosure, and adherence to labor standards. Data Source: Shareowners Initiative Postseason Annual Reports and Institutional Shareholder Services (ISS) Voting Analytics Database.

	Vote for (%)	Passed (%)
	(1)	(2)
(1) All firms targeted by the BAP campaign	57.79	38.06
(2) Other shareholder proposals in the same firm not by the NYCPS	27.47	3.85
(3) Firms targeted for environment reasons by the BAP campaign	58.59	51.02
(4) Other shareholder proposals in the same firm not by the NYCPS	29.10	3.94
(5) All firms targeted by the BAP campaign	57.79	38.06
(6) Proxy access proposals at other firms not by the NYCPS	46.83	27.50

TABLE IA9: BAP CAMPAIGN OUTCOMES

This table provides a summary of outcomes for the activism events undertaken by the Boardroom Accountability Project (BAP) initiated by the New York City Pension System (NYCPS). The table reports the average fraction of proxy access proposals that are settled without going for a shareholder vote and the average fraction of proposals that are eventually adopted. For the BAP campaign, we identify outcomes through publicly available data from the Boardroom Accountability Project. Specifically, we identify whether firms are targeted for their inadequate redressal of climate change risk (*Environment*) or if they are targeted for other reasons (*Others*) which include excessive CEO pay, lack of board diversity, inadequate political disclosure, and adherence to labor standards. Data Source: Shareowners Initiative Postseason Annual Reports.

	Settled immediately (%)	Adopted eventually (%)
	(1)	(2)
(1) All firms targeted by the BAP campaign	59.64	88.89
(2) Firms targeted for environment reasons by the BAP campaign	66.18	89.55

TABLE IA10: DOES TARGETING FOR OTHER REASONS DRIVE THE REAL EFFECTS?

This table reports results examining the impact on firms targeted for other reasons by the BAP on their release of toxic chemicals. The regressions compare the toxic releases at plants of targeted firms to toxic release at plants of RUSSELL 3000 Index firms in a difference-in-differences empirical setup. The dependent variable is the natural logarithm of one plus the release scaled by previous years' cost of goods sold. The table presents toxic chemical releases by the location of release, i.e., on-site and off-site. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Other reasons* is an indicator variable equal to one if the BAP targets the firm for other reasons not related to climate change or environment, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI).

Dependent variable	Log(1+Release/COGS $_{t-1}$)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Post	-0.034	-0.004	-0.029***
	(0.024)	(0.018)	(0.010)
Post × Other reasons	0.008	0.021	-0.014
	(0.028)	(0.024)	(0.011)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.77	0.79	0.73
Observations	96,877	96,877	96,877

TABLE IA11: DOES TARGETING FOR PROXY ACCESS DRIVE THE REAL EFFECTS?

This table reports results examining the impact of targeting firms for proxy access on their release of toxic chemicals. The regressions compare the toxic releases at plants of targeted firms to toxic release at plants of RUSSELL 3000 Index firms in a difference-in-differences empirical setup. We remove all the firms that were targeted by the BAP from this sample. The table presents toxic chemical releases by the location of release, i.e., on-site and off-site. The dependent variable is the natural logarithm of one plus the release scaled by previous years' cost of goods sold. *Post* is an indicator variable equal to one for all years after the target year (pseudo-target year), and zero otherwise. *Proxy access target* is an indicator variable equal to one if the firm is targeted by investors to adopt a proxy access proposal, outside of the BAP, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI), ISS Shareholder Proposals database, and SEC filings.

Dependent variable	Log(1+Release/COGS $_{t-1}$)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Post	0.021	0.004	0.022
	(0.045)	(0.020)	(0.029)
Post × Proxy access target	-0.052	-0.005	-0.030
	(0.040)	(0.019)	(0.027)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.75	0.77	0.69
Observations	146,616	146,616	146,616

TABLE IA12: BAP CAMPAIGN AND DIVERSITY ON BOARDS

This table reports the impact on firms that were targeted by the BAP campaign due to lack of boardroom diversity. The regressions compare measures of boardroom diversity of targeted firms to measures of boardroom diversity at other firms. The dependent variable is the firms' boardsize defined as the number of directors on the board each year (column 1), male ratio defined as the fraction of male directors each year on the board (column 2), and HHI index for board members' ethnicity (column 3) and nationality (column 4). *Diversity* is a dummy variable indicating whether the firm is a target of BAP campaign. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. All regressions include year and firm fixed effects and are estimated using ordinary least squares (OLS). Standard errors clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: BoardEx.

Dependent variable	Boardsize	Male Ratio	HHI (Ethinicity)	HHI (Nationality)
	(1)	(2)	(3)	(4)
Post	-0.228	-0.010	0.001	0.002
	(0.146)	(0.007)	(0.002)	(0.002)
Post × Diversity	0.845***	-0.037**	-0.008***	-0.011***
	(0.226)	(0.014)	(0.003)	(0.003)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
R^2	0.80	0.76	0.77	0.78
Observations	4,646	4,646	4,646	4,646

TABLE IA13: BAP CAMPAIGN AND CEO COMPENSATION

This table reports the impact of targeting by the BAP campaign on companies that failed to align executive compensation with business performance. The regressions compare measures of executive compensation of targeted firms to measures of executive compensation at other firms. The dependent variables are the natural logarithm of total compensation (column 1), growth in total compensation (column 2), excess total compensation (column 3), growth in excess compensation (column 4), and pay-for-performance measure of compensation delta (column 5) and vega (column 6). *Pay* is a dummy variable indicating whether the firm is a target of BAP campaign. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. All regressions include year and firm fixed effects and are estimated using ordinary least squares (OLS). Standard errors clustered at the firm level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: Execucomp.

	CEO compensation		Excess compensation		Pay-for-performance	
Dependent variable	Log (total)	% (total)	Total	% (total)	Delta	Vega
	(1)	(2)	(3)	(4)	(5)	(6)
Post	0.010	0.046	-177.780	0.021	-22.406	-50.137
	(0.062)	(0.045)	(528.844)	(0.063)	(132.368)	(37.014)
Post × Pay	-0.205***	-0.095	-1919.887**	-0.213**	-46.070	-158.609***
	(0.076)	(0.078)	(970.233)	(0.083)	(297.735)	(57.041)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.80	0.08	0.63	0.76	0.78	0.66
Observations	3,884	3,646	3,884	3,884	3,702	3,702

TABLE IA14: ENVIRONMENTAL CAMPAIGNS OUTSIDE OF THE BAP

This table reports the impact of environmental campaigns, identified using shareholder proposals, on toxic chemical releases for the sample of firms targeted outside of the BAP. The regressions compare toxic chemical releases at plants of targeted firms to toxic chemical releases at plants of Russell 3000 Index firms in a difference-in-differences empirical setup. We exclude the firms targeted by the BAP from this sample. The table reports toxic chemical releases by the location of release, i.e., on-site and off-site. The dependent variable is the natural logarithm of one plus the release scaled by previous years' cost of goods sold. *Post* is an indicator variable equal to one for all years after the activism event year (pseudo-event year), and zero otherwise. *Environment* is an indicator variable equal to one if the firm was targeted for environmental reasons, and zero otherwise. All regressions include *Plant* × *Chemical* and *Chemical* × *Year* fixed effects and are estimated using ordinary least squares (OLS). Standard errors are clustered at the firm-year level and are robust to heteroscedasticity. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. Data source: EPA Toxic Release Inventory (TRI) and ISS Shareholder Proposals database.

Dependent variable	Log(1+Release/COGS $_{t-1}$)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Post	0.020	0.022	-0.004
	(0.019)	(0.017)	(0.006)
Post × Environment	-0.073**	-0.078**	0.007
	(0.034)	(0.032)	(0.007)
Plant × Chemical fixed effects	Yes	Yes	Yes
Chemical × Year fixed effects	Yes	Yes	Yes
R^2	0.75	0.77	0.69
Observations	146,616	146,616	146,616

Appendix B Excerpts From Sustainability Reports

This table summarizes various ways firms report that they are improving their environmental impact. These are collected from each firm's sustainability reports.

Company	Action
AES Corporation	• The primary reason for a decrease in NOx emissions since 2015 is fuel conversion projects, decommissioning and the sell-down of several fossil fuel-fired units. • Diverse emission reduction projects or low-carbon energy installations were implemented or started implementation for over 1.5 million metric tons of estimated annual CO2e reductions.
Chevron Corporation	• We have developed internal country-specific plans to minimize gas flaring, and we are a member of the World Bankled Global Gas Flaring Reduction Partnership. • Chevron flares and vents natural gas for safety and operational purposes and in areas where pipelines or other gas transportation infrastructure and utilization alternatives do not exist. We are working to reduce natural gas flaring and venting and the resulting GHG emissions.
ConocoPhillips	• NCG co-injection technology to reduce GHG emissions while reducing operating cost goal to validate technology on commercial scale on full lifecycle reduce GHG 15% in reservoirs affected by thief zones • In 2018, our total gross operated GHG emissions, in CO2 equivalent terms, were approximately 20.3 million tonnes, a decrease of about 1.4%, or 0.3 million tonnes, from 2017
CONSOL Energy Inc.	• Scope 1 emissions related to our current and our former parent companys coal assets have decreased by approximately 50%. • Our scope 2 emissions decreased by 12% compared to 2016 levels, and by 26% compared to 2015 levels
Devon Energy Corporation	• We also use green completions to capture produced gas during completions and well workovers following hydraulic fracturing. • Where flaring is unavoidable, we install monitoring equipment to help ensure the gas is properly destroyed rather than vented. • In recent years, Devon has implemented new technologies and upgraded our existing operations to reduce methane emissions from production sites. Since 2011, we've replaced high-bleed natural gas pneumatic controllers on hundreds of wells in Wyoming, Oklahoma, New Mexico, and Texas, and we no longer use them on new wells. • Spill prevention procedures at our facilities with storage tanks include secondary containment, nearly full tank alarms, and offsite monitoring equipment with the ability to shut in facilities remotely.

Company	Action
Duke Energy Corporation	• Since 2005, decreased carbon dioxide (CO2) emissions by 31 percent, sulfur dioxide emissions by 96 percent and nitrogen oxides emissions by 74 percent.
EOG Resources	• Reduced our methane intensity rate and our methane emissions as a percentage of our natural gas produced in 2018 by 46 percent and 45 percent • In 2018, our GHG intensity rate slightly increased by 1 percent, primarily due to increased operational activity and an increase in our emissions intensity associated with combustion sources.
EQT Corporation	• Our total energy consumption across facilities was 49,277 GJ, a 5% decrease from 2016. Our direct energy usage in 2017 totaled 18,905 GJ and was primarily generated by natural gas • In 2017, 100% of EQTs completions operations were flare-less and we used green completions technology for 100% of completed wells.
Freeport-McMoRan Copper & Gold Inc.	• FMCs total GHG emissions in 2018 were 4.9 million metric tons compared to 5 million metric tons the year prior.
Hess Corporation	• We have reduced our absolute Scope 1 and 2 equity emissions from 10.8 million tonnes of CO2e to 3.9 million tonnes, or 64 percent • On an intensity basis, we have reduced our cumulative flaring intensity by 41 percent through 2018, compared with our 2014 baseline. While our flaring intensity remained essentially flat between 2017 and 2018, we are still on track to achieve our 50 percent reduction target by 2020. • The number of non-hydrocarbon spills decreased by 9 percent in 2018 compared with 2017, and the volume of spills decreased by 80 percent.
Marathon Oil Corporation	• Over the last five years, our methane emissions intensity has declined by 31%, largely due to our internal goal of eliminating the routine use of high-bleed pneumatic controllers, which we met ahead of schedule. • Recorded a global spill volume reduction of 8%.

Company	Action
Noble Energy, Inc.	• Our global direct greenhouse gas emissions decreased by 6.4 percent year over year in 2018. • Methane intensity (total methane emitted expressed as a percentage of natural gas production) decreased in 2018 as a result of divesting Gulf of Mexico and Southwest Royalties assets as well as operational improvements. Intensity was 0.09 percent compared to 0.13 percent in 2017.
Occidental Petroleum Corporation	• Using the most recent data, from 2016 to 2017, Occidentals sum of direct and indirect GHG emissions (Scope 1 + Scope 2) decreased more than 3 percent year-over-year (16.0 to 15.5 million tonnes CO2e).The decrease in combined Scope 1 and 2 emissions was primarily due to decreases in CO2e emissions associated with our chemical segments power consumption. • From 2016 to 2018, Occidental reduced gas flaring emissions intensity by approximately 17 percent at its EOR plants in the Permian Basin.
Pioneer Natural Resources Co.	• Our vapor recovery strategy allows Pioneer to capture potential facility emissions and recover these high-value gases as part of our product offerings. • Pioneer is testing two innovative approaches to monitoring methane emissions in its operations: 1) aerial methane monitoring, which provides field-wide survey capabilities, and 2) continuous methane monitoring, which detects leaks at the facility level.
PPL Corporation	• As part of LG&E and KU's ongoing emissions reduction efforts, the companies use GPS and fleet monitoring software to control idling and optimize routes for their vehicle fleet. The utilities continue to seek out opportunities to use plugin hybrid electric vehicles when costs are favorable. Since 2015, PPL Electric has been working to reduce Sulfur Hexafluoride (SF6) gas emission through predictive analytics.
Southern Company	• Without any regulatory mandates, our systems total annual GHG emissions in 2018 of 102 million metric tons of CO2 equivalent (CO2e), were approximately 35 percent (54 million metric tons) lower than 2007 levels • We have mitigated more than 3.3 million metric tons of CO2e from the atmosphere. These reductions are the result of aggressive investment in programs like those targeting pipeline replacement to improve the safety and performance of our natural gas system.

Appendix C BAP and Proxy Access

Institutional investors have long called for the ability to nominate directors to the corporate ballot—proxy access—but have historically faced opposition (Funds (2015)). The Securities and Exchange Commission (SEC) approved a universal proxy access rule (Exchange Act Rule 14a-11) in August 2010. This rule was to allow shareholders holding greater than 3% of a firm's outstanding shares for more than three years, collectively, to nominate board candidates via the firm's proxy materials.

In 2011, the U.S. Court of Appeals overturned this rule, saying that the SEC had acted "arbitrarily and capriciously". Although the Court of Appeals vacated this new rule on procedural grounds, it did not vacate a provision within the Dodd-Frank Financial Reform Act, enabling shareholders to start requesting proxy access mechanisms through shareholder resolutions (Holly Gregory and Holland (2019)).

Against this backdrop, many institutional investors did not resort to proxy access as a means of external governance and instead preferred voting to raise their concerns. Before 2015, only 15 U.S. companies had adopted proxy access. This number saw a significant increase after 2015, when the NYC Comptroller and the NYCPS launched their Boardroom Accountability Project (BAP), which targeted a set of firms in their portfolio. By the end of 2018, more than 150 targeted firms had adopted a proxy access bylaw. As of 2019, most S&P 500 companies had adopted them too, some voluntarily, and others as a result of shareholder resolutions.

Starting in 2014, the Boardroom Accountability Project was led by the NYCPS. The BAP brought together influential investors, including California Public Employees Retirement System (CalPERS) and California Teachers Retirement System (CalSTRS), with total assets under management exceeding $650 billion. The proxy access proposals submitted by the Comptroller closely mirrored the rules previously enacted by the SEC.

The BAP submitted proxy access proposals requesting new bylaws that permitted shareholders who collectively held 3 percent of the company for at least three years to nominate up to 25 percent of the board using the company's proxy materials. Using these proxy access proposals over several years, the BAP pursued very specific social mandates, and we focus on firms that were targeted by the BAP to reduce their environmental impact.

Appendix D Exempt Solicitation and SEC Rule 14a-8 Decision Letters

CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
SCOTT M. STRINGER

Michael Garland
ASSISTANT COMPTROLLER
ENVIRONMENTAL, SOCIAL AND GOVERNANCE

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Arch Coal, Inc.
Received
OCT 22 2014
Legal Department

October 20, 2014

Mr. Robert G. Jones
Senior Vice President-Law, Gen. Counsel and Secretary
Arch Coal, Inc.
One City Place Drive, Suite 300
St. Louis, MO 63141

Dear Mr. Jones:

I write to you on behalf of the Comptroller of the City of New York, Scott M. Stringer. The Comptroller is the custodian and a trustee of the New York City Employees' Retirement System, the New York City Fire Department Pension Fund, the New York City Teachers' Retirement System, and the New York City Police Pension Fund, and custodian of the New York City Board of Education Retirement System (the "Systems"). The Systems' boards of trustees have authorized the Comptroller to inform you of their intention to present the enclosed proposal for the consideration and vote of stockholders at the Company's next annual meeting.

Therefore, we offer the enclosed proposal for the consideration and vote of shareholders at the Company's next annual meeting. It is submitted to you in accordance with Rule 14a-8 of the Securities Exchange Act of 1934, and I ask that it be included in the Company's proxy statement.

Letters from The Bank of New York Mellon Corporation and State Street Bank and Trust Company certifying the Systems' ownership, for over a year, of shares of Arch Coal, Inc. common stock are enclosed. Each System intends to continue to hold at least $2,000 worth of these securities through the date of the Company's next annual meeting.

We would be happy to discuss the proposal with you. Should the Board of Directors decide to endorse its provision as corporate policy, we will withdraw the proposal from consideration at the annual meeting. If you have any questions on this matter, please feel free to contact me at (212) 669-2517.

Sincerely,

Michael Garland

Enclosure

FIGURE ID1: LETTER TO TARGETED FIRM BY NYCPS AS PART OF BAP CAMPAIGN

This figure presents the letter that was sent by NYCPS as part of BAP campaign to Arch Coal Inc., a firm targeted by the BAP campaign for environmental reasons. These letters were sent to targeted firms individually to formally submit the proxy-access proposals. Source: SEC.

CalPERS

SCOTT M. STRINGER
COMPTROLLER
THE CITY OF NEW YORK

April 17, 2015

Dear Fellow Arch Coal Inc. Shareowner:

Support Shareowner Proposal #5 Requesting Proxy Access

The California Public Employees Retirement System (CalPERS) and the New York City Pension Funds urge shareowners to vote "FOR" proposal #5 – a non-binding proposal to give shareowners effective access to the director nomination process – at the Arch Coal Inc. annual meeting on April 23, 2015. Collectively, our funds have $468 billion in assets and are substantial long-term Arch Coal Inc. shareowners, with approximately 2,860,512 shares.

Proxy Access a Fundamental Shareowner Right

Providing access to a company's proxy to permit shareowners the ability to nominate directors to the board is one of the most important rights given to the owners of a company. Without effective proxy access, the director election process simply becomes a ratification of corporate management's slate of nominees. Therefore, we believe long-term shareowners should have meaningful access to this process on the terms specified in the proposal #5. The proposed thresholds include:

- Beneficial ownership of at least 3 percent of the outstanding stock;
- Three years of continuous ownership; and
- Ability to nominate up to 25 percent of the board.

Proposed Terms Based on Thoughtful SEC Proxy Access Rulemaking in 2010

Before adopting its now vacated proxy access rule in 2010, the SEC undertook careful analysis, both internally and through the public comment process. It was the SEC that determined that a 3 percent ownership threshold was appropriate, stating, "The ownership threshold we are establishing should not expose issuers to excessively frequent and costly election contests conducted through use of Rule 14a11, but it is also not so high as to make use of the rule unduly inaccessible as a practical matter." The proposed holding period and slate size limitation are also consistent with the SEC rule.

CFA Institute Concludes Proxy Access Would Benefit the Markets and Boardroom

A 2014 report published by the CFA Institute found that giving investors access to the proxy to nominate directors would benefit shareowners and the capital markets.[1] The specific report findings include:

- Proxy access has the potential to enhance board performance and raise US market capitalization by between $3.5 billion and $140.3 billion.
- Proxy access reform will not hinder board performance.

[1] http://www.cfapubs.org/doi/pdf/10.2469/ccb.v2014.n9.1

FIGURE ID2: EXEMPT SOLICITATION LETTER

This figure presents the exempt solicitation letter sent by the New York City Pension Funds System (NYPCS) in collaboration with California Public Employees Retirement System (CalPERS) to the shareholders of Arch Coal Inc., a firm targeted by the BAP campaign for environmental reasons. These letters were sent in order to garner support for the proxy-access proposal submitted as part of the BAP campaign. Source: SEC.

ArchCoal

Robert G. Jones
Senior Vice President
Law & General Counsel

Bjones@archcoal.com

December 23, 2014

Office of Chief Counsel
Division of Corporation Finance
Securities and Exchange Commission
100 F Street, N.E.
Washington, D.C. 20549

Re: Securities Exchange Act of 1934 – Section 14(a), Rule 14a-8; Omission of Stockholder Proposal

Ladies and Gentlemen:

I am writing on behalf of Arch Coal, Inc. ("Arch") to inform you, pursuant to Rule 14a-8(j) under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), that Arch intends to omit from its proxy solicitation materials for its 2015 annual meeting of stockholders a stockholder proposal (the "Proponent's Proposal") submitted by the Comptroller of the City of New York, The Honorable Scott M. Stringer, as the custodian and a trustee of the New York City Employee's Retirement System, the New York City Teachers' Retirement System and the New York City Police Pension Fund and custodian of the New York City Board of Education Retirement System (the "Proponent"). In accordance with Rule 14a-8(j), Arch hereby respectfully requests that the staff (the "Staff") of the Division of Corporation Finance of the Securities and Exchange Commission (the "Commission") confirm that it will not recommend enforcement action against Arch if the Proponent's Proposal is omitted from Arch's proxy solicitation materials for its 2015 annual meeting of stockholders (the "2015 Annual Meeting") in reliance on Rule 14a-8(i)(9) under the Exchange Act. Copies of the Proponent's Proposal and accompanying materials are attached as Exhibit A.

Arch expects to file its proxy solicitation materials for the 2015 Annual Meeting on or about March 16, 2015. Accordingly, as contemplated by Rule 14a-8(j), this letter is being filed with the Commission no later than eighty (80) calendar days before the date upon which Arch expects to file the definitive 2015 proxy solicitation materials.

Pursuant to Staff Legal Bulletin No. 14D ("SLB 14D"), I am submitting this request for no-action relief to the Commission under Rule 14a-8 by use of the Commission's email address, stockholderproposals@sec.gov, and have included my name and telephone number both in this letter and the cover email accompanying this letter. In accordance with the Staff's instruction in Section E of SLB 14D, I simultaneously am forwarding by email or facsimile a copy of this letter to the Proponent. The Proponent is requested to copy the undersigned on any response it may choose to make to the Staff.

Arch Coal, Inc.
One CityPlace Drive, Suite 300
St. Louis, Missouri 63141

direct: 314.994.2716
fax: 314.994.2734

archcoal.com

FIGURE ID3: MANAGEMENT OPPOSITION TO PROXY-ACCESS PROPOSAL

This figure presents a letter written by the management of Arch Coal Inc. to the SEC requesting the omission of proxy-access proposal from the proxy material for the 2015 annual meeting. This letter was extracted based on the request submitted by Arch Coal Inc. to SEC under rule 14a-8(i)(9). Source: SEC.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
CORPORATION FINANCE

February 2, 2015

Robert G. Jones
Arch Coal, Inc.
bjones@archcoal.com

Re: Arch Coal, Inc.
Incoming letter dated December 23, 2014

Dear Mr. Jones:

This is in response to your letter dated December 23, 2014 concerning the shareholder proposal submitted to Arch by the New York City Employees' Retirement System, the New York City Fire Department Pension Fund, the New York City Teachers' Retirement System, the New York City Police Pension Fund and the New York City Board of Education Retirement System. Pursuant to rule 14a-8(j) under the Securities Exchange Act of 1934, your letter indicated Arch's intention to exclude the proposal from Arch's proxy materials solely under rule 14a-8(i)(9).

On January 16, 2015, Chair White directed the Division to review the rule 14a-8(i)(9) basis for exclusion. The Division subsequently announced, on January 16, 2015, that in light of this direction the Division would not express any views under rule 14a-8(i)(9) for the current proxy season. Accordingly, we express no view on whether Arch may exclude the proposal under rule 14a-8(i)(9).

Copies of all of the correspondence related to this matter will be made available on our website at http://www.sec.gov/divisions/corpfin/cf-noaction/14a-8.shtml. For your reference, a brief discussion of the Division's informal procedures regarding shareholder proposals is also available at the same website address.

Sincerely,

Matt S. McNair
Special Counsel

cc: Michael Garland
The City of New York
Office of the Comptroller
mgarlan@comptroller.nyc.gov

FIGURE ID4: SEC RULE 14A-8 DECISION LETTER

This figure presents the SEC decision letter in response to Arch Coal Inc. request to review the exclusion of proxy-access proposal submitted as part of the BAP campaign from the proxy material for the 2015 annual meeting under rule 14a-8(i)(9). Source: SEC.