

Metrics, Principles, and Standards for Dissociation from Fossil Fuels at Princeton University

A Report prepared by Princeton University's Faculty Panel on Fossil Fuel Dissociation

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SUMMARY

BACKGROUND: In May 2021, in keeping with Princeton University’s core truth-seeking mission and commitment to sustainability, its Board of Trustees announced, through a press release, the University’s decision to “*dissociate from fossil fuel companies engaged in climate disinformation and those materially participating in the thermal coal and tar sands segments of the fossil fuel industry unless able to meet a rigorous standard for greenhouse gas emissions*”. The University convened a faculty panel charged with “*developing metrics, principles, and standards that would provide impartial scholarly advice to help implement the dissociation decision*”, and an administrative committee that will use the findings of the faculty panel report to propose to the Board a set of actionable criteria for dissociation, and a process for implementing them now and in the future. Dissociation at Princeton University is a larger construct that includes divestment, as well as refraining from sponsored research, gifts, purchasing, student career networking, and all other campus engagement activities associated with those companies (identified for dissociation). Given its all-encompassing nature, University guidelines note that the decision to dissociate from a company must be taken only when the actions of that company are found to be in strong contradiction with Princeton University’s core values.

SCOPE OF THIS REPORT: The faculty panel’s work was guided by our charge; the Trustees’ decision to dissociate from certain segments of the fossil fuel industry and those engaged in climate disinformation; and the University’s long-held guidelines for dissociation grounded in core values (see Background). The charge to the panel was fourfold, developing metrics and standards for: 1) identifying fossil fuel companies engaged in climate disinformation; 2) identifying companies participating materially in thermal coal and tar sands segments of the fossil fuel industry; 3) constructive engagement prior to dissociation; and, 4) developing a framework for future evolution of the metrics and standards. While the faculty panel is charged with addressing specific segments of the fossil fuel industry in terms of greenhouse gas (GHG) emissions in Charge 2, the panel, in response to Charge 4, sought to develop metrics, standards and algorithms such that they could be updated in future years and potentially translated to other industry segments, as appropriate, consistent with the Trustees’ long-term goals to drive progress towards a net-zero carbon portfolio, and the University’s goal to support net-zero carbon transitions in society at large.

MAIN FINDINGS: The panel’s main findings are organized into four categories:

1) **Core Values:** The panel clarifies Princeton’s core values relevant to fossil fuel dissociation, which included: a) Princeton’s truth-seeking core value as a leading research institution (relevant to disinformation, Charge 1); b) Princeton’s commitment to environmental sustainability, represented by Princeton’s Net-Zero Carbon plans (relevant to fossil fuel companies identified in Charge 2); and c) Social justice and global awareness core values applicable to all Charges. *[See Section 2.1]*

2) **Conceptual Foundations** that highlight the urgency of acting on climate change, the importance of a glide path that systematically lays out a pathway to net-zero emissions by 2050, global awareness of social inequality and climate justice in charting energy transitions, the role of climate disinformation in slowing progress towards a zero-carbon sustainable future, and the need to hold companies accountable for their actions, vis-à-vis their greenhouse gas emissions and plans to mitigate them, as well as participation in disinformation campaigns. *[See Section 2.2]*

3) **Principles for Developing Metrics and Standards**, which include universal applicability to all fossil fuel companies in Princeton’s direct and indirect investments, and its research portfolio; simplicity and practicability in addressing a broad swathe of companies; objective and transparent metrics developed through scientific rigor; strategic focus on largest fossil fuel companies engaged in disinformation; comprehensive coverage of fossil fuel industry segments globally (covering 90% of global coal production,

and ~99% of global oil production from tar sands); proactive design for future adaptability towards zero-carbon futures; and transparent design and consultation. [See Section 2.3]

4) Analytic frameworks, metrics, and standards designed specifically to address the four components of our charge: climate disinformation (Charge 1, *Section 3*); material participation in thermal coal and tar sands (Charge 2, *Section 4*); and constructive engagement prior to dissociation (Charge 3, *Section 5*). Uniquely, relevant to Charges 2 and 4, we propose a framework that can potentially be broadly applied/adapted in the future to other industry segments, providing a glide path approach to a zero-carbon society (*Section 6*). Likewise, we have developed a unique rubric for assessing disinformation that may be tested across a number of different companies, advancing the science of policy-relevant evaluation of disinformation.

Overall, we believe that the frameworks and associated metrics and standards developed by the Faculty Panel are at the leading edge of what universities are proposing in their efforts to dissociate/divest from fossil fuels.

1. Introduction: Background and Context

In May 2021, in keeping with Princeton University’s core truth-seeking mission and commitment to sustainability, its Board of Trustees authorized the establishment of an administrative process for dissociating from fossil fuel companies engaged in climate disinformation and those materially participating in the thermal coal and tar sands segments of the fossil fuel industry unless able to meet a rigorous standard for greenhouse gas emissions (Valenti, 2021; Princeton University, 2021). To implement the dissociation decision made by the Board, the University convened two groups:

- A Faculty Panel, charged with developing metrics, principles, and standards that would provide impartial scholarly advice to help implement the dissociation decision. The charge to the panel is to present its findings in a public written report, and update the broader community periodically while its work is in progress.
- An Administrative Committee, who will use the findings of the faculty panel report to propose to the Board a set of actionable criteria for dissociation, and a process for implementing them now and in the future.

This report presents the findings of the Faculty Panel, and is organized as follows:

- [Section 1](#): Background and context of the panel’s work (this section)
- [Section 2](#): Core values, conceptual foundations and principles that guide the panel’s report
- [Sections 3-6](#): Specific recommendations on metrics and standards relating to four specific charges to the Panel (see Table 1).

1.1 Background

Climate change and fossil fuels: Sustained and wide-ranging scientific consensus finds that anthropogenic greenhouse gas (GHG) emissions, largely driven by fossil fuel combustion to support society’s consumption and economic production activities, are transforming our planet and its climate. The impacts of climate change are wide-ranging, including a rise in global mean temperature and sea level, increased occurrence of extreme heat and heavy precipitation, higher levels of coastal flooding, more extensive wildfire and more prevalent regional drought. These are already impacting the economy and the sustainability of human and other forms of life on our planet. To reduce the likelihood of crossing climate tipping points and triggering the worst impacts of climate change, 196 countries signed the Paris Agreement in 2015, pledging substantial reductions in GHG emissions globally to limit global mean temperature increase to below 2 degrees Celsius above pre-industrial levels, while pursuing a more ambitious goal of limiting the increase to 1.5 degrees (United Nations Climate Change, 2022). In the years since the Paris Agreement, scientists, policymakers, and industry leaders have proposed pathways to achieving zero net-GHG emissions across large parts of the global economy in the second half of this century by integrating energy efficiency, renewable and nuclear energy, transitions to electric mobility, technologies for carbon capture, utilization and storage (CCUS), direct air capture (DAC), and nature-based solutions for carbon sequestration as a means to achieve the Paris temperature objectives. Concerted action by all sectors of society, including pillar industries (energy, transportation, heating, cement, steel, agriculture), commercial business entities, individuals/households, and communities will be needed to achieve a net-zero carbon future by 2050. Action by energy/electricity and fossil fuel companies can be particularly impactful, given that 72-75% of global GHG emissions arise from this sector (IEA, 2021; WRI, 2017).

Climate action at Princeton: The increasing severity of the climate impacts worldwide, e.g., wildfires, extreme heat, hurricanes, and extreme flooding caused by heavy precipitation, some tied directly to GHG emissions, has prompted several nations, cities, industries, and commercial businesses to adopt the goal of achieving net-zero carbon emissions by 2050 or earlier. Princeton University has itself pledged to reduce its operational GHG emissions to net-zero by 2046. There are increasing calls to expand the scope of emissions that cities and businesses are currently accounting, for example, for cities to include GHG

emissions associated with construction materials and fuels used within the city even if produced elsewhere, i.e., supply chain emissions (Ramaswami et al., 2021). There are also calls for investment portfolios to divest from fossil fuel companies, with varying motivations and opinions, e.g. Howard, 2015; Pope, 2022. This rapidly evolving context—with sustained engagement by students, alumni, faculty, and staff, including through Divest Princeton—stimulated a report by the Council of the Princeton University Community’s (CPUC) Resources Committee (2021), which in turn helped prompt the decision by Princeton University’s Board of Trustees to dissociate from fossil fuel companies.

Dissociation as a larger construct than divestment: At Princeton University, divestment is a subset of actions under the broader umbrella of dissociation. Dissociation means divesting from companies, as well as refraining, to the greatest extent possible, from soliciting or accepting gifts from such companies, purchasing the companies’ products, forming partnerships with these companies, and facilitating the companies’ campus engagement activities (Princeton University, 2022). Dissociation is applied only to those companies whose values are in strong contradiction with Princeton University’s core values. The logic is that if the University should not invest in a company as a matter of policy due to a conflict in values, then it also should dissociate from that company in all other aspects of its operations. Therefore, the bar for dissociation is exceptionally high. To date, the only investment-related issues that have crossed this threshold of significance have been companies that operated under the apartheid state in South Africa (CPUC Resources Committee, 1997), and those complicit in genocide in Darfur, Sudan (Cliatt, 2006).

Long-term plans of the Trustees to achieve a zero-carbon investment portfolio: While the University’s press release of May 2021 highlights the Trustees’ initial focus on certain segments of the fossil fuel industry, the press release also indicated a longer-term focus on achieving net-zero greenhouse gas emissions in the University’s portfolio: “The University also has committed to reducing the aggregate harmful climate impact of the entirety of the University’s direct and indirect endowment holdings” (Valenti, 2021). This will require assessing “*greenhouse gas impact of all companies in its holdings — not just fossil fuel companies — and to drive change and expand investment in innovative technologies that hold the most promise to benefit the environment.*” Thus, while the faculty panel is charged with addressing specific segments of the fossil fuel industry in terms of GHG emissions (see Charge 2 below), the panel, in response to Charge 4, sought to develop metrics, standards and algorithms such that they could be updated in future years and potentially translated to other industry segments, as appropriate in the future.

Table 1: Charge to the Faculty Panel on Dissociation from Fossil Fuel Companies, issued by President Christopher Eisgruber
<u><i>Charge 1: Disinformation</i></u> - What metrics and standards should be used to assess whether a company is spreading climate disinformation or participating in disinformation campaigns? What information is available to assess whether a company is participating in a climate disinformation campaign? What distinguishes these acts from legitimate skepticism or challenging of scientific consensus?
<u><i>Charge 2: Thermal coal and tar sands</i></u> - What constitutes material participation by a company in the thermal coal or tar sands segment of the fossil fuel industry? What would be an appropriate rigorous standard or target for greenhouse gas emissions for companies in this segment of the fossil fuel industry? How can the greenhouse gas intensity of these companies be assessed?
<u><i>Charge 3: Constructive engagement</i></u> - What constructive engagement options exist to attempt to convince companies to remedy their conduct before dissociation? What standards and metrics can be used to assess whether a company is remedying its conduct? What is a reasonable time frame over which a company could be expected to make progress toward established standards and targets?
<u><i>Charge 4: Future evolution of metrics & standards</i></u> - How can the metrics, standards, and targets referenced above be flexible enough to meet changing conditions over time? On what time frame should they be revisited to keep pace with evolving knowledge?

1.2 Faculty Panel Process

The panel's process involved several steps:

- The faculty panel, as a whole, conducted their deliberations over a period of 9 months from September 2021 to May 2022. **Two sub-committees** were formed to address Charge 1 and Charge 2, respectively. All panel members engaged in addressing Charges 3 and 4.
- Both subcommittees **reviewed and interpreted the trustees' decision** as described in the University press release of May 2021 (Valenti, 2021) to help guide the Panel's work and establish the scope of their work.
- The panel clarified **Princeton's core values** that are contravened by companies identified for dissociation. The core values included the following:
 - Princeton's **truth-seeking** core value (for Charge 1, Disinformation)
 - Princeton's commitment to **environmental sustainability**, represented by Princeton's Net-Zero Carbon plans (For Charge 2)
 - **Social justice** and **global awareness** core values applicable to all Charges
- An extensive review of the literature enabled development of the **conceptual foundations** necessary to inform Charge 1 and Charge 2
- The panel developed **overarching principles for developing the metrics and standards** relating Charge 1 and Charge 2, drawing upon the literature and core values.
- The panel developed **quantitative and semi-quantitative frameworks** to identify companies for dissociation based on participation in thermal coals and tar sands (Charge 2) and disinformation (Charge 1), respectively, by evaluating available data sources and consulting three external experts:
 - Mohammad S. Masnadi, Assistant Professor of Chemical & Petroleum Engineering at the University of Pittsburgh
 - Kyung-Ah Park, finance expert for developing Environmental, Social, and Governance (ESG) criteria for investment industry
 - Geoffrey Supran, Research Associate in the Department of the History of Science at Harvard University and Director of Climate Accountability Communication for the Climate Science Social Network
- The panel **met with the Administrative Committee, or representatives thereof**, frequently, with six joint meetings (four with students—see below) held to discuss the charge, provide progress updates, discuss the framework for the metrics, and their practical implementation. In addition, VP Parker, as chair of the administrative committee, and Prof. Ramaswami, as chair of the faculty panel, coordinated their efforts through frequent (biweekly) phone calls to check in and align progress.
- The Faculty Panel and Administrative Committee met with Undergraduate Student Government leaders and their invited student participants to share progress and answer questions in four separate meetings that spanned a period from Nov. 2021-May 2022.
- A summary of work for the panel was also periodically reported to the University community at-large at the CPUC meetings.

Section 2 details the core values, conceptual foundations, and the operating principles that provided the foundations for the standard, metrics and recommendations relating to the 4 charges (described in Sections 3-6).

2. Core Values, Conceptual Foundations and Principles

2.1 Core Values

The Faculty Panel considered the University’s announcement of the Trustees’ decision, along with the CPUC Resource Committee’s report (2021) and President Eisgruber’s reflections on the topic of dissociation (CPUC, 2015). Reflecting on these documents, the Panel first identified four core values at Princeton that are relevant to discussions around dissociation and divestment. We list them briefly below.

- 1) ***Princeton University’s core value of truth-seeking*** is reflected in its position as a world-leading research institution that advances the frontiers of science. This truth-seeking core value is particularly relevant to Charge 1 on disinformation, defined by the panel as “*communicating with the intent to mislead*” (See Section 2 & 3 for detail). Disinformation is distinct from merely the misstatement of facts often referred to as misinformation. Thus, engaging in disinformation, i.e., communicating with the intent to mislead, directly contradicts the University’s truth-seeking core value.
- 2) ***Princeton’s environmental core values*** are reflected by the University’s own decision to achieve net-zero emissions for campus operations by the year 2050 (now accelerated to 2046; Aronson, 2019). This core value is relevant to Charge 2, pertaining to thermal coal and tar sands segments of the fossil fuel industry, and to Charge 4, reflecting evolving standards that can guide the University to a net-zero emissions investment portfolio over time. Specifically, the alignment of prospective actions of fossil fuel companies with Princeton’s core environmental values can be assessed by examining the company’s public commitments to achieve net-zero emissions by 2050, along with credible milestones to track progress.
- 3) ***Princeton’s commitment to addressing inequality through equity and social justice***: This core value is relevant because personal consumption by individuals and high inequality in such consumption is found to be a key driver of greenhouse gas emissions, both within the United States (Jones & Kammen, 2014) and across the world (Oswald, 2021), with the top 10 percent of the global income spectrum consuming *20 and 75 times as much final energy* as the bottom 10 percent in buildings and mobility sectors, respectively. Thus, energy transitions must be planned carefully and in conjunction with the development of cost-competitive alternatives, to avoid inequitable energy burdens for the least wealthy households. A singular focus on GHG emissions from companies often obfuscates these larger questions around societal inequality in consumption and energy burden.
- 4) ***Princeton’s motto, “In the Nation’s Service and the Service of Humanity,”*** highlights the importance of global awareness, including of global climate justice, relevant to Charge 2 metrics. Climate justice acknowledges that ~41% of the global carbon emissions budget for achieving the Paris targets has already been consumed (as of 2020) by historical emissions from developed countries, and an additional ~11-14% by China (CarbonBrief, 2021; Future Earth, 2020). This leaves little room for less developed countries to achieve their economic and human development goals, particularly when they are at the cusp of urbanization and industrialization, which may require continued use of fossil fuels in the near term, even as they invest in renewable energy with its attendant environmental and health co-benefits. Thus, considering climate equity, coal exit plans cite earlier target dates of 2030 for developed countries and 2050 or later for the others (Climate Analytics, 2019). In addition to equity, global developments such as the war in Ukraine may also stimulate a rise in coal use in the short term in select nations. The university community may therefore want to carefully consider exceptions from dissociation for fossil fuel companies that predominantly serve developing nations, or for the case of war, while maintaining the longer term GHG mitigation targets so as to be consistent with the Paris Agreement’s objectives.

2.2 Conceptual Foundations

Building upon the core values in section 2.1, we summarize below key concepts, drawn from the literature, that guided the development of the principles, metrics and standards for dissociation from fossil fuel, developed by the Faculty Panel.

Climate change is an existential threat requiring urgent and concerted climate action: Society’s understanding of climate change science, climate change impacts and climate change solutions is imperfect but rapidly improving. Based on this understanding, national and subnational governments, firms, civil society organizations (like Princeton University), and even individuals have established goals with a view toward implementing the collective objectives embodied in the 2015 Paris Agreement, which are aimed at avoiding “dangerous anthropogenic interference with the climate system” (UNFCCC, 1994, p. 9). Although climate change and its consequences will be a fact of life for decades or centuries to come, the goal of the Paris Agreement is to limit the worst impacts of climate change by acting in concert immediately to reduce emissions to net-zero by 2050. The objective of this panel is to provide guidance to the Trustees to facilitate Princeton University leadership in implementing its fair share of the solution. Accordingly, we address our immediate charges from the Trustees in terms of a near term framework for implementing dissociation from firms whose actions are obstacles to solutions, as well provide insights on longer term issues that the University will confront in later phases of dissociation. In this way, we hope to facilitate immediate action, as well as establish a coherent, long-term approach, one that can evolve as knowledge increases, as is suited to the nature of climate change.

Pathways to Net-Zero Emissions have been charted in different countries, but are not instantaneous. Societies need time to achieve systemic changes to reach net-zero emissions. Specifically, society cannot decouple from fossil fuels immediately without significant harm, both to the economy, and especially to the most disadvantaged in society. See Core Values #3 & #4. For example, diesel fuel and gasoline used in transportation provide mobility and freight services essential for the functioning of the entire economy. Electric vehicles provide a viable alternative for much of the transportation sector, but will take time to scale and replace large numbers of vehicles, and may not be suitable for all transportation modes (e.g. long-haul freight, aviation). Electricity, derived today from a mix of fossil, renewable resources, and nuclear fission, is essential for basic home heating/cooling, medical care, emergency services, financial services and other core functions. Even recognizing the potential for improved efficiency in energy production and end use, society will still require substantial amounts of energy. To meet human development and climate objectives, the energy driving our economy must get cleaner rapidly. The Trustees rationale to focus on the worst GHG emitting energy companies in Charge 2 – e.g., thermal coal and tar sands - provides clarity in identifying companies that are pursuing high GHG emitting activities today even while cost-competitive alternatives are widely available.

Establishing a glide path to a zero-carbon future by 2050: Looking to the future, discussions with experts and a review of the literature suggest a glide path approach can be developed to decarbonize society step-by-step and investment portfolios in tandem. Zero carbon pathways emphasize a sequence of interrelated steps (Azvedo et al., 2020; Jenkins et al., 2021; Seto et al., 2021): exit from thermal coal tied to grid decarbonization with increasing penetration of renewables; steady improvement in end-use efficiency and transitions to electric mobility and heating via electrically-driven heat pumps anchored upon the availability of a zero carbon electric grid; and, investments in advanced technologies for carbon capture, storage and utilization, followed by direct air capture and nature based solutions for sequestering the remaining emissions. The Faculty Panel’s efforts to develop metrics and standards in Charge 2 sought to support a glide path approach wherein the metrics developed for Charge 2 could become increasingly stringent over time, or applied to a broader swathe of industries, supporting a glide path to decarbonization by 2050. Some

sectors such as steel, cement, aviation, and freight can be particularly challenging to decarbonize (Davis et al., 2018) and are beyond the scope of this report and the Trustees current mandate to this committee.

Holding companies accountable for their decarbonization commitments: Evaluating the ongoing and prospective actions of companies, cities and nations in advancing net-zero emissions by 2050 requires a rigorous assessment of their commitment. Companies that have made pledges to transition to net-zero emissions must make steady, measurable, near-term progress towards concrete milestones for these actions to be considered credible (relevant to Charge 2). Furthermore, bold pledges that mask inaction can create a false impression of progress that in some cases constitutes disinformation (relevant to Charge 1). Much attention is focused on fossil fuel and energy sector companies (i.e., power plants), since coal and natural gas combustion for heating and electricity generation, and combustion of fuels derived from crude petroleum, together contribute to 75 % of global GHG emissions (International Energy Agency, 2021; World Resources Institute, 2017). Studies show that fossil fuels processed and sold by just 20 of the world's largest fossil fuel companies contribute to a third of global emissions (Kenner & Heede, 2021). For the case of oil companies, scientific papers (Masnadi et al., 2018) and climate action databases such as those developed by Urgewald and the Rocky Mountain Institute are tracking the current emissions, and the ongoing and future actions of oil companies worldwide. Similarly, coal and natural gas power plants are tracked in databases such as Urgewald's Coal Exit List. The panel evaluated these literatures and databases in developing metrics and standards detailed in Sections 3-6.

Climate disinformation can delay climate actions: A large and growing literature indicates that the spread of climate disinformation has been found to: (a) delay meaningful action to mitigate climate change (Farrell, McConnell, & Brulle, 2019); (b) reduce climate literacy (Ranney & Clark, 2016); (c) contribute to public polarization (Cook, Lewandowsky, & Ecker, 2017); (d) cancel out the positive effect of accurate information (McCright et al., 2016); (e) reinforce climate silence (Geiger & Swim, 2016), and, (f) influence how scientists engage with the public (Lewandowsky et al., 2015). These findings reinforce the Trustees' decision to pursue dissociation from fossil fuel companies that engage in climate disinformation. Large companies engaging in disinformation can have greater reach and negative impact; hence the panel recommends evaluating the largest companies in Princeton's investment and sponsored grants portfolio first for disinformation (Charge 1).

Distinguishing between disinformation and misinformation: Different academic disciplinary and public policy approaches define "disinformation" and "misinformation" in varying ways (see Table 2). Most common is to define "disinformation" as hinging upon a question of intent, while "misinformation" refers only to the truth or falsity of information verifiable as facts (Guess and Lyons 2020). We surmise that this kind of distinction is likely what the Trustees had in mind in adopting the word "disinformation" as opposed to "misinformation". Drawing upon the works of Guess and Lyons (2020) and (Fallis 2014), we define disinformation as follows: "*Disinformation comes from an agent communicating with the intent to mislead.*" This includes factual "misinformation", but also, communication of what might be factually correct information which is done with an intent to mislead (by such means as omission, redirection of attention to irrelevant or exaggerated issues, or factual statements placed out of context). The panel determined that a company has agency in its communications, and that disinformation to some part of the public needs to be assessed as occurring over a reasonably long period of time, making past actions relevant to an evaluation of contemporaneous actions (the latter being what are addressed in the Trustees' decision). A rubric is proposed in Section 3 for a semi-quantitative scoring of disinformation by fossil fuel companies, with focus on their claims regarding their own and societal pathways to decarbonization.

Table 2: Synthesis of various definitions of misinformation and/or disinformation

Definitions of misinformation and/or disinformation	Notes
<p><i>Guess and Lyons, 2020</i>: “We define misinformation as constituting a claim that contradicts or distorts common understandings of verifiable facts,” and assert that “Misinformation...is false by definition,” though it may be “inadvertent or unintentional.” (Guess and Lyons 2020, 10-11)</p> <p>“We define disinformation as the subset of misinformation that is deliberately propagated. This is a question of intent.” (Guess and Lyons 2020, 11).</p> <p>...Disinformation is related to intent to deceive.</p>	<p>Misinformation is factual inconsistencies, which could be inadvertent, while disinformation is the intent to misinform. Further, Guess and Lyons posit that disinformation has the intent to deceive.</p>
<p><i>Fallis 2014</i>: “Disinformation comes from someone who is actively engaged in an attempt to mislead.” (Fallis 2014, 136)</p>	<p>Fallis' choice of the word "mislead" is appropriately more broad than “deceive”: one may propagate disinformation by distracting one's listeners from the truth rather than by deceiving them about it, as we argue.</p>
<p><i>Communication of EU Commission (2018)</i>: “Disinformation is understood as verifiably false or misleading information that is created, presented and disseminated for economic gain or to intentionally deceive the public, and may cause public harm.”</p>	<p>Combines the falsity of misinformation with the misleadingness inherent in the above definitions of disinformation, but adds on a requirement of economic gain, that may not always be applicable.</p>
<p><i>Coan et al. (2021)</i>: Distinguish between:</p> <p>(a) misinformation that can be documented to be intrinsically such (e.g., containing false statements and/or reasoning fallacies),</p> <p>(b) factually correct statements, taken out of context (e.g., “climate models are uncertain” is not equal to “climate science is unreliable,” even though these are often equated by the general public), and</p> <p>(c) contrarian views (their example: “the weather is cold today, therefore global warming is not happening”)</p>	<p>Misinformation is intrinsically false, but on the other hand, disinformation can use factually correct statements taken out of context to mislead, as shown in these examples.</p>
<p><i>Faculty Panel Charge 1 Group’s definition (Lane et al., 2022)</i>: Disinformation comes from an agent communicating with the intent to mislead.</p>	<p>The panel’s definition of disinformation follows the arguments of those works cited in this table, and recognizes it as distinct from (though generally including) misinformation. The role of agents is made visible.</p>

Climate change is a wicked problem requiring integration across production and consumption: Alongside decarbonization efforts by fossil fuel companies, the role of personal consumption (e.g., reducing meat consumption, reducing motorized travel, purchasing electric vehicles, etc.) and infrastructure transitions to support such consumption can be critical. Indeed, small shifts in diet, locational and mobility choices have large impacts on GHG emissions (Dietz et al., 2009). Many of these behavioral shifts can be supported by programs and policies of cities and major institutions like universities. While outside the charge of the panel, we suggest more symmetry in efforts of universities and companies in pursuing high GHG reduction targets. Specifically, while many universities are decarbonizing their direct energy use in buildings and buses, tackling the larger challenge of decarbonizing/reducing GHGs from employee commuting travel, student and employee airline travel to/from campus, and campus food service operations, can complement deep decarbonization actions in fossil fuel, mobility, and agricultural production sectors. Likewise fossil fuel companies are committing to reduce emissions from production/refining oil, but are increasingly being asked to also decarbonize the combustion of those fuels post-sales in buses, planes and cars. Furthermore, the role of automakers and bus manufacturers to produce electric vehicles at scale will also be critical. Efforts from both production and consumption perspectives, mediated by energy efficient technologies and by inclusive, resource-efficient design of cities and infrastructure systems, will therefore be needed to tackle the climate challenge.

Developing countries need special considerations: As detailed in core value #4, developing nations have historically contributed little toward the global carbon budget, and may require fossil fuel use for their future human and economic development particularly as they urbanize, even alongside large investments in renewable technologies. Furthermore, the impacts of climate change are felt disproportionately by the global poor, whose current and historical GHG emissions are the lowest, and for whom economic development is a key contributor to climate-resilience. Therefore, climate equity perspectives suggest careful design of metrics, considering their unintended potentially harmful impacts on developing nations.

2.3 Principles for Developing Metrics and Standards

- ***Panel's work guided by our Charge and Trustees' Decisions:*** The Faculty Panel stayed largely within the scope of its charge and used Princeton University's core values to develop dissociation criteria.
- ***Metrics designed for universal applicability:*** The Faculty Panel developed metrics that would be applicable to all fossil fuel companies in Princeton's investment and sponsored research portfolio. This includes both direct and indirect investments. Addressing all such companies in the portfolio required the development of simple metrics that could be applied even when there are no public data available, such as in the case of privately held companies.
- ***Simplicity:*** For both Charges 1 and 2, a relatively simple framework was developed to enable potential evaluation of all companies in direct and indirect portfolios, including publicly traded and private companies (the latter may not always publicly release their GHG emissions data, as an example).
- ***Objective and transparent metrics:*** Quantitative or semi-quantitative metrics are proposed with data sources identified publicly in the Faculty Panel's report.
- ***Scientific rigor:*** Metrics and standards are developed through review of peer-reviewed literatures and publicly available data sources cross-checked with domain experts.
- ***Strategic focus of Charge 1:*** The largest fossil fuel companies in Princeton's investment and sponsored research portfolio are prioritized for testing with a new scorecard framework with attendant metrics and standards to evaluate disinformation (Charge 1), so as to have the greatest impact on limiting the spread of disinformation,
- ***Comprehensive coverage in Charge 2:*** About 90% of global coal production, and ~99% of global oil production from tar sands are evaluated via the metrics proposed for Charge 2, enabling

comprehensive coverage of these fossil fuels worldwide. The logic for developing the framework can be applied to larger swathes of fossil companies in the future, as appropriate.

- **Proactive design for future adaptability:** The proposed framework in Charge 2 is designed proactively so that it can be adapted in the future (Charge 4) to create a potential “glide path toward a net-zero portfolio”, although this was not our explicit charge, and, more work will be needed.
- **Transparency and consultation:** The analytic frameworks, scorecard metrics, and rubrics are transparently described in this report, and have been developed through consultation with student groups, domain experts, and the administrative committee.

2.4 Overall Reflections

The Faculty Panel strived for innovation, impact, and inclusion of diverse perspectives.

In terms of **innovation**, we believe that the frameworks and associated metrics and standards developed by the Faculty Panel for Charges 1 and 2 are at the leading edge of what universities are proposing in their efforts to dissociate/divest from fossil fuels. Specifically, in an analysis of fossil fuel actions of 20 peer institutions, collated by the Administrative Committee (Princeton University, 2022), we highlight that:

1. Princeton is **one of only two schools out of 20^{*1} that are developing metrics and standards that can be broadly applicable to all fossil fuel companies** in both the direct and indirect investment holdings. Princeton’s process, rooted in principles of dissociation, appears to be one of the few, if not the only, that addresses not only indirect holdings, but also the portfolio of sponsored research.
2. Of the 14 schools developing divestment plans, **Princeton is unique in the broader scope of industries that are being evaluated in the Trustees’ Charge**. Specifically, the Faculty Panel has interpreted the charge as applying not only to thermal coal and crude oil producing companies, but also to power generators making the choices to invest in coal versus lower-emission alternatives, and to oil refineries that refine the most GHG-emitting crude oils produced from the oil and gas sector.
3. Uniquely, we have developed a framework that can be broadly applied to other industry segments, **providing a glide path approach to a zero-carbon society** by expanding the framework. Likewise, we have developed **a unique rubric for assessing disinformation** that may be tested across a number of different companies, advancing the science of policy-relevant evaluation of disinformation.

In terms of **impact**, as noted in the principles, the fossil fuel metrics cover >90% of the global production of thermal coal and oil. The application of standards themselves can be made more stringent and more expansive over time to develop a glide path towards a zero-carbon future.

In terms of **inclusion**, the report captures the diversity of views of the faculty, students, and our experts, including consideration of social inequality within the US, global climate justice issues, and recognition that multiple levers of change beyond technology and policies aimed at fossil fuel companies will be needed to advance a zero-carbon society, including the role of personal lifestyles and end-use efficiency supported by technological innovations, urban design, behavioral nudging, and policies that link production with consumption.

¹ Of which six decided not to divest/dissociate from fossil fuels at this time (Princeton University, 2022).

Charge 1: Disinformation by Fossil Fuel Companies

Review of Charge 1: What metrics and standards should be used to assess whether a company is spreading climate disinformation or participating in disinformation campaigns? What information is available to assess whether a company is participating in a climate disinformation campaign? What distinguishes these acts from legitimate skepticism or challenging of scientific consensus?

Section accomplishes the following. We delve deeper into the definition of disinformation; establish a typology of claims made in claims disinformation campaigns; describe ways that disinformation is spread, and can be evaluated as evidence; and, propose a rubric or scorecard for evaluating a company's overall participation in disinformation practices and campaigns.

3.1: A Deeper Exploration of Disinformation

The Charge 1 sub-committee reviewed multiple definitions of misinformation and disinformation drawn from different domains (summarized in Section 2, Table 1), and formulated the following definition to inform Charge 1: “*Disinformation comes from an agent communicating with the intent to mislead.*”

According to this definition, the “spreading” of disinformation involves a relatively consistent set of communications over a reasonably long period of time with an intent to mislead. As argued in Table 1, disinformation is distinct from misinformation, wherein one can mislead even when one's communication includes some factually true statements. The above definition is also consistent with philosophical approaches that appeal to the role of an agent in communicating a claim. To unpack this definition, we expand upon the words "intent," "mislead," and "agent" (asking whether firms can be treated as agents).

A. Intent: We construe "intent" in line with the discussion of "intention" in contemporary analytic philosophy, rooted in Anscombe 1957. This broadly Wittgensteinian literature conceives of intent not as residing in a private mental state, but as being ascribed through an intersubjective judgment of an agent's behavior in context. Intention can be distinguished from motivation. Motivation refers to the reasons, conscious or otherwise, that the action was taken, in this case, transmission of information in a particular way. Individuals' motivations are complex and often difficult to infer. Corporate motivations are sometimes more transparent and ipso facto can be assumed to involve an entity's profit maximization responsibility to shareholders. However, even for corporations, motivation can be complex and fluid (e.g., depending on changes of CEO).

A few authors (Freelon and Wells 2020, the EU Commission 2018) have explored the ends for which disinformation is being communicated, which includes economic gain, presumably one reason for which fossil fuel companies might engage in it. Firms can reap clear economic gains by spreading climate disinformation aimed at (and succeeding in) preventing public policies from being formulated which would devalue their fossil fuel assets and/or reduce their revenues from product sales. However, it should be noted that other kinds of companies (internet companies, media companies) as well as other kinds of corporate agents (political parties) and also individual agents (individual contrarian scientists or politicians) can also reap clear economic or reputational gains by spreading climate disinformation, though they would reap those gains by other mechanisms (increased advertising revenue, honoraria and book contracts, as the case may be). Guided by our charge, the panel focused specifically on the intent of fossil fuel companies to mislead on climate change and its solution(s), with assessment of such intent discussed in Section 3.3.

B. "Mislead": Mislead should be construed not merely as a feature of the semantic content of information, but of the way that it is deployed in communication. Part of the reason that "mislead" is a more helpful term in defining disinformation than "deceive" (used by Guess and Lyons, 2014) is that it allows for, and recognizes, how a wide range of speech acts or omissions can serve to purvey such disinformation.

As S e (2018) argues, it follows that “misleadingness—and not falsity as such—is the vehicle of...disinformation. The misleadingness of...disinformation can be generated by (false) Gricean implicatures (Fallis, 2014; Mahon, 2008), by acts of omission, by inaccuracies, etc.” Thus, a Gricean approach usefully modifies the definitions in Guess and Lyons 2020, by broadening the category of “disinformation” beyond what is “false by definition,” to include ways in which omissions, redirections, distractions, irrelevancies, and so on, can serve to mislead. Consider for example messages which are conveyed by repeatedly associating two matters, implying a causal connection without asserting one (for example, “Scientists say Earth is warming and 20XX was the hottest on record. What about that nasty cold spell in January of that year?”). Nothing is said which is not literally true, but the intent, and effect, of the communication is to mislead. Many of the communications of fossil fuel companies have been analyzed as making claims that are (generally) true but incomplete and highly misleading in their context and intention. The possibility that stating something which is literally true could (depending on how it is stated) count as part of an attempt to mislead, may be beyond the kinds of cases which the Trustees were envisioning. Nevertheless, we believe that S e is correct to insist that it is “misleadingness—and not falsity as such— [which] is the vehicle of...disinformation” (though we have regimented the line between misinformation and disinformation differently from that author).

Another kind of misleading by stating something which is literally true has become known as “greenwashing.” This involves stating something which is true, for example advertising some limited positive action which a company has taken on climate change, while omitting to mention other facts which are also true, such as a company’s financial support of industry groups which promote disinformation in their own right. For example, to paraphrase a line of questioning (and cite the figures offered) by Congressman Sarbanes stated during the House Oversight Committee hearings on October 28, 2021: although BP in its 2020 shareholder report pledged to “advocate for fundamental and rapid progress toward the Paris climate goals,” of the company’s 488 reported instances of federal legislative lobbying since 2015, exactly 1 of those (0.2 percent) advanced the goals of the Paris Agreement (Fueling the Climate Crisis: Hearing before the Committee on Oversight and Reform, House of Representatives, October 28, 2021, Serial No. 117-50, 55). The claim in the 2020 shareholder report is misleading, and counts as spreading disinformation, when judged against the company’s lobbying record. A similar example comes from a background memorandum prepared for the hearings, which points out a more general discrepancy between the total amount which four major oil companies operating in the United States (ExxonMobil, Chevron, Shell, and BP), as well as the American Petroleum Institute which they each support, have spent lobbying the federal government since 2011, and the fact that almost none of their lobbying on legislation since 2015 was in support of legislation directed to achieve the goals of the Paris Agreement (such as carbon pricing) despite their public statements of support for these policies (Memorandum, Majority Staff, House Committee on Oversight and Reform, October 28, 2021).

An even broader version of this kind of effort has been documented by Brulle et al. 2020, who analyze the timing and content of advertising expenditures by five major oil and gas companies from 1986 to 2015. They conclude: “The intentional promulgation of what essentially amounts to fossil fuel corporate propaganda by these corporations can have a major impact on the perceptions of the public and major stakeholders regarding the need for legislative action to address climate change” (Brulle et al. 2020, 99). These actions by companies which mislead the public by directing their attention away from the impact of their corporate activities on climate change, or to create a popular impression that the sector was already investing so as to handle climate change without the need for policy intervention, would count as “disinformation” according to the broader definition adopted by the Faculty Panel (Table 2).

C. Agent: Is a company the kind of agent which can communicate with the intent to mislead? In our view, the Trustees’ Charge presupposes and presumes that the companies in question are agents of this kind. We agree with that presumption and offer reasons to support it. A persuasive argument to justify that presumption has been developed by Princeton philosopher and political theorist Philip Pettit in his analysis of the capacities of group agents. In a chapter entitled “Holding Group Agents Responsible,” he and a co-

author contend (List and Pettit 2011: 158l): "... [A] group agent is fit to be held responsible for doing something to the extent it satisfies these requirements: (1) The group agent faces a normatively significant choice, involving the possibility of doing something good or bad, right or wrong. (2) The group agent has the understanding and access to evidence required for making normative judgments about the options. (3) The group agent has the control required for choosing between options."

List and Pettit's second requirement is especially important in developing criteria for judging which acts of misinformation are intentional rather than inadvertent and thus categorized as disinformation. A large firm or other actor with resources sufficient to gather facts and expert opinion, and interpret them, cannot be excused from spreading disinformation by claiming ignorance or error, especially where the same disinformation is repeated regularly and always erring in the same direction. Such firms certainly have "understanding and access" and, we would add, the responsibility to use their resources to ferret out and understand the facts. Given that firms are expected to be able to exhibit due care in their financial statements and operational management, we believe it is reasonable that any firm which can be shown to have spread disinformation over time, in a more than incidental way, can and should be held responsible as an agent for doing so.

3.2: Metrics, Standards, and a Proposed Scorecard for Evaluating Disinformation

As a matter of principle, we believe that the University's decision about whether to dissociate from a company does not require proving a case according to the standards that would be required in a court of law. Nevertheless, the framework of tort law provides a useful comparison for our purposes. For example, intentional torts are defined as "wrongs that the defendant knew or should have known would result through his or her actions or omissions" (Cornell Law, 2022). The knowledge in question is described as either actual knowledge or constructive knowledge. An agent can be held to constructively know something, if it is something which they can reasonably be expected to know. Thus a reasonable expectation that an agent should know something is enough to meet the legal standard of intentional tort. Similarly, we hold that a reasonable expectation that a corporate agent should know (or should have reasonably known) that their false or otherwise misleading communications are in fact misleading, should be enough to meet the Charge 1 standard of spreading climate disinformation.

We argue above, building on List and Pettit, that firms generally should be viewed as capable of gaining this knowledge. Moreover, fossil fuel companies cannot plausibly claim that the question of the impact of their business activities on the climate is incidental or irrelevant to their business model. It is a reasonable expectation that fossil fuel companies should be aware of the broad state of climate science and also of the costs and implications of climate policy and potential policies. It is also a reasonable expectation that such companies are capable of regulating their behavior generally. Thus, if they engage in spreading false or otherwise misleading information, it is reasonable to infer that they should know better (and so constructively do know better), but are acting with the intent to mislead: they are spreading disinformation.

Standards: What is the standard by which the spreading of disinformation should be tested? Here we can borrow from the law directly (Cornell Law, 2017): "In civil cases, the plaintiff has the burden of proving his case by a preponderance of the evidence." The **standard of preponderance of the evidence** is a reasonable standard to apply for our purposes as well. It is worth noting that "[t]he burden of proof is often said to consist of two distinct but related concepts: the burden of production, and the burden of persuasion" (Cornell Law, 2017); we return to these two aspects of the burden of proof below.

Interpreting this standard for our purposes, it is helpful to think of it as applying to the pattern and content of the claims in question. One true statement recognizing the reality of climate change, accompanied by ten statements casting doubt on it, minimizing the risks or inflating the costs, calling for delay, and so on, would constitute a corpus of 11 statements indicating a preponderance of evidence toward disinformation.

Finally, we conclude this section by observing that the definition of disinformation, the literature that we draw upon, and the standards that we propose to evaluate it, invite absolute rather than relative judgments of the preponderance of evidence. That is, the question is not whether one company is a worse offender than another, but simply of whether it itself has spread disinformation according to a preponderance of the evidence. So companies cannot offer the defense that they are no worse than the average in their sector. This is in keeping with the deontological nature of the University's core value of truth-seeking, which we understand to be one of the commitments animating the Trustees' decision.

Proposed scorecard: To evaluate the preponderance of evidence on disinformation, we propose a scorecard that tracks the different types of climate-contrarian claims made in disinformation practices and campaigns (columns of proposed score card), along with the modes via which disinformation is effected (rows) and can hence be evaluated for preponderance of evidence. These modes by which disinformation is effected reflect behaviors of the agents, and hence speak to intent (i.e., intent is inferred by behaviors and not by motivation). These two elements – climate contrarian claims, and the modes to effect them – together constitute the scorecard (see Table 3), and are described in sections 3.3 and 3.4, respectively. Guidance on how to use the proposed Scorecard is further detailed in Section 3.5.

3.3: Types of Climate-Contrarian Claims Made in Climate Disinformation Efforts

Different types of climate-contrarian claims are made in disinformation campaigns. These are well-represented by Coan et al. (2021), who used supervised machine-learning to assemble and categorize contrarian claims about climate change from 255,449 documents from 20 prominent conservative think tanks (CTTs) and 33 influential contrarian blogs from 1998-2020. 95% of such claims of CCTs and 64% of such claims from blogs are from the USA; others from blogs come from Australia, NZ, UK, Canada, Iceland, and Germany. The following five categories of “super claim” content areas emerge (Coan et al., 2021):

1. Climate change is not happening.
2. Human greenhouse gas (GHG) emissions are not causing it.
3. Climate impacts are not bad.
4. Climate policy/solutions are not working.
5. Climate science is unreliable.

The above list is broadly consistent with Supran and Oreskes (2017), who analyzed “four key points of understanding about anthropogenic global warming—that it is real, human-caused, serious, and solvable.”

Contrarian Claims on Climate Science—Occurrence, Cause and Effect: Claims 1-3 in the above list from Coan et al (2021) address core elements of climate science that were broadly proven to be false, and known to be false, at least as of the issuance of IPCC’s First Assessment Report in 1990 and Second Report in 1996. Therefore, any campaigns based upon claims 1-3 may directly indicate misleadingness (ML), and serve as review triggers (RT) to explore other aspects of the company’s communications.

Claims on Climate Science Reliability: Claim 5 in the above list, that climate science is unreliable, undermines the whole enterprise of climate science which the University itself pursues. On the other hand, Claim 5 could be asserted in good faith, rather than disinformation, and hence is noted as potential for legitimate skepticism (PLS). However, if its assertion is repeatedly conjoined with any of the other super claim categories, such as Claim 4 on climate solutions (for example, if the claim is made while misrepresenting either the costs or the benefits of the policy), then it may count toward an assessment of the spreading of disinformation.

Contrarian Claims on Climate Solutions: Claim 4 in the above list (policy solutions are not working) is a more contested area, hence is noted, similar to Claim 5, as potential for legitimate skepticism (PLS). Supran and Oreskes (2017) include the topic of whether anthropogenic climate change is "solvable" in the remit of what they argue to have been misleading climate communications by ExxonMobil. They do so on the following grounds, noting the evolving toolkit of contrarian arguments: "While the question of Anthropogenic Global Warming (AGW)'s solvability is not resolvable on purely technical grounds, the relative extent to which documents promote doubt on the matter remains relevant to the character of climate communications, insofar as assertions that AGW cannot be stopped are a common component of contrarian claims" (4-5).

Company Greenwashing: Finally, researchers are increasingly focused on the disinformation which some fossil fuel firms spread about their own activities, in light of their purported commitments. This is sometimes called "greenwashing," in that they may have made a public commitment to be compliant over time with the goals of the Paris Agreement (for example), but then both fail to pursue a business plan capable of bringing about such compliance, and also spread disinformation about their failure to do so.

As a Faculty Panel, we have adopted the view that each one of the above categories of claims can potentially count as disinformation—in certain circumstances—when spread by an agent on the terms which we describe in analyzing this Charge. This is consonant with the state of the literature on which we draw. Indeed, the fact that corporate disinformation about climate change has increasingly come to center in disinformation about their own commitments and efforts in this area, suggests a way in which Charge 1 and Charge 2 might ultimately begin to converge. Focusing attention on the public commitments to a glide path toward the goals of the Paris Agreement made by fossil fuel companies of various kinds, and evaluating the extent to which these commitments are mere greenwashing versus credibly pursued plans, is one way in which the University could come to identify companies which are at odds with both its truth-seeking and its environmental core values and so which do not merit further association.

In summary, evidence of certain climate claims (e.g., Challenging Climate Change Cause and Seriousness of Effect) directly establish intent to Mislead (ML) and hence provide evidence of disinformation, while others may indicate potential for legitimate skepticism (PLS). Still others may serve as a Review Trigger (RT) for further evaluation of other aspects of a company's communications. These actions are conceptually illustrated in a draft scorecard in Table 3, that is proposed for evaluating the preponderance of evidence of disinformation. Table 3 is not intended to be comprehensive, but rather to illustrate the different types of evaluations that can emerge, distinguishing between those climate-claims that directly inform misleadingness, versus those that might leave room for legitimate skepticism and those that serve as triggers for further review.

Table 3. A proposed scorecard to evaluate the preponderance of evidence of disinformation by mapping sources of data against different types of climate-claims made in company communications. Evidence of certain claims may directly establish intent to mislead (ML), indicate potential for legitimate skepticism (PLS), and/or serve as a review trigger (RT) for further evaluation of other aspects of a company’s communications. Illustrative actions and determinations of disinformation as intent to mislead (ML) are shown below.

Sources of Data as Evidence Base	Types of Climate-Claims in Disinformation Efforts			
	<i>Climate science cause and effect</i>	<i>Climate science reliability</i>	<i>Climate solutions</i>	<i>Company greenwash</i>
<i>1. Internal vs public communications</i>	ML, RT			RT
<i>2. Public statements, incl climate action plans</i>	ML, RT			RT
<i>3. Advertisements and social media</i>	ML, RT			RT
<i>4. Membership in forums that spread disinformation</i>	Passive membership is a review trigger (RT) to evaluate other (above) sources and modes of disinformation, but not sufficient by itself to establish intent to mislead. Active membership will lead to ML if evidence found for Climate Change Cause-Effect and Greenwash			
ML: Evidence of communications with intent to mislead (i.e., disinformation). RT: Review trigger for evaluating other aspects. PLS: Potential for legitimate skepticism which requires further analysis (grey area in table)				

3.4: Evidence Base and Modes of Climate Disinformation

There are different kinds of evidence potentially available in different cases to support an ascription of disinformation. The evidence is closely linked to the modes by which disinformation is effected//implemented (the rows of Table 3).

1. Companies’ Internal vs External Communications: The clearest evidence of an intent to mislead is a systematic discrepancy between a firm’s internal communications and its external communications to the public. Exemplary of this are the analyses by Supran & Oreskes (2017, 2020b) of the discrepancy between scientific statements shared in Exxon’s internal communications and those spread in its public communications between 1977-2014, taking this discrepancy to support the conclusion that “ExxonMobil misled non-scientific audiences about climate science” (Supran & Oreskes 2017, 12). Supran & Oreskes 2017, 2020b, 2020a, rest on particularly rich bodies of material allowing for the comparison of public and private corporate communications, furnishing evidence that the firms in question (both Exxon and Mobil before their merger, and ExxonMobil thereafter), actually knew the true state of climate science, and also, that they systematically misled the public nevertheless. See Box 1.

2. A Company’s Public Statements, including Climate Action Plans: While systematic discrepancy between a company’s internal versus public communication (as in the Exxon case) affords a high degree

of evidence of both knowledge and intent, and so makes the judgment of this case an easy one, we contend that similar conclusions can be drawn in other cases simply by analyzing patterns of public communication themselves, insofar as these can be shown to be systematically skewed in their misleading tendencies. Evidence may be available indicating either discrepancy on the one hand, or synchrony on the other, between the communications in question and other corporate actions and/or external events. Both discrepancy and synchrony can, in different contexts, support a reasonable inference of an intent to mislead vis-à-vis what an agent otherwise can be shown to affirm, which could constitute disinformation. See examples in Box 2a and b. Relevant data sources include public statements made in earnings calls and investor conferences available through LexisNexis and Bloomberg; public statements in SEC files; disclosures with regard to political lobbying, among other sources. **Company Climate Action Plans** are an important subset of a company's public communications. ClimateAction 100 (<https://www.climateaction100.org>) tracks the business plans of the largest greenhouse gas emitting companies in order to assess their credibility in regard to commitments they have made with regard to the goals of the Paris Agreement.

3. Advertisements, Social Media and Other Sources: Identification of the spreading of climate disinformation, including as part of a campaign, requires a substantial evidentiary archive, which may not be available in all cases. Researchers have been developing various kinds of tools for compiling such archives, with many tools focusing on advertisements, for example, the project at <https://eco-bot.net> that automatically scrapes and classifies Facebook advertising and greenwashing, and AdWeek. We understand that research efforts are underway to automatically track and flag worldwide social media postings in this space, which may provide significant data within a year or so. There are other informational resources available, including court judgements in regard to specific companies. The Influence Map project (<https://influencemap.org>) compiles data on how industry and finance are acting in regard to climate change.

4. Membership in Organizations that Spread Disinformation: In regard to the organizations that spread disinformation, in which fossil fuel companies may be members: a number of recent studies have provided supplementary information listing and documenting such organizations (Brulle 2013/2014, Farrell 2015, Brulle et al. 2021, Brulle 2022). We believe that membership in such an organization can serve as a review trigger, though not as the sole evidence on which a decision to dissociate should be taken. A challenging question is whether the purely passive membership of an organization makes one part of a campaign which that organization pursues. One view is that so long as the financial contributions are relatively insignificant, and/or the membership involvement is relatively passive, it does not. Another view is that organization membership does indeed make one part of a campaign which that organization pursues, particularly if a firm is an active leader in the organization, for example, with representatives on its board. Continued participation by a firm in an industry group or association engaged in a climate disinformation campaign could be deemed as a sufficient basis for dissociation unless evidence is presented that discontinuation of the relationship is underway, or that a firm has engaged actively in efforts to change the trade association's policies, or to countervail any disinformation which it may be spreading, or both. We believe that this judgment needs to be made by the Trustees. Concretely: we recommend that a set of industry groups and associations be identified that have a demonstrated history of disinformation. A history of and/or present-day membership in or financial contribution to such groups or associations, would be a review trigger (RT) for the need for assessment of the company's record in regard to spreading climate disinformation, including as part of campaigns led by such groups or associations.

BOX 1: Evidence of Misleadingness from Discrepancies between a Company’s Internal versus Public Communications

“Available documents show a discrepancy between what ExxonMobil’s scientists and executives discussed about climate change privately and in academic circles and what it presented to the general public. The company’s peer-reviewed, non-peer-reviewed, and internal communications consistently tracked evolving climate science: broadly acknowledging that anthropogenic global warming is real, human-caused, serious, and solvable, while identifying reasonable uncertainties that most climate scientists readily acknowledged at that time. In contrast, ExxonMobil’s advertorials in the NYT overwhelmingly emphasized only the uncertainties, promoting a narrative inconsistent with the views of most climate scientists, including ExxonMobil’s own. This is characteristic of what Freudenberg et al term the Scientific Certainty Argumentation Method [Freudenberg et al., 2008]—a tactic for undermining public understanding of scientific knowledge. Likewise, the company’s peer-reviewed, non-peer-reviewed, and internal documents acknowledge the risks of stranded assets, whereas their advertorials do not. In light of these findings, [the authors] judge that ExxonMobil’s AGW communications were misleading...” (Supran & Oreskes 2017: 15).

In Supran & Oreskes, 2020a and 2020b (the latter an “Addendum” to the 2017 paper) they respond to objections made to the original article by the company in the interim (in Swarup 2020).[1] They conclude in 2020b by categorizing three ways in which the public was misled by ExxonMobil during this time period: “The **first** way the public was misled derives from the results of our content analysis and relies on a line of reasoning presented in our original paper: comparison across company document categories” (12); “The **second** way the public was misled also derives from the results of our content analysis and relies on a line of reasoning presented in our original paper: comparison of public company communications against available scientific information.” (13); “The **third** way the public was misled relies on an additional line of reasoning that was not explicitly discussed in our original paper: comparison of the results of our content analysis against an extensive literature of scholarly research and investigative journalism that has chronicled the company’s history of directly and indirectly perpetuating climate science misinformation.” (14).

BOX 2: Evidence of Misleadingness on Climate Issues from Analysis of Public Communications

2A: Discrepancy in Public Communications: An example of discrepancy emerges from comparing the ExxonMobil corporate guidance on proxy voting at its annual shareholder meeting in 2021, with a statement in its 10-K filing with the SEC for the same year.[1]

In seeking to persuade shareholders not to support 2021 Item 6, a motion proposing that “Shareholders request that ExxonMobil’s Board of Directors seek an audited report assessing how applying the assumptions of the International Energy Agency’s Net Zero by 2050 pathway would affect the assumptions, costs, estimates, and valuations underlying its financial statements,” the Board recommended that shareholders “vote AGAINST this proposal for the following reasons,” which included this statement: “ExxonMobil is well positioned for a lower-carbon energy future as it works to provide the reliable energy that supports economic growth and improves the quality of life for people around the world, while at the same time pursuing further emission reductions and technologies that support the goals of the Paris Agreement.”

However, the 10-K registers no such unqualified support for the Paris Agreement as the shareholder guidance had implied. Instead, its discussion of agreements reached within the UN Conference of the Parties framework is expressed as an arm’s length analysis which stresses uncertainties and hypotheticals rather than a commitment to pursue the framework’s common goals: “Driven by concern over the risks of climate change, a number of countries have adopted, or are considering the adoption of, regulatory frameworks to reduce greenhouse gas emissions including emissions from the production and use of oil and gas and their products. These actions are being taken both independently by national and regional governments and within the framework of United Nations Conference of the Parties summits under which many countries of the world have endorsed objectives to reduce the atmospheric concentration of CO₂ over the coming decades, with an ambition ultimately to achieve “net-zero.” Net-zero means that emissions of greenhouse gasses from human activities would be balanced by actions that remove such gasses from the atmosphere. Expectations for transition of the world’s energy system to lower emission sources and ultimately net-zero derive from hypothetical scenarios that reflect many assumptions about the future and reflect substantial uncertainties.” (ExxonMobil 2021 10-K)

2B: Synchrony in Public Communications: An example of synchrony between a communication and an event or action, which supports a judgment of disinformation, is the spreading of disinformation of specific kinds by fossil fuel firms, which can be shown to have increased strategically following the announcement of specific climate action bills and just prior to floor votes on them, as well as following specific other external events (Coan et al. 2021; Brulle et al. 2019/2020).

SOURCE: Case study 2A developed from data gathered by Barbara Coffey, Librarian, Princeton University

3.5: Disinformation Campaigns

The practice of disinformation within a company, and the spreading of disinformation can be embedded in an overall campaign. This raises the questions, what exactly is a campaign? When is a campaign effective? And finally, when is a firm part of a disinformation campaign?

A campaign is characterized by the following attributes. First, a campaign involves many people as possible recipients of a message, and can include company's internal practices such green-washing annual reports, versus externally-focused efforts to spread disinformation, e.g., via advertisements or by financial donations to social media platforms that further disinformation. An information exchange that targets only one or very few people does not constitute a campaign. Thus, the panel recommends focusing evaluation of disinformation on the largest fossil fuel companies in Princeton's investment and sponsored research grant portfolio. Second, a campaign is an organized course of action to achieve a certain goal. It is the opposite of an off the cuff remark or any one-time communications. Finally, a campaign implies automatically some form of intent, which is an important element of any disinformation. Intent is assessed on the basis of a pattern of behavior gleaned from evidence (rather than motivation), sources of evidence are summarized in Section 3.4. We note that the existence of a campaign does not require that it was ever formally "approved" as such in order to be reasonably judged to have existed. This fact makes irrelevant the fact that each of the CEOs who testified at the House Committee on Oversight and Reform hearing on October 28, 2021, answered "no" to the question "have you ever approved a disinformation campaign" (Fueling the Climate Crisis: Hearing before the Committee on Oversight and Reform, House of Representatives, October 28, 2021, Serial No. 117-50, 23-24). Presumably, the ExxonMobil CEOs over the years would have answered no to this as well, yet that would not render them invulnerable to an evidentially-based judgment of having "misled non-scientific audiences about climate science" (Supran & Oreskes 2017, 12).

A campaign is considered as "effective", if it (i) is not ignored and (ii) at least has the potential to change people's opinions. The latter is not the case if people's views are already cemented, i.e. the earth is not flat. Importantly, whether a campaign is considered as effective should be evaluated from an ex-ante perspective, not from an ex-post perspective. That is, if organized effort happens to have failed to make an impact in the aftermath, it is still considered a campaign as long as there was a good ex-ante chance that the effort changes people's opinions, based on application of a 'reasonable person' standard.

Returning to the question of the information available to assess whether a company is participating in a climate disinformation campaign specifically: we would suggest that this effort must begin by identifying the campaign itself. The organizers of a campaign are necessarily participants in it. So are firms that contribute funding to a campaign. Thus a company's participation in a campaign can include systematic efforts to greenwash, shaping company practices internally, as well as external-facing campaigns linked to advertisements and associations with groups that amplify disinformation. Both aspects are addressed in the Scorecard that can provide an overall picture of a company's practice of disinformation and its participation in campaigns.

3.6: Utilizing the Proposed rubric/scorecard for evaluating disinformation

Because of the complexity of the assessment required to judge whether a climate-claim counts as disinformation or not, vis a vis the intent to mislead vs potential for legitimate skepticism, there are no simple metrics available. Instead of metrics, therefore, we propose the scoring system described in Table 3. The aim is not to require that every row and column be filled in, but rather to use them as guides for amassing and assessing relevant evidence. The scorecard is intended as a starting point for deliberation and assessment, not as its end point, and provides guidance on where potential for legitimate skepticism (PLS) might apply and where intent to mislead (ML) is clear. A "review trigger" (RT) means a trigger for further exploration of a company's communications by the future panel established to oversee the dissociation process. There is no unambiguous threshold to determine which kind of scorecard profile is worse than another and which crosses the line of unacceptability. On the one hand, we consider that any violation of

Princeton's core truth-seeking value needs to be recognized; on the other hand, we acknowledge that the University may be able to make most progress in dissociation most quickly, and so contribute also to fostering the environmental values it holds, if it focuses on the most severe and egregious cases of such violation. Any potential instance of disinformation should be indicated on the card, with an assessment of how widely repeated a claim was, over how long a period, by how central a corporate actor or action. Conversely, if disinformation was issued but then corrected and disavowed, that should be noted too.

The scorecard allows exploration of legitimate skepticism. An example of legitimate skepticism and the challenging of scientific consensus is provided in Box 3. Patterns of argumentation that characterize disinformation and distinguish it from honest skepticism include:

- Repetition of numerous clearly false statements that are biased in one direction, e.g., counter to the scientific consensus as defined above, or by the laws of physics.
- Frequent and continued use of rhetorical devices such as half-truths and strawman arguments biased in one direction (again, see Coan et al. 2021).
- Invocation of conspiracy theories and heavy reliance on motivations as opposed to scientific reasoning in criticizing scientific statements by others or/and the scientific consensus.

The second and third points above involve consideration of the context in which statements are made (Coan et al. 2021), consonant with our analysis above of current and recent patterns of climate disinformation as well as of the range of ways of spreading disinformation.

BOX 3: Example of Legitimate Skepticism

This is the case of John M. ("Mike") Wallace, a distinguished meteorologist (and member of the National Academy of Sciences) at the University of Washington, whose attitude toward the human influence on climate evolved from 1994-2004. Wallace is highly regarded, but like many other meteorologists, because he works on the weather end of the spectrum of variation, disciplinary differences coupled to sensible caution had him often in the role of "legitimate" skeptic. A newspaper article in 2005 tells the story as follows, beginning from an encounter between Wallace and Al Gore in 1994: "Like many of his peers, Wallace wasn't convinced greenhouse gasses were altering the world's climate, and he thought Gore was straining scientific credibility to score political points. More than a decade later, Wallace still won't blame global warming for any specific heat wave, drought or flood — including the recent devastating hurricanes. But he no longer doubts the problem is real and the risks profound. "With each passing year the evidence has gotten stronger — and is getting stronger still."

As this shows, Wallace was a skeptic who continued to consider the emerging scientific evidence and changed his views as a result. The documentation cited here ends in 2004 with his acceptance of the human influence on climate (anthropogenic climate change), while expressing continuing skepticism about event attribution to that influence, a field that was then just emerging. This is a good example of legitimate skepticism and the challenging of scientific consensus which remains responsive to evidence.

We note that the scientific consensus is imperfect and subject to legitimate skepticism; we recognize that society should be open to shifts in consensus, and open to paradigm shifts (as per Thomas Kuhn's philosophy of science). Assessing a consensus requires a background theory to determine the relevant confidence interval. Such work has been done in analyses including confidence intervals or equivalent qualitative statements in recent approaches to measurements of climate consensus (Mastandrea et al., 2010). Overall, we believe that for present purposes, it is possible to distinguish the spreading of disinformation from skepticism and challenging of consensus on the basis of the three criteria above. These criteria along

with the elements of the scorecard rubric can provide a first semi-quantitative judgment of the entire scope of disinformation efforts of fossil fuel companies.

3.7: Summary and Recommendations

1. Evaluate full range of disinformation: The future entity charged with overseeing the dissociation process should be guided by the principles in this report that characterize disinformation and disinformation campaigns; take account of the full range and typical nature of climate disinformation campaigns as identified in scholarly literature (including not only claims about climate science, but also patterns of statements about a firm's own emissions performance or about public policy when these can be credibly judged to mislead); and distinguish disinformation from statements that reflect potential for legitimate scientific disagreement and dissent. In gauging the veracity of statements and whether disinformation was intended, the panel should engage expertise on communications, science, and public policy from within and outside Princeton.

2. Test the scorecard rubric and report results publicly: We recommend that the University test the rubric with 2-3 fossil fuel/energy sector companies, focusing on the largest in its investment and grants portfolios. We recommend publicly posting a reflexive description of the data and the subjective judgments involved in evaluating the preponderance of evidence using the rubric in Table 3.

3. Apply scorecard rubric initially to the largest fossil fuel firms in Princeton's investment and research portfolio using past two years' data: Learning from the test cases, the University initially on the largest 20 firms in the fossil fuel industry segments identified in Charge 2 within Princeton's investment portfolio, sponsored research, grants and/or career services associates, including thermal coal producers and powerplants using thermal coal; oil and gas producers; oil refineries. The focus on the largest firms is to address the largest potential impact on the public from disinformation campaigns. This review should take into account a firm's conduct in this space in the last two years, in order to establish a "watchlist" for further evaluation, which could then be maintained in ways that we describe below.

4. Extend analysis to ALL fossil fuel companies associated with the University: After gaining adequate experience with the initial effort focused on the largest fossil companies, other candidates for review should be any fossil fuel companies with which Princeton University has grants or research partnerships with (whatever the size of the firm). We also recommend that the panel conduct a benchmark review of the conduct of the major trade associations for the various sectors of the fossil fuel industry, as their conduct will be relevant to assessing the records of their members (though the degree of relevance needs itself to be further assessed by the Trustees as described in Section 3).

5. Other triggers for future assessments: Assessments could also be triggered by a process of receiving allegations raised on the basis of evidence, by members of the university community including alumni, students, or other concerned parties, that a particular firm covered by the Trustees' policy is engaged in the spreading of climate disinformation, including through participation in a climate disinformation campaign. Such campaigns may include those led by trade associations to which the firm belongs and other entities over which the firm exerts substantial influence via contracts, donations, or grants. The university should also periodically review new publicly available information as it is amassed, including determinations of a similar kind made by peer institutions, which could trigger review of particular companies.

6. Burden of proof: Once the panel has determined that a credible reason for investigating a particular firm on this question exists, the burden of proof should rest on that firm to show that they had not engaged in spreading climate disinformation or participating in climate disinformation campaigns. This involves their bearing both the burden of production of evidence to counter the allegations, and the burden of persuasion to show how the evidence is relevant to doing so. Companies may seek to clear themselves of an allegation

of having spread climate disinformation. Alternatively, they could acknowledge having spread disinformation in the past, but put forward a credible plan to change that behavior going forward.

7. *Guidance on lack of data:* In cases where credible reason for investigating a particular firm exists, but the firm does not provide sufficient evidence for a conclusive determination to be made, we propose that investment or other form of association by the University should cease. If the University cannot determine that a company's activities are in keeping with University values, it cannot confidently associate actively with that company. The burden of proof must be placed squarely on the companies which seek continued University investment or association. It is up to them to demonstrate that they have not spread disinformation, making available a representative set of records to make this judgment plausible.

8. *Creating a Public Repository:* Over time, the above recommendations should generate a public list of companies meeting the Trustees' criteria for having engaged in disinformation, which should be tested against other similar lists at other universities. We recommend that all of the information and analysis be made publicly available, at least within the Princeton University community.

Charge 2: Thermal Coal and Tar Sands Segments of the Fossil Fuel Industry

4.1. Trustees' Rationale for Dissociation

The trustees of Princeton University have indicated an initial focus of dissociation efforts on fossil fuel companies materially participating in thermal coal and tar sands segments of the industry. Their rationale is communicated as follows in the University's May 2021 press release: "*Thermal coal, which is burned for steam and used to produce electricity, emits substantially more carbon dioxide in its combustion than alternative available fossil fuels. Tar sands oil, derived from loose sands or sandstone, produces significantly higher emissions than conventional crude oil, including in its extraction and production process.*" These statements indicate a slightly different rationale for the two different fossil fuel industry segments; they also help identify industry segment sub-categories to evaluate for dissociation and guide the development of associated metrics, as described in sections 2 and 3.

4.2. Thermal Coal

Industry Segments: The Trustees' rationale for thermal coal (see Section 1), highlights the substantially greater carbon dioxide (per unit of energy) produced upon combustion of thermal coal compared to widely available alternative fossil fuels such as natural gas. The panel interprets this statement to indicate a focus on two types of companies materially participating in the production or direct use of thermal coal: **a) Coal producers** engaged in coal mining operations, and, **b) Electric utilities** that burn coal for power generation in the US, where natural gas and other cleaner options are readily available for power generation.

Metrics: A Global Coal Exit List (GCEL; Urgewald) was evaluated by the faculty panel to develop metrics for material participation in thermal coal by the two industry subgroups (coal producers and utilities). The GCEL was also referenced by one of the invited external experts as a global resource used by investment groups engaging in environmental, social, and governance (ESG) focused investing. Drawing upon this resource, we propose the following metrics for material participation in the thermal coal segment of the fossil fuel industry:

- **Coal Producers:** Those with either a $\geq 10\%$ share of revenue from coal production, or, producing ≥ 5 million tons of coal per year.
- **Power plants:** Those with either a $\geq 10\%$ share of revenue from coal-fired power plants, or, with ≥ 2.5 GW installed coal power generation capacity

The Urgewald Coal Exit List is able to provide these data worldwide, covering 90% of the world's thermal coal production and 90% of global coal-fired power generation capacity; year 2023 updates to the GCEL will incorporate the thresholds referenced above. The absolute threshold of 5 million tons of coal per year would include companies producing a small fraction ($\sim 0.065\%$) of the world's total coal production in 2021 of 7,741 million tons of coal per annum (EIA), thus providing granularity to track smaller coal producers.

Private coal companies and electric utilities that do not publicly report their GHG emissions will be assumed to be among the worst emitters, unless they provide data indicating otherwise.

4.3. Tar Sands and High Emitting Crude-oils

Industry Segments: The Trustees' rationale for dissociating from the Tar Sands segment of the fossil fuel industry (See Section 1) is noted to be the higher greenhouse gas (GHG) emission intensity of producing oil from tar sands, compared to conventional crude oil. However, recent studies assessing emissions up to

the refinery gate show that, in some cases, conventional heavy crude oil can be as or more emission intensive than crude oil derived from tar sands (Masnadi et al., 2018).

Therefore, the panel recommends focusing on the following segments of the oil industry: a) **Tar sands companies** that produce diluted bitumen or bitumen-derived synthetic crude oil from tar sands; b) **Conventional heavy crude oil producers** whose operations result in GHG (CO₂-equivalent) emissions intensities up to the refinery gate that are similar to or higher than that of oil from tar sands; and, c) **All oil refineries that refine such crude oils** (both tar sands and conventional heavy crude oil). We focus on GHG emission intensity up to the refinery gate as a marker for the most polluting oil industry segments; other environmental impacts of tar sands extraction (e.g., on local water or land resources), while significant, were not considered by the panel as they were not indicated in the rationale for dissociation provided by the Trustees.

Metrics: Peer-reviewed articles on GHG emissions from the oil industry addressing chemical processing up to the refinery gate (Masnadi et al., 2018; Jing et al., 2020) along with Urgewald's Global Oil and Gas Exit list (GOGEL; Urgewald) were evaluated by the faculty panel to develop metrics for the three types of oil companies noted above. Drawing upon these resources, we propose the following metrics for material participation in the tar sands and high intensity crude oils segment of the fossil fuel industry:

- **Oil producer:** Those producing ≥ 20 million barrels of oil equivalent per year, from tar sands or from conventional heavy crudes, with GHG emission intensity up to the refinery gate greater than 12 g CO₂e/MJ crude produced.
- **Oil refineries:** Those processing ≥ 20 million barrels of oil equivalent per year of either of the above crude oils (heavy conventional crudes, synthetic crudes from tar sands or diluted bitumen from tar sands), identified by their unique refinery processes/operations. Websites such as the "refinery report" have tracked some of these refineries across the US.

The threshold of 20 million barrels of oil equivalent represents a share of CO₂e emissions from annual oil production that is commensurate with CO₂ emissions from combustion of 5 million tons of coal per annum (the metric used for thermal coal). Applying a suggested emissions intensity threshold of 12 g CO₂e/MJ crude up to the refinery gate, represents ~75th percentile in terms of GHG emission intensity of crude oil production, and would address 28% of global petroleum production that lies above that threshold- see Figure below from Masnadi et al. (2018). Tar sands operations that fall below this threshold can be considered high performers with low GHG-intensity, while conventional crude oil that is highly polluting will fall in the highest 22% of emission intensities. The proposed materiality metric of 20 million barrels per year reflects a small fraction (~0.055%) of the world's total oil production in 2021 of 36,500 million barrels of oil equivalent (EIA), indicating sufficient granularity to track smaller oil producers. The GOGEL database covers 94.6% of global oil and gas production, ensuring comprehensive coverage. (Source: <https://gogel.org/gogel-explained>). Annual reports from oil refiners will need to be queried to identify those refining high emitting crudes and bitumen, as the refineries use specialized chemical processes, and can also be cross-checked with emerging data on refinery emissions (Jing et al., 2020).

Private oil companies that do not publicly report their GHG emissions will be assumed to fall among the worst emitters, unless they provide data indicating otherwise.

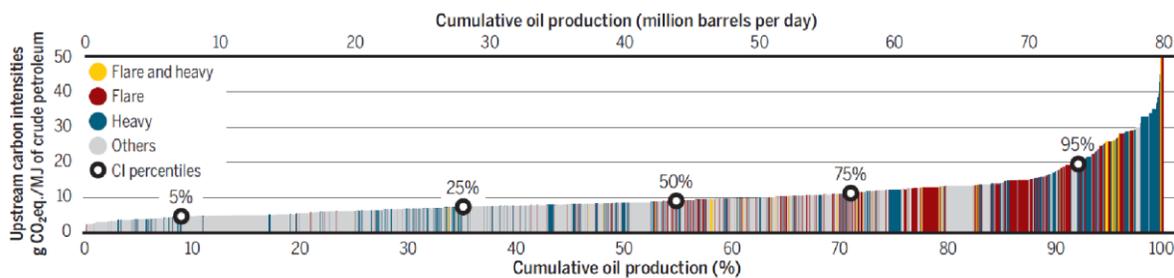


Figure 1: From Masnadi et al., 2018.

4.4. A Rigorous Standard for Prospective Actions

Fossil fuel companies that meet the materiality standards outlined in Section 2 and 3, will be evaluated further for dissociation based on their prospective actions, as indicated by the Trustees’ statement: *“based on current and prospective actions of companies in the fossil fuel industry, rather than past actions. Those businesses involved in thermal coal and tar sands [as identified in #2,3] will be exempt from dissociation only if they can prove they can meet a rigorous standard for greenhouse gas emissions.”*

We define a rigorous standard for evaluating prospective actions as the same standard that Princeton applies to itself: public reporting the University’s GHG emissions, demonstrating measurable ongoing and future reductions in emissions intensity, and credible publicly stated plans to decarbonize at least the energy use in university operations (called Scope 1+2 GHG emissions), by 2050, with milestones to track progress. [Note that at this time, Princeton University has not pledged to decarbonize its Scope 3 emissions from employee commuter travel, employee work-related airline travel, or, embodied energy from construction materials, fuel or food purchases, although these sectors are now being recommended in many University and Community GHG protocols.]

Following the guidance offered by the Trustees, the panel recommends that companies that are identified for dissociation in sections 2 and 3, may be exempt from dissociation if they have a credible plan to fully decarbonize their emissions by 2050 or earlier, with credible near-term milestones to track progress. The following conditions are stipulated:

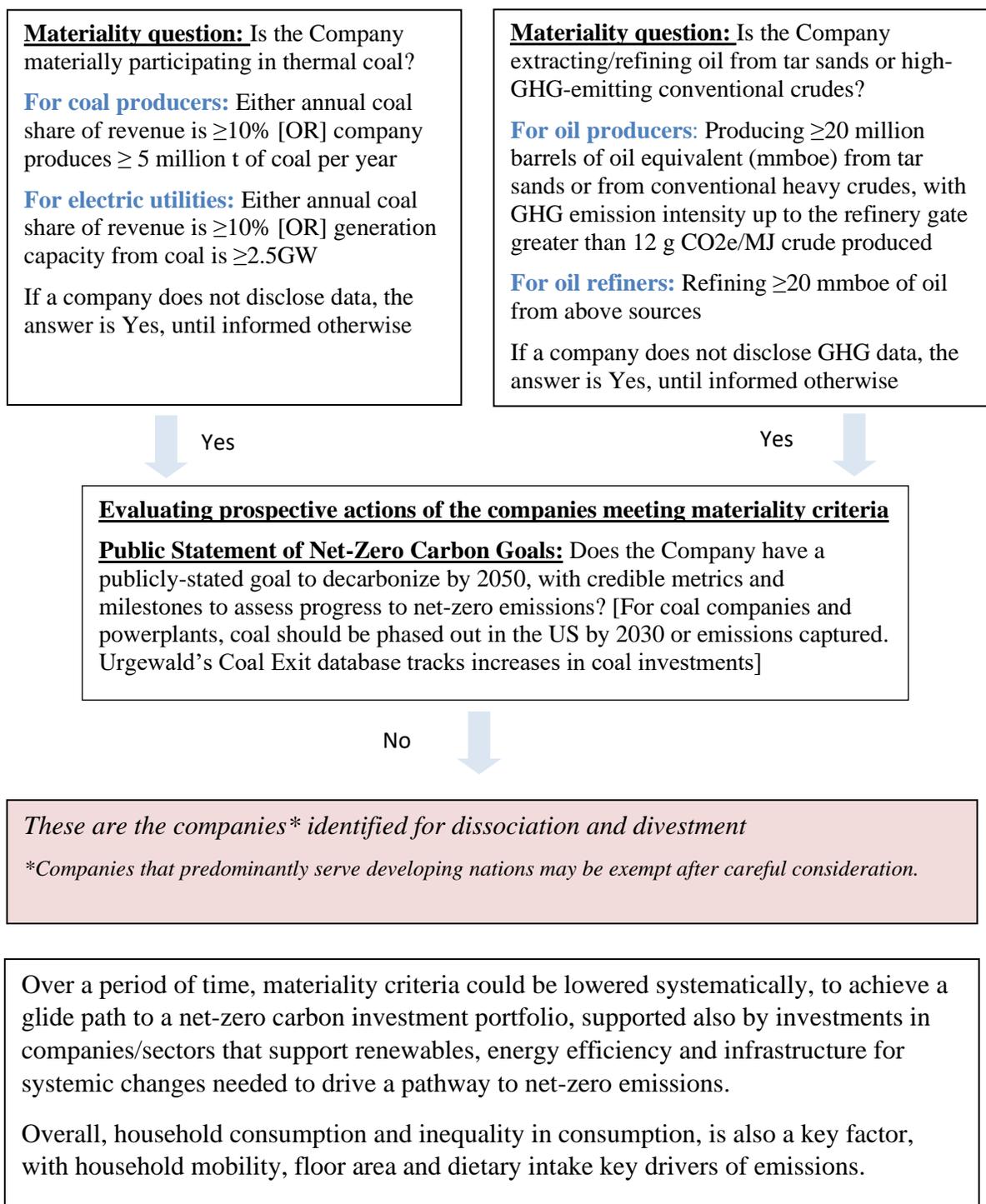
- Credible decarbonization plans must not rely materially on ecological approaches toward carbon sequestration, given uncertainty regarding their permanence and additionality. Credible decarbonization plans must involve either reducing the use of fossil fuels or demonstrate investments in technologies that if combusting fossil fuels, capture the resulting GHG emissions (e.g., carbon capture and sequestration, CCS) or permanently remove and geologically sequester an equivalent volume of CO₂ from the atmosphere. e.g., direct air capture, DAC).
- For the thermal coal industry, rigorous standards for decarbonization include full phase out of coal production assets (for coal producers) or capture of coal combustion emissions (by power plants) by no later than 2030. Credible milestones include no future investments in coal-production assets, reduced operations of existing assets, and reduced emissions from coal-burning power plants due to carbon capture, all of which can be tracked via the GCEL.
- Decarbonization targets for oil producers and refiners are more complex because emissions from combustion of the produced gasoline and diesel occurs in the transportation industry (bus fleets, car fleets, airline fleets, freight and personal cars). An initial rigorous standard for dissociation of the oil industry, consistent with Princeton University’s current decarbonization plans, is to decarbonize operational energy use (Scope 1+2) emissions by 2050, for both oil producers and refineries. Credible metrics to track progress include reduced wells-to-refinery-gate GHG emission intensities and investments in technologies that achieve net-zero carbon goals for industry operations.

- A more advanced decarbonization target is to create net-zero carbon products – e.g., gasoline, diesel and jet fuel, such that their combustion emissions post-sale in transportation sector operations are “zeroed out.” However, this standard has been publicly adopted by only a small handful of oil companies to-date. Creating net-zero oil products can potentially be achieved via carbon capture, storage and utilization for enhanced oil recovery from the subsurface or direct air capture at refineries to produce net-zero carbon products; however, without careful carbon accounting and governance, it may result in perpetually growing the oil industry (and emissions) rather than promoting a systemic shift to electric vehicles and a transition of the oil industry toward chemicals and plastics. The panel recommends oil companies demonstrate commitment to decarbonize their operational (Scopes 1+2) emissions by 2050, and discuss timelines to decarbonize the product portfolio they sell (Scope 3 emissions) aligning with Princeton’s future efforts to decarbonize the University’s Scope 3 emissions, particularly around employee airline and commuter travel. Such efforts to align actions of producers (oil companies) and consumers (university students and employees) can provide a more integrated approach toward a decarbonized society.

4.5. Consideration for Developing Economies

The faculty panel recognizes that society at large is still reliant on fossil fuels, particularly so in many developing countries where small increases in per capita energy use have been correlated with steep increases in wellbeing (as measured by the human development index and its component metrics) and resilience to climate damages. The panel recommends consideration of an exemption from dissociation for fossil fuel companies identified in Sections 2 and 3 that predominantly serve consumers directly in developing nations. These countries may have a slower timeline for decarbonization (e.g., 2070 for India) established by their governments. The University may want to provide an exception in the short-term for fossil fuel companies that predominantly serve low and low-mid income nations with (nominal) GNI per capita <\$4,095/person/year [World Bank threshold for lower middle-income nation]. The Panel suggests that companies serving these markets should provide the data indicating that the majority of their business serves the developing world. The Faculty Panel identified *Datamyne*, a dataset available at the library that tracks freight shipments, imports, and exports across countries, which can be used to verify these claims as needed.

Figure 2: Protocol to Identify & Evaluate Fossil Fuel Companies for Dissociation



Charge 3: Notification and Constructive Engagement with Companies Identified for Dissociation

Statement of the charge to the faculty panel: What constructive engagement options exist to attempt to convince companies to remedy their conduct *before* dissociation? What standards and metrics can be used to assess whether a company is remedying its conduct? What is a reasonable time frame over which a company could be expected to make progress toward established standards and targets?

The panel suggests the following steps, with Steps 1a and 1b occurring concurrently.

Step 1a: Preparation for Potential Dissociation

After a company has been identified for potential dissociation under either Charge 1 or 2, the University should evaluate within a short time period (we suggest 60 days) the impacts of dissociation on grant-funded students and faculty projects in order to consider options to mitigate negative impacts, evaluate practical matters for the investment portfolios, and determine a timeline for dissociation.

Step 1b: Notification and Response Period

Concurrently with Step 1a, Princeton will serve written notice to the identified Company that it is on Princeton's list for potential dissociation, with a short explanation of the rationale, applied metrics and standards, and evidence that is of concern. The University will provide a short response period (we suggest 60 days) for the Company to clarify any facts related to the communication. The notification will be privately communicated to the company and not revealed to the public. Any factual claims challenged by the Company must be verified by Princeton rapidly (within 60 days).

Constructive engagement prior to dissociation (during Step 1a-b and before Step 2) would occur only if both sides seek it. The primary conditions for stopping dissociation during this period would be if a firm submitted new evidence relating to its compliance with dissociation criteria and metrics or made credible material changes in the company's circumstance, such as decommissioning or divestment of assets related to thermal coal or tar sands. Examples of constructive engagement during this period include discussions on pathways to decarbonize, and analysis of immediate actions taken by the Company to meet the metrics and standards related to Charges 1 and 2.

Step 2: Public Identification of Companies and the Start of Dissociation

After the time period needed to accomplish Steps 1a-b of preparation, initial company notification and response (we suggest no more than 60 days), and if no facts or circumstances underlying dissociation are verifiably refuted by the Company, Princeton will publicly reveal the name(s) of the companies identified for dissociation. Dissociation shall then start as soon as is practical, to be determined by the body charged with overseeing this process.

Criteria for reassociation emerge from Charge 1 and Charge 2 metrics.

- Charge 1: The Company acknowledges past error and demonstrates that it has become compliant with Charge 1 metrics in the recent past.
- Charge 2: The Company has made changes so as to fall below the stated metrics for materiality or emission intensity, recognizing that these metrics are designed to become increasingly stringent over time.

Constructive engagement after the announcement to dissociate would occur only if both sides seek it, with the goal to reassociate over a period of time (we suggest 3 to 5 years after dissociation). Significant improvement in violations on Charges 1 and 2 would prompt engagement after dissociation. Continued violations (or no decrease in violations) on Charges 1 and 2 would preclude engagement after dissociation.

Charge 4: Evolution of the Metrics, Standards and Targets in the Future

Statement of the charge to the faculty panel: How can the metrics, standards, and targets referenced above, i.e., for fossil fuel companies engaged in disinformation or in thermal coal and tar sands segments, be flexible enough to meet changing conditions over time? On what time frame should they be revisited to keep pace with evolving knowledge?

The faculty panel suggests that the University establish an ongoing process for reflection on the metrics, standards, and targets, and to learn from implementation experiences. Substantive changes to the proposed metrics, standards and targets could be made every 3-5 years, consistent with the timeline for reassociation proposed in Charge 3.

Our general recommendations are as follows:

- 1) **For Charge 1**, we suggest that the rubric developed to identify fossil fuel companies engaged in misinformation and disinformation be refined based on experience gained in applying it to a few companies (See Charge 1). With a view toward future actions, we suggest focusing on the mis-match between public statements regarding each company's net-zero carbon goals and associated interim targets versus actual actions and performance relative to these targets in the upcoming years.
- 2) **For Charge 2**, we note that the metrics proposed for material participation in the thermal coal and tar sands segments and the emission intensity thresholds to identify the most GHG intensive oil producers can be readily updated through publicly available data. For example, materiality metrics proposed for thermal coal and tar sands are being updated by Urgewald, with 2023 metrics shown below:
 - a. For thermal coal (Urgewald 2023): Those companies with either $\geq 10\%$ annual revenues from coal, or producing ≥ 5 million metric tons of coal per year. For power plants, those with either a $\geq 10\%$ share of revenues from coal-fired power plants, or, ≥ 2.5 GW installed coal power generation capacity.
 - b. For oil from tar sands: Companies producing ≥ 20 million barrels of oil equivalent from tar sands, with GHG emission intensity up to the refinery gate > 12 g CO₂e/MJ crude produced.By updating these metrics periodically (e.g., every 3-5 years), the University can create increasingly stringent yet practicably applicable metrics for material participation in these segments of the fossil fuel industry.
- 3) **Future fossil fuel industry segments:** The Faculty Panel provides suggestions on additional fossil fuel industry segments beyond those specifically included in our charge, inspired by the broader goals announced by The Trustees in the University's May 2021 press release to address a broader swathe of companies, and potentially achieve a net-zero emission portfolio in the future. The Trustees provided the rationale for dissociation from thermal coal as the widespread availability of alternative options for power generation with lower carbon intensity, e.g., using natural gas. As renewable energy resources and alternatives to petroleum-based fuels in transportation, such as electric vehicles, become more widespread, the same approach described in Charge 2 can be expanded to other fossil fuels such as natural gas, and other oil sources, to establish a long-term glide path toward a zero-carbon society.

The University should also keep abreast of emerging methods that seek to track GHG emissions along all supply chains serving businesses. These methods, which could be applied to all businesses in the future, are in the developmental stage at the present, and once mature, could enable the transition of the entire University investment portfolio to net-zero greenhouse gas emissions in the future.

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