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Fossil Fuel Funds for University Research in the Transition to Clean Energy

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The Need for Clean Energy

Climate change is not a pessimistic prediction; it's a harsh reality. The Earth's average global temperature has increased by 1.1°C since 1880 (NASA). As a result, the number of extreme weather disasters increased five-fold over the last 50 years (WMO, 2021). A yearly average of 23.1 million people became displaced over the last decade due to weather-related events (UN). The Arctic sea ice cover area has shrunk by 40% since 1979 (NOAA). Tropical cyclones in the Atlantic and Gulf waters have increased in intensity over the past 20 years (EPA). The frequency of heatwaves in the U.S. is three times greater than in 1960 (EPA). Each heatwave season is 49 days longer (EPA). Half of California's 20 worst wildfires happened in the last five years (Bay Area News, 2022). Extreme wildfire smoke days have shown a 27-fold increase in number in the last decade (Rojanasakul, 2022). I could continue, but the point here is made clear: global warming is not imminent; it's current. Whether or not we can recognize this reality quickly enough to adapt and prevent further damage–therein lies the question of the century.

Given today's pace of action, the Paris Climate Accord's primary goal of limiting global warming to 1.5 °C by 2050 is simply unlikely to happen, as the International Panel on Climate Change (IPCC) itself stated in the 2022 report (IPCC, 2022). The next bar of the international agreement–in which the planet reaches a total increase of 2 °C–would have widespread, disastrous impacts. The heatwaves of today would continue to increase (IPCC). Farm yields would be affected by drought or extreme precipitation, in a world where already over 750 million people are undernourished (FAO), increasing crop prices and destabilizing the global food system. Sea level rise due to melting glaciers would cause coastal areas of cities like Miami and New York to be underwater by 2050, displacing over a million residents (Koonin, 2023). Although global warming disproportionately impacts communities that are most vulnerable to its devastating impacts, it will eventually catch up to all socioeconomic levels, as wildfires further spread in California, tropical vector-borne diseases like dengue and malaria migrate to colder regions, droughts escalate in dry areas, smog worsens in cities like Los Angeles and

Phoenix, and water scarcity in the U.S. West is compounded.

In the intricate, complex, and enormous puzzle that makes up the solutions to climate change, clean energy is the most important piece, for the combustion of fossil fuels releases more than 70% of global greenhouse gas emissions for the energy requirements of transportation, industry, and heat as well as electricity production (EPA). When it comes to carbon dioxide, the greatest contributor to global warming, fossil fuels account for almost 90% of all emissions (UN). Thus, it is clear that clean energy must be the foundation of our energy systems if we are seeking to effectively tackle climate change. Clean energy includes solar, wind, geothermal, hydropower, and nuclear power, which do not release any greenhouse gases. Out of these major energy sources, nuclear is the only non-renewable one, for uranium's natural replenishment rate is lower than its potential rate of consumption by humans.

The transition from a fossil fuel-driven to a clean energy-driven economy must be rapid and in scale. Peer-reviewed research papers from top scientific journals show that, to meet the Paris Climate Accord's 2 °C goal, new fossil fuel development must cease now and no more fossil fuel power plants can be built from this point on (Cohen, 2022).

We have no other option; we have to transition to clean energy, now.

Climate Change & University Research

University research plays a central role in this complex shift. The truth is that many aspects of clean energy need to be refined, improved, and discovered. Solar panels' energy efficiency can be enhanced. Lithium batteries need greater energy storage capacity. Electricity grids must be expanded. Tidal energy power plants are being developed. Enhanced Geothermal System (EGS) plants are under testing. Nuclear fusion (rather than fission) has been achieved and is in the works to become commercially viable.

We need all researchers' hands on deck to make clean energy the main reliable source in the U.S. and beyond. Among top U.S. universities, it has become common practice to accept funds from fossil fuel companies for energy research (Thacker, 2022). In fact, between 2010 and 2020, six major fossil fuel companies together donated $700 million to 27 American universities (The Guardian, 2023). Harvard, Columbia, Stanford, Yale, Vanderbilt, MIT, UC Berkeley, and many others receive such funding. This brings us to our central question: what impact does fossil fuel money have on research? We will examine a case study that is emblematic of this debate: Stanford University.

Since the new Doerr School of Sustainability opened on September 1st, 2022, there has been an uproar on campus in protest against accepting donations from fossil fuel companies for research. The previous School of Earth, Energy, and Environmental Sciences–which became part of Doerr–has long been doing the same. Established in 1947, it was first called the

School of Mineral Sciences, being renamed the School of Earth Sciences in 1962 (Moran, 1968) and, as late as 2015, it was renamed the School of Earth, Energy, and Environmental Sciences (Doerr). From 1962 until 1999, the school had a Petroleum Engineering department, which gave rise to the Department of Energy Resources Engineering (Stanford Earth). The directories of scientists in Petroleum Engineering and the school's other departments show the common, long-standing practice of fossil-fuel-related research at Stanford and ties to the fossil fuel industry that persist to this day (Moran, 1968; Minshall & Woodward, 1974; Edmund & Minshall, 1980).

However, the thirst for change heightened in light of the nearly 1.7 billion-dollar philanthropic donations that allowed for the creation of the school. The largest share–$1.1 billion–was given by Silicon Valley venture capitalists and long-time clean energy investors John and Ann Doerr, giving the school its name. The Doerr School's central goal is to accelerate solutions to the global climate crisis, having a sustainability accelerator to develop "near-term policy and technology solutions" (Adams and Anneke, 2022).

Nevertheless, big oil companies like Chevron and ExxonMobil fund Doerr's industry affiliate programs. Back in May, when the school's opening was officially announced, a group of students and faculty questioned this practice, giving rise to the formation of the Coalition for a True School of Sustainability, a member group of the international Fossil Free Research movement. The organization started a petition calling on the Doerr school to stop taking fossil-fuel money, which as of early 2023 has collected over 900 signatures from Stanford faculty, staff, students, post-doctorates, and some alumni. Five Ph.D. students, representing the petition's signees, wrote and published an open letter asking Stanford to reject funding from oil and gas corporations (Stanford Community, 2022). Since then, protests have taken place, guest talks have been organized, and their campaign has been expanded, allowing their name to become a staple and the movement's momentum to grow.

However, the dean of the new school, Dr. Arun Majumdar, has publicly announced his intentions to continue accepting such funding from the start. In response to the uproar, on May 25th, 2022, he sent an email to the entire community of the Doerr School of Sustainability, listing and expanding on his reasons for continuing this practice (Majumdar).

In the following section, his arguments will be presented, as he outlines the benefits that this research potentially presents. Then, we will consider the counter narrative to the dean's points and this overall prevailing norm, evaluating whether this resistance movement's reasoning is well-founded. I will conclude with the proposed solution to this conflict, and the best way to move forward.

Benefits of Fossil Fuel Funds in University Research

In his email, Majumdar outlines two overarching benefits of accepting fossil-fuel money. First, he emphasizes that he only intends for the Doerr school to engage with the fossil fuel corporations that are making "measurably significant efforts to be a part of the solution" and are committed to fighting climate change (Majumdar, 2022). The dean briefly sets informal criteria for his own evaluation of whether an oil and gas company is aligned with the values of the Doerr School of Sustainability, which include whether its climate commitments align with the Paris Accord, whether significant financial resources are being allocated to meet such targets, and whether they support government policy that accelerates the transition to a clean energy economy (Majumdar, 2022). The evidence proving that these three actions are actually happening is not presented; however, we will objectively apply these criteria to the donor fossil fuel companies.

Second, Majumdar points to the benefits that these funds have on the research programs themselves. Transnational corporations like Shell and Chevron have vast financial resources that "should be welcome allies in this fight," since they can enable "breakthroughs in academia, which are invariably at the laboratory scale" (Majumdar, 2022). He selects two programs to support his argument: the Bitts and Watts Initiative to improve the electric grid and StorageX**,** which studies energy storage. We will analyze the full scope of the research programs that are being funded by fossil-fuel money, examining the overarching impact.

Overall, the dean states that these partnerships are crucial in addressing the "complexity, magnitude, and urgency of climate change" (Majumdar, 2022). In other words, their money and collaboration are not only beneficial but are *needed* if an institution like Stanford intends to have a significant impact in making clean energy the norm fast enough to tackle climate change.

However, U.S. universities should *not* accept funds from fossil fuel companies for their research programs because, in reality, these corporations are not attempting to transition to clean energy given their minimal tangible actions and monetary investments to do so. Moreover, these funds negatively influence research, substantially affecting the topics studied and deviating from solutions to climate change. Hence, this practice results in greenwashing that misrepresents the climate actions of fossil fuel companies, mistakenly painting them in a good light while ultimately slowing the transition to clean energy.

The Reality of Fossil Fuel-Funded Research: Fossil Fuel Companies & Greenwashing

I. Words versus Actions

Oil and gas companies must reform themselves if there is any hope of reducing greenhouse gas (GHG) emissions from fossil fuel combustion.

The Paris Climate Accord sets targets that they should strive to meet, with the main one being achieving net-zero emissions by 2050 (UN). On a smaller scale, the fossil fuel industry can decarbonize or diminish its greenhouse gas emissions through measures like preventing methane leaks during fossil fuel extraction. However, for the target to be met, the industry must substantially invest in clean energy to fully eliminate its operations-related emissions–from the carbon dioxide released when transporting petroleum to the carbon dioxide released when supplying electricity to its facilities. Still, the most significant emissions of the fossil fuel industry are certainly not from its operations but from its products. Thus, for a fossil fuel corporation to truly play a part in addressing climate change, it must diversify its energy, with the ultimate intent of transitioning away from fossil fuels. Whether or not such efforts are aligned with the Climate Accord's goals is a framework being used by Dean Majumdar to assess these corporations' climate commitments (Majumdar, 2022), one which we will now apply.

In February 2022, an academic paper was published by the environmental researchers Mei Li, Gregory Trencher, and Jusen Asuka at Tohoku and Kyoto universities in Japan through PLOS One, a peer-reviewed and open-access scientific journal platform of the U.S. Public Library of Science. Drawing on a plethora of publicly available data from 2009 to 2020, they analyze the decarbonization measures undertaken by four of the world's largest fossil fuel companies: ExxonMobil, Chevron, Shell, and British Petroleum (BP)–all of which donate money to several of Stanford's industry affiliate research programs (Coalition for a True School of Sustainability, 2022). The researchers evaluated their activities from three angles: sustainability-related discourse, business pledges, and clean energy investments versus fossil fuel expenditures (Li, 2022).

First, the discourse, or language. The paper examines the frequency of 39 sustainability-related keywords and their variants in annual reports during the time period of evaluation. These include "2-degree," "net zero," "climate," and "warming" (Li, 2022). Related words were grouped into categories that convey the same overall message, such as *climate change* or words that all intend to show an awareness of climate-change-related concepts (Li, 2022). It was found that all four companies "show a clear increasing trend" in sustainability-related language, particularly when it came to two categories: *emissions,* which groups words that acknowledge the need to reduce GHG emissions, and *transition,* discourse that suggests the resolution to transition to clean energy (Li, 2022). Again, this language was directly obtained from the companies' annual reports, documents that provide "public disclosure of a company's operating and financial activities," being very important and useful to potential investors, shareholders, stakeholders, and the general public (Hayes, 2022). Nonetheless, a quick look around any of their websites indicates an increased emphasis on sustainability campaigns. On ExxonMobil's main page, for example, the very first tab is titled, "Climate Solutions." The

third, "Sustainability." If you look long enough at the background image slideshow, you will come across the headline, "ExxonMobil aims to achieve net-zero emissions."

This brings us to the second angle, *pledges.* All four entities have pledged to achieve net-zero emissions by 2050 for their operations (Li, 2022; ExxonMobil, 2022; Chevron, 2022). This can mainly be done by electrifying all their activities, while ensuring that such electricity is generated by clean energy. Only the European-based companies Shell and BP have explicitly pledged to reduce the emissions of their fossil-fuel products in addition to that of their operations (Li, 2022). Nevertheless, all companies have already established or increased their pledges when it comes to GHG emissions reduction (Li, 2022; ExxonMobil, 2022).

However, the third and final angle, *investments and expenditures*, paints a different picture than that of their sustainability-related discourse and business pledges. As shown in Figure 1 below, each company's total low-carbon energy production investment as a percentage of their total CAPEX (capital expenditures, or total investments) from 2010-2018 is as follows: BP, 2.30%; Shell, 1.33%; Chevron, 0.23%; ExxonMobil, 0.22% (Li, 2022).

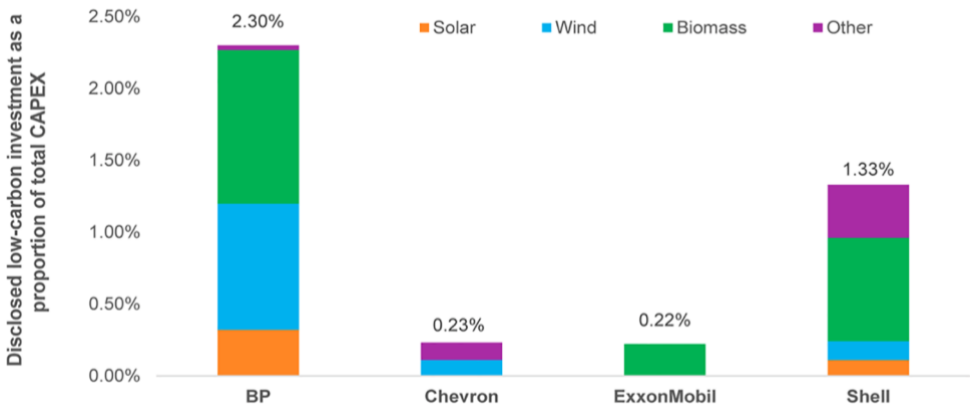

FIGURE 1. Disclosed investment in low-carbon energy production and development as a percentage of total CAPEX from 2010 to 2018. Note: "Other" includes carbon capture and storage (CSS), hydro, smart technologies, etc. (Li)

These are called "low-carbon energy" rather than clean energy because they also include investments in technologies like carbon capture and storage (which make up considerable fractions of Shell's and Chevron's investments) as well as biomass energy, which does release greenhouse gases but is considered low-carbon. Your first thought might be that these percentages are quite low. After all, how can a company like Chevron claim to be on the way to net-zero emissions while having invested less than 0.23% of its expenditures in low-carbon energy? Putting

this data into context, this reaction is still reasonable. One megawatt (MW) of electricity can fulfill the average electricity demands of about 330 homes for one hour (Longley, 2021). As displayed in Figure 2 below, the actual electricity produced from clean energy in megawatts from 2009-2019 follows: BP, 2,000 MW; Shell, 704 MW; Chevron, 65.5 MW; ExxonMobil, 0 MW (Li, 2022).

FIGURE 2. Electricity generation from clean energy from 2009 to 2019. Note: "Other" encompasses other renewables. (Li)

Overall, Exxon Mobil did not produce any clean energy during the past decade and only invested in biomass energy (Li, 2022). Even the highest number–BP's production of 2,000 MW–corresponds to "two large gas-fired power plants" (Li, 2022), which, for a multinational company that produced over 41 billion MW per hour of just natural gas last year (BP, 2020), is comparatively little. In other words, it is basically nothing, a bit better than Exxon's actual nothing.

The researchers thus conclude that there is no evidence to support the claim that any of these four corporations have "entered the renewables market at a scale that would indicate a shift away from fossil fuels" (Li, 2022). Instead, most of their behavioral changes have been in the quick

wins of language and promises, lacking any "concrete strategies to translate pledges into actions" (Li, 2022). In fact, at times, actions outright contradict their narrative, given that, aside from pandemic-related fluctuations, there has been no evident decrease in fossil fuel production and fossil fuel reserves among all four companies (Li, 2022).

Ultimately, it is found that there is a "mismatch between discourse, pledges, actions and investments," and that none of these companies are on the path of a clean energy transition, hence making allegations of greenwashing justified (Li, 2022). Their sustainability-oriented campaign and negligible clean energy investments aim to create positive publicity, prolonging their "social license" or socially accepted legitimacy to continue operating amidst growing societal pressure (Li, 2022). The reality is that these companies are not taking substantial action to achieve zero emissions by 2050.

Thereby, their greenhouse gas emissions are not aligned with the Paris Climate Accord, a core criterion for Stanford's partnerships with these companies. In another peer-reviewed academic paper published in October 2021 on the platform *Science*, researchers at the London School of Economics and Political Science specifically proved this statement. From examining the disclosed greenhouse gas emissions data and the emissions targets of 28 of the world's most prominent fossil fuel companies, including the four we have focused on, they found that *none* are Paris-aligned (Dietz, 2021).

The facts are laid bare before our eyes. Despite some data disclosure still being hard to find, such as the actual monetary volume of clean energy investments, it is clear that Stanford is accepting money from an industry that is intentionally greenwashing itself, investing the equivalent of breadcrumbs in low-carbon and clean energy technology while claiming to be on track with the sustainable development agenda.

II. Lobbying Against Climate Change Legislation

Contrastingly, there is an area where fossil fuel companies are surprisingly efficient, where they take tangible action *and* make significant monetary investments: lobbying against climate change legislation. On October 28th, 2021, the U.S. House Committee on Oversight and Reform held a hearing with top fossil fuel executive officers, with the intent of addressing their historical climate disinformation campaign and current inaction. Ahead of the hearing, the committee's representatives were given a memo detailing the lobbying expenditures of the four fossil fuel companies we have been analyzing, as well as that of the American Petroleum Institute (API), the largest trade association for oil and gas in the country. Collectively, these five entities have spent a combined total of $452.6 million on lobbying the national government since 2011 (House, 2021). The document outlined how Exxon, Chevron, Shell, BP, and API have all publicly claimed to support the Paris Climate Accord since its

passage in 2015; however, out of the 4,597 instances of legislative lobbying by Big Oil from 2015 until 2021, only 8 were on the Paris Agreement or related laws (House, 2021). This corresponds to a measly 0.17% of these five companies' total lobbying since 2015 (House, 2021). They simply cannot claim to be allocating their resources to address climate change when only 0.17% of their lobbying actually advocated for solutions.

Indeed, they were not able to do so. During the hearing itself, the CEOs of Chevron, ExxonMobil, and BP America were present, as well as the President of Shell USA, all of whom testified under oath. Under questioning, the leaders all acknowledged climate change to be a real and existential threat, but most "refused to take responsibility for decades of disinformation and would not pledge to end spending to block climate action" (House, 2021). When asked to stop running advertisements against electric vehicles, the CEO of BP America and the President of Shell USA declined. When asked why Chevron, out of 986 lobbying instances, lobbied 144 times on corporate tax breaks but 0 on the Paris Agreement (House, 2021), its CEO's fervent support of the agreement–as he reminded the committee 9 times in his opening statements–became outright hypocritical. When asked to merely apologize for past disinformation, Darren Woods, CEO of Exxon, refused (House, 2021). As aptly put by Chairwoman Carolyn Maloney herself, "these oil companies pay lip service to climate reforms, but behind the scenes they spend far more time lobbying to preserve their lucrative tax breaks" (House, 2021). As incontrovertibly shown by the data, these companies only support climate change legislation in words, not in action.

Interestingly, the committee ultimately came to the same conclusion as researchers Li, Trencher, and Asuka: there is a "stark inconsistency" between fossil fuel companies' public support for climate reforms and their lack of "meaningful action to advance these policy results" (House, 2021). Hence, in response to Majumdar's first argument, these companies are not fulfilling their commitments and supporting related governmental policy. The fossil fuel industry is greenwashing itself through clean energy investments, lobbying, and, last but not least, university research funding.

Influence on Research: History Repeats Itself

I. History Repeats Itself

In the early 2000s, various programs aiming to tackle climate change began being created in elite U.S. universities–Princeton's Carbon Mitigation Initiative (2000), Stanford's Program on Energy and Sustainable Development (2001), and MIT's Energy Initiative (2006), to name a few (Thacker, 2022). However, they were all funded by oil and gas companies.

Industries funding research programs to better their image is not a new phenomenon. In his peer-reviewed journal published in September

2022, investigative journalist Paul Thacker delves into the history and current state of this practice, using the known example of the tobacco industry. In the 1950s, when mounting independent research started to show the detrimental health effects of smoking, tobacco companies exhibited an interesting response: they "resolved to 'demand more science, not less'" and quickly became leaders in funding university-based biomedical research (Thacker, 2022). This may seem like a conflict of interest–after all, why would tobacco companies fund studies that could demise their own product?

Science historian Naomi Oreskes, a professor at Harvard, details the truth behind such funding in her article in the *Scientific American* published in October 2022. She points out how the tobacco-funded studies were "much less likely to find clear evidence of harm than independent studies" (Oreskes, 2022). Hence, today, the vast majority of medical journals no longer accept papers funded by tobacco companies (Oreskes, 2022). As stated by the Union for International Cancer Control (UICC, 2022), Big Tobacco has been notorious for manipulating the data and altering the standards of scientific research, creating a smokescreen that hid the lung cancer potential and all damaging health effects of smoking cigarettes (UICC, 2022). In fact, psychological studies have found that funders influence academic findings, as conflicts of interest increase the likelihood of bias and affect results (Boutron). With that, it is clear that funders are likely to affect the outcome of scientific research.

Nevertheless, there is still the popular belief that, if there are regulatory measures that encourage scientists to stay objective, research integrity will be left unscathed. In this way, any money can be put to good use. This notion–besides being contradicted by independent studies–fails to encompass the fact that funders also heavily influence the actual topics being studied. Oreskes emphasizes how funding influences "what kind of questions are asked" and how "entire research programs are framed in ways that are consistent with what funders are interested in and are likely to fund in the future" (Oreskes, 2022). After all, the inflow of money could be removed if the research does not benefit the donor in any way. Thus, it is not surprising that it is likely to dictate the intellectual agenda.

The tobacco debacle is well-accepted and established today, despite being highly controversial before. Yet, this strategy has since been replicated by fossil fuel companies.

II. Stanford's Industry Affiliate Programs

In his argument, Dr. Arun Majumdar highlights how the money kindly donated by fossil fuel companies allows for invaluable breakthroughs in academia, which turns them into potential allies in the fight against climate change (Majumdar, 2022). That is, the dean suggests that the fossil-fuel-funded research being done will, ultimately, help address climate change. He mentions two industry-affiliate programs that receive

fossil fuel funding: the Bitts and Watts Initiative and StorageX. They aim to improve the electricity grid and energy storage, respectively. Despite not being directly linked to clean energy, as they can be used with electricity derived from fossil fuels as well, these programs are indeed essential in advancing the transition to clean energy. We need our electricity grids to transmit more energy to allow for greater electrification and clean energy storage.

However, these two examples are cherry-picked and thus do not paint a complete picture, since the Doerr School of Sustainability has nineteen more programs: 13 industry affiliate programs under various departments, 3 under the Precourt Institute for Energy, and 3 energy forums. The Coalition for a True School of Sustainability has compiled summaries of each research program, sourcing their content directly from Stanford University's own descriptions of these projects. Included are the list of funders, annual membership fees, stated purpose, and donor benefits (Coalition). These reveal a starkly different image.

Take SUPRI-B: Reservoir Simulation Research Program. Various oil companies fund it: ExxonMobil, Chevron, Shell, and even Brazilian-owned Petrobras. As explicitly stated on its own "About" page, updated in 2022, its purpose is to "constantly advance the state of reservoir modeling technologies," describing "reservoir simulation" as the "art, science and engineering of modeling flow and transport processes in porous media, including oil and gas reservoirs and aquifers" (Stanford Doerr). In less convoluted wording, SUPRI-B is about improving computer models of extracting oil and natural gas from their reservoirs.

A second example: the Stanford Exploration Project (SEP). Funded by Chevron, BP America, and other oil corporations, its stated purpose is to "improve the theory and practice of constructing 3-D and 4-D images of the earth from seismic echo soundings" (Stanford Doerr). In practice, this improved seismic technology has served to significantly enhance the identification of deepwater oil reservoirs (Bousso, 2019). For example, SEP alumni played a crucial role in BP's finding of an additional one billion barrels of oil in the Gulf of Mexico in 2019 (Bousso, 2019). It is certainly no surprise that fossil fuel companies are scrambling to find new petroleum deposits at the bottom of the sea, given that, with current reserves, we are estimated to run out of oil in about 47 years (McFadden, 2022).

On a simplistic level, this makes sense–why would ExxonMobil fund money into clean energy solutions, given that it will lower their profits from petroleum? This clear and inherent conflict of interest impacts the research. They choose what programs they donate money to, and the topics are inevitably in line with their interests. Funding from fossil fuel companies continuously encourages the existence of research programs that support a fossil-fuel-driven society and future.

In fact, a total of eleven of these programs are about the "ongoing discovery and extraction of fossil fuels" (Coalition). The stated purposes

may be worded differently– "optimization", "engineering of modeling", "reservoir simulation", "computerization", or "seismic–imaging" (Stanford Doerr)–but the overall goals are very similar: locating new reservoirs, reaching more reservoirs, and becoming more efficient at extracting crude oil and natural gas. As mentioned in the introduction, for us to meet the Paris Climate Accord's 2 °C second-bar goal, new fossil fuel development must cease now and no more fossil-fuel power plants can be built (Cohen, 2022). Of course, the context of real-world energy needs is extremely complex. For example, it can be sensibly discussed whether natural gas can be used as a transitory energy form in some cases–functioning as a bridge between the fossil-fuel-driven society of today and a clean energy future–or whether directly transitioning to renewables is necessary and cost-effective in the long term. Combusting natural gas does emit about 40% fewer CO2 emissions than coal and 20% less than oil for the production of the same amount of energy (IEA). However, this should only be a step in the right direction, not the final destination. Meaningful research must be done into technology that accelerates a clean energy, rather than natural gas, future. It is imperative that universities with the human capital and resources to develop crucial climate solutions actively focus on doing so, helping make clean energy more viable for all instead of contributing to the continuity of a fossil-fuel-dominated energy sector.

Nonetheless, skeptics may point to one particular project in search of supporting evidence for fossil fuel funding: the Stanford Center for Carbon Storage, which aims to study the technology of CO_2 storage in depleted oil and gas reservoirs (Stanford Doerr). It is important to note this project because there has been an increasing trend of fossil fuel companies funding carbon capture and storage (CCS) research. As stated in the peer-reviewed academic journal by investigative journalist Thacker, this in-the-works technology contributes to the notion that fossil fuel consumption can continue to occur in scale because then the carbon dioxide released can be sequestered underground (Thacker, 2022). However, academics argue that although it may be "scientifically feasible," it "does not make economic sense" (Thacker, 2022). In fact, removing 3% of yearly global carbon emissions requires the same amount of electricity generated in the U.S. in all of 2020 (Thacker, 2022). As put by environmental engineer and Stanford Professor Mark Jacobson, "'There's never, under any circumstances, any benefit of using carbon capture equipment'" (Thacker, 2022). He describes such research as a "smokescreen" that divert us from solutions, stating, "'Renewables are the only option'" (Thacker, 2022).

Furthermore, the donor benefits of these programs exemplify the conditions that science historian Oreskes warns against. The funders have access to "early pre-prints of research reports", exposure to "Stanford researchers at a high level", "informal interactions" with researchers, and "facilitated access to students and recruitment opportunities" (Stanford Doerr). For instance, the program SUPRI-D explicitly states the benefit of

"assistance in arranging interviews" for a "substantial increase in the supply of graduates for work" (Stanford Doerr). Undoubtedly, this encourages Stanford students to work in fossil fuel extraction rather than on sustainable, clean energy technology that desperately needs to be our priority.

This is climate-change-friendly research. It is unacceptable that a sustainability school that aims to address the urgent issue of climate change is funding unnecessary and actively harmful research into the further extraction of fossil fuels. Funding from oil and gas companies causes our research to benefit them, contributing to a stagnant fossil-fuel-driven economy that is the primary cause of climate change.

Solution

The Stanford Doerr School of Sustainability's goal is to be a crucial part of the solution. These funds make it a part of the problem. In helping fossil fuel companies greenwash themselves, Doerr is greenwashing itself too. These companies often point to their funding of "climate-change-related" university research programs and their measly clean energy investments for positive publicity. Doerr is contradicting its own purpose, claiming to be actively accelerating "near-term policy and technology solutions" to climate change (Adams and Anneke, 2022) while partnering with such companies and spending a significant share of its resources to perpetrate fossil fuel extraction and consumption. Contrary to what the dean may state, Stanford does not need fossil-fuel money to develop breakthrough solutions, especially in light of the nearly 1.7 billion-dollar donation and Stanford's own vast resources. In reality, this funding is actively slowing us down in the transition to clean energy. As best stated in the petition by the Coalition for a True School of Sustainability, "The research conducted at Stanford carries significant weight in the conversation around tackling the climate crisis, and the University cannot afford to lose out on the brightest talents or have its voice compromised" (Stanford Community, 2022). We are wasting our resources by allowing fossil fuel companies to influence our research agenda.

The Coalition is calling for a pragmatic solution to this issue. Rather than outright banning all fossil fuel funds, its demands consist of "committing to an open and transparent process for industry-funded research," one based on quantifiable and "Paris-aligned criteria" (Coalition). These criteria must be enforced strictly, such that Stanford "phases out institutional funding from industry partners" that do not meet them on "a Paris-aligned timeline" (Coalition). Again, *none* of the donor fossil fuel companies are in line with the Paris Agreement. The phase-out of funding from such companies is realistic and conveys a clear message to oil and gas corporations against greenwashing, redirecting Stanford's resources to research that actually moves us forward in the transition to clean energy.

Princeton University has done precisely that. On September 29th, 2022, it committed to dissociating from 90 fossil fuel companies through a process of gradual phase-out, with the creation of rigid criteria to follow in any future industry partnerships (Cohen, 2022). This represents a historic victory for the activist students and academics of the global Fossil Free Research movement, as Princeton is the first university to formally recognize the negative impacts of fossil-fuel-funded research and take action.

A valid argument against such pragmatism is that fossil fuel companies may be now starting to put in the effort to meet their pledges; thus, they *will* achieve results. If indeed there are fossil fuel companies that are now trying to be on track, I would say that substantial actions and investments by them must be seen, quantified, and evaluated first *before* receiving any of their funds. Furthermore, to ensure the money is utilized for actual clean energy research, these affiliations should become blind pools instead. These are limited partnerships in which investors do not control what the funds are used for, thus having no strings attached (Gordon, 2022). These measures must be strictly implemented by Stanford and other U.S. universities; otherwise, oil and gas corporations will continue to greenwash their way out of substantively funding and achieving a clean energy transition.

Conclusion

During the 2022 Fall quarter, Dr. Arun Majumdar was on a listening tour, during which he pledged to hear from all stakeholders and create a "set of shared values" to guide the school's actions (Clark, 2022). After hearing from diverse perspectives–ranging from Darren Woods, the CEO of Exxon, to representatives of the Coalition for a True School of Sustainability–the tour likely led to the decision by Marc Tessier-Lavigne, Stanford's President, to create a committee to evaluate the different viewpoints and approaches to fossil fuel funding (Adams, 2022). This committee, which includes Stanford Law School's former dean and the School of Humanities and Sciences' current dean, is also encharged with assessing the dissociation pathways taken by other universities (Adams, 2022). The final report of this work will guide any potential policy changes–making this a critical moment and the movement against fossil fuel funding more important now than ever.

Thus, as members of the student body, it is essential for us to band together and amplify our voices. So, here is my call to action for you–probably one of the simplest and quickest ones you will encounter. Sign the petition, linked here. This may seem like an insignificant, stand-alone act, but, much like voting, it can have ripple effects at the macro level. Right now, the movement against fossil fuel funds for research is seen as a small, annoying minority in the eyes of many in the school's administration. Expanding it is, hence, a priority, as we have to show them

that, after being presented with the true implications and consequences of fossil-fuel money, we can rise to ensure that our own investment in this university helps create a better, sustainable path for society, rather than contribute to a problematic, fossil-fuel stagnation that will taint our futures.

References

Adams, A., and Anneke, C. (2022, May 4). *Introducing the Stanford Doerr School of Sustainability*. Stanford News. https://news.stanford.edu/2022/05/04/stanford-doerr-school-sustainability-universitys-first-new-school-70-years-will-accelerate-solutions-global-climate-crisis/

Adams, A. (2022, December 13). *Committee to review fossil fuel research funding*. Stanford Report. https://news.stanford.edu/report/2022/12/12/university-committee-review-fossil-fuel-research-funding/

Bay Area News. (2022, August 22). *List: California's largest wildfires since 1932, according to cal fire*. The Mercury News. https://www.mercurynews.com/2022/08/21/list-californias-largest-wildfires-since-1932-according-to-cal-fire/

Bousso, R. (2019, January 18). After billion-barrel Bonanza, BP goes global with Seismic Tech. https://www.reuters.com/article/us-bp-seismic-focus/after-billion-barrel-bonanza-bp-goes-g lobal-with-seismic-tech-idUSKCN1PC0HF

Boutron, I., et al. (n.d.). *Chapter 7: Considering Bias and conflicts of interest among the included studies*. Chapter 7: Considering bias and conflicts of interest among the included studies | Cochrane Training. https://training.cochrane.org/handbook/current/chapter-07

BP (2020). *Energy outlook 2020 - BP*. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2020.pdf

Chevron (2022, December 7). *Actions to reduce our carbon intensity*. chevron.com. https://www.chevron.com/sustainability/environment/lowering-carbon-intensity

Clark, G. (2022, October 27). *Stanford's fossil fuel funding problem, explained*. The Stanford Daily. https://stanforddaily.com/2022/10/27/listening-tour-leaves-doerr-open-to-shift-stance-on-fossil-fuel-funding/

Coalition for a True School of Sustainability (2022). *Big Oil Entanglements at the Doerr School of Sustainability*. https://www.truesustainabilityschool.com/big-oil-entanglements

Cohen, I., et al. (2022, November 14). *Princeton will stop taking oil money. now the pressure is on Harvard, MIT, and Columbia.* The

New Republic. https://newrepublic.com/article/168099/princeton-fossil-fuels-harvard-mit-columbia

Dietz, S., et al. (2021, October 21). *How ambitious are oil and gas companies' climate goals? | science*. https://www.science.org/doi/10.1126/science.abh0687

Doerr School of Sustainability (n.d.). *About SPODDS.* Stanford Project on Deepwater Depositional Systems. https://spodds.stanford.edu/

Doerr School of Sustainability (n.d.). *About SUPRI-B.* SUETRI. https://suetri-b.stanford.edu/about-supri-b

Doerr School of Sustainability (n.d.). *Affiliates*. SUETRI. https://suetri-b.stanford.edu/affiliates

Doerr School of Sustainability (n.d.). *Become an affiliate*. Stanford Rock and Geomaterials Project. https://srgp.stanford.edu/become-affiliate

Doerr School of Sustainability. (n.d.). *History*. Stanford Doerr School of Sustainability. https://sustainability.stanford.edu/history

Doerr School of Sustainability (n.d.). *Membership*. Stanford Exploration Project. https://sep.sites.stanford.edu/membership

Doerr School of Sustainability (n.d.). *Membership*. SUETRI. https://suetrid.stanford.edu/about/membership

Doer School of Sustainability (n.d.). *D Research Consortium on innovation in well and reservoir testing*. SUETRI. https://suetrid.stanford.edu/

Doerr School of Sustainability (n.d.). *Stanford Earth Sciences Algorithms and architectures initiative*. SESAAI. https://sesaai.stanford.edu/

Doerr School of Sustainability (n.d.). *Welcome.* Stanford Center for Carbon Storage. https://sccs.stanford.edu/

Edmund, W., & Minshall, F. (1968). Directory of Stanford Earth Scientists. Vol. 28. The Associates of the School of Earth Sciences of Stanford University.

EPA. (n.d.). *View the Indicators*. U.S. Environmental Protection Agency. https://www.epa.gov/climate-indicators/view-indicators

EPA (n.d.). *Global Greenhouse Gas Emissions Data.* U.S. Environmental Protection Agency. https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

ExxonMobil (2022, January 18). *ExxonMobil announces ambition for net zero greenhouse gas emissions by 2050*. https://corporate.exxonmobil.com/news/newsroom/news-releases/2022/0118_exxonmobil-announces-ambition-for-net-zero-greenhouse-gas-emissions-by-2050

FAO (n.d.). *The state of food security and Nutrition in the world 2021*. Food and Agriculture Organization of the United Nations. www.fao.org https://www.fao.org/state-of-food-security-nutrition/2021/en/

Gordon, J. (2022, April 15). *Blind Pool - explained*. The Business Professor, LLC. https://thebusinessprofessor.com/en_US/business-transactions/blind-pool-definition

Hayes, A. (2022, October 13). *Annual report explained: How to read and write them*. Investopedia. https://www.investopedia.com/terms/a/annualreport.asp#:~:text=1%20The%20intent%20of%20the,and%20to%20make%20investment%20decisions

House Committee on Oversight and Reform (2021, October 28). *At historic hearing, fossil fuel executives admit climate crisis is an 'urgent threat'*. https://democrats-oversight.house.gov/news/press-releases/at-historic-hearing-fossil-fuel-executives-admit-climate-crisis-is-an-urgent

House Committee on Oversight and Reform (2021, October 28). *Subcommittee releases fact sheet highlighting unfair fossil fuel industry's lobbying reveals public praise for climate policies is not backed by meaningful action*. https://oversight.house.gov/news/press-releases/subcommittee-releases-fact-sheet-highlighting-unfair-fossil-fuel-subsidies

IEA (n.d.). *Natural gas and the environment.* U.S. Energy Information Administration - EIA - independent statistics and analysis. https://www.eia.gov/energyexplained/natural-gas/natural-gas-and-the-environment.php

IPCC (2022, February 28). *Press release*. Climate Change 2022: Impacts, Adaptation and Vulnerability. The Intergovernmental Panel on Climate Change. https://www.ipcc.ch/report/ar6/wg2/resources/press/press-release

Koonin, S. (2023, January 4). *Opinion | will climate change really put New York Underwater?* The Wall Street Journal. https://www.wsj.com/articles/will-climate-change-really-put-new-york-underwater-nasa-noaa-salinity-global-temperature-average-11672829529

Li, M., Trencher, G., and Asuka, J. (2022, February). *The clean energy claims of BP, Chevron, ExxonMobil and Shell: A Mismatch between Discourse, Actions and Investments*. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0263596

Longley, A. J. (2021, March 29). *Price of 1 mwh electricity*. Utility Bidder. https://www.utilitybidder.co.uk/business-electricity/price-of-1-mwh-electricity/

Majumdar, A. (2022, May 25). *Message to the Stanford Doerr School of Sustainability Community*.

McFadden, C. (2022, November 9). *Don't worry, we'll never run out of oil*. How much oil is left in the world? https://interestingengineering.com/science/we-will-never-run-out-of-oil

Minshall, F., & Woodward, A. (1974). Directory of Stanford Earth Scientists. Vol. 27. The Associates of the School of Earth Sciences of Stanford University.

Moran, W. (1980). Directory of Stanford Earth Scientists. Vol. 26. The Associates of the School of Earth Sciences of Stanford University.

NASA (n.d.). *World of change: Global temperatures*. National Aeronautics and Space Administration. https://earthobservatory.nasa.gov/world-of-change/global-temperatures

NOAA. (n.d.). *Climate change impacts*. National Oceanic and Atmospheric Administration. https://www.noaa.gov/education/resource-collections/climate/climate-change-impacts

Oreskes, N. (2022, October 1). *Fossil-fuel money will undermine Stanford's new Sustainability School*. Scientific American. https://www.scientificamerican.com/article/fossil-fuel-money-will-undermine-stanford-rsquo-s-new-sustainability-school/

Rojanasakul, M. (2022, September 22). *Wildfire smoke is erasing progress on Clean Air*. The New York Times. https://www.nytimes.com/interactive/2022/09/22/climate/wildfire-smoke-pollution.html#:~:text=Researchers%20found%20a%2027%2Dfold,were%20affected%20by%20dangerous%20smoke.

Thacker, P. D. (2022, September 14). *Stealing from the tobacco playbook, fossil fuel companies pour money into elite American Universities*. The BMJ. https://www.bmj.com/content/378/bmj.o2095

The Guardian (2023, March 1). *Fossil fuel companies donated $700m to US universities over 10 years*. https://www.theguardian.com/environment/2023/mar/01/fossil-fuel-companies-donate-millions-us-universities

Stanford Community (2022, May 19). *From the community: Open letter: Doerr School of Sustainability should cut ties with the fossil fuel industry*. The Stanford Daily. https://stanforddaily.com/2022/05/18/from-the-community-open-letter-doerr-school-of-sustainability-should-cut-ties-with-the-fossil-fuel-industry/

Stanford Earth (n.d.). *History*. Stanford School of Earth, Energy & Environmental Sciences. https://pangea.stanford.edu/d7-archive/sesd7/about/history/index.html

UICC (2022, June 27). *The smokescreen of the tobacco industry's use of Science*. Union for International Cancer Control. https://www.uicc.org/news/smokescreen-tobacco-industrys-use-science

UN (n.d.). *Causes and effects of climate change*. United Nations. https://www.un.org/en/climatechange/science/causes-effects-climate-change#:~:text=Changes%20in%20the%20climate%20and,of%20people%20are%20at%20risk.

UN (n.d.). *Net zero coalition*. United Nations. https://www.un.org/en/climatechange/net-zero-coalition

UN (n.d.). *Renewable energy – powering a safer future*. United Nations. https://www.un.org/en/climatechange/raising-ambition/renewable-energy

WMO. (2021, September 9). *Weather-related disasters increase over past 50 years, causing more damage but fewer deaths*. World Meteorological Organization of the United Nations. https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer