

A photograph of a wind farm at sunset. The sun is low on the horizon, creating a bright orange and yellow glow. Several wind turbines are visible, their silhouettes against the bright sky. The foreground is a field of tall grasses, also illuminated by the warm light of the setting sun.

# The Moral Magnitude of Fossil Fuel Investments

WRITTEN BY **THOMAS LEE & RICHARD LING**



## If you agree with 98% of the scientific community

that the climate is changing due to anthropogenic pollution, and with the 641 institutions around the world that have already divested over \$3.4 trillion from fossil fuel companies, you agree that climate change is one of the foremost issues of our era.<sup>1</sup> On September 22, 2016, the Board of Trustees of the University of Pennsylvania thought otherwise. They believed that fossil fuel companies do not possess a “clear and undeniable nexus to moral evil,” in which moral evil is defined as “an activity on par with apartheid or genocide.”<sup>2</sup>

Yet while there are legitimate concerns about the strategy of divestment, the Trustees’ perception of moral ambiguity was grounded in a context of sparse evidence. An ad hoc advisory committee’s report, upon which the Trustee decision was based, devotes exactly 19 words—with no supporting rationale—to claim that fossil fuel companies do not constitute a moral evil.<sup>3</sup> Amid this sparsity of logical analysis, this article critically examines the question: *are fossil fuel investments morally evil?*



## DEFINING MORAL EVIL

The Board of Trustees failed to see the moral implications of fossil fuel investments, and contends that divestment can only occur if “there exists a moral evil implicating a core University value that is creating a substantial social injury” under Criterion 1 of the Trustees Guidelines and Procedures.<sup>4</sup> So what constitutes moral evil? There would be no better source for this subjective interpretation than the University itself. A precedent on this issue was set by the Trustees in response to the Darfur divestment proposal by the Social Responsibility Advisory Committee (SRAC).<sup>5</sup> During this case, the Trustees’ deciding rationale for divestment was the fact that the oil companies contributed tax revenues to the regime’s genocidal activities, but produced relatively small benefits to the victim population (in terms of oil consumption and local employment). Thus, the existence of particular populations who suffer from harms that outweigh benefits, inflicted by the companies in question, is a necessary condition for achieving “moral evil.”

On the other hand, evil often conjures a perception of intentionality, perhaps evoking a sense of *mens rea* from criminal liability. However, the legal principle *ignorantia juris non excusat* nullifies ignorance as a shield from decisions to act or not act. To the extent that the action-effect causal chain is well-studied and publicly available, the moral agent has responsibility to learn such facts and avoid committing harmful actions. Moreover, this consequentialist standard for intentionality is the most reasonable, because actions by large multinational companies do not stem from any single individual’s psychological intentions, desires, or whims. Therefore, a corporate decision to undertake some activity, in the face of clear evidence that such activity would result in social damages, constitutes corporate-level intention. In this

Figure 1: Visualization of comparative casualties from Apartheid, Dalfur, and climate change.

sense, the aforementioned cost-benefit analysis of net harms constitutes a sufficient condition for “moral evil” as well.

## HUMAN CASUALTIES OF CLIMATE CHANGE

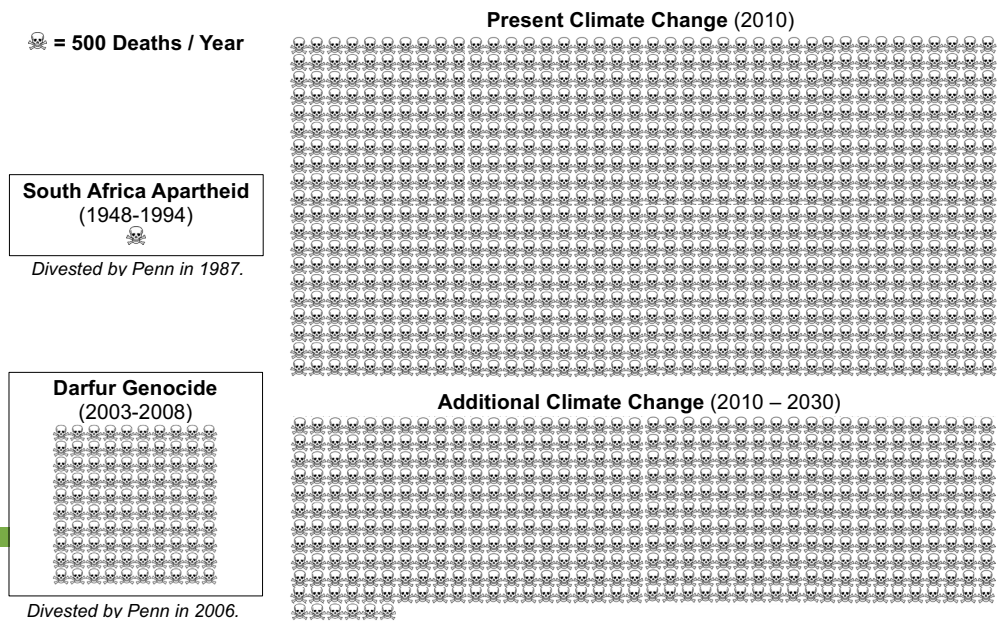
Passing moral judgments without facts results in flimsy ethics based on intuition and whims. While the Trustees’ claim that climate change is not comparable in impact to apartheid or genocide, the following is a direct comparison grounded in evidence.

According to the South African Truth and Reconciliation Commission, a total of seven thousand deaths can be attributed to repressive Apartheid policies over the period from 1948 to 1989, and 14 thousand deaths can be attributed to the period from 1990 to 1994; equivalently, during their imposition the morally evil policies of Apartheid killed 450 people every year.<sup>6</sup> According to a statistical meta-analysis of mortality studies published in the Lancet *The Lancet*, the Darfur conflict of government-sponsored ethnic cleansing caused 298 thousand deaths which would not have otherwise occurred over the conflict period from 2003 to 2008, translating to a point estimate of 49.7 thousand annual deaths.<sup>7</sup> While the *Lancet* study is the most comprehensive, in the context of genocidal chaos and extra-judicial killings, the estimates are

not derived from precise death records; rather, its methodology extrapolates smaller sample surveys to models about the larger population.

How many people does climate change kill? The Climate Vulnerable Forum is a partnership between 43 governments of nations disproportionately impacted by climate change. A meta-analysis by the Climate Vulnerable Forum and the humanitarian organization DARA combines emissions projections with peer-reviewed scientific studies on empirical damage functions along comprehensive impact pathways for human health.<sup>8</sup> The report quantifies the magnitude of how much climate change would increase the geographic reach and population incidence of life-threatening diseases, specifically: hunger, diarrheal infection, meningitis, vector-borne disease (like malaria, yellow fever, dengue fever), and temperature-related illnesses (including respiratory diseases, cardiovascular diseases, and skin cancer). Similar to the *Lancet* study’s estimation method, the DARA report extrapolates prior studies onto world population data.

### Annualized Human Casualties by Cause



According to this analysis, climate change kills 400 thousand people every year—estimated for the year 2010.<sup>9</sup> Furthermore, the same analysis shows that projected business-as-usual greenhouse emissions will cause 232 thousand additional deaths annually. So climate change kills human beings in this present moment—not in the distant future lifetime of our grandchildren or children—to a larger magnitude than either Apartheid or the Darfur genocide. Furthermore, these estimates only include direct human health effects, and conservatively leaves out destruction of economic capital and productivity (which are the effects commonly incorporated in social cost of carbon estimates). Continuing the status quo of inaction implies either denial about this human suffering, or intent to perpetuate these harms.

Additionally, Apartheid and the Darfur genocide were morally horrendous because civilians were systematically persecuted and killed on the basis of their racial or ethnic status. Racial inequality also extends to the disproportionality of climate damages towards the Global South: the majority of the 400 thousand human lives and 232 thousand additional human lives each year come from regions in Sub-Saharan Africa, Southeast Asia, and

the Pacific Islands. These lives should not be forgotten.

## DOES TRANSITIONING TO CLEAN ENERGY EXACERBATE POVERTY?

The presence of casualties should not automatically demonize useful products; indeed, fossil fuels currently provide the majority of energy for humanity. An opinion column in the Daily Pennsylvanian argues that that world’s “impoverished” “will be directly doomed, rather than saved, by” fossil fuel divestment.<sup>10</sup> Becker argues that fossil fuels are needed to provide “affordable and abundant electricity,” because “[a]lternative energy sources are very expensive and cannot compete without large subsidies and guaranteed market shares” (citing another opinion column in the Wall Street Journal). Ultimately, the argument goes, fossil fuels are required because any negative environmental impact on humans are outweighed by their affordability.

Becker’s concern about populations in developing nations is extremely important; however, the facts contradict his claims. Five months prior to the publication of

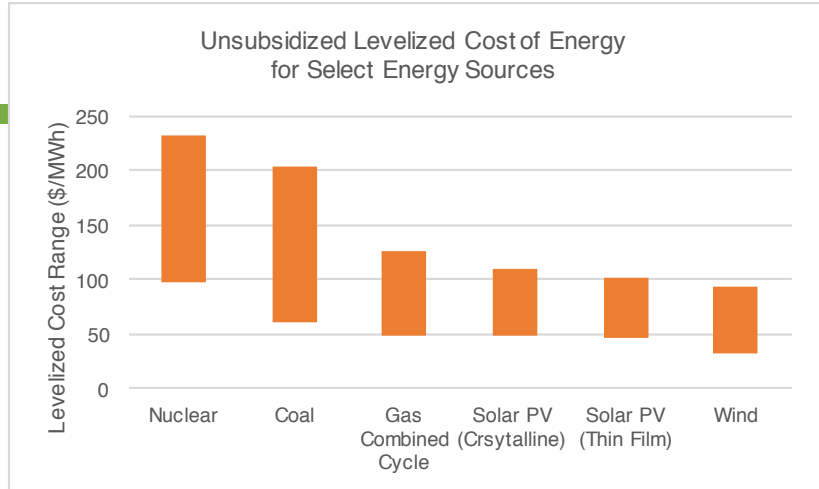
Becker’s piece, the Fossil Free Penn proposal addressed this exact concern, by quantifying “whether the net negative externalities of fossil fuels exceed the additional consumer surplus of fossil fuels.”<sup>11</sup> The cheapness of fossil fuels is socially beneficial inasmuch as they are cheaper than alternatives. By comparing the greenhouse gas externalities (which kill people via the abovementioned mechanism) versus the consumer surplus of cheaper coal, oil, and gas compared to renewable alternatives, the Fossil Free Penn proposal determined that each of these three fossil fuels cause net harms to soci-

	Coal	Natural Gas	Oil
Emissions factor	93.28 kg CO <sub>2</sub> /MMBtu	53.06 kg CO <sub>2</sub> /MMBtu	10.29 kg CO <sub>2</sub> /gallon
Heat content	19.622 MMBtu/short ton	1032 Btu/cubic foot	
Emission per quantity	1830 kg CO <sub>2</sub> /short ton	70.97 kg CO <sub>2</sub> equiv./Mcf	
Social cost at \$40	\$73/short ton	\$2.80/Mcf	\$0.41/gallon
Average market price	\$66/MWh	\$61/MWh	\$1.95/gallon
Alternative price	\$81/MWh	\$81/MWh	\$2.17/gallon equivalent
Consumer surplus	\$28.84/short ton	\$1.98/Mcf	\$0.22/gallon
Harm-to-benefit ratio	2.5	1.4	1.8

Figure 2: Net harms and costs of coal, natural gas, and oil



Figure 3: Unsubsidized Levelized cost of energy for select energy sources (Lazard, December 2016).



ety (see Figure 2). This evidence, submitted as part of Fossil Free Penn’s proposal, was not substantively addressed by either the ad hoc committee or the Trustees’ response.

The benefits of a clean energy transition are reinforced by detailed research led by Stanford Professor Mark Jacobson, which highlights roadmaps using existing technologies to convert all sectors’ energy needs (not just electrical power but including transportation and industry) to 100% wind, water, and solar—all while balancing power supply and demand across 30-second intervals. The “139 Countries of the World” study by Jacobson et al, which integrates civil engineering with atmospheric science and economics, estimates that converting to 100% non-fossil energy by 2050 may avoid “~\$22.8 trillion/yr” of air pollution costs and “~\$28.5 trillion/yr” of

climate costs.<sup>12</sup> After accounting for the large capital and financing costs to install renewable energy supplies, the study estimates that switching to 100% fossil-free still generates “~\$85/yr per capita” monetary savings compared to the status quo. Going fossil free while keeping the lights on is not only possible, but net beneficial.

In addition to engineering and economic efficiency, clean energy has humanitarian advantages over fossil fuels.





The think tank Overseas Development Institute (ODI) co-authored a report with other nonprofits including Oxfam and Christian Aid, highlighting the issues of energy poverty.<sup>13</sup> The report points out that 84% of the world’s electricity-poor households—the people discussed in Becker’s article who rightfully deserve energy access—live in off-grid rural areas that would not benefit from additions of centralized coal power. Instead, ODI et al recommends: “If scaled up appropriately, distributed renewable solutions will be the cheapest and quickest way of reaching over two thirds of those without electricity.” Conversely, continued dependence on fossil fuels would further entrench poverty because “[b]uilding just a third of the planned coal-fired power plants, mostly in developing Asia, would take the world past 2°C of warming, pushing hundreds of millions into extreme poverty before the middle of the century.” Fossil fuels inflict large tolls on human life, and climate impacts often correlate with socioeconomic disadvantage.

Moreover, renewables’ attractiveness is increasing as its cost declines steadily. Contrary

to past claims about renewable energy’s reliance on government support, wind and solar power have reached grid parity. According to investment bank Lazard’s most recent levelized cost of energy (LCOE) calculations, wind and utility-scale solar is as cheap as natural gas on an unsubsidized basis, in terms of levelized costs (\$/MWh).<sup>14</sup> The dwindling costs of solar power has led to clean energy seeing twice as much job growth as the fossil fuel industry (see Figure 4), as the total amount of installed solar panels has grown 115,000-fold.

Basic economics teaches that decision-making should consider opportunity costs, in addition to just direct costs. The direct, upfront costs involved in a sustainable energy transition may be significant (albeit decreasing),

**There Are More Jobs in Solar than Oil and Gas, Coal Extraction in the U.S.**

Employment grew 6 percent in solar and slumped 18 percent in upstream oil and gas and support services

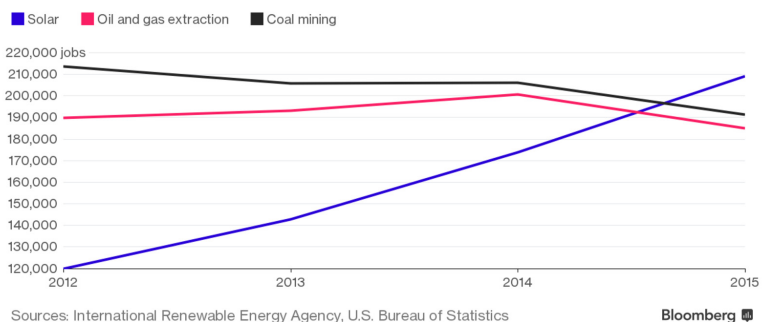


Figure 4: Comparison of Solar, Oil and Gas Extraction, and Coal Mining Job Sector Growth via Bloomberg





but the huge negative externalities from climate change and pollution represent much larger opportunity costs to human life and the economy. While economic theory points to the positive societal welfare benefits from switching to cleaner energy, to what extent this shift will actually occur in practice depends a lot on political will—as well as financing.

## MATERIAL BENEFITS OF DIVESTMENT

Even if climate change inflicts disproportionate social harms upon the world’s marginalized communities, is divestment a solely “symbolic” measure with “small potential for financial impact” as Becker claims? Reinforcing the notion of divestment’s inefficacy, the word “finance” often elicits an image of greedy stock speculators who gamble bets on the economy’s ups and downs like a slot machine, profiting off of other investor’s losses, without ever contributing real value to companies. This is an incomplete view.

Finance, including asset management, is fundamentally about the allocation of scarce capital to enable productive human endeavors. A transition to clean energy, even if it saves lives on paper, needs to be financed. Specifically, in order to limit global temperature rise to below 2 degrees Celsius, the think tank Ceres estimates the

world must invest \$12.1 trillion into renewable power generation over the next 25 years.<sup>15</sup> This is roughly \$5.2 trillion above current projections, and most of the \$12.1 trillion investment must be allocated to emerging markets in developing countries. Similarly, the World Economic Forum’s Green Growth Action Alliance estimates that “additional, incremental investment needs of at least US\$ 0.7 trillion per year” are required in “clean energy infrastructure, low-carbon transport, energy efficiency and forestry” in order to achieve the 2 degrees target.<sup>16</sup> Thus, there is a clean energy funding gap: finance is an important function required to scale up clean energy deployment, but investors currently are not providing enough of this function.

Again, the basic economic lesson about opportunity costs applies. A dollar invested in a fossil fuel extraction company is a dollar not invested to fill in the substantial clean energy funding gap. What is the material effect of switching investments from fossil fuels into clean energy, as Fossil Free Penn has advocated? The wide asymmetry between the sizes of the fossil fuel versus clean energy industries—several orders of magnitude—suggests that this strategy of divest-reinvest produces net benefits. Divesting shares (mostly secondary market) from fossil fuel majors with huge market capitalizations, as divestment opponents themselves point out, likely has negligible direct impact on these companies’ cost of capital.

In other words, fossil fuel divestment would not negatively impact populations who currently live under energy poverty, even if they depend on continued fossil fuel development. On the other hand, reinvesting into clean energy produces benefits for nascent (but higher growth) alternative energy sources, e.g. by enabling project financing that otherwise would not have occurred.

As large institutional investors with long investment horizons, university endowments are in a position to help solve this clean energy funding gap.<sup>17</sup> “There is huge opportunity for expanded clean energy investments today,” said Sue Reid, Vice-President of Climate and Clean Energy at the nonprofit group Ceres. In an article published by the Kleinman Center for Energy Policy, Wharton MBA student Yann Manibog explains how many national governments, facing increasing deficits, do not have sufficient fiscal capability to solve the clean energy funding gap. Citing the development of Green Bond market, Environmental, Social, and Governance (ESG) asset managers, and financial instrument innovation for wind power hedging, Manibog illustrates growing opportunities for private investors to mitigate climate damages while earning financial returns.

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*All opinions and errors are those of the authors alone.*

## CONCLUSION

Climate change’s impact can be mitigated by strategically weaning off fossil fuels and scaling up alternative energy—a transition that benefits those who currently live in poverty or lack energy access. This transition faces a financial obstacle: not enough private investor capital is mobilized to develop clean energy. In this vacuum, divestment linked with reinvestment would positively impact the planet and its inhabitants. This analysis suggests that fossil fuel investments can be linked to moral evil, and university endowments may wield divestment as a tangible tool to combat this evil.

As a Holocaust survivor and professor of physics at Brooklyn College, Micha Tomkiewicz has a nuanced understanding of genocide in the context of climate change. In a talk at the University of Pennsylvania on December 1, 2016, Tomkiewicz painted climate change as a prospective “self-inflicted genocide.” With greenhouse emissions (whose increase is primarily attributed to fossil fuel combustion) threatening irreversible harms to ecosystems, living organisms, and the human race, Tomkiewicz makes it salient that his comparison of climate change to genocide should be used as a marker of direction and pointer to clear evil. He warned: “It’s easy today to teach students to condemn the Holocaust, but it’s much more difficult to teach them how to try to prevent future genocides.” As moral agents, we ought to maintain an active memory of past injustices, and proactively act in the face of new moral evils. Truth and justice ought not to be dismissed in 19 words.

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