

Time to Put the Fossil-Fuel Industry Into Hospice

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What is expected of a socially responsible fossil-fuel company in a world being changed by climate change? The answer is that such a company and the executives who run it must devote their financial, technical, and political assets towards *a just and orderly transition* away from fossil-fuels. In effect, leaders in the fossil-fuel sector must bring about the end of their industry as we know it.

To examine how such a task can be accomplished, we apply models akin to the compassionate care of an individual, her loved ones, his care givers and everyone involved in the recognition of extreme, if not terminal care. We begin by presenting the prognosis that both society and the fossil-fuel industry face existential challenges that are terminal in nature. With such a prognosis, we then consider three possible forms of treatment: (1) triage, (2) euthanasia and (3) hospice. Finally, we offer 9 key considerations in carrying out such a treatment regimen.

This paper is meant to provoke a discussion on a very real dilemma that we face an economy and as a society. The idea of an industry sector bringing about its own demise presents us with some unusual and difficult questions that have relevance for both business management and business education. If we can address these questions, then we can get a better glimpse of the magnitude of the systemic challenge before us. If we cannot address these questions, then we must accept that we are, and will continue to be, dependent on the fossil-fuel sector for the medium to long-term. There could be no more complex and integrated industry sector upon which to undertake this exercise than the fossil-fuel sector, and there could be no more complex and integrated challenge to motivate such an exercise as climate

change. We are, in the end, faced with an existential challenge that requires radical action if we are to respond with adequate scope and scale.

Prognosis: The Fossil-Fuel Sector Faces Terminal Challenges

The first step in the compassionate treatment of a terminal health condition is helping the patient, and those connected to the patient, come to terms with the reality that the patient is very sick and needs extreme if not terminal care. Below we offer three arguments for such a prognosis of the fossil-fuel sector based upon the full scope of the problem, the limited scope of economic policy solutions, and the fact that the reduction and elimination of Scope 3 greenhouse gas emissions presents an existential threat to the ongoing viability of the fossil-fuel industry.

Acknowledge the full scope of the problem

Climate change, in its truest sense, is more than an environmental issue. It is a systems breakdown with widespread implications for life on this planet. This is not hyperbole; it is the assessment of leading scientists from around the world, and it will forever change the nature of our economies. Human activity is increasing the atmospheric concentration of carbon dioxide, resulting in a rise in the average global surface temperature of the Earth by 1°C since pre-industrial times¹ and we are struggling to contain continued warming to 2°C. Such a temperature rise leads to increased weather and climate instability in the form of droughts, wildfires, food insecurity, water scarcity, coastal flooding, disease proliferation, and the social unrest that may result.

Adding urgency, climate change is just one planetary boundary that scientists warn we are crossing in what has been termed a new geologic epoch: the Anthropocene. By exceeding the sustainable boundaries for land system use, pollutants (including plastics), nitrogen and phosphorous waste and novel chemical releases, we are causing reduced rates of agricultural productivity, degraded marine ecosystems and most notably, increased rates of species extinction in what scientists call the “sixth mass extinction” where as much as half of all present species could be extinct by 2100.² In short, through the growth of our population and the economy that supports it, we now influence the biosphere in systemic ways that are unprecedented and we do not fully understand.

Left unabated, estimates of the global economic damage from such change could have a present-discounted value as high as \$22.5 trillion by 2100³ in lost labor productivity, declining crop yields, food shortages, early deaths, property damage, breakdown of infrastructure networks, water shortages, air pollution, flooding, fires, and more. The Bank for International Settlements, an umbrella organization for the world’s central banks, warned in 2020 that climate change could be one of the largest economic dislocations in history.⁴

The pragmatic prognosis is that we must reduce the emission of greenhouse gases to zero if global temperature is to be stabilized, and such a radical goal “means that the shape and structure of modern capitalism will have to be changed”⁵ as the fossil-fuel sector underpins much of our present-day economy. The moral prognosis is that resistance to this goal is being imposed on the majority of humanity both now and in the future by a small minority, leading, in the words of Duane Elgin, one to ask, “When will humanity express its moral outrage that it is

wrong to devastate an entire planet for countless generations to come, just to satisfy the consumer desires of a fraction of humanity for a single lifetime?”⁶

Recognize the limited scope of economic policy solutions

The foremost tool for shifting the economy to address climate change is the introduction of carbon pricing (whether in the form of a tax or tradeable permit) to create market signals that will steer corporate strategy and entrepreneurial activity towards less carbon intensive activities. While important as one tool for dealing with this issue, it will not be enough to bring about the full-scale systems change that brings carbon emissions to zero on the time scale that is needed. They are incremental in scope; based on the “win-win” belief that solutions to climate change are synergistic with the market and that we can increase profits while reducing emissions. Unfortunately, such solutions do not change the fundamental system that caused the problem in the first place.

To begin, such market adjustments treat the economic system as separate from the planetary system; two systems that are moving at different paces, and it is the pace of change in the planetary system that must dictate the pace of change in the economic system. In 2020, the global average atmospheric concentration of CO₂ was 412.5 ppm, setting a new record high, jumping 2.6 ppm over 2019 levels (the fifth-highest annual increase in NOAA's 63-year record) despite the economic slowdown due to the COVID-19 pandemic.⁷ Global mean temperature reached 1.1°C above pre-industrial levels and both emissions and temperature are rising irrespective of the pace of change in our economy. To make matters worse, the rate of CO₂

concentration rise is now is growing faster than the 2 ppm per year that scientists had originally predicted.⁸

If we don't come to terms with climate change by 2030, damage to the global climate will be irreversible.⁹ Scientific modeling warns that a CO₂ concentration of 450 ppm will likely drive average temperature rise above 2°C, the level set by the international community as the threshold of "dangerous." If we reach 3°C, risks of crossing irreversible "tipping points" increase dramatically, leading to the collapse of ice sheets, sea level rise and substantial species extinction.¹⁰ On our current trajectory, temperature rise could exceed 4°C by the end of the century.¹¹ This is the time scale by which economic system change must occur. But instead, we are crossing critical environmental thresholds while we wait for market solutions to develop. We will not be able to simply adapt or innovate our way out of this problem – human life cannot survive at wet bulb temperatures above 35°C, a threshold that has been crossed in some regions around the world. In May 2022, India and Pakistan faced a record-breaking heat wave that, according to experts, tested "the limits of human survivability."¹² Even if we stopped increasing CO₂ today, the temperature would continue to rise as previously released emissions continue to overheat the atmosphere.¹³ In the end, the mathematical and pragmatic reality is that we must stop burning fossil-fuels. This change must happen far more quickly than can be realized by a carbon price.

Accept that reducing Scope 3 emissions presents an existential challenge for the industry

Human and economic behavior does not always respond "efficiently" to market signals and incremental market signals do not compel systemic changes. Instead, they focus attention

on increasing the efficiency of existing systems and eco-efficiency will not be enough to prevent ecological collapse, as it fails to transform the root cause of the problem. We can already see the incremental and limited responses emerging from the fossil-fuel sector as it struggles to become part of the climate solution.

First, many fossil-fuel companies (and other carbon emitting sectors like cement) are pinning their hopes on carbon capture and sequestration (CCS) technologies to offset their emissions. Yet, these technologies are not yet market-ready; most actually emit more CO₂ than they capture, and; in the view of many, it will be “impossible for most CCS methods to sufficiently reduce industrial CO₂ emissions in time.”¹⁴ It would be unwise to bet the future on an unproven technology.

Second, and most importantly, while twelve of the world's largest oil companies plan to cut their carbon and methane emissions by 50 million metric tons annually by 2025, these goals are not binding and do not include scope 3 emissions – those emitted when the oil, gasoline and diesel oil that companies sell are burned¹⁵ – which, in the case of Exxon-Mobil, makes up roughly 90% of the company's carbon footprint.¹⁶ Another oil major, BP, has also made a carbon neutral pledge that includes a 20% reduction of some Scope 3 emissions but the company defines those emissions narrowly as only those in which the company has an equity share, specifically CO₂ emissions from the combustion of upstream production of crude oil, natural gas and natural gas liquids.¹⁷ The challenge for any oil company to achieve actual net zero are monumental. The fact is that cutting downstream Scope 3 emissions to zero poses an existential challenge for the industry and would require that they close or sell off their fossil fuel assets.

Treatment: Envisioning the Managed Demise of the Fossil-Fuel Industry

Throughout history, we have been witness to the demise of previously thriving sectors because of the competitive forces of what Joseph Schumpeter termed “creative destruction,”¹⁸ where the market “incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one.” The typewriter industry disappeared with the rise of personal computers and the incandescent lightbulb industry dimmed as more energy-efficient lighting alternatives like compact fluorescent lamps (CFLs) and light emitting diodes (LEDs) become more cost competitive. Creative destruction has also forced individual companies to remake themselves. Nokia was founded in 1865 as a paper mill and has since expanded into cable, rubber boots, tires, and ultimately telecommunications hardware and software. Minnesota Mining and Manufacturing Company (3M) began in 1902 by making sandpaper and grinding wheels and today makes a wide variety of products such as personal protective equipment, window films, dental and orthodontic products, medical products, car-care products, and healthcare software. But these examples represent adaptation to shifting market conditions, not entire sectors ending for the non-market reasons of a stable global climate those who live within it (read: everyone).

We have also been witness to the end of particular sectors due to the “visible hand” of government regulation – such as legislation in the United States that forced the end of DDT application in 1972, gutted the asbestos industry in 1989, and is poised to end the industry for per- and polyfluoroalkyl substances (PFAS) today. But these sectors were not nearly as

intertwined with the global economy and society as fossil fuels.¹ Today, there is a vast physical, economic and political network that is connected to oil. It cannot be simply replaced without a disordered disruption, politically, socially and technologically. So, instead of “creative destruction,” the challenge becomes one of managing “compassionate destruction” where an effort is made to guide all the complex and expansive elements of the fossil-fuel sector through a *just and orderly transition* to a carbon-free economy.

Models for compassionate destruction and the fossil fuel transition

Since coal steam engines gave rise to the industrial revolution, fossil-fuels have been the source of energy that powers most of the world’s economic activity. While nuclear and renewable sources of energy are available, almost 80% of primary energy use still comes from carbon-based fuels and ending it will not be easy. BlackRock CEO Larry Fink warns that “Divesting from entire sectors — or simply passing carbon-intensive assets from public markets to private markets — will not get the world to net zero.” Focusing solely on cutting the supply, he argued, and not reducing the demand would simply drive-up energy prices and encourage more of a backlash against green-energy efforts.¹⁹ But the complexity, centrality and interconnectedness of oil in the economy creates a paradox. The demise of the sector must be

¹ There are also examples of public organizations bringing about their own demise. For example: The Continental Army largely dismantled itself after the revolutionary war; Early forms of charter corporations disbanded by design after fulfilling their purpose; Small towns with declining populations often vote to unincorporate themselves; Post-USSR governments dismantled public enterprises, euthanizing the state in order to sell off its assets; Advocacy groups have voted to disband when they worried that their organizations would be captured and used for purposes antithetical to their cause; Governments can call for a constitutional convention to redesign their purpose.

a carefully orchestrated endeavor, and that takes time. But, the urgency compelled by changes already underway in the natural environment mean that it needs to be undertaken quickly.

The patient needs urgent care. To consider such care, we take seriously the notion that corporations have been endowed with certain rights and responsibilities historically enjoyed by human beings and ask the obvious follow-on question - if a corporation is a person, can a corporation die just as a person does? And if so, how do we provide compassionate assistance and comfort to the dying patient as well as those impacted by the passing? In this section, we offer three different models for considering this challenge. First, corporate triage may be a treatment regimen that is beginning to take hold today. Second, corporate euthanasia may be necessary as some within the sector resist the prognosis. And third, corporate hospice may be feasible as some within the sector begin to accept the prognosis.

Triage: *“a process of sorting to identify and prioritize treatment given the limitations of the current situation, the mission, and available resources (time, equipment, supplies, personnel, and evacuation capabilities).”²⁰*

Our first model, triage, is an approach that requires difficult decisions in the face of traumatic injuries. It involves the sorting, prioritization, and allocation of treatments for different parts of the patient, and in more extreme cases, the decision to remove an ailing limb or organ. How might corporate triage be applied to an oil company? One example was offered in 2021, when investor Third Point called for Royal Dutch Shell to be split into “multiple stand-alone companies,” separating sustainable business lines from legacy fossil fuel lines. Designed to maximize the survival of Shell, Third Point argued that amputation of the extraction business (or the threat of amputation) would force the company to accelerate a shift to lower carbon

businesses while presenting a vision for the corporation's survival after the "operation."²¹ In this case, it was an outside investor that proposed a triage-based approach, but companies in other industries have applied it to themselves. Following the Russian invasion of Ukraine in 2022, BP abandoned (amputated) its 19.75% stake in the Russian oil company Rosneft, resulting in charges of up to \$25 billion.²²

But triage can also bring about a new kind of entity, becoming truly transformative. In 2022, a billionaire and a Canadian asset management firm launched an unusual joint bid to take over the Australian energy company, AGL Energy, and turn it into a renewable energy company by shutting down (triaging) its coal power plants earlier than planned.²³ Similarly, CVS Pharmacy used triage in 2014 to transition from a pharmacy to a health care company by ending the sale of tobacco. While profitable at the time, President and CEO Larry Merlo stated that "put simply, the sale of tobacco products is inconsistent with our purpose," which was "helping people on their path to better health."²⁴

Euthanasia: *"Euthanasia is the act or practice of killing or permitting the death of hopelessly sick or injured individuals (such as persons or domestic animals) in a relatively painless way for reasons of mercy."*²⁵

John Maynard Keynes once called for "the euthanasia of the rentier" class, those that extract profits, or rents, but not creating wealth in the aggregate economy²⁶ and, in the words of Joseph Stiglitz, "destroy(ing) wealth as a byproduct of their taking it away from others."²⁷ At present, oil companies produce oil that is burned to support our economy but creates greenhouse gas emissions that are destroying wealth creation opportunities for others (through the facilitated increase in droughts, wildfires, food insecurity, water scarcity, coastal flooding,

disease proliferation, and the social unrest that may result). A future in which we address climate change may require that the entire sector be euthanized, imposing death ahead of its imminent arrival.

To decide on corporate euthanasia as the most compassionate treatment, a deliberative process is required. For human patients, decisions on euthanasia require protocols including: a diagnosis that must include a terminal illness, certification by a consulting physician, a psychological examination and an explanation of alternatives, including palliative care, hospice and pain management options. For corporate patients, a similar protocol may be necessary. Most likely, that protocol will be guided by the government but should include the patient.

For example, in 1964, the US Surgeon General recommended that controls on cigarette smoking be established to protect public health. Companies like R.J. Reynolds and Brown & Williamson stood to lose billions of dollars in revenues if cigarettes were linked to cancer and mounted a multi-pronged campaign to create doubt and confusion in the science of cigarette caused cancer.²⁸ As a result, it took four decades for cigarettes to be controlled by government regulation and countless were made sick or died as a result. But finally, in 1998, the four largest US Tobacco Companies entered into the Tobacco Master Settlement Agreement (MSA) that restricted certain tobacco marketing practices and required the companies to make annual payments to the 46 participating states in compensation for medical costs of caring for people with smoking-related illnesses. The MSA also dissolved the Tobacco Institute, the Center for Indoor Air Research, and the Council for Tobacco Research. Mandatory warning labels and a tax on cigarettes have further deterred smoking.²⁹ The tobacco industry, while still in operation, was to some extent euthanized (in the United States at least).

An important step in any triage operation is coming to terms with the extreme decision that has to be made for the patient, the doctor and those affected by the decision. Today, there are signs that many within the fossil-fuel sector are not ready to face the prognosis that faced the tobacco industry, continuing to focus on what they do best; finding, extracting, refining and marketing fossil-fuels. A recent study of coverage of climate change in fossil fuel company annual reports found that concrete actions were rare³⁰ and continued exploitation of fossil-fuels remains unabated.

In the face of declining market for fossil-fuels precipitated by, among other things, the electrification of the automobile fleet, oil companies have sought new markets. Most notably, attention is shifting to chemical production and more specifically, plastics. The World Economic Forum predicts a doubling of plastics production by 2035 and a quadrupling by 2050; leading to a projection that by 2050 there will be more plastic in the world's oceans than fish (by weight).³¹ This is merely problem shifting, as it may reduce the extent we are crossing one planetary boundary (climate change) and increase the extent to which we are crossing another (novel entity or chemical pollution).

Even in the immediate wake of the Russian invasion of Ukraine (within hours in fact), the American Petroleum Institute (API) began calling for the White House to “ensure energy security at home and abroad” by allowing more oil and gas drilling on public lands, extending drilling in US waters and cutting regulations that limit fossil fuel activity.³² The fossil-fuel sector is showing limited signs that it can restrain itself from finding, extracting, refining and marketing fossil-fuels.

Hospice: *“provides comprehensive comfort care as well as support for the family, but, in hospice, attempts to cure the person's illness are stopped. Hospice is provided for a person with a terminal illness whose doctor believes he or she has six months or less to live if the illness runs its natural course.”*³³

Business leaders are trained, just as doctors are trained, to preserve the business, or the patient. Yet, as doctors have begun to become increasingly concerned with the quality versus quantity of life, business leaders must do the same, determining when there is no viable path that balances the needs of the earth and the corporation in the long run. They must plan for death of an organization, a decision that affects many stakeholders in multiple ways and has a comparable emotional journey for those most involved. For workers, identity and work are closely tied and it is challenging to decide to let go and move forward. For customers, investors, suppliers and others, that critical decision may be equally challenging for other reasons.

There is some hope that this treatment regimen is becoming possible as some within the fossil-fuel sector are engaging in conversations that their prognosis is terminal. While many continue to remain at the early stages of grief – denial, anger, bargaining and depression – others are moving towards acceptance³⁴ that the science of climate change is real and that their industry is the chief cause. For example, the International Energy Agency, a multilateral group whose mandate is to assure energy security and stability, issued a report in 2021 that called for investment in new oil and natural gas projects to stop immediately, and sales of new gasoline- and diesel-powered vehicles to end by 2035 for the global energy industry to achieve net-zero carbon emissions by 2050.³⁵

Critical then, to this process, is a sense of control and dignity, something hospice seeks to provide by managing complex physical, social, and emotional processes. The core of the hospice approach is the “belief that each of us has the right to die pain-free and with dignity, and that families will receive the necessary support to do so”³⁶ by providing compassionate care, counseling and support to surviving family and friends. In the same way, corporate hospice can help those within or associated with a company or sector to come to terms with, and plan for, the end of what they know and look towards what is to come.

A caveat: For many, death is not the end but the beginning of a transformation into something else – whether that something else is a spiritual transition of the soul or the physical transition of the body. In a similar way, does the complex network that surrounds the fossil-fuel sector truly die or does it become something entirely new? Just like organ donation, some of the sector’s economic and human assets may be redeployed towards some new purpose. People working in the industry have incredible financial, analytical, and geophysical expertise that can (and should) be recognized as a potential asset for a sustainable future. Additionally, the brand value of the logos of Shell, Exxon-Mobil or BP could be used to draw electric car owners to recharging stations as they are associated with refueling and replenishing. Even some physical assets will be redeployed – in 2021 an idled oil refinery in Newfoundland Canada was bought and will be converted to make biofuels from used cooking oil, corn oil and animal fat.³⁷ Considering the possibilities of what is next is important because it helps us care for persons here and now, and thus our concern for their future and our own.

Central Treatment Questions that Must be Answered

Estimates of how much money is needed to eradicate greenhouse gases over the next three decades range from \$100 trillion to \$150 trillion.³⁸ While this amount represents historic entrepreneurial opportunities, it also represents a massive dislocation with collateral issues that must be managed for a just and orderly transition. Models of triage, euthanasia or hospice challenge the corporate manager in new and unusual ways. A process of compassionate destruction requires a leader to understand the complexity of the corporate ecosystem in order to identify leverage points for innovation and change on at least three levels: within the individual corporation, with the broader economy and, with policy and the broader society. In this final section, we offer 10 key considerations within each of these levels (see table 1).

Table 1

Manage Business Strategy	Manage Broader Economic Impacts	Manage Societal and Policy Issues
1. Corporate leadership to bring about the end of the entire sector.	4. Manage the full scope of the financial impact of the transition.	7. Maintain justice and equity for all communities.
2. Protect workers and avoid labor flight during transition.	5. Control the fate of products both used and unused.	8. Decommission, remediate and repurpose dedicated infrastructure.
3. Overcome political and social resistance to change.	6. Protect indirect workers in related industries.	9. Leverage the power of government.
Manage the Role of Corporate Leadership		
10. Overhaul business education curricula as if people and the planet really matter.		

Manage Business Strategy

The implications of corporate triage, euthanasia or hospice within a corporation will be felt acutely and require careful consideration for an orderly transition. Corporate leaders have a series of questions that must be considered as they assume the responsibility for how this treatment regimen might affect their employees and the communities in which they operate.

1. Corporate leadership to bring about the end of the entire sector. The closure of the fossil-fuel sector will require the participation of wide array of actors. Not only public companies like Exxon-Mobil, BP, Total SA, and Chevron, but nation-states that underpin the entire national economies of countries like China, Saudi Arabia, Russia, Brazil, India, Iran and Venezuela will also have to participate. If one oil company were to merely cease oil production, another player will take its place, one that could be less scrupulous with regards to environmental, social, safety and political standards. This level of global cooperation is on a scale we have never encountered before. One business model for managing collective action is “pre-competitive collaboration,” where industry leaders work to find consensus on the future direction of the fossil-fuel sector and the economy as a whole.³⁹ Precompetitive collaboration allows multiple actors to coordinate and address root causes of issues from multiple vantage points simultaneously, through an iterative and experimental collaborative framework. This process must involve the CEOs of the world’s fossil-fuel companies, but also governments, trade associations, research centers, environmental activists, local indigenous groups and many more.

2. Protect workers and avoid labor flight during transition. A just and orderly transition means not leaving people behind.⁴⁰ When a company announces a plan to end its fossil-fuel activities, will employees that have options flee the company, leaving the company short of talent to affect its plans? How will a loss of jobs where skills can be readily transferred, (for example, accountants and salespeople) and the loss of jobs where the skills are largely industry specific (such as oil field roustabouts) be managed? The actual numbers of people employed in these categories vary widely, ranging from 1 million⁴¹ to 2.6 million.⁴² The U.S. Bureau of Labor

Statistics estimates that 133,300 people work in oil and gas extraction and about 565,000 work in all of “mining, quarrying, and oil and gas extraction.”⁴³ If fossil fuel consumption was largely eliminated over a 20-year period (an extreme scenario), some calculate an average of 53,600 jobs lost annually.⁴⁴ The International Renewable Energy Agency estimates that nearly 8 million jobs in the fossil fuel industry could be directly displaced globally by 2050.⁴⁵ As fossil industries decline, the transition must be managed with dignity, giving displaced workers a chance at a new living through job retraining, education or pension to thank them for helping bring about a modern world. This also might mean identifying parallel opportunities in industries that need similar skillsets (e.g. geothermal drilling, carbon capture tracking, new lobbying priorities). Much like an organ donation system, a clear vision and plan for transition can foster inclusion and catalyze long-term reform that invigorates top talent with a new challenge to tackle.

3. Overcome political and social resistance to change. A decline and end of the fossil-fuel sector will precipitate political, economic and social blowback. Those that stand to lose in a win-lose scenario will fight hard to protect what they have. In several states, the American Legislative Exchange Council (ALEC) is introducing policy to blacklist firms that boycott the oil industry as a way to protect large oil firms from share selloffs and other measures intended to address the fossil fuel industry’s role in the climate crisis.⁴⁶ Texas Lt. Gov. Dan Patrick wrote to Comptroller Glenn Hegar that “If Wall Street turns their back on Texas and our thriving oil and gas industry, then Texas will not do business with Wall Street.”⁴⁷ The oil industry is economically and culturally central to states like Texas. And importantly, it is equally critical to oil producing nations like Saudi Arabia, Venezuela and Russia, translating not only into revenues but political power. Corporate leadership will necessarily need to identify stakeholders and

involve them in the process to align them. Creating an involvement plan, developing metrics of success, and creating a training and culture plan are all precedents communicating the transition itself.

Manage Broader Economic Impacts

The impacts of corporate triage, euthanasia or hospice are not isolated to the companies themselves and is as much about the individual who is dying as it is preparing those around them for their departure. The fossil fuel industry has impacts on the broader economy that must be managed.

4. Manage the full scope of the financial impact of the transition. The emergent clean energy sector is growing rapidly with some estimates reporting an employment base of nearly 3.3 million Americans, outnumbering fossil fuel workers by upwards of 3-to-1.⁴⁸ This growth is driven in large part by technological innovation and policy choices. The average installed cost of wind power has dropped from 7 cents per kWh in 2009 to below 2 cents in 2019.⁴⁹ Solar photovoltaic power has witnessed a dramatic 99% decrease in price between 1980 and 2012.⁵⁰ At the same the total revenue of the United States' oil and gas industry in 2020 reached nearly \$110.7 billion,⁵¹ while global revenues reached approximately \$2.1 trillion.⁵² With such economic power, the fossil fuel sector, as the foundation of energy for the modern economy, must play a significant role in both the process and the outcome of the energy transition that is underway, including consideration for the redeployment of financial assets. The top 10 oil companies in the world enjoy a market capitalization of \$3.3 trillion.⁵³ Sixty of the world's largest commercial and investment banks have collectively invested \$3.8 trillion in fossil fuels

from 2016 to 2020⁵⁴ and the industry paid out a total of \$32 billion in dividends to individuals, retirement plans, foreign shareholders, and other businesses in 2011.⁵⁵ How will these investments be maintained and transitioned? If a company announces a plan to end its fossil-fuel activities, will investors flee the company, leaving it short of capital to affect its plans? Similarly, will those investors who stay with the company watch their capital diminish? Finally, should oil companies and their investors be compensated for oil left in the ground, oil that was factored into the valuation of these companies and drew investors in the first place?

5. Control the fate of products both used and unused. There are 1.65 trillion barrels of proven oil reserves in the world, which amounts to 46.6 times the world's annual consumption levels and will last at least another 50 years.⁵⁶ The International Energy Agency predicts a peak in demand between 2020 and 2040; OPEC predicts increasing demand, followed by a plateau after 2035. If that oil is burned, scientific modeling predicts that will not be able to keep planetary temperatures at levels that are safe for human life. But how do we manage what will become a "stranded asset?" But how does one do that in practical terms? What will prevent defectors choosing to extract that valuable oil? How can a black market be avoided? And, for the sake of equity, should all nations be compelled to leave it in the ground, or should some developing nations be allowed to burn oil as it seeks to meet its primary needs?

6. Protect indirect workers in related industries. For each fossil fuel worker directly impacted by the end of the fossil-fuel sector, there are additional local jobs that depend on the sector. In India, every coal miner on a monthly salary generates anywhere between 3-10 additional local jobs through their consumption. If the coal miner's job is lost, these other local jobs also disappear.⁵⁷ In the U.S., the fossil-fuel industry provides upwards of 7.2 million jobs

through the indirect and induced impacts. For example, the oil and natural gas industry purchases capital goods from a variety of US suppliers, amounting to \$177 billion in new equipment and structures.⁵⁸ Even companies that proclaim to reject fossil fuels depend on petrochemicals derived from oil and natural gas (e.g. clothing suppliers). These kinds of impacts can be regional in their scope, and efforts to protect regional economies should be part of the energy transition.

Manage Societal and Policy Issues

Finally, corporate triage, euthanasia and hospice are made more difficult by complex societal impacts and corporate leaders must consider the process and distribution of these impacts to consider the equity of who will bear the costs.

7. Maintain justice and equity for all communities. Millions of jobs in the fossil fuel industry could be displaced by 2050. But these displacements will not be even and will impact some communities more than others. In Wyoming for example, nearly 8,400 people are employed in coal⁵⁹ and nearly 68,000 are employed in natural gas and oil,⁶⁰ providing in total about 16.6% of jobs in the state.⁶¹ Other states that are heavily dependent on the fossil-fuel sector include (in descending order): Oklahoma, North Dakota, Texas, Louisiana, Alaska, New Mexico and West Virginia. The economies in these states could be devastated if the industry were to decline, in much the way that the departure of manufacturing jobs turned midwestern United States economies into the rust belt. Conveniently, a quarter of the counties in the U.S. with greater potential for both wind and solar are also fossil fuel hubs, allowing some degree of sector transition that reduces localized displacement.⁶² But fossil fuels are still an enormously

important source of employment across the world. Fossil fuel jobs often offer higher salaries and better benefits than most jobs⁶³ and as the oil industry declines or disappears, how will the economies of developing countries be protected? Can they make the infrastructure investments to transition their economies to non-carbon-based fuels and jobs? And can they protect themselves from efforts by fossil-fuel interests to extract rents for lost revenues? In 2021, it was reported that fossil fuel companies were suing governments across the world for more than \$18 billion after action against climate change threatened their profits. These suits were brought under the Energy Charter Treaty and are being hosted within the International Centre for The Settlement of Investment Disputes, a branch of the World Bank which is outside of a country's domestic legal system.⁶⁴

8. Decommission, remediate and repurpose dedicated infrastructure. There is an enormous legacy infrastructure associated with the fossil-fuel sector. In the US alone, there are more than 2.6 million miles of fossil-fuel dedicated pipelines,⁶⁵ 129 operable petroleum refineries,⁶⁶ thousands of train cars and tanker trucks, approximately 542,000 underground storage tanks⁶⁷ and a comparable number of aboveground storage tanks⁶⁸, more than 150,000 fueling stations (95% of which are owned by independent operators)⁶⁹ to fuel 287 million registered cars and 38 million trucks. Globally, there are more than 600 operating refineries⁷⁰ and 810 very large crude carriers (one VLCC can transport over two million barrels of crude oil). How will these assets be redeployed or decommissioned? Further, there is an enormous hazardous waste legacy from coal mining, oil exploration, refining and transport and shale gas development that will require extensive remediation. Who will pay for it?

9. Leverage the power of government. The energy transition that is underway requires the involvement of governments from around the world. And as stated at the outset of this section, it requires a level of global cooperation on a scale humanity has never encountered before. Governments around the world have, and must continue to have, a critical role in determining both the *rate* of innovation and shape its *direction* through a variety of policies and practices.⁷¹ For example, governments, with corporate support, must remain committed to carbon reduction goals. The Norwegian oil major Equinor has made it clear that to meet its goal of allocating more than half of its annual gross capital expenditure to renewables or low carbon solutions by 2030, it needs European and global leaders to stick to their climate commitments.⁷² Governments must also reduce, eliminate or repurpose the \$423 billion in subsidies that have been provided to fossil fuels annually,⁷³ step in to help economically at-risk fossil fuel workers through the energy transition by retraining, support for local businesses and investment in associated infrastructure.⁷⁴ Finally, the power of government must be maintained in the face of pressure from incumbent fossil-fuel companies that leverage their lobbying power, spending nearly \$200 million per year to delay, control or block policies to tackle climate change.^{75?}

Manage the Role of Corporate Leadership

Ultimately, decisions about corporate triage, euthanasia, and hospice require a new form of corporate leadership. The training of business leaders must be revised to cover all facets of the systemic changes such decisions entail, including transformations of the corporation, the economy, and society.

10. Overhaul business education curricula as if people and the planet really matter.⁷⁶

As these grave forms of treatment—triage, euthanasia, and hospice—and the list of critical, related questions make clear, transitioning away from the fossil-fuel sector is a monumental systemic challenge. It will require strong and thoughtful leadership from all within the fossil-fuel sector, as well as from leaders in business, government, and civil society. And, importantly, it will require a reassessment of how we train those future leaders. These needs must guide the transformation of business education.

Many business schools in the United States,⁷⁷ the European Union⁷⁸ and elsewhere have begun to recognize the growing urgency of climate change and are putting the issue more centrally into their curriculum. Their guiding motivation is predicated on estimates of the scale of the market shift that climate change presents, which could range as high as \$26 trillion USD through 2030, creating 65 million new low-carbon jobs, and avoiding over 700,000 premature deaths from air pollution.⁷⁹ In the face of such opportunity, business curriculum is being geared towards the development of new products, services, and practices, examining ways to transform business models, technology, and innovation.⁸⁰

These efforts, while critically important, are missing an important component and focusing only on one side of the equation: the financial opportunity or the win-win. There is little if any attention to the other side of the equation: the eventual win-lose in some sectors.⁸¹ Tough choices are going to have to be made in changing our economic system if we are to address the full scope of our climate problems. We teach business students how to grow companies, how to perpetuate them, but not how to sunset them.

The host of considerations we have offered, and many more, open new avenues of inquiry for teaching important aspects of the role of business in society and how it will operate in the 21st century. The skills to dismantle an industry as complex and integrated as the fossil-fuel sector can help students develop a deeper understanding of the complex network that is the modern multinational corporation. To undertake such a task while the company is still financially viable brings the topic into a new domain, distinct from more straightforward considerations of bankruptcy and liquidation. Just as a mechanic can learn the intricacies of an internal combustion engine by taking one apart, a manager who is taught how to thoughtfully dismantle a company and its sector will be better prepared to understand how to build another business or sector more successfully. Today's climate crisis affords the perfect opportunity to reimagine business education and how it conceptualizes entire sectors, the economy, and the nature of capitalism itself.

Time to Act

In facing a managed end to the fossil-fuel sector, we confront myriad questions that are as complex and intertwined as both the climate-change issue itself and the fossil-fuel sector that is its chief cause. If we can address these questions, we can get a better glimpse of the magnitude of the systemic challenge before us and can begin to implement steps that are commensurate with the challenge. If we cannot, we must resign ourselves to remaining dependent on the fossil-fuel sector and courting environmental and economic calamity.

The questions raised in this article fit within the broader debate that is taking place around the role of the corporation in today's market and political environment. There are

increasing expectations from employees, investors, insurance companies, and others that companies should play a stronger role in addressing the social and environmental challenges of our day. Larry Fink, the CEO of BlackRock, sent a letter to CEOs of public companies in 2018 telling them that they have a responsibility not only to deliver profits, but also to make “a positive contribution to society.”⁸² Similar statements have been made by the Business Roundtable⁸³ the World Economic Forum,⁸⁴ and others. Against this backdrop, how does an oil company put such aspirations into action?

For act they must. Responsible fossil-fuel companies face the pragmatic reality that the sector as we now know it must end. We must turn to, and work with, the market to bring this about. The market – comprised of corporations, the government, non-governmental organizations, as well as the many stakeholders in market transactions, such as the consumers, suppliers, buyers, insurance companies, banks, etc. – is the most powerful organizing institution on earth, and business is the most powerful entity within it. Though government is an important and vital arbiter of the market, it is business that transcends national boundaries, possessing resources that exceed those of many nations. Indeed, if there are no solutions coming from the market, there will be no solutions.⁸⁵ The market is causing climate change and we must steer the market to stop it.

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