Business, Ethics, and Global Climate Change

Denis G. Arnold and Keith Bustos

In years past, there was substantial debate over the existence of global warming. Today, the debate is largely over. A consensus has emerged in the global scientific community that global climate change (GCC) is occurring and that it will have a dramatic and adverse impact on ecosystems, nonhuman species populations, and human populations. In a recent review essay in *Ethics*, Stephen Gardiner notes that despite the fact that GCC is widely regarded by scientists, policy analysts, and politicians as an ethical issue, the philosophical literature on the ethics of GCC is surprisingly underdeveloped. The primary subjects of ethical analysis identified by Gardiner are states, and the primary ethical issues he identifies are the fair distributions of burdens among states in reducing emissions. However, what ethical obligations, if any, the business organizations that produce these emissions—either directly or indirectly—have regarding GCC is not addressed. This is not surprising, for the possibility that business organizations can have ethical obligations concerning GCC is almost entirely absent from the existing literature on the ethics of GCC.

The organization of this essay is as follows. First, an overview and brief history of the discovery of GCC is provided. Second, the influential position that holds that free markets and responsive democracies relieve business organizations of any special obligations to protect the environment is explained. Next, five objections to this "free market solution" to environmental problems, concerning GCC, are presented with special attention given to the transportation and electricity generation sectors' contribution to GCC. Finally, the ethical obligations of business in the transportation and energy sectors are identified with regard to their contribution to GCC, and preliminary policy recommendations are offered.

GLOBAL CLIMATE CHANGE

There is a vast amount of conflicting information concerning GCC available to anyone surfing the Web, browsing headline articles in

© *Business & Professional Ethics Journal* 24:1 & 2 (Summer/Fall 2005): 103–130.

national newspapers, or scanning library collections. When trying to determine the scientific facts concerning GCC, it can be difficult to know which sources to trust. However, the most widely cited, peer-reviewed sources are the assessment reports produced by the Intergovernmental Panel on Climate Change (IPCC). In 1988, the IPCC was jointly established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) with the purpose of assessing the available scientific and socioeconomic information on climate change in order to provide expert advice to the Conference of the Parties to the United Nations Framework Convention on Climate Change.[1] Since 1990, the IPCC has relied upon hundreds of expert scientists to produce a series of reports and papers that have become standard works of reference used by policy makers, scientists, and other agencies such as the Energy Information Administration (EIA), a division of the United States Department of Energy.

Before getting to the IPCC's position on GCC, we should be clear about what factors contribute to this phenomenon. As solar radiation enters the earth's atmosphere, atmospheric greenhouse gases (GHGs) (such as water vapor, carbon dioxide, methane, and others) trap some of this radiation as it travels back out of the atmosphere, retaining heat much like glass in a greenhouse. Even though water vapor is by far the most abundant greenhouse gas in the earth's atmosphere, human activities have a negligible effect on the atmospheric concentrations of water vapor, and for this reason, it is not figured into national greenhouse gas emission inventories. Many of the GHGs (carbon dioxide, methane, nitrous oxide) are produced by both natural and anthropogenic processes, and there are natural mechanisms that remove significant amounts of GHGs from the atmosphere. However, anthropogenic emissions have increased the total concentration of GHGs beyond the earth's natural capacity to remove these gases from the atmosphere. Of these GHGs, CO_2 (carbon dioxide) is the most abundant in the earth's atmosphere due to burning fossil fuels. CO_2 is the most recalcitrant of the GHGs, since it does not decompose easily in the atmosphere (taking anywhere from 50 to 200 years to decompose). This means that a significant decrease in atmospheric CO_2 levels will not be realized for many years after anthropogenic CO_2 emissions drop. Incidentally, the United States has ranked first in the world for CO_2 emissions for several decades and has been responsible for about 24 percent of the total world CO_2 emissions for the past decade and is projected to hover between 23 percent and 24 percent until 2025.

According to the IPCC, approximately 75 percent of the atmospheric CO_2 stemming from human activity (worldwide) over the past 20 years is due to burning fossil fuel, and the other 25 percent is largely due to changes in land use, mainly deforestation. Due to an increase in atmospheric concentrations of CO_2, "the globally averaged surface temperatures have increased by 0.6 ± 0.2°C over the twentieth century."[2] Furthermore, the IPCC projects that "the globally averaged surface air temperature is projected . . . to warm 1.4 to 5.8°C by 2100 relative to 1990."[3] This warming trend is projected to continue at a rate of about 0.1 to 0.2°C per decade for the next few decades. The IPCC has also found evidence indicating that regional changes in temperature have already affected a variety of physical and biological systems worldwide, such as shrinking glaciers, lengthening of mid- to high-latitude growing seasons, poleward migration of plant and animal ranges, and declines of some plant and animal populations.

Generally speaking, an increase in average global temperatures is likely (60 to 90 percent chance) to lead to altered weather patterns resulting in a greater risk of droughts (due to extreme drying) and floods (due to intense

rainfall events) in many different regions, and the global mean sea level is projected to rise between 0.09 to 0.88 meters by 2100. Also, natural systems (such as coral reefs, mangroves, boreal and tropical forests, and prairie wetlands to name a few) are vulnerable to climate changes due to their inability to adapt to rapid environmental changes. Some of the more vulnerable species risk extinction, and the extent of damage or loss of biodiversity is sure to increase with the magnitude and rate of climate change.

The human systems that are highly susceptible to climate change are water resources, agriculture, forestry, fisheries, energy production, industry, insurance and other financial services, and human health (particularly a net increase in the geographic range of malaria and dengue). A nation's ability to cope with and adapt to climate change depends on such factors as wealth, available technology, education, access to information, skills, infrastructure, access to resources, and management capabilities. The most important thing to note is that the impacts of future climate changes will be disproportionately borne by the world's poor.

As for the impact on the global financial sector, the extreme weather events anticipated to accompany climate change would increase actuarial uncertainty in risk assessment, which would result in increased insurance premiums or could possibly lead to the withdrawal of coverage in certain situations altogether. In either case, the need for government-funded compensation following natural disasters is sure to increase (particularly in the United States).

Since many of the IPCC's claims have been met by staunch skeptics in industry and politics, a brief history of the discovery of GCC may be helpful.[4] By the late 1980s many scientists and other well-informed people were aware that the phenomenon of GCC was not a myth. However, no one really knew how severe this problem actually was or could become, nor did they completely understand what should be done about it.[5] The IPCC was formed partially in response to the growing concern that GCC could be worsening. Once formed in the late 1980s, the IPCC quickly gained credibility as supporting a moderate view concerning the reality of GCC, and its potential ecological effects. The IPCC gained credibility by offering cautious conclusions concerning GCC—ones that were extremely well supported by rigorous scientific studies. The third IPCC climate change report, released in 2001, confirmed that the vast majority of the scientific community was certain that GCC was happening and that the release of anthropogenic GHGs exacerbated its further onset. GCC had been discovered. The main uncertainty that remains concerns the appropriate response to GCC, which continues to stand as a major problem that the global community must address.

THE MARKET "SOLUTION"

In his classic and widely reprinted essay "Money, Morality and Motor Cars" Norman Bowie takes on environmentalists who believe that businesses have special obligations to protect the environment.[6] Bowie is skeptical that an adequate defense of the environmentalist position has been mounted, and so he assumes the role of "devil's advocate" in arguing that businesses have no special obligation to protect the environment above and beyond what is required by law. Bowie begins by endorsing the commonly accepted principle that "no one has a right to render harm on another unless there is a compelling, overriding moral reason to do so."[7] He points out that this prima facie duty is commonly understood to apply to individual persons, not ecosystems, species, or even individual animals. Bowie next points out that when it comes to the manufacture and

marketing of consumer goods, businesses must factor the cost of avoiding harm into the price of the product. He illustrates this claim with the example of automobiles. In 2003 there were 33,471 passenger fatalities in the U.S. Death is an obvious harm. When it comes to passenger safety, all cars are not created equal. Inexpensive cars typically have fewer safety features than more expensive cars. Customers who cannot afford to pay for safer, more expensive cars, buy inexpensive ones with comparatively few safety features. Other customers may prefer to pay more for a car that has particular engine performance or style qualities, despite the fact that it has a poor safety record. While still other consumers will emphasize safety as an overriding preference and purchase their vehicles from companies that emphasize safety such as the Volvo division of Ford. If many automobile manufacturers emphasized safety in all their models, then on Bowie's analysis, consumers would not buy as many cars from those manufacturers and those automobile companies would lose money. Given the varied preferences of consumers, Bowie concludes that "an automobile company does not violate its obligation to avoid harm and hence is not in violation of the moral minimum if the trade-off between potential harm and the utility of the products rests on social consensus and competitive realities."[8]

Bowie then extends this analysis to the question of harm to the environment. He points out that consumers often rebuff businesses that embrace environmentally friendly practices. For example,

> The restaurant chain Wendy's tried to replace foam plates and cups with paper, but customers in the test markets balked. Procter and Gamble offered Downey fabric softener in a concentrated form that requires less packaging than ready-to-use products; however the concentrate version is less convenient because it has to be mixed with water. Sales have been poor. Procter and Gamble manufactures Vizar and Lenor brands of detergents in concentrate form, which the customer mixes at home in reusable bottles. Europeans will take the trouble, Americans will not. Kodak tried to eliminate its yellow film boxes but met customer resistance.[9]

Given this type of consumer behavior, Bowie concludes that legal harm to the environment caused by businesses is regarded as morally permissible by society. As such, he believes that "current legal activities by business organizations that harm the environment do not violate the avoid-harm criterion."[10]

In cases of market failure, where citizens recognize that their individual preference satisfaction is harming the environment in undesirable ways, Bowie points out that citizens in democracies have the ability to imposes regulations to correct market failures. For example, when consumers purchase SUVs and conventional automobiles, their use of those vehicles contributes to GCC. Citizens who choose to purchase such vehicles may nonetheless grant tax relief for purchasers of hybrid electric vehicles, thereby encouraging others to purchase low-emission vehicles that contribute much less to GCC. Given the importance of this ability to correct for market failures, together with the fact that businesses justify their environmental practices by appealing to consumer preferences, Bowie concludes that businesses have an obligation to refrain from opposing the preferences of consumers regarding environmental protection.

Bowie does not explicitly take up the issue of GCC. However, it is not difficult to extrapolate the obligations of business with regard to GCC, at least in democracies, according to his analysis. These are, first, to obey the law. Second, to refrain from opposing the collective will of citizens as expressed through the legislative process and the law regarding GCC. Third, to respond to consumer demand regarding GCC. Businesses that do these things

will have no ethical obligations regarding GHG emissions and GCC beyond those stipulated by law.

MARKET FAILURES AND ETHICAL OBLIGATIONS

Bowie's arguments have received surprisingly little criticism in the literature. However, there are serious difficulties with his defense of the market solution to environmental problems. In what follows we raise five of the most substantial objections, focusing in particular on the roles of business organizations in the transportation and electricity generation sectors regarding GCC.

Objection One: The Absence of Democracy

This objection has two parts. First, many of the nations in which MNCs conduct business lack important democratic institutions such as equal voting rights, multiple political parties, democratic elections, politically neutral militaries, and an independent judiciary. Thirty-eight percent of the world's sovereign states and colonial units—home to 42 percent of the world's population—have nondemocratic forms of government. Bowie's defense of the ethical obligations of business concerning the environment are conceptually incoherent when applied to MNCs that operate in nondemocratic nations. It is conceptually incoherent because in order to provide normative guidance it must assume the existence of democratic institutions where they do not exist. Second, the elevated GHG emissions that are permitted in the United States will harm not merely U.S. citizens, but the entire population of the planet. Yet the preferences regarding the potential harm to non-U.S. citizens remain unaccounted for on Bowie's analysis. The fact that voters accept a particular level of harm does not make such harm morally legitimate. This might be the case if the harm is restricted to those who accept it, but GCC will not only affect U.S. citizens, but the entire population of the planet and future generations of persons who cannot yet register their preferences in the market or in the political process. Yet the preferences regarding the potential harm to non-U.S. citizens and future generations remain unaccounted for on Bowie's analysis.

Objection Two: The Roles of Consumers

It is unreasonable to believe that most consumers have an accurate understanding of the causes of global climate change, or an accurate understanding of the role of their own consumer choices regarding global climate change. With regard to complex environmental problems such a GCC, it is reasonable to conclude that most consumers lack an understanding of the causes of climate change or its likely harm to their welfare and the welfare of future generations. However, the large businesses that dominate the transportation and electricity sectors of the global economy typically have a sophisticated understanding both of GCC and the extent to which their own production, products, and services contribute to GCC. This sophisticated knowledge allows them to make changes regarding their practices and to develop environmentally friendly products and services, which consumer preference satisfaction by itself could never achieve. Bowie cites examples of failed environmentally friendly initiatives on the part of businesses. However, as with any new product offering, marketing the initiative to consumers must be regarded as an important priority. And just as the marketing of a new toothpaste or soda flavor can be a failure, so too can the marketing of an environmentally friendly product. Not all environmentally

friendly products will be successful. However, we should not become too cynical as a result of failed product launches. There are many examples of businesses that have brought environmentally friendly products to market successfully. And it is worth noting that despite modest initial resistance from consumers, Wendy's and nearly all fast-food restaurants have successfully switched from foam plates and cups to paper.

Objection Three: Consumer Choice

Bowie's analysis presumes that if businesses are to protect the environment above and beyond the law, it must be as a result of consumer preferences. However, there are two difficulties with this claim. First, consumer preferences are not always satisfied by businesses. For example, consumers who are concerned about GCC and wish to purchase hybrid electric vehicles (HEV) currently have few options. There are waiting lists for many HEV vehicles. But as automobile manufacturers are well aware, consumers purchase vehicles based on the ability of the vehicle to meet a variety of needs. Fuel efficiency and emissions may be important to a consumer, but so are things like passenger capacity, acceleration, and luxury qualities. At present there are no HEV minivans or HEV luxury sedans, so consumers who would prefer more environmentally friendly minivans or luxury sedans are left without options.

Second, consumers often have little or no influence with regard to the environmental practices of businesses. For example, a consumer who recognizes that coal-fired power plants emit harmful levels of GHGs into the atmosphere may strongly prefer to purchase electricity from an energy provider that relies more on wind, solar, or hydroelectric energy sources. However, energy providers typically have a monopoly over consumers, so the consumer cannot take her business elsewhere. Furthermore, the consumer *qua* citizen typically has no direct way to regulate energy providers.

Objection Four: Harm to Others

As noted above, the impact of GCC will affect every person on Earth, and not merely the consumers of specific products or services. The atmosphere is a common resource, one that U.S. consumers share with the global community. As Will Kymlicka and Henry Shue have argued, preferences typically entail a claim on resources. The preference satisfaction of U.S. consumers, for example, makes use of a per capita disproportionate level of atmospheric resources. At the same time, the harm caused to present generations of non-U.S. consumers will be disproportionate to their use of atmospheric resources. So too, presumably, will be the harm to future generations. These future persons will have preferences that require due consideration. The mere preference satisfaction of present-day U.S. consumers cannot by itself justify this harm to others.

Objection Five: Responsibility for the Past

A basic principle of justice holds that it is unfair to require others to pay for the costs of benefits one has secured for oneself without their uncoerced consent. Those who enjoy the benefits resulting from burning fossil fuels, and thereby contribute to GCC, ought to pay more for such benefits than those who do not enjoy such benefits. In the U.S. the transportation sector and the electricity generation sector are the two most carbon-intensive sectors, and thus the two sectors that contribute the most to the total U.S. CO_2 emissions. The reason for these two sectors' being so carbon intensive is due to their heavy dependence upon fossil fuel combustion. The transportation sector is more carbon intensive than the electricity generation sector because the

former is almost completely dependent upon petrofuels.

Between 1990 and 2003, the transportation end-use sector contributed an average of about 31 percent of total CO_2 emissions from fossil fuel combustion in the U.S. In 2003 the U.S. emitted approximately 5,781.4 million metric tons (mmt) of CO_2 due to burning fossil fuels, with transportation accounting for approximately one-third of those emissions. The energy consumed by the transportation sector is predominantly petroleum-based, with slightly more than 61 percent of the CO_2 emissions resulting from burning gasoline, about 21 percent from diesel, and approximately 13 percent from jet fuels. In 2002, the transportation end-use sector consumed almost 97 percent of the total U.S. consumption of petroleum. The amount of energy consumed by automobiles within this sector accounted for more than 33 percent and light trucks (pickups, minivans, sport-utility vehicles, and vans) almost 25 percent. Even though automobiles consume more energy than light trucks (because there are fewer trucks on the road), the latter have had the greatest increase in energy consumption over the past decade due to their growing popularity.

In the United States, fossil fuels are the primary fuel used to power many sectors of our economy, especially the electric power industry. In 2003, the United States generated and sold 3,488 billion kWh of electricity—approximately 1,273 billion kWh (36 percent) was consumed by the residential end-use sector, roughly 1,151 billion kWh (34 percent) consumed by the commercial sector, about 1,008 billion kWh (29 percent) went to the industrial sector, and 7 billion kWh (less than 1 percent) was used by transportation.[11] In this same year, more than half the electricity produced in the U.S. was from coal (51 percent), 20 percent from nuclear, and 17 percent from natural gas. In order to produce 3,488 billion kWh, the electric generating facilities burned slightly more than 1 billion tons of coal, about 207 million barrels of petroleum, and a little more than 5.5 billion metric cubic feet of natural gas. The generation of electricity in the United States released 2,279.3 million metric tons (mmt) of CO_2 into the atmosphere, which is the highest level since 2000. . . .[12]

Given the transportation and electricity generation sectors' large contribution to GCC, it is reasonable to hold them accountable for the proportional harm to the atmosphere that they have caused historically. In particular, there are good reasons for holding them accountable for the impact of at least some of their GHG emissions on GCC to date. While purely theoretical discussions of historical accountability are of interest, we wish to focus on an account of historical accountability that is useful for policy making. Our concern is to provide tools for policy makers who may need to use the coercive power of the law to encourage business organizations to fulfill their moral obligations regarding GCC.

Eric Neumayer offers a compelling moral position that may be helpful in establishing the level of culpability a business organization deserves regarding GHG emissions.[13] Neumayer's arguments pertain to nation states, whereas the present project deals with corporate environmental responsibility. Although these two groups play drastically different roles within society, the actual responsibilities regarding GHG abatement are quite similar. Neumayer gives three reasons in defense of historical accountability as it pertains to global GHG emissions. First, indisputable science has demonstrated that an increase in GHG emissions exacerbates the onset of GCC, and human activities (namely the burning of fossil fuels) have greatly contributed to the atmospheric concentrations of GHGs over the past century. And for this reason, to reject historical accountability would be to reject the phenomenon of GCC. (This tacit assumption

has been embraced by business organizations such as ExxonMobil.) Second, Neumayer contends that the polluter-pays principle (PPP) helps to justify the historical accountability approach. The PPP supports the claim that GCC is predominantly caused by the GHG emissions of developed countries and these countries should pay for mitigating GCC. By rejecting historical accountability, we would reward rich industrial nations by not making them pay for the GHGs they have emitted while disadvantaging poor, less industrialized nations. Third, he argues that by adopting historical accountability we would ensure that all present and future individuals would have the equality of opportunity to use the global atmospheric commons, no matter where they live or will live. So, according to Neumayer, historical accountability should be adopted as morally preferable approach in assigning responsibility for the current and future harm resulting from GCC.

Although we are sympathetic to Neumayer's position, we do not accept full historical accountability, which assigns responsibility to GHG-emitting nations possibly as far back as the late 1800s when Svante Arrhenius first detected a warming trend in the Earth's atmosphere. Instead, we support a truncated version of historic accountability that is effective only back to 2001. Granted, many corporate leaders knew about their respective organizations' potential contribution to GCC as early as 1995 (and possibly as early as the mid-1980s); however, at that time the scientific evidence remained relatively uncertain. Business organizations cannot reasonably be held responsible for responding to every potentially alarming situation concerning their business practices. Even after GCC was determined to be likely in the late 1990s, there was still a significant amount of controversy concerning the science behind those findings. But by 2001 the IPCC was able to claim with a very high level of certainty that CO_2 emissions constituted a significant contribution to the further onset of GCC. It was not until 2001 that GCC was an undeniable fact. It is reasonable to hold business organizations morally responsible for their negligent contribution to GCC once it became abundantly clear that their respective GHG emissions contributed greatly to GCC. . . .

POLICY IMPLICATIONS

How should we determine the appropriate level of GHG abatement? What would an appropriate abatement plan look like? What time frame should it have? The two extremes that set our boundaries are (1) do too little, and cause substantial harm to future generations; or (2) take drastic action too soon thus incurring unnecessary costs. It seems reasonable to suggest that we adopt a moderate approach, which means that if we are to avoid the predicted catastrophes related to GCC, then we need to reduce CO_2 emissions below 1990 levels within a few decades, and then continue to decrease CO_2 steadily thereafter. The long-term goal is to reduce CO_2 emissions to a small fraction of what they are today. The need to engage in aggressive, but not frantic, CO_2 abatement is due to the fact that this GHG has an atmospheric lifetime of 50–200 years. This means that even an aggressive plan of action will not reverse GCC, it will only stabilize it since the CO_2 we produce today can continue to contribute to GCC for up to 200 years into the future. So, we contend that business organizations that are responsible for substantial CO_2 emissions have a moral obligation to be engaged in aggressive proactive measures to abate their CO_2 emissions, and that this obligation has been effective since 2001. Any business organization that has not taken proactive measures to abate CO_2 emissions is deserving of disapprobation.

Before discussing what sort of punishments and incentives might be invoked to help business organizations comply with such a moral duty,

it must be noted that we do not believe that merely complying with current U.S. regulations satisfies the duties of business organizations regarding GHG abatement and GCC mitigation. In order to avoid censure, a business organization must go beyond mere compliance, for current U.S. legislation does not bode well for mitigating GCC.

The problem with determining the actual degree and type of proactive measures that a business organization must engage in, so as to meet this moral demand, is that there are numerous ways to go beyond compliance and still miss the mark. That is, just because a firm engages in beyond-compliance practices does not necessarily mean that it is doing all that it is morally obligated to do regarding GCC. Conversely, just because a business organization is guilty of a few environmental transgressions does not mean that it is failing to take appropriate action regarding GCC. Just as there are "shades of green" within the corporate world, there are also shades of brown.

The ambiguity in abatement actions illuminates the need for diagnostic tools that can help to make a distinction between green and brown organizations. It is challenging to gather neutral information from the business organizations themselves, as they tend to put their best environmental projects forward. Nonetheless, distinctions between the environmental practices of companies can be made. Take for example the difference between Toyota and General Motors (GM). Toyota is currently at the forefront of HEV vehicle production. It currently offers consumers a variety of high fuel economy vehicles, while GM currently manufactures no such vehicles. GM specializes mostly in producing larger vehicles that consume more fuel such as the Hummer brand, whereas Toyota primarily produces midsize cars and smaller vehicles. Another important reason for this disparity is that Toyota has invested heavily in hybrid technology, whereas GM chose to invest in hydrogen technology research. Toyota's investment is currently paying off, allowing them to be a leader in the race to decrease the fuel demand of the transportation industry. GM's activities reflect a lack of concern with the current state of GHG emissions.

Writing in *Foreign Affairs*, Lord Browne, Group Chief Executive of British Petroleum, points out that "BP found that it was able to reach its initial target of reducing emissions by 10 percent below its 1990 levels without cost. Indeed, the company added around $650 million of shareholder value, because the bulk of the reductions came from the elimination of leaks and waste."[14] Morally imaginative companies, such as BP and Royal Dutch Shell, have already begun to assume responsibility for their impact on the global environment. However, it is reasonable to conclude that businesses that decline to fulfill their minimal ethical duties regarding GCC, such as ExxonMobile, should be provided with incentives for doing so by governments. One such incentive in meeting the duty to mitigate GCC would be imposing a tax on carbon emissions. The actual cost of the tax has been hotly contested and has yet to be settled. Setting a specific tax rate is beyond the scope of this paper; however, we suggest that this rate should reflect the fact that the future global climate is just as valuable as it is today. . . .

Those firms that failed to take proactive measures from 2001 on should be penalized for their negligence. Such a penalty might involve a compounding interest rate, meaning that each year past 2001 that a firm fails to take appropriate proactive measures, it will not only incur an interest expense, but for each year that the fine is unpaid, the accrued interest itself becomes part of the principle and also accrues interest. Here, for illustrative purposes, is an example. If the carbon tax were set at $450/toc (ton of carbon) for 2005, business organizations that only began abating their carbon emissions this year would be required to pay $450 per year that has passed ($450 × 4).[15]

This penalty would also include an interest rate of 10 percent. As a result, a firm that has only begun to engage in proactive measures to abate their CO_2 emissions in 2005 would have to pay $495/toc for 2001, $544.50/toc for 2002, $598.95/toc for 2003, and $658.85/toc for 2004.

The position that we have argued for is that individual business organizations are morally responsible for their contribution to GCC and the resulting harm. And, in order for firms to reduce their contribution to the harm that will inevitably befall persons in the future due to the extreme and chaotic weather events caused by GCC, they must take aggressive proactive measure to abate their respective CO_2 emissions. Ideally, this is a moral obligation that should be voluntarily embraced by individual firms. However, we realize that placing such a moral responsibility on firms may be too much to ask of them on their own, so we also call for the help of the government in abating industrial CO_2 emissions. Such governmental assistance would come in the form of imposing a tax on carbon emissions, and this expense can then be internalized by individual firms and incorporated in the price of their goods, thereby requiring consumers to bear a fair price for the pollution produced when manufacturing the goods that they consume. Also, the revenue generated from the carbon tax can be used to fund or subsidize further abatement measures so as to help the U.S. reduce its contribution to GCC.

NOTES

1. Intergovernmental Panel on Climate Change, *Climate Change 2001: Impacts, Adaptation, and Vulnerability* (New York: Cambridge University Press, 2001), foreword.
2. Intergovernmental Panel on Climate Change, *Climate Change 2001: Impacts, Adaptation, and Vulnerability*, p. 3.
3. Ibid., 3.
4. One of the most well known skeptics is the self-proclaimed skeptical environmentalist Bjørn Lomborg. Bjørn Lomborg, *The Skeptical Environmentalist* (Cambridge: Cambridge University Press, 2001).
5. Spencer R. Weart, *The Discovery of Global Warming* (Cambridge: Cambridge University Press, 2003), 160.
6. Norman E. Bowie, "Money, Morality and Motor Cars," in *Business, Ethics, and the Global Environment*, ed. W. M. Hoffman, R. Frederic, and E. Petry (New York: Quorum Books, 1990), 89–97. Reprinted in this chapter.
7. Ibid., 90.
8. Ibid., 92.
9. Ibid., 93.
10. Ibid., 93.
11. Energy Information Administration, *Electric Power Annual 2003* (Washington, DC: Office of Coal, Nuclear, Electric and Alternative Fuels, 2004), 3, 39.
12. Energy Information Administration, *Emissions of Greenhouse Gases in the US 2003* (Washington, DC: 2004), 28. Available at http://www.eia.doe.gov/oiaf/1605/ggrpt/index.html; Energy Information Administration, *Electric Power Annual 2003* (Washington, DC: Office of Coal, Nuclear, Electric and Alternative Fuels, 2004), 2.
13. Eric Neumayer, "In Defense of Historical Accountability for Greenhouse Gas Emissions," *Ecological Economics* 33 (2000): 185–92.
14. John Browne, "Beyond Kyoto," *Foreign Affairs* 83, no. 4 (July/August 2004): 26.
15. This is the carbon tax suggested by William R. Cline, which, according to his calculations, is an appropriately risk-averse tax aimed at quickly reducing CO_2 emissions. Ideally, this tax would start at $450/ton in 2005 and rise as high as $1,900/ton by 2205. William R. Cline, "Climate Change," in *Global Crises, Global Solutions*, ed. Bjørn Lomborg (Cambridge University Press, 2004), 13–43. A summary of Cline's article along with responses to his views can be accessed on the Web at http://www.copenhagenconsensus.com/Default.asp?ID=415
16. The 10 percent interest rate reflects the philosophy behind choosing a private discount rate instead of a social discount rate. That is, a private discount rate reflects a greater degree

of impatience than does a social discount rate because individuals tend to be more myopic than societies when dealing with consumption—individuals place more value on immediate consumption than on future consumption. Private interest rates are generally higher than social interest rates and can be as high as 10 percent. We have deliberately set the interest rate at such a high percentage to reflect a high degree of impatience, in order to entice firms to quickly come into compliance. Ahmed M. Hussen, *Principles of Environmental Economics: Economics, Ecology and Public Policy* (New York, NY: Routledge, 2000), 324.

Editors' note: Seventy-six notes were deleted from this essay because of space constraints. Readers interested in detailed citations should consult the original article.