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THE GREEN ECONOMY: STRATEGIC PLANNING FOR A FUTURE?

“The economy is a wholly owned subsidiary of the environment, not the other way around.”

--Gaylord Nelson¹

“Time held me green and dying, though I sang in my chains like the sea.”

--*Fern Hill*, Dylan Thomas²

While the green economy is uniquely dependent on imagination, it is not imaginary. While it needs ideas to grow, it is not necessarily ideological. The term “green economy” brings to mind for many people wind turbines and solar energy installations, and, perhaps, organic produce and free-range chickens as well. All these usages convey the sense of “sustainability.” The use of the term “green”--long associated with growth and life--is in keeping with the term “sustainability” as articulated in the 1987 United Nation Brundtland Report, entitled *Our Common Future*. The report defines the term “sustainability” as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”³ This concept is not new. It is essentially the Golden Rule in the environmental context. In other words: Use the resources of the world, but do not use them up.

Today, scientists posit the possibility of an “existential warming threat” with a five percent chance of threatening the existence of the world’s population by the end of this century.⁴ Environmental threats capable of devastating society include climate change, deforestation, pollution, loss of biodiversity, melting *914 polar ice caps and rising sea levels, oceanic dead zones, and explosive population growth.⁵ The risks are exacerbated and often created by the level of human populations occupying the planet⁶ and the disconnect between the environment and the economy.

The higher the level of economic development, the more money tends to become an abstraction rather than a counter for something concrete. Thus, the economy can boom as the ecology disintegrates. This is particularly true if the society resorts to currency debasement or loose credit as a way to evade encroaching physical limits and foster an artificial prosperity, for then the economy becomes completely unhinged from concrete ecological reality. Overshoot and collapse is the inevitable result.⁷

Dangers are interconnected, and political destabilization frequently accompanies environmental risks of such magnitude.⁸ Promoting the necessary widespread change to adapt to such problems is daunting. The likelihood of changes in markets happening spontaneously is so slight that it makes sense to assume that some kind of incentives are needed (either positive or negative) to address the significant problems on a large enough scale to effect meaningful change. Incentives necessarily rest on assumptions about the effects of current practices and the efficacy of the regulatory incentive system. Inevitably, the risk that these assumptions are inaccurate means that any incentive system may fall short of its goal.⁹

This Article explores the existence of a green economy--an economy that can sustain life and livelihood with the realistic expectation of our species continuing to live on this planet. The future requires planning and incentive *915 structures, such as regulatory mandates, traditional regulatory incentives, and ex post support for viable ideas in defense of a sustainable future. Part II of this Article examines the existence of environmental threats that have created the need for a widespread green response, e.g., the green economy. Part III surveys the reality and the rise of the green economy, exploring examples of the scope of today’s green economy. Part IV considers the need to incorporate new green incentives into the existing market structure. It argues that the crucial step of prioritizing responses and incentives based on the severity of the threats cannot be

avoided and that introducing opportunities for businesses and innovators to advance new ideas is, likewise, necessary strategic planning. Part V concludes with observations about the relationship of new and existing incentives and the possibility that a green economy should consider an all-hands-on-deck approach, including ex post rewards for innovations.

I. WHY A GREEN ECONOMY? WHAT THE WORLD NEEDS NOW

Advertisements, corporate announcements and stewardship statements all employ the term “green” frequently, on the assumption that readers have a shared working definition of the term.¹⁰ To be “green” is to be alive, healthful, and to have a future. Green-ness is the subject of publications in the popular press,¹¹ scholarly books and articles,¹² and on the internet.¹³ The green product or practice is expected to fit into the physical world and help protect the integrity of the planet. Under the green banner, countries around the world have recognized the threat of global climate change and joined together to take steps toward reducing carbon emissions.

Because, underneath all of this is the real truth we have been avoiding: climate change isn’t an “issue” to add to the list of *916 things to worry about, next to healthcare and taxes. It is a civilizational wake-up call. A powerful message--spoken in the language of fires, floods, droughts, and extinctions--telling us that we need an entirely new economic model and a new way of sharing this planet. Telling us that we need to evolve.¹⁴

In 2017 the U.S. Global Change Research Program Climate Science Special Report (CSSR) reported key findings, including stronger evidence of “rapid, human-caused warming of the global atmosphere and ocean.”¹⁵ Though political reaction to the threat often focuses on minimizing the danger,¹⁶ the response has been slow and the effects and dangers of climate disruption are increasingly apparent. Ongoing research and observable changes in the planet have made the scientific consensus about climate disruption and the urgency of climate change stronger as glaciers shrink, oceans and rivers warm, and coast lines recede. A draft report by agencies such as NASA and the National Oceanic and Atmospheric Administration released in 2017 states “that the world has warmed by about 1.6 degrees Fahrenheit over the past 150 years and that human activity is the primary cause for that warming.”¹⁷

According to a new paper, climate change could threaten the existence of the world’s population by the end of this century. Scientists Yangyang Xu and Veerabhadran Ramanathan found that there is a 1 in 20 chance that the carbon dioxide in the air could cause an “existential warming threat.”¹⁸ This would have grave consequences, causing 20 percent of the world’s species to become extinct.¹⁹ The researchers propose three mitigating changes to avoid this situation: (1) achieve carbon neutrality by 2050, (2) target short-lived climate pollutants like hydrofluorocarbons, and (3) take some of the existing carbon in the atmosphere out. “To put in perspective, how many of us would choose to *917 buckle our grandchildren to an airplane seat if we knew there was as much as a 1 in 20 chance of the plane crashing?” Ramanathan said in a statement.²⁰ “With climate change that can pose existential threats, we have already put them in that plane.”²¹

The catastrophic consequences of global climate disruption should come as a surprise to no one.

It all seems obvious once we step back and focus on the relation between the edifice of civilization and its ecological foundation. Of course, resources are limited; of course, we cannot violate limits with impunity; of course we cannot indefinitely consume natural capital. Yet history is littered with the corpse of civilizations that lived beyond their ecological means and paid the price.²²

Whether climate change and the increasing extreme weather events are man-made continues to be debated despite a growing consensus that, whatever the cause, immediate action is necessary to respond to climate change and to attempt to mitigate some of the severe effects. Climate change in the range now predicted affects a range of economic and environmental indicators. For example, crop production is falling due to higher temperatures and lower moisture levels. Wheat is a useful indicator of the ability of farmers to feed the populations of the world as it is the biggest source of calories of any crop in the world, and it is a staple food for more than a third of the world’s population.²³ The U.S. Department of Agricultural reports a production decline in winter wheat of approximately 25% from 2016.²⁴ “Prospects for both lower harvested area and yields, currently projected at 48.8 bushels per acre as compared to 55.3 bushels in 2016.”²⁵ Winter wheat plantings are also at a record low, exacerbating the sharp decline in winter wheat production.²⁶ Estimated wheat production is likely to “fall between 4.1 percent and 6.4 percent for every 1-degree Celsius increase in global temperatures.”²⁷ Farmers are experimenting with heat and insect-resistant varieties, as well as rotation crops to conserve moisture. The nearly unanimous scientific consensus about the science of climate change is that *918 this pressing concern poses an environmental risk of staggering proportions.²⁸ Taking one isolated but significant consequence of climate change, rising sea levels imperil islands and coastal villages and cities. Ocean life and sea life habitats such as coral reefs are in peril as a result of ocean acidification, a direct result of climate change. Scientists attribute increases in extreme weather, as a matter of both frequency and severity, to global climate change. Moreover, displaced populations and scarcity of water and other resources are predicted results in the future of climate change as well as the current reality in many locations.

Persistent disagreement about how to value protection of the environment and continuing debates about jobs versus the environment pose challenges to a sustainable future. Despite strong and growing efforts by the international community to develop a framework to deal with the issues of environmental degradation and climate change,²⁹ the United States is backing away from commitments.³⁰ Based on weighty evidence recognized by the international community, the Kyoto Protocol of 1997 sought to limit greenhouse gases in the global atmosphere.³¹ In November 2016, the Paris Agreement entered into force, acknowledging the scientific consensus stated by the Intergovernmental Panel on Climate Change (IPCC) with the commitment of nearly 200 countries.³² Numerous articles, reports, and books have detailed the threat of global climate change, often searching for words to emphasize the gravity of the threat.

We know that if we continue on our current path of allowing the emissions to rise year after year, climate change will change everything about our world. Major cities will very likely drown, ancient cultures will be swallowed by the seas, and there's a very high chance that our children will spend a great deal of their lives fleeing and recovering from vicious storms and extreme droughts.³³

***919** While it is understandable that scientists and scholars emphasize climate disruption as a threat different in kind from anything in our history, it is, nevertheless, not the only threat to society and public health. Environmental threats capable of devastating society and the environment include climate change, deforestation, pollution, loss of biodiversity, melting polar ice caps and rising sea levels, oceanic dead zones, and explosive population growth.³⁴ These dangers are interconnected, raising concerns of both political and environmental disruption.³⁵ Examples of risks in addition to climate change abound. The impact of chemical pollution on the future of our species raises concerns separate from climate change.³⁶

II. THE REALITY OF THE GREEN ECONOMY TODAY

The green economy is important to the goal of a sustainable future. Determination to pursue a green economy is becoming an accepted pillar of economic analysis in the modern market place. The wide-spread use of "green economy" and its variations raises questions about the meaning as a practical matter, which can have impacts on the meaning in accounting and legal contexts as well. What does it signal to readers and why do we hear so much about it? The same idea is referred to by a variety of terms such as the "lower carbon economy"³⁷ and "sustainable development," the overwhelming idea is that the way markets are managed does not promote the interests of people or the planet.

Evidence of the wide-spread green economy and its push toward economic viability rather than short-term growth and quarterly dividends is available on the internet and in virtually every sector of the economy. Data collected and analyzed by the Bureau of Labor Statistics ("BLS") gives a partial picture of the growth of green jobs.³⁸ The BLS orientation of benefit is ***920** expansive in the sense that it is couched in a concept--benefit to the environment--that is theoretical. The BLS defines "green jobs" as those "jobs in businesses that produce goods and provide services that benefit the environment or conserve natural resources."³⁹

In its analysis, BLS uses two approaches to measuring green jobs: (1) output approach, and (2) the process approach. "1) the output approach, which identifies establishments that produce green goods and services and counts the associated jobs, and (2) the process approach, which identifies establishments that use environmentally friendly production processes and practices and counts the associated jobs."⁴⁰

In the "output" part of its assessment, BLS counts "jobs related to producing a specific set of goods and services, and is not concerned with the environmental impact of the production process."⁴¹ BLS's justification for this count is that green goods are a value in the overall green market. The process approach does not assess the good or service produced but, rather, the growth of practices and technologies that "have a favorable impact on the environment, regardless of the good or service produced."⁴² One might see this as over-counting if the intent of the green economy is to produce favorable impacts on the environment. Focusing on the duties of the workers, the BLS states that such jobs are those "in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources." The comparison factor in this definition is a devilish detail. By this definition, a green job can be one that involves environmentally harmful results so long as the individual workers' duties mean the production process of the company is better than it was in the past, meaning, it is "more environmentally friendly or use[s] fewer natural resources."⁴³ This definition is indeed broad. It includes research and development, installation, and maintenance services and BLS defines any job as "green" if it has duties that tend toward a comparatively better outcome than in the past.

The data on the BLS site is incomplete and appears not to be updated consistently. Additionally, the expansive definitions used may be susceptible to charges of "greenwashing." Nevertheless, the BLS data does give evidence of that green is a sizeable portion of the economy. In debate about jobs versus the environment, this data has weight, suggesting that the choice of jobs is not necessarily a matter of the traditional construction sector. Moreover, the BLS approach arguably is consistent

with environmental laws that focus on improvement to the existing systems that impact the environment. Although the scope of the regulatory systems put in place under these and other environmental ***921** laws has had great impact, the laws came from a limited and comparatively modest charge. For example, the Clean Air Act charges the Environmental Protection Agency (“EPA”) to regulate emissions that “endanger public health or welfare.”⁴⁴ In fact, the original federal acts focused on grants to states to incentivize remediation of air and water pollution.⁴⁵ The Clean Water Act (CWA) and the Clean Air Act (CAA) embody the same concept of comparative improvement to the status quo that the BLS employs in defining the green environment. In fact, the history of environmental law in this country and in the wider world is one of imposition of controls on polluting activity by industry and others, effecting government preemption of what had been unregulated laissez-faire capitalism. The Clean Air Act and the Clean Air Amendments of 1970 addressed air quality in extreme cases.⁴⁶ The statement of findings included in the CAA expressly noted risks to public health posed by “the amount and complexity of air pollution brought about by urbanization, industrial development, and the increasing use of motor vehicles.”⁴⁷ As a predicate for Congressional action in the context of regulation of air pollution, the CAA findings pointed to “mounting dangers to the public health and welfare.”⁴⁸ Similarly, the Clean Water Act of 1972 declared a policy of the elimination of discharges of pollutants into the navigable waters by 1985.⁴⁹ The objectives of the act included prohibiting discharge of toxic pollutants in toxic amounts, and the establishment of a permit system for discharges into navigable waters and for the discharge of dredged or fill material into navigable waters.⁵⁰ With a purpose of restoring and maintaining the “chemical, physical, and biological integrity” of the nation’s waters, the Act imposed a permit system, making discharges of pollutants into the waters of the U.S. illegal absent consent of the government.⁵¹

BLS categorizes green jobs in a variety of sectors, focusing on processes in four areas in which employers take a more environmentally friendly approach or use fewer natural resources than have been employed historically.

The categories are: (1) Renewable sources of energy (such as wind, biomass, geothermal, solar, ocean, hydropower, and landfill gas and municipal solid waste), (2) Energy efficiency, (3) Pollution reduction and removal (including greenhouse gas reduction, and recycling and reuse), and (4) Additional ***922** technologies and practices to reduce pollutants, toxics, greenhouse gas emissions, waste reduction, natural resources conservation, including organic agriculture and sustainable forestry; land management; soil, water, or wildlife conservation, and storm water management.

The first category from BLS is “energy from renewable sources,” which includes “electricity, heat, or fuel generated from renewable sources,” such as “wind, biomass, geothermal, solar, ocean, hydropower, and landfill gas and municipal solid waste.”⁵² Taking the perspective of the individual worker, i.e., employees involved in a green economy, the second prong of the BLS definition of “green jobs” includes jobs “in which workers’ duties involve making their establishment’s production processes more environmentally friendly or [which] use fewer natural resources.”⁵³ Corporate stewardship programs fall into this area, and the administrative structure touches the environment in multiple ways and includes green jobs as defined by BLS, and agency workers that study or deal with the environment have “green jobs” as defined by BLS. All employees at the EPA, and many at the Department of Interior, Department of Agriculture, and the BLS fall into the green jobs sector. BLS delineates the “energy efficiency” sector of the economy as the part of the economy that produces products and services that improve energy efficiency, such as “energy-efficient equipment, appliances, buildings, and vehicles, as well as products and services that improve the energy efficiency of buildings and the efficiency of energy storage and distribution, such as Smart Grid technologies.”⁵⁴ Other green sectors recognized by the BLS include pollution reduction and removal, greenhouse gas reduction, recycling to reuse, remove, and reduce pollutants and hazardous waste and other waste materials, resources conservation, organic agriculture and sustainable forestry; land management; soil, water, or wildlife conservation; and storm water management. Environmental compliance, education and training are also recognized as part of the green jobs available in today’s economy.

The economic opportunities to impact green endeavors seem virtually limitless. A sampling of entries on the web and in the market place include: energy production and research, which are central to the goals for green growth and include biomass, bio-energy with carbon capture and storage, wind, solar, geothermal, tidal, and hydro energy, the smart grid and photovoltaics waste-energy, and bio-sequestration of carbon. Husbandry and conservation have traditionally involved agriculture, and marine and wildlife conservation and can include ecosystems and communities that are vulnerable and interwoven to nature’s web. Additionally, jobs in the writing sector have grown.

***923** In fact, Amazon presents a standalone category under the heading “green economy books,” which states, There is a lot of talk today about “green jobs”. How much of it is real? How much of it is nonsense or fraud? It’s hard to say. However, it is important that the world does create a “new” economy based on jobs that help rather than hurt the biological foundations of life.⁵⁵

Today, new jobs are available in sustainable agriculture, adaptive management and ecosystem assessment, Superfund consulting, mitigation banking for wetlands and grasslands, and in the science of adaptive planning there is a need to implement both remediation and mitigation practices to address environmental threats. Wastewater management and

treatment, water conservation and purification, and payment for ecosystem services. Environmental consultants also occupy a significant space in the economy. Renewable energy has drawn major investments and public interest in recent years; increasing demand in solar panels designed for home use is being met by China and other manufacturers, both domestic and international. Energy conservation and efficiency, recycling, energy storage and fuel cells, U.S. Green Building Council (USGBC) and Leadership in Energy and Environmental Design (LEED), green materials, design and construction.

Public financing continues to support fossil fuels projects four times more often than for clean energy projects. Oil, gas, and coal projects averaged \$71.8 billion per year between 2013 and 2015, contrasted with \$18.7 billion for renewable projects during this time period.⁵⁶ The effects of trade in renewable energy sources and the market are subject to dispute, however. For example, solar panels are likely to become more expensive because of the president's decision to levy tariffs on imported solar panels in response to a decision by the U.S. International Trade Commission (ITC).⁵⁷ The ITC responded to claims by Suniva and SolarWorld that solar panels from China hurt the domestic manufacturers. While such a decision could help the economy and the environment by stimulating and protecting domestic production of solar panels, it could have the effect of stifling competition and reducing demand because of ***924** higher domestic pricing of solar panels.⁵⁸ While tariffs would please the solar panel manufacturers who filed the claim with the ITC, the larger effect of such a tariff could be to "choke off the fast-growing green energy industry in the U.S." and perpetuate the fossil fuel hold on energy.⁵⁹ Consumer demand for green energy is having a significant effect in the energy market, including recent coal plant closings. Although the Trump administration has repealed environmental restrictions, the move towards green energy is proving to be a strong economic movement versus one that is merely political.⁶⁰

Companies that rank buildings and certify the "green" nature of different entities have significant influence today. Organizations such as LEED, Energy Star, and Princeton Review create more value and organization around the "green" economy. In line with the tradition of voluntary professional standards, dating back to professional and trade organizations, these organizations provide jobs and, additionally, incentives to the industry subject to the ranking and certification. The industry for certifying green establishments has now expanded to include many aspects of the green economy, including organic clothing farming and food. The Princeton Review, a tutoring and college admission company for more than 35 years, now ranks schools based on their environmental values. The Energy Star website explains the metrics it uses to rank energy efficiency cities. The system based its research on the US Census' "core based statistical areas" known as metropolitan areas. It "tallied the total number of buildings that had earned the Energy Star in each metro area in 2016 and ranked the cities accordingly." The ranking of buildings established by Energy Star compares buildings in a given area and determines that the buildings it certifies are more energy efficient "than 75% of similar buildings nationwide." According to Energy Star the buildings use an average of 35% less energy than typical buildings, and cause 35% fewer greenhouse gas emissions. The company website indicates that "more than 30,000 diverse buildings have earned the ENERGY STAR since 1999."⁶¹

The economic movement toward valuing benefits derived from the environment is strong,⁶² and communities use green infrastructure to support the ***925** mitigation of storm water runoff, protect regional watersheds and wetlands that serve as natural systems to absorb storm water and improve water quality. Cities and states are pledging to support infrastructure that supports green movements, such as electric vehicles.⁶³ Additionally, farmers are moving to harness "untapped value as providers of ecosystem services,"⁶⁴ by conserving water systems on their property in exchange for government payments.⁶⁵ Cities are opting to use natural resources as a way of avoiding the need to build expensive water treatment plants and other utilities for public services.⁶⁶ For example, New York City water travels over 125 miles from the Catskill/Delaware watershed, which envelops more than a million acres and depends on ownership and regulations rather than massive water plants to produce the clean "champagne of drinking water" celebrated by the City.⁶⁷ Payment for Ecosystem Services (PES) as a concept has gained practical force from partnerships between not-for-profit groups, environmental scholars, and organizations such as the World Bank Group.⁶⁸ The availability of PES sample agreements online advances the ability of small-scale sellers of ecosystem services to negotiate the sale of services, preserving those ecosystems.⁶⁹

Recent empirical studies focus on how recycling would affect the environment, the economy, and society.⁷⁰ Even though not everyone will recycle, the recycling industry is projected to add roughly 850 billion dollars to the global GDP by 2025. While some level of waste is inevitable, the U.S. would need an estimated 2,000 facilities to process recycling materials if everyone ***926** recycled some of their waste.⁷¹ Private companies are having positive impacts on the environment by recycling and utilizing a variety of green technologies. For example, Apple reportedly has recovered "more than a ton of gold from recycled devices--that's an estimated worth of \$40 million."⁷²

Transportation, including alternative vehicles such as electric vehicles, flex-fuel vehicles, and hybrid vehicles, as well as mass transit have added value in the economy because of the public's desire for sustainable services and a sustainable environment. To take one industry as an example, consider transportation concerns such as international shipping and commercial air travel. These industries produce major sources of carbon omissions today and the level of these omissions continues to rise despite efforts to adopt efficiency standards and technologies under state regulatory schemes. This year the International Civil Aviation Organization (ICAO), the United Nations specialized agency on international aircraft regulation, promulgated its first set of global CO2 standards for international aircraft.⁷³

The education and information sectors of the economy are likely to grow in future years along with other aspects of the information boom. California recently became the first state to require manufacturers to disclose potentially harmful chemicals.⁷⁴ Likewise, information is an important part of the green economy. The green economy information sector includes disclosure regimes under federal and state law, environmental journalism, consulting, and disclosure of information as a part of compliance or otherwise. Journalists can earn Master's degrees in environmental journalism, and business and accountancy schools offer specialized degrees in environmental accounting.

This assemblage of green jobs and the green economy may seem to suggest that the recent accomplishments leave little to be done. Despite these reports of a growing green economy, however, a sustainable system is unlikely without significant changes to the continuing carbon economy. At this point, even a low-carbon economy tends toward catastrophe. In other words, much has been done, but the underlying economic structure continues to push toward an unsustainable climate and unsustainable practices in the market.

***927 III. INCORPORATING NEW GREEN INCENTIVES INTO THE MARKETPLACE**

Environmental laws developed out of the need to protect the basic interests addressed by the common law of tort and property.⁷⁵ Government's central role of ameliorating unreasonable risks to individuals and the polity gave rise to such laws. Both federal and state constitutions and laws have soundly established the right of the people to be protected from unreasonable risks and have provided a basis for governmental prohibition of dangerous activities. Moreover, the duty to protect also bolstered the idea of government grants and financial support for green alternatives. The Constitution, statutory law, and the common law all rest on recognition that the role of government is to protect the people. This is, simply put, the assertion that the protections of the environmental statutes are constitutional in their operation. It does not mean, of course, that these environmental statutes are sufficient to the task of protecting people and creating a sustainable economy. The collection of federal and state statutes has withstood constitutional scrutiny because they bear a rational relationship to the proper governmental objective. They articulate the right of the people to be free from unreasonable risks posed by some environmental pollution and degradation that threatens their lives and the role of the government in minimizing such risks. While these laws tend toward protection of people and the environment, they are not sufficient to address today's threats. The gap between legal protection and the reality of environmental threats presents an opening for entrepreneurs who have the power to drive the economy to the additional benefits of sustainability. The need for a clean and healthy environment and the need to power the economy are not irrevocably incompatible, and entrepreneurs may be the hidden resource to generate solutions. They can respond to challenges to make profits while making the world a safer place. Market incentives are generally regarded as a mechanism to stimulate those in the economy to respond to challenges that government has solved in theory.

Environmental laws protect people by protecting the environment they depend upon for life and health. For example, the National Environmental Policy Act of 1969 states its overarching purpose is "to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of *928 Americans."⁷⁶ States also have the mandate to act in the public welfare by incentivizing the green economy. Not surprisingly, there are many different state expressions of environmental rights and protections. Some constitutional statements came about as a result of the initial constitution, others as a result of political consciousness of the 1960s and 1970s or from experience with industries. In 1971, the people of Pennsylvania adopted the Environmental Rights Amendment in a 1971 referendum by a four-to-one margin.⁷⁷ In 1972, the Montana Constitutional Convention was affirmed by the people of the state, including its statement of a right to a clean and healthful environment. Despite the variations in the language used in state constitutions, similarities of purpose in the various statements are apparent. Five states--Illinois, Massachusetts, Montana, Pennsylvania, and Texas--expressly recognize the right of a citizen to enjoy a clean and healthy environment. While such statements arguably present the gold standard with their unadorned point, ten additional states (Louisiana, Alaska, Florida, Hawaii, Michigan, New Mexico, New York, Ohio, Virginia, and Alabama) mention the environment in their constitutions as a statement of public policy.

While states do not use the same phraseology to announce or articulate the right, the text of their constitutions centers on the basic right to integrity of the environment as the foundation of life. For example, the Illinois Constitution declares explicitly the right of each person to a healthful environment and also the right of each person to enforce this right. The Illinois Constitution provides: "Each person has the right to a healthful environment. Each person may enforce this right against any party, governmental or private, through appropriate legal proceedings subject to reasonable limitation and regulation as the General Assembly may provide by law."⁷⁸ The Massachusetts Constitution refers to the right of the people to clean air and water and other environmental amenities as well as articulating the right of the people to utilize that environment:

The people shall have the right to clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment; and the protection of the people in their right to the conservation, development and utilization of the agricultural, mineral, forest, water, air and other

natural resources is hereby declared to be a public purpose.⁷⁹

***929** Similarly, the Montana Constitution, which the state adopted in 1972, articulates the right to a clean environment. It does so by including the “right to a clean and healthful environment” in a list of foundational rights protected by the state constitution. It states:

All persons are born free and have certain inalienable rights. They include the right to a clean and healthful environment and the rights of pursuing life’s basic necessities, enjoying and defending their lives and liberties, acquiring, possessing and protecting property, and seeking their safety, health and happiness in all lawful ways. In enjoying these rights, all persons recognize corresponding responsibilities.⁸⁰

In service of these protections, identifying responses must take into account the severity of threats as a crucial step in addressing threats. Moreover, an avenue not to be overlooked is the call to entrepreneurs to explore innovations to respond to these threats. While policy makers and agencies can identify needed outcomes, they may not foresee particular innovations that should be explored.

The costly nature of infrastructure and the reality that investments in infrastructure create the baseline for future decisions make the debate in the grid, pipeline construction, and other infrastructure investments particularly intense. Every energy installation, whether it runs on renewable sources or fossil fuel, requires a commitment of resources for construction, operation, and maintenance of significant infrastructure to process and distribute energy. The significant investments in infrastructure make it more likely that the energy source used in the infrastructure system will continue to be used into the future. Currently, the Department of Energy is speeding up the process for approval of new pipelines to transport oil from drilling and hydraulic fracturing sites.⁸¹ Additionally, a Department of Energy directive to the Federal Energy Regulatory Commission (FERC) advocated payments to nuclear and coal companies to insure stability of the grid.⁸² The need for such payments rests on the assumption about a lack of stability in energy markets, but a contemporaneous report by the North American Electric Reliability Corp. (NERC) contradicted this assumption by assessing the ***930** reliability of the U.S. electrical grid as strong.⁸³ Addressing risks such as cyber hacking require monitoring systems and other responses such as making the grid less regional to minimize the effects of a hack.⁸⁴ How payments to owners and operators of nuclear energy and coal companies reduces the vulnerabilities of the grid is not clarified.

Baseline investments in energy extraction, transportation, and other steps in the production and marketing of energy mean that those expenditures are a sunk cost; they are irretrievable. This sunk cost needs to be justified for the return on that investment and, consequently, creates a barrier to entry into the market by other energy sources because those new sources will require investment for their infrastructures. Winston Churchill’s observation about architecture, often noted with reference to political power structures, rings true with regard to the real “built economy” as well as to political structures. “There is no doubt whatever about the influence of architecture and structure upon human character and action. We make our buildings and afterwards they make us. They regulate the course of our lives.”⁸⁵ For example, the Federal Energy Regulatory Commission has called for action to address threats to the stability of the U.S. electrical grid despite research by the grid monitor, the North American Electric Reliability Corp., finding no grid crises and testimony of NERC’s CEO to FERC indicating that the reliability of the U.S. electrical grid is strong.⁸⁶ Secretary Perry’s plan includes payments to nuclear and coal companies for their status as sources of power on the basis that such payments serve as insurance against a compromised energy grid.⁸⁷ The plan did not include payments to renewable energy companies, resulting in speculation that the payments had a political purpose rather than the noted purpose of insuring an uninterrupted energy supply.⁸⁸

Numerous regulatory mechanisms seek to neutralize the fact of an uneven playing field. For example, in the regulation of pesticide registration, “me too” registration allows for entry into the field by chemical manufacturers who did not develop the safety and efficacy data needed for registration of a chemical. These “me too” registrants can gain entry to the market and sell pesticides that have been registered after paying the fair share of the research and development costs to the original registrant. The US Supreme Court has affirmed ***931** such market mechanisms and, specifically registration under FIFRA “me-too” registration, upholding binding arbitration by the EPA.⁸⁹ A major distinction exists between market incentives and market solutions to problems.

Market incentives involve policy judgments about good outcomes and, as a result of those judgments, the selection of incentives in support of the policy judgments. By contrast, markets as the source of solutions to real problems rests on the assumption that entrepreneurs and markets possess the necessary attributes to respond to change. The foundation of a belief that markets offer solutions to real problems relies on a presumption of a free market with sufficient flexibility to respond to changing conditions. Certainly, the assumption of flexibility runs contrary to embedded information structures, calcified regulations, and requirements developed in an earlier and significantly different world.

The resulting information will be useful for evaluating policy initiatives and the labor market impact of economic activity

related to protecting the environment and conserving natural resources. BLS activities also will be useful to State labor market information offices in their efforts to meet the information needs of policymakers, businesses, and job seekers.

The economy and the environment are often treated as opposing forces or interests at war in the modern world. But it is not necessarily so. Increased global recycling efforts would contribute to many environmental, economic, and social benefits. For example, the recycling industry is projected to add roughly \$850 billion to the global GDP by 2025. While the positive impacts would be significant, there would be obstacles to overcome as well. It is unlikely that people will be perfect recyclers, some waste is inevitable, and the U.S. would need an estimated 2,000 facilities to process materials. The road to sustainability is a long one and one that will take many incremental changes.

Many developments point toward future progress, even though they are not, strictly speaking, realities today. Such developments emanate from private companies as well as from government regulations. They include both collective and individual action. For example, collective standard-setting has had a resurgence of interest.⁹⁰ Other practices which have been around a while are garnering new attention. These include certification and labeling systems, taking environmental effects into account in context such as lending standards, commodities standards, and green building standards.

The growth of Benefit Corporations and the corporate social responsibility program (CSR) as well as non-profit companies suggests that entrepreneurs and innovators are eager for a business structure not dominated by the primacy of profits. Beginning with the Rio convention and moving year-by-year toward agreement, the international community has sought consensus and a ***932** framework to deal with the issues of environmental degradation and climate change.⁹¹

Utility and power companies are adapting to consumer demand for green energy. While these changes are mostly in the margins so far, the rise in renewable energy sources has providers proactively looking for ways to capitalize and retain consumers.⁹² Although it may seem counterintuitive to making profits, utility and power companies are adapting to consumer demand for green energy.⁹³ This move is consistent with the interest of utilities in serving the public good and, additionally, with the public demand for energy production to responsive to the need for environmental protection. “Increasingly, consumers are using smart thermostats to reduce their energy footprint, producing their own electricity with solar panels and saving it for future use with a home battery. As a result, utilities are working to expand their services and even encourage consumers to use less electricity--once an unthinkable notion.”⁹⁴

Many corporations have adopted programs to reduce the use of hazardous chemicals and account for other environmental effects. For example, in 2014, Clean Production Action started the Chemical Footprint Project to encourage businesses to reduce the presence of hazardous chemicals in products.⁹⁵ Major companies such as Wal-Mart have committed to addressing the issue in voluntary programs, and interest in renewables has been growing despite political disagreement regarding policy.⁹⁶

Developed countries have committed to reversing global climate change by pledging billions of dollars per year to address the need to reduce greenhouse gases in the atmosphere.⁹⁷ Divestment of fossil fuel has become a business boom.⁹⁸ In 2008, the World Bank launched the “Strategic Framework for ***933** Development and Climate Change” to incentivize public-private projects. Public/private partnerships play a significant role today and historically in moving technology forward. Such partnerships are crucial to setting up the infrastructure needed for the new green economy. Other countries provide examples of incentives for a wide range of purposes, such as encouraging electric vehicles and other green incentives. For example, New Zealand exempts electric vehicles, including commercial vehicles like buses, vans, and large delivery trucks, from road use fees.⁹⁹ Reliability is a long-standing principle of energy policy and a frequent justification for policies supporting fossil fuel.¹⁰⁰

Although incentives in environmental law and the green economy traditionally activate market participants to strive toward goals that have been set as a matter of environmental policy, the urgency of today’s problems, argue for a larger scope of action. The distinction between “ex ante regulation (often based on rules) and ex post adjudication (often based on standards)” is clearly an important issue to consider in any incentive system.¹⁰¹

[S]imilar substantive regulatory regimes can in practice operate in entirely different ways when implemented through ex post versus ex ante enforcement systems. What is affected by the choice of enforcement mechanism is not only the relative positions and authority of the agency and regulated entities, but also the actual, practical scope and substance of the regulatory regime, as well as the locus of power among agencies, courts, and Congress.¹⁰²

Under either an ex ante or ex post regime, virtually all systems operate in terms of pre-decided government policies to advance positive environmental outcomes. But the possibility of innovation from unpredictable and unforeseen sources should not be discounted. Concerns that ex ante rewards may confer unfair benefits to inventors turns a blind eye to the risks accompanying the failure to attract innovations to solve the global climate problem and other environmental problems.

Government support should encourage the progress that a modern-day Edison, Tesla or Jonas Salk might make with true break-through advances. In such cases, governments should mobilize to support such break-throughs from whatever sector they come.¹⁰³

IV. CONCLUSION

The green economy is real and growing. It represents a significant part of the GNP and provides jobs for a significant segment of the working population. The question is not the existence of a Green Economy but, rather, whether it can respond to threats to the planet soon enough to secure the physical integrity of the earth and its people. The earth will persist, and life on earth will continue in some state.¹⁰⁴ The topic of incentives requires assessment as part of the effort of sustaining the human species. Rather than using market incentives as the sole guide to the market, a new idea is to recognize and stimulate green markets through *ex post* rewards to entrepreneurs who bring tested or promising concepts to the government's attention in pursuit of support prior to invention. Such articulation and structure of incentives to act on the market provide a metaphysic for change and a possible engine for invention.

Historically, Congress has acted in circumstances of urgency. Now, the extent of the challenges to a livable environment mean that everyone--entrepreneurs as well as regulators--face both a challenge and an opportunity to create a sustainable future. The environmental sector of our economy is established and growing. It includes a wide range of activities such as investing in social enterprises, aggregating capital for socially conscious investing, and entering contracts that control or mandate environmental standards in the chain of production. Numerous business and political leaders are recognizing the real threats to the continued existence of humanity posed by climate change and other environmental threats. Moreover, entrepreneurs and business leaders have recognized that sustainable development offers an opportunity for business development and economic prosperity. As with other challenges, early adopters and those who offer solutions to important problems are likely to profit from their good deeds and their socially useful inventions and innovations. While the familiar term "market incentives" is well-known as a concept for using law to nudge industry and the private economy in pre-determined directions, the idea that the private economy itself can be a resource for green ideas and green solutions deserves exploration.

Developing a green economy is necessary for a chance at a sustainable world. To put the point as a legal formulation, the green economy is a necessary predicate for a sustainable future but perhaps not a sufficient predicate. In the physical environment, everything is connected. The interrelationship of ecosystems is truly complex. The chemical plant supplies jobs, schools, baseball leagues, and a way of life to the small town that welcomes it. Without protective controls, it may also bring tragic negative externalities. It affects everything, from frogs to children who swim in effluent.¹⁰⁵

When the world changes faster than species can adapt, many fall out To argue that the current extinction event could be averted if people just cared more and were willing to make more sacrifices is not wrong, exactly; still it misses the point. It doesn't much matter whether people care or don't care. What matters is that people change the world.¹⁰⁶

The existential threat of climate disruption demands action on all fronts with incentive structures across markets. It begins with what we know already, proven positive and negative *ex ante* incentives, such as regulatory mandates and market incentives. It also includes stimulus and reward for entrepreneurs with break through products and processes. For the yet unknown inventions and inventors, *ex post* rewards and support from governments may provide an engine for change and for progress toward a secure, green world.

Footnotes

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- 10 Searches on Google Scholar retrieve numerous examples of corporate stewardship and public communications and commitments centering on sustainable development and corporate commitments to a green economy. For example, a search with the terms “green economy and corporate stewardship” netted over 4,000 website results. See, e.g., *Environmental Stewardship*, PWC, <https://www.pwc.com/gx/en/about/corporate-responsibility/environmental-stewardship.html> (last visited Dec. 27, 2017).
- 11 See, e.g., NAOMI KLEIN, *THIS CHANGES EVERYTHING: CAPITALISM VS. THE CLIMATE*, (2014); ELIZABETH KOLBERT, *THE SIXTH EXTINCTION: AN UNNATURAL HISTORY* 266 (2014). Increasingly, celebrities want to use their connections to advance environmental values. See, e.g., *Innovative Solutions*, LEONARDO DICAPRIO FOUND., <https://www.leonardodicaprio.org/projects/innovative-solutions/> (last visited Dec. 27, 2017).
- 12 Publications relating to stewardship and the green economy are a growing field. See, e.g., BRIAN MILANI, *DESIGNING THE GREEN ECONOMY: THE POSTINDUSTRIAL ALTERNATIVE TO CORPORATE GLOBALIZATION* (2000).
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- 15 See *Executive Summary*, GLOBAL CHANGE RESEARCH PROGRAM, <https://science2017.globalchange.gov/chapter/executive-summary/> (last visited Dec. 27, 2017).
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- 20 Chemnick, *supra* note 4.
- 21 *Id.*
- 22 OPHULS, *supra* note 6, at 12.
- 23 See Marc Heller, *'Something Isn't Right' in Mont. Wheat Fields*, E&E NEWS (July 5, 2017), <https://www.eenews.net/stories/1060056894>.
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- 32 See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 28.
- 33 KLEIN, *supra* note 11, at 4.
- 34 See, e.g., Zimmer, *supra* note 5.
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https://www.nytimes.com/interactive/2017/10/28/opinion/sunday/chlorpyrifos-dow-environmental-protection-agency.html?emc=edit_nk_20171028&nk=true&nl=nickkristof&nid=51086901&te=1&_r=0&auth=login-email (describing history and regulation of chlorpyrifos, a pesticide in class of chemicals developed as a nerve gas by Nazi Germany now common in our environment and linked to cancer and Parkinson’s disease).

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39 *Id.*

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41 *Id.*

42 *Id.*

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44 *See Massachusetts v. E.P.A.*, 415 F.3d 50, 82 (D.C. Cir. 2005) (Tatel, J., dissenting), *rev’d*, 549 U.S. 497 (2007) (focusing on EPA duty to act to regulate air emissions that “endanger public health or welfare”).

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49 *See* 33 U.S.C. § 1251(a)(1) (2017).

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- 104 See, e.g., *Cockroaches Feeling Very Optimistic About Future Of Planet*, THE ONION (Jan. 26, 2017, 10:30 AM), <https://www.theonion.com/cockroaches-feeling-very-optimistic-about-future-of-pla-1819579564>; A.C. Grayling, *Commentary: Humanity is Fragile, Not the Earth*, NEW SCIENTIST (Sept. 3, 2008), <https://www.newscientist.com/article/mg19926722-200-commentary-humanity-isfr-agile-not-the-earth/>.

¹⁰⁵ See generally DAN FAGIN, TOMS RIVER: A STORY OF SCIENCE AND SALVATION (2013).

¹⁰⁶ KOLBERT, *supra* note 11, at 266.

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