OXFORD HANDBOOK OF THE CORPORATION

Editors:

Thomas Clarke, Justin O'Brien, and Charles O'Kelley

Oxford University Press (2019)

CHAPTER 22

THE GREENING OF THE CORPORATION

Thomas Clarke

INTRODUCTION

The dawning realisation of the global consequences of imminent climate change provides a series of inescapable challenges for corporations. Business as usual is not an option as Naomi Klein suggests in *This Changes Everything* (2015). For every corporation, in every business sector, in every economy, the implications of climate change are profoundly serious. There is not any possibility of escape from these responsibilities, and delay will simply compound the disasters to come for business and the community (IPCC 2014; Stern 2006). Responding to these climate challenges involves the exploration and development of new paradigms of corporate purpose and responsibility, new business models, new technologies and new corporate strategies and practices.

This chapter argues that industries and corporations that refuse to acknowledge these new responsibilities over time will lose their licence to operate, their access to finance, and their customers. For companies ready to realise their responsibilities there are a series of international institutional initiatives inspiring, facilitating, and guiding the progress of companies towards new conceptualisations of a sustainable future, and of company directors' duties and responsibilities in this sustainable world. These are increasingly reinforced by market indices which recognise and measure the performance of companies according to social and environmental criteria. This effort is endorsed and verified by a wide array of business and civil society bodies that are researching and disseminating knowledge and practical analytical skills regarding sustainability. This amounts to a changing landscape of corporate existence, in which the greening of the corporation will occur with a new definition and practice of fiduciary duty where risk, strategy and investment are closely calibrated with social and environmental responsibility. The wheel of a vital industrial cycle is turning. Corporations have begun to realise their environmental impact as:

"..The corporate sector became increasingly seen not only as the cause of the environmental problems but also as the source of the solutions. And with this shift in emphasis, the concept of corporate environmentalism was born. ..This concept was redefined through multiple iterations with ever-increasing complexity of the understanding of the intersection of business activity and environmental protection. As a result, conceptions of corporate environmentalism as simply

regulatory compliance in the 1970s gave way to newer management conceptions of pollution prevention, total quality environmental management, industrial ecology, life-cycle analysis, environmental strategy, carbon footprinting, and sustainable development" (Hoffman and Bansal 2011:4).

Today leading corporations are engaged in transforming strategies and practices towards a decarbonised, decentralised and digital future. New technologies are changing the management of the traditional linear economy towards a circular economy, in which waste is effectively eliminated, and the economy is restorative rather than depletive of eco-systems (European Commission 2015a; World Economic Forum 2014). The maintenance of the natural capital of the earth which forms the bedrock of the human economy and life-support system of the planet's species necessitates decoupling of economic growth from further environmental impact (Hackman and Boulton 2016). Human ingenuity and innovation can achieve a greening of the corporation in which pollution is eliminated, green products and process technologies do not continuously create waste, and renewable energy technology and emissions free transport bring balance between the economy and the ecology (Kemp and Pontoglio 2011).

But first it is important to examine earlier failures in corporate social and environmental responsibility, and to understand how damaging this negligence can be both to society and to corporations themselves. Then it is useful to examine the evidence that now corporations and markets are beginning to realise the scale and immediacy of the environmental risks that require urgent action.

GREENWASHING THE CORPORATION

Though the corporate social and environmental responsibility (CSR) movement has moved over the decades from the margins to the mainstream of business reporting, it is hard not to escape the conclusion that this is largely symbolic rather than substantive CSR – that is, it is not changing business models, simply changing rhetoric (Crane et al 2014; Bannerjee 2012). Corporations realise they must be seen to be socially and environmentally responsible, and, in many cases, the boards and directors of these companies wish to be as responsible as possible. However, the transformation of business models, strategies and practices is often conceived to be too difficult or too premature without a fundamental shift in the market. That is, as Vogel (2005) identified, CSR was interpreted by corporations within the logic of existing market constraints, and there was rarely the perception by corporations themselves that it is possible to change markets, and transform technologies. As Bowen explains:

"Symbolic corporate environmentalism consists of shared meanings and representations around changes made by managers that they describe as primarily for environmental reasons. .. However, some of these symbols are completely disconnected from the impacts that firms have on the natural environment, and many more have less substantive environmental impact than they symbolically promise. Despite apparently widespread corporate environmentalism, industrial activities are pushing society closer to and, in some cases, exceeding planetary boundaries. The gap between firm's symbolic activities and the reality of environmental damage endangers our natural

surroundings and, ultimately, may threaten the stability of current economic and social systems" (2014:13).

Though there is now a widespread corporate acceptance of the concepts of corporate social and environmental responsibility, CSR continues to invite a degree of scepticism, most seriously for engaging in amoral apologetics for unacceptable corporate behavior, and the apparent capacity of corporations, particularly in the resources sector, to express CSR ideals while engaging in every opportunity to make money regardless of the environmental or social consequences (Wright and Nyberg 2015). CSR has matured over recent decades, driven by evolving global guidelines, national regulation, increased stakeholder expectations and more demanding corporate disclosure requirements, together with widespread voluntary initiatives by corporations to embed CSR into their core business. Yet what is presently happening lacks the speed and scale to bring about the systemic change required to remedy increasing social and environmental challenges, Jane Nelson argues:

"…The negative headlines persist, fuelled by reports of sweat-shops in low-income countries producing cheap goods for OECD markets, fatal tragedies such as the collapse of the Rana Plaza garment factory in Bangladesh in 2013 and the Turkish mining disaster in 2014, and catastrophic environmental accidents. Moreover, the legacy of the global financial crisis, concerns about corporate tax practices and challenges such as youth unemployment and climate change have forced corporations to lift their sights further above the bottom line and to judge their performance against wider social goals. Economic growth must now be more inclusive and more sustainable. The onus is on firms to produce more jobs, products, services and infrastructure for more people, while putting more emphasis on decent work and fairness, and less strain on natural resources" (Nelson 2014).

Unfortunately, from the origins of the business and environment movement in the early 1990s, there has been a strong inclination within corporations to dissemble concerning environmental intentions and mislead regarding environmental achievements (Table 22.1). While promised genuine commitments to environmental responsibility by corporations, communities around the world too often have instead confronted a tsunami tide of greenwash (Greenpeace 1992; 2012).

Table 22.1 Definitions of Greenwashing

Disinformation disseminated by an organisation so as to present an environmentally public image (OED 2012)
Advertising or marketing that misleads the public by stressing the supposed environmental credentials of a person, company or product when these are unsubstantiated or irrelevant (Gillespie 2008)
The act of misleading consumers regarding the environmental practices of a company (firm level greenwashing) or environmental benefits of a product or service (product level greenwashing) (TerraChoice 2007)
A strategy that companies adopt to engage in symbolic communication of environmental issues without substantially addressing them in action (Walker and Wan 2012)

The selective disclosure of positive information about a company's environmental or social performance, without full disclosure of negative information on these dimensions, so as to create an overly positive corporate image (Lyon and Maxwell 2011).

The disclosure of one element of a corporations environmental performance, for example a commitment to zero emissions, and withdrawing from this commitment when the mismatch is exposed between the proactive-sounding statements and less favourable ongoing environmental impacts (Bowen 2014:2).

Source: Adapted from Bowen (2014:21)

Greenwashing can be found in the politices and practices of many corporations, both consciously and unconsciously presenting a distorted view of the real commitments of companies towards social and environmental responsibility. However it is in retail marketing the greenwashing movement has often proved at its most pernicious. While the general public is expressing deeper concerns about the importance of environmental and social responsibility, corporations marketing campaigns have often responded with a degree of cynicism in the association of products with environmental integrity, obligation and good health, when this is at best fatuous (Table 22.2).

Table 22.2 Common Corporate Product Greenwashing Strategies

Hidden Trade-offs

The suggestion a product is "green" based on an unreasonably narrow set of attributes without attention to other important environmental issues. Paper, for example, is not necessarily environmentally-preferable just because it comes from a sustainably-harvested forest. Other important environmental issues in the paper-making process, including energy, greenhouse gas emissions, and water and air pollution, may be equally or more significant.

No Proof Offered

An environmental claim that cannot be substantiated by readily accessible supporting information, or by reliable third-party certification. Common examples include paper and tissue products that claim various percentages of post-consumer recycled content without providing any evidence.

Deliberate Vagueness

Claims that are poorly defined or so broad that their real meaning is likely to be misunderstood by the consumer. "All-natural" is an example. Arsenic, uranium, mercury, and formaldehyde are all naturally occurring, and poisonous. "All natural" isn't necessarily "green".

Irrelevant Detail

Environmental claims that may be truthful but are unimportant or unhelpful for consumers seeking environmentally sound products. "CFC-free" is a common example, since it is a frequent claim despite the fact that CFCs are banned by law.

Deliberate Distraction

Claims that may be true in themselves about the product category, but that risk distracting the consumer from the greater environmental impacts of the category as a whole. Organic cigarettes might be an example of this category, as might be fuel-efficient sport-utility vehicles.

Deliberate Deception

Environmental claims that are simply false or wildly exaggerated. The most common examples include products falsely claiming to be Energy Star certified or registered.

False Labelling

Products that, through either words or images on product labels are intended to mislead, for example contain images of health irrelevant to the product, or give the impression of third-party endorsement where no such endorsement actually exists.

(Source: Adapted from TerraChoice (2010:10)

Greenwashing can be the public face of a more serious neglect of environmental planning and risk management in core business strategies. As the complexity and scale of corporate operations internationally increases, even as the regulatory framework becomes more developed, the imminent risk of environmental disaster is compounded. This can result in corporations being responsible for catastrophic environmental disasters, the consequences of which they cannot escape. Corporations are beginning to learn that greenwashing can come at a terrible cost as recent corporate environmental catastrophes amply illustrate.

Examples of the Inherent Disasters of Greenwashing

There are a number of recent cases of major corporations which have encountered the environmental risks that can implode with immense unforeseen costs. For example,the British oil company BP had successfully projected itself for two decades internationally as the best managed oil corporation, and having painted its petrol pumps green, and referring to its BP logo as 'beyond petroleum' as the most environmentally aware oil corporation. This all changed after BP was involved in one of the worst man-made environmental disasters when its Deepwater Horizon oil rig exploded in the Gulf of Mexico on 20 April 2010. After five years of litigation on 5 February 2015 BP agreed a $20.8 billion civil claims settlement with US federal and state authorities over the 2010 Deepwater Horizon disaster, with $8.1 billion of the funds designated for coastal wetlands and marine mammals as part of a 15 year Gulf of Mexico restoration program. The goals of reviving the Gulf Coast focus on wildlife, habitat, water quality and recreational activities. The deal was the largest ever reached by the Department of Justice against a single entity. BP will not be allowed to take any tax deductions for the civil portion of its penalty and if the company changes ownership the US can demand immediate payment from BP. BP already has paid out $5.8 billion to people and businesses hurt by the oil spill as part of a 2012 settlement, and the company faced damages claims connected to class action settlements and law suits brought in addition to the earlier settlements. The company also faced securities litigation brought on behalf of some investors (*Financial Times* 6 October 2015).

The US Attorney General, Loretta Lynch said "BP is receiving the punishment it deserves, while also providing critical compensation for the injuries it caused to the environment and the economy of the

Gulf region. The steep penalty should inspire BP and its peers to take every measure necessary to ensure that nothing like this can ever happen again." The spill "inflicted unprecedented damage", said Lynch. "Ecosystems were disrupted. Businesses were shuttered. Countless men and women lost their livelihoods and their sense of security" (*The Guardian* 6 October 2015). The settlement took BP's total budget for the oil spill to more than $54 billion with 18 years to pay the fine. BP lost 55% of its share price in the months after the oil spill, and five years later still had not recovered it's earlier market capitalisation, as it proceeded through a major divestiture of assets in the ensuing years. This was the largest offshore oil spill in US history, and was regarded as one of the worst illustrations of corporate irresponsibility to occur anywhere in the world.

Yet this tragic disaster that cost the lives of 11 oil rig workers could have been prevented as the *Report to the President* prepared by the National Commission on Deepwater insisted (National Commission 2011). Another investigation, the *Report of the Ocean Energy Management, Regulation and Enforcement* into the rig explosion found that BP, and in some instances contractors, failed to follow a series of federal safety regulations (2011). A third study by Berkeley University concluded "This disaster was preventable had existing progressive guidelines and practices been followed. This catastrophic failure appears to have resulted from multiple violations of the laws of public resource development, and its proper regulatory oversight…These failures (to contain, control, mitigate, plan, and clean-up) appear to be deeply rooted in a multi-decade history of organizational malfunction and short-sightedness" (Deepwater Horizon Study Group 2011:5).

In fact, BP had a scarcely concealed a long history of appalling health and safety records that stretched back through a 2005 explosion at its Texas City Oil Refinery which caused 15 deaths and injured 180 people; the largest oil spill on Alaska's North Slope; two further toxic spills from the Texas City refinery in 2007 and 2010; and a Caspian Sea gas leak and blow out in 2008. BP's dismal safety record was known in the industry, and BP refineries in Ohio and Texas accounted for 97% of the "egregious, wilful" violations recorded by the US Occupational Safety and Health and Administration (OSHA). These violations are determined when an employer demonstrates an "intentional disregard for the requirements of the law, or showed plain indifference to employee safety and health" (ABC News 27 May 2010). Ultimately this abysmal health and safety record was the responsibility of the BP Board, which had focused on cost cutting and profitability for too long, neglecting fundamentals that caused this disaster.

Another contemporary illustration of an hitherto highly respected international company confronting disaster because of its neglect and defiance towards essential environmental standards is the German car corporation Volkswagen. In September 2015 VW cars admitted illicitly installing software in 11 million car engines over several years that allowed the cars to pass regulators laboratory emissions tests, but belched out toxic nitrogen oxides when travelling normally on the road. As VW faced a litany of fines, lawsuits and recall costs, its reputation for engineering excellence and environmental responsibility was shredded and the a subject of widespread ridicule. This flagrant abuse of environmental standards was ultimately a result of arrogance, lax board of director controls and a paternalist corporate governance culture described in Germany as "uniquely awful" (*Financial Times* 4 October 2015).

After seeing the company lose over a third of its market capitalisation in a matter of days, the company announced it would set aside $7.3 billion dollars, the equivalent of six months profits to cover the costs of making the cars comply with pollution standards. The car maker had become the most successful in Europe as the result of its 'clean diesel' advertising, and the diesel engines which were affected by the fraud accounted for half of sales. Too late the outgoing CEO Martin Winterkorn announced a change of heart, and that the company would introduce 20 new hybrid or all-electric

vehicles by the 2020 (*New York Times* 22 September 2015). Other European manufacturers announced plans for electric cars including Volvo which committed to a fully electric fleet. The sense that things were changing was undermined by a discovery that experiments had been conducted with monkeys in the US inhaling diesel exhaust, and with humans in Germany to test the impact of inhaling nitrogen dioxide, by a consultancy hired by the the car manufacturers Volkswagen, Daimler and BMW. The European Commission announced in 2018 it was intent on pursuing legal action in Germany and eight other countries regarding their chronic failure to enforce air quality standards claiming 400,000 people died prematurely in Europe each year as a result of air pollution (Ewing 2018).

These corporate disasters by companies formerly regarded as leaders in their sector are a salutary warning to other corporations to be alert to the very real hazards they will face in a more widespread and immediate way with the onset of climate change if they neglect their social and environmental duties. And yet, though many international corporations are taking seriously this threat, others are clinging to their traditional business models while they can still extract profit from them, particularly in the fossil fuel industries. To take one example, Shell which continues as one of the largest oil corporations in the world and the most carbon intensive. The senior executives of Shell in the 1970s made their name with the use of 'scenario planning' to succesfully anticipate the oil crisis, however they seem to have signally failed in their planning for the far more dramatic consquences of climate change except to record fossil fuels as the major source of energy through to 2050 (Shell 2008). Shell's official view is that "fossil fuels will be a big part of the energy mix for decades to come… and would still even in 2050 supply over 60 per cent of global energy" (Brinded 2011).

As Greenpeace (2012) suggests what appears a prediction, becomes a self-fulfilling prophecy if the weight of the existing fossil fuel companies is utilised to continue to dominate energy markets and exclude competition from renewable energy. What Shell appears to be planning for is to continue to use as much fossil fuels as at present for as long as possible. This would mean that energy related carbon dioxide emissions would not decline. Yet Shell accepts that climate change is one of the biggest challenges facing society and offered programmes that help drivers to use less energy and emit fewer carbon dioxide emissions while it continues to develop more sources of oil and gas including the tar sands of Canada. In 2002, Shell's committee of managing directors considered that "essentially the Group's business was not to decarbonise but rather take advantage of opportunities which had arisen as a result of the world's desire to decarbonise." The committee argued that "it was not unreasonable to expect that the Group could pursue decarbonisation as a good business case (Shell 2002)". Since then Shell has marginalised its interest in renewables to concentrate further on development of fossil fuels (Ten Kate 2011). This is not only environmentally disastrous, but ultimately could prove disastrous for Shell as a company.

THE GLOBAL CONSEQUENCES OF CLIMATE CHANGE

In his review on *The Economics of Climate Change* Sir Nicholas Stern (2006) called climate change "*The greatest market failure the world has ever seen*." He insisted the choice we faced was taking mitigation action now, or very expensive adaptation in the future, and concluded "There is still time to avoid the worst impacts of climate change, if we take strong action now" (Stern 2006). Stern insisted: "The scientific evidence that climate change is a serious and urgent issue is now compelling. It warrants strong action to reduce greenhouse gas emissions around the world to reduce the risk of very damaging and potentially irreversible impacts on ecosystems, societies and economies. With

good policies the costs of action need not be prohibitive and would be much smaller than the damage averted" (Stern 2006: iv). Stern highlights how the the effects of climate change are global, intertemporal and highly inequitable. Climate change is a result of the externality associated with greenhouse-gas emissions entailing costs that are not paid for by those who create the emissions. Stern highlights a number of features of climate change that together distinguish it from other externalities:

• It is global in its causes and consequences;

• The impacts of climate change are long-term and persistent;

• Uncertainties and risks in the economic impacts are pervasive.

• There is a serious risk of major, irreversible change with non-marginal economic effects (Stern 2006:23).

The phenomenon of climate changes is gradually becoming part of the discourse of daily life. This is not a discussion of the weather which has proved an eternal focus of human interest since the birth of civilisation. This is *anthropogenic* climate change – that is what *we* did to the earth's climate (and what consequences this will have). Climate change is according to the United Nations Framework Convention on Climate Change (UNFCCC): "A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC 2010; 2013; 2007). Climate change is caused by the increased emission of carbon dioxide and other greenhouse gases, which accumulate in the atmosphere and prevent heat radiating into space. The consequences of climate change range from a gradual to a catastrophic impact on the environment, ecology, economy and society. The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988, with the mandate to provide the world community with the most up-to-date and comprehensive scientific, technical, and socio-economic information about climate change. The IPCC assessments have played a major role in motivating governments to adopt and implement policies in responding to climate change, including the United Nations Framework Convention on Climate Change and the Kyoto Protocol (IPCC 2014).

The IPCC issued a risk assessment report on 31 March 2014 stating that the effects of climate change are already occurring on all continents and across the oceans. This assessment was prepared by a very large international team of scientists including 179 lead authors, 66 review editors, 400 contributing authors, and 1,729 individual expert reviewers from 84 countries IPCC 2014: x). The world is unprepared for the imminent risks of a changing climate, and while there are opportunities to respond to such risks, the risks will be very difficult to manage with high levels of warming (IPCC 2014). The report suggests that though the nature of the risks of climate change are becoming increasingly clear, climate change will continue to produce unpleasant surprises. Vulnerable people, industries and ecosystems around the world are identified in the report. The report finds that risk from a changing climate is due to vulnerability (lack of preparedness), and exposure (people and assets in harm's way), overlapping with increasing hazards (the sudden triggering of climate events or trends. Intelligent intervention to decrease risk in each of these three dilemmas is possible. Vicente Barros, the Co-Chair of the group of scientists who produced the report commented: "We live in an era of man-made climate change. In many cases we are not prepared for the climate-related risks that we already face. Investments in better preparations can pay dividends both for the

present and for the future…Part of the reason adaptation is so important is the world faces a host of risks from climate change already baked into the climate system, due to past emissions and existing infrastructure" (IPCC 2014:ix).

There is a growing consensus on climate change that what we have witnessed since the 1950s is without precedent in recent millennia:

- In the Northern Hemisphere the last 30 years have been the warmest since Anglo-Saxon times, and eight of the ten warmest years on record in the UK have been since 2002 (Meteorological Office 2014);
- The atmospheric concentration of greenhouse gases are now at levels not seen in 800,000 years;
- The rate of sea level rise is now quicker than at any time over the last two millennia (IPCC 2014);
- Though natural fluctuations may mask the impact temporarily, the underlying human-induced warming trend of two-tenths of a degree per decade has continued since the 1970s (Otto 2015).

In response to these impending threats the 2010 UN Climate Change Conference in Cancun, Mexico agreed to reduce greenhouse gas emissions and to help developing nations to protect themselves from climate impacts, and to build their own sustainable futures. Under the Climate Change Convention they included a review for nations on their progress towards the agreed objective of keeping the average global temperature rise below two degrees Celsius (with an agreement to review this objective in future on the basis of further scientific knowledge). The explanation for the two degrees maximum increase, is that beyond this point climate change may become non-linear, that is unpredictable and compounding catastrophic weather events could occur (UNFCC 2010).

Climate change refers to "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer" (IPCC 2014). The UNFCCC makes the significant distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes (United Nations 1992). The IPCC (2014) report assesses the risks climate change poses for human and natural systems, and considers how these risks may be reduced or managed through adaptation and mitigation, examining options, constraints, resilience and limits of adaptation. This assessment is difficult since climate change involves complex interactions and changing likelihoods of many and diverse impacts. The focus on risk supports decision making in the context of climate change, and allows societies, government and business to perceive the degree of risk, and to consider modes of mitigation or adaptation, with reference to impacts, vulnerability and exposure.

There is significant evidence of serious impacts on natural and human systems on all continents and across all oceans, however the impact is strongest and most comprehensive for natural systems with changing precipitation levels affecting water resources, thawing permafrost, and many terrestrial, freshwater and marine species shifting their geographic range and migration patterns in response to climate change. People who are economically or socially marginalised are especially vulnerable to the impact of climate change. The widespread impact of recent climate-related extremes such as heat-waves, droughts, floods, cyclones and wildfires reveal vulnerability and exposure of both eco-systems and human systems to current climate variability (IPCC 2014:6). Governments throughout

the world are already extensively engaged in developing adaptation policies for example in coastal and water management, environmental protection, land planning, protecting infrastructure and disaster management and reforestation. In these complex situations iterative risk management is required to deal with continuing uncertainty and constant monitoring of impacts (IPCC (2014:8).

Systemic Risks

The IPCC report provides an integrative framework for summarising risks for people, economies and eco-systems resulting from anthropogenic (man-made) interference with the climate *system*:

Unique and threatened systems including eco-systems and culture systems already at risk from climate change, in danger of severe consequences with additional warming of around 1°C, with many other species and systems with limited adaptive capacity subject to high risk with additional warming of 2°C such as Arctic sea ice and coral-reef systems.

1) *Extreme weather events* such as heat waves, extreme precipitation and coastal flooding already occurring will increase with 1° C additional warming, with extreme events such as extreme heat increasing at higher temperatures.

2) *Distribution of impacts* involves uneven distribution towards disadvantaged people and communities in countries at all levels of development based on crop yields and water availability, which further impacts at higher temperatures.

3) *Global aggregate impacts* involve the Earth's biodiversity and the global economy, with increasing losses of ecosystem goods and services at around 3° additional warming.

4) *Large-scale singular events* as some physical or ecosystems are at risk of abrupt and irreversible damage and tipping points occur at 0 - 1°C, as indicated by early warning signs from both warm-water coral reef and Arctic ecosystems already experiencing irreversible regime shifts (IPCC 2014:12).

With these integrated and compounding risks included in the IPCC framework, the following specific key risks of climate change are identified:

i) Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea level rise.

ii) Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions.

iii) Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.

iv) Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas.

v) Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings.

vi) Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions.

vii) Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.

viii) Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods (IPCC 2014:13).

While this array of impending environmental, ecological, economic and social risks are daunting for the whole of humanity, the IPCC concludes that the burden of these risks will be confronted by those with the least resources to protect themselves: “Many key risks constitute particular challenges for the least developed countries and vulnerable communities, given their limited ability to cope” (IPCC 2014:13).

The great weight of scientific evidence accumulated by successive reports of the IPCC, and a multitude of other scientific projects and policy reviews, brought recognition of the seriousness of the challenge facing humanity and the environment, and the need for deep cuts in global emissions. Yet a prolonged apparent incapacity to reach agreement followed on how this policy might be effectively and equitably implemented across the planet, as manifest in the limits of the 2009 Copenhagen Framework Convention on Climate Change (UNFCCC 2009; BBC 2009). Following extensive rounds of international negotiations over four years in preparation for the 21st Session of the Conference of the Parties to the United Nations FCCC (COP 21) in Paris in November 2015, at last seizing the opportunity to find a way forward, a total of 196 countries reached an historic moment in global diplomacy with a universal climate agreement more rigorous and ambitious than conceived possible earlier (UNFCCC 2015).

Committing to the Paris Agreement

The Paris agreement aims to substantially “strengthen the global response to the threat of climate change” while maintaining sustainable development and efforts to eradicate poverty UNFCCC 2015:22). Critically the agreement commits to more demanding long term mitigation efforts in Article 2(a):

“Holding the increase in the global average temperature to well be-low 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of cli-mate change” (UNFCCC 2015:22).

Reinforcing this commitment is the agreement to a robust transparency framework for emissions reductions with common accounting standards, national reporting, and independent expert review. The agreement establishes binding commitments of all parties to make “nationally determined contributions” (NDCs) and to pursue the necessary domestic emissions reductions measure to achieve these (CCES 2015). In addition to annual reporting, every five years countries are expected to develop new NDCs that represent a significant progression on previous targets. While it is possible that some countries may breach the caps on emissions, over time there is the possibility of negotiating to renew and increase emissions reductions.

The momentous diplomatic breakthrough achieved in the 2015 Paris Agreement, together with the substantial policy development and publications of the Stern Review, IPCC, and countless other international agencies, market intermediaries, business and civil society bodies, and national and legal authorities have helped to propel the business world into an urgent recognition of the dramatic

consequences of unrestrained industrial activity upon the environment, and how little time there is to put this right. What this scenario suggests is certainly not business as usual. The traditional conception of corporations profit maximising and leaving others to worry about the externalities they create simply does not work in a context of the impending consequences of climate change. In this context not only governments, but business and the wider community have to engage in the immediate and urgent stewardship and recovery of the environment. Business corporations will respond - or will be made to respond - by shareholders, stakeholders and governments to the demand that they act with greater responsibility in their use of resources and impact on the community and environment.

This is a paradigm shift as dramatic as any that has been applied to Thomas Kuhn's *Structure of Scientific Revolutions.* We have to "begin the extraordinary investigations that lead the profession at last to a new set of commitments, a new basis for the practice of science." Kuhn explains "The extraordinary episodes in which that shift of professional commitments occurs are the ones known … as scientific revolutions. They are the tradition-shattering complements to the tradition-bound activity of normal science" (Kuhn 1970:7). This paradigm shift impelled by the real and imminent danger of climate change includes a fundamental widening and deepening of the traditional conception of professional directors' duties. This reconceiving of the responsibilities of directors is occurring in a context of institutional transformation (Lawrence and Suddaby 2006) in finance, law and regulation in which profound shifts are beginning to occur due to the impact of the recognition of the consequences of climate change.

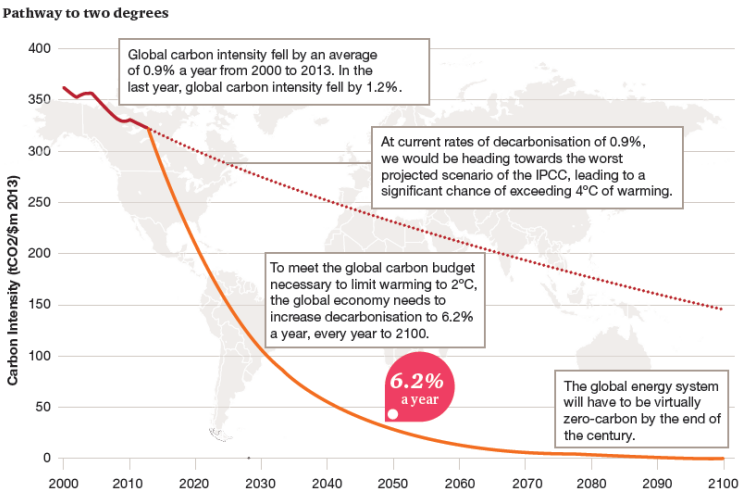
The election of President Trump was a shock to the emerging global determination to resist climate change in his opposition to the Paris agreement, and support for coal and other fossil fuels. However the weight of the U.S. Global Change Research Program Climate Science Special Report (CCSR) (2017) stating that "evidence for a changing climate abounds, from the top of the atmosphere to the depths of the oceans" supported the conclusions of the IPCC (2014). Across America state governments, universities, and corporations confirmed they would continue to support action to meet the Paris Agreement. (We Are Still In 2017). Former Goldman Sachs CEO, and U.S. Treasurer Henry M. Paulson who had to negotiate and resolve the risk of the global financial crisis, is now co-Chair with Michael R. Blumberg of the Risky Business Project an environmental consultancy, and is helping others to get the message, "I know a lot about financial risks—in fact, I spent nearly my whole career managing risks and dealing with financial crisis. Today I see another type of crisis looming: A climate crisis. And while not financial in nature, it threatens our economy just the same" (Risky Business 2014:5). In response to conservative critics who emphasise the high price of early intervention, Paulson insists, "Our failure to act on the underlying problem is deeply misguided, financially and logically. In a future with more severe storms, longer fire seasons, and rising seas that imperil coastal cities, public funding to pay for adaptations or disaster relief will add significantly to our fiscal deficit and threaten our long-term economic security. A tax on carbon emissions will unleash a wave of innovation to develop technologies, lower the costs of clean energy and create jobs as we and other nations develop new energy products and infrastructure" (Paulson 2014).

At a global level the effort to address the risks to the planet caused by greenhouse gas emissions has continued with, for example, Michael Blumberg on behalf of the Financial Stability Board established by the G20, developing policy through the Task Force on Climate Related Financial Disclosure (TCFD). The TFCD stated in its first report, "The expected transition to a lower-carbon economy is estimated to require around $1 trillion of investments a year for the foreseeable future, generating new investment opportunities. At the same time, the risk-return profile of organizations exposed to climate related risks may change significantly as such organizations may be more affected by

physical impacts of climate change, climate policy, and new technologies. In fact, a 2015 study estimated the value at risk, as a result of climate change, to the total global stock of manageable assets as ranging from $4.2 trillion to $43 trillion between now and the end of the century" (TCFD 2017ii); IEA 2015; EIU 2015). The TCFD maintains, "because the transition to a lower-carbon economy requires significant and, in some cases, disruptive changes across economic sectors and industries in the near term, financial policymakers are interested in the implications for the global financial system, especially in terms of avoiding financial dislocations and sudden losses in asset values (2017:iii).

The reality is that if all business does not face up to the enveloping threats and opportunities of climate change, carbon intensity will continue to increase towards the worst case projected scenario of the IPCC at 4 per cent of global warming that will undoubtedly precipitate the non-linear compounding of climactic catastrophes that will endanger civilisation let alone business survival (Figure 22.1). A rate of decarbonisation is required to keep global warming below 2 per cent that will demand virtually zero-carbon emissions by the end of the century, a goal that will require comprehensive commitment from corporations and directors.

Figure 22.1: **Reducing Carbon to Zero Emissions by the End of the Century**



Source: Adapted from PWC (2014)

NEW PARADIGMS OF DIRECTORS DUTIES

Climate change throws up many confronting challenges to corporations and the law, which are presently the subject of intense debate (UN Global Compact 2011: Agrawala et al 2013; CDP 2014; Craig 2010; Craig and Benson; Richardson et al 2011; Phelan 2011; UNEP 2011; IEA 2013; KPMG 2012: Caldecott et al 2015). In the Final Report (2015) of the American Bar Association (ABA) Task Force on Sustainable Development the scale of the challenge in achieving sustainability involving the "promotion of environmental protection, social justice, and economic/financial responsibility at the same time, with the overall objective of promoting human well-being for present and future generations…Sustainability is intended to address two significant and related problems—widespread environmental degradation, including climate disruption, and large-scale extreme poverty. The root causes of these problems, in turn, are understood to be unsustainable patterns of

production and consumption as well as a very large and still growing population" (American Bar Association 2015:1). A resolution of ABA in 2003 made clear that the issues involved in sustainability involved all lawyers, not just environmental lawyers: "Applying sustainable development from a legal perspective means understanding, developing, and applying legal mechanisms that are relevant to the complex relationships among economic, social, and environmental priorities. This suggests a cross-functional approach…that integrates a variety of legal specialties, including environmental, labor, property, tax, corporate, finance, international trade, and risk management (American Bar Association 2015:1)"

In a remarkable speech to Loyds insurers of London on 29 September 2015, Mark Carney the Governor of the Bank of England and Chairman of the Financial Stability Board (established by the G20 to monitor and review global financial and economic stability) highlighted that while a classical problem of environmental economics is the *Tragedy of the Commons* - the despoliation of common property through over-use*,* climate change is also a *Tragedy of the Horizon* – that because the catastrophic impact of climate change is beyond the traditional horizon of most actors, it is imposed as a cost on future generations as the current generations has little direct incentive to fix this (Carney 2015). That is the intervention to repair climate change is beyond the usual business cycle, political cycle, or horizon of regulators and other authorities (Risky Business 2015). The tragic paradox is that by the time climate change is considered a defining issue within the normal business and political cycle it will be too late to repair except at enormous cost. Attempting to calculate the potential future costs involved, the G20 Finance Ministers asked the Financial Stability Board to consider how the financial sector could take account of the risks climate change posed for the financial system. Carney identifies three channels through which climate change can impact on financial stability:

- *Physical risks:* the impact today on insurance liabilities and the value of financial assets arising from climate related events such as floods and storms that damage property and disrupt trade;
- *Liability risks:* the impacts that could arise if parties suffering loss or damage from the effects of climate change seek compensation from those they hold responsible. These claims could come decades into the future, but could potentially hit carbon resources companies and emitters hard, and if they have liability cover would hit their insurers the hardest.
- *Transition risks:* the financial risks resulting from the process of adjusting towards a low carbon economy as changes in policy, technology, and physical risks prompt a reassessment of the value of a large range of assets as costs and opportunities become apparent (Carney 2015:6).

These risks can be minimised by an early and predictable path of transition to anticipating the consequences of a world two degrees warmer, or alternatively the risks can be maximised by waiting for the consequences to occur and allow *jump-to-distress* pricing to ruin businesses (Carney 2015:6). Already since the 1980s the number of weather related loss events has tripled for the insurance industry and the inflation-adjusted insurance losses have increased from an annual average of around $10 billion in the 1980s, to around $50 billion over the past decade (Prudential Regulation Authority 2015; Munich Re 2015).

Corporations have a central role to play in the two main strategies for combating climate change by mitigation and adaptation. Diminishing the potentially catastrophic consequences of the increasing

impact of climate change will require urgent efforts to reduce carbon emissions. Corporations are required to make a major contribution to emissions mitigation, and if they refuse to do so will face reputational damage, higher energy costs, legal costs and fines from increasingly rigorous emissions regulation. More critically they may find it increasingly difficult to transfer the risk they encounter through insurance, and also discover they are being deserted by investors and credit providers concerned at the exposure to emissions intensive sectors, stranded assets, and declining industries (Barker 2015). Equally corporations will be fully engaged in the efforts at adaptation to climate change involving actions to moderate the harm of climate change, or to pursue opportunities to ameliorate the harmful effects of climate change. While the primacy of the effort to mitigate climate change is indisputable, the fact that past emissions will determine a certain degree of climate change, make adaptation necessary. Corporations that prove incapable of adaption to the physical impact of climate change will be vulnerable to interruptions in their business operations and supply chain, potential damage to plant and infrastructure, and water and other raw materials scarcity. The two corporate strategies of mitigation and adaptation are connected, since significant emissions mitigation is necessary to achieve effective adaptation by minimising vulnerability to environmental shocks and enhancing resilience (Barker 2015).

We have clearly passed the stage where the responsibility for mitigation and adaptation relating to climate change could largely be regarded as belonging solely to government. The hazards associated with climate change are both considerable and pervasive, and are characterised by their complexity and inter-connectedness. The dramatic climactic discontinuities caused by climate change "may give rise to cascading risks of potentially unforeseeable magnitude" (Godden et al 2013:235) Therefore climate change cannot be framed as one of technical risk management for government and specialists, it is the responsibility of everyone, but particularly those in leadership positions in organisations that have a significant environmental impact: "..Although risk management is a responsibility of corporations and government agencies which carry out risk assessments as part of their legal and actuarial responsibilities, it now seems to be required of all actors − as risk is shifted from collective institutions and specialised systems to individuals. Faced with systemic and pervasive risk, the individual must plan and measure contingencies and adopt 'actuarial rationality'" (Godden et al 2013:237). As Godden et al argue:

"..Climate change adaptation measures require a more sophisticated model of legal, regulatory and governance structures in order to develop effective responses… Adaptation to climate change, therefore, must negotiate the need for heightened complexity in governance, but also seek to deconstruct conventional simplifying mechanisms such as clear boundaries between public and private spheres. Embracing such complexity is not always palatable, but re-invoking simplifying assumptions about appropriate legal and institutional forms may be detrimental if robust governance for climate risk adaptation is the overarching objective" (Godden et al 2013:255).

How climate change impacts upon the interpretation of directors duties is now being examined. As Barker elucidates with reference to climate change international law has thus far concentrated upon the broad areas of taxing of emissions, protecting the environment with emissions standards and disclosures, and planning. Litigation has mainly occurred in planning and environmental protection regarding high-emitting projects or vulnerable environments, with the law recognising the impact of anthropogenic climate change and the risks of failure to mitigate emissions, and adapt to its consequences (Barker (2013:10; Peel 2011; Peel and Osofsky 2013; McDonald 2011; Lord et al 2012; Agnew 2012). Barker concludes that at this stage the question of liability for climate change has revolved around mitigation and its cost, while the issue of damage caused by climate change impacts remains at an embryonic stage: "Plaintiffs have found duty and causation (or, in a climate change

context, 'attribution') to be near 'insurmountable' evidentiary hurdles. This is primarily due to the disconnect between the global nature of emissions and their collective, cumulative effect, versus the localised nature of their impacts" (Barker 2013:12).

As Sarah Barker convincingly argues in an Australian legal context, that has similar implications for other jurisdictions, there will be in the future no safe harbour for the irresponsible director:

"…Even where directors' subjective bona fides are not in question, passivity, reactivity or inactivity on climate change governance is increasingly likely to contravene the duty of care and diligence under section 180(1) of the Corporations Act, and increasingly unlikely to satisfy the 'business judgment rule' defence under section 180(2). This includes governance strategies that emanate from climate change denial, a failure to consider its impacts due to ignorance or unreflective assumption, paralysis caused by the inherent uncertainty of its magnitude and timing, or a default to a base set by regulators or industry peers. In addition, even considered decisions to prevail with 'business as usual' are increasingly unlikely to satisfy the duty (or the business judgment rule defence) - particularly if they are the product of a conventional methodology that fails to recognise the unprecedented challenges presented by an erratically changing climate. In addition, whilst unorthodox, it is reasonably arguable that a failure to actively consider the impacts of climate change may also breach the duty to act in good faith in the best interests of the corporation under section 181. Accordingly, directors who do not proactively respond to the commercial risks and opportunities of climate change, now, may be held to account under the Corporations Act if corporate value becomes impaired into the future" (Barker 2013:4).

While international agencies remain silent on the question of the implications for directors' duties of climate change, this reserve is unlikely to continue. As the American Bar Association contends: "Corporate sustainability efforts in particular have been growing in scope and intensity over the past few years. In translating the broad objectives of sustainability into specific practices, businesses are guided to a growing degree by private systems of governance. These include sustainability-related codes of organizational behavior, including the CERES (Coalition for Environmentally Responsible Economies) Principles, the UN Global Compact, the UN Guiding Principles on Business and Human Rights, the Global Reporting Initiative standards on sustainability reporting, and the International Chamber of Commerce's Charter for Sustainable Development" (ABA 2015:3). There are indeed many hundreds of policy initiatives led by institutions across the world. Existing initiatives vary in their *status* from laws to voluntary guidance, from the UN to government, and through to civil society; in their *scope* from limiting greenhouse gas emissions to tackling broader environmental risks; and in their *ambition,* from demanding simple disclosure to full explanations of mitigation and divestment strategies. These institutional initiatives have increasing influence and authority as the science and policy base that supports them becomes more profound. In aggregate over 90% of FTSE 100 firms and 80% of Fortune Global 500 firms participate in these various initiatives (Carney 2015:14).

In the past corporate objectives described as 'wealth generating' too frequently have resulted in the loss of well-being to communities and the ecology. But increasingly in the future the *licence to operate* will not be given so readily to corporations and other entities. A licence to operate will depend on maintaining the highest standards of integrity and practice in corporate behaviour. Corporate governance essentially will involve a sustained and responsible monitoring of not just the financial health of the company, but the social and environmental impact of the company. As ABA states "legal tools, the legal profession, and the rule of law can make important contributions and are an integral component of efforts to achieve sustainability, especially by promoting good governance" (Carney 2015:14).

Given the enormity of the environmental and social threat to their existence that humanity has encountered in recent decades, and the range and extent of the civil, professional, business, and governmental response to the impending crisis of climate change, it is curious that internationally while there have been substantial reforms in environmental and related law, there has been comparatively little change in corporate law or in the duties of directors. One explanation of this paradox is the view that directors in pursuing the success of the company already are able and willing to take into account the impact of environmental and social changes, and to develop strategies to mitigate or adapt to these threats. That is directors are becoming increasing aware of the elephant in the boardroom, and are interpreting their duties in this context:

"It is estimated that the top 100 environmental externalities cost the global economy around US$4.7 trillion a year, according to a 2013 report commissioned by The Economics of Ecosystems and Biodiversity (TEEB) for Business Coalition, now known as the Natural Capital Coalition. The report observes that half of all existing corporate profits are at risk if the costs associated with natural capital were to be internalised through market mechanisms, regulation or taxation. A water shortage, for example, would have a 'severe' or 'catastrophic' impact on 40% of Fortune 100 companies" (CIMA 2014: 6-7).

Company directors are nearer to the coal face than the courts, and, as Barker insists, material and insistent evidence "posits climate change as a squarely financial concern: not only consistent with, but prerequisite to, the maximisation of wealth, and therefore imperative to directors' oversight of risk and strategy" (Barker 2013:13). That is directors will incorporate environmental and social responsibility into their decision making as part of a balanced assessment of the risks and opportunities facing the company. Barker continues: "As the impacts of climate change continue to intensify, so too does the likelihood that corporations who are not strategically positioned to manage them will be placed at a significant competitive disadvantage. This undermines the maximisation of corporate wealth or value and, in some cases, may raise the prospect of insolvency. In such circumstances …the regulator charged with maintaining the integrity of the market, may hold directors to account for any breach of the corporate governance laws. And shareholders and creditors may look to recover their losses from directors and their deep-pocketed insurers" (Barker 2013:13).

While much attention has been focused on the effort to reform the interpretation of directors duties in the US with corporate constituency statutes, and with the development of B-corporations with more inclusive objectives; and in the UK with Section 172 (1) of the Companies Act 2006, which states directors should have regard to the impact of the company's operations on the community and environment, imperceptibly wider changes may have been occurring in the interpretation of directors duties in practice (which were always more carefully balanced than the naked tenets of shareholder primacy urged). In fact the narrow strictures of shareholder value routinely neglected the ethical foundation of business as a University of Cambridge study argues "...the separation of ethics from fiduciary duty assumes that the overriding interest of savers is to make the most money possible, regardless of the social and environmental consequences – a view that has never been verified through robust empirical research but, rather, imputed without consent" (ISL 2014). The landscape of directors' fiduciary duty is changing dramatically in the 21st century, and both company directors and investors need to respond. As a UNEP international survey of asset owners, investment managers, lawyers and regulators concludes, "Failing to consider long-term investment value

drivers, which include environmental, social and governance issues, in investment practice is a failure of fiduciary duty" (UNEP 2015:9)

The re-evaluation of fiduciary duty is presently taking place, and will prove to be profound, as Watchman states, "The concept of fiduciary duty is organic, not static. It will continue to evolve as society changes, not least in response to the urgent need for us to move towards an environmentally, economically and socially sustainable financial system" (UNEP 2015: 9). What is occurring is the widespread and insistent development of soft law to deal with the wicked complexities the overwhelming emergency of climate change has exposed. While soft law has its limitations, it also may be applied intelligently and promptly to deal with changing circumstances, and can be translated into hard law when required and possible. "The term 'soft law' entered the international lexicon in the 1970s as a descriptive and differentiating phrase: soft law was anything that was not in fact, hard law promulgated by a government body authorised to enact it, but that nonetheless was designed to affect, or actually behaviour and that might in time solidify into hard law or otherwise affect the development of hard law" (Bjorklund 2012:51). Soft law does possess authority, the UN *Declaration of Human Rights* is the most translated document in the world (in 370 languages), and yet has no legal status (UN 2015).

There are many current issues which will sharpen company directors' sense of fiduciary duty regarding the materiality of environmental and social concerns. The issue of 'Loss and Damage' from climate change (the impact of climate change not mitigated by reductions in emissions) is now on the agenda of the United Nations Framework Convention on Climate Change, with discussion of the case for compensation (UNFCCC 2013). Addressing the insurance industry Mark Carney stated, "Participants in the Lloyd's market know all too well that what appear to be low probability risks can evolve into large and unforeseen costs over a longer timescale. Claims on third-party liability insurance – in classes like public liability, directors' and officers' and professional indemnity - could be brought if those who have suffered losses show that insured parties have failed to mitigate risks to the climate; failed to account for the damage they cause to the environment; or failed to comply with regulations… Cases like Arch Coal and Peabody Energy – where it is alleged that the directors of corporate pension schemes failed in their fiduciary duties by not considering financial risks driven at least in part by climate change (Roe v Arch Coal Inc et al 2014; Lynn v Peabody Energy 2015) – illustrate the potential for long-tail risks to be significant, uncertain and non-linear" (Carney 2015:9).

Mark Carney from a Bank of England and Financial Stability Board perspective set out starkly the implications for the resources industries of the IPCC's estimate of a carbon budget necessary to limit global temperature rises to 2 degrees above pre-industrial levels: a carbon budget that amounts to between 1/5th and 1/3rd world's proven reserves of oil, gas and coal.

"If that estimate is even approximately correct it would render the vast majority of reserves "stranded" – oil, gas and coal that will be literally unburnable without expensive carbon capture technology, which itself alters fossil fuel economics. The exposure of UK investors, including insurance companies, to these shifts is potentially huge. 19% of FTSE 100 companies are in natural resource and extraction sectors; and a further 11% by value are in power utilities, chemicals, construction and industrial goods sectors. Globally, these two tiers of companies between them account for around one third of equity and fixed income assets" (Carney 2015: 10).

Yet there is the other side of the ledger if corporations are astute enough to realise it. "On the other hand, financing the de-carbonisation of our economy is a major opportunity for insurers as long-

term investors. It implies a sweeping reallocation of resources and a technological revolution, with investment in long-term infrastructure assets at roughly quadruple the present rate" (Carney 10-11).

Figure 22.2: The Widening Scope of Director's Duties:
The Increasing Impact of Social and Environmental Responsibility

The gathering scale of the international, national, market and business, and civil society campaign for corporate social and environmental responsibility presents an irresistible challenge to corporations and directors to rethink their mission in the direction of sustainability (Figure 22.2). We are now engaging in a profound process of institutional transformation around the imperatives of sustainability. This transformation may be understood in terms of Fligstein and McAdam's *Theory of Fields* (2012) which conceives how the commitment of skilled people may upset established routines and build new political and organizational fields. The core of the argument examines how people deploy resources, build relationships, and forge new practices. In doing this they place *agency* in a new and more visible light.

Perhaps never in the history of human civilisation has the world faced a more consuming challenge than climate change, or more terrible consequences if a sustainable solution is not achieved. Yet the field of sustainability has assembled the most remarkable constellation of talents and ideals stretching from engineers and life scientists, through community activists and institutional entrepreneurs, to lawyers, company directors and politicians. Tackling the greatest problem of humanity, and some of the most deep-seated corporate interests in business as usual, are an array of individuals and institutions with a vision of a sustainable future. The contest will continue for many decades to come, and the outcome will determine the future of human civilisation as well as planetary sustainability.

It is clear though that the pace of change towards a sustainable economy will only continue to accelerate if there is significant, insistent and sustained pressure upon business to contribute to this

goal from all stakeholders. Coalitions of institutions have sponsored initiatives for corporate responsibility which have driven collaborative business action for responsible business practices (Grayson and Nelson 2013: Nelson 2002) The vast institutional development internationally around the theme of corporate social and environmental responsibility and sustainability is impressive. It is useful to highlight a selection of the leading institutional initiatives, the objectives of the institutions, the business response to the initiative, the recognisable impact of the initiative upon business, and any revealed weaknesses in the nature of the initiative or the business response (Benoit and Vickery-Niederman 2010; Kolb 2007).

INTERNATIONAL AGENCIES

Of the hundreds of international institutional and policy initiatives around corporate social and environmental responsibility and sustainability the UN Global Compact is the most prominent. The Global Compact was commenced in 1999 by UN Secretary General Kofi Anan to "initiate a global compact of shared values and principles, which will give a human face to the global market" (UN Global Compact 2010). The UN accepts "Corporate sustainability starts with a company's value system and a principled approach to doing business" (UN Global Compact 2010; 2015; Rasche and Kell 2010). With affiliations from 8,375 large corporations in 162 countries the UN Global Compact has a remarkable foothold in the boardrooms of the world's leading corporations. The ten principles to doing business proposed in the Global Compact involve fundamental responsibilities in the areas of human rights, labour, environment and anti-corruption. The principles are derived from the *Universal Declaration on Human Rights*, the International Labour Organization's *Declaration on Fundamental Principles and Rights at Work*, the Rio Declaration on *Environment and Development*, and the United Nations *Convention Against Corruption*. These principles are seen as a comprehensive and practical tool in "formally committing to, assessing, defining, implementing, measuring and communicating a corporate sustainability strategy" (United Nations/Deloitte). The UN sees the commitment to these principles coming from the top:

"Whereas the importance of chief executive commitment to sustainability is often well understood, the focus on the critical role of Boards of Directors is a newer phenomenon. Corporate boards, or equivalent governance entities, must take responsibility for the implementation of and reporting on corporate sustainability, as they do for corporate financial and business performance. Importantly, boards are uniquely positioned to integrate sustainability into executive recruitment and remuneration, paving the way for sustainability outcomes to be linked to compensation across the entire leadership spectrum" (UN Global Compact).

In September 2015 the Heads of State and Government representatives to the UN met to decide on new global Sustainable Development Goals. Going beyond the Millennium Development Goals established in 2000 (United Nations 2014), a new agenda of 17 Sustainable Development Goals with 169 associated targets were agreed representing a universal policy for sustainable development that included: "…Making fundamental changes in the way that our societies produce and consume goods and services. Governments, international organizations, the business sector and other non-state actors and individuals must contribute to changing unsustainable consumption and production patterns, including through the mobilization, from all sources, of financial and technical assistance to strengthen developing countries' scientific, technological and innovative capacities to move towards

more sustainable patterns of consumption and production" (United Nations 2015). It is the expansive philosophy of the UN Sustainable Development Goals which now informs the Global Compact vision of a sustainable world. Though a voluntary commitment the UN Social Compact expect participant companies to report on their progress towards effecting change though producing strategic reports showing measurable gains and losses. This annual Communication on Progress (COP) often included in company's annual report or sustainability report to stakeholders provides a degree of transparency to the process.

The UN Global Compact has proved a vehicle for the international dissemination of the values of corporate social and environmental responsibility, and has provided a productive learning opportunity to many leaders in the corporate sector for whom human rights, labour, environment and anti-corruption would not normally be at the top of their agenda. However the Global Compact has been criticised as a voluntary exercise with less traction than might at first appear. Sethi and Schepers question the effectiveness of the UNGC in changing social and environmental performance in its signatory companies, commenting on the low level of accountability and transparency demanded by the UN (Sethi Schepers 2014). Rasche and Waddock suggest there are two purposes of global governance initiatives: the first from the demands of regulatory institutions calling for stricter compliance and monitoring, the second from the demands of principles-based initiatives emphasising a consensus building function. However there is a complementarity between the two approaches, and to achieve a global implementation of standards both approaches are required. While the UNGC could be argued to be largely engaged in consensus building this could be regarded as an important step towards more rigorous compliance initiatives (Rasche and Waddock 2014).

The UN Principles of Responsible Investment (PRI) is an investor initiative in partnership with the UNEP Finance Initiative and the UN Global Compact and founded in 2006 it has recruited 936 signatories to its principles, 245 asset owners and 691 investment managers. This represented 19 per cent of asset owners with assets of $12.4 trillion of a total market of $64.6 trillion, and 63 per cent of investment managers with assets of 46.3 trillion of a total market of $74 trillion. The PRI principles focus upon incorporating environmental, social and governance (ESG) issues into investment analysis and decision-making processes. Signatories are obliged to provide publicly available Transparency Reports regarding their commitments to ESG issues, and Assessment Reports which are confidential and provide details of organisational characteristics, asset mix, responsible investment policy and governance. Providing the largest data-set on investment responsibility in the world, of the 936 PRI reporters in 2015 a total of 725 reported on whether their submission was assured by a third party provider and 95 (13 per cent) responded they had been assured by an independent party, though in some cases this assurance was partial (PRI 2015b; Hebb et al 2015; Louche and Hebb 2014). The PRI has taken an active stand on climate change and encourages asset managers to investigate and understand their carbon exposure risk by measuring their portfolio's carbon footprint, and reviewing it with portfolio managers. The purpose is to mitigate their carbon risk exposure and be setting a goal to reduce as appropriate for their individual organisations, including considering joining the Portfolio Decarbonisation Coalition (PRI 2015b; Portfolio Decarbonisation Coalition 2015).

As with the UN Global Compact while acknowledging the success of the PRI in recruiting asset owners and investment managers to the cause (though more extensively in Europe than elsewhere in the world) some critics "..Query the capacity of the UNPRI to effect change in the practices of target companies. It is very much embedded in a business case approach to responsible investment, does not require signatories to provide formal public reporting of their implementation progress, does not require CSR and ecological sustainability factors to be determinative of any ultimate investment decisions, and does not require specific quotas of socially and environmentally responsible companies within their investment portfolios" (Miles 2012:103). The UN PRI has developed and extended the debate on responsible investing internationally, however the question remains whether the PRI has given too much credibility to investment corporations that have not committed to responsible investing except at the margins.

The Global Reporting Initiative (GRI) was founded in 1997 by the US non-profit Coalition for Environmentally Responsible Economics (CERES) and the Tellus Institute in conjunction with the United Nations Environment Program (UNEP). The GRI became a Sustainability Reporting Framework with reporting guidelines at its centre covering the environment, social, economic and governance issues. In 2002 the GRI relocated from Boston to Amsterdam and was inaugurated as a UNEP collaborating organisation. A sequence of four sets of reporting guidelines G1 to G4 have been published in 2000, 2002, 2006 and 2013 (GRI 2015a). Over 3,000 experts from business and civil society participated in the development of the G3 reporting guidelines in 2006 in a multi-stakeholder approach. In 2010 the GRI published guidelines on how to use the GRI in combination with the ISO 26000, a Social Responsibility standard of the ISO (GRI 2011). In 2013 with the publication of G4 the GRI released *Reporting Principles*, *Standard Disclosures* and an implementation manual, with G4 being released online as a free web-based tool (GRI 2015b). To assist with reporting the GRI in 2015 published research on the definition and analysis of materiality at sector and company level: the material issues that will most impact on company value. That is the most significant material issues impacting on the industry including general long term trends with an impact on industry drivers, and common issues within an industry that have an impact on long-term company value:

"For each industry, the factors were prioritized according to their expected magnitude (degree of impact) and the likelihood of their impact (probability and timing of impact) on growth, profitability, capital efficiency and risk. This two-dimensional evaluation resulted in a materiality matrix for each industry, which maps the relative importance of each material factor against the others, and provides a visualization of the most important factors for each industry" (GRI 2015c).

This was an important step for the GRI as the earlier versions of the reporting framework allowed a box ticking exercise on the number of reported indicators leading to the final scope of the sustainability report. With an emphasis upon materiality the GRI is taking a stance that sustainability reporting is not about the quantity of metrics reported against, but rather about the context and importance of sustainability issues unique to the company and the quality of what is reported, which would include new disclosures on supply chain risks and greenhouse gas emissions (Hsu 2013).

A large consortium of agencies combined together in the effort to progress a proposal for integrated reporting including The Prince's Accounting for Sustainability Project, the Global Reporting Initiative, the World Business Council for Sustainable Development, the World Resources Institute, the World Intellectual Capital Initiative, the Carbon Disclosure Project, the Climate Disclosure Standards Board, the European Federation of Financial Analysts, the United Nations (UN) Conference on Trade and Development, the UN Global Compact, the International Corporate Governance Network, the Collaborative Venture on Valuing Non-Financial Performance, and many others (Integrated

Reporting 2011). Integrated reporting provides a comprehensive and integrated reporting framework for companies:

"Integrated Reporting brings together the material information about an organization's strategy, governance, performance and prospects in a way that reflects the commercial, social and environmental context within which it operates. It provides a clear and concise representation of how an organization demonstrates stewardship and how it creates value, now and in the future. Integrated Reporting combines the most material elements of information currently reported in separate reporting strands (financial, management commentary, governance and remuneration, and sustainability) in a coherent whole, and importantly:

- shows the connectivity between them; and
- explains how they affect the ability of an organization to create and sustain value in the short, medium and long term" (Integrated Reporting 2011:6)

Undoubtedly the GRI and the Integrated Reporting initiative have raised the corporate social and environmental responsibility debate, and considerably sharpened the corporate skills in reporting on this. However both approaches have needed to respond to recurrent criticism. The most common complaint is that social and environmental reporting is too burdensome, when in fact the GRI does adopt a flexible comply or explain approach. Companies complain they do not have the data available to report on, but the GRI has been in place now long enough for large companies to gather what is required, and in an era of 'big data' this is no longer costly. Other companies insist value chain assessments are too complex, however a refusal to go beyond the legal boundary of the company is not acceptable any longer to multi-stakeholder groups interested on the impacts of business upstream and downstream.

Companies need to be going beyond incremental reporting to measuring the value-cycle of their activities in an integrated and context-based manner that encourages innovation and transition (Thurm 2013). Other companies feel confused by the number of standards and frameworks including the GRI, International Integrated Reporting Council (IIRC) and Sustainability Accounting Standards Board (SASB), as each of these frameworks has their own approach on how materiality may be determined, reported and assessed. Further the SASB is a compliance driven approach to materiality based on the US SEC, which contradicts the principles driven approach of the GRI and IIRC (Leinaweaver 2015).

MARKET INDICES

There are many market indices which assist investors in making informed investment decisions, and among them are a group of increasingly influential sustainability indices that focus upon corporate social and environmental performance (Institute of Business Ethics 2013). The FTSE4Good Index Series is designed to measure the performance of companies demonstrating strong Environmental, Social and Governance (ESG) practices. The FTSE4Good Index Series criteria are based on publicly available data in assessing ESG practices, and do not accept privately provided data from companies, which is intended to enhance transparency. The ratings process for the FTSE4Good has an independent committee of experts from the investment community, companies, NGOs, unions and academia oversee reviews and methodology development (FTSE, 2015; FTSE 2011). The series consists of six benchmark indices covering the Global and European regions, the US, Japan and the

UK, and an additional five tradable indices. The criteria consist of Governance: corporate governance, risk management, tax transparency, and anti-corruption. Social: health and safety, labour standards, human rights and community, customer responsibility. Environment: climate change, water use, biodiversity, pollution and resources. Companies are rated against these criteria, and can be removed from the index if they fall below a minimum standard for a twelve month period. Companies which manufacture tobacco, weapons systems and components for controversial weapons including cluster bombs and chemical/biological weapons are excluded from the series (FTSE 2011:6). (Though in the early years of the index the tobacco companies were allowed in (and of course as consummate marketers, equipped with glossy CSR reports).

The rigour applied by the FTSE4Good ratings system is somewhat attenuated by the realisation that all of the indices are heavily influenced by economic criteria of scale and profitability, for example in the FTSE4Good Global Index producing a list of household names in the top positions (for example in 2015 the top ten constituents were Apple Inc; Microsoft; Wells Fargo; Johnson and Johnson; Nestle; Novartis; AT &T; Proctor & Gamble; Roche; Verizon Communications). While each of the companies will have made some considerable efforts to raise their performance in social and environmental performance over the years, they could each be questioned on some aspect of their performance, for example the leader Apple Inc has a very chequered history with its 350 contractor plants in China, and while attempting to deal with this for some years has not made as much progress as it might have (Clarke and Boersma this volume).

The rival S & P Dow Jones Sustainability Indices (DJSI) were launched in 1999 as the first global indices tracking the financial performance of leading sustainability-driven companies with an integrated assessment of their economic, environmental and social performance with a focus on long-term shareholder value. A rules-based methodology focuses on best-in-class companies with a total of 3,470 companies invited and 1,845 analysed distributed among a DJSI World, Europe, North American, Asia Pacific, Emerging Markets, Korea and Australia indices. Key changes to criteria introduced since 2014 include to corporate governance, risk and crisis management, customer relationship management, and environmental policy and management systems. In September 2015 the S&P Dow Jones Indices launched three new climate change index series in association with Trucost: the S&P Global 1200 Carbon Efficient Index Series, S&P Global 1200 Carbon Efficient Select Index Series and S&P Global 1200 Fossil Fuel Free Index Series. All three index series are derived from the constituents of the S&P Global 1200, and will focus attention keenly on the carbon footprint of listed companies. “Climate change and its impact present a challenge from an investment perspective,” commented Julia Kochetygova, Head of Sustainability Indices at S&P Dow Jones Indices. “Many investors are trying to facilitate the transition to a low carbon economy by financing projects in the renewable energy sector, avoiding high carbon producing companies or minimizing their exposure to fossil fuel companies. The three new S&P DJI index series are designed to provide alternative performance narratives to standard benchmarks, being comprised of those companies meeting the strict fossil fuel and carbon efficient standards set within each index series” (Trucost 2015).

However again the rigour of the DJSI assessment criteria “the gold standard for corporate sustainability” (DJSI 2015a) experienced something of a shock when on 21 September 2015

Volkswagen AG was listed as the industry group leader for Automobiles and Components (DJSI 2015b) and on 29 September 2015 S&P Dow Jones Indices announced that Volkswagen AG was to be removed from the Dow Jones Sustainability Indices as a result of revelations that it has manipulated emissions tests to conceal the level of toxic pollutants issuing from its diesel engines in popular saloon cars in the United States.

The mainstream sustainability indices clearly have a way to go to establish both rigour and relevance in the market place: "Even though many indices verify the disclosures submitted by companies, they are still subject to the criticism that they are exposed to corporate bias. It has been suggested that indices reward the companies with greatest capacity to respond to the questionnaires rather than those with the best socially responsible practices and that they are more of a reflection of successful marketing than proven sustainability performance" (DJSB 2015c). The consultancy SustainAbility suggests we should rate the raters (2013). Bendall astutely observes the inspiring aspirations but serious limitations of ESG analyses which:

- Rely predominantly on information published or provided by the companies being assessed;
- Focus analysis on management policies and processes not on the actual ESG impacts and outcomes of the companies;
- Assess companies within a downside risk framework focusing on the management of negative externalities that can lead to damage to reputation or litigation (rather than focusing on whether the company is creating greater social or environmental value for society);
- Use limited frameworks for understanding complex and evolving fields of corporate responsibility, and reductionist methods to assess companies;
- Are not completely independent from the companies they are assessing;
- Conflate the materiality of ESG issues for financial performance of investments, and the materiality of those issues to affected stakeholders and wider society.
- Run indices or supply date to indices including companies that could never be sustainable, and blur the issue of responsible investing for fund managers;
- Do not integrate the ESG analysis products and ratings with the mainstream financial analysis and ratings they offer, partly because of the commercial interest in maintaining different products;
- Are not completely transparent about their methods of research, analysis and ranking, or about their general operations to allow stakeholders and regulators to assess their credibility (Bendell 2010).

The further development and influence of ESG market indices will depend upon how well they can demonstrate their independence from the corporations they are rating, and in turn how well the corporations can verify the authenticity and value of the ESG data on their performance.

The admirable goals of the Sustainable Stock Exchanges Initiative (SSEI) commenced by a Sustainability Working Group with representatives of 23 global stock exchanges formed with the backing of the World Federation of Exchanges (WFE) which is the trade association for al regulated

stock, futures and options exchanges, that list more than 44,000 companies representing a total market capitalisation of US$ 60 trillion, must be informed by the ideals yet aware of the limitations of the existing sustainability indices (SSEI 2015). The value proposition for stock exchanges adopting environmental, social and governance principles recognised by the SSEI include:

- Developing well-functioning markets, which are more resilient and less volatile.
- Contributing to stronger, more transparent listed companies that are better able to identify and manage risks and opportunities.
- Creating more attractive markets where investors can better evaluate fundamental drivers of value creation, and as more investors recognise the value of ESG information, they will direct more of their activity to exchanges that foster it.
- Helping companies navigate, comply with or stay ahead of regulations that require disclosure of financially material ESG information.
- Assisting companies in differentiating themselves on ESG matters, which is quickly becoming a competitive imperative.
- Contributing to the achievement of national and international sustainable development commitments and priorities, such as the UN Sustainable Development Goals, and steering investment towards sustainable development priorities (SSEI 2015:7-8).

The WFE and UNCTAD (2017 produced a report on the role of stock exchanges internationally in promoting economic growth and sustainable development, illustrating the increasing support for ESG themed financial products, ESG-indices, and green bonds. It seems likely that the sustainability imperative will have an increasing impact upon investors and stock exchanges throughout the world as the materiality of environmental, social and governance factors becomes fully appreciated.

BUSINESS AND CIVIL SOCIETY INITIATIVES

The World Business Council for Sustainable Development is one of the most prominent of the international business agencies campaigning for corporate environmental, social and governance responsibility and closely aligned with the fundamental principles of the UN Global Compact, UN Millennium Development Goals and now the 2015 UN Sustainable Development Goals. As outlined in successive policy statements Vision 2050 (WBCSD 2010), Changing Pace (WBCSD 2014), and CEO Guide to Climate Change (WBCSD, 2015) the WBCSD recognises business cannot leave all of the heavy lifting to create a sustainable world to public policy because:

- Public financing alone will fall short of the necessary investment levels to create a global economy that successfully deals with the resource and carbon limitations of the future;
- A predictable, certain and long-term policy will encourage business to work with investors, to implement and scale up solutions;
- The Green Race will need to evolve as we move through the different stage of exploring, testing, scaling up and learning from yet unfound solutions. This is best carried out in close cooperation between business and governments (WBCSD 2014:1).

The WBCSD is committed to eco-efficiency, that is “to embrace practices that start to decouple economic growth, human development and well-being from negative environmental and social impacts.” More critically Stephan Schmidheiny the industrialist founder of the WBCSD

acknowledges, eco-efficiency "is also about redefining the rules of the economic game in order to move from a situation of wasteful consumption and pollution, to one of conservation; and to one of privilege and protectionism to one of fair and equitable chances open to all" (Schmidheiny 1992). WBCSD has developed policies on climate change and carbon emissions with a consortium We Mean Business (WMB 2015) of other agencies including Business for Social Responsibility (BSR 2015), the Carbon Disclosure Project (CDP 2015), CERES (2015), and The Climate Group (2015), campaigning for science based emissions reductions, putting a price on carbon, procuring 100% of electricity from renewable sources, and reporting climate change information in mainstream reports as a fiduciary duty. Supporting this campaign are organisations such as the Portfolio Decarbonisation Coalition (PDC 2015) and the Low Carbon Technology Partnership Initiative (LCTPi 2015).

Most of the coalitions and initiatives considered thus far have concerned primarily the environmental impact of business, however there are many other initiatives that focus on wider social, economic and governance concerns internationally and in specific sectors. An outstanding illustration of this development is the Extractive Industries Transparency Initiative (EITI) which in 2003 established firm principles of responsibility for the resources sector. The resources industry are central to the economic development of many emerging economies, however too often in the past the operation of resources companies in poor countries has been associated with political corruption which has enriched national politicians and impoverished local communities. Putting this into perspective in key resources emerging economies, extractive industry revenues as a percentage of government revenue range from 96% in Nigeria to 22% in Liberia (EITI 2015a:1). As Clare Short the Chair of the EITI Board stated: "the wealth from a country's natural resources should benefit all its citizens and this will require high standards of transparency and accountability. After the principles were agreed, rules were drawn up to ensure that all EITI member countries committed to minimum levels of transparency in company reporting of revenues paid and government reporting of receipts" (EITI 2015b:6).

The EITI has proved successful in bringing together a grand coalition of 48 resources countries implementing the EITI standard and more supporting countries preparing to implement the standard, major resources companies and investors, and leading representatives of civil society organisations from the respective countries and internationally who have together committed to the effective implementation and monitoring of the EITI principles. Over time the EITI reporting process has widened in scope and involved deeper disclosure, offering a more complete account of the extractive industries in a country. Reports now disclose disaggregated revenue figures by individual companies and revenue streams for each country. Ten countries have begun to disclose the beneficial ownership of extractive companies operating in their country, and almost all countries publish data on production and licencing (EITI 2015c). As a result of these efforts the EITI has promoted the open and accountable management of natural resources in the most vulnerable economies which were until recently opaque and impenetrable:

"In emerging and middle-income economies, the EITI process provides a mechanism through which to gauge institutional reform both in the extractive industries and in broader fiscal revenue management. Data disclosed through the EITI are increasingly quoted in frontier markets' sovereign bond prospectuses, commodity producers' share offerings and fundraising brochures for private equity and investment funds. The EITI offers credible insights into institutional strength and governance" (EITI 2015d:4).

Together the international agencies policies, sustainable market indices, and business and civil society initiatives are encouraging and supporting companies to examine their strategies and practices, and to move towards a decarbonised future.

CHANGING STRATEGIES AND PRACTICES IN INDUSTRIES AND COMPANIES: DECARBONISED, DECENTRALISED AND DIGITAL

There is emerging now a new sustainable future of industries and companies that are committing to new strategies and practices. These have the potential to deliver a decarbonised, decentralised and digital economy (Fay et al 2015). Networks of decentralised companies will be able to digitally share resources and achieve zero emissions.

The traction which the many institutional initiatives are having with companies internationally is illustrated by the companies that report their greenhouse gas emissions, water management and climate change strategies to the Carbon Disclosure Project which has increased from 253 unique company reports in 2003, to 5003 companies disclosing in 2014 (CDP 2015). CDP and the Climate Group have compiled the companies with a list of companies with 100% greenhouse gas emissions reductions targets achieved by 2014 (Table 22.3), a number of which have pursued zero emissions into their value chain (CDP/Climate Group 2015). Even if most of these companies are in industries where there are not very large emissions to eliminate, this is a remarkable feat, and a beacon for other companies in more emissions-intensive industries to follow. As Eric Schmidt, Executive Chairman of Google comments, "We're serious about environmental sustainability not because it's trendy, but because it's core to our values and makes good business sense. After all, the cheapest energy is the energy you don't use in the first place. And in many places clean power is cost-competitive with conventional power" (CDP/Climate Group 2015).

Table 22.3 Corporations Committing to Zero Greenhouse Gas Emissions Targets (2014-2050)

Organization	Country	Per Cent Reduction	Target Year
Aimia	Canada	100	2014
Bank of Montreal**	Canada	100	2014
Biogen	US	100	2014
Google	US	100	2014
Insurance Australia	Australia	100	2014
Intuit	US	100	2014
Kohl's**	US	100	2014
Marks & Spencer **	UK	100	2014
Microsoft**	US	100	2014
TD Bank Group**	Canada	100	2014
Royal KPN	Netherlands	100	2015
Infosys	India	100	2018

Goldman Sachs	US	100	2020
Interface	US	100	2020
Kingspan Group	Ireland	100	2020
Mars	US	100	2040
GlaxoSmithKline*	UK	100	2050
Tesco**	UK	100	2050
Verbund	Austria	100	2050

Bold text indicates achieved target
*Near term targets likely include use of renewable energy certificates (RECs) and/or carbon offsets.
**Target includes emissions beyond direct operations into the value chain (Scope 3)

Source: Adapted from: CDP/The Climate Group, Unlocking Ambition 2015 p3
https://www.cdp.net/Documents/policy/CDP-targets-briefing-2014.pdf

However, the goal of sustainable enterprise existing integrally with the natural environment is both possible and necessary: the strategies of business can be redirected to serve the natural environment rather than to destroy it. Table 22.4 projects a transition to a sustainable economy on which we have already embarked (Hart 1995: CIMA 2014; Trucost 2013). For many decades industry has been subjected to environmental laws that have limited emissions and waste, which have enlightened enterprises have engaged in with a spirit of continuous improvement and the benefit of lowering costs (and those businesses that have transgressed the law have faced prosecution – often in the past with penalties that did not discourage further pollution, but with more adverse consequences today including being abandoned by investors afraid of the risks involved). In more recent times a sense of product stewardship has developed largely with the motivation of minimising the life-cycle cost of products but with significant residual environmental benefits). Finally, we are entering an era of sustainable enterprise where minimising and eliminating the environmental impact of the growth of firms is becoming established as a key objective, and integrated into firms' operations.

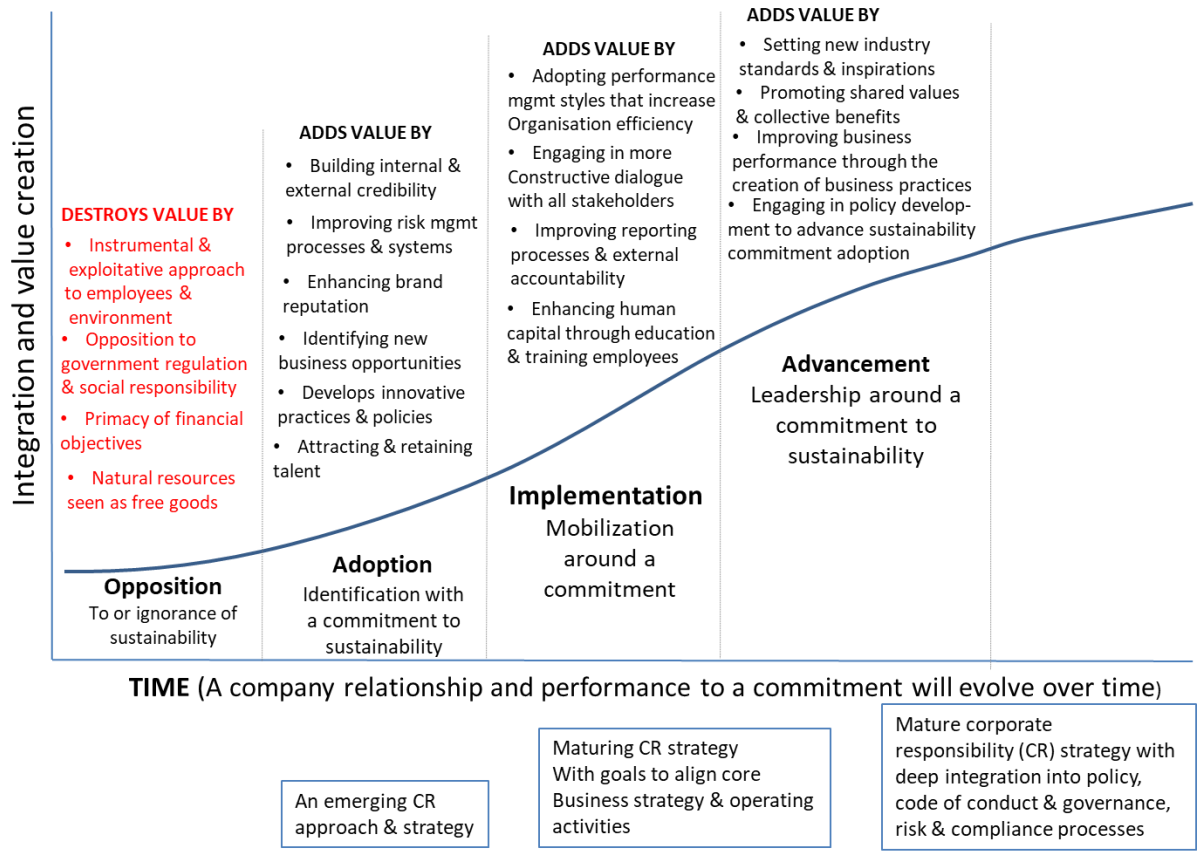
Table 22.4 A Natural Resource-Based View of the Firm

Strategic Capability	Environmental Driver	Key Resource	Business Advantage
Pollution Prevention (1900s-1980s)	Minimise emissions, effluents and waste	Continuous improvement	Lower costs
Product (1980s-2000s)	Minimise life-cycle cost of products	Stakeholder integration	Pre-empt competitors
Sustainable Development (2000s-2060s)	Minimise and eliminate environmental burden of firm growth	Shared vision, Circular economy	**Stewardship** Future Position

Source: Adapted from Hart (1995)

An emerging trajectory of corporate sustainability is discernible whereby corporations move from opposition to sustainability to adoption, implementation and advancement of sustainability (Figure 22.3). In pursuing this sustainability trajectory corporations move from destroying value with instrumental and exploitative approaches to employees and the environment, opposing government regulation and failing to see any duty to corporate responsibility beyond keeping within the bounds of the law. This approach uniformally regards natural resources as a free good which can be routinely exploited (Benn et al 2015). With the dawning realization of the sustainability imperative corporations move to adopting commitments to risk mitigation and brand enhancement, and begin to see new business opportunities. With more committed implementation of sustainability there is a more effective dialogue with stakeholders about sustainability principles, and improved training, accountability and reporting. In time this commitment matures into a more advanced leadership setting new industry standards and improving business practices. (Accountability/UN Global Compact 2014). Finally corporations leading in sustainability commit to transforming their enterprises towards safe and environmentally friendly products and services with sustainable business models, reinventing the corporation as a evolving element of the society and ecology (Benn et al 2015).

Figure 22.3 An Emerging Trajectory of Corporate Sustainability



Sources: Adapted from Kemp, V., Stark, A. and Tantrum, J. (2004) *To Whose Profit: Evolution,* WWF-UK, note 19; Benn, S., Dunphy,D. and Griffiths, A. (2015) *Organizational Change for Corporate Sustainability,* Third Edition, London: Routledge; AccountAbility/United Nations Global Compact, (2014) *Growing Into Your Sustainability Commitments: A Roadmap for Impact and Value Creation,* AccountAbility/United Nations Global Compact; Nidumolu, R., Prahalad, C.K., and Rangaswami M.R. (2009) Why Sustainability is Now the Key Driver of Innovation, *Harvard Business Review,* September 2009

Innovation for Sustainability

There is beginning to be introduced across the world a substantial development of innovation based on firm ecological principles (Jang et al 2015). The advancing phenomena of eco-innovation may be defined as "All efforts from relevant actors that introduce, develop, and apply new ideas, behaviours, products and processes and contribute to reducing environmental burdens or ecologically specified sustainability targets" (Rennings 2000). Eco-innovation is a broad concept, comprising:

• innovation in pollution control (new, better, or cheaper abatement technology);

• green products;

• cleaner process technologies;

• green energy technology and transport technologies, and

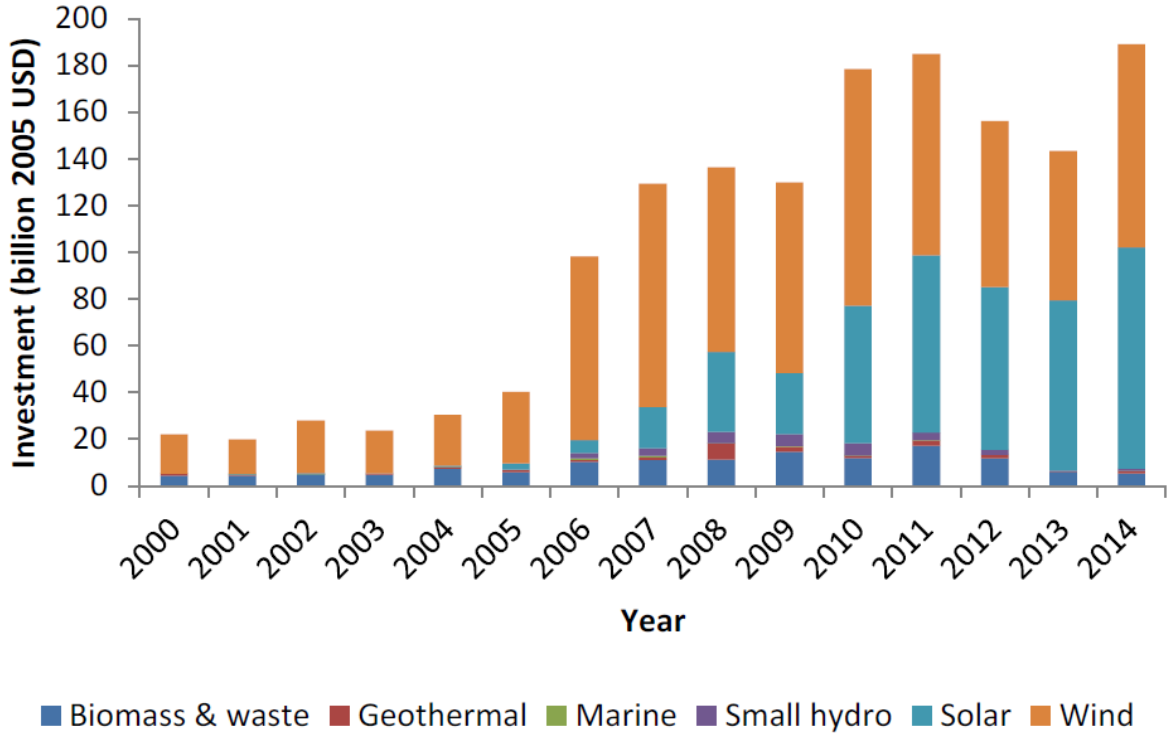
• waste reduction and handling techniques (Kemp and Pontoglio 2011).

Eco-innovation creates and develops extensive new business opportunities and benefits by preventing or reducing the negative impacts of fossil fuels or other toxic emissions or pollution, or optimizing the use of natural resources. Eco-innovation involves the application of environmental technologies to operationalise the concepts of eco-efficiency and eco-industry (Sarkar 2013). At the beginning eco-innovation focused mainly on production and processes, but has expanded considerably to include management systems, creating new markets, organizations, institutions and social eco-innovation (Charter and Clark 2007; OECD 2009; EIO 2015).

A standard bearer of radical innovation is Elon Musk who has achieved important advances in battery storage technology, and also driven the transformation of the automotive industry, as the Tesla electric car corporation surpassed Ford and General Motors in market capitalisation, and began to overtake the luxury brand BMW. Interestingly the response of car corporations world-wide to the sudden competitive threat of Tesla was to dramatically turn to electric power with such conviction the end of the petrol internal combustion engine became a real possibility. VW announced in 2016 a range of electric cars, and vowed to pass Tesla in electric car production. Volvo in 2017 announced it would only be producing electric cars in the near future (a boost to its Chinese parent company that is a leading global producer of electric engines and batteries). Meanwhile Toyota in Japan has committed to hydrogen engines which emit only water.

The sustained increase in the investment in and innovation around renewable energy has proved impressive in recent years (Figure 22.4). Significant reductions in the cost of critical renewable technologies with the capital costs of utility-scale photovoltaic falling by 20 per cent in 2016 have encouraged investment. However to meet the Paris agreement goal of below a two per cent centigrade increase in temperature, the International Energy Agency (IEA) estimates that cumulative investments in renewable power of more than USD 6 trillion will be required by 2040, requiring progressive massive scaling up of investment over the next two decades.

Figure 22.4 The Investment in Renewable Energy in the OECD and G20 Economies 2000-2014



Source: Adapted from OECD (2017)

The Circular Economy

New business models forming in the circular and sharing economies are enabling transitions to sustainable business practices, addressing resource depletion, waste management, and resource stewardship models that go beyond the traditional life-cycle requiring collaborative governance structures, new partnership arrangements, and networks between and across sectors. *Closing* loops refers to (post consumer waste) recycling, *slowing* is about retention of the product value through maintenance, repair and refurbishment, and remanufacturing, and *narrowing* loops is about efficiency improvements, a notion that already is commonplace in the *linear economy* (Bocken et al. 2016; Bocken et al 2017). New technologies may transform the management of the traditional linear economy towards a circular economy, in which waste is effectively eliminated, and the economy is restorative rather than depletive of eco-systems (European Commission 2015a; World Economic Forum 2014). The European Commission has been developing a Circular Economy Strategy for some time, "The circular economy requires action at all stages of the life cycle of products: from the extraction of raw materials, through material and product design, production, distribution and consumption of goods, repair, remanufacturing and re-use schemes, to waste management and recycling" (European Commission 2015b). The central elements of the circular economy are set out in Table 22.5 involving revolutions in energy and efficiency, integration of value chains, bioeconomics, and sustainable transport systems and construction.

Table 22.5 Key Elements in the Circular Economy

- Energy

A revolution in energy production and consumption, with the sustained drive towards 100% renewable sources of energy in wind, water and solar and 100% zero emissions.

- Efficiency

The transformation of efficiency in the creation and the use of materials, to deliver greater prosperity and better quality of life while utilising fewer resources

- Integrated Value Chains

The achievement of zero waste and zero emissions through integrated value chains, where waste products are usefully fed back through biological and industrial cycles.

- Bioeconomics and Biomimicry

Employing natural materials and biological processes as the basis of sustainable production, synthesising biology and technology, imitating the ingenuity of nature.

- The Greening of Agriculture and Cities

Mass reforestation and rehabilitation of arable land through organic farming, and the integration of agriculture and food processing. Organic high tech urban farming.

- Sustainable Mobility

Emissions free autonomous vehicles, shared vehicles and accessible, integrated public transport integrated systems. Transnational railways and emissions free air travel.

- Environmentally Friendly Buildings

Environmentally friendly construction and buildings. Buildings that produce their own energy, vertical gardens and roof gardens.

Source: Adapted from Fücks, R. (2015)

The possibilities of the circular economy are limitless, as a senior executive of Veolia, a French water resources company projected “A priority is to go beyond the linear economy, where stakeholders are in traditional silos. In addition to preserving natural resources, shifting to a circular economy offers an opportunity to create new sources of wealth. The emergence of innovative models leads to collaborative dynamics across industries, cities, and communities that reveal new fields of sustainable value creation, such as selling services instead of products, recovering resources from waste, sharing assets, and producing green supplies” (MacArthur 2015:6).

An analysis by the Ellen MacArthur Foundation, SUN, and the McKinsey Centre for Business and the Environment (2015) reached the following policy conclusions concerning the potential for the circular economy in Europe:

- The European economy is surprising wasteful in its model of value creation, and continues to operate a take-make-dispose system.

- Europe could integrate new technologies and business models to maximise value from asset and material stocks applying the rules of a circular economy to achieve growth from within the process.
- The circular economy could produce better welfare, GDP, and employment outcomes than the current development path ((MacArthur 2015: 12-15).

NATURAL CAPITAL

Further widespread adoption of zero emissions policies by business and plans for green growth will be inseparable from the commitments to delivering major emissions reductions in successive international climate change negotiations, with national governments accelerating the transition of corporations towards total decarbonisation. Assisting corporations to think strategically in this direction is the work of agencies which highlight to investors the real cost of carbon, and how this must be incorporated into estimates of the market valuation of corporations such as Trucost. Trucost is a dedicated consultancy established by a number of large financial institutions in London to examine natural capital dependency across companies, products, supply chains and investments, with a view to managing risks from volatile commodity prices and increasing environmental costs, and ultimately building more sustainable business models. “It isn't "all about carbon"; it's about water; land use; waste and pollutants. It's about which raw materials are used and where they are sourced, from energy and water to metals, minerals and agricultural products. And it's about how those materials are extracted, processed and distributed” (Trucost 2015). Natural capital is defined by Trucost as “The finite stock of natural assets (air, water and land) from which goods and services flow to benefit society and the economy. It is made up of ecosystems (providing renewable resources and services), and non-renewable deposits of fossil fuels and minerals” (Trucost/TEEB 2013:3).

Dieter Helm examines the delicate nuances of natural capital, upon which the future of mankind rests: “Natural capital is itself one of many different types of asset. Capital is an input into production, which in turn produces a flow of goods and servicesfor the ultimate flow of humans. What makes it *natural* is that it is not itself produced by humankind – nature givest it to us for free. In come cases, like North Sea oil and gas, there is a fixed amount and it is a question of who consumes it, when, and with what consequences. This sort of natural capital is *non-renewable.* In other, and in many ways more interesting , cases nature keeps on providing the asset for free, provided it is treated with respect and not over-exploited. It is *renewable,* with potentially infinite yield at zero cost, and hence is extraordinary valuable” (2015:2).

In estimating the world’s largest natural capital risks which business, investors and governments face, Trucost suggests these risks are costing the global economy of the order of $4.7 trillion dollars per year. Resource intensive industries and supply chains around the planet are incurring these natural capital cost, and internalisation of the costs by companies and industries has only occurred at the margins. However confronted by the prospect of another 3 billion middle class consumers by 2030, demand for natural resources will grow rapidly as supply continues to shrink. “The consequences in the form of health impacts and water scarcity will create tipping points for action by governments and societies. The cost to companies and investors will be significant” (Trucost/TEEB 2013:3). Trucost is engaged in informing companies and investors how to measure and manage

natural capital impacts, to focus on high risk areas, and to develop mitigation (Green Biz/Trucost 2015).

Together with examining the impact and costs of climate change, what also has to be estimated is the cost of the ongoing depletion of ecosystems and biodiversity. Trucost was a founding member of The Economics of Ecosystems and Biodiversity in Business and Enterprise (TEEB), which is supported by the G8 and UN Environment Programme and the European Commission, together with the German, UK, Norwegian and Netherlands governments. The key messages of TEEB on business, biodiversity and the ecosystem maintain:

- The world is changing in ways that affect the value of biodiversity and ecosystem services (BES) to business. The value of biodiversity and ecosystem services is a function of population growth, urbanisation, economic growth and eco-system decline.
- Biodiversity loss and ecosystem decline cannot be considered in isolation from other trends which are growing and shifting markets, resource exploitation and climate change.
- Business risks and opportunities associated with biodiversity and ecosystem services are growing and with the interaction between biodiversity loss, decline in eco-system services and other major trends business can expect increased risks and opportunities over time.
- There will be increasing pressure on and more restricted access to natural resources with growing market demand for natural resources and increasing public concerns about the environment.
- Consumers increasingly consider biodiversity and ecosystems in their purchasing decisions which companies and their suppliers will need to rexamine.
- Business is beginning to notice the threat posed by biodiversity loss and surveys of CEOs indicate a growing concern about the impact of biodiversity loss on their business growth (Bishop 2012:3; Sukhdev et al 2014).

TEEB draws attention to the invisibility of nature in the economic choices we make, and how this is a key driver of the ongoing depletion of ecosystems and biodiversity. Valuation as an institutional development in diverse social contexts and many forms has a role to play in stemming the tide of degradation of ecosystems and the loss of biodiversity. There are concerns about valuation in conditions of economic and environmental uncertainty, and TEEB recognises that values are a product of different worldviews and treats them in their respective socio-cultural contexts. However, TEEB argues in the absence of valuation essential ecosystem services are presently being traded as commodities often with an implicit value of zero. Policy responses are required to resolve the public goods problem s underlying biodiversity loss and ecosystem degradation, such as land use planning, regulation, and payments for environmental services. Corporate impacts and dependencies on biodiversity and ecosystem services should be measured and valued as an integral part of statutory reporting and disclosure in the interests of the conservation of the natural commons and intra-generational equity (Sukhdev et al 2014:3).

A Natural Capital Coalition has now formed to provide a global platform of business, accounting, consultancy, academia and government members working on natural capital with a common vision (Natural Capital Coalition 2015a). The purpose is building the business case for integrating natural capital into decision-making; developing and testing natural capital protocols and sectoral guidelines; shifting corporate behaviour towards enhancing rather than depleting natural capital;

and supporting the evolution of an enabling policy environment and access to reliable data (Natural Capital Coalition 2015b).

Ultimately this all leads to biomimicry, that is innovation inspired by nature (Benyus 2002). The idea is that over 3.8 billion years of research and development, nature has evolved systems and processes that can inform solutions to many of the waste, resource efficiency and management problems that we now grapple with today: "In a society accustomed to dominating or "improving" nature, this respectful imitation is a radically new approach, a revolution really. Unlike the Industrial Revolution, the Biomimicry Revolution introduces an era based not on what we can extract from nature, but on what we can learn from her…In a biomimetic world, we would manufacture the way animals and plants do, using sun and simple compounds to produce totally biodegradable fibers, ceramics, plastics, and chemicals. Our farms, modelled on prairies, would be self-fertilizing and pest-resistant. To find new drugs or crops, we would consult animals and insects that have used plants for millions of years to keep themselves healthy and nourished" (Benyus 2002:2).

Collectively this huge and multi-faceted effort by both business and civil society, by all the agencies and initiatives discussed above, represents a great advance in the campaign for corporate environmental, social and governance responsibility. The ideals manifested are often exemplary, and whatever weaknesses and limitations revealed in the complex challenges these initiatives face, in aggregate the initiatives do represent a significant institutional development in the cause of corporate responsibility.

CONCLUSIONS

The world has to face the inordinate economic and social risks of climate change including the dangers of increased flooding and storm damage, altered crop yields, lost productivity, increased crime, damaged public health, strained energy systems (Houser et al 2015). Over the next 20 years businesses will be exposed to hundreds of environmental and social changes that will bring both risks and opportunities in the search for sustainable growth including climate change; volatile fossil fuel markets; material resource scarcity; water scarcity; population growth; the impact on resources of the growing global middle class; growing urbanization; food security; ecosystem decline; and deforestation (KPMG, 2012).

To tackle these compounding problems, corporations will be required to engage in a sustainable revolution, just as profound as the industrial revolution, in which we will move from a 19th-century focus on production, and a 20th-century focus on marketing and consumption, to a 21st-century focus on sustainability. However, the integration of corporate finance and governance and sustainability is still to be achieved: although corporate policy has become more sophisticated, implementation remains in its infancy (UNEP, 2014). The reformulation of corporate purpose, corporate governance and directors' duties in the direction of greater environmental and social responsibility is now a matter of survival.

There are alternatives to waiting for disaster to happen, and building a circular economy to sustain natural capital is now is one of them. Presently we have a linear economy in which we extract resources at an ever-increasing pace, making them into products to then dispose of wastefully. A circular economy is designed to be waste free at every stage and resilient by design, innovative, and restorative of eco-systems. This creativity is technically feasible but what is required are the

supporting institutions and values. Businesses can succeed while exercising ethical values, respecting people and communities, and sustaining the natural environment. This requires comprehensive responsible policies, practices and programs fully integrated into business operations, incentive systems and decision making to achieve corporate sustainability. The UN Global Compact defines corporate sustainability as "a company's delivery of long-term value in financial, social, environmental and ethical terms" (UN Global Compact 2014:5). Greening the corporation will be essential to achieve this balanced assessment of purpose and performance.

REFERENCES

ABC News (2010) BP's Dismal Safety Record, 27 May 2010, http://abcnews.go.com/WN/bps-dismal-safety-record/story?id=10763042

AccountAbility/United Nations Global Compact, (2014) *Growing Into Your Sustainability Commitments: A Roadmap for Impact and Value Creation*, AccountAbility/United Nations Global Compact

Agnew, R. (2012) The End of the World as We Know It: the Advance of Climate Change from a Criminological Perspective, in R White (ed), *Climate Change from a Criminological Perspective*, Springer

Agrawala, S., Carraro, M., Kingsmill, N., Lanzi, E., Mullan, M. and Prudent-Richard, G. (2013) *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*, OECD Environmental Working Papers, No. 39, OECD Publishing, revised February 2013 http://www.oecdilibrary.org/docserver/download/5kg221jkf1g7.pdf?expires=1443415479&id=id&accname=guest&checksum=D165B27080655A6E2C2B02C016204C2D

American Bar Association (2015) *Final Report of the American Bar Association Task Force on Sustainable Development,* 30 July 2015, p1, http://www.americanbar.org/content/dam/aba/administrative/environment_energy_resources/resources/final_sdtf_aba_annual_08-2015.authcheckdam.pdf

Banerjee, S.B. (2012) Critical Perspectives on Business and the Natural Environment, in, P.Bansal and A.Hoffman (eds), *The Oxford Handbook of Business and the Natural Environment,* Oxford University Press

Barker, S. (2013) Directors'Duties in the Anthropocene: Liability for Corporate Harm Due to Inaction on Climate Change, Corporate Law, Economics and Science Association, http://www.clesa.net.au/blog/2015/1/14/directors-duties-in-the-anthropocene-liability-for-corporate-harm-due-to-inaction-on-climate-change

BBC (2009) *Why Did Copenhagen Fail to Deliver a Climate Deal?*, BBC NEWS (Dec. 22, 2009), http://news.bbc.co.uk/2/hi/8426835.stm

Bendell, J. (2010) *World Review*, The Journal of Corporate Citizenship, Number 40,Winter 2010. 6-40. p19, http://www.greenleaf-publishing.com/content/pdfs/JCC40_worldreview.pdf

Benn, S., Dunphy, D., and Griffiths, A. (2015) *Organizational Change for Corporate Sustainability*, Third Edition, London: Routledge

Benoit, C. and Vickery-Niederman, G. (2010) *Social Sustainability Assessment Literature Review, White Paper 102*, Sustainability Consortium, Arizona State University and University of Arkansas, December 2010 http://www.sustainabilityconsortium.org/wpcontent/themes/sustainability/assets/pdf/whitepapers/Social_Sustainability_Assessment.pdf

Benyus, J.M. (1997) *Biomimicry: innovation Inspired by Nature,* HarperCollins

Berchicci, L. and King, A. (2008) Postcards from the Edge: A Review of the Business and Environment Literature, *Academy of Management Annals,* 1, 513-547

Bishop, J. (2012) (ed), *The Economics of Ecosystems and Biodiversity*, TEEB, http://www.teebweb.org/media/2012/01/TEEB-For-Business.pdf

Bjorklund, A.K. (2012) Assessing the Effectiveness of Soft Law Instruments in International Investment Law, Edward Elgar, in Andrea K. Bjorklund and August Reinisch (2012) *International Investment Law and Soft Law*, Edward Elgar

Bocken, N. M. P., I. de Pauw, C. Bakker, and B. van der Grinten, (2016) Product Design and Business Model Strategies for a Circular Economy, *Journal of Industrial and Production Engineering* 33(5): 308–320

Bocken, N., Ritala, P., and Huotari, P. (2017) The Circular Economy: Exploring the Introduction of the Concept Among S & P 500 Firms, *Journal of Industrial Ecology,* 21, 2, 487- 490

Bowen, F. (2014) *After Greenwashing: Symbolic Corporate Environmentalism and Society,* Cambridge University Press

Brinded, M. (2011) Upstream International, at the FT Global Energy Leaders Summit, London, June 28, 2011

BSR (2015) Business for Social Responsibility, http://www.bsr.org/

Bureau of Ocean Energy Management (2010) *Regulation and Enforcement, Report Regarding the Causes of the April 20 2010 Maconda Well Blowout*, 14 September 2011, http://docs.lib.noaa.gov/noaa_documents/DWH_IR/reports/dwhfinal.pdf

Caldecott, B., Dreicks, G. and Mitchell, J. (2015) *Stranded Assets and Subcritical Coal: The Risk to Companies and Investors,* Stranded Assets Program, Smith School of Enterprise and the Environment, Oxford University http://www.smithschool.ox.ac.uk/research-programmes/stranded-assets/Stranded%20Assets%20and%20Subcritcial%20Coal%20-%20The%20Risk%20to%20Investors%20and%20Companies%20-%20April15.pdf

Carney, M. (2015) *Breaking the Tragedy of the Horizon – Climate Change and Financial Stability,* 29 September 2015, http://www.bankofengland.co.uk/publications/Documents/speeches/2015/speech844.pdf

(CCES 2015) *Outcomes of the UN Climate Change Conference in Paris,* Centre for Climate and Energy Solutions, http://www.c2es.org/docUploads/cop-21-paris-summary-12-2015-final.pdf

CDP (2014) *Climate Change and Profitability*, CDP S & P 500 Climate Change Report , Carbon Disclosure Project, https://www.cdp.net/CDPResults/CDP-SP500-leaders-report-2014.pdf

CDP (2015) Carbon Disclosure Project https://www.cdp.net/en-US/Pages/HomePage.aspx

CDP, https://www.cdp.net/en-US/Results/Pages/overview.aspx

CDP/The Climate Group, *Unlocking Ambition* 2015 p3 https://www.cdp.net/Documents/policy/CDP-targets-briefing-2014.pdf

Ceres (2015) https://www.ceres.org/

CIMA (2014) *Accounting for Natural Capital: The Elephant in the Boardroom*, London: Chartered Institute of Management Accountants http://www.cimaglobal.com/Documents/Thought_leadership_docs/Sustainability%20and%20Climate%20Change/CIMA-accounting-for-natural-capital.pdf

Clarke,T. and M. Boersma (2017) The Governance of Global Value Chains: Unresolved Human Rights, Environmental and Ethical Dilemmas in the Apple Supply Chain in China, *Journal of Business Ethics*, 133, 395-419

Clarke T (2015) The Long Road to Reformulating the Understanding of Directors' Duties: Legalising Team Production Theory, *Seattle University Law Review*, Vol 38, 433-487

Clarke T (2013) Deconstructing the Mythology of Shareholder Value 3 *Accounting, Economics, and Law* 1, pp. 15-42

Clarke, T., (2007a). The Evolution Of Directors Duties: Bridging The Divide Between Corporate Governance And Corporate Social Responsibility, *Journal Of General Management*, March 32(3): 1-27

Clarke, T., (2007). The Materiality of Sustainability: Corporate Social and Environmental Responsibility as Instruments of Strategic Change, in Benn, S., and Dunphy, D., *Corporate Governance and Sustainability*, London and New York: Routledge, pp 219-251

Craig, R.K. (2010) "Stationarity is Dead" – Long Live Transformation: Five Principles for Climate Change Adaptation Law, 24 *Harvard Environmental Law Review* 10, 22 et seq;

Craig, R.K. and Melinda Harm Benson, Replacing Sustainability, *Akron Law Review*, 46, 4, 841, https://www.uakron.edu/dotAsset/bf08a9cb-5cbb-47ea-a415-36b686c5f7ad.pdf

Crane, A., Matten, D., and Moon, J., (2008) Ecological Citizenship and the Corporation: Politicising the New Corporate Environmentalism, *Organization and Environment* 21,371-389

Crane, A., Matten, D. and Spence, L.J. (2014) *Corporate Social Responsibility: Readings and Cases in a Global Context,* London: Routledge

CSSR (2017) U.S. Global Change Research Program, Climate Science Special Report, U.S. Global Change Research Program http://www.globalchange.gov/content/cssr

Deepwater Horizon Study Group (2011) *Final Report on the Investigation of the Maconda Well Blowout*, Centre for Catastrophic Risk Management, 1 March 2011, p5, http://ccrm.berkeley.edu/pdfs_papers/bea_pdfs/dhsgfinalreport-march2011-tag.pdf

Delmas, M.A. and Burbano, V.C. (2011) The Drivers of Greenwashing, *California Management Review,* 54, 64-87

DJSB (2015a) *Results Announced for 2015 Dow Jones Sustainability Indices Review*, http://www.sustainability-indices.com/images/150910-djsi-review-2015-en-vdef.pdf

DJSB (2015b) *Dow Jones Sustainability Index, 2015 Review Presentation*, 21 September 2015, http://www.sustainability-indices.com/images/review-presentation-2015.pdf, p7

EITI (2015a) *The Importance of Natural Resources for Government Revenues*, 2015, p1, http://progrep.eiti.org/2015/glance/importance-natural-resources-government-revenues

EITI (2015b) *The EITI Standard*, 2015, p 6, https://eiti.org/document/standard

EITI (2015c) *A Step Change in Extractive Transparency*, http://progrep.eiti.org/2015/glance/lessons

EITI (2015d) *Quantifying Intangibles: Using Extractive Industries Transparency Initiative (EITI) in Credit Ratings Assessments*, https://eiti.org/files/20150825_eiti_brief_how-to-use-the-eiti-in-credit-rating-assessments.pdf

Elkington, J. (2005). Government in the Chrysalis Economy, in R. Olsen and D. Rajeski (eds), *Environmentalism and the Technologies of Tomorrow: Shaping the Next Industrial Revolution* , Washington DC: Island Press, 133–142

EIU (2015) *The Cost of Inaction: Recognising the Value at Risk from Climate Change*, Economist Intelligence Unit https://www.eiuperspectives.economist.com/sites/default/files/The%20cost%20of%20inaction_0.pdf

European Commission (2015a) *Circle Economy*, http://www.circle-economy.com/circular-economy/

European Commission (2015b) *Moving Towards A Circular Economy*, European Commission, http://ec.europa.eu/environment/circular-economy/index_en.htm

European Commission (2015c) *Circular Economy Strategy,* http://ec.europa.eu/smart-regulation/impact/planned_ia/docs/2015_env_065_env+_032_circular_economy_en.pdf

Ewing, J. (2018) Volkswagen Suspends Top Lobbyist Amid Inquiry Into Diesel Tests on Monkeys, *New York Times,* 30 January 2018

Fay, M., S.Hallegatte, A. Vogt-Schilb, J. Rozenber, U. Narlock, T. Kerr (2015) *Decarbonising Development: Three Stepts to a Zero-Carbon Future,* World Bank

Financial Times (2015) BP Finalises $20.8 billion Deepwater Horizon Settlement, 6 October 2015

Financial Times (2015) Boardroom Politics at Heart of VW Scandal, 4 October 2015

Fligstein, N. and McAdam, D. (2012) *A Theory of Fields*, Oxford University Press, 2012

FTSE (2011) FTSE4Good: Ten Years of Impact and Investment, FTSE, http://www.ftse.com/products/downloads/FTSE4Good_10_Year_Report.pdf

FTSE (2015) Index Inclusion Rules for the FTSE4Good Index Series, FTSE, http://www.ftse.com/products/downloads/F4G-Index-Inclusion-Rules.pdf

Fücks, R. (2015) *Green Growth, Smart Growth: A New Approach to Economics, Innovation and the Environment,* Anthem Press (originally published as Carl München, *Die Grüne Revolution*, 2013

Gillespie, E. (2008) Stemming the Tide of Greenwash, *Consumer Policy Review,* 18, 79-83

Godden, L., Rochford,F., Peel,J., Caripis,L. and Carter,R. (2013) Law, Governance and Risk: Deconstructing the Public-Private Divide in Climate Change Adaptation, *UNSW Law Journal*, Vol 61, 1, 224-255, P235

Grayson,D., Nelson, J. (2013) *Corporate Responsibility Coalitions: The Past, Present, and Future of Alliances for Sustainable Capitalism*, Stanford University Press

Green Biz/Trucost (2015) The State of Green Business 2015 https://www.greenbiz.com/microsite/state-green-business

Greenpeace, (1992) *Greenpeace Book on Greenwash,* Greenpeace

Greenpeace, (2012) Greenwash + 20: How Some Powerful Corporations Are Standing in the Way of Sustainable Development, Greenpeace http://www.greenpeace.org/international/Global/international/publications/RioPlus20/GreenwashPlus20.pdf

GRI (2011) *GRI and ISO 2600: How to Use the GRI Guidelines in Conjunction with ISO 26000,* Global Reporting Initiative, https://www.globalreporting.org/resourcelibrary/How-To-Use-the-GRI-Guidelines-In-Conjunction-With-ISO26000.pdf

GRI (2015a) *GRI's History*, Global Reporting Initiative, https://www.globalreporting.org/information/about-gri/gri history/Pages/GRI's%20history.aspx

GRI (2015b) *G4 Sustainability Reporting Guidelines*, Global Reporting Initiative, https://www.globalreporting.org/standards/g4/Pages/default.aspx

GRI (2015c) *Defining Materiality: What Matters to Reporters and Investors*, Global Reporting Initiative/ROBECOSAM, https://www.globalreporting.org/resourcelibrary/Defining-Materiality-What-Matters-to-Reporters-and-Investors.pdf

Guardian (2015) Deepwater Horizon: BP Got 'Punishment It Deserved' Loretta Lynch Says, 6 October 2015

Hackmann H. and Boulton, G. (2016) Science for A Sustainable and Just World: A New Framework for Global Science Policy, *UNESCO Science Report – Towards 2030*, UNESCOPublishing, pp12-14

Hart, S. (1995) A Natural-Resource-Based View of the Firm, *The Academy of Management Review,* 20, 4, 986-1014

Helm, D. (2015) *Natural Capital: Valuing the Planet*, New Haven and London: Yale University Press

Hebb, T., Hawley, J., Hoepner, A. Neher, A., and Wood, D. (2015) *The Routledge Handbook of Responsible Investment*, Routledge

Hoffman,A. and Bansal, P. (2011) *The Oxfrod Handbook on Business and the Natural Environment,* Oxford University Press

Houser,T., Hsiang,S., Kopp,R., and Larsen,K. (2015) *Economic Risks of Climate Change: An American Prospectus,* Columbia University Press

Hsu, J. (2013) *Is the GRI's G$ too Ambitious for Business?* Carbon Trust, 30 May 2013, http://www.carbontrust.com/news/2013/05/is-gris-g4-too-ambitious-for-business/

IEA (2013) International Energy Agency, *World Energy Outlook Special Report – Redrawing the Energy-Climate Map*, OECD/IEA, 10 June 2013, 85

Kemp, R.; Pontoglio, S. (2011) The innovation effects of environmental policy instruments—A typical case of the blind men and the elephant? *Ecological Economics*, 2011, 72, 28–36

Klein, N. (2015) *This Changes Everything: Capitalism vs. the Climate,* Penguin

KPMG, *Expect the Unexpected: Building Business Value in a Changing World*, KPMG International 2012, https://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/building-business-value.pdf

IEA (2015) World Energy Outlook Special Briefing for Cop 21, International Energy Agency

Institute of Business Ethics (2013) *Business Ethics Briefing*, Ethical Indices, Issue 33, September 2013, http://www.ibe.org.uk/userfiles/ethicalindices.pdf

ISL (2014) Institute for Sustainability Leadership, *The Value of Responsible Investment: The moral, financial, and economic case for action*, University of Cambridge, file:///C:/Users/990880/Downloads/ILG%20the%20value%20of%20responsible%20investment.pdf

Integrated Reporting (2011) *Towards Integrated Reporting: Communicating Value in the 21st Century,* International Integrated Reporting Committee (IIRC), p7, http://integratedreporting.org/wp-content/uploads/2011/09/IR-Discussion-Paper-2011_spreads.pdf

IPCC (2007) *Climate Change 2007: Synthesis Report, Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Rajendra K Pachauri and Andy Reisinger (eds) (IPCC, 2007)

IPCC (2013) *Climate Change 2013: The Physical Science Basis - Headline Statements from the Summary for Policymakers*, Working Group I Contribution to the IPCC Fifth Assessment Report (IPCC, 27 September 2013);

IPCC (2014) *Climate Change 2014: Impacts, Adaptation, and Vulnerability, Working Group II, Intergovernmental Panel on Climate Change*, p vii https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-FrontMatterA_FINAL.pdf

Kolb, R.K. (2007) *Encyclopaedia of Business Ethics and Society*, Sage,

Kuhn, T. (1970) The Structure of Scientific Revolutions, University of Chicago Press

Lawrence, T.B., Suddaby, R. (2006) Institutions and Institutional Work, *The Sage Handbook of Organization Studies*, 2nd Edition, 215-254

Leinaweaver, J. (2015) Is Corporate Sustainability Reporting A Great Waste of Time? *The Guardian*, 7 January 2015

Levy, D.L. and Egan, D. (2003) A Neo-Gramscian Approach to Corporate Political Strategy: Conflict and Accommodation In the Climate Change Negotiations, *Journal of Management Studies,* 40, 803-829

Lord, R., Goldberg, S. Rajamani,L. and Brunnee,J. (eds) (2012) *Climate Change Liability: Transnational Law and Practice*, Cambridge University Press

Louche, C. and Hebb, T. (2014) Socially Responsible Investment in the 21st Century, Emerald Group Publishing

Low Carbon Technology Partnership Initiative (2015) http://lctpi.wbcsdservers.org/

Lynn v Peabody Energy Corporation et al, Case: 4:15-cv-00916-AGF, United States District Court, Eastern District of Missouri, 11 June 2015

Lyon, T.P. and Maxwell, J., W., (2011) Greenwash: Corporate Environmental Disclosure Under Threat of Audit, Journal of Economics and Management Strategy, 20, 3-41

MacArthur, E. (2015) *Growth Within: A Circular Economy Vision for a Competitive Europe,* Ellen MacArthur Foundation, SUN, and McKinsey Centre for Business and Environment

McDonald, J. (2011) The role of law in adapting to climate change, *Wiley Interdisciplinary Reviews: Climate Change*, 2, 2, 283

Meteorological Office (2014) News Release, United Kingdom https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf
http://www.metoffice.gov.uk/news/releases/archive/2015/Record-UK-temps-2014

Miles, K. (2012) Soft Law Instruments in Environmental Law: Models for International Investment Law, in, Andrea K. Bjorklund and August Reinisch (2012*) International Investment Law and Soft Law*, Edward Elgar, 82-107, p103

Munich Re (2015) September 2015, NatCatSERVICE (2015), http://www.munichre.com/en/reinsurance/business/non-life/natcatservice/significant-natural-catastrophes/index.html

National Commission, Deepwater (2011) *The Gulf Oil Disaster and the Future of Offshore Drilling,* Report to the President, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011 http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf

Nelson, J. (2002) *Building Partnerships: Cooperation Between the United Nations System and the Private Sector*, United Nations Publications

Nelson, J. (2014) Corporate Social Responsibility: Emerging good practice for a new era, *OECD Observer*, OECD
http://www.oecdobserver.org/news/fullstory.php/aid/4369/Corporate_Social_Responsibility:_Emerging_good_practice_for_a_new_era.html#sthash.Fy81yzUM.dpuf

New York Times (2015) Volkswagen Says 11 Million Cars Worldwide Are Affected in Diesel Deception, 22 September 2015

Natural Capital Coalition, http://www.naturalcapitalcoalition.org/about/coalition-members.html

Natural Capital Coalition, http://www.naturalcapitalcoalition.org/about/the-ncc.html

OECD (2017) The Government Role in Mobilising Investment and Innovation in Renewable Energy, *Investment Insights,* OECD

OED (2012) *Oxford English Dictionary*, Oxford University Press

Otto F.E., (2015) Climate Change: Atribution of Extreme Weather, *Nature Geoscience* 8, 581–582 (2015)

Paulson, H. (2014). We US conservatives need to recognise climate change and find market solutions, *The Observer* 29 June 2014

Peel, J. (2011) Issues in Climate Change Litigation, *Carbon and Climate Law Review* 5,1, 15

Peel, J. and Osofsky, H. (2013) Climate Change Litigation's Regulatory Pathways: A Comparative Analysis of the United States and Australia, *Law & Policy,* 35,3, 150

Phelan, L. (2011) Managing climate risk: extreme weather events and the future of insurance in a climate changed world, *Journal of Environmental Management*, 18, 4, 223

PDC (2015) Portfolio Decarbonisation Coalition, http://unepfi.org/pdc/resources-2/

Portfolio Decarbonisation Coalition (2015) http://unepfi.org/pdc/

http://www.unepfi.org/fileadmin/documents/PortfolioDecarbonizationCoalition.pdf

PRI (2015a) Principles of Responsible Investment, *Report on Progress*, PRI http://www.unpri.org/wp-content/uploads/PRI_Report-on-Progress_2015.pdf

PRI (2015b) PRI Climate Change Strategy Project, *Discussion Paper Reducing Emissions Across the Portfolio,* 2015b http://2xjmlj8428u1a2k5o34l1m71.wpengine.netdna-cdn.com/wp-content/uploads/PRI_Discussion-Paper-on-Reducing-Emissions.pdf

Prudential Regulation Authority (2015) The Impact of Climate Change on the UK Insurance Sector, Bank of England, http://www.bankofengland.co.uk/pra/Documents/supervision/activities/pradefra0915.pdf

PWC (2014) Two Degrees of Separation: Ambition and Reality, Low Carbon Economy Index 2014, PWC UK https://www.pwc.co.uk/assets/pdf/low-carbon-economy-index-2014.pdf

Rasche, A. and Kell, G.(2010) *The United Nations Global Compact: Achievements, Trends and Challenges*, Cambridge University Press

Rasche, A. and Waddock, S. (2014), Global Sustainability Governance and the UN Global Compact*, Journal of Business Ethics*, Vol 122, No 2, June III, 209-216

Richardson, K., Steffen, W. and Liverman, D. (2011) *Climate change: global risks, challenges and decisions*, Cambridge University Press, 2011

Roe v Arch Coal Inc et al, Case: 4:15-cv-00910-NAB, United States District Court, Eastern District of Missouri, 9 June 2015

Richardson, B.J. (2009) Keeping Ethical Investment Ethical: Regulatory Issues for Investing for Sustainability, *Journal of Business Ethics*, Vol 87, 4, 555

Risky Business (2014) A Climate Risk Assessment for the United States, June 2014

Risky Business (2015) The Economics of Climate Change in the United States, http://riskybusiness.org/

Sandberg, J. et al (2009) The Heterogeneity of Socially Responsible Investment, *Journal of Business Ethics*, 87, 4, 519

Sethi,S. and Schepers,D. (2014), United Nations Global Compact: The Promise-Performance Gap, *Journal of Business Ethics*, Vol 122, No 2, June III, 193-208

Schmidheiny,S. (1992) *Changing Course: A Global Business Perspective on Development and the Environment,* MIT Press, 1992

Shell (2002) "Minutes meeting of the Committee of Managing Directors", Shell, London, 22/23 July 2002 cited in Ten Kate, A. (2011) *Royal Dutch Shell and its Sustainability Troubles*, Friends of the Earth, Netherlands

Shell International (2008) *Shell Energy Scenarios to 2050*, Shell file:///C:/Users/Thomas%20Clake/Desktop/Greening%20the%20Corporation/Greenwashing/shell-energy-scenarios2050.pdf

S & P Dow Jones Indices, Volkswagen AG to be Removed from the Dow Jones Sustainability Indices, 29 September 2015 http://www.sustainability-indices.com/images/150929-statement-vw-exclusion_vdef.pdf

SSEI (2015) Sustainable Stock Exchanges Initiative, *Model Guidance on Reporting ESG Information to Investors, A Voluntary Tool for Stock Exchanges to Guide Issuers*, 2015, http://www.sseinitiative.org/wp-content/uploads/2015/09/SSE-Model-Guidance-on-Reporting-ESG.pdf

Sukhdev, P., Wittmer, H. and Miller, D. (2014) The Economics of Ecosystems and Biodiversity: Challenges and Responses, TEEB, http://www.teebweb.org/publication/teeb-challenges-responses/

Sustainable Stock Exchanges Initiative (2015) http://www.sseinitiative.org/

Stern, N. (2006) *Stern Review: The Economics of Climate Change*, Department of Industry, UK Government http://mudancasclimaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview_report_complete.pdf

SustainAbility, Rate the Raters: Phase 3 Uncovering Best Practices, 2011, http://www.aristastandard.org/content_files/rtrphase3report3.pdf

SustainAbility, Rate the Raters Project, 2013, http://www.sustainability.com/projects/rate-the-raters

TCFD (2017) Final Report, Recommendations of the Task Force on Climate-Related Financial Disclosures, Task Force on Climate-Related Financial Disclosures, https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf

The Climate Group (2015) http://www.theclimategroup.org/

Ten Kate, A. (2011) *Royal Dutch Shell and its Sustainability Troubles*, Background report to the Erratum of Shell's Annual Report 2010, Friends of the Earth, Netherlands, http://www.foei.org/wp-content/uploads/2011/05/Shell-background-report.pdf

TerraChoice (2010) *The Six Sins of Greenwashing: A Study of Environmental Claims in North American Consumer Markets,* Northbrook, Il: Underwriters Laboratories http://sinsofgreenwashing.com/index35c6.pdf

Thurm,R. (2013) Reforming Sustainability Reporting: For and Against, *The Guardian,* 12 March 2013

Trucost, http://www.trucost.com/what-we-do

Trucost/TEEB (2013) *Natural Capital at Risk: The Top 100 Externalities of Business*, http://www.trucost.com/published-research/99/natural-capital-at-risk-the-top-100-externalities-of-business

Trucost (2015) New Climate Change Index Series Launched by S & P Down Jones Indices, 17 September 2015 http://www.trucost.com/news-2015/209/S&P/carbon-efficient/indices

UNEP (2011a) *Oxfam and the World Resources Institute*, United Nations Environment Program, New York, June 2011 http://pdf.wri.org/adapting_for_a_green_economy.pdf

UNEP (2011b) *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers*, United Nations Environment Program, www.unep.org/greeneconomy

UNEP, *Fiduciary Duty in the 21st Century*, http://www.unepfi.org/fileadmin/documents/fiduciary_duty_21st_century.pdf

UN Global Compact (2010) *Adapting for a Green Economy: Companies, Communities and Climate Change, A Caring for Climate Report for the UN Global Compact,* United Nations https://www.unglobalcompact.org/

UN Global Compact (2014) Building the Post-2015 Business Engagement Architecture, United Naions https://www.unglobalcompact.org/docs/about_the_gc/Architecture.pdf

UN Global Compact, *Guide for General Council*, 2015 https://www.unglobalcompact.org/library/1351

UN Global Compact (2015) *Guide to Corporate Sustainability*, United Nations https://www.unglobalcompact.org/docs/publications/UN_Global_Compact_Guide_to_Corporate_Sustainability.pdf

UN, http://www.ohchr.org/EN/NewsEvents/Pages/AnewworldrecordUDHR.aspx

United Nations/Deloitte, *UN Global Compact Management Model*, https://www.unglobalcompact.org/library/231

United Nations (2015a) *The Millennium Development Goals Report*, United Nations, http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf

United Nations (2015b) *Transforming Our World: The 2030 Agenda for Sustainable Development*, United Nations https://sustainabledevelopment.un.org/content/documents/7891Transforming%20Our%20World.pdf

UNFCC (2007), *UN Framework Convention on Climate Change*, United Nations (1992) http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf

UNFCCC, *Copenhagen Accord*, U.N. Doc. FCCC/CP/2009/L.7 (Dec. 18, 2009), http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf

UNFCC (2010) *The Cancun Agreements,* UN Climate Change Conference http://cancun.unfccc.int/cancun-agreements/significance-of-the-key-agreements-reached-at-cancun/

UNFCCC (2011) United Nations Framework Convention on Climate Change, Report of the Conference of the Parties on its Sixteenth Session, Held in Cancun, Mexico from 29 November – 10 December 2010, UN Doc FCCC/CP/2010/7/Add.1 (15 March 2011)

UNFCCC (2013) Warsaw agreement in 2013 discussed support for measures to address loss and damage. See http://unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf

UNFCCC (2015) *Adoption of the Paris Agreement*, FCCC/CP/2015/L.9/Rev.1 (Dec. 12, 2015) http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf

Vogel, D. (2005) *The Market for Virtue: The Potential and Limits of Corporate Social Responsibility*, Washington, DC: Brookings Institute

Walker, K., and Wan, F., (2012) The Harm of Symbolic Actions and Greenwashing: Corporate Actions and Communications on Environmental Performance and their Financial Implications, *Journal of Business Ethics,* 109, 227-242

WBCSD, *Vision 2050*, WBCSD 2010, http://www.wbcsd.org/vision2050.aspx

WBCSD(2014) *Changing Pace*, WBCSD, 2014 http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=14622&NoSearchContextKey=true

WBCSD (2015) *The CEO Guide to Climate Action 2015*, WBCSD http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=16483&NoSearchContextKey=true

We Are Still In (2017) *Open Letter to the International Community and Parties to the Paris Agreement*, U.S. State, Local and Business Leaders

WFE (2017) *The Role of Stock Exchanges in Fostering Economic Growth and Sustainable Development,* World Federation of Exchanges and UNCTAD

WMB, (2015) We Mean Business, http://wemeanbusinesscoalition.org/

Wright, C. and Nyberg, D. (2015) *Climate Change, Capitalism and Corporations: Processes of Creative Self-Destruction*, Cambrdige University Press

World Economic Forum (2014) *Towards the Circular Economy: Accelerating the Scale-Up Across Global Supply Chains*, World Economic Forum http://www3.weforum.org/docs/WEF_ENV_TowardsCircularEconomy_Report_2014.pdf