From Bob Doppelt
The Power of Sustainable Thinking:
How to Create a Positive Future for the
Climate, the Planet, Your Organization and
Your Life
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The Gift

To most of the world, especially those of us living in the West, this seems like a particularly troubled time. From global warming to terrorism, growing poverty, war in the Middle East and uncertainties over the supply and affordability of oil, it sometimes feels as though the wheels of our civilization are all coming off at once.

At some point, every society finds itself confronted by forces that the reigning worldview cannot successfully address. Some forces arise from uncontrollable natural events. After Hurricane Katrina devastated the US Gulf Coast in 2005, many people were forced to re-examine their perspectives about the role of government in overseeing construction, land use and emergency management systems. Others are self-inflicted, such as when a nation overextends itself in war and, as a result, must alter its entire foreign policy. Still other forces result from purposeful acts of enquiry that lead to entirely new understandings. The discovery of coal-driven steam power that triggered the Industrial Revolution comes to mind.

No matter what the cause, when societies come face to face with these core inflection points, the successful practices of the past quickly become failures because ideas and solutions that seemed pertinent under previous circumstances lead to disaster under new conditions.

It is at this point that societies rise or fall. Human history is filled with defining moments when, faced with new conditions that only altered perspectives could surmount, people were forced to make fundamental choices that determined their fate. Grasping the significance of such moments and making the deep shifts in thinking, perception and behaviour required in order to succeed in the new reality is what historian Thomas Berry (1999) calls *The Great Work* of a people.

Seen from this perspective, human history is the story of how societies responded to their defining moments. Occasionally in the past, tragedy resulted when a society failed to rise to the challenge. Archaeologists believe the Mayan culture in Mesoamerica collapsed, in large part, because they failed to heed the warning of depleted soils, silted lakes and declining water supply in dry years. Geographer Jarred Diamond (2005, p248) suggests that the Norse culture in Greenland collapsed predominantly because they did not adapt their thinking and perspectives to cooler weather conditions.

Yet, at other times, when societies altered their core beliefs and thought processes, greatness resulted. New perspectives opened the floodgates of inspiration, creativity and possibility. The Renaissance, which followed the Middle Ages, a time described as a period of darkness and ignorance, unleashed a flourishing of European artistic and scientific achievement, starting in Italy during the mid 1300s. Many historians today view the roots of the Renaissance as an intellectual and ideological change, rather than a substantive one.

One of the most important solutions to global warming is a deep-seated shift in the type and way in which energy is used. Transformations in the energy regimes that power societies have long been at the heart of many of history's defining moments. Every major economic revolution throughout time, for example, has been driven by a fundamental shift in energy regimes because energy powers every aspect of human activity. The transition to new forms of energy inevitably alters a society's beliefs and thought patterns in a fundamental way. With new thinking comes a shake-up of the prevailing economic, social and political power structure. The upheaval and stress that accompany these transformations typically marshal in legions of doomsayers and end-of-times religious revivals. Yet, looking back, one can see that each major energy transition offered the gifts of increased prosperity and well-being.

The first major energy shift came about 230,000 years ago when humans discovered how to control fire. The ability to kill germs by cooking food and to provide warmth in cold and damp weather dramatically reduced illness and death. The change from wood and organic material – for most of human history the dominant source of energy – to coal over 200 years ago launched the Industrial Revolution. In the first four decades of the 20th century, the transition from coal to oil, and then from the direct to the indirect use of fuel through electricity for commercial and residential uses, and from horses and coal-fired trains to electricity and oil-fuelled cars and tractors in the transportation sector, triggered wealth creation in the West on a scale never before seen in human history.

Despite the turmoil and difficulty involved in each of these transitions, changing conditions provided an offering that, with a suitable response, not only avoided the social calamity predicted by the pessimists, but dramatically improved human well-being.

Today, through circumstances only partly our doing, it is our turn. We have been offered a gift. We must decide if we will accept it. The offering has come about due to the profound risks posed to us and future generations by global climate change and many other interlinked environmental and social problems. These perils are the result of humankind's failure to align our thinking and behaviours with the fundamental laws of ecological and human systems.

Human-induced global warming is perhaps the most serious threat that the whole of humanity has ever faced. It is the result of the most profound failure of perception and reason in the history of humanity. Climate change is not really new. Since time began, living beings have had to adapt to changing climatic

conditions. However, most of the adjustments humans have made in the past were in response to short-term regionalized climate variations caused by natural events, such as volcanic eruptions and fluctuations in solar radiation. Today, for the first time in history, climate change threatens the entire world and humans are the dominant cause.

Global warming is the ultimate issue of sustainability. Although few people, as of yet, seem to grasp this, it will be the defining issue for all of humanity for decades to come.

In their *Climate Change 2007: Synthesis Report* (IPCC, 2007) the United Nations-sponsored Intergovernmental Panel on Climate Change said that it is unequivocal that global warming is happening now and that the consequences will be serious even if worldwide greenhouse gas emissions can be immediately reduced. For example, a global mean warming of 2° Celsius (3.6° Fahrenheit) is almost unavoidable due to the greenhouse gases already emitted into the atmosphere. Sea-level rise of up to 1.4m (4.6 feet) may now be inevitable. If global temperatures rise high enough to cause a partial deglaciation of the polar ice sheets, over a time frame of centuries or less sea levels may rise an additional 3.7m to 6m (12 to 20 feet).

Even a little less than a 2°C (3.6°F) warming would put millions of human beings at risk from coastal flooding, drought-induced famine and other effects. Up to 30 per cent of species on the planet could be pushed to the brink of extinction (IPCC, 2007). Temperature increases much above 2°C (3.6°F) compared to pre-industrial levels are very likely to force the climate beyond a point where dangerous risk to human societies and ecosystems rises substantially. Limiting warming to 2°C (3.6°F) must therefore be the goal for mankind.

James Hansen, head of the US National Aeronautics and Space Administration's (NASA's) Goddard Institute for Space Studies and one of the first imminent scientists to warn the public about global warming, suggested in March 2008 that to limit temperature increases to 2°C, atmospheric concentrations of greenhouse gases must be stabilized at no more than 350 parts per million (ppm). Climate models had previously suggested that keeping emission levels to between 450ppm and 550ppm would be sufficient, and the European Union and many of the big environmental groups had advocated for the lower end of this target. The concentration of greenhouse gases in the atmosphere has already reached 385ppm, which means that if Hansen is correct, emission levels may already be above the range that could trigger dangerous climate change.[1] This may explain why Arctic ice sheets are melting faster than climate models first predicted.

Time is therefore of the essence. To keep warming below 2°C, the Intergovernmental Panel on Climate Change's (IPCC's) chairman, Rachandra Pachuari, said in 2007 that changes instituted in the *next two to three years* must halt global emission increases in less than ten years (*by 2015* was the date given) in order to avoid tragedies of an almost unimaginable scale. This must be

followed by an unbending effort to reduce emissions by 50 to 80 per cent or more by mid century or earlier.

The need for dramatic emission reductions means we now live in a carbon-constrained world. For the next 100 years, and more likely for centuries, humanity will be forced to meet its needs while generating significantly less – and some would say almost zero – greenhouse gas emissions. The Kyoto Accord, the world's first international treaty aimed at controlling global warming, requires industrial nations to reduce their greenhouse gases by 5 to 8 per cent compared to 1990 levels by 2008 to 2012 (targets and due dates are nation specific). Most of the nations that signed the accord are struggling to meet even these modest targets. A 50 to 80 per cent or more reduction seems especially daunting.

The ecological impacts of uncontrolled climate change, such as increased droughts, floods, wildfires, heat waves, disease, storm intensity and sea-level rise, will cause damage to the global economy on the scale of the great depression of the 1920s and 1930s or either World War. This was the conclusion of a major study released in 2006 by Nicholas Stern, head of the UK's Government Economic Service and former chief economist for the World Bank. The report found that the economic impacts are likely to be between 5 and 20 per cent of the world's gross domestic product (Stern, 2006).

The main culprit is our use of fossil fuels. However, deforestation and land-use changes also contribute to the problem. Since the early 1800s, fossil fuels have powered the growth of Western industrial economies. More recently, coal and other fossil fuels have also powered the expansion of economies in nations such as China and India, processes that have elevated millions of people out of poverty. Whether burned in industrial or developing nations, however, fossil fuels produce carbon dioxide (CO_2) that accumulates in the atmosphere. Too much CO_2 heats up the Earth and unbalances the global climate. The climate crisis resulted from economic development that drives energy production and use in industrialized economies; but some developing nations, such as China and India, have now become major contributors as well.

So far, much of the attention on reducing greenhouse gas emissions has focused on power plants and large manufacturing facilities. Big energy producers and industrial plants, however, are not the sole problems. They generate energy and manufacture products for consumers. This means the problem is all of us. Ordinary people like you and me are the ultimate drivers of global warming through the greenhouse gases that we directly generate through our transportation choices, the way in which we power and manage our buildings and homes, and the waste that we generate. Consumers are also responsible for emissions that we indirectly influence through the type and amount of goods and services we purchase and use. One study found that consumers in the UK are directly or indirectly responsible for 60 per cent of that nation's greenhouse gases (CBI, 2007). Another study in the UK found that at least a third of the carbon

savings achievable from households result from behavioural changes as opposed to new technologies (Boardman, 2007). Almost two-thirds of the energy used in the US today comes from consumer-driven industries, including residential energy use and vehicle transportation (McKinsey and Company, 2008).

Solving global warming will therefore involve much more than modest efficiency improvements or cap-and-trade policies. Although they are absolutely essential, new legislation and market-based tools represent just a few of the tools needed to fight the climate crisis. Successful solutions will require altogether new perspectives and ways of thinking that produce behavioural changes, as well as technological and policy changes at every level of society: individual, household, organizational, community, state, national and international.

Climate change may be humanity's most pressing environmental problem today, but it is far from the only challenge. The *Millennium Ecosystem Assessment*, a four-year international study of the status of the world's environment, found in 2005 that two-thirds of the globe's ecological services, such as the clean air and water provided by nature, are degraded or are used unsustainably (United Nations Environment Program, www.millenniumassessment.org/en/About.aspx). A separate study by a dozen academic institutions in five countries predicted that due to over-fishing, pollution and other environmental factors, all of the world's fishing stocks will likely collapse by mid century unless major changes are made (Worm et al, 2006, 2007). Given the unanticipated emergence of many recent environmental concerns, we should also expect new and, as yet, unforeseen risks to suddenly appear.

These issues influence the global climate, and the way in which global warming unfolds will exacerbate existing environmental problems. Environmental degradation also aggravates and, in turn, is aggravated by poverty and other forms of social distress. Poverty has many faces. It is hunger. It is lack of adequate shelter. It is being sick and not having access to healthcare. Poverty is the death of a child due to illness caused by polluted air or water. The World Bank estimates that in 2001, 1.1 billion people had consumption levels below US$1 a day – one fifth of the world's population – and 2.7 billion lived on less than US$2 a day (Chen and Ravallion, 2004). A 2007 study by the World Health Organization (WHO) found that approximately 40 per cent of deaths worldwide today are caused by water, air and soil pollution. Furthermore, of the world population of about 6.5 billion, 57 per cent are malnourished, compared with 20 per cent of a world population of 2.5 billion in 1950, with most of the increase concentrated in non-industrialized nations.[2]

In addition to the human suffering that these figures represent, the interplay between environmental degradation, poverty and disease increases social and ethnic tensions and produces political instability, which reinforces the cycle. The severe drought caused by a shifting climate, coupled with unsound environmental practices, led to social chaos and violence in Sudan, Somalia, Ethiopia and across the Sahel in sub-Saharan Africa, forcing millions of subsistence farmers and

herders to become refugees. A similar explanation has been given for the guerrilla war in Mexico's Chiapas Province, where more than half the farmers cultivate steep hillsides. Seventy per cent of Mexico's agricultural land is affected by erosion, which could be one of the reasons for the steady migration northward into the US.

Ironically, just as concern grows over the environmental impacts of fossil fuels, the supply and price of oil seems to be rapidly changing. A number of oil experts believe that the global supply of oil may already have peaked or will soon do so. The major concern about peak oil is not so much that supplies will run out; in theory, half the supply is still available. Fossil fuels are also fungible, meaning that oil can be made from shale, coal and other resources. The problem is that supplies will now be on a downward slide even as demand continues to rise, which means prices will continue to rise. And making oil from shale, as is now being done in Canada, or from other fossil fuels is extremely costly and produces even greater environmental impacts than the direct use of oil. When it occurs, peak oil therefore promises major economic, social and environmental disruptions.

If global warming, ecological degradation and peak oil cause economic opportunities to decline, many experts fear that instability will grow around the world. Forced migration of refugees, civil unrest, expanding regional and global conflict, and the collapse of governments and expansion of authoritarian practice will likely result.[3]

In short, the Earth's natural capital – ecological wealth not created by, but essential for, human survival – as well as social and economic well-being are at grave risk. The way in which society responds to these challenges will define the winners and losers of the future.

A four-part response that I call 'RPEG' is needed to resolve global warming and today's other pressing challenges. We must quickly and simultaneously: **R**educe greenhouse gas emissions by 80 per cent or more below 1990 levels; **P**repare our natural (e.g. ecosystems and biodiversity), built (e.g. water, transport infrastructure), human (e.g. health care, emergency response) and economic (e.g. industry, agriculture) systems to withstand and adapt to the now unpreventable impacts of a warming planet; **E**ducate everyone around the globe about how to live in a much warmer carbon-constrained world; and **G**row prosperity and security through low and non-carbon industries and jobs.

This means that no silver bullet can solve our challenges. They are interlinked and must be tackled together. Economic development must be decoupled from the environmental and social impacts that it now generates, allowing prosperity and security for people across the globe to increase while greenhouse gas emissions and environmental degradation decrease. As the signers of the Kyoto Accord have found, achieving an 80 per cent reduction in global warming emissions while expanding economic and social well-being cannot be accomplished simply through modest energy efficiency improvements and other slight adjustments. Nothing less than a fundamental redesign of our economic development paradigm and the social systems that support it will accomplish this type of absolute decoupling.

Because fossil fuels are central to most economies, deep-seated changes in the type of energy and the way in which it is used offer a way to start the emission reduction component of the REPG processs. Indeed, increased energy efficiency and a shift to clean energy are the focus of most current climate protection efforts.

Changes in energy regimes, however, are just one piece of the solution. Almost every consumer product today seems to be constructed in whole, or in part, with fossil fuels, from the plastics in computers and most household goods to the natural gas in industrial fertilizers and the plastic bags that litter the landscape. Whole new ways of designing goods and services, new sources of renewable material feedstocks, and new ways of using and disposing of end-of-life materials will, consequently, be needed.

Because the Earth's ecological systems are in such peril, fundamental shifts to sustainable mining, agriculture, forestry and land use must also be integral elements of any solution.

Although rapidly reducing emissions is vital, it is just as important now for people across the world to assess the vulnerabilities and increase the resilience of their natural, built, human and economic systems to withstand and adapt to the impacts of climate change. Extensive education and training will be necessary to help people understand the risks, reduce emissions and prepare for climate change. And, of course, none of this will occur unless people feel secure, which will require extensive efforts to increase prosperity through the expansion of sustainable industries and jobs.

Some type of human behaviour is involved with designing, constructing, using, managing and disposing of every gizmo, plan and educational curriculum we develop. Significant changes in behaviour will therefore be a core element of any successful effort to protect the climate and adopt a path towards sustainability. And each of these transformations must increase economic prosperity and personal security in industrial and developing nations alike if they are to have any chance of long-term success.

New solutions always start with fresh perspectives. Whole new visions and forms of reasoning must drive the transition. New thinking begins with an accurate understanding of our current challenges and the beliefs, assumptions and values that produced the problems in the first place. It also requires rethinking what we stand for, how we want to live and what we want to achieve in the future.

Global climate change and today's other environmental and social challenges may produce bumps and bruises for a while; but, paradoxically, they may also be the shock that humanity needs to sweep away tired old ideas and allow new ones to flourish. Many people seem aimless today, with little sense of purpose. Lacking any other source of meaning, rampant consumerism and other personally and socially destructive behaviours have come to dominate. If we get our heads screwed on correctly, however, today's challenges could be just the ticket needed to focus individuals, organizations and society at large on achieving a higher

purpose that ushers in a whole new era of prosperity and security, while resolving our environmental challenges.

New thinking among early adopters offers a glimpse of the possibilities to come. Industries producing low-carbon goods and services are rapidly growing, for example, and the global market for these technologies alone is projected to exceed US$500 billion and could exceed US$2 trillion per year by 2050 (Stern, 2006). The market for renewable energy technology is expected to grow from just less than US$60 billion in 2006 to almost US$240 billion by 2016 (Clean Edge Inc, 2006). Worldwide investment in clean energy could be as much as US$100 billion by 2009. More than 2 million people are already employed in the renewable energy field globally, and more than 170,000 jobs were created just in 2006. Investments in renewable power reached US$71 billion in 2006, almost 50 per cent more than in 2005. And the market capitalization rate of the 85 largest renewable energy companies reached US$50 billion in 2005, double that of 2004 (The Climate Group, 2007).

Renewable energy, such as solar, biomass and wind, holds special promise in developing countries because of the potential for small distributed systems that avoid the need for huge centralized infrastructure and for its job creation potential. The most important need is financing. International carbon trading is seen as one of the most economically efficient means of financing renewables in developing nations. Other ideas are also being explored.

The market for bio-based products is also rapidly growing. Bio-based products include commercial and specialty chemicals, fuels, and materials produced from the direct or indirect physical or chemical processing of biomass, such as cellulose, starch, oils, protein, lignin and terpenes.

Big corporations are getting into the act. In 2007 alone, for example, Dell Inc, the computer maker, pledged to become the greenest technology company in the world and become 'carbon neutral'. FPL Group, a Florida-based utility, announced plans to invest US$2.4 billion in a clean energy programme. In Texas, regulators approved a US$45 billion buyout of utility TXU Corp, but only after its new owners, investment firms Kohlberg Kravis Roberts & Co and TPG, agreed to cancel 8 of 11 coal-burning power plants that it had planned, increase investments in renewable fuels, reduce its carbon emissions, and take other steps to address global warming. Google Inc launched one of the biggest solar power arrays in the world at its headquarters and pledged to become 'carbon neutral'. Google also launched a programme to reduce energy consumption in its huge data centres and said it was investing hundreds of millions of dollars to figure out how to make renewable fuels as cheap as environmentally unfriendly coal (The Climate Group, 2007). Although some of this is likely to turn out to be greenwash, these activities represent growing awareness of the need for innovation and change.

Early adopters in the public sector have also begun to engage in climate protection. At the national level, Germany, for example, has already reduced

emissions by 19 per cent below 1990 levels and expects to reduce them by 21 per cent by 2010 and by 40 per cent by 2020. Germany is aggressively pursing renewable energy and now has more wind power capacity than the US. Through a combination of a carbon trading scheme and corporate reductions involving 44 industrial sectors and 6000 companies, efforts to reduce greenhouse gas emission in the UK have exceeded expectations and been accomplished more cheaply than anticipated as well.

Some municipal governments have engaged in far-thinking innovation. For example, since 2006, Barcelona – Spain's second largest city – has required all new and renovated buildings to install solar panels to supply at least 60 per cent of the energy needed to heat water. Vaxjo, a town of 78,000 on the shores of Lake Helga in Sweden, has cut greenhouse gas emissions by 30 per cent since 1993 through a combination of replacing oil with wood chips from local sawmills at its heating and power plant. Ashes from the furnace are returned to the forest as nutrients in a truly closed-loop system. Toronto, Canada, has saved Cdn$23 million since 1993 from energy efficiency improvements. The city also receives Cdn$1.5 million in revenue annually from the sale of electricity generated from methane gas that is captured at three of its landfills (The Climate Group, 2007).

Innovative ways of improving the environment, while creating jobs for low-skilled individuals, are also sprouting. Richmond, California, for example, is spending US$1 million annually to train low-income residents in solar installation as a way of preparing them for jobs in the solar industry. During 2007, Oakland, California, designated US$250,000 for a Green Collar Jobs Program that will train unemployed people in solar and green roof installation, green building and home weatherization. Since 1994, the City of Chicago has spent US$2 million on a programme that trained 265 participants in landscaping and tree pruning, and since 2005 in computer recycling and disposal of household chemicals, such as motor oils and paints. Sixty per cent of the people found jobs in government, the private sector or non-profits (*U.S.A. Today*, 2007).

The Climate Masters Program developed by my programme at the University of Oregon, which as helped private citizens reduce their greenhouse gas emissions by an average of 2 tons per person, and other community-based programmes are helping households and individuals in the US reduce emissions while also saving money, and improving personal health and quality of life.[4]

Similar efforts are emerging in developing nations. Cleaner, more efficient wood fuel cooking stoves, for example, are being distributed in southern developing nations. Traditional cooking stoves are inefficient, generate large amounts of greenhouse gas emissions and are linked to 1.6 million deaths per year from indoor air pollution.

These and many other examples signify the exciting possibilities that new thinking offers for increasing prosperity and security while resolving global warming and other environmental challenges. They represent just the tip of the iceberg, however, of the new perspectives and economic opportunities that will

be needed and can emerge in the future if we reorient our thinking and behaviours around the mission of stabilizing the climate in a way that increases global prosperity and security.

And so, in these early years of the 21st century, through circumstances created by previous generations and amplified by our own behaviour, we have been chosen for the great work of fundamentally reframing the thinking and behaviours that created and buttressed our economic and social systems around the higher purpose of protecting the climate and adopting a path towards sustainability. We did not set out to create this moment. Ironically, the unbridled success of our industrial economy and related social systems brought it upon us.

As in previous times, we have the ability to choose our own destiny. Defining moments like this do not come along all that often. They also do not endure. The window of opportunity slams shut if left open too long. Failure to act will just as surely determine our future, as will active engagement. The choice is ours to make.

The journey that lies ahead is certain to be fraught with hazards. No matter how fast or effectively we act, humanity must learn to live with some global warming and climate change. Some regions of the world and certain people will be particularly hard hit. Doomsayers will undoubtedly fan the flames of fear and despair. The transition will not be painless. Yet, if we follow the path of previous societies who rose to the challenge of their defining moment and made fundamental adjustments in their sense of purpose and way of thinking, we can make the transition to a climate-positive sustainable future and end up better off.

Seen from this perspective, we have been offered the opportunity to write the first act of a whole new script about how humanity meets its economic, social and environmental needs. This is, indeed, a gift – and a great responsibility.

NOTES

1 Tim Flannery interview on 'Landline', Australian Broadcasting Corporation, 9 October 2007.
2 Online edition of the journal *Human Ecology*, www.ingentaconnect.com/content/klu/huec, June 2007.
3 For more on this topic, see the report by 11 US admirals and generals produced in April 2007 by the CNA Corporation, an Alexandria Virginia national security think tank, entitled *National Security and the Threat of Climate Change*.
4 For more information, see http://climlead.uoregon.edu.

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