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A Win-Win Strategy for Fossil-Fuel Producers and Environmentalists

Graeme Taylor
Griffith University
Australia

Humanity's dilemma

Humanity now faces a dangerous dilemma: on one hand leading scientists predict that if we continue to burn coal, gas and oil the environmental consequences are likely to be catastrophic (e.g. Hansen et al., 2013); on the other hand many economists argue that if we stop using fossil fuels our industrial civilization will run out of energy and collapse (e.g. Canes, 2015). Although renewable technologies are beginning to compete with fossil fuels in the production of electricity, electricity is only 20% of energy use (IEA, 2014). In other areas—e.g. most heating, industrial production and transport—renewable alternatives are either non-existent or not yet cost-competitive.

Because the global economy still requires fossil fuels, any efforts to quickly cut carbon pollution will reduce output. This is an enormous problem as most people—especially those struggling to get by in developing countries— are not prepared to accept lower standards of living. In addition fossil fuel producing countries and companies are not prepared to forgo coal, gas and oil revenues.

This dilemma underlies the failure of international negotiations to agree to sharp reductions in greenhouse gas emissions. While most decision-makers accept that climate change poses growing threats, they are unwilling to enact policies likely to cripple their businesses and national economies.

As a result it is hard to imagine any scenario in which action will be taken in time to prevent dangerous climate change. Yet time is of the essence: already glaciers are melting, coral reefs are bleaching, rainforests are burning, and many critical agricultural areas are becoming hotter and drier (e.g. Ricke et al., 2013). We must find solutions, or doom our children to living on a dying planet.

The need for a win-win strategy

The evidence is clear: in order to prevent dangerous climate change we must stop the greenhouse gas emissions caused by burning fossil fuels. As a result most environmentalists are demanding that coal, gas and oil production should be rapidly phased out and remaining reserves of fossil fuels left in the ground (McKibben, 2012). This win/lose approach gives the industry only two choices: either to write off trillions of dollars' worth of assets or to oppose environmental initiatives. Not surprisingly, coal, gas and oil producers have (successfully)

chosen to resist efforts to reduce carbon emissions, with the result that atmospheric pollution has steadily worsened.

Efforts to stop climate change will continue to meet stiff resistance as long as business leaders and the general public are more afraid of short-term economic contraction than long-term environmental collapse. This poses an almost insuperable problem for the environmental movement. Because the world is rapidly approaching dangerous climate tipping points, they cannot afford to spend decades more fighting powerful fossil-fuel interests. However, unless they adopt different, pro-development strategies, they will have great difficulty winning broad public and corporate support for a global program of rapid decarbonisation.

On the other side fossil fuel producers are facing growing pressures from multiple sources including the falling cost of renewable energies, growing energy efficiency, new technologies, divestment campaigns, overproduction (which has led to an intra-industry price war), and the threat of rising carbon taxes. Although the 2015 Paris climate change conference only agreed to aspirational, non-binding goals, it sent a clear message to governments and investors that the world is moving away from dirty energy (Taylor, 2015). This shift is already occurring: for example Toyota predicts that electric, fuel-cell and hybrid vehicles will account for almost all sales by 2050 (Kubota, 2015). Countries and companies producing oil, gas and coal will have to develop new, greener business models to survive.

The climate/energy dilemma has produced ideological polarisation and political gridlock and delayed constructive action. It is in the interests of both environmentalists and fossil fuel producers to develop new, mutually beneficial approaches that resolve the underlying issues. This is possible if win-win solutions are devised that allow both sides to achieve their core objectives: solutions that simultaneously preserve the environment and maintain economic growth.

The starting point may be to reframe the current conflict as a common problem. The reality is that humanity is still a long way from being environmentally and economically sustainable: we have not yet developed either clean technological replacements for most polluting fuels and industries (Heinberg, 2015), or a sustainable global political economy (Costanza et al., 2013). Rather than argue that one side is right and the other wrong, it might be more useful to recognise that no-one has all the answers and that a cooperative effort will be required to develop viable solutions.

This approach will refocus the discussion from why humanity should or should not stop using fossil fuels to how we must and can rapidly transform our wasteful, unsustainable global economy into a sustainable system.

In this paper I suggest that instead of trying to force the energy industry to write off some $20 trillion in oil, gas and coal reserves, a win-win approach will support the development of alternative, non-polluting uses for their assets — uses that incentivize the shift to an environmentally, economically and socially viable global system.

Plan B for fossil-fuel producers: creating a sustainable industry

In the coming decades humanity will have to come to grips with the finite ability of our planet to produce resources and absorb pollution: the threat of catastrophic climate change will force governments to pass strict laws protecting the

environment, and growing shortages of critical resources will force us to produce and use goods much more efficiently. Nevertheless, at the same time the global economy will need to meet the needs of the poor majority of the world's people for more goods and services, including adequate housing, sanitation, transportation, education and health.

Because our world has biophysical limits (i.e. a relatively fixed supply of fresh water, arable land, easily accessible minerals, etc.), a sustainable global system must have a steady state economy, i.e. one that keeps consumption and pollution at or below our planet's carrying capacity (Czech, 2013). These biophysical constraints are not negotiable.

Fortunately, biophysical limits on the consumption of non-renewable resources are not an insurmountable barrier to the production of more energy, food and goods. Steady state does not mean static (Goodland, 2013). Further material growth is possible, although only to the extent that this growth does not damage ecological health. There are also no material limits to qualitative development: to improving happiness, community, creativity and the other non-material factors that contribute to the quality of people's lives.

There is also a difference between unsustainable material growth and sustainable material growth. Any growth that increases pollution and consumes resources that are both non-replenishable and non-substitutable is unsustainable. The key to sustainable growth is to decouple natural resource use and environmental impacts from economic growth (UNEP, 2011). For example, material growth based on the environmentally benign use of renewable and/or recyclable resources is sustainable. Even with current technologies, economic and technological redesign can be used to greatly reduce waste and produce more and better (e.g. more useful and durable) goods with fewer inputs (RMI, 2015).

Disruptive technological breakthroughs have the potential to deliver much smarter, smaller and more efficient goods and services. Because disruptive innovations introduce completely new products and methods, they can often bypass or eliminate existing problems (Diamandis & Kotler, 2014).

In order to sustainably produce a much larger quantity of goods, not only will we need to make most products recyclable, but new ways will have to be found to access and utilise the world's most abundant resources—energy from renewable sources such as tides, solar and wind; and atmospheric and organic carbon.

Oil, gas and coal are made up of complex hydrocarbons which are not only used to make fuels, but also many other essential products (e.g. plastics, paints, fertilizers). It makes no sense to keep these valuable resources in the ground as the problem is not the fossil fuels, but the carbon dioxide generated by the 'dirty' processes currently used to produce power and manufacture goods. The solution is to develop new technologies that enable products to be made from fossil fuels without generating carbon dioxide and other pollutants.

Lester Brown has proposed a "Plan B"—a global mobilization—to save civilization from environmental collapse (Brown, 2009). A similar emergency approach—a "Plan B for the fossil-fuel industry"—is needed to rapidly transform the fossil fuel industry and solve the climate/energy dilemma.

This strategy is both necessary and feasible. It is a win-win approach: it will prevent most industrial carbon pollution; it will support sustainable economic growth; and it will draw down carbon dioxide from the atmosphere.

Some new concepts are:

- New technologies can be developed that use carbon to manufacture recyclable products in non-polluting processes.
- Since both fossil carbons and carbon captured from the atmosphere (via biomass) can be used as feedstocks, these processes will increase the resources available to produce clean fuels and industrial products as well as help reverse global warming.
- Carbon based materials (e.g. plastics, fibres, carbon nanotubes) could then be used to manufacture a wide range of commodities and fabricate much of our built environment.
- Manufacturing products with fossil carbon will add value for resource owners:
  - instead of burning coal, oil and gas to produce energy, it will be more profitable to process them into finished products;
  - through creating recyclable products, the life of finite resources will be greatly extended;
  - the addition of new manufacturing capabilities and markets will greatly expand the business models and life-expectancies of fossil-fuel companies;
  - new manufacturing industries will increase employment in fossil fuel producing countries.

Many of these technologies are already being developed. Scientists have discovered non-polluting processes for using fossil fuels as feedstocks to manufacture 'clean' products (e.g. McFarland, 2012) and 'clean' hydrogen fuel (e.g. Karlsruhe, 2015). Clean substitutes are also being developed for liquid fossil fuels. One solution is to use algae to produce aviation and diesel fuels (e.g. Solazyme, 2016).

In addition research is being conducted on carbon capture and storage (CCS) as well as on disruptive methods for removing carbon dioxide and other pollutants from smokestacks and tail pipes (e.g. LaMonica, 2015). These innovations have the potential to make it possible to continue burning coking and thermal coal in smelters and generating plants.

The need for massive additional investments in research, development and deployment

The problem is that most of these technologies are still at an early stage of development. Massive investments will be needed to rapidly turn proof of concept prototypes into cost-competitive products and scale them up for global production and distribution. (These challenges are similar in complexity to those involved in developing the Internet or smartphones—i.e. enormous but doable.)

Non-polluting energy sources will also need to be reduced in cost and scaled up to power the new manufacturing processes. These could include large-scale renewable sources (e.g. geothermal, offshore wind or solar thermal), safe nuclear (e.g. thorium and/or Gen IV reactors), and fossil-fuel generation using carbon capture and storage.

The speed and costs of developing disruptive innovations are always difficult

to estimate. However, with good leadership enormous challenges can be overcome very quickly. In World War II the atomic bomb was invented and deployed in five years at a cost (in today's dollars) of $26 billion (Manhattan, 2015). The first iPhone was developed in 30 months at a cost of $150 million—one of the most profitable investments in history (Vogelstein, 2013).

Developing and deploying clean fuels and products will be extremely expensive. Fortunately the biggest problems are often the best business opportunities. Fossil-fuel companies as well as governments need to invest in the research and development of non-polluting fuels and products not only to mitigate risk, but also to open new markets worth trillions of dollars per year and ensure sustainable economic growth.

The world is in the midst of a Third Industrial Revolution: technological breakthroughs are being made every day (Rifkin, 2011). Although massive investments will be needed to create a clean, sustainable global economy, these expenses pale in comparison to the catastrophic environmental, economic and social costs of allowing increasing pollution to trigger runaway climate change.

The Paris climate conference resulted in two major pledges to increase R & D on clean energy technologies. Billionaires Bill Gates and Mark Zuckerberg announced the creation of an international private-public research initiative (Breakthrough Energy Coalition, 2016), and 120 nations formed a 'Global Solar Alliance' to share technology and mobilize investment in solar energies (Neslen, 2015).

A lot of money is now being invested in clean energy research, but it is not nearly enough (Gates, 2014). The International Energy Agency points out that "the current pace of action is falling short of the aim of limiting climate change to a global temperature rise of 2°C…not one of the technology fields tracked is meeting its objectives." (IEA, 2015). But rapid change is possible: the US space program succeeded in putting humans on the moon only 8 years after it was made a national goal. A similar effort is now needed to research, develop and deploy new energy technologies.

Many experts believe that the most cost-effective way to address climate change will be to combine a carbon pollution tax with support for clean innovation. The International Monetary Fund recommends a three-part strategy on taxing carbon fuel: "price it right, tax it smart, and do it now." (Lagarde, 2015) "Price it right" means taking into account the true environmental and health costs of pollution while "tax it smart" means using tax revenues to fund climate action as well as to finance cuts in taxes on labor and capital that distort economic activity and harm growth. A successful example of this policy is the revenue neutral C$30 per tonne carbon tax imposed by British Columbia since 2008, which has simultaneously reduced carbon emissions and reduced taxes (Elgie, 2014).

The introduction of a carbon pollution tax is critical for creating proper markets as the current price of fossil fuels ignores the high environmental and health costs of pollution. Because carbon pollution taxes will increase the prices of 'dirty' fuels and products, they will greatly accelerate the development and deployment of cleaner cost-competitive substitutes (Musk, 2015). Subsidies for polluting fossil fuels also need to be eliminated (in 2014 subsidies favoured fossil fuels over renewable energy by $490 billion to $112 billion) and government support shifted to developing and introducing clean energies (Sustainable Business, 2015).

Reframing climate change as a security threat

Politicians cannot choose between a safe climate and a secure economy: we need both. We also do not have a choice about the speed of the transition to a clean economy: because biophysical laws are not negotiable, sharp reductions in atmospheric pollution must be made in the coming decades. This means that the rapid development of alternative, non-polluting fuels and manufacturing processes is not an option but a necessity.

The enormous cost of moving away from polluting energies is viewed as a major barrier to managing climate change risk. This view is countered by Frank Ackerman and Elizabeth Stanton:

> *"Protection against threats of incalculable magnitude – such as military defense of a nation's borders, or airport screening to keep terrorists off of planes – is rarely described as "too expensive." The conclusion that climate policy is too expensive thus implies that it is an option we can do without, rather than a response to an existential threat to our way of life." (Ackerman, F. & Stanton, E. A., 2013, pp. 3-4)*

Political priorities can rapidly shift when leaders believe that there is a threat to national security. In the Second World War many nations allocated 40%-75% of their GDP to military production. Following both the '911' attack on the United States and the global financial crisis of 2008, politicians quickly overcame normal budgetary constraints, allowing trillions of dollars of new funds to be accessed.

Most political and business leaders are unlikely to take urgent action on climate change unless it is framed as a security threat (i.e. reframed from being a primarily environmental issue). Decision-makers need to understand that runaway climate change is not just an environmental danger: because it will progressively destroy economic and social stability, it is a growing threat to the long-term survival of their societies.

To frame the climate/energy dilemma as a security emergency, policy advisors will have to focus on risk assessment and management: on identifying both dangerous threats and the requirements for safe, viable outcomes (Taylor, 2014). The need for a safe climate will also have to be tied to the need to develop secure, stable and sustainable sources of clean energy and manufactured products.

The need for a plan for transitioning to a clean energy economy

It will be impossible to make a rapid transition to a clean energy economy without a viable business plan. Not many politicians or business leaders are likely to bet on new, unproven technologies and business models without a detailed plan that includes a precise assessment of risks, costs, benefits, and timelines.

There are large gaps between the aspirational goals agreed to in Paris and the disparate research and business efforts of companies and universities. At present no clear strategy exists for how any country—let alone the world—will make the transition to an environmentally and economically sustainable economy.

Comprehensive plans need to be developed to provide investors and researchers with both a clear strategic direction and the certainty that they will receive the support needed to develop new products and take them to market. The Post-Carbon

Institute's Richard Heinberg has suggested a framework for a global transitional plan (Heinberg, 2015); developing this plan (and a complete range of national plans) should be prioritized.

While strategies and plans are essential, by themselves they are not enough. The role of leadership is critical to building consensus, mobilizing action and ensuring that the plans are successfully implemented (e.g. Heifetz & Linsky, 2002). In order to make the transition to a sustainable global system we will need not only a clear vision of where we need to go and a viable strategy for getting there, but international support for the strategy from a coalition of credible leaders representing a wide spectrum of cultures, institutions, and political and religious views.

Resolving the climate/energy dilemma will not be easy, but it can be done. We do not have to choose between the environment and the economy, or between the interests of the developed and the developing world. There are win-win solutions.

Correspondence

Graeme Taylor
Environmental Futures Research Institute
Griffith University
23/12 Bryce Street, St Lucia, Qld. 4067, Australia
E-mail: graeme.taylor@griffith.edu.au

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