

# America's emerging 'energy renaissance'

The country has undergone a massive cultural and ideological swing in recent months; the environment and – crucially – energy generation are under the spotlight. In this exclusive feature for PES, Andrew J. Hoffman and Aaron Nelson of the Erb Institute for Global Sustainable Enterprise at the University of Michigan, discuss how companies must innovate to survive, in a world where sustainability has become a business fundamental.





A market shift is underway. America as we know it is about to change – dramatically. We hear of change in the promise of politicians, in the chants of protesters, in the demands of citizens burdened by economic disaster. But a convergence of three forces is driving changes in regulation, investment capital and consumer demand that will signal a market shift in energy. Those forces are: a growing consensus around the science that humans are causing changes to the global climate, a desire for energy independence from foreign countries and a recognition that to remain competitive on global markets America will have to increase its investment in the non-fossil fuel based energy technologies of the future. The convergence of these forces explains the strength of this market shift. While historically, attention to environmental issues is diminished in times of financial distress, during this recession there have been no such drop as the forces for change have appeal to both the left and the right. Companies that ignore this emerging reality do so at their own peril.

As in any market shift, there will be winners and losers. Joseph Schumpeter's notion of creative destruction is alive and well and takes its form in entrepreneurship and innovation. Who will be the losers? Certainly coal tops the list. By some economic analyses, a \$20 price on a ton of carbon dioxide adds about 15 percent to the cost of electricity, but increases the price of coal-generated electricity by about 40 percent. Who are the winners? You can begin to identify that group by who is not simply recognizing this shift, but rather hastening it.

Reminiscent of the 1960s, when industry called on Washington to give them one set of environmental standards – the Environmental Protection Agency – instead of the 50 individual standards that were developing, industry today is asking Washington for one national standard for climate and energy rather than the proliferation of individual state standards, whether they be carbon reduction targets, renewable portfolio standards, or tax incentives for clean technology. Rather than make large capital asset decisions in the uncertain void of federal policy, companies would rather have clarity on the competitive dynamics for facilities that will last for 50 years or longer.

And going further, businesses in all sectors and industries have some stake in this market shift, as every company depends on energy at some point in its value chain. In short, regulations are coming which, combined with growing interest in investor and consumer markets, will bring about an energy renaissance in this country.

These regulations will take many forms. The most obvious is a price for carbon, with the political momentum strongly favoring a cap-and-trade program. But, while we could tell you that there will be a cap-and-trade system tomorrow, we have told you nothing, as a host of questions have yet to be answered.

Will the standards be economy wide or sector based, upstream or downstream; will both direct and indirect emissions be capped? What will be the target and the baseline year? Will there be credit for early action? Will there be a safety valve? And a question that garners much attention is, how will permits be allocated, by auction or distributed for free?

The answers to these questions will dictate where the new costs will be absorbed and how various industries are likely to respond. But no industry is immune. With 85 percent of the American economy reliant on fossil fuels, 85 percent of the economy will be paying a price for carbon. That is game changing economics.

But the policies that will drive this market shift do not stop there. We can expect vast changes, including: renewed attention to national policies on energy sourcing, such as feed-in tariffs, net-metering, renewable portfolio standards, fuel taxes, or energy subsidies; changes in infrastructure investments such as a national grid, smart grid, high-speed rail, home weatherization and nuclear waste disposal; increases in federal direct spending in both procurement policies and R&D funding; improvements in federal standards in building energy, consumer appliances, automobiles, biofuels, land use and product labeling. And finally, we can expect "moon shot" type leadership from Washington, calling for a renewed emphasis on efforts to hasten the shift away from fossil fuels.

The \$59 billion in energy related spending in the economic stimulus package is just a start. President Obama

has also announced plans for \$150 billion in the federal budget to promote his vision of America's clean energy future, which aspires to have 10 percent of the nation's electricity come from renewables by the end of his first term and 25 percent by 2025.

This shift is not a small one, nor is it one to take lightly. It has both technological and cultural elements to it. We live in a fossil fuel-based economy. Petroleum alone accounts for nearly 40 percent of America's energy, the majority imported. Images of wind turbines and solar panels capture America's hope for a renewable energy future, but these sources combined account for less than half of one percent of America's energy supply. And at present, the federal government spends only about two percent of its

The abolition of fossil fuels draws our attention to all sectors of the economy, including ourselves. We are all in this together. But that gives reason for hope because climate change is an existential threat to us all. That makes it reasonable to expect that a burst of human ingenuity – technological and cultural – is forthcoming. Rational and collective self-interest of the species will accelerate the necessary culture shift that is, arguably, more daunting than any prior movement in history.

And there are signs that this shift in the economy is already underway. The building industry has seen a rapid growth in the number of LEED certified buildings as the economic benefits from green construction increasingly outweigh the costs. The nation's largest

record of \$155 billion in 2008, in the same year that a credit market crisis disrupted investments worldwide. Clean Edge, a cleantech market research and consulting firm, projects that solar photovoltaic, wind power, biofuel and fuel cell technologies could become a \$226 billion market by 2016. Announcing a set-aside of \$100 million for investments in cleaner energy, transportation, air, and water technologies, venture capitalist John Doerr of Kleiner Perkins Caulfield & Byers said, "This field of greentech could be the largest economic opportunity of the 21st century."

Robert Metcalfe, founder of 3Com and now a venture capitalist puts it more bluntly, "You'd have to be an idiot not to notice the huge opportunity in energy."

Moving from broad scale investor markets to individual technologies, we can see signs of the market shift. The light bulb, for example, a classic invention of the industrial revolution, has seen multiple re-designs as compact fluorescents and LEDs increasingly replace incandescents as a more energy efficient alternative.

In the city of Ann Arbor, for example, these efficiencies add up to real cost savings. A single LED streetlight can save the city \$107 a year. Street lighting accounts for over 20 percent of the city's energy budget at an annual cost of \$1.4 million. The \$630,000 decision to retrofit 1,400 downtown globe lights will save the city over \$150,000 and pay itself back in a period of 4.2 years. Not bad for a better light bulb.

And manufacturers of energy efficient appliances are looking for increased consumer demand in a carbon constrained world. At present, a super efficient washing machine costs roughly \$500 more than a baseline model. Given the water and energy savings of the new washer, that price differential will be recouped in 4.8 years for a Midwest family of four. That payback shortens to 1.2 years in Southern California. When climate change regulations raise the price of energy, those payback periods will shorten and rates of return on investment will increase. And companies like Whirlpool are banking on the increased sales that will result.

Looking to the future, which new technologies and companies will thrive

## Where will renewable energy supply and storage replace fossil fuels? Where will leaps in efficiencies diminish demand for fossil energy?

research dollars on energy; down from 10 percent in 1980. From 1998 to 2003, the energy industry invested even less, on average less than a quarter percent of annual revenues.

Turning these trends presents a significant challenge. We cannot simply turn off the oil wells, close up the coal mines and continue to live as we do. There is a vast physical infrastructure that depends on oil, coal and gas. It includes wells, tankers, refineries, fuel trucks, and gas stations, roads constructed and maintained. It includes power plants and distribution lines arranged geographically to take advantage of energy intensive hydrocarbon fuels. It includes factories, stores, and homes designed inefficiently for an era of cheap fossil energy.

Restructuring these pillars of the economy will create disruption to all areas of society, from obvious sectors like manufacturers and transportation down to often unknowingly complicit consumers. And unlike many other environmental problems, there is no clear single villain. We can't simply point to that smoke stack or that waste dump and identify someone who should fix it.

green building conference, Greenbuild, has witnessed a steady increase in attendance that reflects its growing importance, from around 1,500 in Austin in 2002, to 13,500 in Denver in 2006, and up to 28,000 in Boston this year. What used to be a conference of smaller companies offering straw bale and rammed earth homes is now populated by major corporations such as Siemens, GE, Turner, Trane, Skanska and many others. And these companies are drawn by market returns. According to McGraw-Hill Construction's Green Outlook 2009, the value of green building construction starts increased from \$10 billion in 2005 to \$36-\$49 billion in 2008 and could reach \$96-\$140 billion by 2013.

Venture capital firms have created large and growing funds dedicated to clean technologies. While the current downturn has stalled things a bit, no one expects the market to stay that way. Energy use – and associated prices – will increase and the signals from Washington portend a shot in the arm for the industry. By all accounts, the market for green investment is strong and will rebound.

According to New Energy Finance, clean energy investment reached a new

in this market shift? That is the \$64,000 question, and one that we can only speculate on. But the key is reading the market signals of interactions of the multiple policies that are being discussed. Energy, for example, must be restructured with mutual consideration for both mobility and grid power. Where will renewable energy supply and storage replace fossil fuels? Where will leaps in efficiencies diminish demand for fossil energy? And which new technologies and processes will provide the right mix of performance attributes to enable strategic shifts across the value chain?

This uncertainty creates the greatest risk and the greatest opportunity for business leaders navigating this renewable renaissance. In the words of Linda Fisher, Vice President and Chief Sustainability Officer at DuPont, "We need to understand, measure, and assess market opportunities. How do you know and communicate which products will be successful in a greenhouse gas constrained world? ... The company that answers these questions successfully will be the winner."

And in the final analysis, that is what makes this prospect of an energy renaissance so compelling. It is not driven by an appeal to a social agenda, nor is it an issue of "corporate social responsibility." This is an issue of market economics and business strategy. The increasingly prolific use of the word "green" in describing its many facets, while descriptive, distracts from this fundamental truth.

Companies must innovate to survive; they must divest some businesses, expand into others and alter the ones they keep. The question "does it pay to be green?" becomes nonsensical. It is the same as asking "does it pay to innovate?" The answer depends on who does it, when they do it and how they do it. To answer these questions, the business executive must consider sustainability as intrinsic to business fundamentals. ▀

Andrew J. Hoffman is Associate Director of the Erb Institute for Global Sustainable Enterprise at the University of Michigan; Aaron Nelson is a MBA/MS 2010 student whose work at Erb focuses on corporate strategy and opportunities created by market shifts and environmental performance.

