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INTRODUCTION

Over the course of human history, inventions such as the printing press, automobile, computer, and Internet-related technologies have radically altered the way humans live, work, and connect to each other. According to Radicati Group, worldwide more than 200 billion emails are sent and a billion online videos are watched every day. These technological innovations and the businesses that design, build, and deliver them have enriched our lives, strengthened our economy, and allowed us to experience things that were only recently considered the domain of science fiction novels. Today, a soldier in the middle of a far-off desert can watch a live video feed, on a hand-held device, of his child being born thousands of miles away. These innovations enable immeasurable efficiencies, and allow people to share ideas and collaborate on an unprecedented scale.

Today, businesses are using their passion for innovation to develop and build new technologies that can address some of the world’s most pressing environmental and sustainability challenges. For example, the development and application of “smart” technologies to manage buildings, transportation systems, manufacturing, health care, retail, and many others may help significantly reduce emissions and energy use. A report by the Climate Group (The Climate Group, 2008)
and Global Sustainability Initiative concludes that better use of information technology (IT) has the potential to reduce worldwide greenhouse gas (GHG) emissions by 7.8 gigatons by the year 2020. This savings represents 15% of global GHG emissions, and in economic terms translates into saving nearly $950 billion in costs.

Ubiquitous, connected computing and information technologies can improve our lives and our environment. Computer-aided design and integrated, pervasive smart technologies have made cars 40% more efficient and allowed us to create buildings that have the potential to be carbon neutral. Complex computer-generated algorithms and high-performance computational models can tell airlines which routes and flight patterns are most efficient to save passenger time and fuel and can enable scientists to make more accurate climate and weather predictions. Data collection, analysis, and modeling can enable researchers to track changes in the ocean currents and chemistry and understand their effects on sea life and the coral reefs.

For consumers, online banking saves a trip to the local bank and associated auto emissions. Digital photography allows us to share photos online while significantly reducing the use of chemicals associated with developing and printing conventional film. Online shopping saves emissions associated with traveling to multiple stores; downloading music avoids the manufacture, packaging, and distribution of CDs and their environmental impacts. Business meetings and conferences can be held virtually, and companies can monitor and optimize the shipment and transport of goods in real time. The potential applications are endless. Technology gives individuals, families, companies, and governments information they can use to be more sustainable in their homes and across industries, helping to reduce the environmental footprint of cities and countries. Armed with richer data, researchers are developing whole-system energy management solutions used in electricity grids, homes, commercial buildings, water systems, transportation, agriculture, and more.

American businesses are continuing to explore opportunities to design, develop, and deliver new technologies that not only create jobs but also enable us to better manage our precious natural resources and address global sustainability challenges. By delivering environmental innovation, businesses today are enabling a high-tech-low-carbon economy.
The Business Civic Leadership Center (BCLC) is undertaking a series of reports on how business intersects with key social and environmental issues. This report on the role of business in environmental innovation is not meant to be definitive, but rather reflects a baseline of BCLC’s research on business practices in this space. BCLC is embarking on an information inventory over the next few years that will undoubtedly uncover new findings and deepen our understanding of business interactions in this field.

Breakaway Growth since the Nineties
Since 1990 the U.S. economy grew more quickly than CO2 emissions, and also uses energy more efficiently. All evidence points to the growth of environmental consciousness among businesses, and their crucial role in spurring environmental innovation. The following facts highlight this growth.

- **1992**—First time in history global leaders gather to protect natural resources while promoting economic growth (United Nations Conference on Environment and Development).

- **1990-Now**—United States’ population grows 23%—U.S. GDP grows 61%. CO2/GDP ratio drops 34%.

- **1996-Now**—ISO 14001 environmental management certification grows to 223,149 organizations with over 20 million individuals certified.

- **1999-Now**—Number of companies filing CSR reports grows seven fold from 500 to 3,500.

- **2010**—Bureau of Labor Statistics (BLS) produces first-ever estimate of green jobs. 3.1 million jobs are related to the production of green goods and services. This comprises 2.4% of total U.S. jobs.

- **2011**—Research in renewable energy development grew to over $257 billion globally.

These indicators testify to the ability of the business community to quickly embrace change and create innovation. As environmental issues became central, the business community reformed operations. It also has become increasingly clear that businesses are the driving force in environmental innovation. The technology behind solar energy panels improved dramatically since the 1990s. According to Thomson Reuters, over the past five years...
the price of solar power has dropped by 50%, and the amount of megawatts installed has grown tenfold. The technology behind the present day fracking industry began its development in the 1980s. The technology behind maximizing the energy efficiency of buildings is also a recent invention, with utilities across the U.S. only beginning to offer smart meters to customers in 2006. Without the leading role of business, these innovations would not have come to pass.

Overview
As you will see from the contributions to this report, the business community is “swarming” the challenges associated with the environment. They are fundamentally reforming their operations and actively incorporating environmental factors into strategy. In doing so, they are discovering significant cost savings, new business opportunities, and burnished brand reputations. These benefits can be seen in a broad range of industries and company size. The examples in this report include:

- How Xilinx is incorporating a radical new technology in order to become more energy-independent.
- How MGM is implementing its Green Advantage program to instill sustainability principles throughout its operations.
- Why Mattel is introducing a new system for its suppliers across the globe.
- What Prudential’s sustainability values mean for the present and future of the company.
- How Marriott International is instilling LEED design strategies into all future hotel plans.

The report also covers broad trends that will transform entire economic sectors, and indeed, the entire U.S. economy:

- The recent breakthroughs in shale gas extraction technologies will alter the future of U.S. energy production and consumption. This trend has the potential to jumpstart the U.S. economy and provide consistent job and market growth.
- New technologies in building energy management will result in massive energy savings in the built environment, and will yield creative new synergies and efficiencies.
- Investments into environmental R&D have been growing strongly in recent years, but there remains a lot of unlocked potential. By coordinating investments and building aggregate demand for new technologies and processes, we can create an important growth sector that will power the U.S. economy into the future.

We hope that you will come away from this report with a much richer understanding, as we have, of the complexity of the range of engagement between business and environmental factors, and an appreciation for the thousands of business-driven professionals who are at the leading edge of developing win-win solutions.
The Trifecta That Opens a $10 Trillion Opportunity into the Next Economy

By Jigar Shah, The Carbon War Room

The famed horse I’ll Have Another regrettably did not achieve the near-impossible: the ultimate trifecta of winning the elusive Triple Crown. To win a Triple Crown, everything has to be right. The track. The horse. The jockey. The weather. In fact, the stars have to align.

Unfortunately, we are at a point where we all know that we have pushed the Earth past its limits. We are now using 1.5 times the resources that the Earth can safely replenish on an annual basis. In short, we have pushed our water, air, and food systems over the limit. Yet we are viewing this as a problem instead of the opportunity it is—the largest economic opportunity of our lifetime. By fixing our environmental issues we can create a new economy: one based on infrastructure for all, not just consumption for the few.

The key is that to do so, we must hit the ultimate trifecta of our lifetime. First, we must create efficiency in the capital markets to spur investment in infrastructure deployments using the solutions just sitting on the shelf ready to be deployed. Second, we must prioritize these deployments to maximize the ones that will deliver the highest financial returns to the capital markets. And third, we must have a comprehensive plan to diversify ourselves away from volatility-prone energy fuels such as oil, gas, and coal.

Of course, we must do all three simultaneously. In doing so, we will create jobs. But more important, we will unleash a sustainable new economy driven by $10 trillion in available investment opportunities. This one-two-three punch has been waiting for us to seize the moment since we started research and development in the late 1970s.

In April 2012, the International Energy Agency pointed out that we needed to invest in $5 trillion in the clean energy space by 2020, of which $3 trillion were already on track through renewable electricity investments. And, in my estimation, the $5 trillion of opportunities in energy total more than $10 trillion once you include energy access, water, waste, agriculture, and other profitable infrastructure opportunities. There are so many technologies that we have simply not deployed that are not accounted for in most reports. The largest one is waste—so much embedded energy and valuable materials just allowed to be buried underground or burned.

The reality is that we have already piloted all of these technologies—but in fits and starts. In late 2011, Bloomberg New Energy Finance reported that cumulative investments in renewable energy, energy efficiency, and smart energy technologies have exceeded the $1 trillion mark since its records started in 2004. While these investments have been led by the “private investor” sector, they have come about because in electricity we have an explicit and coherent policy including renewable portfolio standards and feed-in tariffs. This is one barrier to realizing $10 trillion or even $5 trillion in opportunity.

Goldman Sachs recently blessed renewable electricity investments as one of their major investment areas with a $40 billion announcement in May 2012. More such announcements by trusted names are needed in waste, water, and other infrastructure areas.

Another key to these investments is that they replace imported commodities with good-paying jobs. We are already seeing that the renewable sector will be a major factor in our economic recovery. Solar photovoltaic (PV), for example, attracted
According to Bloomberg, $52 billion was invested in clean energy in 2004 and $243 billion was invested in 2011. At a 29% compound growth rate, the next trillion could be achieved in just three years. Right now, though, we do not have a comprehensive infrastructure plan. We approach solutions in a piecemeal fashion. For example, while renewable electricity incentives like the Production Tax Credit for Wind Energy is set to expire on December 31, 2012, permanent subsidies for mature technologies for other energy technologies live on in perpetuity.

A comprehensive plan would address the way we will deploy American-invented technologies. It would also help us create a level playing field for investments. For example, why do we have subsidies for highly profitable, mature industries like oil, gas, and coal? When the government stops choosing winners among mature technologies, we can determine what we really want to invest in to meet our energy needs while giving the planet a respite.

Despite the lack of a comprehensive plan, entrepreneurs are still chipping away and hiring more people. The question is, in our race to meet our energy needs, are we moving fast enough? Most certainly not, but to increase the velocity and commitment of investments in the new economy, we must (1) think about investments at the trillion-dollar scale, (2) market low-risk investment value of renewable energy investments, and (3) implement financing standards and aggregation for smaller scale opportunities.

Here is how to think on a broader scale to increase investments. Today, annual investments, at $243 billion, are dominated by renewable electricity projects. But to eliminate the more than $400 billion in oil imports into the United States, we are going to have to invest in much more than renewable electricity. We will need to continue improvements in vehicle efficiency, better local oil and gas drilling, information and communications technologies, alternative fuels, and a new mobility paradigm.

Next, we need to market the value of renewable energy investments versus other investment choices. There is more
than $125 trillion in the world today, and much of that money is earning less than 4% in government bonds. At the same time, the world’s pension funds, sovereign wealth funds, and insurance companies need to maintain an average return of more than 8% to meet the needs of their stakeholders. The only places where they can make up the difference in the short term are clean energy technologies. Traditional technologies such as oil and gas simply cannot find a home for an additional $10 trillion in investment by 2020.

To increase the speed of investment for deployment, we need to implement finance standards and bundle the thousands of current $1 million projects. Right now, most investors want larger $1 billion projects, but those projects are slow and generally less profitable. In the previous century, bigger projects were the norm, but with today’s technologies, thousands of entrepreneurs armed with a computer and a mobile phone can become project developers. Yet most small businesses do not have the balance sheet to aggregate this many projects together without help. This is where creating standards and bundling would-be competitor companies together to share services and create economies of scale can work. From writing expensive legal contracts to attracting large capital sources, it is important to spread these costs over a large base of projects.

In the PACE example of energy efficiency for buildings, the Carbon War Room worked with Ygrene, Lockheed Martin, and Energi to put together a program using PACE bonds. However, to attract (in this case) Barclay’s, it had to demonstrate that $650 million in projects could be bundled together—no small feat. Since the entire U.S. energy service company (ESCO) industry is less than $3 billion per year, it would take a 20% growth in the entire industry to meet Barclay’s goal. The only way to reach that goal is for the entire industry to work together—with projects that will average just $500,000 in size, we will need more than 1,300 projects. If companies can aggregate deal flow, investors are ready to lend.

Another challenge is that most developers do not know how to present or market their projects to investors. Many are simply not equipped to put together financial models suitable for investors. For example, there are three publicly traded renewable fuels companies with another six looking to go public this year. With aviation fuel trading at all-time highs and innovation keeping pace, the aviation industry is trying to figure out how to hedge oil-based fuel with renewable energy fuel. Delta Airlines just bought its own refinery because it is so worried about fuel costs. Hedging fuel like this is not easy because most renewable fuel refineries are too large for any single end customer to buy all of the output. At the same time, only a small number of large companies have good credit on the fuel-buying side. This presents an opportunity for smaller buyers of jet fuel to partner with larger, more creditworthy buyers to form a buying group. Together they can share legal contracts and best practices, and even negotiate better prices.

I do believe we are at the “tipping point,” as Malcolm Gladwell put it. However, is this a tipping point that can put us on a road to recovery of the Earth and of the economy? Or is it the tipping point where it is too late to recover our air, water, and food systems? Which way do we want to tip?

We are in a race where everything needs to go right. We need to hit our trifecta of (1) creating efficient capital markets, (2) uncovering all the clean energy deployments that will deliver compelling returns to the capital markets, and (3) having a comprehensive plan to wean ourselves off of carbon-producing energy fuels such as oil, gas, and coal. To meet these goals, first we must think on a broader scale and expand solutions beyond energy efficiency to vehicle efficiency, next-generation information and communications technologies, and more. Next, we need to market the value of renewable energy investments within the context of all investments and show that they do have compelling returns. And finally, to deploy what exists, we need to implement finance standards and bundle the thousands of sub-$1 million projects.

So, do we need to win the Triple Crown? Yes, we do. In horse racing, you cannot afford a near-miss. In leveraging the next $10 trillion into a new economy, we cannot afford to miss a beat.
Case Study

Integrating Environmental Stewardship into Core Strategy

Company: Prudential

Overview:
Prudential has been offering solutions to meet societal needs for 137 years. The company’s mission, to help customers achieve financial prosperity and peace of mind, is supported by integrating its values into all aspects of its work. Prudential’s commitment to environmental stewardship is an extension of these values, and the company has taken thoughtful action to manage the impact of its business activities on the environment, while creating opportunities for all of its stakeholders to build stronger futures. Highlights of its stewardship efforts include reducing energy consumption, maintaining a comprehensive and innovative recycling program, and ensuring sustainable paper procurement and use.

Prudential has committed to reducing GHG emissions at its U.S. home office properties by 10% from its 2007 levels by 2013. The company has nearly reached that goal. In part, its results are due to utilizing renewable energy within its corporate-owned and leased home office properties. Prudential is also increasing the efficiency of its data centers and has standardized procurement of ENERGY STAR computer equipment for employees. Once equipment is deemed obsolete, it is either donated to nonprofits, sold to other firms that have use for it, or recycled through a firm certified to ensure environmentally responsible disposal.

Results:
The company’s achievements in saving energy and creating value for its investors in 2011 were also significant. As of the end of 2011, Prudential’s portfolio of certified green buildings was valued at more than $7.6 billion globally. It has also added more than $56.4 million to the value of its portfolios through sustainable initiatives, including hosting more than 10.5 megawatts of rooftop solar PV systems on multiple properties.
How Business Innovates in the Built Environment

By David Bartlett, Vice President, IBM Corporation

As the world becomes more instrumented, interconnected, and intelligent, an incredible opportunity for business is presenting itself. Savvy companies are turning the explosion of data into new insights for better decisions, new ways of transforming business models for unprecedented rewards, and new means of removing the walls that separate them from their customers.

Technology today plays a key role in organizations achieving success. In fact, in IBM’s latest CEO survey, technology was cited as the number one external factor affecting organizations. Examples of transforming technologies are those that manage smarter physical infrastructure. The world’s physical infrastructures continue to be transformed from traditional “dumb” assets to smarter physical infrastructures with embedded intelligence. Today, more than 20 billion machine-centric intelligent devices are deployed in the world, not including IT-centric devices. Assets are generating tremendous amounts of data, with 2.7 zetabytes of digital content in 2012—an increase of 50% in one year.

The business sector should embrace technology for the built environment much as it has in the past for the IT environment. Understandably, IT-centric services within businesses such as banking, online retail, and advertising have done the best job of leveraging technologies to minimize cost and provide greater flexibility, accessibility, and access to their clients. This has literally transformed the competitive landscape. The obvious area for business improvement is around managing non-IT assets and services. With the advent of smarter physical infrastructure or the “Internet of things,” we have a significant opportunity before us. Smart sensor and digital control technology is available and producing data, but these data need to be captured, analyzed, and used. Business focus, experience, and innovation must be added to prioritize how we leverage such technology to drive the most value.

An example is smarter buildings. Real estate and its associated services typically are the second-largest expense for companies after payroll. They are also among the biggest users of energy and contributors to GHG. Monitoring the health of smarter infrastructures can yield significant savings and provide new insight into workforce dynamics.
This in turn can optimize workflow across business and IT operations and help companies to understand the impact of problems on service.

The city of Dubuque, Iowa, is transforming its utilities and buildings with IBM smarter physical infrastructure solutions that have already increased water leak detection eightfold for participating citizens and decreased water utilization 6.6%.

Bharti Infratel, a leading telecom provider in India, has improved its reliability, visibility, and revenue, using IBM to instrument, monitor, and optimize 32,000 communication control building towers, including AC/DC energy meters, batteries, remote terminal units, power interface units, diesel generator sets, and air conditioners. The solution was so transformative that it earned the PCQuest Magazine award for “Best IT Implementation of The Year 2011 - Project with Maximum Business Impact,” saving Rs.55 million per year by negating unnecessary diesel generator run hours, while also reducing approximately 4.08 million kilograms of CO2 emissions per year.

In addition, the U.S. Air Force has just selected IBM smarter buildings software to maximize energy efficiency and automate physical infrastructure from buildings to vehicles to runways. This includes more than 600 million square feet of real estate, 100 million square yards of runways, and 10 million acres of property.

Every business has the same opportunity to improve its bottom line and customer service while at the same time doing a more responsible job of managing assets, energy, and carbon footprint. It is not only good for the planet; it makes good business sense!
By constructing projects using Marriott's LVP, owners are building more environmentally-sensitive buildings and can expect to reduce their total energy and water consumption by 20% to 30%. This reduces the net operating expenses for the life of the building, thereby increasing the net operating income for the hotel. This new class of buildings is having a positive impact on employees, guests, and their communities.

Results:
Owners have reduced their costs by reducing their energy consumption. The following are the results of some of the LEED hotels:

Portland City Center Courtyard (LEED Gold)—opened in 2009
- Energy savings of $58,035 annually
- Water savings of $5,880 annually
- Anticipating $675,000 in operating savings over 10 years\(^1\)
- Payback achieved in 12 months

Courtyard by Marriott Chevy Chase (LEED Gold)—opened in 2009
- Energy savings of $44,000 annually
- Water savings of $16,000 annually
- Anticipating $813,333 in operating savings over 10 years\(^2\)
- Payback achieved in 22 months

\(^1\) Above analysis calculations provided by SERA Architects/Sage Hospitality
\(^2\) Above analysis calculations provided by OPX/Grosvenor Americas and are estimates based on simulations
Case Study

Mattel’s Resource Expedition Program

Company: Mattel, Inc.
Mattel created and developed a worldwide Resource Expedition Program that Mattel locations are implementing to identify resource efficiencies, reduce costs, and engage employees.

Overview:
Over the past four years, Mattel has been executing Resource Expeditions at more than 20 locations around the globe. A Resource Expedition is a three-day event that gathers a cross-functional group of participants to view processes, equipment, and building operations. Employees evaluate mechanical, electrical, water, and employee behavior to develop a series of potential initiatives, as well as the associated cost and the environmental impact of those initiatives. On the third day, the team presents the initiatives to senior management. To date, Mattel has identified more than 250 initiatives with the potential to save millions of kilowatt-hours (kWh) and gallons of water. Mattel has also expanded the program to its vendor base, training vendors at its Learning Center on how to conduct Resource Expeditions and gain efficiencies at their own locations.

Results:
The success of this program is due to three primary factors. The first is gaining the sponsorship of executives from the participating location who will be engaged throughout the process and during the final presentation. The second is developing accessible tools to ease the financial and environmental impact calculation process for employees who are not familiar with carbon footprint or payback period. The third is bringing in trusted outside vendors to provide expertise on available technology, efficiencies, and investment. Overall, the program is centered on executing small but powerful changes that have an impact on the environment, engage employees, and cut costs.
The Coming Shale Revolution

By Christopher Guith, Vice President for Policy, Institute for 21st Century Energy, U.S. Chamber of Commerce

If you haven’t noticed, the United States is in the midst of an energy revolution, the likes of which we have not witnessed in more than a century. After decades of warnings about running out of oil and natural gas, we are now finding and producing massive supplies of both, perhaps enough to last our country for a hundred years. We are already realizing the initial benefits of this trend in job production, economic growth, and increased energy security, and stand to realize much more in the coming years. We can attribute this burgeoning success story to technological innovation fostered by American business.

The process of hydraulic fracturing injects water, sand, and fluids into dense shale rock at high enough pressure to create microscopic fractures in the rock, allowing natural gas or liquids to be pumped to the surface. Hydraulic fracturing has been in use in the oil and natural gas industry for more than 50 years, being used to complete more than 1.1 million wells over that time. However, in the 1980s a few enterprising companies began to experiment by combining hydraulic fracturing with horizontal drilling, whereby a drill pipe is turned 90 degrees underground to run parallel with the surface.

These innovations originated in the oil fields of north Texas in the late 1970s, when an experienced and single-minded oilman named George Phydias Mitchell defied the conventional wisdom in the industry, the advice of his employees, and sometimes even the will of his shareholders and invested millions of dollars attempting to produce gas from the Barnett shale formation. Under his direction, Mitchell Energy pioneered the use hydraulic fracturing to unleash methane from this thin but dense shale formation. Ultimately, Devon Energy purchased Mitchell Energy in 2001 and married Mitchell’s experience “fracking” shale formations with its experience using horizontal drilling technology to make it an early mover of shale exploration and production.

For decades, geologists have known that dozens of shale formations throughout the United States contain massive amounts of natural gas and oil. However, until recently the technology did not exist to extract these resources economically. The combination of hydraulic fracturing and horizontal drilling has catalyzed an energy revolution in America, enabling the economic production of trillions of cubic feet of natural gas from shale formations around the country. More recently, industry has evolved these technologies further to produce millions of barrels of oil, putting us on a path that could quite possibly make the United States the largest oil producer in the world once again.

As recently as 2006, policymakers were warning about future shortages of natural gas and were crafting policies to facilitate massive importation from abroad. Fast-forward to 2012, and the United States is sitting on more than a 100-year supply. The increased production over the past five years has outstripped consumption, and the U.S. natural gas market is glutted. This has caused prices to plummet to 10-year lows. These massive new supplies, together with lower and more stable prices, have catalyzed an industrial renaissance. We have seen several steel mills reopened and even a new plant started in Ohio. There have been announcements of major new petrochemical facilities in Pennsylvania, Louisiana, and Texas. A recent PwC report estimated that lower natural gas prices are spurring growth in the manufacturing sector that could lead to the creation of 1 million new jobs by 2025.
Moreover, discussion has shifted from importing natural gas to potentially exporting it in the very near future. Some 12 companies have applied for permits to export natural gas. Natural gas prices in Europe and Asia are currently as much as five times higher than in the U.S. This spread is providing U.S. businesses a significant competitive advantage over their overseas competitors. At a time when our economy is struggling to maintain growth and to create jobs, cheap and abundant natural gas is providing one of the few lifelines to spur investment in U.S.

This success story does not stop with natural gas. The same innovations that have led to huge supplies of natural gas have been refined to allow production of oil and other liquids from the same shale formations. The year 2009 saw the first year-on-end increase in domestically produced oil since 1985. Over the past three years, domestic production has increased by more than 14%. Over that same period, the amount of oil we import has declined by 10%. When you combine crude oil with all of the refined products made from it, 2010 was the first year since 1997 when we produced more domestically than we imported. Increased domestic production translates to less money sent overseas for imports. That investment now stays at home to create economic growth and generate jobs.

Perhaps even more important, less imported energy also means greater domestic energy security. Importing less oil means that our economy is more insulated from civil unrest and supply disruptions on the other side of the world. This increased stability in turn increases the attractiveness of investing in the U.S. economy.

One of the greatest aspects of this nascent energy revolution is that it is not taking place in only one isolated region of the country, as has been the historical trend. There are shale deposits of natural gas and oil through the country, and development is occurring in Pennsylvania, Arkansas, North Dakota, West Virginia, and Colorado, to name a few. This geographic diversity has meant that the hundreds of thousands of jobs being created are spread throughout the country. Additionally, dozens of states are experiencing significant growth in government revenues at a time when many states are struggling with deficits.

While we are beginning to reap the benefits of this new energy revolution, the public is being provided greater assurances that these benefits are not coming at a cost to public safety or environmental impact. In spite of the exponential increase in hydraulic fracturing recently, there has been no documented case where it has affected groundwater. State regulators have collaborated with industry and are adopting modern and aggressive regulations not only to provide transparency to the public but also to significantly mitigate any potential environmental impact. At the same time, industry continues to innovate new products and technologies to further reduce potential impact. From smaller drilling rigs that lessen surface footprint to cleaner and more efficient machinery that reduces noise and emissions, technology continues to make this revolution safer for the public and the environment.

This energy revolution is truly turning conventional wisdom on its head. America is becoming less dependent on energy imports by the day, as our domestic resources continue to grow. In the process, hundreds of thousands of jobs are being created, billions of dollars of government revenues are being generated, and economic growth is happening in many of the states and regions that need it most right now.
Case Study
MGM Drives Sustainable Hospitality and Entertainment

Company: MGM Resorts International
MGM Resorts International is committed to being a global leader in sustainability and stewardship of the environment, bringing value to customers, guests, employees, communities, and shareholders.

Overview:
The MGM Resorts environmental responsibility imperative has evolved to the recently introduced Green Advantage, an effective approach to enriching all levels of the organization with sustainable business practices without compromising the luxury experience of its guests or the future of the planet.

Central to its approach, MGM Resorts is dedicated to monitoring its business operations and environmental impact. Through the company’s understanding and ongoing assessment of its environmental innovation initiatives, overarching, company-wide innovative strategic plans are achieved.

With its employees sharing in the Green Advantage goal areas and in the way the company operates, MGM Resorts can increase the breadth and depth of its environmental programs in five core areas: energy and water; green buildings; recycling and waste management; sustainability supply chain; and outreach and education. As a result, environmental innovation is embedded into the company’s core values.

Results:
In 2011, Newsweek ranked MGM Resorts as the most “green” resort and casino company. Since 2007, the company has succeeded in reducing electric power consumption by more than 300 million kWh—enough to power more than 17,400 homes for a year. The company has also reduced water consumption by 1.7 billion gallons through water-efficient strategies in its guest rooms, replacing grass for desert landscaping, and green building air and advanced electrical/lighting strategies. Through responsible waste management strategies, the company’s recycling rates have increased fourfold to an overall rate of 38.4%.

The company has also introduced the first, and what is believed to be the largest fleet, of compressed natural gas (CNG) powered limousines. Organic and sustainable food strategies have also been implemented at its 250 restaurants. As an organization that is committed to collaboration and partnerships, MGM Resorts is also a major supporter of ONE DROP, a nonprofit organization created by the founder of Cirque du Soleil, which is dedicated to fighting poverty through projects aimed at supporting global access to water and raising awareness of water-related issues.
Case Study

Xilinx to Get an Energy Boost from Fuel Cells

Company: Xilinx

Overview:

One of the major expenses in running a company the size of Xilinx is the energy bill. It takes a huge amount of electricity to run all the lights, computers, servers, and climate systems in the four buildings on the company's main San Jose campus. Finding ways to reduce the energy bill at the campus is a priority throughout the company.

One way Xilinx has found to reduce these costs is to make its own electricity. Xilinx has recently installed Bloom Energy fuel cells to self-generate energy in a way that makes sound financial sense and also has a net positive environmental impact.

Fuel cells use the hydrogen from natural gas in a chemical reaction to make electricity. Bloom Energy fuel cells reduce CO2 emissions by 30% compared with the California grid and 50% compared with the U.S. grid. It also helps eliminate sulfur oxide, nitrogen oxide, and other harmful smog-forming particulate emissions.

Results:

Each Bloom Box 2.0 energy server will generate 200 kW. Xilinx is installing five energy servers for a total of 1 megawatt (MW) of energy. Using this system, Xilinx will be able to self-generate 40% of the electricity used at its San Jose headquarters. The difference between buying Pacific Gas and Electric electricity and generating its own electricity is about 4 cents/kWh. Coupled with state and federal incentives, this will result in substantial utility operating cost savings over the 10-year life of the fuel cells.
Final Thoughts on the Role of Business in Environmental Innovation

By Stephen Jordan, Founder and Executive Director, U.S. Chamber of Commerce Business Civic Leadership Center

The following are some key trends in the future of business environmental innovation observed by the BCLC. These trends are based on the articles in this report, and on the BCLC's unique position in the business community.

1. The economy is becoming increasingly efficient.

   Since the first UN conference on the environment in 1992, aggregate energy and environmental factor use is up, but it is down on a per capita basis in advanced economies, and the changes are particularly striking in many large companies.

2. Businesses are a key driver of environmental innovation through their supply chains, and governments are also driving environmental innovation through their procurement requirements.

   Consumer demand has been, and will always be, an important factor in why businesses are becoming more focused on environmental issues, but there are other central drivers to the leading role of the business community. Many businesses see leadership in environmental areas as a way to derive competitive advantage. Mitigating environmental impact is also a basic way of positively affecting a company's bottom line.

   One of our key observations is that surprisingly, the business-to-business and business-to-government markets are in many ways more predictable than the business-to-consumer market when it comes to driving demand for environmental innovation.

   Consumers, while attesting to a preference of “green” goods and services, are sometimes reluctant to adapt to change even when businesses are taking the lead. For instance, Chevrolet recently shutdown production of its much touted Chevy Volt for five weeks due to weak consumer demand. While certain bad press might be involved, the overall weakness of sales suggests that consumers are not willing to cover the premium for this green good. In contrast, the pressure that businesses like Walmart put on their supply chain and that government agencies put on their contractors may lead to deeper and more consistent changes than the consumer market.
3. Environmental R&D often allows companies to produce more with less factor inputs.

Because many environmental success stories are related to reductions in energy consumption and greater efficiency, focusing on environmental innovation as a mechanism for creating jobs may not be the most appropriate frame for viewing progress. Based on a review of the corporate literature of the Fortune 500 and related survey data, and supported by the case studies in this report, it appears that environmental innovation is not only becoming more embedded in large company operations, but that in some cases, companies are actually accelerating their investment in this area and in the sustainability of their supply chains. These technological solutions may represent the greatest leaps forward in the near term.

4. Environmental innovation is not just about reducing carbon.

Environmental innovation shows up in a range of industries including agri-business, aviation, hospitality, manufacturing, chemicals, energy, finance, pharmaceuticals, consumer products, and retailing. It is about minimizing all forms of environmental impact, such as water contamination, fuel emissions, and general waste. It is also about using technology to create ground-breaking new products and services, ones that capture available synergies and efficiencies. The recent focus of the public on carbon and carbon-intensive industries is not representative of the totality of environmental issues.
What can the Help Desk Do for Your Small Business?

The Environmental Help Desk for Business is a resource to help America’s small and medium-sized businesses understand green supply requirements, green business certifications, and environmental innovations that can save businesses money while reducing their impact on the environment. Businesses can call (919)-886-4228 or send a message to the Help Desk to find answers to questions such as:

- What are the big issues around green supply chain requirements in my line of business?
- What big purchasers in my line of business have green supply chain standards?
- What are those standards, and how do I prove my business has met them?
- Are there standard green business certifications that will help me meet the requirements of a number of different buyers?
- Who is the organization behind a given certification, and what will it cost me?

The Environmental Help Desk for Business will also feature cutting edge environmental innovations – new products, services, or tactics – that can help your business save money, increase your client base, and reduce your business’ impact on the environment.

The Environmental Help Desk for Business encourages your comments and ways to improve the site. We want to make this resource as valuable to small businesses like yours as possible, and to do that we need your active feedback and honest input.

The Environmental Help Desk for Business is a partnership of the U.S. Chamber of Commerce’s Business Civic Leadership Center and the Institute for Sustainable Development’s Green Plus program. It is staffed by Green Plus professionals, and supported by talented graduate assistants from Duke University and the University of North Carolina at Chapel Hill.

For more information about the Environmental Help Desk, please call Chris Carmody at (919) 408-7556 or Chris Ryan at (202) 463-5714.

http://gogreenplus.org/environmental-business-help/