

# 9

## The New Business Model for Investing in the Green Space

Peter C Fusaro, Global Change Associates

Emerging markets for environmental financial investment and trading continue to attract significant global investment interest. Traditionally, private investment has come from the venture capital world, which typically has the requisite patience to invest in many projects for as long as the ten-year life of venture capital funds. More recently, this area of investment has attracted hedge funds. Hedge funds don't have that much patience and usually look for more immediate arbitrage opportunities.

As markets change, so do investment models. The new business model that has emerged for investment in alternative energy and clean technology is a hybrid business model of venture capital and hedge funds. Investment is locked up for shorter periods of time from two to four years rather than with traditional venture capital time periods of up to ten years. Coupled with the project orientation of the investment, there is a dimension of credit trading for emissions, carbon and renewable energy included in this investment strategy. The blurring of the lines between hedge funds and venture capital is also being exacerbated by significant private equity participation in environmental finance. This new hybrid financial green investment model will be discussed and analyzed in this chapter.

### The new market drivers

The three global market drivers – sustained high energy prices, accelerated technology shift and increased environmental concerns – form the perfect storm for clean technology investment. Falling renewable energy costs are also increasing investment opportunities in this sector. To put this clean technology market in some perspective, we must look at its origin, what is driving it and where it is headed in the foreseeable future.

Today, clean technology investment is the fifth largest share of early stage venture capital in North America at 10 per cent of market share and rising. US\$8.2 billion was

invested by venture capitalists in this sector from 1999 through 2005 according to the Cleantech Venture Network. It is now very conservatively estimated that US\$8.5 billion more will be invested in this sector from 2007 through 2010.

In addition to early stage venture capital, both private equity and hedge funds will supply additional billions more as new technology is rapidly commercialized and deployed globally. The need is that great. Demand pull of global financial markets is accelerating. We will enter the world of Kyoto Protocol implementation in 2008 and that has already impacted environmental project finance. It is accelerating. Some of that anticipated investment in all stages of development is estimated in the chart below.

Table 1: Clean energy investment today and tomorrow

Source: Clean Edge

	2005	2015
Bio Fuels	US\$15.7 bn	US\$52.5 bn
Wind	US\$11.8 bn	US\$48.5 bn
Solar PV	US\$11.2 bn	US\$51.5 bn
Fuel Cells	US\$ 1.2 bn	US\$15.1 bn

Global growing pains in this sector are seen in the shortage of wind turbines, polysilica for solar power, and even geothermal parts. The whole world is moving rapidly toward cleaner energy sources at the same time. Rising environmental imperatives will accelerate much of this energy market transformation into a cleaner energy world.

## Clean technology investment is accelerating

The opportunities are immense. World demand is accelerating. Renewable energy mandates are proliferating in the United States, the European Union, China and India. The 'Kyoto Factor' arriving in 2008 and the need for carbon credits for the industrialized world are accelerating, as well as the need for less carbon-intensive technology.

Also, this is much more market driven than regulatory driven as before. While there continues to be a focus on the regulatory regime, greater energy demand is pushing out products faster. Biological and materials sciences are also contributing to this effort on a new level in the form of both biofuels and nanotechnology. There is a higher use of information technology than ever before. This tweaks many efficiency gains that make projects fly, particularly in advanced metering and remote sensing. Higher sustained energy prices are setting up the price floor to push it faster than ever before. Technology is also becoming more cost effective.

Energy, agriculture, manufacturing, transportation and water are all under the clean technology tent. This leads to many applications and cross-fertilization between different scientific disciplines. The list includes bio-based fuels, micro-irrigation systems, distributed energy, renewables, energy storage, advanced packaging, natural

chemistry, hybrid vehicles, lighter materials, smart logistics software, water recycling desalination, and newer applications of sensing equipment. The opportunities are almost endless and the technology cycles are shrinking as well. This age of technology delivers results.

### BOX 1: CLASSIFICATION OF THE CLEAN ENERGY BUSINESS OPPORTUNITY:

#### Alternative energy

- Solar
- Wind
- Hydro, tidal and wave
- Geothermal

#### Bioenergy and ethanol

#### Distributed energy

- Microturbines
- Fuel cells
- Hydrogen generation
- Flywheels

#### Energy efficiency

- Lighting
- Buildings

#### Energy recycling

#### Waste-to-energy

#### Battery technology & energy storage

#### Medical & biological crossovers

#### Environmental technologies

- Waste & wastewater treatment
- Clean coal gasification
- Emissions mitigation

#### Information technology

- Net metering and real-time pricing
- Demand response (energy efficiency)
- Remote sensing

Source: Energy Hedge Fund Center LLC ([www.energyhedgefunds.com](http://www.energyhedgefunds.com))

As one can see, these encompass engineering disciplines, information technology and the physical sciences.

### What the new business model looks like

It may be helpful to review recent developments in 'clean technology,' also called 'cleantech.' When mainstream press – Business Week, the Financial Times, Forbes and the Economist – all start covering this sector, they herald the news that the time has arrived for greener and cleaner technology. But the space is very different than many envision. Good venture projects for the clean technology space need three elements to

be successful. These are defined as: revenue stream, a seasoned management team to grow the business, and a defined exit strategy (usually by an initial public offering or roll up). Building a business to scale and commercialization is very different than funding research and development efforts that are really science projects. In fact, some of the currently funded technologies are so debt ridden that they will never be commercially viable. Moreover, their cost structure will require an ability to significantly reduce costs in order to become commercialized. They cannot depend on the 'environmental kicker' of emissions reductions (called offsets) making a project economically viable. These are additional benefits for a business, but are not the reason for that business to exist.

What may be more interesting are the second stage investments in clean technology and alternative energy that *do* have revenue and *can* make money for investors. Several venture funds are focused on these later stage investments, and the investment space is beginning to get crowded. There is a great need for viable later stage companies. Angel investing, on the other hand, will fund start-ups in the green space, and consequently take on more risk.

While the outcome is still uncertain, the timing is right. Higher energy prices are now sustainable due to unprecedented global demand coupled with underinvestment in the global energy business for two decades. The real metric is that US\$40 oil makes a floor for all these new technologies to take off. Higher global energy demand growth will continue to drive return on investment (ROI) higher in the cleantech space.

But what about the trading markets and the reduction of project costs? The new model that has emerged is a hybrid somewhere between venture capital and hedge funds. They require a capital commitment from investors for two to four years (called a lock up) and a capability to trade the renewable energy credits (Recs) and emissions reductions (sulphur dioxide  $\text{SO}_2$ , nitrous oxides  $\text{NO}_x$  and carbon dioxide  $\text{CO}_2$ ). These green streams of revenue or 'green finance' make the cost of capital cheaper, but also bring much needed liquidity to emerging environmental financial markets. They cannot fund projects entirely unless they are a pure speculative play.

There is now increasing interest by investors in how  $\text{SO}_2$ ,  $\text{NO}_x$ ,  $\text{CO}_2$  and Recs are related to clean technology projects. It seems obvious to most cleantech investors that we are entering a carbon-constrained world and that their venture capital investments in clean technology will have an environmental kicker at some juncture in the US and from 2008 in the Kyoto world. The question then becomes how this is related to carbon finance and carbon offsets and more importantly investment in the realm of clean energy and cleaner technology.

This hybrid business model of figuring out of the best business structure to participate – not in only in investment in equities and commodities but also in clean technology tied to carbon reductions – is actually becoming quite important for new project development in the area of carbon offsets. The entire concept of 'green trading' is focused on the interrelationship of emissions reductions, renewable energy credits and energy efficiency.

Investment interest is now more focused on how to invest in new technologies and gain investment streams that encompass two or three of these environmental benefits and should benefit from multiple credit streams. Of course, there are those who believe that 'double counting' of credits for renewable energy and carbon reductions is a bad thing, but I think that in the beginning of a market shift these multiple environmental credit streams actually enhance project creditworthiness. They also get us beyond the myopia of subsidizing technologies and push cleaner technologies to more market-centric sustainability. This is a better economic model for the future since it seems inevitable that technology cycles are accelerating and the need to invest in better technologies that are more energy efficient as well as cleaner will deliver better financial results.

## Climate change as the new driver

The impending climate change regime in the United States will add an extra dimension to the drive for greater energy efficiency and reduction of emissions footprint for carbon. There is clear movement of capital into 'carbon finance' but this is not very well followed in the United States. This extra dimension of monetization of carbon credits for green project finance will increase ROI for many projects. More energy efficiency and renewable projects will take root as technology continues to shift, and the regulatory scheme for a less carbon-intensive world takes hold.

It also seems reasonable that more rapid deployment of these cleantech investments will be needed to scale to meet the rising environmental and energy needs both in the United States and around the world. It is no accident that there is a shortage of most renewable energy equipment today. A flattened world levels the playing field for new technology and also creates more market opportunities. It should not be forgotten that throughout the world two billion people do not have access to electric power, and three billion people do not have potable water. The scale is mind boggling and has been underestimated by all forecasts. Global demand is evident in the BRIC (Brazil, Russian, India and China) economies with 800 million middle class consumers who have money in their pocket and want consumer goods and products just like the developed world. Most economic projections have underestimated this need, just as no one estimated or anticipated how much electricity the Internet would use.

Everyone has misjudged the scale of the cleantech revolution. The short-term focus on ethanol and solar companies which receive most press and investment attention is only the initial stage of this change over to clean energy. It is a growing global phenomenon that will be rising in developing countries in coming years and cycle in much more innovation than can be imagined today. The market demand is there in both the developing and developed world. One is leapfrogging technology and one is replacing antiquated infrastructure. Green is the new gold, and now is the time to watch it accelerate.

Several funds have invested and made money on the ethanol and solar price moves of the last year within existing funds and are now launching alternative energy specific funds. There are carbon funds in Europe that are oversubscribed and many in the US

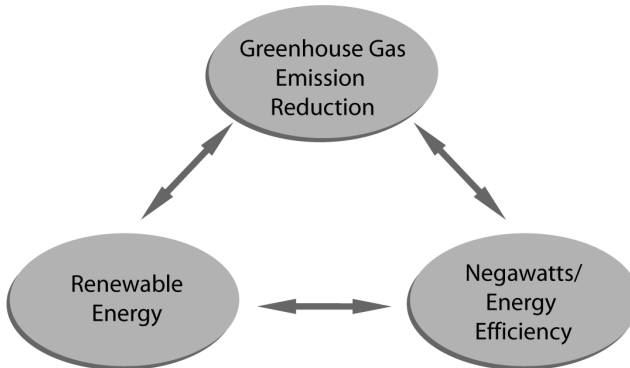
are growing their asset base. There are alternative energy/cleantech funds in Europe with multi hundred million dollar backing. There are cleantech funds on both sides of the ocean. There seems to be a realization that this market move is sustainable. What is really lacking is in-depth knowledge of the sector. The sector is not as widely followed by Wall Street and City of London investment analysts today.

It would take mainstream investors at least 12–24 months to get up to speed in the cleantech/alternative energy sector. Some investors had allocated into several commodity trading green hedge funds (those that trade RECs and GHG) but felt that the capacity was limited in those existing structures. This time lag of knowledge is significant as it focuses much of today's investment attention on the narrow band of biofuel and solar projects and gives short shrift to the broader dimensions of the opportunity.

## The green revenue stream

The ability to trade both emissions and renewable energy credits creates another revenue stream. Green trading is an encompassing term. We define green trading as the triple convergence of emissions reductions, renewable energy and energy efficiency.

Source: Global Change Associates, Inc.



This triple convergence of carbon emissions, renewables and energy efficiency offers multiple risk arbitrage opportunities as well as many revenue streams. They are obviously interrelated in their use of more efficient technology, which reduces the emissions footprint. Similarly, using renewable energy can reduce the carbon footprint of power stations for example.

Green trading is a term coined several years ago to capture the value of the convergence of the capital markets and the environment. It encompasses all forms of environmental financial trading including carbon dioxide and other GHG reductions. Sulphur dioxide (acid rain) and nitrous oxide (ozone), renewable energy credits and negawatt (value

of energy efficiency). All of these emerging and established environmental financial markets have one thing in common: making the environment cleaner by either reducing emissions, using clean technology or not using energy through the use of financial markets. Sometimes, both can be accomplished as in reducing emissions and reducing energy usage by moving to cleaner technology. Green trading is one mechanism to accelerate this change.

The trading markets determine the financial value of environmental benefits. The quaint notion that we are 'trading pollution' is an oversimplification of the need for markets to create financial incentives to reduce pollution and accelerate more efficient and environmentally benign technology transfer. This is not an academic exercise but an exercise of rational economic behavior.

### **BOX 2: SULPHUR DIOXIDE AND NITROUS OXIDE MARKETS IN THE US**

For example, in the well established US sulphur dioxide (SO<sub>2</sub>) and nitrous oxides (NO<sub>x</sub>) markets established in 1995 and 1999 respectively, we have seen a sea change in the past two years in US environmental financial markets. As coal burning increased, due to rising electricity demand and decreasing supply of natural gas, the emissions trading markets responded in kind. The price of emissions allowances rose to a peak of US\$1,630 per ton for sulphur dioxide in December 2005 and US\$40,000 for nitrous oxide during the past year in the US. Sulphur dioxide credits in the 11-year-old markets had never before risen above US\$225 per ton. Prices have leveled off to the US\$500 to US\$600 range during most of 2006.

The financial penalty for emitting more emissions accelerated the emergence of new technology into the coal burning power generation space that was previously uneconomical. In the past year, at least 20 newly planned coal gasification facilities have either been announced or are on the permitting cycle for siting. Two years ago there were none. The benefits of gasification technology are that they not only reduce the previously mentioned SO<sub>2</sub> and NO<sub>x</sub> emissions but also reduce carbon dioxide emissions. They also increase efficiency of coal burning from 30 per cent to the 50–70 per cent range, which means that less coal will need to be burned to produce the same amount of electric power in the future. This additional efficiency benefit is often overlooked by environmentalists, economists and policy makers who tend to view the energy supply picture as static with ever increasing energy demand. Basically, we will be using less energy and it will be cleaner forms of energy in the future due to market-based incentives coupled with financial penalties for noncompliance. These are not voluntary markets but government *mandated* markets. Proved to work and are cost effective, they are essentially the templates for the Kyoto Protocol.

For carbon dioxide and greenhouse gas (GHG) markets, 2005 was a watershed year. In February 2005, the Kyoto Protocol entered into force more than seven years after it was established. With Russia's ratification in November 2004, countries that represent over 60 per cent of the total 1990 carbon dioxide emissions have now ratified the Protocol. They include the European Union, Japan, New Zealand, Canada, Russia and most of the countries known as the economies in transition (the countries that were 'behind the iron curtain' in the decades leading up to 1990). The United States and Australia have not ratified the Protocol, but are nonetheless pursuing programs to reduce GHG emissions on a voluntary basis – hence their prices for carbon credits are less than in the EU.

### **BOX 3: KYOTO PROTOCOL IN THE GLOBAL ARENA**

Under the Kyoto Protocol, countries can use emissions trading to lower the overall cost of reducing GHGs to meet the protocol targets. The protocol provides three flexible mechanisms for trading among countries: (1) An international emissions trading regime. This cap-and-trade program will allow industrialized countries to trade carbon permits in the international market. (2) Joint Implementation (JI) permits trading among industrialized countries and the economies in transition, and (3) the Clean Development Mechanism (CDM) permits developing countries that are not parties to the Protocol to sell emission reductions to Annex 1 countries. By far, the CDM market has been the most developed with over 700 projects globally.

A marked shift in the market began in 2004 as the EU countries prepared to implement the EU Emissions Trading Scheme (ETS), a program adopted to reduce the cost of Kyoto Protocol compliance, permits trading of carbon dioxide. The EU Emissions Trading Scheme officially started on 1 January 2005, and is now trading hundreds of millions of tons per year. It is estimated that €25 to €30 billion will trade in 2006. Trades on the European market have continued to increase on a year to year basis. The European Commission estimated that adopting the EU-wide trading scheme would reduce the costs of attaining its emission target by at least 20 per cent if it covered the energy supply sector.

### **BOX 4: EMISSIONS TRADING SCHEME IN THE EUROPEAN UNION**

12,000 facilities in Europe fall under the purview of the EU Emissions Trading Scheme from 2005 to 2007. In 2008, the Kyoto Protocol takes effect and the program globalizes for the over 160 Kyoto signatory countries.

Carbon prices fluctuate:

In the EU ETS, the price is €12.58 (September 29, 2006)

On the Chicago Climate Exchange, the price is US\$3.90 (29 September 2006)

Another venue for green trading has been in the renewable energy area. Wind, solar and biomass markets are accelerating commercially, due to the monetization of 'renewable energy credits' as they are called in the US. Today, 22 states have, or are developing, a Renewable Portfolio Standard (RPS) that is jump-starting markets in Texas, California and the Northeastern states to take advantage of 'green power' programs that are now popular with consumers. In America today there are over 600 green power programs where consumers willingly pay more for green power. The renewable energy projects in these states are able to bank-finance their development and create a revenue stream of green credits that reduce the cost of capital, in effect creating 'green finance.'

Green trading is the mechanism to create market-based incentives. Their application is global. Not only are the US, EU and Japan moving forward, but so are developing economies such as China, India and Russia, on both emissions trading initiatives and clean technology applications.

As fossil fuel prices remain high throughout this decade and as demand continues to increase, clean technology will become a more attractive economic choice for deployment in global markets. Energy and environment issues continue to be more interconnected. Rising demand is accelerating the need to move faster to clean technology solutions. Green trading is the financial mechanism that allows markets to meet that goal of global deployment of new, cleaner technology to meet rising demand for electricity, transportation, heating and cooling applications. What used to be expensive and uncommercial is rapidly changing to economic solutions to global environmental problems.

## The new wall of money

This investment sector is getting started. There is pent up demand for renewable and clean technology. There is global demand due to rising Asian economies. The green investment sector is about to really blossom. Wall Street and City of London analysts are gearing up to speed and to start following those companies that can scale. A new asset class has emerged and it is called 'green.'

The implications of this new wall of money are hard to predict at the present time. The hype of markets for ethanol and solar power overshadow many other investment opportunities. However, we are starting to see private equity funds dedicated to infrastructure investment beyond clean technology raise capital in the multi-billion scale.

The rapidly evolving renewable energy and clean technology industry offer attractive investment opportunities. While some funds focus on early stage investment, many funds are focused on mid/late stage development and want to provide developmental capital to fund expansion and scale of operations. There are opportunities across the value energy and environmental chain.

Renewable opportunities include wind, biomass, geothermal, solar, landfill gas, waste-to-energy, hydro, ocean/wave, biodiesel and ethanol. Some funds are offering the

traditional private equity project finance component and are extremely well capitalized. For example, Carlyle's Riverstone fund and ARC Light fund is now close to US\$3 billion. Others are just ramping up and are in the process of raising US\$100 to US\$400 million in their first financing. Still others have become standalone investment vehicles as part of larger hedge funds where ethanol and solar projects over the 2005–2006 have paid off handsomely. These fund managers now wish to take the deeper dive by building a wider renewable energy portfolio.

Some funds are seeking to secure a portfolio of projects with different locations so that they can get into the game faster. Others are either looking for co-investment opportunities or partnerships with developers. Law firms have become extremely entrepreneurial and take equity stakes in projects in lieu of fees, as Boston Consulting Group, Bain and McKinsey have all done.

The sector is changing rapidly since the need has become global. It is not surprising to see the emergence of India's Suzlon and the rapid growth of China's Suntech, with global projects in 2006. But what is underestimated is the second wave of new technology companies that will also come from those and other developing countries.

## **Finding the good green projects globally**

The Holy Grail of clean energy investment is finding the outstanding technology projects that can be scaled into a robust enterprise.

Market opportunities for wind, biofuels, photovoltaics, and fuel cells are expected to increase fourfold in the next ten years, growing from US\$40 billion in global revenues in 2005 to US\$167 billion by 2012 according to Clean Edge, Inc.'s 'Clean Energy Trends 2006.' According to the Cleantech Venture Network, investments increased to US\$513 million in the first quarter 2006 – the largest recorded since Q1 2000 representing a 2.3 per cent increase from the US\$502 million recorded in the previous quarter.

As in all boom times, there will be a short-term bust, and this most likely will be in the ethanol sector sometime in 2007, but the need for global investment is so great and the technology is shifting so fast that the momentum will carry clean energy as well as clean water initiatives for the next two decades. Climate change risk will be increasingly mitigated by the movement and rapid deployment of clean energy projects on a global scale which has never before been anticipated nor appreciated. The skills shortage of the oil and gas industry will spill over into the clean tech sector. Building out infrastructure will take time. This presents many opportunities for smaller scale technologies in distributed generation and distributed water solutions to take root. Both small and big projects will be built out, licensed and distributed on a global scale following a new manufacturing model of global outsourcing and distribution. It is possible this model may be crimped by supply chain management, too.

### **BOX 5: TIPS FOR COMPANIES TRYING TO ATTRACT 'GREEN' INVESTMENT CAPITAL**

- Create a professional, concise business plan with clear business objectives.
- Have a seasoned management team in place to grow the business and allow experienced external help to assist in global company growth.
- Look for scalable green technologies that have global applications.
- Have strategic investors from the targeted market segment.
- Create attainable financial milestones.
- Don't underestimate the environmental externalities that can be monetized such as carbon credits, renewable energy credits, and other emissions reductions.
- Offer shared saving opportunities so that risk is also shared.
- Be willing to be flexible in management control and providing equity opportunities for investors.
- Look well beyond ethanol and solar for next generation market opportunities.
- Use the knowledge and expertise of the advisory board to leverage global projects.

Source: Energy Hedge Fund Center LLC

## **This is the end of the beginning**

Higher energy prices, national security concerns over oil, global warming, implementation of Kyoto Protocol, modernization of Asian economies, particularly China and India, and a growing movement of multinational corporations to go green and adopt clean technologies have pushed the energy and environmental dynamic faster than anyone imagined five years ago. The need to improve operational efficiency, reduce costs, eliminate waste and pollution have all coalesced to form a new market. It is not hindered by misconceptions that it is a bubble or dotcom boomlet. The energy value chain is now overlaid with an environmental value chain. The clean energy market is large, growing and global with higher rates of market acceptance than anyone anticipated. There are now over 600 green power programs in the US alone where consumer preference is for green energy. This trend is growing.

The competitive landscape has shifted. Government initiatives are helpful but the global capital markets are driving this boom. There will be high-profile market failures during this transition to cleaner technology and cleaner use of energy. The era of coal and oil is plateauing, and not in the production sense. These dirtier, carbon-intensive fuels are being replaced by renewables, cleaner technology, and higher efficiencies. By 2020,

oil and coal will plateau in global usage. For example, as clean coal technology takes root with gasification of coal, there is not only an emissions reduction but also a higher efficiency gain from 30 per cent for conventional coal-fired plants to a higher range of 50 – 70 per cent. The same is true of hybridization of the transportation fleet featuring greater fuel economy and reduced tailpipe emissions. If we apply this business model to how cleantech permeates the entire energy value chain, it stands to reason that all applications – to be financially viable – will have to reduce energy consumption and be cleaner. This dual benefit is lost by many observers in the mainstream media. Using renewables to replace fossil fuels brings with it a third layer of benefit by offsetting carbon.

The new green business model is blurring the lines between hedge funds, private equity and venture capital. The arbitrage opportunities combined with the building out of new projects will lead to more incentives to invest in clean energy and clean technology. However, this is a transition that defies a quick fix. It will take decades to remediate the environmental damage done and shift to the more environmentally benign technologies of tomorrow. But the good news is that global investors are now focused on this sector!

## References

- Fusaro P.C. and James T. *Energy and Emissions: Collision or Convergence*, Wiley, 2006.
- Fusaro P.C. *Energy and Environmental Hedge Funds: The New Investment Paradigm*, Wiley, 2006.
- Fusaro P.C. and Yuen M. *Green Trading Markets: Developing the Second Wave*, Elsevier, 2005.
- Fusaro P.C. (author and editor) *The Professional Risk Managers Guide to Energy & Environmental Markets*, Professional Risk Management International Association, 2006. [www.prmia.org](http://www.prmia.org)
- Fusaro P.C. 'Cleantech is More Than a Buzzword', *Utilipoint Issue Alert* April 26, 2006. [www.utilipoint.com](http://www.utilipoint.com)
- Fusaro P.C. 'The New Business Model for the Green Space', *Utilipoint Issue Alert* July 11, 2005. [www.utilipoint.com](http://www.utilipoint.com)
- Fusaro P.C. 'Turbulent Markets Ahead: Why the Energy and Environmental Crisis Will Continue for Many Years' September 20, 2005. [www.utilipoint.com](http://www.utilipoint.com)

Other useful websites for environmental finance information are [www.pointcarbon.com](http://www.pointcarbon.com), [www.evomarkets.com](http://www.evomarkets.com), [www.cleantech.com](http://www.cleantech.com), [www.cleandedge.com](http://www.cleandedge.com), and [www.environmental-finance.com](http://www.environmental-finance.com)