

Next Stop: Durban

Global Markets Institute

Moving beyond the Kyoto Protocol

Durban to continue shift away from binding global agreements

The UN climate conference in Durban is unlikely to yield a comprehensive and binding agreement to replace the expiring Kyoto Protocol. Instead, we expect to see a further transition to a global climate change process that focuses on voluntary national pledges and international support through financing and technology transfer. The focus of mitigation and adaptation efforts is likely to shift from multilateral institutions and developed countries to developing countries and the private sector—echoing the ongoing shift of economic growth to emerging markets.

Emissions to continue to rise, especially in emerging economies

Despite ongoing efforts at mitigation, greenhouse gas emissions remain on a long-term growth trajectory, with energy-intensive economic growth in developing countries spelling more emissions ahead. In response, climate change policy is likely to rebalance some focus away from emission reduction efforts toward adaptation initiatives, i.e., adjustments to actual or expected climatic effects.

High-growth nations are generating both emissions and solutions

Some of the world's faster-growing countries, including Australia, China and Brazil, are moving ahead unilaterally, seeing climate change as an economic opportunity rather than simply a cost. In 2010 China was the world leader in both clean energy investment and renewable energy capacity. At the same time, economic weakness has deterred the traditional champions of climate change efforts, namely the EU and Japan, from pursuing aggressive policy changes.

Private sector is starting to seize opportunities

Lower costs, revenue opportunities and government incentives in many countries are driving private sector involvement in climate change. Many large companies have already realized the cost containment benefits of "green" planning. Some are hedging future operational risk. Some are now starting to capitalize on the revenue opportunities that climate change is generating. In particular, investment in clean technology has continued to grow in both developed and developing countries.

Abby Joseph Cohen, CFA

(212) 902-4095 abby.cohen@gs.com
Goldman, Sachs & Co.

Koby Sadan

(212) 902-7009 koby.sadan@gs.com
Goldman, Sachs & Co.

Rachel Siu

(212) 357-0493 rachel.siu@gs.com
Goldman, Sachs & Co.

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Goodbye Kyoto: Durban meeting will continue the shift away from globally coordinated action on climate change

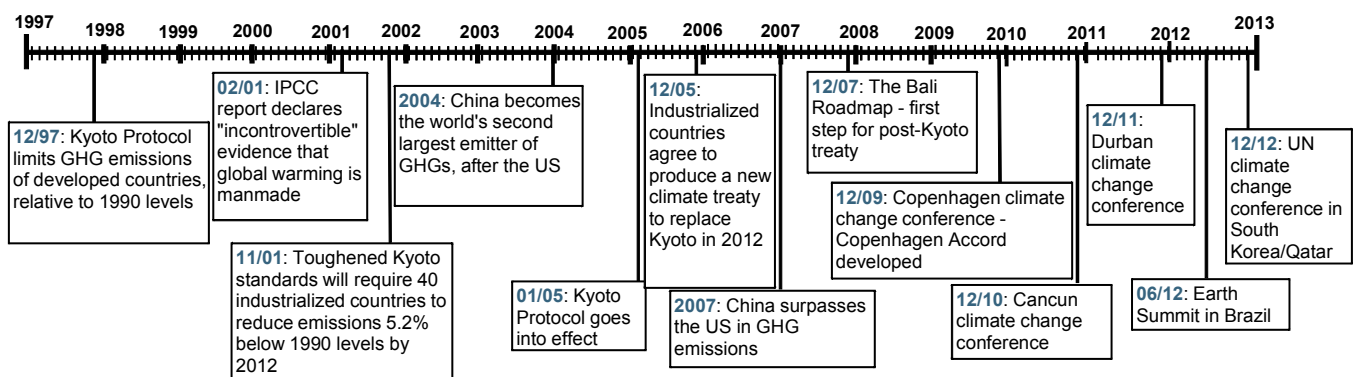
The next major UN climate conference will run from November 28 through December 9

Durban meetings should solidify the ongoing shift away from binding agreements toward voluntary pledges

The UN's Framework Convention on Climate Change (UNFCCC) meets in Durban, South Africa, with the expiration of the Kyoto Protocol's emissions reduction targets looming in 2012. We do not expect to see this meeting produce another binding, one-size-fits-most agreement similar to that reached in Kyoto in 1997. Meetings in Copenhagen in 2009 and Cancun in 2010 have already demonstrated the challenges in reaching such an agreement. Instead, we expect to see further progress along the lines of what occurred in Copenhagen—non-binding pledges by individual countries that reflect divergent states of economic development as well as varying domestic political commitments to emissions reductions.

Thus, Durban should solidify the shift away from the historical top-down binding approach, directed by a handful of developed economies, toward a more flexible and voluntary system, advocated in part by advanced developing economies (see Exhibit 1). This shift both reflects and is driven by broader macroeconomic changes—higher economic growth and rising greenhouse gas (GHG) emissions among advanced developing economies, most notably the BRICs. We are also likely to see further initiatives by the private sector as companies begin to focus on the economic opportunities around adaptation and mitigation efforts.

Exhibit 1: UN climate negotiation timeline



Source: UNFCCC, Goldman Sachs Global Markets Institute.

From Kyoto to Cancun

The UN's climate framework has been in effect since the Earth Summit in 1992. The process was at first driven by developed economies, which were the major emitters of greenhouse gases (GHG) and were also most financially and technologically able to pursue emissions reductions. The apogee of coordinated international efforts came with the 1997 Kyoto Protocol, which bound developed industrialized countries and countries in transition (mostly Eastern European countries, such as Russia and Poland) to commit to average emission reductions of 5.2% below their 1990 level by 2008-2012. As it operates today, the Protocol does not include the United States (which initially signed the agreement but later withdrew from it); it also excludes most developing countries (China among them), which refused to commit to binding emission reductions due to concerns that such reductions would hurt economic development.

The UNFCCC process subsequently focused on extending Kyoto beyond its expiration date of 2012, and trying to secure US support. The UN's goal for the 2009 meeting in Copenhagen was to produce a new binding agreement that would include the United States.

The result was quite different, however. Copenhagen produced only—and at the last minute—a voluntary pledge system for emission reductions, deforestation targets and adaptation targets. Developed countries also created a Green Climate Fund and made nonbinding commitments to provide financial assistance to developing countries within this framework. The US delegation to Copenhagen, which included President Obama, opted to work intensively with a smaller group of countries, especially those with sharply increasing emissions, rather than the full complement of more than 100 countries in attendance. They developed the Copenhagen accord, a blueprint for additional action. In the months which followed, many of the other countries signed on to the accord reached in Denmark.

The 2010 Cancun meeting further moved away from a top-down approach of a binding target with a universal base year. The conference emphasized the idea that actions to reduce emissions should not substantially hinder economic development, broadening the flexibility for individual countries to set their own targets. Developed countries pledged specific emission reductions, but with variable base years, while developing economies pledged emission reductions using variant benchmarks (for example, business as usual or emissions vs. energy intensity). At the same time, Cancun did not address specifics of how these agreements would be implemented, leaving this as a topic for discussion in Durban.

Kyoto will expire next year

Without a second commitment period, the Kyoto Protocol will expire at the end of 2012. Although it will be a diplomatic disappointment to some, it is unlikely to have a large practical effect on climate policies. The Kyoto emissions reductions policies are already legislated in the countries that are signatories to the Protocol and most of them have instituted additional legislation after making pledges in Copenhagen and Cancun. Fifteen years later, Kyoto standards are embedded within climate policy making in Annex I developed countries.

Durban will focus on implementing the Cancun Agreements

From Cancun to Durban

The Durban meetings will focus on implementation. The goal is progress on a “balanced package,” including climate financing, adaptation efforts, reduction in deforestation, transparency (building tools for measurement, reporting and verification) and technology transfer. Financing will be one of the most contentious topics. In Copenhagen, wealthier countries promised \$30 billion by 2012 as “Fast-Start” funds, along with a Green Climate Fund to provide long-term financing reaching \$100 billion per year by 2020, roughly half of what the world is spending annually on expanding fossil fuel energy capacity. All funds were to be “new and additional” to any prior commitments.

Financing will be a major topic for negotiation

Of the \$30 billion “Fast Start” funds, half of the sum pledged is from Japan, with the bulk of the rest from the EU. As of May 2011, while total pledged funds were close to the targeted \$30 billion mark, many countries have not yet actually delivered on their commitments. In addition, there have been concerns that a large share of the committed funds is not “new and additional” but is rather portions of previous programs.

Long-term financing, through the Green Climate Fund, is the real focus for many developing countries. The Durban conference will discuss a draft implementation report under which the Fund would provide direct and indirect funding to projects in eligible countries (developing countries that are within the UN climate change framework). Eligible projects would include projects for adaptation and mitigation, technology development and transfer (including carbon capture and storage) and renewable energy capacity

building. The report also suggests that the Fund create a special facility for private sector projects, although it does not specify what level of resources would be available. But many outstanding issues remain, including the sources of the funds, the timing, how closely the Fund would be associated with the UN, the governance structure and the role of the private sector. Furthermore, it has been reported that the United States and Saudi Arabia voiced their disagreement with the current blueprint for the fund’s design; in particular, the United States is interested in greater private sector involvement. Given the lack of consensus on the fund’s design and the economic constraints facing many developed countries, progress in Durban is likely to be incremental. See Exhibit 2.

Exhibit 2: Path from Copenhagen to Durban

Major conference agenda items

The Durban Agenda		
Agreed in Copenhagen 2009	Decided in Cancun 2010	Expected in Durban 2011
<ul style="list-style-type: none"> * Voluntary country-level pledges for emissions reduction * Agreed to elevate adaptation efforts with developed countries providing resources to the more vulnerable developing countries * Agreed to intensify deforestation reduction efforts assisted by developed country funding * Developed countries pledged to provide \$30bn by 2012 and \$100bn per year by 2020 for a Green Climate Fund 	<ul style="list-style-type: none"> * Establishment of an Adaptation Committee to encourage adaptation efforts * Engagement of developing countries in mitigation efforts, on a flexible and voluntary basis * Set out rules and procedures for implementation of the Copenhagen Accord 	<ul style="list-style-type: none"> * Greater focus on adaptation: focus on aid for small island developing states, least developed countries and Africa * Further discussion on deforestation reduction efforts and market mechanisms to provide for credit trading * Discussion on institution building: transparency mechanisms, financing for a Green Climate Fund, and technology centers * Kyoto Protocol: Agreement on a second commitment period less likely, though a framework for a future treaty is possible

Source: UNFCCC, Goldman Sachs Global Markets Institute.

International negotiations adjust to a major shift in economic reality

Advanced developing countries are now shaping the negotiation process...

...in large part due to their rising share of energy consumption and emissions

Fast-growing countries are driving both negotiations and emissions

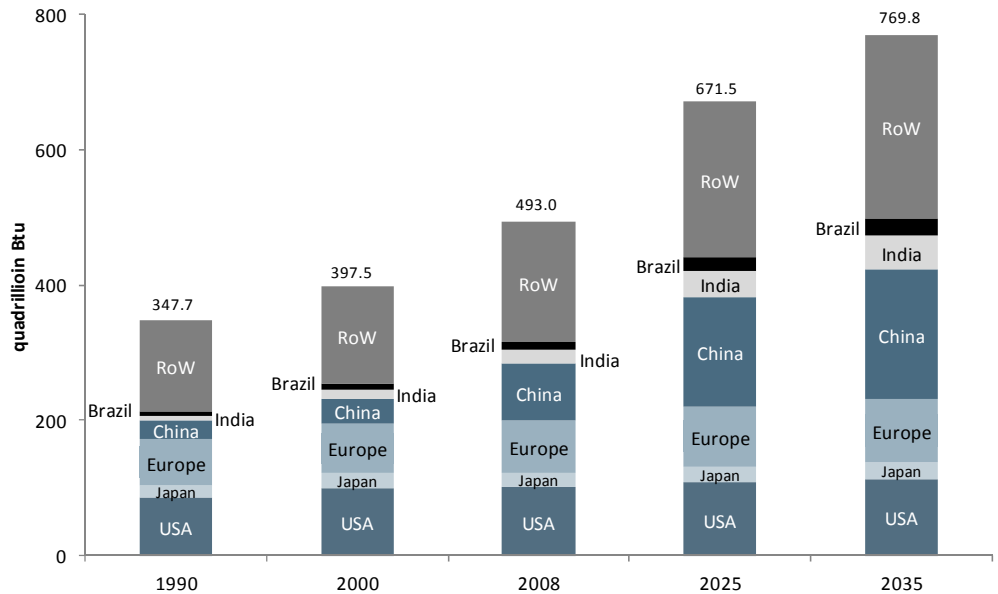
The historical split that once put developed countries on one side of the climate negotiations table and developing countries on the other has been erased by changing political and economic reality. The progress that was made in Copenhagen was due principally to a group of advanced developing countries, including Brazil, China, India and South Africa and often referred to as the “BASIC” countries. Working with the United States, these countries played a key role in creating a more flexible blueprint for tackling climate change that year, and have since continued playing a leadership role.

Rising energy usage will continue to drive GHG emissions across the world. The US Energy Information Administration (EIA), which provides energy consumption and emissions forecasts out to 2035, projects that global energy use will increase by 56% between 2008 and 2035. The EIA expects China and India together to account for nearly 31% of global energy consumption by 2035, up from 21% in 2008. At the same time the aggregate share of the United States, Japan and the EU is projected to decline to 30% from 40% in 2008. Exhibit 3 illustrates the projected changing composition of major energy consumers. These data are, of course, subject to assumptions made about the pace of economic growth in each nation.

Economic growth in the advanced developing countries is highly energy-intensive (defined as the energy used to generate each dollar of GDP, expressed in PPP terms), as Exhibit 4

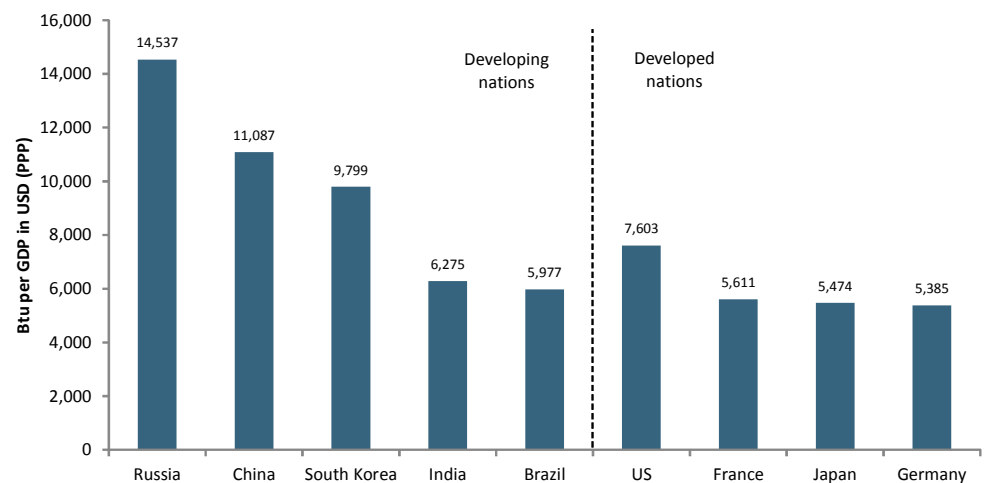
shows. Until the composition of economic activity shifts from heavy manufacturing toward the services industry or energy-efficiency rises dramatically, it is likely to remain so.

Exhibit 3: Global energy demand continues to grow
Changing composition of major consumers



Source: US Department of Energy, Energy Information Administration (EIA).

Exhibit 4: Energy intensity gap between developed and developing countries
2008



Source: US Department of Energy, Energy Information Administration (EIA).

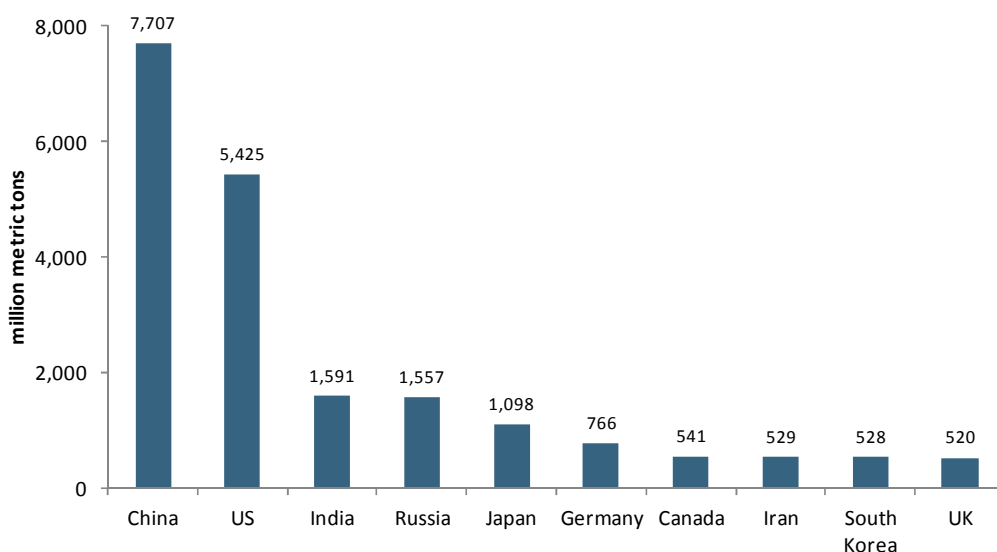
Rising incomes in developing economies spell more emissions ahead

Moreover, growth in energy consumption would also be driven by rising incomes in developing economies. Richer people tend to consume more: to eat more food (including energy-intensive protein), to use more electricity as they light their homes and power their appliances, to use more gasoline and jet fuel as they travel more, etc. Goldman Sachs

economists estimate that the global middle class (defined as people with income between \$6,000 and \$30,000 in PPP terms) will grow by 2 billion by 2035. Most of this growth is projected to be in the BRICs (an incremental 1.6 billion people), but the trend would play out in other major emerging markets as well, including the Philippines and Turkey.

The BASIC countries are now responsible for an increasing share of global GHG emissions, contributing 34% of global CO₂ emissions in 2009, up from 16% in 1990. China's share of CO₂ emissions reached 25% in 2009, up from just 10% in 1990. Over the same time, the US share declined to 18% from 23% and Europe's to 13% from 19%. In absolute terms, the EIA projects that worldwide CO₂ emissions will grow 43% between 2009 and 2035, with China, India and Brazil accounting for over half of the increase. In fact, China surpassed the United States as the world's largest source of GHG emissions in absolute terms as early as 2007. Similarly, over the past two decades, CO₂ emissions from India have more than doubled, while South Africa's CO₂ emissions have grown by 50%. As Exhibit 5 shows, five of the top ten emitting countries in 2009 were developing countries.

Exhibit 5: Top 10 CO₂ emitters in 2009 illustrate rising significance of developing nations



Source: US Department of Energy, Energy Information Administration (EIA).

Adaptation is a crucial part of the response to rising emissions

Focus in climate change shifts toward adaptation

Given the expected long-term rise in emissions, it is increasingly apparent that global climate change policy must focus on adaptation, not just on emissions reduction. "Adaptation" refers to adjustment in response to actual or expected climatic change effects, which moderates harm or exploits beneficial opportunities. For example, shore protection (e.g., dikes, bulkheads, beach nourishment) can prevent sea level rise from destroying low-lying coastal property or farm land. Another policy related to rising sea levels is a population relocation or urban retreat, in which structures and inhabitants are relocated inland. The UNFCCC estimates that each \$1 invested in anticipatory action can save up to \$7 in future relief efforts. While the work on evaluating the economic cost necessary for adaptation is still in early stages, most estimates suggest approximately \$100 billion a year will be necessary to adapt to a 2°C warmer world by 2050. This amount is slightly lower than the level of foreign aid that developed countries give developing countries every year.

With growing commitment to adapt to “manage the unavoidable”, international efforts are increasingly focused on adaptation. One example of international efforts moving towards adaptation is the Adaptation Fund. The Adaptation Fund was established in 2001 and made operational in Bali in 2007 by the parties to the Kyoto Protocol to assist developing country parties to meet the costs of adaptation. The Fund is partially financed by proceeds stemming from credits issued for the Clean Development Mechanism (the CDM allows a developed country to earn carbon credits via implementing offset projects in developing nations toward meeting Kyoto targets; the credits then can be traded or sold). As of June 2011, funds available for projects totaled \$172 million, while the cumulative funding decisions from inception amounted to \$75 million. By the end of 2012, potential resources are expected to total \$315 million to \$440 million, based on World Bank projections of proceeds from CDM credits.

Adaptation efforts tend to be small-scale and local. For example, these include a UN Development Programme (UNDP) effort to help remote areas in Bangladesh improve agricultural productivity while reversing land degradation. Another UNDP example is a project in rural Niger aiming to foster sustainable water management in areas at risk of desertification. Vulnerable areas in developed countries are beginning to take action as well. For instance, coastal cities in Florida have started to undertake efforts in response to, and also in preparation for, natural disasters and coastal flooding, including improving drainage systems and relocating public works facilities to higher elevations.

With multilateral approaches focused on details, progress is occurring within individual countries

With the UN’s ability to deliver a binding and comprehensive agreement waning, a number of countries have moved to adopt climate policies unilaterally or in accords involving a small number of nations. This trend is especially visible in developing countries, while efforts in developed countries have stalled in the face of the economic downturn. Unilateral steps allow for greater flexibility and experimentation in approaches, targets and funding, and are likely to be the principal source of progress on climate policy in the next few years. Exhibit 6 shows some of these initiatives undertaken between 2006 and 2011, while Exhibit 13 in the Appendix gives a more detailed list of national efforts.

Exhibit 6: Countries focus on encouraging renewable energy capacity

Areas of focus for unilateral climate change efforts in selected countries

Country	Major climate change efforts 2006-2011 outside UN process						
	Renewable targets/ increased capacity	Incentives / Investment	Intensity / efficiency targets	Emission / energy taxes / price floors	Mitigation targets	Efforts to reduce deforestation	Cap-and-trade schemes
Australia		✓		✓			
Brazil	✓	✓			✓	✓	
China	✓	✓	✓			✓	
EU	✓	✓	✓	✓			✓
Germany	✓	✓					Participates in EU ETS
India	✓	✓	✓	✓	✓		
Indonesia	✓					✓	
Japan	✓	✓	✓				
Mexico	✓						
South Africa	✓		✓	✓			
UK	✓	✓	✓	✓	✓		Participates in EU ETS
US		✓	✓				

Source: Center for Climate and Energy Solutions, United Nations Environment Programme Finance Initiative, International Energy Agency, Office of Prime Minister of India, Bloomberg New Energy Finance, various governments' energy ministry press releases, Goldman Sachs Global Markets Institute.

Economic strength is allowing developing countries to pursue new climate initiatives

Developing countries are leading with new climate initiatives

Strong economic growth has made climate changes initiatives more politically attractive in a number of emerging economies. Growth gives these countries the flexibility to pursue climate policies without straining government expenditures. It makes policies to pursue energy independence and sustainable development more attractive. At the same time, as these countries build new capacity, they are able to leapfrog to cleaner technologies while many developed countries must spend resources on retrofitting existing capacity. In addition, both the Chinese and the Indian governments see direct economic opportunities through investments in new technology, particularly investment in research and development (R&D) in clean energy technologies.

Several countries have targeted an increase in the proportion of clean energy consumption, be it wind, solar, bio-fuel, hydro or nuclear. For example, China is committed in its 5-year-plan to have 11.4% of total energy consumption sourced from non-fossil energy by 2015, up from 4% in 2008. India hopes to derive 15% of its energy consumption from renewable sources by 2015, a significant increase over its 2% in 2008. Brazil is also increasing capacity in hydro, bio-mass and wind production, with renewable capacity growing at a rate of 42% between 2005 and 2010.

Efforts to reduce deforestation are also gaining momentum, following discussions in Copenhagen and Cancun. The World Resources Institute (WRI) estimates that deforestation alone drives 18% of total GHG emissions, making it the second-largest source of total emissions after electricity and heating, which drive 24.6% of total emissions. As trees are made up of 50% carbon, when they are burned or cut, they release carbon into the air. In addition, trees, through the process of photosynthesis, are ongoing natural carbon capture systems converting carbon dioxide into organic substances. Deforestation thus also reduces the potential for future carbon capture. Some countries with high deforestation levels are taking action to protect and preserve forests. In particular, Indonesia is expected to achieve 80% or so of its planned emissions reductions by 2020 from efforts to curb deforestation. Norway and the United States have pledged to help finance Indonesia's efforts. Brazil has also pledged in the past to reduce deforestation in the Amazon. However, after a reduction in total deforestation in 2010, Brazil has announced that levels in 2011 are again on the rise, casting doubts on its ability to achieve its target.

Finally, there is an important trend in moving "from carrot to stick" in policy making—by using taxes. India has recently instituted a tax on coal production and importation to finance investment in clean technology. South Africa is also considering implementing a carbon tax on non-renewable energy consumption, having already imposed a CO₂ emissions tax on passenger cars. China announced in November 2011 that it will implement a national sales tax on oil and gas and a production tax on coal.

Australia is pressing ahead with carbon pricing

Australia is also in the process of instituting a CO₂ emissions tax system, one which over time is designed to evolve into a cap-and-trade plan. Australia's move is in contrast to most other developed economies, which have largely seen their own efforts at carbon policy stall in the face of the economic downturn, as we discuss below. Of course Australia's current economic outlook is stronger than that of the United States or Europe, as the country continues to benefit from strong global commodity prices, trade relations with China and other nations in East Asia, and a relatively muted housing market decline.

Climate policy has slowed in developed world due to stagnant economic growth

Economic downturn has stalled action in most developed countries

In the rest of the developed world, stagnant economic growth has meant that there has been a slower uptake of new policies, at least on the national/regional level. In the major EU countries there is still determination to push the climate agenda forward but domestic issues are slowing down progress. A lack of consensus within the EU on economic priorities between the developed and emerging European economies will make regional policies more difficult. While the EU has many existing climate programs, such as the Emissions Trading System (ETS), renewable energy targets and feed-in tariffs, many of these policies were enacted before the credit crisis. The recession has caused the pace of new policies to slow dramatically in the past two years. Meanwhile, individual countries in Europe, specifically Germany and the United Kingdom, are charting their own rules and incentive schemes. Germany continues to build its solar and renewable capacity and was host to \$41 billion in clean technology investments in 2010, the second highest in the world after China. At the same time, the United Kingdom instituted aggressive mitigation targets and is engaging the private sector through a Green Deal (to encourage retrofitting of households) and a Green Investment Bank (to fund "green" infrastructure), both of which will benefit from public funding.

Within the United States, the federal government's ability to take a leading position in climate policy is limited. Persistent unemployment during an election period has already provided fodder for opposition to new climate initiatives. President Obama has allowed the Environmental Protection Agency (EPA) to push the agenda forward on some issues where Congressional approval is not legally required. However, the EPA faces challenges on its plans to regulate GHG emissions from power plants and refineries, both in Congress and

the federal courts. The proposed rules are politically unpopular as the potentially required shutdown or retrofit of power plants is perceived as hindering economic growth. The EPA has extended deadlines for proposed standards several times, and may continue to do so given the political pressure.

Despite the slowdown in comprehensive climate policy action in developed countries, one area of progress has been the development of fuel economy standards to regulate emissions from vehicles. As Exhibit 7 shows, Japan and the EU aim to reach a minimum of close to 50 miles per gallon (mpg) by 2015, while the United States recently enacted a minimum target of 34.1mpg by 2016. Both China and South Korea have proposed standards exceeding the current US target. The improvement in fuel economy in the United States would be a critical factor in reducing the nation's overall energy intensity to levels seen in other developed economies. At present, the tendency for Americans to drive larger cars, and over longer distances, than individuals in other countries explains much of the difference in energy usage and GHG emissions per capita and per unit of GDP.

Exhibit 7: Fuel economy standards in selected nations

Country/region	Status	Target Year	Adjusted target (mpg, normalized to US CAFE test cycle)
US	Enacted	2016	34.1
	Proposed	2025	54.5
Canada	Enacted	2016	34.5
EU	Enacted	2015	48.6
	Proposed	2020	64.8
Japan	Enacted	2015	47.0
	Proposed	2020	55.1
Australia	Voluntary	2010	30.1
China	Proposed	2015	36.9
South Korea	Proposed	2015	40.0

Source: International Council on Clean Transportation (ICCT).

Nuclear policy under review in many nations following Japan's nuclear accident

Japan's nuclear accident has affected climate policy as well. In its wake, many countries have made significant changes in their own renewable energy policies. Germany and Japan have made significant cutbacks to their existing nuclear capacity given renewed concerns about reactor safety. It is unclear if the nuclear gap can be filled without deepening reliance on high carbon emitting sources, meaning that this retrenchment on nuclear power may undermine these countries' ability to meet GHG reduction goals. There has also been an impact on development of new plants. While some countries are constructing new reactors (India has continued with its nine reactors under construction), others have delayed prospective plans (China has suspended approvals for new nuclear plants pending a review of nuclear safety and atomic energy regulation). Whether this pullback from nuclear energy will be long-lasting remains to be seen, but one enduring impact from the accident will be higher costs due to greater emphasis on nuclear safety, in both existing and new plants.

Efforts continue at the US state and regional level

US states and regions are moving ahead without waiting for federal action

Many individual states, including those with significant GHG emissions, are undertaking climate actions without direct federal involvement. Consider that California, long regarded as a leader in climate policy, generates 13% of the nation's GDP but only 7% of nationwide emissions. By contrast, Texas generates 8% of the US GDP and 11% of total US emissions. The differences are linked to the industrial activities in each state and to their specific mitigation efforts.

Twenty-three states have thus far adopted statewide emission reduction targets. One approach many states have taken is the imposition of mandatory renewable portfolio standards (RPS), which require a specified amount of electricity generation from renewable sources. For instance, California's policy requires 33% of electricity to come from renewable sources by 2020. In 2010, the three large investor-owned utilities (IOUs), which provide approximately 68% of California's electric retail sales, reported to have sourced 17% of their electricity from RPS-eligible generation. Texas previously committed to installing 5,880MW of new renewable generation by 2015 (about 5% of the state's projected electricity demand) and 10,000MW by 2025. These goals were exceeded in 2010 when Texas had nearly 11,000MW in wind capacity.

Outside of the individual states framework, collaboration across state borders has resulted in regional climate-related initiatives. For instance, the Regional Greenhouse Gas Initiative (RGGI), the first US GHG cap-and-trade program for CO₂ emissions, includes ten Northeastern and Mid-Atlantic states. Cumulative auction proceeds as of September 2011 totaled \$900 million, with participating states investing 80% of the proceeds toward energy efficiency or GHG emissions reduction programs.

At the same time, however, the economic downturn and political factors have impeded some activities, as seen in recent attempts by newly elected officials in several states to reverse earlier climate initiatives. For example, lawmakers in New Jersey and Maine have recently proposed withdrawing from RGGI.

Cap-and-trade efforts around the world

The RGGI is an example of an effort to tackle GHG emissions through a cap-and-trade mechanism. These systems differ in detail but at their core all impose a system-wide cap on permitted emissions at a "cap" and allow participants to trade credits in line with their own usage and emissions. Similar programs are in effect or underway around the world.

Currently, the largest emissions trading arrangement is the EU's Emissions Trading System (ETS), which covers over 10,000 facilities accounting for 50% of the EU's CO₂ emissions. However, initial design flaws in the first two phases of the ETS have led to uncertainties regarding the configuration of the third phase in 2013. In the first two phases, the over-allocation of emissions credits provided windfalls to the receiving businesses and distorted the market price of carbon. Moreover, towards the end of the first phase, trading volumes fell and the price of allowances fell close to zero as credits were not transferable from phase one to phase two. The EU is currently looking at revising the program as the second phase is due to expire at the end of 2012.

Other programs include Australia's system, discussed earlier in this paper, which will from July 2012 impose a price of AUD\$23 (approximately US\$22.3) per ton of carbon emissions for the top 500 emitters. This price is considered quite ambitious when compared with trading prices in other programs—allowances in the RGGI have been trading close to the minimum bid of \$1.89, while EU allowances have been pricing around €10. In the United States, California adopted rules in October 2011 to regulate GHG emissions; this scheme is more extensive than most initiatives as it extends beyond carbon emissions to include

other GHG such as methane, nitrous oxide and sulfur hexafluoride. The first compliance period is expected to begin in 2013. A more detailed comparison of selected cap-and-trade plans can be found in Exhibit 14 in the Appendix.

Private sector is stepping up

Corporate leaders are finding revenue opportunities in climate change

Companies are incorporating environmental initiatives in their business models

The private sector is playing an increasingly large role in implementing climate initiatives. Looking across the spectrum of company programs, we see three broad types of initiatives in addition to brand management. The first category is cost containment, the “low-hanging fruit”, where companies use environmental initiatives as a way of cutting expenses. The second category, risk management, moves one step beyond cost reduction, to include efforts that incorporate climate action into operational risk mitigation strategies. The third category comprises corporate initiatives to capitalize on the revenue opportunities that climate change is generating. Exhibit 15 in the Appendix displays examples of initiatives from large companies in various industries. Since we began tracking corporate initiatives about 10 years ago, we have seen a notable increase in activities in the third category.

Most large companies have already recognized the cost containment benefits in sustainable initiatives and have taken the steps to incorporate energy use reduction in long-term cost-cutting strategies. Here are some examples.

- Wal-Mart has set goals to double the efficiency of its fleet by 2015 from a 2005 baseline, allowing the company to save on transportation costs.
- Coca Cola has established targets for 2015, including a pledge to improve packaging material efficiency per liter of product sold by 7% from 2008 levels and a commitment to improving water efficiency by 20% from 2004 levels.
- Microsoft is working to design and construct data centers that average 1.125 in power usage effectiveness (PUE), compared to the current industry average of 2 PUE. Increasing the efficiency of data centers will help increase the environmental benefits associated with cloud computing.

Increasingly, climate initiatives are also being incorporated into operational risk management strategies. Increasing the use of renewable energy allows firms to diversify their energy supply, helping to reduce their exposures to the risk of higher future costs from traditional sources of energy.

- Kohl’s is the largest single host of solar electricity production in North America, with 116 solar power systems installed on store rooftops. The systems are expected to provide about 40% of these stores’ power.
- Sprint has pledged to meet 10% of its total energy needs from renewable sources by 2017. For example, 80% of the corporate headquarters’ power is currently purchased from a wind farm.
- Shell is involved with carbon capture and storage (CCS) projects to mitigate emissions from large-scale fossil fuel use in Australia, Canada and Norway.

Some corporations are going beyond cost cutting and risk mitigation and are recognizing climate change as a business opportunity.

- General Electric launched its “ecomagination” brand in 2005 for operationally and environmentally efficient products. With expectations that “ecomagination” sales will

grow at two times the rate as the rest of the company, GE has pledged to invest \$10 billion in “ecomagination” products by 2015.

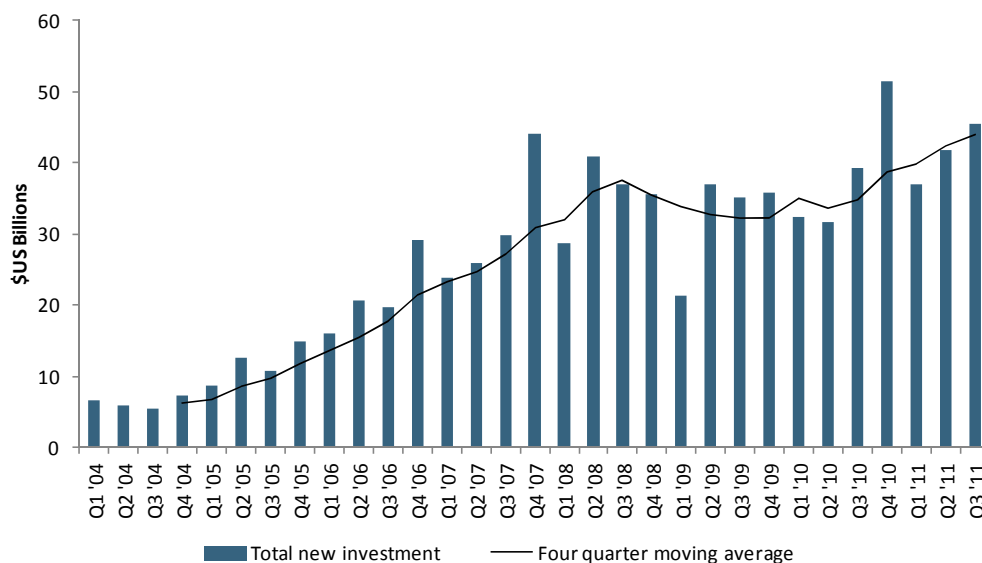
- Many power companies, foreseeing future demand for renewable-sourced electricity, have started to include renewable energy in their generation portfolios. For instance, Exelon has announced plans to invest \$5 billion in clean energy projects by 2015.
- The electric utilities industry has responded to increased electricity needs through the use of smart grid technologies. Smart grids use information and communication technologies to make electric power systems more reliable and efficient. Some of the largest utilities in the United States, including Xcel Energy, Pacific Gas and Electric (PG&E) and American Electric Power, have started deploying smart grid technologies. PG&E, for example, has a smart meter system, allowing consumers to track energy use at any time. This data allows customers to choose from optional rate schedules depending on their own energy consumption patterns.

Clean technology investment is rising again and is on track to reach record level in 2011

Investment in clean technology is again on the rise

After a short-lived decline in global investment in clean energy in 2008 and early 2009, there has been growth in global investment levels. In the third quarter of 2011, global new financial investments in clean energy totaled \$45 billion, the second highest quarterly level since 2004 and on track to reaching a record year in investments. Through asset financing, venture capital, private equity and public markets, investment has been directed toward corporate initiatives, R&D, capacity building and household projects including solar panels. See Exhibit 8.

Exhibit 8: Global new clean investment bounces back from recessionary impact



Note: Excludes corporate and government R&D, and small distributed capacity.
Source: Bloomberg New Energy Finance.

One clear effect of this investment has been a rise in renewable energy capacity across the globe, especially in China, Germany, and the rest of the EU—between 2005 and 2010 capacity grew by 106%, 67%, and 45% respectively. Renewable capacity has also grown extremely rapidly in other countries, including South Korea (88% growth) and Turkey (85%

growth). While the US remains the country with the second highest capacity, it is not building new capacity as quickly as either China or the major European countries.

At the global level, total capacity of renewable energy generation by year-end 2010 reached 388 gigawatts (GW), doubling levels from just three years ago. This added capacity is a key step to reaching country targets and pledges. However, despite this recent growth in capacity, Bloomberg New Energy Finance and the UN estimate that as of 2010 renewable capacity (excluding hydro) is still only 8% of total energy capacity.

Global clean energy policy has benefited from government support following the credit crisis. According to Pew Environment Group, government stimulus funds from G-20 countries post-2008 reached \$194 billion. Interestingly, the United States was the leader in government stimulus support with \$65 billion announced. However, although China announced a lower amount of support (\$46 billion) than the United States, a higher amount was deployed (\$32 billion in China versus \$23 billion in the US). Some of these funds have been funneled to research and development. Global R&D funding of renewable energy, coming from both the private and public sectors, grew by a remarkable 50% during 2010, jumping to \$9 billion from \$6 billion in 2009. Of the total government stimulus funds announced, only half has been spent by end of 2010, leaving approximately \$100 billion still on the table, mostly in the US (\$42 billion), South Korea (\$20 billion) and China (\$14 billion).

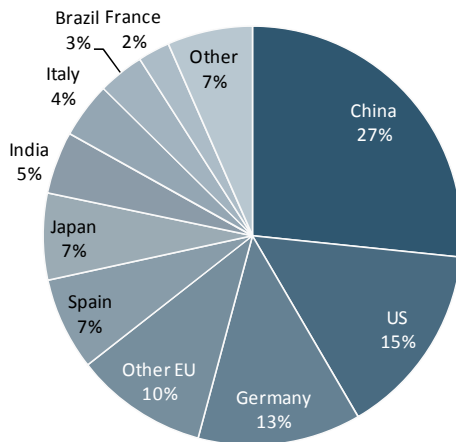
China has emerged as the world leader in clean energy investment

Much of the growth in clean energy investment is coming from developing countries. In 2010, developing countries as a whole, and for the first time, overtook the developed world in total investment levels. Due in part to a significant financial commitment by the Chinese government, China had already surpassed the United States in total clean energy investments in 2009. By the end of 2010, annual investment in China’s clean energy sectors totaled \$50 billion, 70% higher than the rate in the United States.

China also surpasses the United States in already installed renewable energy capacity (103 GW as opposed to 58 GW) and has become the single country with the largest capacity, at 27% of the global total. Brazil and India are also attracting significant levels of investment at \$6.9 billion and \$4 billion respectively, capturing the fifth and ninth places in the top ten clean-energy investment destinations. See Exhibits 9-10.

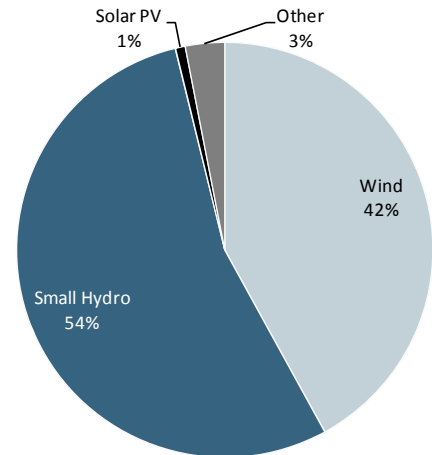
Exhibit 9: Breakdown of global renewable energy capacity

China’s investment pays off as it becomes the global leader in renewable energy capacity



Source: Pew Environment Group.

Exhibit 10: China’s renewable energy capacity



Source: Pew Environment Group.

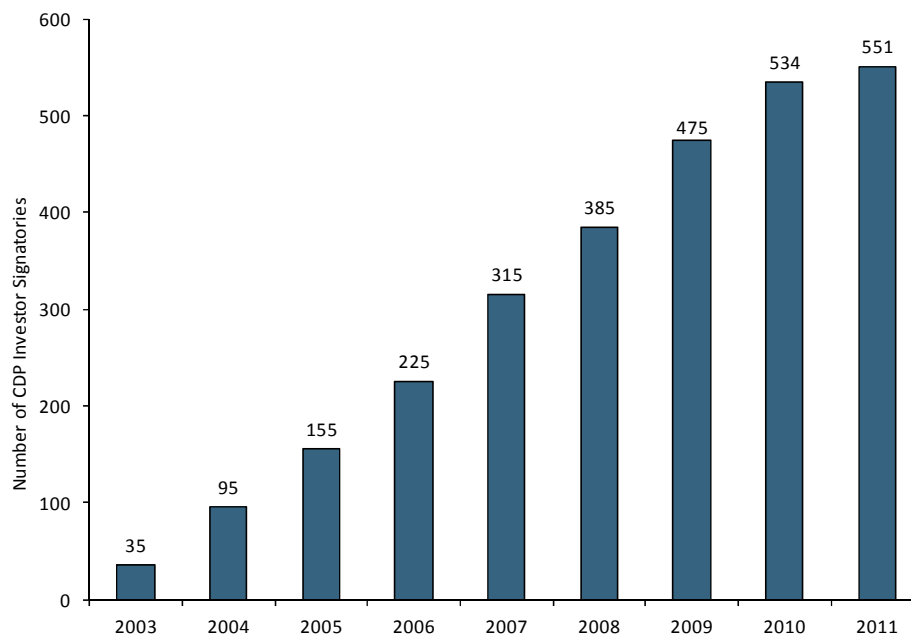
Investor interest in climate change continues to grow...

Growing investor interest in climate change

The private sector initiatives are being supported by an increasing investor interest in sustainable investment. One indication of this trend is the Carbon Disclosure Project, which works on behalf of institutional investors to collect company disclosures on the business impact of climate change. Since its inception in 2003 with 35 investor group participants, the project has now expanded to include 551 investor groups. See Exhibit 11.

Exhibit 11: Rising investor interest in climate change

Investor groups participating in the CDP



Source: Carbon Disclosure Project.

...leading to increased climate change disclosures from companies

The growing number of investor groups interested in the impact of climate change on business operations has pressured companies to disclose more information. As a result, over time the CDP has received responses from a growing number of companies from various sectors, especially many carbon-intensive industries. Through the CDP, companies report climate-related data, including GHG emissions, water management and climate change strategies, providing investors with more information to incorporate in their investment analyses.

An additional source of investor pressure on companies is the growing Investor Network on Climate Risk (INCR). The INCR was recently involved with the successful petition to the SEC for formal guidance on climate change-related disclosures made in financial filings, which became effective in 2010. The SEC Guidance emphasized the disclosure of climate change issues that present material risks to investors. While the availability of corporate disclosure practices on climate change has improved since the release of that Guidance, the level of detail and clarity still varies greatly among companies. Overall disclosures are inconsistent, vary in format and often lack in quantitative measurements, making it difficult for investors to compare between companies.

Appendix

Exhibit 12: Selected country pledges under the Cancun Agreements

Country	Pledges by year 2020	Conditions	Percent of World's CO ₂ emissions (2009)	CO ₂ Emissions Per Capita (Metric Tons of CO ₂ per capita)
Australia	5 - 25% below 2000 levels	<ul style="list-style-type: none"> * Reduce by 25% if global deal reached to stabilize levels of GHGs in atmosphere at 450ppm CO₂-eq or lower * Reduce by 15% if global agreement only includes significant developing country commitments and developed country commitments similar to Australia's * Unconditionally reduce emissions by 5% below 2000 levels 	1.4%	19.6
Brazil	36.1 - 38.9% below business as usual	<ul style="list-style-type: none"> * Actions are voluntary in nature (though coded into domestic law) * Use of Clean Development Mechanism (CDM) is not excluded 	1.4%	2.1
Canada	17% below 2005 levels	* Conditioned on being aligned with final US enacted reductions	1.8%	16.2
China	40 - 45% below 2005 CO ₂ intensity levels	* Actions are voluntary in nature	25.4%	5.8
EU	20 - 30% below 1990 levels	* Reduce by 30% if other developed countries commit to similar targets and developing countries contribute adequately	12.9%	7.8
India	20 - 25% below 2005 CO ₂ intensity levels	<ul style="list-style-type: none"> * Excludes agriculture * Actions are voluntary 	5.2%	1.4
Indonesia	26% below business as usual	<ul style="list-style-type: none"> * Will reduce by 41% if received international support (pledged informally in subsequent forums) * Limited to specific sectors * Effort expected to focus on reducing deforestation 	1.4%	1.7
Japan	25% below 1990 levels	* Fair and effective local framework with participation of major countries undertaking ambitious targets	3.6%	8.6
South Korea	30% below business as usual	* N/A	1.5%	9.2
Mexico	30% below business as usual	* Subject to the provision of adequate financial and technological support from developed countries	1.5%	4.0
New Zealand	10 - 20% below 1990 levels	* Subject to global agreement that sets world on path to limit temperature rise to 2°C, similar targets by developed countries and appropriate targets for advanced developing countries	0.1%	9.3
Russia	15 - 25% below 1990 levels	<ul style="list-style-type: none"> * Appropriate accounting of the potential of Russia's forestry sector in the context of its contribution to meeting the obligations of anthropogenic emission reductions * The undertaking by all major emitters of the legally binding obligations to reduce anthropogenic GHG emissions 	5.1%	11.1
South Africa	34 - 42% below business as usual	* Conditioned on finance, technology, and capacity-building support from developed countries	1.5%	9.2
United States	17% below 2005 levels	* Conditioned on domestic legislation	17.9%	17.7

Source: World Resources Institute, UNFCCC, Center for Climate and Energy Solutions.

Exhibit 13: Major climate change efforts in selected countries 2006-2011

Initiatives outside of the UNFCCC process

Country	Efforts in 2006-2011 (outside UN process)
Australia	<ul style="list-style-type: none"> - "Clean Energy Future" legislation (2011) aiming at: <ul style="list-style-type: none"> * A carbon price scheme and eventual emissions trading scheme * Closure of the most emission intensive power plants * Renewable energy financing: total of A\$13.4 billion for businesses with new clean energy technologies, R&D efforts, and business investment * Government will provide free carbon permits and financial assistance to emissions intensive industries - Government will provide assistance to generators to shut down 2000 MW of highly polluting power plants - Government will provide funding for private sector to conduct R&D and initiate investments in clean energy
Brazil	<ul style="list-style-type: none"> - New Decennial Plan (2010-2019) calling for: <ul style="list-style-type: none"> * Increased capacity in hydro (116.7 GW+7 GW small hydro), biomass (8.5 GW), and (6 GW) wind by 2019 * Investment of BRL952 billion (approx. \$540 billion) over 10 years to achieve targets * Increase grid-connected renewable capacity of 4GW by the end of 2010, 777 MW in 2011 and 2 GW in 2012 - Domestic law requires reduction of 1.3 billion-tonne in CO₂ emissions by 2020 - National Climate Change Plan legislation (2008) calls for reduction in deforestation by 50% by 2017 and raising proportion of energy produced using sugarcane bagasse cogeneration to 11.4% of energy consumption by 2030
China	<ul style="list-style-type: none"> - 12th 5-year plan (2011) specifies: <ul style="list-style-type: none"> * Targets on reducing energy intensity by 16% and carbon intensity by 17% by 2015 * Increase non-fossil energy to 11.4% of total energy use * Investment in railways and public transportation * Reforestation efforts * Pilot cap-and-trade schemes - Announced in 2010 a 15-year national Feed-In Tariff for biomass energy production - Government required (2009) provinces to come up with off-shore wind energy plans and set a target for offshore wind deployment targets of 5 GW by 2015 and 30 GW by 2030 - Government required (2009) electricity grid companies to buy whole renewable capacity from renewable energy producers and gives priority power dispatching to renewable energy - Special fund created (2009) to fund R&D in renewable energy
EU	<ul style="list-style-type: none"> - New directive for Emissions Trading System (ETS) to come into effect in 2013 - Commitment to invest in construction of up to 12 power plants using carbon capture and storage technology - Renewable Energy target: 20% renewable from energy sources and 10% biofuels of all fuel consumption by 2020 - Non-binding target of 20% improvement in energy efficiency by 2020 - Auto fuel economy: mandatory standards to reduce average CO₂ emissions in cars by 25% by 2015 - Minimum energy taxes: Set minimum taxes on energy products with exemptions for renewables - Fuel quality directive instructing fuel suppliers to reduce life-cycle emissions by 6% by 2020 - Building standard: minimum energy efficiency standards for new commercial and residential buildings
Germany	<ul style="list-style-type: none"> - Solar feed-in tariffs - an established program - is set to reduce government subsidy by 15% starting 2012 to account for cost reductions. The local PV industry continues to grow its PV capacity at a rate of 3.5 GW per year - Renewable Energy Sources Act (2009) sets out Feed-In Tariffs and replacement subsidies to wind, solar, hydropower, biogas, and geothermal facilities
India	<ul style="list-style-type: none"> - Clean Energy Fund financed by a tax of US\$1 per tonne of coal – expected to raise US\$1.1bn which will be used for funding research and innovative projects in clean energy technologies. - National targets: <ul style="list-style-type: none"> * Increase proportion of electricity from renewable energy sources to 15% by 2020 * Install 1 GW by 2013, 4 GW by 2017, and up to 20 GW of solar by 2022 * Make biofuels comprise at least 20% of diesel and gasoline by 2017 * Install 60 GW of nuclear power capacity by 2030 * Reduce the specific energy consumption of designated consumers in industry by approximately 5% over the period by 2015 - National ethanol support scheme (2007) including price fixing for ethanol, freight subsidies for sugar mills exports (until 2008), mandating 10% mix of ethanol with petrol, and allowing production of ethanol directly from sugar cane

Source: Center for Climate and Energy Solutions, UN Environment Programme Finance Initiative, International Energy Agency, World Resources Institute, Office of Prime Minister of India, Bloomberg New Energy Finance, and various government energy ministry press releases.

Exhibit 13 cont'd: Major climate change efforts in selected countries 2006-2011

Country	Efforts in 2006-2011 (outside UN process)
Indonesia	<ul style="list-style-type: none"> - Signed an agreement with Norway to receive a grant of up to \$1bn in exchange for efforts on deforestation. Agreement specifies a moratorium on future concessions for deforestation and preparation for trading in carbon - National biofuel production plan specifies targets of 20% of diesel consumption to use biodiesel and 15% of gasoline consumption to use bioethanol by 2020
Japan	<ul style="list-style-type: none"> - Target proportion of renewable energy set to 10% of total energy supply by 2020 - Long standing Feed-In Tariff rates paid for surplus solar power (recently increased tariffs) and subsidies for household PV - Building standards regulating energy efficiency in small and large buildings - Expected to re-evaluate its energy program post-nuclear crisis
Mexico	<ul style="list-style-type: none"> - 15-year energy plan to use 35% of its power from renewable energy sources by 2024 (extending prior plan to reach 7.6% renewable energy capacity by 2012)
South Africa	<ul style="list-style-type: none"> - Proposed carbon tax on non-renewable energy consumption (follow on to instituted tax on passenger vehicles) - Proposed GHG emissions caps on top polluting companies from selected industries - National plan to reduce dependence on coal: reduction of coal proportion of total energy sources from 93% in 2011 to 46% in 2030, this will be partially reached by increased use of nuclear energy (to 12.7% by 2030) and renewable energy (33.7% of total capacity by 2030)
UK	<ul style="list-style-type: none"> - Carbon budget: targeting a 50% reduction in UK greenhouse gas emissions from the 1990 baseline - Building nuclear capacity to reduce carbon emissions - CRC Energy Efficiency Scheme: a mandatory scheme aimed at improving energy efficiency and cutting emissions in large public and private sector organizations - Plan to reach proportion of 15% of energy consumption from renewable energy by 2020 - Pending reform legislation on a carbon price floor and feed-in-tariffs - Market oriented tools: the Green Deal and the Green Investment Bank aimed at getting private sector involvement to deliver solutions to households and businesses to increase their use of renewables - Renewable Heat Incentive scheme (2011) provides 20-year Feed-In Tariffs to non-household and subsidies for installation of renewable heating sources in households - Energy Act (2010) specifies financial assistance to build 4 carbon capture and storage demonstration projects - Low Carbon Industrial Strategy (2009) legislation includes up to GBP 195 million for development renewable energy capacity including nuclear capacity, GBP 230 million for electric vehicle consumption and deployment, incentives for construction of low-carbon homes, and a fund GBP 405 million to support R&D in renewable energy - Target set (2009) for renewable energy to reach 30% of total energy consumption - Microgeneration strategy (2006) specifies government assistance of GBP 30 million for households and small businesses to install clean microgenerators to test the viability of this option long term
US (federal)	<ul style="list-style-type: none"> - Joint rule from the Environmental Protection Agency (EPA) and the Department of Transportation (DoT) establishing GHG emission and fuel economy standards for light-weight vehicles. This is expected to reduce emissions by 21% from business as usual by 2030 - Stimulus bill included financial support for building efficiency, renewable energy, transit, and high speed rail - Executive order mandating federal agencies to reduce their GHG emissions, carbon footprint, and improve water management

Source: Center for Climate and Energy Solutions, UN Environment Programme Finance Initiative, International Energy Agency, World Resources Institutes, Office of Prime Minister of India, Bloomberg New Energy Finance, and various government energy ministry press releases.

Exhibit 14: Comparison of selected cap-and-trade programs

Cap-and-trade program	Participants	Covered gases	Implementation Date	GHG Cap	Allowances	Price	Proceeds	Penalties for non-compliance
EU ETS (27 EU members plus Iceland, Liechtenstein and Norway)	<ul style="list-style-type: none"> - Powerplants with over 20 MW in capacity and metals/minerals processing plants (the 10,000+ covered facilities currently account for approx. 50% of EU's CO₂ emissions) - Proposal to include aviation in 2012 	Carbon dioxide	<ul style="list-style-type: none"> - First 'learning by doing' stage: 2005-2007 - Second stage: 2008-2012 (coincides with first commitment period of Kyoto Protocol) - Third Stage: 2013-2020 	<ul style="list-style-type: none"> - 2008-2012: 2.08 billion MtCO₂e annually (capped at 6.5% below 2005 levels to help ensure delivery on Kyoto commitments) - Cap will gradually decline each year by 1.74% until 2020 (to reach 21% reduction compared with 2005) 	<ul style="list-style-type: none"> - 95% of allowances were allocated for free in the first phase - 90% of allowances were distributed for free during the second trading period and the remaining 10% to be auctioned - The overall proportion of permits auctioned will increase in subsequent trading periods, reaching 100% in 2027 (one EU emission allowance (EUA) represents one ton of CO₂) - Emissions offsets and emissions credits generated from the Kyoto Protocol Clean Development and Joint Implementation Mechanisms are permitted 	<ul style="list-style-type: none"> - EUAs were priced at close to zero during the final six months of 2007 given the nontransferability of Phase 1 EUAs to Phase 2 - EUAs are currently priced around €10 	<ul style="list-style-type: none"> - The ETS directive recommends at least half the revenue be used to fight and adapt to climate change within the EU and in developing countries 	<ul style="list-style-type: none"> - Fine of €100 per ton of CO₂ in excess of permissible limit and compensate for the missing EUAs in following year
Regional Greenhouse Gas Initiative (participating states: CT, DE, MA, MD, ME, NH, NJ, NY, RI, VT)	<ul style="list-style-type: none"> - Fossil fuel-fired plants 25MW or greater in size 	Carbon dioxide	<ul style="list-style-type: none"> - Compliance periods are 3 years (first period: 2009-2011) 	<ul style="list-style-type: none"> - 2009-2014: stabilize emissions at 188 million tons annually - 2015-2018: total reduction of 10% with cap declining by 2.5% per year 	<ul style="list-style-type: none"> - CO₂ allowances issued by each participating state are distributed through quarterly, regional CO₂ allowance auctions (one CO₂ allowance represents one ton of CO₂ emissions) - Emissions offsets are permitted for qualifying GHG reduction projects outside the electricity sector (power plants can use offsets to meet 3.3% of compliance obligation) 	<ul style="list-style-type: none"> - Clearing price for auctions has steadily declined from over \$3 in Sept 2008 to \$1.89 at the Sept 2011 auction (minimum allowable bid is set at \$1.89 per CO₂ allowance) - Ratio of bids to supply decreased from 4.1 at the first auction in Sept 2008 to 0.18 at the Sept 2011 auction 	<ul style="list-style-type: none"> - Cumulative proceeds totaled \$900.5 million through September 2011, with 80% invested in consumer GHG reduction programs 	<ul style="list-style-type: none"> - In the case of excess emissions, the entity will be deducted allowances equal to three times the number of the excess emissions - Enforcement is a state-by-state process and additional penalties can be decided by the relevant state on a case-by-case basis
Australia's Carbon Pricing Mechanism	<ul style="list-style-type: none"> - Top 500 emitters (excludes agriculture and transport sector) 	Carbon dioxide	<ul style="list-style-type: none"> - Fixed carbon tax beginning in July 2012 - Emissions trading scheme from July 2015 onward 	<ul style="list-style-type: none"> - Caps not yet announced (planned announcement in 2014) 	<ul style="list-style-type: none"> - Export-focused industries with intensive emissions (aluminum, zinc refiners and steel makers) will get 94.5% of carbon permits for free in the first 3 years 	<ul style="list-style-type: none"> - Fixed carbon tax of AUD\$23 a ton on the top 500 polluters from July 2012 and increasing 2.5% annually until 2015 - Shift to an emissions trading scheme with floating-rate price from July 2015 onward (with set price floor of AUD\$15 and ceiling of AUD\$20 above the international carbon price) 	<ul style="list-style-type: none"> - Half of the tax's revenue will be spent on compensating consumers for higher electricity bills and other costs passed on by polluters - 40% will be used to help industries lower costs by switching to cleaner forms of energy (if they face competition from untaxed foreign competitors) - AUD\$10 billion will be invested in renewable energy sources over 5 years 	
California Cap-and-Trade Program	<ul style="list-style-type: none"> - Phase 1 (2013): all major industrial sources and electric utilities whose GHG emissions exceed 25,000 MtCO₂e - Phase 2 (2015): distributors of transportation fuels, natural gas and other fuels 	Carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride and other fluorinated greenhouse gases	<ul style="list-style-type: none"> - First compliance period: 2013-2014 - Second compliance period: 2015-2017 - Third compliance period: 2018-2020 	<ul style="list-style-type: none"> - First compliance period: initial aggregate cap of 162.2 million MtCO₂e for all regulated sectors as of 2013, set to decline to 159.7 million MtCO₂e in 2014 - Second Compliance period: aggregate cap raised to 394.5 million MtCO₂e (to accommodate inclusion of new sectors) - Third Compliance period: cap declines to 334.2 million MtCO₂e by 2020 - In aggregate, the declines represent a 2-3% reduction per year in emissions from fossil fuel use 	<ul style="list-style-type: none"> - For electric utilities: allocations are free to public owned utilities and free initially for investor owned utilities - For industrial sector: initially, 90% of allowances will be allocated for free and the remaining 10% will be sold in auctions. Over time, free allowances will decline. (one allowance represents one MtCO₂e) - Emissions offsets are permitted to comply with 8% of annual compliance obligation 	<ul style="list-style-type: none"> - Minimum price of \$10 per metric ton for 2012 and 2013, rising 5% (over inflation) in following compliance periods 	<ul style="list-style-type: none"> - Auction proceeds are required to be used for the benefit of electricity ratepayers 	<ul style="list-style-type: none"> - Regulated entities are allowed to misreport up to 5% of GHG emissions - Above 5%, entities must replace the underreported allowances - In the case where an entity fails to submit allowances, it will be required to supply four times the original required allowances and be subject to other penalties

Source: European Commission Climate Action, Regional Greenhouse Gas Initiative, Australian Government Clean Energy Future, California Environmental Protection Agency Air Resources Board, Goldman Sachs Global Markets Institute.

Exhibit 15: Selected company initiatives from various sectors and countries

Company	Sector	Country	Selected corporate initiatives	Brand management	Cost containment	Risk management	Revenue enhancement
Coca-Cola	Consumer	us	<p>Established 2015 goals to:</p> <ul style="list-style-type: none"> - Grow business without increasing system wide carbon emissions from manufacturing operations (from 2004 levels) - Reduce absolute emissions from manufacturing operations in developed countries by 5% (from 2004 levels) - Improve packaging material efficiency per liter of product sold by 7% (from 2008 levels) - Improve water efficiency by 20% (from 2004 levels) 	✓	✓		
Kohl's	Consumer	us	<ul style="list-style-type: none"> - Recycled 77% of all waste in 2010 - Met 100% of energy use with renewable sources in 2010 and 2011 - Largest single host of solar electricity production in North America with 116 solar power systems in the US (solar systems provide approximately 40% of each store's power) 	✓	✓	✓	
Starbucks	Consumer	us	<ul style="list-style-type: none"> - Goals to develop comprehensive recycling solutions for paper and plastic cups by 2012 and to serve 25% of beverages in reusable cups by 2015 (although only 1.8% was achieved in 2010) - Target to reduce energy consumption by 25% in company-owned stores by 2015 (previous goal to do so by 2010 was not achieved) - Purchased renewable energy equivalent to 50% of electricity used in company-owned stores; set goal to increase to 100% by 2015 - Engaged in partnership with Conservation International to improve farmers' access to carbon markets (over 5,000 tons of carbon credits have been sold to date through pilot program) 	✓	✓	✓	
Sysco	Consumer	us	<ul style="list-style-type: none"> - Sustainable Agriculture/Integrated Pest Management (IPM) program collects sustainability data from suppliers with the aim of reducing inputs, waste and cost - Distribution fleet includes 100 hybrid electric/diesel trucks and 70 LNG-powered 18-wheelers - Currently testing alternative technologies to power refrigeration units 	✓	✓		
Walmart	Consumer	us	<p>Set targets to:</p> <ul style="list-style-type: none"> - Reduce global GHG emissions from buildings by 20% by 2012 (from 2005 levels); an absolute reduction of 10.5% was achieved by year end 2009 - Double fleet efficiency in the US by 2015 (from 2005 levels); a 65% improvement was achieved in 2010 by replacing nearly two-thirds of the fleet with more efficient tractors - Eliminate 20 million metric tones of GHG emissions from the global supply chain by 2015 - Create zero waste with goals to eliminate landfill waste generated by US operations by 2025 and reduce the global plastic shopping bag waste by an average of 33% per store by 2013 	✓	✓		

Note: Checkmark categorization corresponds to selected corporate initiatives mentioned in company filings.
Source: Company filings through 2011, Goldman Sachs Global Markets Institute.

Exhibit 15 cont'd: Selected company initiatives from various sectors and countries

Company	Sector	Country	Selected corporate initiatives	Brand management	Cost containment	Risk management	Revenue enhancement
Chevron	Energy	US	<ul style="list-style-type: none"> - Largest producer of geothermal energy in the world with 1,273MW of installed electricity-generating capacity in Indonesia and the Philippines - Operates cogeneration units at refineries and production facilities to generate electricity on-site (total capacity of about 3,500MW) - Subsidiary Chevron Energy Solutions (CES) helps schools, government agencies and business use energy for efficiently and reduce energy use (CES helps clients reduce energy use by average of 30%) - Established the Environmental, Social and Health Impact Assessment (ESHIA) process in 2007 to evaluate all new capital projects for potential risks (applied to 690 projects since inception) 	✓	✓		✓
Exxon Mobil	Energy	us	<ul style="list-style-type: none"> - Set target to improve energy efficiency against worldwide refining and chemical operations by at least 10% between 2002-2012 - Since 2006, invested \$1.6 billion in projects to improve energy efficiency and GHG emissions reductions and over \$5 billion in gas utilization and commercialization projects to reduce routine natural gas flaring 	✓	✓	✓	
Shell	Energy	Netherlands	<ul style="list-style-type: none"> - Involved with carbon capture and storage (CCS) projects to mitigate emissions from large-scale fossil fuel use in Australia, Canada and Norway - Met goal to reduce GHG emissions from global facilities by 5% below 1990 levels in 2010 - Established the Shell Eco-marathon to challenge students to design and build energy-efficient cars able to travel the furthest distance on one liter of fuel 	✓	✓	✓	
Johnson & Johnson	Healthcare	US	<ul style="list-style-type: none"> - Achieved 23% absolute reduction in CO2 emissions from 1990-2010 - Eliminated 88% of secondary and tertiary PVC packaging - 98% of manufacturing and R&D facilities provide facility-or-company-specific environmental sustainability information for posting on jnj.com 	✓	✓		
Deutsche Post DHL	Industrial	Germany	<ul style="list-style-type: none"> - GoGreen program: committed to improving CO2 efficiency of operations and transportation subcontractors by 20% by 2020 (from 2007 levels) - Ongoing effort to replace older vehicles with more fuel-efficient models (1,800 new fuel-efficient trucks to be operated in UK, Finland in Sweden starting in 2010) and invested in piloting over 80 electric vehicles in 2010 	✓	✓		

Note: Checkmark categorization corresponds to selected corporate initiatives mentioned in company filings.

Source: Company filings through 2011, Goldman Sachs Global Markets Institute.

Exhibit 15 cont'd: Selected company initiatives from various sectors and countries

Company	Sector	Country	Selected corporate initiatives	Brand management	Cost containment	Risk management	Revenue enhancement
General Electric	Industrial	us	<ul style="list-style-type: none"> - Launched ecomagination in May 2005 to provide products that improve customers' operating performance and environmental performance - Pledged to invest \$10 billion in ecomagination products by 2015 (110 ecomagination products in total as of 2011) with expectations that ecomagination sales will grow twice as fast as the rest of the company - Reduced GHG emissions by 24% and reduced energy use by 18% (from 2004 levels) while energy intensity improved by 32.8% (from 2004 levels) - Reached multiyear target of investing \$6 billion in renewable energy in 2010 	✓	✓	✓	✓
Swiss Re	Insurance	Switzerland	<p>Established Greenhouse Neutral program to:</p> <ul style="list-style-type: none"> - Reduce per capita CO2 emissions by 30% until 2013 and to fully compensate the remaining emissions (at end of 2009, total reduction in per capita CO2 emissions since 2003 was 48.4%. Remaining emissions from 2003-2008 were compensated through buying and retiring voluntary emission reduction certificates) <p>Created COYou2 Reduce and Gain program for employees to:</p> <ul style="list-style-type: none"> - Provide subsidies for employees for a range of emissions-cutting investments in private lives (for example, public transportation, household appliances and hybrid cars) 	✓			
Dow Chemical	Materials	us	<p>Established 2015 goals to:</p> <ul style="list-style-type: none"> - Increase sales of products that meet high 'sustainable chemistry advantages' standards to 10% - Reduce GHG emissions by 2.5% per year (from 2005 levels) - Reduce energy intensity by 25% (from 2005 levels) 	✓	✓		✓
DuPont	Materials	us	<ul style="list-style-type: none"> - Reduced global GHG emissions by 72% since 1990, with an additional reduction of 10.5% from 2004 levels in 2010 - Reduced water consumption by 16% at sites in water scarce and stressed areas and 9% at all DuPont sites - Reduced energy use by 6% from 1990 levels, with 6.5% of energy from renewable sources - Goal to double investment in R&D programs by 2015 (\$667 million invested in 2010) and to grow annual revenues by at least \$2 billion from products that create energy efficiency or reduce GHG emissions by 2015 (\$1.6 billion in revenue in 2010) 	✓	✓	✓	✓

Note: Checkmark categorization corresponds to selected corporate initiatives mentioned in company filings.
Source: Company filings through 2011, Goldman Sachs Global Markets Institute.

Exhibit 15 cont'd: Selected company initiatives from various sectors and countries

Company	Sector	Country	Selected corporate initiatives	Brand management	Cost containment	Risk management	Revenue enhancement
Nokia	Technology	Finland	<p>Set 2012 targets to:</p> <ul style="list-style-type: none"> - Reduce energy used in production by 20% per unit produced (from 2008 levels) - Reduce GHG emissions per person working in Nokia Offices and R&D by 23% (from 2008 levels); a 6% reduction was achieved between 2007-2010 - Reduce GHG emissions per sales package produced by 20% (from 2008 levels) - Reduce the average charger's no-load power consumption by 75% (from 2006 levels); a 50% reduction was achieved from 2005-2010 	✓	✓		
Sprint	Telecom	US	<p>Pledged 2017 commitments to:</p> <ul style="list-style-type: none"> - Recycle 50% of operational waste from commercial facilities and ensure 90% of supplies comply with Sprint's environmental standards - Meet 10% of total energy needs from renewable sources (headquarters currently purchases 80% of power use from a wind farm) - Collect phones equal to 90% of quantity sold per year as part of phone-recycling efforts 	✓	✓	✓	
CLP Holdings	Utilities	Hong Kong	<ul style="list-style-type: none"> - Set target for renewable energy to account for 20% of CLP Group's generation portfolio by 2020 (16.8% achieved by beginning of 2011) - Established carbon intensity target of 0.7 kg CO₂/kWh by 2020 - 20% of generating capacity was achieved through non-carbon emitting sources by 2010 	✓	✓		✓
Exelon	Utilities	us	<ul style="list-style-type: none"> - Exelon 2020 strategy sets a goal to reduce, offset or displace 15.7 million metric tons of GHG emissions per year by 2020 - Created Energy Reduction Challenge to reduce energy in commercial facilities by 25% and power use by generating stations by 7% by 2012 (from 2001 levels) - Plans to invest \$5bn in cost-effective, clean energy projects from 2010 through 2015 	✓	✓		✓

*Note: Checkmark categorization corresponds to selected corporate initiatives mentioned in company filings.
Source: Company filings through 2011, Goldman Sachs Global Markets Institute.*

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Global Markets
Institute

President

Abby Joseph Cohen, CFA +1-212-902-4095 (US)

Chair

Esta E. Stecher +1-212-902-3490 (US)

Sandra Lawson +1-212-902-6821 (US)

Koby Sadan +1-212-902-7009 (US)

Rachel Siu +1-212-357-0493 (US)

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