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The forthcoming U.N. Framework Convention on Climate Change Summit brings the possibility of an agreement on a mechanism to finance the activities aimed at cutting greenhouse gas emissions and countering the effects of global warming. It will also look to firm up emission reduction commitments from developed and developing countries. However, several building blocks may need to be in place before emission reductions can be meaningfully taken.

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There is a yawning gap between the current level of climate change finance (approximately \$8 billion per year) and even the conservative estimates by the World Bank for the amount required by developing countries (\$90 billion to \$210 billion). Closing that gap was high on the agenda at the Climate Change Financing roundtable discussion hosted by Standard & Poor's and Parhelion Underwriting Ltd., a U.K.-based specialist insurer.



34 Carbon Markets, Reduction Measures Help Manage Emissions Exposure In Europe

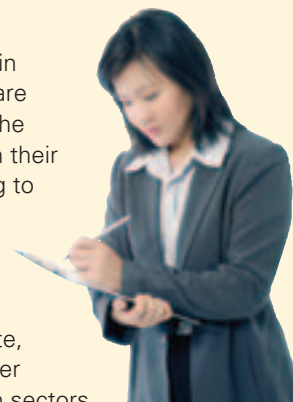
By Michael Wilkins, London

European companies are considering carbon exposure strategies post-2012, when the stringent Phase III of the EU Emissions Trading Scheme comes into force. This is when carbon exposure likely will start to have a real impact on industry. A number of European companies indicate that by implementing a carbon management strategy now, they can generate a sustainable competitive advantage and potentially bolster their company's creditworthiness.

40 Survey Highlights Climate Change Concerns For Asia-Pacific Corporates

By Michael Wilkins, London

Asia-Pacific corporations, particularly those operating in Japan, Malaysia, and India, are seriously concerned about the impact of climate change on their industries, and are preparing to tackle increasing legislation aimed at curbing greenhouse gas emissions, according to a recent survey. The real estate, metals and mining, consumer products, and transportation sectors envisage climate change as having the most physical impact on their operations.



28 European Emissions: Tougher Target Could Make Carbon And Compliance More Costly

By Michael Wilkins, London

"The polluter pays" may be about to take on a new significance for companies in Europe. Before the end of 2010, the European Commission (EC) looks likely to recommend tighter control of carbon emissions across all 27 EU member states. It proposes to set an emissions reduction target of 30%, relative to 1990 levels, by 2020. This recommendation, if enacted, would replace the existing emissions reduction target of 20% agreed only last year.





49 S&P Utilities CEO Conference: Changes To Industry May Be Slow, But They're On The Way

By John W. Whitlock, New York

While a division of power in Washington may put the brakes on any sweeping reform of the U.S. utilities industry, power providers are making changes to address the evolution of their business. Although they don't expect the federal government to pass significant climate-change legislation any time soon, utilities face a world interested in cleaner energy sources and cost-effective power generation.

51 What Are The Obstacles To U.S. Nuclear Power Plant Expansion?

By Aneesh Prabhu, New York

Nuclear power plant construction in the U.S. has been at a standstill for the past 14 years, more recently because of the favorable economics for carbon-based energy production. Even though the U.S. produces more nuclear energy than any other country, France is the nation most people consider when thinking of nuclear power, because France uses it to the greatest degree. Only about 20% of U.S. energy production is from nuclear power.

Large institutional investors are beginning to consider the role of potential risks posed by climate change in the value and performance of their investment portfolios.

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Global Efforts To Address Climate Change Are Just Warming Up

The forthcoming U.N. Framework Convention on Climate Change (UNFCCC) Summit in Cancun, Mexico, on Nov. 29, 2010, brings the possibility of an agreement on a mechanism to finance the activities aimed at cutting greenhouse gas (GHG) emissions and countering the effects of global warming. It also will look to firm up emission-reduction commitments from developed and developing countries. However, Standard & Poor's Ratings Services believes that several other building blocks may need to be in place before steps toward emission reductions can be meaningfully taken, not least a coherent and enforceable climate and energy policy.

One of the main objectives of the Convention, we understand, will be to reach agreement on a financial framework to collect, manage, and distribute climate change funding; set feasible funding targets; and deliver clear guidance for the implementation of adaptation and mitigation activities.

To be feasible and acceptable to U.N. host countries, we believe an effective financial framework for climate change would likely include the following features:

- Secure short- and long-term funding commitments from the developed world to developing countries;
- Include bilateral and multilateral delivery channels for the agreed funding; and
- Set out institutional arrangements for the measurement, reporting, and verification (MRV) of the delivery and allocation of this funding in order to build trust between developed and developing countries and promote accountability.

In addition to this framework, we believe the Cancun summit is likely to focus on emissions-reduction commitments pledged by individual countries under the Copenhagen Accord of December 2009. Reaching a consensus will not be easy, in our opinion. Developing countries such as India, China, South Korea, and Mexico are likely to call for an extension of the Kyoto Protocol, which is currently due to expire at the end of 2012, while most of the developed countries (including the U.S., Europe, and Japan) are likely to favor a new treaty or legal arrangement that covers everyone.

In our view, there will likely be some progress on reducing emissions for deforestation and on the MRV issue. We think agreement on the latter—covering how and when emissions are reported, and who reports and audits them—is crucial if binding emissions-reduction commitments are to emerge.

That said, most market participants do not appear to expect the Cancun summit to deliver a legally binding agreement on emission reductions. They do, however, expect a resolution on the financial framework and a general understanding that will underpin fresh attempts to

finalize an overarching agreement on tackling global warming at the next round of UNFCCC talks in South Africa in December 2012.

Studies Reveal Uneven Preparations For Carbon Pricing

Is industry and the investment community ready for such an agreement? Over the past year, Standard & Poor's has been engaging with issuers and investors to assess the risks surrounding climate change and its effects on businesses, and has carried out surveys in Europe and Asia Pacific to help to analyze the extent to which rated issuers are sufficiently prepared for the introduction of carbon pricing. (For more details, see articles titled "Can Capital Markets Bridge The Climate Change Financing Gap?," on p. 18, and "Survey Highlights Climate Change Concerns For Asia-Pacific Corporates," on p. 40.)

Respondents to these surveys indicate that their companies are at different stages of preparedness for the introduction of carbon pricing, emissions trading, and other market-based instruments that politicians believe are necessary to deliver the level of emissions reduction agreed by signatories to the Copenhagen Accord last year.

We recognize that companies across sectors and regions will have differing levels of exposure to carbon pricing and believe that such pricing and associated mitigation strategies may affect the financial profiles of certain companies.

Climate Financing Lies At The Heart Of A Low-Carbon Economy

The Copenhagen Accord outlined significant "fast-start" funding for climate change adaptation and mitigation of \$30 billion by 2012, followed by long-term funding commitments from developed countries to the developing world of \$100 billion per year by 2020.

In November 2010, the U.N.'s High-level Advisory Group on Climate Change Financing (AGF) published a study of potential sources of revenue to meet these funding commitments (see footnote at the

Developed Countries' Fast-Start Climate Change Financial Pledges For 2010–2011 Fiscal Year*

Country/area	Pledged amount (mil. US\$)
Australia	582.0
Canada	392.0
Denmark	221.0
European Commission (EC)	207.0
EU (not included in EC total)	10.4
Finland	110.0
France	1,740.0
Germany	1,637.0
Ireland	137.0
Japan	15,000.0
The Netherlands	427.0
Norway	375.0
Spain	517.0
Sweden	1,100.0
Switzerland	143.0
U.K.	2,400.0
U.S.	3,029.0
Total	28,027.4

*As of Oct. 2, 2010.

Source: World Resource Institute.

end of this article). The report identifies climate finance as key in the transition to a global low-carbon economy and argues that such financing will need to come from a wide variety of sources—public and private, and bilateral and multilateral. This mix would include alternative sources of finance such as fuel and financial transaction taxes, the scaling up of existing sources, and increased private capital flows.

The AGF report emphasizes the importance of a carbon price in the range of \$20 to \$25 per ton of carbon dioxide (CO₂)-equivalent in 2020 as crucial in reaching ambitious financial goals set out in the Copenhagen Accord. The AGF believes that a carbon price of \$20 to \$25 could generate around \$10 billion to \$20 billion of net private capital flows per year. It also estimates that an additional \$30 to \$50 billion could be generated in increased carbon market flows.

There are already a number of climate-specific funds operating both within and outside the UNFCCC that support emissions-reduction projects in developing countries. These funds include the Global Environment Facility, the Adaptation Fund, the Least Developed Country Fund, the World Bank's Forest Carbon Partnership Facility, and the Multilateral Development Bank (MDB)—administered Climate Investment Funds. In addition, bilateral agencies such as Germany-based KfW (AAA/Stable/A-1+) and the MDB have started to take climate change into account as they channel significant resources toward energy efficiency projects in developing countries.

However, while the Copenhagen Accord set some important political priorities and directions, Standard & Poor's considers it left many unanswered questions, particularly for countries that felt it fell far short of the scale and ambition necessary. In our view, to achieve meaningful progress in Cancun, several actions are likely to be necessary in order to rebuild trust and goodwill among all negotiators.

First, developed countries need to show clear evidence that they are delivering the \$30 billion "fast-start" funding, as the pledges publicly announced to date fall shy at around \$28 billion (*see table*). Second, significant new sources of funding

are needed to reach the U.N.'s long-term finance commitments of \$100 billion a year. One potential source could be the capital markets. As the findings of attendees at our Climate Change Financing roundtable event in June indicate, capital markets may have a potential role to play in funding climate change mitigation in the developed and developing world. (*See "Can Capital Markets Bridge The Climate Change Financing Gap?"*)

Investors Take A Closer Look At Carbon Exposure, CEOs Too

In our view, large institutional investors are beginning to consider the role of potential risks posed by climate change in the value and performance of their investment portfolios. Responses to our carbon exposure surveys further indicate that an increasing number of CEOs are also keeping a watchful eye on the evolving risks and opportunities.

Nevertheless, our European Climate Change Finance roundtable event highlighted potential stumbling blocks that attendees believed may need to be overcome before institutional investors will allocate substantial amounts of their capital to low-carbon projects and climate change adaptation activities in developing countries. Chief among these is regulatory uncertainty. Attendees indicated that policymakers should put in place a coherent, transparent, and enforced long-term framework of climate and energy policy and regulation that reduces risk and minimizes uncertainty. In our view, such a framework will have particular significance for fixed-income investors, who rely on stable revenues over a long period of time. Given their long-term perspective, institutional investors may focus more closely on growing risks to their assets and investments in climatically sensitive regions and within the sectors that are mostly exposed to climate change legislation.

Uncertainty Stalks U.S. Climate Policy

Taking into account economic conditions, the uneven development of climate change legislation, and the overall business environment, we believe that companies'

credit quality will be affected to varying degrees by climate change and emissions-reduction legislation depending on where they're located.

In the U.S., we feel that the primary corporate credit risks and opportunities will relate to the potential impact of U.S. government climate policy. At present, however, there is significant uncertainty over the timing and details of any such legislation. To date, we have not explicitly factored carbon risk (or opportunity) into our ratings on U.S.-based industrial companies or utilities. And we believe that we may not see any impact on cash flows and financial metrics for several years, even after the passage of any legislation. This is due to the lead time before legislation takes effect and before emission reductions become large enough to have a material effect on cash flows.

We think the outcome of the U.S. midterm elections...means that there will likely be no progress on a federal carbon emissions reduction policy until after the 2012 presidential election.

Between now and the point when climate policy takes effect may afford a window of opportunity for companies to assess the relative risks and, where they judge prudent, to take steps to adjust their operations and strengthen their balance sheets, in our opinion. We believe that if the U.S. eventually introduces a countrywide cap-and-trade scheme, which also likely implies a global treaty being in place, carbon could eventually become a larger commodity globally than even oil is today.

We think the outcome of the U.S. midterm elections that took place on Nov. 2, 2010, means that there will likely be no progress on a federal carbon emissions reduction policy until after the 2012 presidential election. There is also uncertainty over plans to expand the funding support available

for clean energy, such as the Department of Energy's loan guarantee program, largely due to budget and funding concerns. This could also affect the recent development in U.S. nuclear power, which appears to have been spurred on by anticipated climate policy and the loan guarantee program (*see "What Are The Obstacles To U.S. Nuclear Power Plant Expansion?" on p. 51*). However, the job-creating potential of this program may assist in its introduction and it appears to have the support of some members of Congress for primarily this reason.

Meanwhile, California is preparing to launch an emissions cap-and-trade scheme in 2012 that we understand is largely modeled on the EU Emissions Trading Scheme (EU ETS). The proposed scheme would cover 85% of the state's greenhouse gas emissions, with a target of reducing emissions to 1990 levels by 2020. Initially, almost all allowances to emit will be given away for free, with the price of auctioned permits starting at \$10 per ton in 2012, rising to \$15 per ton in 2020, with a ceiling price set at \$40 to \$50 per ton in 2012 and \$60 to \$75 per ton in 2020. A significant compromise is that participants will be able to offset up to 8% of their compliance obligation. We understand that a public hearing of the proposal will be held on Dec. 16, 2010.

Europe Prepares For Tighter Emissions Caps

Climate policy in Europe is in a more explicit transitory position. At the end of 2012, Phase II of the EU ETS gives way to Phase III, which market participants anticipate will place stricter mandatory emissions-reduction targets on different sectors (*for more details, see "European Emissions: Tougher Target Could Make Carbon And Compliance More Costly," on p. 29*).

From a ratings perspective, we believe the first two phases of the EU ETS have been fairly benign for European companies: There has only been one downgrade largely on the basis of a company's carbon expo-

sure—that of Drax Power Ltd. (see “*Drax Power Ltd. Issuer Rating Cut To ‘BB+’ On Weak U.K. Power Prices And Increasing Business Risk; Outlook Negative*,” published May 15, 2009). Phase III of the EU ETS has much stricter compliance rules, however, and we think these rules could increase the pressure on credit quality. In our view, this pressure will be especially acute in the power sector, which has to hedge power sales with future carbon allowance purchases three years ahead.

Asia Pacific Takes A Longer-Term View

In Asia Pacific, our recent Corporate Carbon Exposure Survey highlights what we believe is a noticeable gap in the risk appreciation surrounding climate change and carbon-related risks and opportunities among respondent companies.

Although more than one-half of the survey respondents view the regulatory and physical risks of climate change as “serious,” only a minority of companies demonstrated a good appreciation for those risks, in our view. We believe existing levels of awareness around factors such as carbon prices, expected climate change regulation, and financial risks and opportunities are still relatively low. However, some Asian companies are recognizing climate change and carbon-reduction commitments as a possible source of competitive advantage, with 46% of the survey respondents already performing direct emissions forecasting to determine future carbon liabilities and build carbon-management strategies.

Emissions-reduction frameworks are evolving at a dynamic pace in the region, underpinned by long-term reduction targets set against a backdrop of booming economies. According to the targets submitted under the Copenhagen Accord, China—the world’s largest GHG emitter—is working toward lowering its emissions by 40% to 45% by 2020; Japan has pledged to cut emissions by 25% by 2020, with an 80% reduction by 2050;

and India is committed to reducing emissions by 20% to 25% below 2005 levels by 2020.

Can Cancun Make A Difference?

At both the corporate and project level, we note that investors appear to be developing and incorporating a broader range of screening criteria for investment and lending purposes that encompass the risks associated with climate change and corporate carbon exposure. At the same time, the current level and quality of information available on corporate carbon exposure to perform analysis varies significantly between companies, industry sectors, and geographies.

In our view, there is a long way to go before regulatory certainty and an effective funding framework is likely to be achieved. Even so, we believe that the effect of efforts to address climate change risks could impinge on some issuers’ creditworthiness over the medium term. Specifically, we think pressure will likely increase on energy-intensive industrial companies to manage their carbon exposure and protect their credit quality. We believe that those firms that address relevant risks in a timely manner could gain an advantage over those who delay the implementation of carbon-management programs, at least temporarily.

While uncertainty surrounds the exact outcome of international climate change negotiations at Cancun, the move toward constraining the adverse effects of global warming is now, we believe, inevitable. [CW](#)

Footnote

1. Report of the Secretary-General’s High-level Advisory Group on Climate Change Financing, Nov. 5, 2010.

For more articles on this topic search RatingsDirect with keyword:



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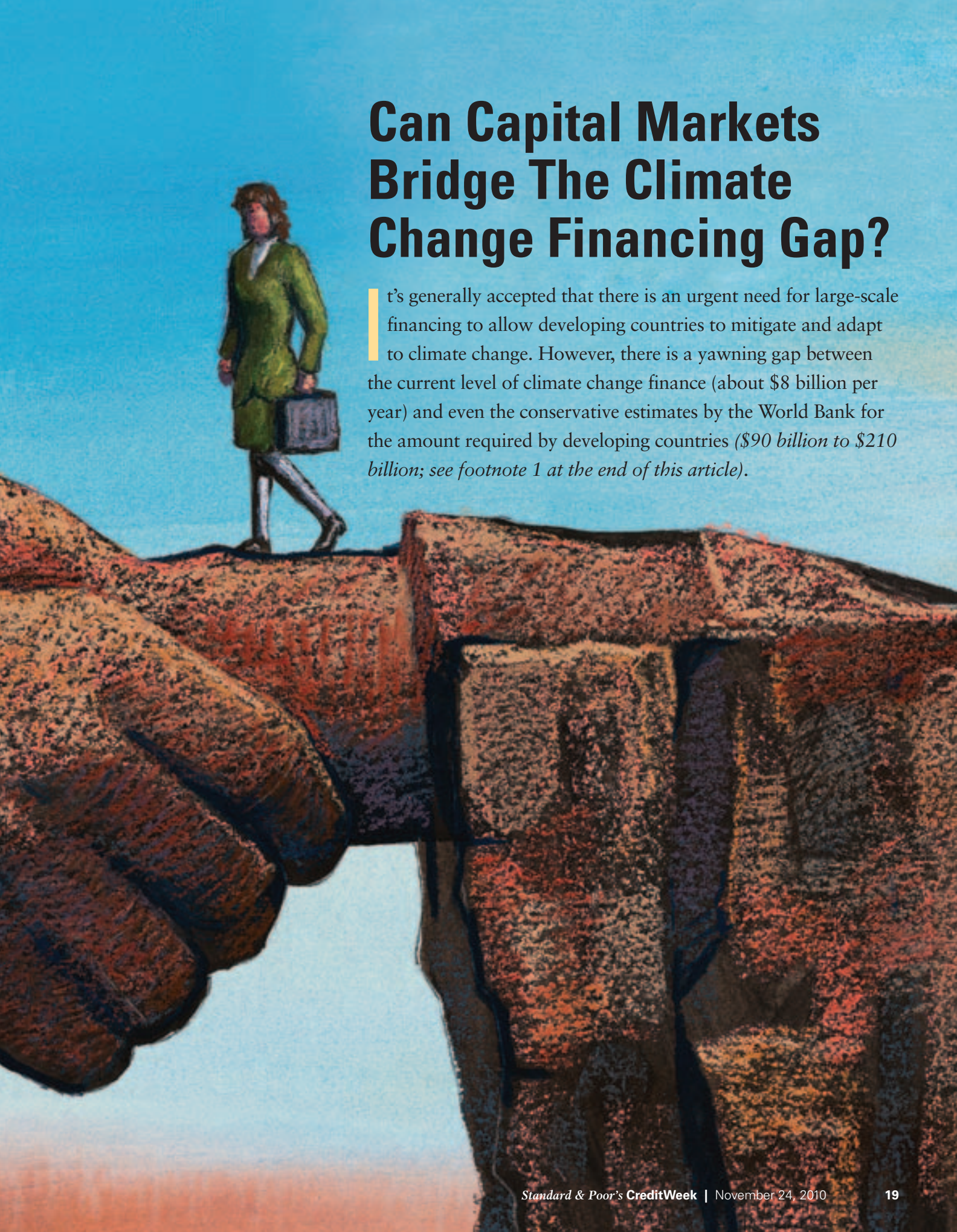
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A woman in a green suit and white shirt, carrying a black briefcase, is walking across a bridge. The bridge is constructed from large, rough, reddish-brown blocks that look like stone or concrete. The bridge is incomplete, with a significant gap between the blocks she is currently on and the next section. The background is a clear blue sky. The overall image is a conceptual illustration representing the 'climate change financing gap' mentioned in the text.

Can Capital Markets Bridge The Climate Change Financing Gap?

It's generally accepted that there is an urgent need for large-scale financing to allow developing countries to mitigate and adapt to climate change. However, there is a yawning gap between the current level of climate change finance (about \$8 billion per year) and even the conservative estimates by the World Bank for the amount required by developing countries (\$90 billion to \$210 billion; see footnote 1 at the end of this article).

Closing that gap was high on the agenda at a Climate Change Financing roundtable discussion hosted by Standard & Poor's Ratings Services and Parhelion Underwriting Ltd., a U.K.-based specialist insurer, in London on June 17, 2010. The objectives of this event were to assess investor appetite for climate change financing, identify innovative financial structures that could be applied to fund climate change projects, and examine the risks and barriers that might prevent their implementation. The event was attended by around 30 participants from the public and private sector, including representatives from multilateral agencies, development banks, investment banks, the insurance industry, policy think tanks, and institutional investors.

For the purpose of this report, we define climate change finance as the provision of financial resources and investment, both public and private, in projects and actions partially or wholly intended to support action on mitigating greenhouse gas (GHG) emissions and adapting to climate change.

Roundtable Conclusions

- Participating investors signaled their commitment to take action—providing policymakers put in place a coherent, transparent, and enforced long-term framework of climate and energy policy and regulation that reduces risk and minimizes uncertainty. Transparent, well governed, and effectively functioning markets are essential. To stimu-

late institutional investor involvement, the returns on climate change investments must be commensurate with the perceived levels of risk involved and also need to be competitive with business-as-usual investments.

- Participants indicated their view that by tapping the global capital markets, a wide range of new funding instruments could be created to accelerate the transition to a low-carbon economy. Financial instruments will likely vary according to the specifics of the project, business, or technology to be financed.
- There was a consensus that bond markets have a crucial role to play in climate change finance. Many pension funds are already comfortable purchasing fixed-income instruments of

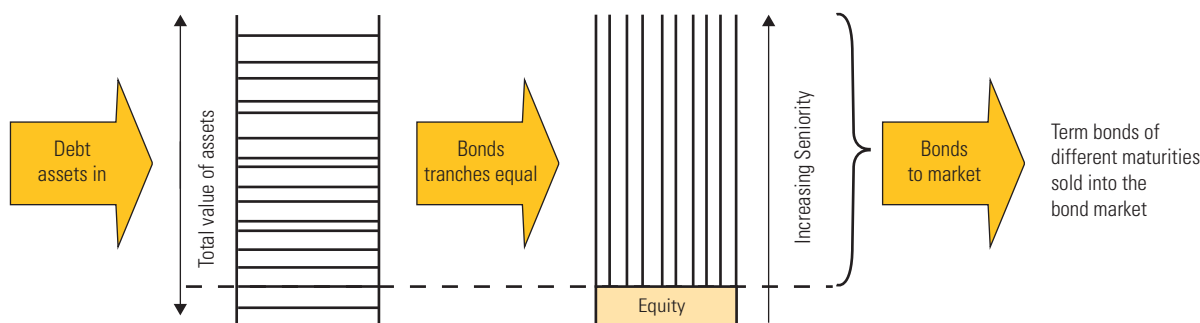
Box 1 | Aggregation Structures Pool Finance For Small-Scale Projects

With high upfront development and construction costs and lower ongoing variable costs, and predictable long-term income streams, renewable energy assets such as large-scale wind farms and solar plants are perfectly suited to traditional debt financing, argues Jason Langley, corporate finance manager at AXA Investment Managers (AXA). As he points out, the long-term debt profile of renewable energy plant, in some cases up to 15 years and beyond, also matches the long-term liabilities of institutional investors.

Langley notes that banks are adept at providing higher risk renewable energy development finance, but less willing and able than bond markets and institutional investors to provide longer term debt. He feels the transfer of loans from bank bal-

ance sheets to institutional investors' balance sheets through securitization structures would allow banks to recycle their capital into building new renewable energy projects, thus enabling a scaling up of financing. Aggregation of loans was also necessary, in his opinion, since debt from an individual renewable project was often too small in scale to form large, liquid bonds suitable for institutional investors. Langley cites The Housing Finance Corporation, which creates a secondary market for debt to increase the supply of funds available for new lending, as an example of how this could be achieved.

The diagram below shows an example of a simple aggregation structure that can be replicated for a renewable energy debt.



Aggregation will allow large bond issuances that are listed on global benchmarks and are therefore liquid enough for fixed income investors.

Source: AXA Investment Managers.
© Standard & Poor's 2010.

this type and maintain large, long-term exposures to bonds. Some participants cited their view that green bonds, which provide an opportunity to invest in climate change solutions through a fixed-income product, are already proving to be a way of engaging institutional investors. Such bonds have been trialed by the World Bank to raise funds for projects seeking to mitigate the rise in GHG emissions and help developing countries affected by climate change. The World Bank issued its inaugural green bonds in November 2008, and has since issued an equivalent of more than \$1.5 billion through 22 transactions in 15 currencies.

- Investors attending the event expressed an appetite for bonds across the risk-return spectrum, not just low-yielding 'AAA' rated securities.
- Project finance and securitization structures, where lenders look primarily to the revenues generated by a project as a source of repayment as well as security, are already providing examples of financing used for the development of renewable energy throughout the world. Two such projects make use of special purpose financing vehicles CRC Breeze Finance S.A. and Alte Liebe 1 Ltd., the debt of which is rated by Standard & Poor's, to fund wind farms. As the risk-return profile of a project changes through the various phases of the development cycle (feasibility, financing, construction, and operating), different types of investors will have a role to play, offering potentially significant scope to recycle funds. On the supply side, the EU has set mandatory targets for renewable energy that require investment of over \$1 trillion by 2020, creating a significant investment opportunity. Many of these projects can be implemented without a carbon price in place as other government subsidies such as feed-in tariffs are already in place.

Policymakers Look To Private Capital To Fund The Shift To A Low-Carbon Economy

Signatories to The Copenhagen Accord agreed in December 2009 pledged to

commit to a goal of jointly mobilizing \$100 billion a year by 2020 from the developed countries to finance climate change mitigation and adaptation. In a report two years before (*see footnote 3*

at end of this article), the United Nations Framework Convention on Climate Change (UNFCCC) considered that long-term finance for climate change mitigation and adaptation

The Risks Involved In Securing Climate Change Finance

Risk/category	Description
Policy risks	
Additionality risk	Lack of clear environmental additionality (that is, the concept that a benefit would not happen in the absence of a policy)
Cannibalization risk	Climate budgets are not additive to overseas development aid spending
Enforcement risk	Rules not fully binding or difficult to enforce
Illegitimate policy changes	Nationalization, confiscation, expropriation, and deprivation
Inconsistency risk	Regional, national, and international rules and regulations in conflict
Legitimate policy changes	Change in legislation in the ordinary course of government
Longevity risk	Regulations are only in force for a short period compared with investors' time horizons and capital commitment, adversely affecting continuity and stability
Methodology, reporting, and verification (MRV) risk	Lack of appropriate methodologies
Multitude risk	Multiple project types in multiple countries and/or employing multiple technologies
Capacity risks	
Aggregation/commoditization risk	Difficulty in aggregating and/or commoditizing individual transactions into large-scale investment vehicles
Human/operational risk	Lack of a well-trained workforce to implement projects
Infrastructure risk	Poor physical infrastructure
Institutional—property rights risk	Lack of property rights and/or legal system
Institutional—regulatory risk	Lack of well established and resourced regulator
Policy development risk	Lack of understanding among policymakers and the public sector
Transaction risks	
Branding risk	Public unacceptability of mechanism (market-based solution, securitization, for example)
Complexity risk	Financial instruments are too complex
Currency risk	Currency fluctuations
Economic/commodity price volatility risk	Fluctuation in economic conditions and commodity prices
Fungibility risk	Lack of fungibility between regimes/environmental instruments
Liquidity risk	Fragmented measures lead to too many different regimes
Private sector funding shortage	General shortage of funding
Risk/reward imbalance	Insufficient returns available given risks involved
Transaction cost risk	High transaction costs, including high costs of complying with MRV requirements
Project risks	
Fraud/cash leakage	Investment eroded by leakage costs and/or fraud
Physical risk	Natural hazards including fire, explosion, war, machinery breakdown, and other material damage
Scale risk	Individual project size unattractive
Technology risk	Technology is inefficient and/or too complex and/or not publicly accepted

Source: Parhelion Underwriting Ltd.

should be an approximate mix of 15% public (bilateral and multilateral) and 85% private resources.

In Standard & Poor's Ratings Services' view, however, there is a stumbling block to getting institutional investors to allocate substantial amounts of their capital to low-carbon projects and climate change adaptation activities in developing countries. That is, there needs to be an appropriate risk and reward balance.

Policymakers, meanwhile, are searching for ways to redirect a larger proportion of private capital toward the low-carbon economy as the developed world emerges from recession with severely depleted public finances. They are closely examining a number of financing mechanisms, such as green

funds and securitization structures, that have the potential to mobilize private sector investment on a massive scale in developed and developing countries.

For asset owners and developers, trillions of dollars worth of project finance will need to be raised because new low-carbon companies, renewable energy and infrastructure developments, and projects to improve energy efficiency will need to be financed upfront, in some cases on an industry sector-wide basis. Investors and insurers recognize that businesses are already being affected by climate-related events, and will face more of them in the future. With this in mind, we believe it's likely that long-term asset allocations may need to be revised and, over time, investors may consider whether high-

risk, carbon-intensive companies may need to be divested from portfolios.

Climate Change Investments Are Fraught With Risks

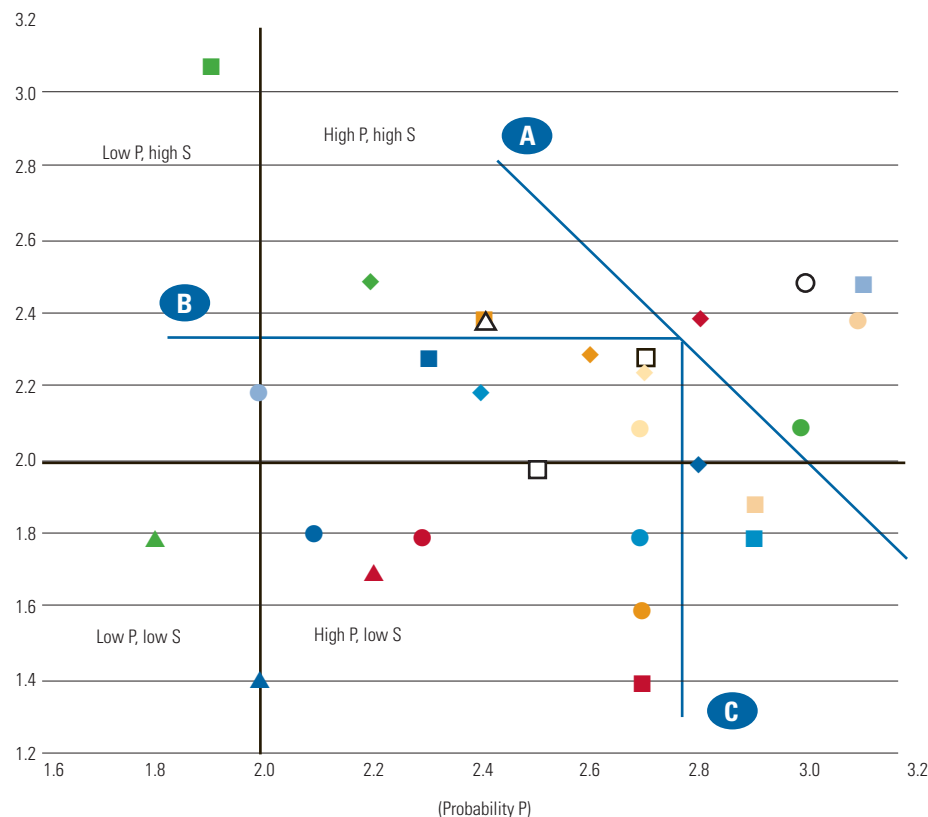
From the roundtable participants' perspective, institutional investors such as pension funds, sovereign wealth funds, and insurance companies have both the ability and the capacity to provide a significant portion of the finance necessary to transition the global economy to a low-carbon future. However, these asset managers will only invest if they can earn adequate risk-adjusted returns on their capital.

Investing in a low-carbon economy can be risky. As part of the roundtable event, participants examined the risks involved in providing capital for climate change financing structures such as those outlined

Average Probability And Severity Of Risks Affecting Climate Change Financing

Risk list—Average probability and severity scales

(Severity S)



■—Policy risks. ●—Capacity risks. ◆—Transaction risks. ▲—Project risks.

Source: Parhillion Underwriting Ltd.

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in the section headed “*Innovative Finance Structures Lead The Way To A Low-Carbon Economy*”. By listing and categorizing these risks (*see table*), participants sought to identify the barriers that currently prevent widespread investment by institutional investors in climate change finance. Twelve participants provided additional insight by mapping the risks to their own industry groups of investment and development banking, market infrastructure, policy/academic, and insurance.

The results of this exercise were subsequently analyzed by Parhelion to show how the four main risk categories—policy risks, capacity risks, transaction risks, and project risks—interact in terms of probability and severity (*see chart*).

Longevity Risk Appears The Most Likely—And Most Severe—Test For Funding

According to Parhelion’s analysis, while all risks should be carefully considered and managed when considering a climate change financing investment, it’s appropriate for policymakers to focus their attention on those risks with the highest probability and severity (the area of the chart marked “A”). The risks involved here concern longevity, risk/reward imbalance, transaction cost risk, human and operational risk, economic risk, and commodity price volatility (*see table for specific risk definitions*).

That longevity risk is perceived by our roundtable participants to have the highest probability and severity provides confirmation, in Parhelion’s view, that investors are most concerned with the apparent mismatch between the long-term nature of capital commitments inherent in climate change financing and the relatively short time frame of climate change regulations. Investment horizons and/or capital commitment periods can range from 20 years for a reasonably sized renewable energy project to 50 years or more for a climate change adaptation-related investment. Compare this with the duration of regulations that promote climate change investments: In the U.K., for example, renewable obligation certificates provide an additional source of revenue for renewable energy producers. The amount of rev-

enue available is partly driven by the level of renewable energy targets set by government. Yet, while targets have been espoused by government to 2037, they have only been legislated for until 2027. Even these legislated targets are still subject to change, and investors are typically reluctant to rely on them fully.

We believe the relatively high probability and severity attached to the risk/reward imbalance shows that financiers are concerned that insufficient returns will be generated given the risks involved in a project. This illustrates a key point that it’s not sufficient to create a return for investors; the return must be attractive relative to all other investment opportunities. Therefore, to stimulate institutional investors’ involvement in climate change finance, it appears that investors believe that the returns expected on climate change investments must be commensurate with perceived levels of risk and also competitive with the returns on normal business investments. As a consequence, we think risk transfer instruments, and especially insurance, may have an important role to play. The harsh reality facing both policymakers and climate campaigners is that soft capital is in limited supply—investors tend to seek an appropriate return, even in climate change investments.

The relative levels of probability and severity for transaction cost risk (high) against complexity risk (relatively low) provide an interesting comparison, in our view. We conclude that investors and funders are able to deal with the complexity of a climate change financing project provided it does not add significant costs to a transaction, thereby reducing the project’s risk-return characteristics. This is borne out of investors’ experience in developing clean development mechanism (CDM) projects, where, we understand, they quickly dealt with the complexity of a CDM project but struggled with its transaction costs.

Economic/commodity price volatility also ranked among the top five risks for high probability and severity. In the roundtable panel’s view, this reflects that other basic and pressing needs may detract from climate change finance flows in periods of low or negative economic growth.

Box 2 | Green Bond Brings Risk-Sharing To The Fore

Imtiaz Ahmad, executive director at Morgan Stanley, outlined to roundtable participants the concept of the Green Nationally Appropriate Mitigation Action (NAMA) Bond developed by The International Emissions Trading Association (IETA). Similar to the AXA proposal, the Green NAMA Bond would tap the international debt capital markets, but it also aims to reduce policy and political risks by deploying public guarantees and a risk-sharing structure. According to Ahmad, this would provide improved regulatory stability for investors on a longer term basis. Green NAMA bonds would enable a mechanism of combining returns from sovereign or quasi-sovereign borrowers, conditional guarantees from international financial institutions (IFIs), and underlying project returns expressed in conventional financial terms. The bonds could also take into account carbon units that can be used for compliance by companies or governments with obligations under carbon trading systems, or fulfil voluntary emission-reduction commitments.

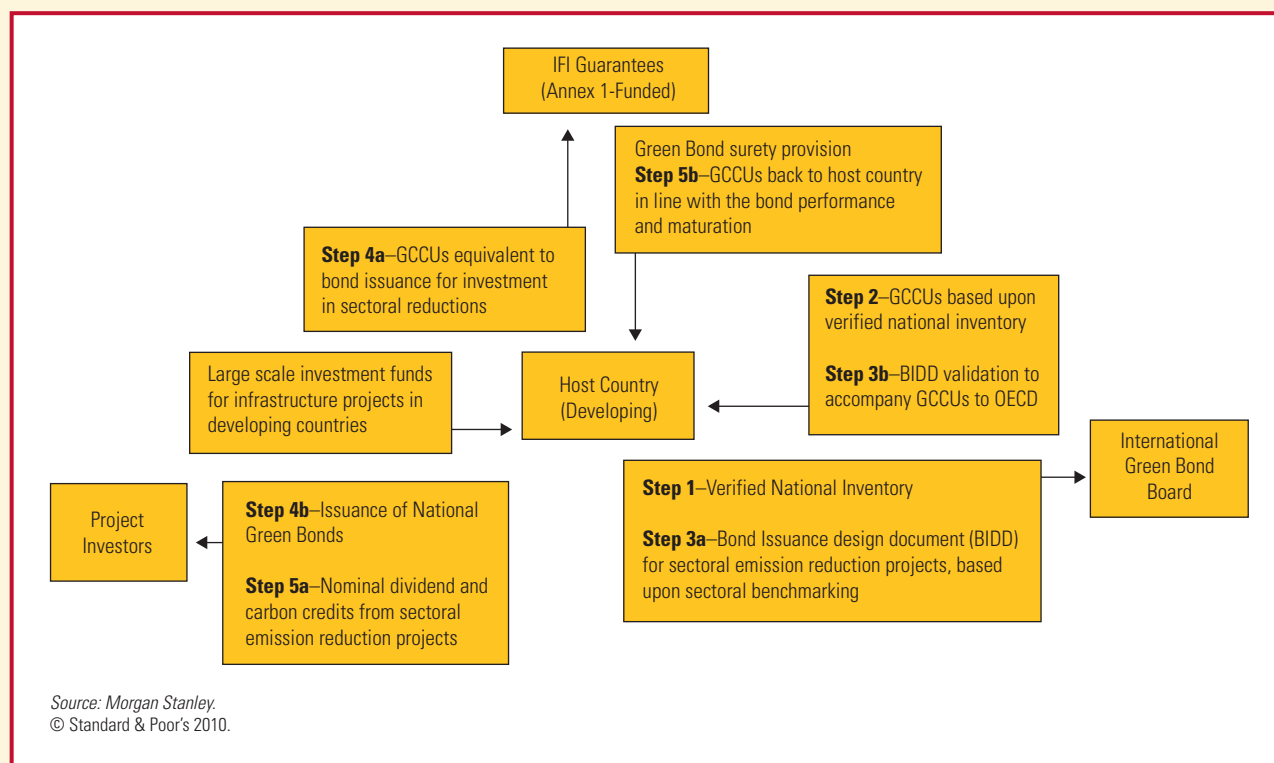
The limitation on the facility available to borrower governments would be expressed in Guaranteed Carbon Collateral Units (GCCUs), added Ahmad. The global total of GCCUs would be linked to the total global emissions reduction ambition of developed countries. The GCCU arrangements would provide an important incentive to focus the borrower's attention on the need to deliver whatever is necessary to achieve emissions reductions—often policy changes or domestic government support to incentivize low-carbon behavior. The GCCUs could be tradable between gov-

ernments or other licensed borrowers, though they could only be used for projects acceptable to the issuing IFI.

In practice, said Ahmad, Green NAMA bonds would be issued with a low-coupon rate and a stream of carbon credits, the volume of which is tied to the host country's reduction target performance in the given industry sector or subsector. The bond issue would be fundamentally linked to predetermined baselines, standards, and methodologies, as set forth in a bond issuance design document and approved by the proposed international bond oversight and administrative body.

The defined performance target acts as the cornerstone of this hybrid bond concept, says Ahmad, because a green NAMA bond would pay its holders a low coupon from the outset plus a preagreed volume of carbon credits, contingent on the NAMA reductions being achieved. If reduction targets are not met, the bond issuer (that is, the host country) would be obligated to pay a determined cash equivalent to bondholders, thereby increasing the coupon. In which case, the ultimate guarantor(s) for the host country's payment would be one or more IFI(s), providing the guarantee on behalf of (or via) a pool of guarantees from a subset of Organization for Economic Cooperation and Development governments.

Ahmad believes the Green Bond concept (*see diagram*) has the potential to raise substantial private investment at the necessary scale for climate change mitigation activities that are simply uneconomic without an economic price on carbon and a reason to invest.



If our roundtable participants are indicative of the industry groups they represent, funders and investors in climate change financing are also concerned that a lack of a well-trained workforce to implement projects (that is, human/operational risk) will significantly affect the willingness to invest. The roundtable consensus was that policymakers should develop an integrated policy that not only creates a high-level framework for climate change finance, but also a supporting operational infrastructure.

Unexpected Policy Changes Pose The Greatest Threat To Investments

The most severe risks highlighted by the roundtable participants (the chart area marked “B”) were:

- Unexpected policy changes;
- Institutional and property rights;
- Enforcement risk; and
- Scale risk.

Unexpected policy and regulatory changes (often known as political risk), such as currency transfer restrictions, expropriation, war and civil disturbance, breach of contract, and sovereigns not honoring financial obligations pose a real threat to climate change financing. The

absence of an environment in which such changes in policy occur are generally deemed critical to low-carbon investments. However, the relatively low probability given by roundtable participants to the likelihood of this risk occurring reflects that investors can simply avoid those countries where there is a history of these types of event. Therefore, if a country is not considered a stable place to invest for normal commercial activities, it is also unlikely to attract climate change finance. This may be reflected by experience with the CDM: Africa, for example, well-known for political risks, has struggled to attract interest. Roundtable participants believe one possible way forward would be to offer affordable political risk insurance, which can protect investors against such events.

According to our roundtable participants, the risk of general policy changes is probable and significant. These changes refer to the possibility that policies may be amended in the course of government and from government to government in the same country as political and economic circumstances change. That both political risk and policy changes in general are high on the risk agenda of investors and funders suggests that they will more likely get involved in climate

Box 3 | The European Commission Looks To An International Carbon Market To Deliver Climate Change Funding

Martin Hallet, deputy head of the Globalization, Trade, and Development unit at the European Commission (EC), introduced the roundtable panel to an EC staff position paper titled “Financing the Response to Climate Change,” released on March 25, 2010. This paper notes that some instruments, such as a price on carbon and the introduction of emissions trading schemes, offer a significant “double dividend” in both raising revenues for governments and improving market efficiency and stability.

Relative to regulation, said Hallet, the EC concludes that a price on carbon emissions is more efficient as it allows individuals to decide whether they want to continue to pay a price to emit, or whether they prefer to abate their emissions. In this way, carbon pricing identifies the least-cost opportunities of emission abatement and ensures that emission reductions are distributed efficiently across the market, providing a continuous incentive for the firms to invest in energy efficiency and low-carbon technologies.

Carbon taxes, the auctioning of emissions allowances and permits on shipping and aviation were all identified by the EC as potential sources of revenues. Overall, said Hallet, the EU’s goal is to develop an OECD-wide carbon market by 2015 and an even broader market, extended to economically more advanced developing countries, by 2020. The EU Emissions Trading Scheme (EU ETS) currently forms the main part of the international carbon market. Transactions of EU ETS allowances accounted for approximately 83% of the total value of the market in 2009. According to Hallet, the EC paper states that a broader international carbon market, if designed properly, would create an increasing financial flow to developing countries and could deliver up to 38 billion per year by 2020 under an ambitious international agreement. An international carbon market could be built by linking compatible domestic cap-and-trade systems.

change financing if governments and regulators create a regime beyond the normal reach of political interference. Moreover, it suggests that such a regime should ideally contain features contributing to policy stability such as clear and predictable long-term targets, measures, and enforcement mechanisms. Roundtable participants also opined that solutions should be found to accommodate investors and funders in their search for protection against general policy changes—along with the blurry boundary with political risk events. In this context, the need to create an “Investment Grade Policy,” a term coined by Chatham House, a U.K.-based nongovernmental organization and a roundtable moderator, becomes a huge challenge. It would need to encompass comprehensive policy and a legal framework that reduces financing barriers, intensifies capacity building and knowledge transfer, and implements clarity and predictability.

Linked to political risk, investors among our roundtable participants fear a lack of property rights and/or

the legal system in the host country where a particular low-carbon economy investment is made (that is, institutional and property rights risk). This risk recognizes that climate change finance will be largely flowing from the developed world to the developing world, where institutions and property rights are often weaker. So countries seeking to attract climate change finance may need to strengthen their governance and accountability to attract investors. This issue is also linked to enforcement risk, where investments in a developing country are liable to expropriation because the legal system is less robust and rights are less well established than in the developed world. Roundtable participants perceive enforcement risk to be severe for climate change investments.

Multiple Projects And Complexity Add To The Uncertainties

According to work undertaken by Parhelion, the most probable risk sce-

narios identified by our roundtable panel (found in the area of the chart marked “C”) were:

- Multitude risk (that is, multiple projects in a number of countries and/or employing multiple technologies);
- Inconsistency risk; and
- Aggregation/commoditization risk (that is, difficulty in aggregating and/or commoditizing individual transactions into large-scale investment vehicles).

Multitude risk and aggregation/commoditization risk are both seen as relatively high on the probability scale, according to our roundtable participants. In terms of severity, however, these risks are perceived as relatively less significant, although not insignificant. This may reflect the range of projects seeking climate change finance and the differing needs of countries exposed to the implications of climate change. We note the similar ranking of these risks, since multitude risk may lead to, or be a cause of, aggregation/commoditization risk. Moreover, these risks are also

Box 4 | IMF Puts Forward The Case For A Green Fund

In January 2010, International Monetary Fund (IMF) Managing Director Dominique Strauss-Kahn proposed the creation of a Green Fund to help finance the shift to a low-carbon economy and to act as a bridging mechanism to large-scale carbon-based financing in the medium term. The fund would have the capacity to raise resources on a scale commensurate with the Copenhagen Accord of \$100 billion a year by 2020.

According to Hugh Bredenkamp, IMF deputy director, Policy, Strategy and Review Department, the IMF is looking into the feasibility of such a fund, possibly partly financed through the issuance of additional special drawing rights (SDRs), and as such is seeking the views of the international financing community and the UN High Level Advisory Group on Climate Change Financing (AGF). Previously, investor George Soros has proposed that rich countries hand \$100 billion of their SDRs for 25 years to a special green fund to be used for loans to developing countries for immediate use to combat climate change. This proposal is of particular relevance in the context of implementing The Copenhagen Accord and its commitment to mobilize long-term finance from a wide variety of sources.

As soon as SDRs are converted into hard currency for the finance to be released, says Bredenkamp, they would incur

interest payable by the SDR donor countries to the IMF, which currently stands at a rate of below 0.5%. If donor countries were unwilling to pay this interest, it could be reimbursed by the fund (as a return on the equity in the fund held by donor countries, for example) on the basis of the interest payments that the fund receives from developing countries drawing on the financing. Under the Soros proposal, the developing countries' payments of interest and principal would be guaranteed by the IMF's gold reserve. Developing countries could make money from their low-carbon investments from the SDR fund by selling carbon credits from projects under the U.N.'s Clean Development Mechanism.

As Bredenkamp points out, a motivation for using the SDRs only as the capital base for the Green Fund would be to allow them to remain on the books of contributing countries as reserve assets. This may allow the deactivated SDRs to be viewed as a guarantee for debt securities issued by the fund in the capital markets. An additional benefit is that leverage would help to increase the overall amount of funding available.

For more information on the proposal go to:
<http://www.imf.org/external/pubs/ft/spn/2010/spn1006.pdf>.

related to scale risk (that is, where individual project size is unattractive to investors), which is perceived by the roundtable panel to be low in terms of probability but significantly severe when it occurs. In our view, this may indicate that funders and investors think that there is a multitude of small-scale climate change finance projects; if a small-scale individual project cannot be combined into a large-scale investment, it may not be attractive to investors. Roundtable participants were of the opinion that such risks could be minimized by harmonizing policy and regulation across borders wherever possible.

In addition, roundtable participants were of the view that regional, national, and international rules and regulations will likely be (or are) in conflict (in other words, inconsistency risk). They believe policymakers should be encouraged to adopt a multi-dimensional approach, taking into account the geospatial, operational, and institutional dimensions of climate change finance when regulating at different policy levels.

Risk Ranking Allows Policymakers A Clearer View Of The Way Forward

Since international policymakers view the mobilization of substantial amounts of private sector capital into climate change financing within the next two years as a major priority, we see the results of this risk-ranking exercise as a useful illustration of the obstacles that need to be cleared in order to achieve this aim. Our roundtable participants, by identifying and prioritizing the risks that are generally viewed as the key stumbling blocks to attracting institutional investment, provided critical insight for policymakers under current economic conditions. If global economic and environmental conditions change, the risk ranking may differ in order of priority and perhaps even in severity. However, we believe the types of risks identified are unlikely to change substantially.

(We would like to acknowledge the contributions of Julian Richardson and

Veronique Bruggeman of Parhelion Underwriting Ltd. to this article. The thoughts expressed in the sidebar are those of the individuals involved and do not necessarily reflect the views of Standard & Poor's Ratings Services.) **CW**

Footnotes

1. World Bank (2009), Development and Climate Change. World Development Report 2010.
2. Parhelion Underwriting Ltd. is a U.K.-based specialty insurance and risk transfer business focused on climate change, carbon finance, and renewable energy markets. For more information on the company's risk-mapping report, go to: http://www.parhelion.co.uk/about_news.html. Link name: Parhelion_Climate_Financing_Risk_Mapping_Report_2010.pdf.
3. Investment and Financial Flows to Address Climate Change, UNFCCC, 2007.

The authors would also like to acknowledge the contribution of Matthew McAdam to this article.

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 **Climate Change** 

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Appendix | Innovative Finance Structures Offer Support For Climate Change Investments

In the opinion of participants at the roundtable event, many of the proposals and structures related to climate change financing that were discussed could be viewed as complimentary to the three flexible mechanisms of the Kyoto Protocol, which is due to expire at the end of 2012. Furthermore, such proposals and structures could be applied in both developed and developing countries.

All three Kyoto Protocol mechanisms—the CDM, Joint Implementation (that is, projects in developing countries generating emission reductions that can be sold to developed countries), and international emissions trading—have played a crucial role in engaging the finance and investment communities in thinking about climate change. However, according to our roundtable participants, the level of private sector investment needed requires the urgent mobilization of additional sources of capital on a considerably bigger scale.

The bond markets represent one possible source with the depth and scale of investment required, in Standard & Poor's view. Investors are already familiar with bond instruments; as of 2009, the size of the worldwide bond market (total debt) was an estimated \$82.2 trillion (source: Bank for International Settlements data as of March 31, 2009).

Within the bond markets, innovative structures, ranging from project-based asset-backed securitization to carbon-linked structured sovereign debt (*see boxes 1 and 2*), are put forward by investors and financial institutions as potential solutions to meet the demand for climate change investments. The public sector similarly offers sources of additional finance for climate change projects, including carbon taxes, receipts from carbon allowance auctions, and a dedicated Green Fund (*see boxes 3 and 4*).





European Emissions

Tougher Target Could Make Carbon And Compliance More Costly

“**T**he polluter pays” may be about to take on a new significance for companies in Europe. Before the end of 2010, the European Commission (EC) looks likely to recommend tighter control of carbon emissions across all 27 EU member states. It proposes to set an emissions reduction target of 30%, relative to 1990 levels, by 2020. This recommendation, if enacted, would replace the existing emissions reduction target of 20% agreed only last year.

Standard & Poor's Ratings Services believes a commitment to a 30% cap on emissions could push up the market price of carbon and potentially put pressure on the creditworthiness of carbon-intensive companies over the longer term if cost changes are significant and cannot be mitigated. We think this tighter emissions reduction standard could create a substantially different business environment for industry in the region and increase compliance costs.

Energy and climate change are high priorities for EC legislators. What's more, the EU's current 20% carbon emissions reduction target is seen in some political quarters as inadequate, being low in the context of existing climate change science as presented by the Intergovernmental Panel on Climate Change.

On May 17, 2010, Connie Hedegaard, EU Climate Action commissioner, suggested that the existing 20% reduction target was too weak. According to Ms. Hedegaard, a 30% cut was now more

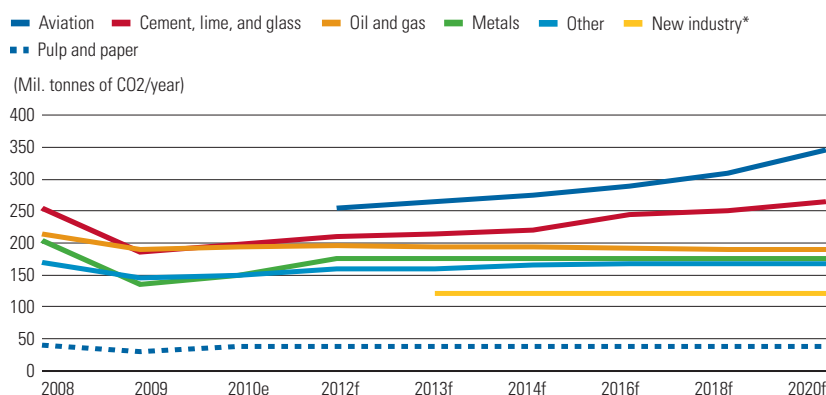
affordable due to the recession and would be in the EU's economic interest even without a global climate agreement. She also said that industry sectors facing international competition had nothing to fear because the EC would arrange carbon quotas and allocate free emissions permits to protect their interests. This would include those sectors most at risk of carbon leakage (that is, where industrial production moves to countries with more lax environmental regulations).

A recent draft impact assessment document from the EC (*see footnote 1 at end of this article*) estimates that the additional cost for the EU to step up to a 30% reduction target from 20% would be around €33 billion (\$44.3 billion) in 2020, or 0.2% of GDP. This, the assessment points out, is one-third cheaper than before the economic crisis, mainly because of a slump in carbon prices in the EU emissions trading scheme (EU ETS). Furthermore, the EC estimates the total cost of implementing the package at €81 billion, or 0.54% of GDP, which is around 20% higher than the cost of reaching a 20% emissions reduction target estimated in 2008. By comparison, according to the EC, China is currently investing almost 10x as much as the EU in planning for a low-carbon economy by 2050. So according to the EC, even with a 30% emissions reduction commitment by 2020, compared with 1990 levels, Europe could risk being overtaken by Asia in reaping the economic benefits of developing green technologies.

Industry Flags Its Concerns

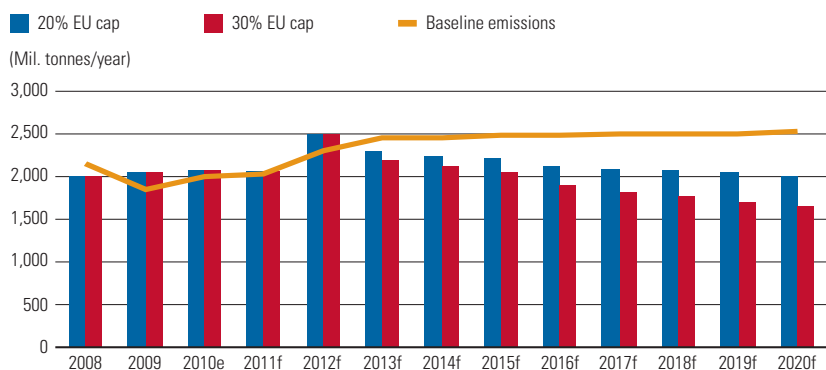
Not everyone agrees with the case for a more stringent emissions reduction target. In an announcement on May 6 (*see footnote 2*), the European Alliance of Energy Intensive Industries (EAIEI) criticized the EC proposal, stating it is against any unilateral move by the EU toward a stricter reduction target. The alliance—representing member companies in steel-making, refining, glass, paper, cement, ceramics, and chemicals—says EU-based energy-intensive companies are already operating under the most stringent climate change and environmental policies worldwide. At the same time, argues the

Chart 1 Breakdown By Industry Of EU Emissions Outside The Power Sector 2008–2020f



*Covers combustion installations and nitrous oxide emissions, perfluorocarbon emissions from aluminum production, and petrochemicals installations. e—Estimated. f—Forecast.
Source: Point Carbon.
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Chart 2 Baseline Emissions* And The Overall Cap In The EU ETS 2008–2020f



*Allocation and emissions include aviation from 2012 (capped at 212 million tons) and new industries from 2013 (capped at 120 million tons). New industries cover combustion installations and nitrous oxide emissions, perfluorocarbon emissions from aluminum production, and petrochemicals installations. EU ETS—European Union Emissions Trading Scheme. e—Estimated. f—Forecast.
Source: Point Carbon.
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alliance, these companies are exposed to international competition.

European industry groups within the alliance are concerned that a tighter emissions cap would bring significant uncertainties to the carbon market. While in relative terms carbon prices may be cheaper today than anticipated by the EC, the industry groups say the recession leaves them financially weaker to meet tougher emissions regulation. BusinessEurope, another industry group representing 20 million companies from 34 countries across the Continent, indicated on May 17, 2010, at a roundtable discussion with Ms. Hedegaard, that an increase in the EU's emissions reduction target at this point in time would be counterproductive.

European industry groups within the alliance are concerned that a tighter emissions cap would bring significant uncertainties to the carbon market.

By contrast, the EU Corporate Leaders Group on Climate Change, which includes companies such as Acciona, Alstom, Deutsche Telekom, Shell, and Tesco, argued at the same roundtable for an economic review of the EU ETS. The group said it was concerned that weak carbon prices in the EU could seriously undermine domestic investments in low-carbon technologies.

Carbon Prices Could Soar With A 30% Cut In Emissions

Adopting the tighter 30% emissions reduction target could push up the price of carbon significantly. Point Carbon, a carbon analytics and data provider, believes the price of Emission Unit Allowances (EUAs)—the benchmark price of carbon across the EU—could more than double to a range of €30 to €55 per tonne by 2016 from the current price of €15.5 per tonne (*see table*). In our view, the price ranges forecast by Point Carbon reflect the degree of uncertainty surrounding how the power plant

stack will evolve in the region up to 2020 (that is, uncertainty regarding the type and timing of new-build power plant, and decommissioning of old plant). The price forecasts are nevertheless far higher than the €32 per tonne assumed by the EC in its draft impact assessment.

Copenhagen Accord Bolsters Case For A Tighter Emissions Cap

The EC's tightening stance on emissions follows developments at the U.N. Climate Change Conference in Copenhagen at the end of 2009. (*For more details, see article titled "Q&A: Successes And Shortcomings From Copenhagen's Climate-Change Conference," published Jan. 12, 2010, on RatingsDirect on the*

Global Credit Portal.) At the conference, major economies from both the developed and developing world seemed to accept—some for the first time—that they may need to proactively reduce emissions in order to keep the increase in global warming to below 2 degrees by 2050, compared with pre-industrial levels before 1900.

To meet targets generally accepted by the countries signed up to the Copenhagen Accord as scientifically necessary, EU member states would need to implement carbon emissions reduction targets as high as 80% to 95% by 2050, compared with 1990 levels. In this context, we believe it's likely that the EU will move to a 30% emissions reduction target sooner rather than later. This would help bridge the gap between current emission levels and the 2050 goal.

An U.S. ETS Could Clinch The Deal

One of the main obstacles to the new 30% emissions reduction target in

Europe is the uncertainty surrounding future climate change legislation in the U.S. According to the EC, the introduction of a Federal emissions trading scheme in the U.S., together with comparable moves by other nations as part of a global deal, would make the decision more acceptable.

A U.S. ETS scheme is inching closer. On May 12, 2010, Senators John Kerry and Joseph Lieberman introduced the American Power Act to the U.S. Senate. This is the latest version of the long-awaited U.S. Climate Change Bill that aims, among other things, to introduce a federal cap-and-trade scheme—at least for the power sector—by 2013. The Senate bill aims to cut U.S. emissions of carbon dioxide (CO₂) and other greenhouse gases (GHGs) to 17% below their 2005 levels by 2020. If this legislation is passed, the path to the EU adopting the 30% emissions reduction target could become easier.

A Tougher Emissions Regime May Force Companies To Rethink Their Energy Investments

We believe the tighter emissions cap, backed by regulation, could change the marginal abatement cost curve (MAC; the relationship between tonnes of emissions reduced and the CO₂ [or GHG] price) of affected industry sectors and individual companies within these sectors. Industries employ MAC curves to guide their decisions about long-term capital investments in energy efficiency and power generation.

In our opinion, the 30% emissions reduction target could result in a steeper MAC curve for certain energy-intensive sectors, especially the power sector. We think this would leave companies to decide about how much abatement they can afford, and where and at what point they would have less flexibility in achieving emissions reductions.

We also believe energy-intensive sectors may have to undertake more fundamental changes in the way they conduct their operations in order to meet the new compliance targets. This may, for instance, involve the introduction of new and more energy-efficient processes in existing production lines or, in some cases, moving production facilities outside the EU.

At present, the cost of such changes across different sectors remains unclear, but we believe it will probably spark intense debate over the coming months between EC officials and industry representatives. Key variables in this debate will be forecast production levels by industry as well as various abatement options, which together will determine emissions growth across the EU.

Unchecked, Emissions Will Continue Their Inexorable Rise

The EU has so far had a solid track record in terms of action on climate change, and is on track to meet its 2008 to 2012 emission reduction commitments outlined in the Kyoto Protocol (*see footnote 3*). In terms of total GHG emissions, the EU

emitted about 14% less in 2009 than in 1990, according to Point Carbon. However, we do not consider that this sharp drop in emissions, which is generally put down to the economic recession in 2009, can be extrapolated into the future. Currently, production levels in energy-intensive industries such as steelmaking are increasing compared with 2009.

Point Carbon believes emissions are likely to increase as Europe comes out of recession, albeit unevenly sector by sector. Of those industries covered by the EU ETS, Point Carbon expects emissions from the cement, lime, and glass industries to grow the fastest (*see chart 1*). Emissions in the metals industry, by contrast, should level off after 2012 at a lower point than in 2008. This is because of reduced metals

production in the EU and energy-intensity improvements such as new and improved processes for manufacturing. Point Carbon's analysis also indicates weak growth in oil and gas emissions, based on a forecast of stable oil demand in Europe between now and 2020.

Aviation emissions, however, look set to take off. Baseline projections from a joint Point Carbon/RDC Aviation report indicate a significant rise in aviation emissions after 2012 if left unchecked. The projections also encompass "new industry" that will be included in the EU ETS from 2013 onward. This classification consists of inclusions resulting from a wider definition of combustion installations, processes that generate nitrous oxide (N₂O) emissions, perfluorocarbon emissions from aluminum production, and more petrochemicals installations.

How Far, And How Fast, Can Europe Cut Its Carbon Emissions?

Given the overall rise in baseline emissions, we think the critical question may be not whether, but how and how fast the EU could reach a 30% emissions reduction target. The difference between these two goals could be substantial in terms of the required reductions relative to baseline emissions (*see chart 2*). The larger the gap between these two parameters, the more pressure there is likely to be on carbon prices. This is because industry will either have to cut emissions or buy extra allowances to comply with the stricter cap on emissions.

Ahead of a European Council meeting of Environment Ministers on June 11, 2010, the EC has announced that it will prepare an analysis of what practical policies would be required to implement the 30% emissions reduction. It says it will later outline a pathway to reach this level of proposed emission cuts by 2020 and the EU's transition to becoming a low-carbon economy by 2050.

To ensure a high level of environmental integrity, we believe the policies underpinning political pledges on the 30% emissions reduction would likely

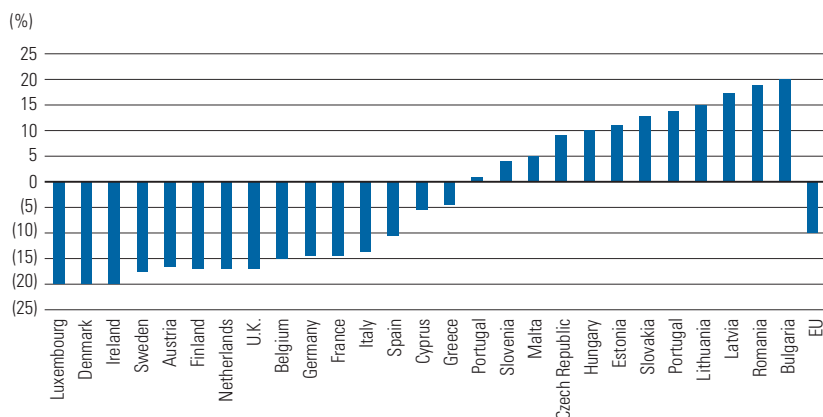
Carbon Price Ranges, Probabilities, And Probability Weighted Price

Four Emission Reduction Scenarios For EU ETS And The Probability Weighted Price For 2016

Emissions reduction scenario	Probability (%)	Carbon price in 2016 (€/tonne)
EU-20%	50	15-30
EU-25%	20	25-45
EU-30%	20	30-55
EU-30% linked markets*	10	25-35
Probability weighted price		30

*This scenario encompasses global carbon markets. EU ETS—European Energy Trading Scheme.
Source: Point Carbon.

Chart 3 Effort-Sharing Targets For 2020* Compared With 2005 Emissions Levels



*Based on a 20% emissions reduction target.
Source: European Commission, Climate Action.
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We think the critical question may be not whether, but how and how fast the EU could reach a 30% emissions reduction target.

follow a fairly stringent path. In our view, detailed policy options could imply a revision of the EU ETS Directive and/or the Effort Sharing Decision.

The Effort Sharing Decision, part of the EU 2020 Energy and Climate Change package, aims to reduce GHG emissions from sectors not included in the EU ETS (transport, buildings, agriculture, and waste management, for example). Under this scheme, each member state will contribute to this effort according to its relative wealth in terms of GDP per capita (*see chart 3*). While sectors in the EU ETS are regulated at the EC level, it will be the responsibility of member states to define and implement policies and measures to limit emissions of sectors under the Effort Sharing Decision.

An example of an Effort Sharing Decision initiative is the Carbon Reduction Commitment Energy Efficiency Scheme, the U.K.'s mandatory climate change and energy saving scheme. It started in April 2010 and is administered by the Environment Agency.

A relative picture of the effort-sharing targets for member states is shown in chart 3, calculated on the basis of the existing 20% emissions reduction target. We assume that the shared effort in contributing to the 30% reduction target would follow a similar pattern.

Innovation Points The Way In A High-Price Carbon Environment

The clamor for action on emissions is unlikely to abate. Referring to the analysis that the EC is preparing ahead of the European Council meeting in Luxembourg on June 11, 2010, EU Climate Action Commissioner Connie Hedegaard notes that the Commission will assess the policies required for implementing the 30% target "from a rational perspective."

Moreover, she stresses that discussions should focus on the means to reach the target and not on the target itself.

Despite the varying positions being taken across European industry groups, from a political if not an economic perspective, we believe a 30% emissions reduction target by 2020 is fast-becoming more acceptable and hence more likely. Backing up this assertion is the new U.K. Conservative-Liberal coalition government's pledge on May 20, 2010, that it would support such a move. With a growing expectation that carbon prices will trend upward toward €30 a tonne within the next 10 years, the debate will continue to shift, in our view, toward innovation and competitiveness across Europe's carbon-intensive industrial base. **CW**

Notes

1. Unlocking Europe's Potential in Clean Innovation and Growth: Analysis of Options to Move Beyond 20%, European Commission, May 5, 2010.
2. European Alliance of Energy Intensive Industries Opposes EU Unilateral Move to -30%, Brussels, May 6, 2010.
3. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The Protocol sets binding targets for 37 industrial countries and the European community for reducing GHG emissions. These amount to an average of 5% against 1990 levels over the five years between 2008 and 2012.

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Carbon Markets, Reduction Measures Help Manage Emissions Exposure In Europe

European companies plan to use short-term emissions abatement measures as well as the carbon markets to manage their carbon exposure, according to Standard & Poor's Ratings Services' survey of 500-plus rated corporate issuers. Furthermore, it appears that respondent companies are now considering their carbon exposure strategy post-2012, when the more stringent Phase III of the EU Emissions Trading Scheme (ETS) comes into force. This is when carbon exposure is likely to start to have a real impact on industry, in our view. Until now, according to our findings, the financial implications of complying with carbon legislation have been minimal for most companies. *(For details on the survey, see the section headed "Survey Methodology" at the end of the article.)*

In our survey, we canvassed the views of 513 corporate issuers that we rate on their current and anticipated future position in terms of their corporate carbon exposure. According to our analysis, the results indicate European companies increasingly believe that EU climate change policies will create risks and opportunities. Moreover, a number of survey respondents indicate that by implementing a carbon management strategy now, they can generate an opportunity for sustainable competitive advantage and potentially bolster their company's creditworthiness. This may explain why, according to some replies, the stewardship of companies' carbon

management programs now rests with senior executives and board directors.

Another possible reason for this level of stewardship, in our view, may be that climate change policies are now more likely to be on the political agenda. Certain governments are currently formulating a range of policies, standards, and regulations around greenhouse gas emissions (GHGs), energy consumption, and production that we feel could have significant and broad consequences for industry.

In the absence of a new legally binding international agreement on emission reductions post-2012, certain national and local governments worldwide are initiating bottom-up approaches and broad-

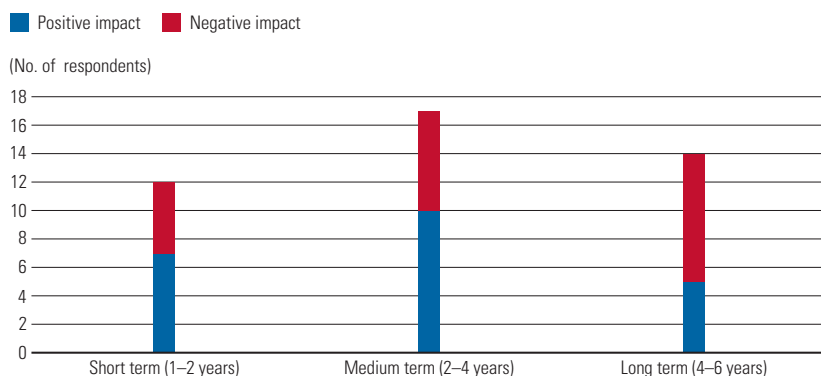
ening the scope of regulation. Countries such as the U.K., for example, have their own carbon reduction legislative frameworks in place that will determine emission limits for different industry sectors over the short (one to two years), medium (two to four years), and long (four to six years) term. In the U.K., the Carbon Reduction Commitment covers small businesses and municipal facilities that fall outside the EU ETS. Recent announcements of carbon taxes in Ireland and France and the revisions to the EU Energy Tax Directive provide further evidence regarding governmental actions to curb carbon emissions through fiscal and regulatory mechanisms, in our view.

Emissions And The Bottom Line: A Delayed Impact

According to our survey, emissions are becoming an accountable item for a significant number of companies. About 40% of respondents indicate that they fully account for carbon in their financial statements and annual reports. However, a similar percentage do not factor carbon emissions into any of their corporate financial calculations at all, which suggests there is still some way to go before European companies comprehensively integrate carbon reporting into their normal financial statements. Just over 20% have just started looking into the issue, which in our view indicates that industry is beginning to move toward that type of assessment.

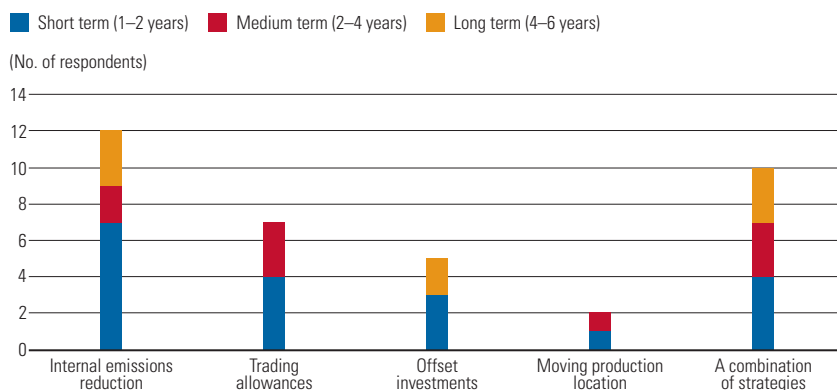
Companies holding back on their measurement of carbon exposure costs could, we believe, be due to a lack of accounting-specific information on the subject. One respondent commented that there is a lack of comprehensive guidance on accounting issues related to emissions trading schemes and the allocation of EU Allowances (EUAs, otherwise known as GHG emission rights). In the absence of specific standards, a certain degree of variation exists in the accounting approaches taken within industry sectors. Overall, one-third of responding companies account for the treatment of allowances on their financial statements, and there is an equal split between recording allowances as either inventory or intangible assets.

Chart 1 **Likely Impact Of Carbon Regulation On European Companies' Financial Statements Over Various Time Frames**



© Standard & Poor's 2010.

Chart 2 **European Companies' Mitigation Strategies For Carbon Exposure Are Evenly Spread Over The Longer Term**



© Standard & Poor's 2010.

With respect to the short-term financial impact of complying with emissions legislation, our survey reveals a fairly benign picture at present. About 60% of respondents say that the cost of carbon regulation (that is, the amount of allowances required to cover net emissions multiplied by the current carbon price) is currently positive. Furthermore, they anticipate that it will likely remain positive for the next three years (*see chart 1*). With some notable exceptions, the historical impact on credit quality has therefore been minimal since the EU ETS was introduced in 2005.

With the start of Phase III of the EU ETS in 2013, however, most industry sectors expect their carbon cost positions to turn negative. This may explain why some companies are already implementing carbon strategies and plan to carry forward a net surplus of their current EUAs, and thus may be able to cover their short positions when the more stringent emission reduction regulations are introduced. Such strategies may help to protect companies from the detrimental credit impact of longer-term carbon exposure.

Significantly, the overwhelming majority of respondents (about 90%) say that their current level of carbon exposure does not significantly affect their ability to raise financing. For about 7% of companies, carbon exposure provides a financial gain in the form of carbon revenues. Only 4% claim that carbon exposure levels are adversely affecting their fundraising capability. This may suggest, in our view, that lenders and investors have yet to fully incorporate carbon exposure risk into their funding decisions.

Firms Take A Proactive Approach To Meet Tighter Regulation

Regardless of their current position, the respondents from our portfolio of rated European companies anticipate that the regulatory regime post-2012 will be more restrictive in terms of emissions allowances. Moreover, they foresee increasing pressure from regulatory bodies in terms of carbon emission reductions. To prepare for this more stringent regulatory regime, companies appear to be developing

flexible carbon exposure mitigation strategies to cover the next five to six years (*see chart 2*).

In the short term (one to two years), these mitigation strategies appear to center on investing in projects that reduce in-house CO₂ emissions from industrial processes and improve energy efficiency. In addition, respondent companies say they plan to take full advantage of their ability to offset up to a certain limit their emissions by purchasing carbon credits from qualifying projects under the Kyoto Protocol. Companies also plan to take advantage of their allocated emission rights until 2012 and their ability to carry forward potential surpluses into Phase III of the EU ETS.

Chart 3 The Impact Of Final Carbon Cost On European Companies Is Limited

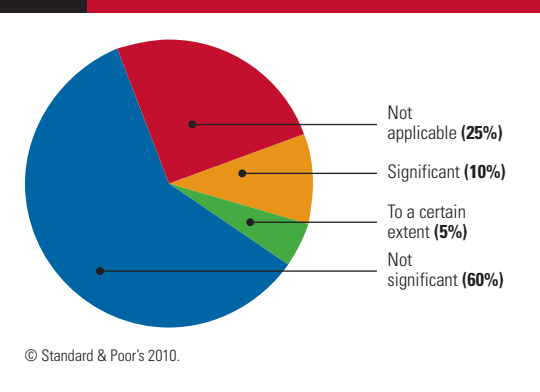
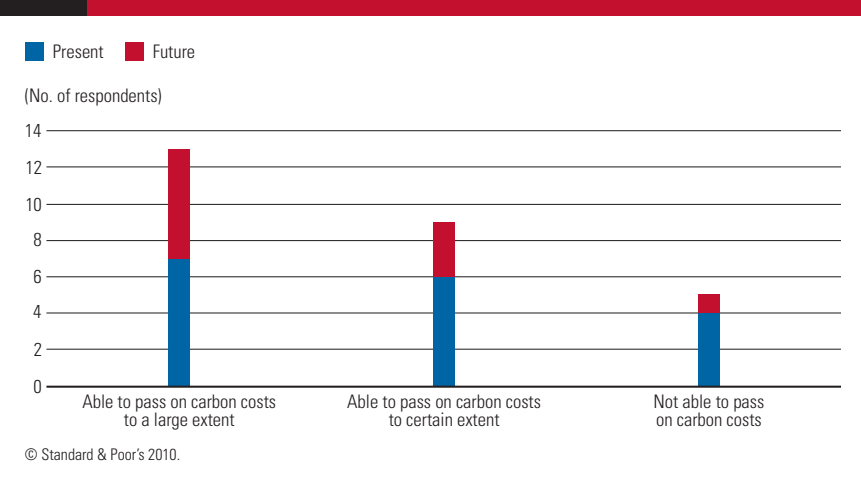


Chart 4 Carbon Cost Pass-Through By European Companies Is Set To Increase In The Future



Over the medium term (two to four years), the survey reveals an anticipated shift among companies to trade allowances and move production to locations with less restrictive climate change regulations in the absence of integrated global carbon markets and a global carbon price.

However, our survey data indicates that in the long term (four to six years) more companies intend to expand their carbon offset investment strategies, implement systems to buy allowances on a regular basis, and continue to reduce internal emissions. In our view, this may indicate an increasing need among European companies over the foreseeable future to mitigate their carbon exposure, and hence support credit quality, through a combination of trading allowances and carbon offset investments. Even those respondents that do not have an active EUA

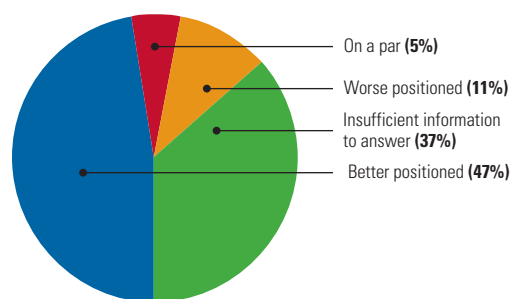
trading strategy in place at present say that they will have to enter the emissions market after 2012 to cover their short carbon positions.

Nearly 60% of survey respondents state that the final cost of carbon exposure (that is, the difference between the net cost of carbon and carbon revenues) has had no significant effect on their company to date (*see chart 3*).

This lack of impact, we believe, could be due to the favorable allocation of allowances in the early stages of the EU ETS. The survey results also suggest that, at present, carbon costs are not being entirely passed on to end consumers as there is a net benefit from carbon allowances. However, we anticipate that over the medium term, EU decisions on carbon leakage (the movement of production to countries with less stringent carbon legislation), reduced free allowance allocations to less-exposed industries, and the availability of substitute products are likely to reduce this net benefit.

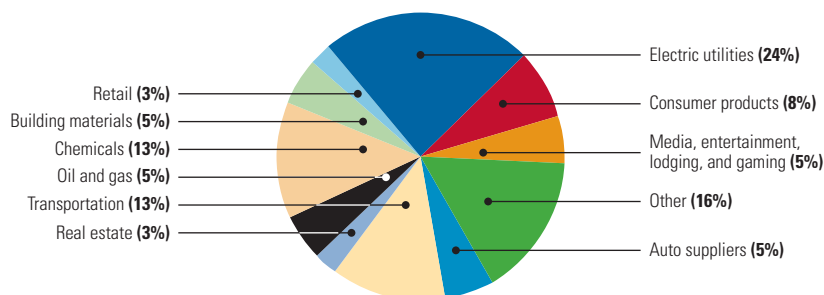
In the longer term, we believe companies will be exposed to negative net carbon costs—that is, the difference between total emissions (the amount of allowances a company needs to purchase) and the number of free allowances allocated under the relevant trading scheme. That said, we think that companies will seek to mitigate this exposure, since our survey responses show that companies expect to increase their carbon revenues by passing on more net costs to end consumers (*see chart 4*). Eventually, according to the majority of respondents, the aim is to pass on 100% of carbon costs. Whether this can be achieved or not will, in our view, ultimately be a key factor in determining the credit impact of future carbon exposure.

Chart 5 European Companies' Perception Of Their Carbon Exposure, Compared With Peers



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Chart 6 European Carbon Exposure Survey Responses By Industry Sector



Total number of survey respondents = 39.
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Carbon Management May Point The Way To Competitive Advantage

In the current economic downturn, companies are looking to leverage the most cost-effective solutions, and the survey shows that carbon management is starting to play a big part in this strategy. One respondent comments that the incremental cost of creating a carbon management strategy seems trivial in

comparison with its potential value in acquiring competitive advantage.

From our survey responses, it appears that an increasing number of European companies view carbon as a tradable commodity and that the carbon market is fast becoming an important tool for all industry sectors affected by climate change legislation. Against this background, our survey indicates that some respondent companies are looking to manage the financial and credit risks presented by tighter carbon regulations and to identify opportunities for earning additional revenues. In addition, it appears that they see obtaining green credentials and creating new brands as representing a competitive advantage.

Almost one-half of our survey respondents claim that they are better positioned than their competitors in terms of carbon exposure (*see chart 5*), with one company claiming a carbon footprint 20 times lower than those of its closest peers, which it views as strengthening its overall business position. The company expects this situation to be reinforced by the implementation of Phase III of the EU ETS and other new national regulations covering carbon emissions, such as the proposed carbon tax in France. Moreover, a number of survey respondents believe that a price on carbon can give an edge to top industrial players that are able to produce more with less energy and/or GHG emissions, and to offer products that enable their customers to do the same. Some respondents claim that this fosters research and development at the production stage and during the product life cycle (that is, from product creation to utilization).

Over the next 12 to 18 months, Standard & Poor's anticipates examining more closely verified GHG emissions data in relation to all companies that we rate. With European companies likely to face new and more stringent climate change regulations within the next two years, some businesses appear to be investing in robust and flexible data management systems. While carbon exposure has so far not created too many challenges for corporate Europe, as the views of the respondents to our survey indicate, this situation could be about to change.

Survey Methodology

In this survey, the views of 513 corporate issuers rated by Standard & Poor's were canvassed on their current and anticipated future position in terms of their corporate carbon exposure.

The results cover a wide variety of industry sectors. They include those sectors that have obvious high carbon exposure—electric utilities, chemicals, building materials, and oil and gas. They also encompass sectors that, due to the nature of their activity, are not directly exposed to carbon legislation to the same extent—auto suppliers, for example. The response rate of 39 completed questionnaires is close to 8% of the sample population, which is above average for this kind of survey and therefore statistically valid in our view. Furthermore, the spread of responses is reasonably broad across all industrial sectors (*see chart 6*).

The following definitions associated with carbon exposure were provided with the questionnaire:

- **Gross carbon costs:** The amount of emission allowances a company needs to surrender for compliance purposes multiplied by the price of such allowances.
- **Net carbon cost:** The difference between total emissions (the amount of allowances a company needs to purchase) and the number of free allowances allocated under the relevant trading scheme.
- **Carbon revenues:** The level of allowance costs passed through to the final consumer ("recovered costs") multiplied by sales.
- **Final cost of carbon:** The difference between the net cost of carbon and carbon revenues.
- **Cost of carbon regulation:** The amount of allowances required to cover net emissions multiplied by the current carbon price. **CW**

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Survey Highlights Climate Change Concerns For Asia-Pacific Corporates

Corporates in Asia-Pacific are seriously concerned about the impact of climate change on their industries, and are preparing to tackle increasing legislation aimed at curbing greenhouse gas emissions, according to responses to a survey conducted among issuers from 13 countries and 16 sectors across the region rated by Standard & Poor's Ratings Services. The survey and this following analysis were completed jointly with carbon analytics firm RepuTex Ltd.

Editor's note: Standard & Poor's Ratings Services would like to acknowledge the contributions of RepuTex Carbon Analytics to this article.

The survey was sent to more than 300 corporates, and 28 responses were received. Around 90% of respondents expressed their concern about the impact of physical climate change on their industry, with most concern expressed by corporates operating in Japan, Malaysia, and India. By sector, real estate, metals & mining, consumer products and transportation envisage climate change as having the greatest physical impact on their operations.

The other key findings of the survey were as follows.

- Although more than half of the surveyed respondents view the regulatory and physical risks of climate change as “serious”, in our view only a minority of companies demonstrated a comprehensive understanding of those risks.

Current levels of awareness around factors such as carbon prices, expected climate change regulation, financial risks, and opportunities are relatively low, indicating that there is a substantial knowledge gap that may need to be addressed to achieve effective risk management for affected companies.

- According to the data provided by RepuTex, the most carbon-intensive sectors in the Asia-Pacific region are utilities (58%), energy (18%) and materials (13%). By country, Japan (31%), China (29%) and South Korea (11%) produce the most carbon emissions in the region.
- Recognizing climate change and carbon reduction commitments as a possible source of competitive advantage, 46% of the survey respondents already perform direct-emissions forecasting to

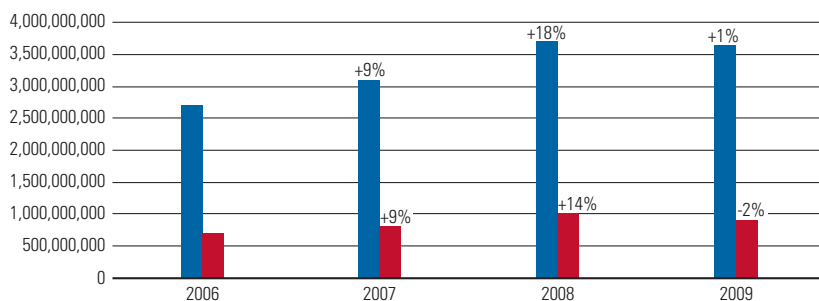
determine future carbon liabilities and build carbon management strategies.

- The survey also indicates that respondents believe that the current and evolving regulatory and physical environment in the Asia-Pacific region could lead to the following opportunities: investors increasingly using an understanding of variations in carbon performance within sectors to identify which companies pose the greatest risks to their portfolios, as well as opportunities presented by carbon-efficient leaders; reduced exposure to increasing energy costs through new technologies and behavioral change; and, potential acceleration in R&D of new technologies in carbon-intense sectors, on the back of enforced carbon reduction regulations.

Chart 1 Asia-Pacific Universe Direct Emissions History

■ RepuTex Asia-Pacific universe ■ Survey respondents

(Total direct emissions tCO₂-e)



Source: RepuTex Carbon Analytics, 2010.
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Total Direct Emissions Across the Region Plateau, Following Strong Rise

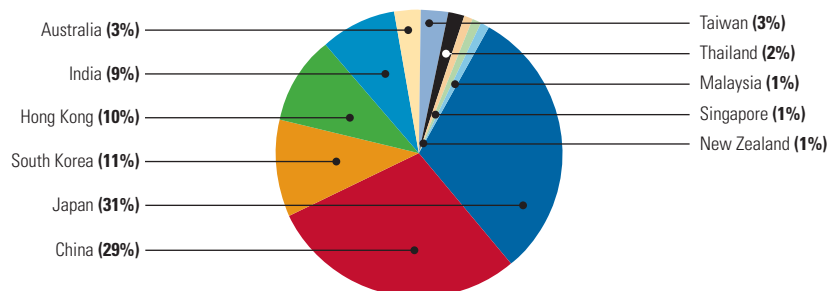
According to supplementary data provided by RepuTex, total direct emissions among 1,657 Asia-Pacific companies monitored by that firm have grown significantly from 2006 to 2008, in line with industrial production and economic growth across most Asian economies, notably China and South Korea. A slowdown in economic and industrial output as a result of the global financial crisis resulted in a slight drop in emissions across most Asia-Pacific companies in 2009. The data for corporate issuers rated by Standard & Poor's who responded to the survey suggest much better performance in terms of emissions than their industry peers' (see chart 1).

This finding is also backed up by the survey results indicating that more than 70% of respondents rank their relative position in terms of carbon exposure as much more favorable than the sector benchmark.

Analysis undertaken by RepuTex of companies across the Asia-Pacific region indicates that more than 70% of regional emissions from the selected RepuTex universe are derived from companies based in Japan (31%), China (29%), and South Korea (11%) (see chart 2).

Utilities represent the overwhelming source of emissions across the regional

Chart 2 Asia-Pacific Universe Emissions By Geography



Source: RepuTex Carbon Analytics, 2010.
© Standard & Poor's 2010.

universe in the RepuTex analysis, accounting for 58% of direct emissions, due to a strong reliance on fossil fuels. The energy (18%) and materials (13%) sectors were highly represented, with these sources in combination with utilities accounting for almost 90% of all emissions.

Direct emissions from the energy sector arise from upstream oil & gas extraction processes (e.g. flaring) as well as downstream refining processes. Offshore oil & gas production generally is more carbon intensive than are onshore operations.

Materials sector companies, including cement, steel, and fertilizer producers, directly emit greenhouse gases through fossil fuel usage as well as through industrial emissions relating to the chemistry of each process.

Transport companies, in particular airlines, are the major contributors to the industrial sector's direct emissions, which represent 7% of emissions across the regional universe according to RepuTex.

Carbon Risk Transformed Into A Source Of Competitive Advantage

The survey results show that the most proactive corporates have already started incorporating carbon management across their entire value chains as part of their competitive-advantage strategies. One of the respondents said that it complies with the CO₂ Emission Reduction Program implemented by the Tokyo Metropolitan Government, starting with the implementation of plans for CO₂ reduction in its Tokyo headquarters and disclosing its progress every fiscal year via its Website. Some comments clearly indicate that in the survey respondents' view the incremental cost of creating a solid carbon management strategy is trivial in comparison to its potential value in acquiring competitive advantage.

In anticipation of a mandatory emissions trading scheme (ETS) and official guidelines for accounting for liabilities and revenues associated with emissions, we believe that the utilities and airports sectors are preempting future regulatory carbon reduction frameworks covering their operations and already reveal costs

associated with their carbon footprints in their financial statements. In particular, Asia-Pacific airlines that fly into and within the European Union face an imminent exposure to carbon regulation from 2012. According to the survey results, corporates from New Zealand that are already covered by a national ETS and have obligations to report their activities and surrender New Zealand units under that ETS are leading the trend. Companies from Australia, Japan, Malaysia, and South Korea also are actively preparing for future mandatory emissions-reporting obligations.

In total, 18% of the respondents stated that they already account for carbon liabilities in their statements and 32% of the respondents declared that they have just started looking into this.

Respondents from all sectors across entire Asia-Pacific region clearly stated that they anticipate climate change regulations to progressively affect their financial statements, with 41% of the respondents reporting that, to a certain degree, they already feel the impact of carbon regulations on their fund-raising activity.

It appears that some companies are already taking advantage of new climate legislation, with 11% of respondents—representing the oil & gas and electric utilities sectors from Australia, Malaysia, and Thailand—indicating that they have experienced positive effects of carbon regulations to date, notably via investment in low-emissions activities such as renewable energy, coal seam gas, and liquefied natural gas. However, the chemicals, consumer products, utilities, integrated gas, and airports sectors from Australia, China, Japan, South Korea, Taiwan, and Thailand show signs of experiencing negative effects of the carbon reduction regulations on their fund-raising abilities. Research undertaken by RepuTex indicates that investors worldwide are increasingly more knowledgeable about carbon exposure, and analyze which companies present the greatest risks to portfolios, as well as opportunities created by carbon-efficient leaders.

China, Japan, and Taiwan were most concerned about regulatory frameworks.

Asia-Pacific Corporates Increasingly Engaged In Carbon Reduction Activities

We believe that corporate carbon management strategies generally have been hampered by the current uncertainty and lack of clarity around both the nature and timing of future carbon regulations across the globe. However, the survey results indicate that Asia-Pacific corporates are increasingly engaged in carbon reduction activities across their entire value chains. The respondent corporates appear to be actively exploring strategies to turn financial risks from carbon regulations into opportunities and a source of competitive advantage.

Energy efficiency was indicated as being the most preferable option across sectors and geographies, with respondents in the transportation and media and entertainment sectors entirely relying on this option.

Investment in carbon offset strategies was chosen by respondents in the oil and gas, integrated gas, and airports sectors as the most feasible carbon abatement option. Development of low-carbon products and services was favoured by the metals & mining and retail sectors.

Geographically, respondent corporates from Australia, Indonesia, and New Zealand view themselves as being better positioned to reduce carbon risk through energy efficiency measures. Chart 3 describes corporates' preferred options for turning carbon risk into opportunity by the main operations location.

Value Chain Emissions Analysis Points to Varying Performance

RepuTex undertook a benchmarking exercise to model the levels of Asia-Pacific's average emissions intensity by scope and to compare the results with the performance shown by the survey's respondents (*see chart 4*).

Value chain carbon intensity generally is regarded as a good indicator of vulnerability to carbon pricing. Expressed in terms of tonnes of CO₂-e emitted per million dollars of revenue, carbon intensity corresponds to the total emissions (direct and indirect) throughout a company's value chain required to put goods or services in the market, as well as the

emissions produced by the use of these products and services. For example: for the automotive sector, total carbon intensity analysis includes the quantity of carbon needed to produce a car (Scope 3-Upstream), the fossil fuel consumed during production (Scope 1), electricity consumption during production (Scope 2), and the carbon emitted during the use and eventual disposal/recycling of a car (Scope 3-Downstream). By applying this comprehensive value chain approach to carbon risk, RepuTex believes its analysis more accurately reflects a company's entire carbon risk and dependence. (See the Appendix for definitions for the scopes of emissions.)

In a carbon-constrained economy, direct carbon intensity indicates a company's exposure to carbon permit liability under a cap-and-trade or a carbon tax system. Supply chain and electricity carbon intensity allow an assessment of a company's likely indirect cost exposure.

Downstream carbon intensity provides insight into a company's broader exposure to carbon risk. For instance, through a border tax, Australia's coal exporters could incur liability for their "downstream" or product use-related emissions in carbon-conscious European markets.

Overall, the direct and indirect (Scopes 2 & 3) carbon intensity of

RepuTex's Asia-Pacific universe is higher than that of survey respondents, indicating a higher degree of vulnerability and impacts to cost under future carbon-pricing regimes. We believe this is mainly due to a lower representation of carbon-intensive industries within the surveyed universe.

Value chain emissions at a sector level reveal that respondent companies in the utilities and materials sectors have significant direct emissions, while respondents in the consumer discretionary and consumer staples sectors are exposed to high supply chain (Scope 3 and Upstream) emissions (see chart 5).

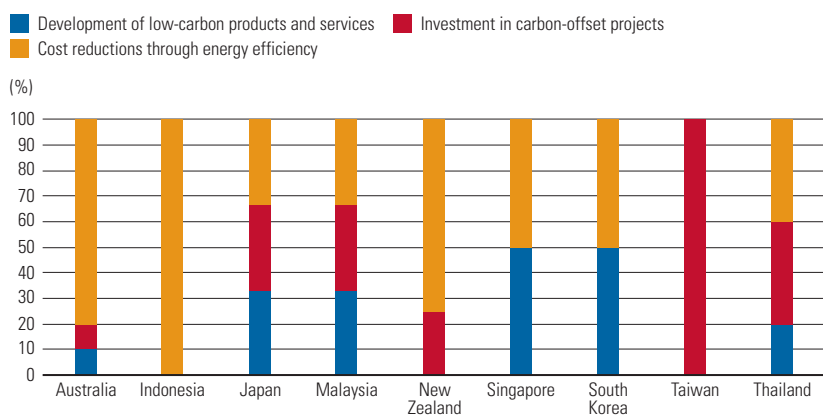
For materials, Scope 2 emissions primarily arise from high electricity usage during metal smelting and refining processes. Overall, 74% of the survey respondents are quantifying their Scope 2 emissions. Given that electricity prices generally increase post an ETS, companies who do not implement energy efficiency strategies may be less well placed to minimise future costs.

For utilities and materials, RepuTex estimate that direct emissions contribute 77% and 44% of value chain emissions respectively, while for industrials (e.g., building products, construction), energy, and consumer staples, indirect emissions make up around 82%, 86%, and 84% of each sector's value chain carbon intensity, respectively. We believe that this indicates that utilities and materials could face significant direct-permit liability under a cap-and-trade or a carbon tax system whereby liability is dependent on the level of direct carbon intensity. Meanwhile, industries with high indirect emissions are likely to experience higher supply chain and impacts on electricity price due to a pass-through of carbon costs, in our view.

Overall, the survey results indicate limited accounting for Scope 3 emissions, with only 30% and 26% of the respondents stating that they quantify their supply chain and downstream emissions, respectively.

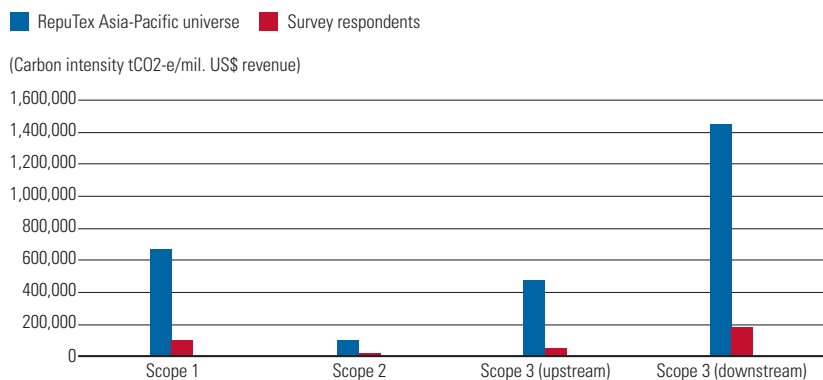
According to the survey, the most proactive sectors in quantifying emissions

Chart 3 Country Preferences For Turning Financial Risks From Carbon Regulations Into Opportunities



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Chart 4 Asia-Pacific Universe Value Chain Carbon Intensity



Source: RepuTex Carbon Analytics, 2010.
© Standard & Poor's 2010.

appeared to be chemicals, metal & mining, and airports. Of these respondents, 100% indicated that they quantify their direct carbon footprint (Scope 1).

Geographically, the survey indicates that corporates that take an active voluntary approach in quantifying their direct carbon footprint are based in Australia, Japan, Malaysia, New Zealand, South Korea, Taiwan, and Thailand.

All the respondents that already quantify their direct emissions outlined that while calculating their carbon footprint they do a complete coverage of all facilities under operational control and compute their emissions data based on standard methodologies (e.g. greenhouse gas (GHG) Protocol). For instance, a construction company has applied GHG Protocol guidelines to establish its carbon-emissions inventory (including some Scope 3 emissions such as business travel). This inventory accounts for emissions from construction sites, buildings, and also the company's headquarters, and it has the potential to provide "good practice" guidelines for the construction industry.

Nearly 80% of the respondents chose implementing energy efficiency measures as the most preferable and feasible option to mitigate carbon exposure. Investing in clean technologies, innovation, and renewable energy, and retrofitting and optimizing existing processes, were chosen by 71% of the respondents. We believe that this indicates that respondents are taking advantage of low-hanging fruit such as energy efficiency measures, which often result in cost savings (i.e. "negative cost").

In terms of corporates' upstream emissions (Scope 3), only 4 % of respondents were confident that they were knowledgeable about their supply chain partners' carbon intensity. Meanwhile, 52% of the respondents stated that they are knowledgeable but only to some extent.

Around one-third of respondents said that they have considered the potential increase in supply chain cost that may occur under a low-carbon economy,

and expressed their readiness to tackle their upstream emissions, with 39% of the total number considering streamlining their supply chain operations and 30% of total number favouring finding a way of selecting supply partners that have lower emissions.

The most proactive sectors ready to undertake actions to reduce the risk of carbon cost from their supply chain were the transportation, chemicals, electric utilities, and integrated gas sectors. Geographically, these corporates are based in Australia, Japan, Malaysia, New Zealand, and South Korea.

According to the survey respondents, the best-positioned sectors in terms of passing carbon costs to the end consumer are the electric utilities, integrated gas, and airports sectors. The sectors that have a partial ability to pass on carbon cost are chemicals, metals and mining, and oil and gas.

The best-positioned sectors in terms of passing carbon costs to the end consumer are the electric utilities, integrated gas, and airports sectors.

Respondent corporates from Taiwan, South Korea, Singapore, and New Zealand believe that regulatory frameworks will give them the ability to shift additional costs of emissions reduction on to the end product/service users.

In total, 57% of the respondents are seriously considering developing strategies to manage downstream carbon costs that arise from the potential imposition of carbon tariffs on imported products from Asia-Pacific suppliers. Of the respondents, 38% are planning to develop alternative low-cost carbon products, and 19% purchasing of carbon offsets or investing in carbon offset projects.

Considering strategies to mitigate entire carbon exposure, 59% of survey respondents chose internal emission reduction as their preferred option.

Only 5% of the respondents considered the possibility of moving production locations, meaning minimal carbon leakage to non-regulated markets. This contrasts with the results from the Standard & Poor's European Corporates Carbon Exposure Survey, published March 1, 2010 (*see footnote 2*), which showed moving of production location was chosen by 17% of the respondents as a possible option.

Carbon Cost Analysis

For illustrative purposes, RepuTex has modeled the implementation of a hypothetical regional ETS for the selected Asia-Pacific countries covered in the survey. The purpose of this exercise was to investigate the potential direct (i.e., permit trading) and indirect (supply chain and electricity costs) financial impacts of a typical ETS on Asia-Pacific corporates.

The scheme was applied equally across all markets, based on the following assumptions:

- Implementation of a cap-and-trade scheme across all Asia-Pacific countries;
- Economy-wide ETS covering all sectors;
- Overall mid-term target of 20% by 2020;
- ETS inclusion threshold of 25,000 tCO₂-e (direct emissions only); and
- Starting carbon price of US\$20/tCO₂-e.

Background To Reputex's ETS Liability Model

RepuTex's Carbon Liability Model adopts a holistic approach to measuring direct (permit and trading) and indirect (electricity and supply chain)

carbon costs facing each company, in addition to projections of costs passed through to consumers—for example, impact on post-ETS revenue from the increased price of goods. This net position is termed the company's total carbon liability.

Each key carbon impact is modelled using a combination of company research and Scopes 1, 2, and 3 greenhouse gas emissions data compiled by RepuTex.

The translation and normalization of liabilities into comparable metrics are essential for benchmarking the real risks that a company faces from a hypothetical ETS.

RepuTex measures carbon risk using three financial metrics to allow flexible and meaningful comparisons:

- Revenue exposure: carbon liabilities as a percentage of revenue;
- EBITDA exposure: carbon liabilities as a percentage of EBITDA; and

- Value at carbon risk (VaCR): valuation impact of carbon liabilities as a percentage of market value.

VaCR is a proprietary investment risk metric developed by RepuTex to model and translate firm-level carbon liabilities into an ex-ante valuation impact. Accordingly, VaCR estimates the market value of a firm that is expected to be “at risk” should that firm continue to operate “as is” under a proposed ETS (i.e. in the absence of emissions abatement).

In determining VaCR, RepuTex adopts a capitalization-of-“cost”-earnings approach that measures the impact on net profit after tax in conjunction with the company's current pre-carbon P/E multiple.

Using the RepuTex ETS liability model, for Asia-Pacific companies across the selected universe, the average annual cost of a hypothetical regional ETS in 2006 would have been about US\$3.62 billion. Based on emissions growth experienced across the region, a 7% increase would have occurred by 2007, followed by a 10% increase to US\$4.2 billion by 2008. Costs dropped slightly in 2009, attributed to the industrial slowdown post the global financial crisis (*see chart 6*).

Based on the commencement of a hypothetical regional ETS, Asia-Pacific companies within the universe may be exposed to up to a 5% VaCR impact, with the survey respondent sub-set exposed at a slightly lower 4.2% (*see chart 7*). Higher carbon prices due to increased demand within the market would potentially mean a higher valuation impact for Asia-Pacific companies.

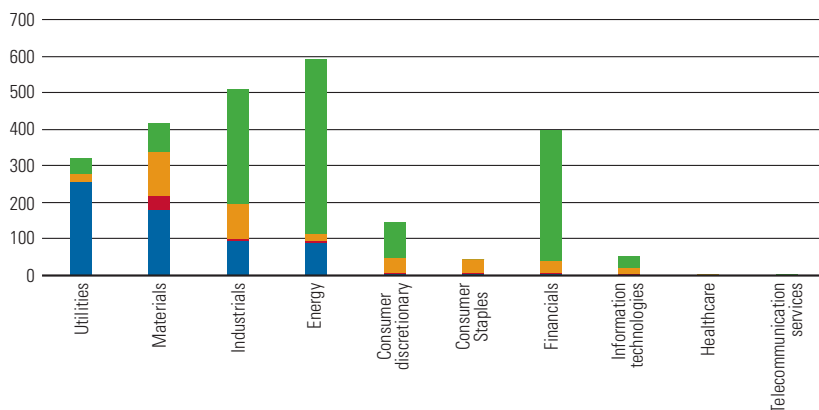
Direct carbon costs **Indirect carbon impacts**

Total ETS + I. Net permit expense + II. permit trading cost + III. Electricity price impact + IV. Supply chain impact – V. Revenue impact (passed-on costs)

Chart 5 Asia-Pacific Universe Carbon Intensity By Sector

■ Scope 1 ■ Scope 2 ■ Scope 3 (upstream) ■ Scope 3 (downstream)

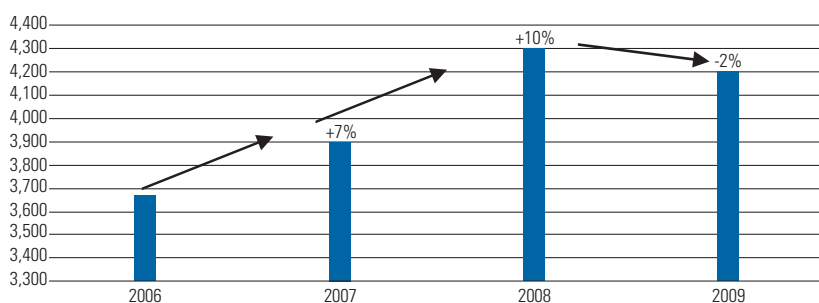
(Carbon intensity tCO₂-e/mil. US\$ revenue)



Source: RepuTex Carbon Analytics, 2010.
© Standard & Poor's 2010.

Chart 6 Asia-Pacific Universe Annual ETS Costs

(Mil. US\$)



Source: RepuTex Carbon Analytics, 2010.
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Cost Breakdown Across The Value Chain

Recognizing climate change and carbon reduction commitments as a possible source of a company's competitive advantage, 46% of the survey respondents already perform their direct-emissions forecasting to determine their future carbon liabilities and to build carbon management strategies around it.

Survey results indicate that the oil and gas, metals and mining, electric utilities, and integrated gas sectors anticipate significant carbon exposure under future ETS, and are already

performing direct-emissions forecasting to determine future carbon liabilities.

A trend is shown by the survey respondents from China, Malaysia, Australia, Japan, South Korea, and Thailand, who indicated that they perform direct-emission forecasting. One of the respondents stated: “We review our operation from upstream to downstream to identify key operations that have negative impacts on the environment and climatic change, and take necessary action—medium- to long-term action plans to contribute to greener operations in Malaysia.”

In assessing a company’s emissions profile and its potential liability on a carbon price, we believe it is important to take a holistic value chain approach so that overall costs to a business model can be assessed and abatement strategies implemented accordingly.

Across the Asia-Pacific universe selected and analyzed by RepuTex, indirect (supplier, electricity) carbon liabilities outweigh direct permit-trading costs, with the latter accounting for only 3% of total ETS costs; indirect supply chain and electricity costs make up 63% and 34% of total costs, respectively.

A large percentage of incurred costs—US\$2.84 billion, or about 65% of total costs—is likely to be passed through to downstream customers through higher pricing arrangements, leaving a net liability across the universe of US\$1.47 billion. RepuTex estimates pass-through rates by reviewing the competitiveness of an industry and the given firm within that industry. Pre-carbon profit margins relative to industry group are an important metric according to RepuTex; it is also, in our view, essential to conduct sensitivity analysis as estimates are established.

In both Standard & Poor’s and RepuTex’s opinions, the ultimate impact on a given industry is likely to be determined by the market dynamics (strength of competition, suppliers etc), government subsidies, and costs structures. At the company level, carbon exposure generally is assessed on the basis of the specific expected costs of carbon and the potential revenue flows associated with carbon regulation and competition.

In our view, companies with strong market positioning, and carefully selected and closely managed supply chains and procurement practices, and those with energy efficiency and abatement policies, are likely to be best placed to mitigate such indirect costs.

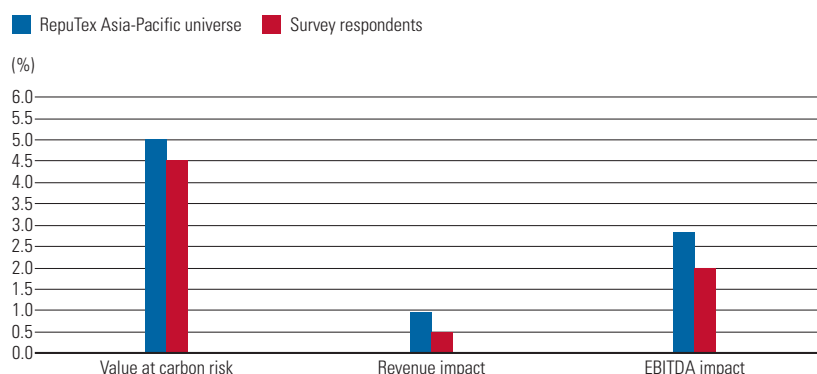
According to the analysis carried out by RepuTex, sector value chain costs indicate that despite having the lowest exposure to a direct carbon price, consumer discretionary and telecommunications companies could potentially have the highest overall annual carbon liability due to high supply chain cost expo-

sure. The level of indirect exposure for each company is assessed by reference to pricing power and market positioning (see chart 8).

Utilities, energy, and materials companies are likely to make up the largest share of the carbon compliance markets across Asia-Pacific. This trend is in line with the European ETS experience, which is the largest operational scheme globally.

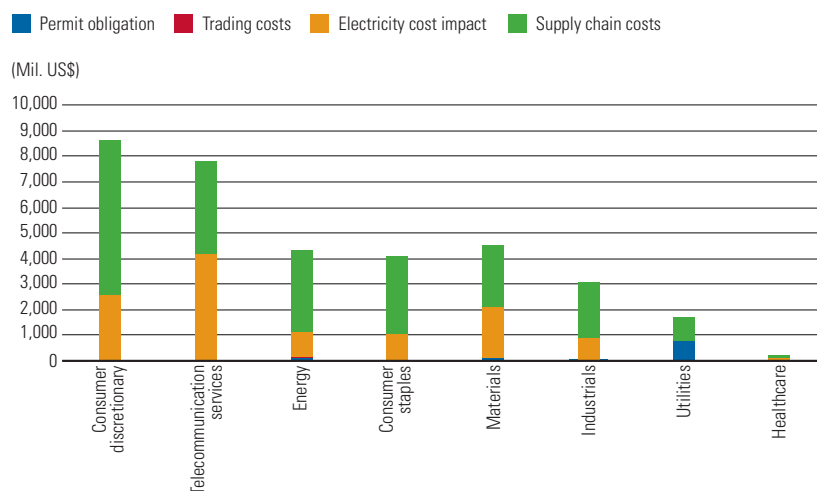
As well as direct-permit expenses, materials companies, including carbon-intensive industries such as steel, cement, chemicals, and fertilizer manu-

Chart 7 Average ETS Valuation Impacts



Source: RepuTex Carbon Analytics, 2010.
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Chart 8 Asia-Pacific Universe Value Chain Liability Profile By Sector



Source: RepuTex Carbon Analytics, 2010.
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factures, are also likely to face very significant increase in cost for raw materials, fuel, and electricity, in our view.

This analysis indicates that a carbon price would have important implications for survey respondents, notably those within the consumer discretionary, energy, and consumer staples industries. Survey responses indicate that consideration of supply chain emissions has taken a backseat to direct emissions, with only 5% of survey respondents having a reasonable idea about their supply chain partners' carbon intensity, while 52% of respondents indicated "some" knowledge, and the remaining 43% had no knowledge at all.

Overall, results reflect that for Asia-Pacific, there is further room for development of risk analysis of both direct and indirect carbon costs, as well as the competitive implications of these carbon risks and liabilities.

Survey Methodology

In this survey, we canvassed the views of 318 corporate issuers rated by Standard & Poor's on their current and anticipated future position in terms of their corporate carbon exposure.

The results cover a wide variety of industry sectors. They include those sectors that have obvious high carbon exposure—electric utilities, chemicals, building materials, and oil and gas. They also encompass sectors that, due to the nature of their activity, are not directly exposed to carbon legislation to the same extent—auto suppliers, for example. The response rate of 28 completed questionnaires represents 9% of the sample population, which is above average for this kind of survey and therefore statistically valid in our view. Furthermore, the spread of responses is reasonably broad across all industrial sectors. **CW**

Footnotes

1. RepuTex is a research firm specializing in carbon risk analytics for global companies and investment professionals and a recognized knowledge source for market participants seeking to measure, benchmark, and price carbon risk and

exposure. RepuTex specialises in data-driven advisory and analytical services, underpinned by the company's proprietary database of emissions information on more than 250,000 assets in 80 markets globally. RepuTex was founded in 1999 and is headquartered in Hong Kong, with offices in Melbourne, Australia. For more information visit: <http://www.reputex.com.au>

2. Standard & Poor's *"Carbon Markets, Reduction Measures Help Manage Emissions Exposure In Europe"*, on p. 34.

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Appendix | "Scopes of Emissions" Referred To In RepuTex Analysis

Scope 1: Direct Carbon Intensity

This metric refers to the carbon dioxide-equivalent emissions of direct emissions of a business activity per million U.S. dollars (tCO₂e/Mil. US\$ revenue). Direct emissions include: fuel use, energy use, manufacturing process activity, mining activity, and on-site waste disposal.

Scope 2: Indirect Carbon Intensity

This metric refers to the carbon dioxide-equivalent emissions associated with electricity purchase or consumption (or steam or heating/cooling) per million U.S. dollars revenue (tCO₂e/Mil. US\$ revenue) for a particular business activity.

Scope 3 (Upstream): Supply Chain Carbon Intensity

This metric refers to the carbon dioxide-equivalent emissions per million U.S. dollars revenue (tCO₂e/Mil. US\$ revenue) associated with the supply chain (e.g. raw materials, logistics) of the business activity.

Scope 3 (Downstream): Use Phase Carbon Intensity

This metric refers to the carbon dioxide-equivalent emissions per million U.S. dollars revenue (tCO₂e/Mil. US\$ revenue) associated with the use phase of a product (e.g. downstream N₂O emissions of fertilizers when applied for agricultural purposes).

Direct Carbon Footprint (Scope 1)

This refers to the total direct carbon footprint of a company (tCO₂e). This direct carbon footprint includes:

- Stationary combustion: To produce electricity, steam, heat or power using equipment in a fixed location.
- Mobile combustion: Fuels used in transportation e.g. cars, trucks, marine, aviation; and emissions from non-road equipment such as equipment used in construction, agriculture and forestry.
- Physical and chemical processes: Other than fuel combustion (e.g. the manufacture of cement, aluminium, adipic acid, and ammonia.)
- Fugitive sources: Releases for the production, processing, transmission, storage, and use of fuels and other substances that do not pass through a stack, chimney, vent exhaust pipe or other functionally equivalent opening (such as releases of sulfur hexafluoride from electrical equipment; hydrofluorocarbon releases during the use of refrigeration and air condition equipment; and methane leakage from coal mining and natural gas transport.)



S&P Utilities CEO Conference

Changes To Industry May Be Slow, But They're On The Way

While a division of power in Washington may put the brakes on any sweeping reform of the U.S. utilities industry, power providers are making changes to address the evolution of their business, said panelists at Standard & Poor's Ratings Services' U.S. Electric Utilities Industry Luncheon, which was held on Monday, Nov. 1, 2010, in Palm Desert, Calif.

Gerald Anderson, president and chief executive officer of DTE Energy Co. in Detroit, and Tom Fanning, chairman and CEO-elect of Atlanta-based

Southern Co., told attendees of the conference that although they didn't expect the federal government to pass significant climate-change legislation any time soon, utilities face a world interested in cleaner energy sources and cost-effective power generation.

"My sense is the days of big sweeping legislative moves are over for the near term, and that we're going to head into a much more tactical period—so, I think the likelihood of climate change legislation is minimal," Mr. Anderson said. "Obviously, the EPA (Environmental

Protection Agency) is going to work on its own version of how to affect climate change, and I think that is going to be the focus of a significant part of the new Republican House next year.”

Mr. Fanning agreed, adding that a coordinated effort between Washington and industry leaders is likely.

“Regardless of who’s in power at any one time, I think our industry has a really good track record of working with the powers that be to arrive at constructive outcomes,” he said. “That’s where I think we are, and that’s where we will be for the foreseeable future.”

Mr. Fanning said that, with regard to cleaner power generation and renewable energy sources, the industry would need to reconcile ecological concerns with economic practicalities.

“The capacity you don’t build is the cleanest of all,” he said. “We’ve got to provide a path where we can continue to innovate on technology development to make sure that this industry is where it needs to be, to deal with the big issues around the environment and the future.”

DTE’s Mr. Anderson said this evolution would likely result in the scaling back of coal-fired power generation, but that accounting for the cost of this change would be a big factor in how quickly it would occur.

“I do think older coal-fired assets are going to be transitioned out, and we’re going to replace them,” he said. “So the question is, ‘Do we do that in an efficient way that makes sense relative to invested basic capital, or do we, through regulatory policy, just try to make it really expensive so that people will evacuate those assets?’”

He said that he believed the latter would be an “inefficient path.” Southern’s Mr. Fanning agreed, adding that lawmakers and industry leaders must explore a number of solutions.

“We need all the arrows in the quiver: nuclear, clean coal, gas, renewables,” he said. “We think these things are important. But there are other things that we must remember, especially with the kind of budget pressures facing the U.S.”

“What we’ve got to do is to provide a whole framework of energy production: the reliability, economic consequence, and environmental impact that make sense for customers,” Mr. Fanning said. “If you’re going to embark on things like nuclear, we at Southern have always believed that you’ve got to have scale, credit quality, and credibility of operations. Without all three of those things, you are stepping into trouble.”

With regard to a significant move to natural gas-fueled generation, both men cautioned that there are pitfalls mixed in with the positives.

“I don’t think it’s any secret that the shale-gas evolution over the past two years has been a revolution,” Mr. Anderson said. “It’s really fundamentally changed the picture of natural gas in North America—and pricing with it.”

“And it’s been a huge supply-side development,” he continued. “I think, eventually, we’re going to see big demand-side developments. I think the power sector will use a lot more gas over time. That supply response to the availability of this new resource will come. But that comes a lot more slowly than the supply has. So I foresee that we’re going to have this deflated price environment for natural gas for some period of time.”

At the same time, he said, natural gas should be just a part of the mix. “This country should be building a portfolio of supply for the next century, not whatever’s expedient, given the current spot-price environment,” he said.

“No matter what you believe about nominal prices in the future, the other thing that we have seen traditionally with gas is volatility,” Mr. Fanning added. “Volatility is bad for industrial America, bad for our retail customers of any class. So, we’ve got to find ways to keep them away from so much exposure to that.” **CW**

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What Are The Obstacles To U.S. Nuclear Power Plant Expansion?

Nuclear power plant construction in the U.S. has been at a standstill for the past 14 years due to safety concerns after Three Mile Island in 1979 and Chernobyl in 1986, and more recently because of the favorable economics for carbon-based energy production. And even though the U.S. produces more nuclear energy (798.7 billion kilowatt-hours) than any other nuclear-producing country, France is the nation most people consider when thinking of nuclear power, most likely because France uses it to the greatest degree while only about 20% of U.S. energy production is from nuclear power.¹



The volatility of gas prices over the long term and expectations for eventual carbon emissions regulation keep nuclear power as an integral part of many utilities' resource planning.

According to the International Energy Outlook 2010 Test Case, global energy consumption will rise 49% by 2035, much of which is expected from China and India, but also from the U.S. and other OECD nations.² Given international concern about climate change and a realization that every form of power generation has its costs and benefits, the U.S. and many other nations are eyeing nuclear energy as a less damaging way to satisfy these energy needs.

In 2007, the U.S. government instituted a loan guarantee program, which, along with high gas prices and momentum toward carbon emissions legislation that were prevalent then, encouraged a flurry of projects. The enthusiasm has slowed significantly since 2007, although at least three of the projects with loan guarantees appear to be moving forward. This article summarizes Standard & Poor's Ratings Services' opinions on the state of, and risks to, the U.S. nuclear renaissance. Our detailed commentaries on all risks can be found in our special report "U.S. Nuclear Power: Can The Industry Remain The World Leader?," published Aug. 23, 2010, on RatingsDirect on the Global Credit Portal.

New Nuclear Plants Face Uncertain Economics

The fall in natural gas prices, the ongoing credit crunch, and the lack of momentum for carbon emissions legislation have significantly dampened nuclear economics. We expect unregulated operations, which do not receive loan guarantees, to defer or abandon their nuclear projects. However, the volatility of gas prices over the long term and expectations for eventual carbon emissions regulation keep nuclear power as an integral part of many utilities' resource planning. As the first nuclear units are not expected to be completed until 2017, depressed natural gas prices in the medium term should not hinder nuclear expansion. However, claims that the potential supply of shale gas can support demand for the next 75 to 90 years could lower natural gas prices for the long term, as forward gas price curves are currently indicating.

We performed a levelized cost of energy comparison between new nuclear and combined-cycle gas turbine plants, currently the only realistic base-load alternative, across three scenarios. A utility rate-base structure requires natural gas prices of \$6.50 to \$10 per million British

thermal units (MMBtu) for nuclear capital costs of \$5,000 to \$8,000 per kilowatt (kW) to be competitive (at \$8.20/MMBtu for \$6,500/kW), indicating the need for subsidies at current natural gas prices and without carbon costs. With a loan guarantee, a merchant plant with \$6,500 per kW in capital costs requires gas prices at about \$6 per MMBtu; carbon costs lower the breakeven level by \$1 per MMBtu for every \$15 charged per ton of carbon. Models that add other subsidies (production or investment tax credits) can make the \$6,500 per kW nuclear option competitive at \$5 per MMBtu without carbon emission costs.

Significant Risks And Hurdles To Nuclear Expansion In The U.S.

New nuclear plants in the U.S. will cost much more to become operational on a dollar-per-kW basis than in other nuclear-power producing countries. Lack of recent regulatory and nuclear plant construction experience, higher contingency costs, a lack of economies of scale, and smaller pool of skilled labor contribute to this expectation.

Economies of scale are more difficult to generate due to the smaller number of projects and the fragmentation of construction among small, private companies that do not necessarily share their expertise. Even in Japan, where private companies lead the way in nuclear plant construction, a law encourages private partnership consortia. In most other countries with nuclear capability, the government runs the energy program.

Time uncertainty (due to the regulatory process and financing issues) increases the risk of higher-than-expected construction costs due to commodities price increases. Both are factors in the inability of bidders to offer fixed-price engineering-procurement-construction (EPC) contracts. Steel, cement, and copper—all necessary for nuclear plant construction—have doubled and, in some cases, almost tripled their prices since 2001.

Fixed-price EPC contracts offer Japan and China a lower cost because of contractors' confidence in quantities, costs,

performance history, and ability to meet schedules, obtained through the respective countries' continuing development programs. The U.S.' lack of recent experience precludes such certainty and, thus, raises the costs of construction. Even if EPC contracts were offered in the U.S., labor costs for nuclear island construction would likely remain outside the bounds of any EPC contract. Other key issues for the EPC contract sponsor are which costs will be fixed and which risks of cost overruns will remain, even after financing approval and start-up of construction.

Another hurdle for the U.S. is that the market price must be able to bear all of the costs of production and construction, which is not necessarily the case in other countries with government ownership of nuclear plants. And if the U.S. utility is regulated, regulations may require it to recapture costs only after operations have begun or require the lowest-cost type of power be used at any particular time, thus leaving unused, yet expensive, production capacity.

Safety concerns will remain the industry's Achilles heel and are paramount whether the government runs the enterprise or functions mainly as a safety regulator, as is the case in the U.S. The type of cooling unit, the dependence and synergy of the units working within the reactor, and the amount of manual versus automatic control are all design factors that regulators from each country scrutinize. Licensing entails significant risks, even for technologies further along the Nuclear Regulatory Commission's (NRC) review process. Regulators can require amendments to design even after they issue certifications, such as with the NRC's new rule dealing with "consideration of aircraft impacts for new nuclear power reactors," which can, of course, lengthen the project completion time.

Global Construction Track Record Is Mixed And Holds Important Lessons

The global nuclear power industry's aggressive expansion holds important lessons for the U.S. Based on the experiences in China, South Korea, Japan, France, Canada, and Russia, we believe

the following factors are vital to successful nuclear power construction:

- Strong government support and partnership among technology vendors;
- A focus on development aimed at standardizing only a few reactor designs;
- The incorporation of lessons learned from incremental changes to locally made reactors, coupled with continual adaptation of imported reactors to shorten construction schedules; and
- The employment of large modular construction at low-cost locations worldwide and expanding the domestic supply base for labor and equipment.

New nuclear construction experience around the world has been mixed. Only the advanced boiling water reactor technology has a reasonable track record of meeting cost and schedule estimates. The AP1000 reactor technology has had a good start in China, but construction is still in its early days, and projects have not reached major critical path items. Westinghouse's and the Shaw Group's ability to deliver completed units on schedule and within budget is unclear. The first two European pressurized reactors (EPR) have run into substantial schedule delays and cost overruns, although costs are still lower than proposed U.S. EPR projects. It will be important to the credit quality of U.S. sponsors to learn from the international experience.

Ultimately, new construction of nuclear power in the U.S. remains in a state of flux, and further government support—loan guarantees or a price on carbon—will likely be necessary to spark new construction of nuclear power plants. Safety issues and high costs are foremost, but when it comes to credit, the key additional concerns for Standard & Poor's are regulatory risk, construction contract terms, and government support.

Notes

¹Retrieved from www.nei.org

²U.S. Energy Information Administration. International Energy Outlook 2010.

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