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Climate Change Service Providers Track Growth to Non-Regulatory Drivers

The December 2014 Lima climate change talks concluded with an outcome that was relatively successful—as long as one didn't expect a breakthrough agreement. Negotiators agreed on some key building blocks and interim steps to prepare for the December 2015 Paris meeting—most importantly, that each country provide its Intended Nationally Determined Contribution (INDC) for greenhouse gas (GHG) reductions by March 2015.

At Paris in December 2015, nations will agree on—or fail to agree on—post-2020 climate change mitigation and adaptation goals. Based on conversations with analysts and our own history of observing (from afar) climate negotiations, we're confident in predicting that COP 21 in Paris will yield nothing like a binding agreement.

There is little political support in the United States, Canada, Japan or Australia for a binding international agreement like Kyoto. Indeed, ratification of such a treaty by the U.S. Senate is a political impossibility—and will likely remain so for at least a decade if not much longer.

Instead, Paris will almost certainly yield a commitment to continue the “pledge and review” process, in which countries commit to INDCs and then report their progress periodically. Through

Climate Change Industry Drivers 2014

While climate change continues to be discussed at the global, regional, national, state and local levels, distinct market drivers to propel growth in climate change industry segments remain few and far between. Nevertheless a number of corporate and government initiatives are keeping technology and services providers busy.

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mutually agreed upon reporting methodologies, countries and NGOs will be able to monitor how nations are performing relative to their goals, and apply pressure to meet targets that are missed and increase ambitions as targets are achieved.

Whether an international carbon trading scheme emerges is a major question.

This would be highly advantageous for GHG mitigation, as investment would be drawn to the least-cost, highest-impact reduction measures.

But while there's a growing trend toward creating national emissions trading schemes—more than 60 have been an-

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nounced or are in various stages of development—key nations and regional blocs have signaled that they intend to keep their markets domestic. None of China's seven regional ETS pilots will allow foreign offsets for compliance, while Europe has signaled that it wants to end the use of foreign offsets for compliance. (Europe is still linked with New Zealand and had been expected to link with Australia until that nation did an about-face on climate policy in 2013).

On the adaptation side, Lima provided an optimistic sound bite as pledges to the Green Climate Fund exceeded \$10 billion. "This was an important milestone to both demonstrate the confidence of donor countries in the GCF and build trust with developing countries that the funds would flow," wrote a team of **World Resources Institute** staff members just after Lima concluded. However, the United States' contribution of \$3 billion will be difficult to get through Congress. (For more on climate finance, see story in this edition on page 15).

Drivers in Absence of Coordinated National or Global Policy

As CCBJ has been emphasizing for at least five years, however, there are robust and growing forces—completely independent of global negotiations—driving investment in climate change mitigation and adaptation:

- National and regional policies continue to gain strength, with the key examples in North America being California's climate policy and President Obama's executive branch actions. In this edition, we look at the early activity by electric power market participants and their professional service consultants and advisors to plan for the EPA's Clean Power Plan.

While it's still early in this game, and key court decisions are looming, the Clean Power Plan will likely strengthen market drivers for renewable power, energy efficiency, energy storage and combined-cycle

gas turbine power—and potentially even nuclear power. See the story on page 17.

- Pressure on corporations to report and manage their GHGs has been growing from investors, NGOs, wholesale customers and other stakeholders in recent years; and a growing number of large companies are measuring and reporting their GHG emissions, most of them to CDP, formerly the Carbon Disclosure Project.

Large consumer goods companies and retailers in particular are becoming increasingly sophisticated in measuring, reporting and managing their GHGs—and letting the public and stakeholders know about their efforts. The story on page 4 describes the key trends and issues in this growing market.

- Commodity suppliers and manufacturers who source palm oil for their products are increasingly committing to zero-deforestation production standards, which will have profound implications for preserving and rebuilding carbon stocks in tropical forest. A Q&A with a leading expert in this topic on page 14 explains why there's reason for hope with this new corporate initiative.

- Regional efforts are also gaining in significance, including not just states and provinces like California and Quebec but also cities. Between the C40 Cities Climate Leadership initiative and the recently announced Compact of Mayors, at least 228 cities had GHG reduction goals that equate to an annual reduction of 454 million metric tons of carbon dioxide-equivalent (MtCO₂-e) by 2020 and a cumulative total of 13 GtCO₂-e by 2050. Climate action by cities is covered on page 31.

It is likely that many more cities and states will set GHG reduction targets, especially as NGOs and activists become more frustrated with the lack of progress in senates and parliaments and on the international stage.

20 Years Since COP 1; Still Not Much Policy Glue to Hold a Global Climate Change Industry Together

2015 will mark 20 years since the first global climate meeting, the first ‘Conference of the Parties’ meeting or COP 1. The December 2014 meeting in Lima was COP 20 and also incorporated CMP 10 or the tenth Meeting of the Parties to the Kyoto Protocol. At COP 1 in Berlin, negotiators committed to “protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”

During the last 20 years, the scientific consensus on the anthropogenic causes of climate change has become much stronger—and climate change denial and skepticism are slowly but steadily withering away in the face of perceived climate change impacts. While activists and scientists justly argue that we’re not doing enough fast enough, the momentum of mitigation activity continues to build, and demand for the services and

products necessary to create a low-carbon economy continues to grow apace.

When CCBJ first started using the term climate change industry in 2007, the prospects for national and even global policy were not as dim as they have been that past five years. And while cohesive policy around limiting or putting a price on carbon emissions would lead to a more cohesive climate change industry, CCBJ still believes it is valid to view the industry in its entirety as presented below, or at least as a collection of loosely-connected segments with some common drivers.

The global climate change industry accounted for \$1.45 trillion in revenues in 2013, up 4% from 2012. The United States accounted for 21% of the market in 2013, or \$300 billion, with some notice-

able differences in segment growth rates. In low-carbon power, the decline in wind energy installations dropped U.S. revenues in spite of strong growth in solar, but global growth was sustained, albeit at a 6% rate that was 20 points lower than the segment’s average growth the previous seven years. In carbon markets, the decline in EU carbon permit prices to below 5 euros/tonne and a decrease in volume contrasted with the nascent activity in California and regions of China whose growth still has a long way to go to balance the volumes in the more mature EU system. For the consulting & engineering and project management community, specialty services in adaptation and climate change consulting grew in 2013, presaging more work in mitigation and adaptation in the future. ☼

The 2013 Global Climate Change Industry (\$bil)

	USA 2012	USA 2013	2013 Growth	Global 2012	Global 2013	2013 Growth	% USA in 2013
Low-Carbon Power	48.7	39.6	-19%	337.6	356.6	6%	11%
Energy Efficiency & DR	55.8	57.3	2%	175.7	180.4	3%	32%
Energy Storage	3.8	4.7	17%	8.4	9.6	14%	49%
Green Buildings	68.2	76.7	14%	211.7	235.3	11%	33%
Transportation	101.4	115.4	16%	555.5	594.2	7%	19%
Carbon Markets	1.8	2.1	37%	97.5	63.9	-34%	3%
Adaptation	0.6	0.7	14%	1.9	2.2	14%	33%
Research/Consulting&Engineering	3.4	3.3	1%	9.6	10.0	3%	33%
Climate Change Industry	284	300	15%	1,398	1,453	4%	21%

Source: Climate Change Business Journal; Environmental Business International, Inc., San Diego, Calif. DR=demand response

The U.S. Climate Change Industry 2005-2013 (\$bil)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low-Carbon Power	10.8	13.2	19.5	27.6	33.1	28.9	37.5	48.7	39.6
Energy Efficiency & Demand Response	37.8	41.8	45.0	49.2	49.1	51.9	54.8	55.8	57.3
Energy Storage	2.3	2.5	2.8	2.9	2.9	2.9	3.3	3.8	4.7
Green Buildings	24.6	33.8	45.3	55.4	56.7	53.4	59.8	68.2	76.7
Transportation	45.2	60.4	69.3	80.7	71.3	77.2	87.1	101.4	115.4
Carbon Markets	0.1	0.1	0.2	0.4	0.6	0.9	1.3	1.8	2.1
Adaptation	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7
Services: Consulting & Engineering	2.2	2.2	2.6	2.8	3.2	3.1	3.3	3.4	3.3
Total U.S. Climate Change Industry	123.2	154.0	185.0	219.3	217.2	218.8	247.6	283.8	300.0
USA Growth	24.7%	25.0%	20.1%	18.5%	-1.0%	0.7%	13.2%	14.6%	5.7%
USA % of Global	34%	34%	32%	30%	28%	27%	26%	29%	30%

SOURCE: Climate Change Business Journal; Environmental Business International, Inc., San Diego, Calif., based on totals for 48 subsegments. Low-Carbon Power includes wind, solar, bioenergy, geothermal and wave & tidal equipment and power sales, but not nuclear or hydroelectric; Energy storage includes utility-scale, vehicle traction batteries and fuel cells; Transportation includes hybrid, electric and alternative fuel vehicles, biofuels, planning, public transit and high-speed rail. For government services, i.e., transit and rail, only revenues for vendors are reported.

GHG Management is a Growing Focus For Consumer Goods Firms and Retailers

Consultants are just getting started on the complex challenge of supply chain emissions; CDP, ERM and Deloitte offer perspective.

As CCBJ readers know, policy and regulations are not the only drivers for greenhouse gas (GHG) mitigation by major corporations. Pressure from investors, NGOs, wholesale and retail customers and other stakeholders has been increasing in recent years. As a result, a growing number of large companies are measuring and reporting their GHG emissions, most of them to CDP, formerly the Carbon Disclosure Project.

“This year over 5,000 companies globally have reported to CDP on climate change, including 70 percent of the S&P 500,” said Paul Simpson, CEO of CDP.

Large consumer goods companies and retailers in particular are becoming increasingly sophisticated in measuring, reporting and managing their GHGs—and letting the public and stakeholders know about their efforts.

“A lot of consumer facing brands have been evolving from reporting because they were requested to do so by a customer or investor, to using the opportunity to proactively get the message out about what they’ve been doing,” said Sarah Matheson, a sustainability senior manager for Deloitte Consulting LLP. “In many cases there’s much more transparency about where there are gaps in their programs and where they have aspirations to grow into new areas of focus. Forestry, water and waste are now increasingly part of the narrative.” (See Q&A with Andreas Dahl Jørgensen for more on corporate zero-deforestation commitments.)

Large companies of all types, including consumer-facing firms that have been

reporting for a while are also seeking to derive more bottom-line value from their carbon and sustainability metrics. “What we’ve seen is that the reporting activity in some cases ends up driving development of new programs and aligning those to business values,” said Matheson.

“With our clients, we’ve seen increasing focus on trying to measure the value of what they’re doing across sustainability, with GHGs and other relevant metrics, using indicators to assign dollar values,” said Matheson.

“There are inefficiencies that lead to GHG emissions and some of these can be ironed out to yield cost savings and greater productivity, whether that’s energy use or materials use,” said Simon Aumonier, principal partner with ERM in the United Kingdom. “We’ve done some work recently in Europe to help companies identify ways of influencing staff behavior to cut energy costs and GHGs.”

Simpson says he has seen this trend evolve over the 14 years of CDP’s existence. “Big corporations who take climate change seriously increasingly view disclosure as a part of their strategy,” said Simpson. “They want to reduce GHGs, reduce climate risk and use this data as a business opportunity. Companies learn a lot from the information and data that they prepare and provide to CDP.”

Internal Carbon Pricing

Some 29 large U.S.-based firms have internal prices on carbon ranging from \$6 to \$60 per metric ton of CO₂-equivalent emissions, according to a December 2013 CDP white paper. In some cases, these are publicly reported future cost projections—ExxonMobil assumes \$60 per tonne cost by 2030—and in many cases they are internal pricing schemes that shift money from manufacturing units to a fund for GHG reduction projects. Simpson told CCBJ that worldwide the number is about 150. “These are companies planning

for a carbon-constrained future. The number should be more, but it’s now a trend and more are adopting this approach as a tool to send the right signals internally around energy and carbon.”

There continue to be new entrants, so to speak, to the climate reporting market. From 2013 to 2014 alone, CDP saw an increase of more than 500 companies disclosing through their platform, from 4,500 to more than 5,000.

“Companies that are just starting to report, whether they’re consumer facing firms or not, are likely doing that because a shareholder or major customer is requesting they do it. Some stock exchanges, such as the U.K.’s and South Africa’s, are requiring climate change reporting for listed companies,” said Matheson.

There’s also competition among firms for strong CDP scores, and some indication that firms that perform better on climate change reporting are also performing better financially (see chart).

Interest in Carbon Labeling Wanes

Consumer preference, however, is not a strong driver for corporate GHG reporting and management. “The reporting in CDP is not likely a major part of a decision-making process for individual consumers when choosing products in a store,” said Matheson. “Firms may be communicating it to consumers in bullet points that are a subset of what they report in other forums, but not in the level of detail that the data are reported in forums such as CDP.”

Interest in carbon labeling has waned, even in the United Kingdom where the PAS 2050 carbon product lifecycle assessment protocol was developed. Carbon-labeling pilots “have been relatively ineffective,” said Aumonier. “TESCO at one point had a pilot with carbon labeling on over 1,000 products, but that’s not a very large proportion of the products on its shelves.”

“Unless you’re reaching out across an entire product category or an entire store, people aren’t going to appreciate or respond to such labels,” said Aumonier.

“We now have a new Product Environmental Footprint initiative at the EU level, which is currently in its pilot phase,” said Aumonier. “That may lead to greater emphasis on product carbon footprint disclosures and labeling. The aim is to create a single market standard for green products so that consumers can compare the environmental merits of products.”

Retailers Challenged By Supply Chain GHGs

While consumers haven’t yet become a driving force for managing and reducing the GHG associated with consumer products, the large retailers and brand manufacturers—wholesale customers for a vast number of supplier companies—are focusing more and more attention on their supply chains, the source of most of the GHG emissions associated with their products and revenues.

But it is much more difficult to accurately measure supply chain emissions—classified as scope 3, along with capital goods, transport, waste and other emissions associated with the goods and services a company purchases—than direct GHGs from onsite combustion (scope 1) and indirect emissions from purchased electricity, heat or steam (scope 2).

Analyst firm **Verdantix** reported in a June 2014 report on the performance of 14 of the largest global retailers that only Tesco and IKEA were doing a good job fully capturing scope 3 emissions, including those from supply chains.

Others were reporting only easier-to-quantify scope 3 emissions, especially business travel, and thus vastly understating their true carbon footprints. For a retailer, Verdantix noted, the GHG emissions from electricity associated with the time a product is held in inventory

are “minimal when considered over the product’s lifecycle.”

By way of illustration, Tesco and IKEA—which incorporated estimates of supply chain emissions—reported that scope 3 emissions accounted for 89% and 97%, respectively, of their total corporations emissions. Other companies’ scope 3 emissions accounted for between 1% and 9% of reported emissions, and one firm, Costco, reported no scope 3 emissions. (See chart, Carbon Disclosures and Targets)

“Scope 3 is critically important, and the supply chain is the biggest contributor to scope 3 emissions by a mile,” said Simpson. “Most large companies can get some handle on their transportation and logistics emissions by working out miles traveled and the average fuel efficiency of their truck fleet, or they can get that information from their logistics companies, such as UPS. Supply chain is a much bigger challenge.”

Wal-Mart Supply Chain Just Getting Started on Measuring GHGs

Wal-Mart Stores, the world’s largest retailer which as of November 2014 operated 11,156 stores under 71 different banners in 27 countries and purchased products from about 100,000 suppliers, acknowledged in its CDP report for 2013 that it is just getting started measuring the GHG emissions associated with its supply chain.

Four hundred of Wal-Mart’s largest suppliers of goods who participated in CDP’s 2013 supply chain survey allocated 31 million MtCO₂e to Wal-Mart. These suppliers accounted for roughly 15% of U.S. sales and 8% of global sales.

Suppliers used different methodologies for estimating emissions, and many of their calculations weren’t verified by a third party, according to Wal-Mart’s CDP report. Suppliers also reported between 1% and 25% levels of uncertainty in the

proportion of GHGs they allocated to Wal-Mart—and they used different approaches to estimate the allocation.

“Calculating scope 3 emissions from purchased goods is complex and especially complex for the world’s largest retailer,” which had \$473 billion in 2013 revenues, states Wal-Mart’s report.

The firm estimated that total scope 3 emissions “could be as much as ten times that of our own Scope 1 and Scope 2 emissions.” Those emissions totaled 19 MtCO₂e in 2013, according to the CDP report. And as Wal-Mart’s report notes, supply chain reporting has a long, long way to go, as does the whole industry.

“No company knows exactly what the emissions are in their supply chain,” said CDP’s Simpson. “They’re working to understand where the hot spots are and what they can do about those.”

Wal-Mart and other large retailers and consumer goods firms are sponsoring multiple efforts to improve methodologies for supply chain GHG accounting. Two of the leading efforts include The Sustainability Consortium (TSC) and CDP’s supply chain program.

TSC engages more than 90 firms as well as academic, government and NGO researchers to develop “transparent methodologies, tools and strategies for a new generation of products and supply networks that address environmental, social and economic imperatives,” according to its website.

For members only, the TSC has developed Category Sustainability Profiles for 93 product categories ranging from aerosol air fresheners to yogurt, from bananas to video game consoles. The CSPs summarize “the best available, credible and actionable knowledge about the sustainability aspects” of the categories.

It also offers key performance indicators that companies can use to assess and

track the sustainability performance of suppliers; and a one-page “Sustainability Snapshot” summary of “issues, hotspots and improvement opportunities” for product categories.

For its 2013 supply chain questionnaire, CDP worked with 64 of the largest consumer-facing companies to survey their suppliers—of which 2,868 responded.

CDP’s supply chain report based on the survey doesn’t reveal much about the level of rigor with which suppliers measured and reported their emissions, nor what methods they used to allocate emissions, nor how many submitted results that had been verified by a reliable third party.

It did show that the percentage of companies disclosing scope 1 and scope 2 emissions declined from 2011 to 2012 before increasing slightly in 2013 to 65% for scope 1 and 64% for scope 2.

Suppliers, of course, also have suppliers and are responsible for other types of scope 3 emissions. Of the 2,868 respondents, 42% said they reported scope 3 emissions in 2013, although most likely didn’t report their supply chain emissions, following the pattern that Verdantix revealed for the large retailers.

Analysis of the 2013 CDP supply chain data showed, for the first time, “where emissions are generated within

Carbon Disclosures and Targets for 14 Retail Firms

	Aeon	Carrefour	Costco	CVS Caremark	H&M	IKEA	John Lewis Partnership	LVMH	Metro Group	Tesco	The Home Depot	TJX Companies	Walmart	Whole Foods
Scope 1														
Scope 2														
Scope 3														
Scope 3 Emissions														
Employee commuting	✓					✓			✓					
Business travel	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Electricity and gas not in scope 1 and 2	✓								✓	✓				
Product use	✓					✓				✓				
Bought goods & services	✓							✓	✓	✓				
Capital goods	✓							✓	✓					
Downstream transport		✓				✓	✓	✓						
Upstream transport	✓				✓	✓		✓	✓	✓	✓		✓	
Raw materials						✓								
Goods transport						✓								
Agricultural emissions							✓							
Waste disposal	✓						✓	✓	✓	✓			✓	✓
End of life treatment	✓					✓				✓				
Water treatment & supply							✓							
Leased assets/Outscg.	✓								✓				✓	

Source: Verdantix Carbon Strategy Benchmark: Retail Sector

supply chains, and which sections of those supply chains are most likely to provide a return on investments in terms of reducing emissions and generating monetary savings,” according to the report.

Still, this is top-down stuff, which companies can only use to a certain extent. Those who are serious about reporting their supply chain emissions accurately must do “bottom-up assessment of the emissions throughout the lifecycle of key products and services,” notes CDP. And this is no easy task.

“For most companies, the majority of scope 3 GHG calculations are not being done inside any piece of software, but rather are being done very manually, and in some cases with outside consultant help,” said Matheson. “A lot of great technical platforms are coming out around

scopes 1 and 2 and at a minimum business travel for scope 3. The other scope 3 categories—capital goods, purchased goods and services, upstream transportation, et cetera—are more challenging to capture and calculate across companies with so many different data sources and data types.”

CDP offers a fee-based platform for surveying suppliers to capture the scope 3 emissions from suppliers that is used by Wal-Mart, PepsiCo, Unilever, SC Johnson and others, according to CDP website. “Other companies choose to ask their own sustainability questions such as Procter & Gamble, which is doing its own surveys using an Excel based form that they send out to their suppliers to populate their Supply Chain Environmental Sustainability Scorecard. Those types of requests are becoming pretty common.”

The GHG and sustainability requests—many of them coming through with different questions and formats—represent an increasing reporting burden for supplier firms.

As discussed in CCBJ's Q2 2014 edition on energy efficiency and green building, overlapping reporting requirements make sustainability reporting difficult for large corporate property owners—and even makes consulting in this space a challenging business.

For supply chain emissions, the challenge is multiplied many times. Matheson told CCBJ that suppliers are eager for their large customers to align their reporting standards and formats to reduce the reporting burden.

“While larger reporting groups such as Green Real Estate Sustainability Benchmark, Energy Star, GRI and CDP have worked hard to align and link their questions, many companies like Kohls or Procter & Gamble have their own surveys to suppliers which often go beyond GHG information only or company specific programs around sustainability,” she said.

Of course, a complex challenge can translate into a significant business opportunity for consultants—although more consistent reporting formats and standards would help firms to scale a climate disclosure consulting practice.

ERM's Aumonier averred that a lot can be done with generic data. “The more precise numbers you want for your footprint and the more complex your supply chain the more complex it is to measure.”

“What really drives up costs is having to apply a very rigid methodology and then having to have that methodology verified,” said Aumonier. “Ultimately, if people are not especially responding to precise figures, then there may be just as much utility in ballpark numbers. These can give you a sufficient understanding of a footprint to allow you to act, and

can be delivered cost-effectively. They avoid allocating resources on calculating academically precise figures that provide no greater benefit.”

“You can use macro economic techniques like environmental output analysis to give very broad figures that could be helpful in identifying which parts of a complex supply chain in a complex business are responsible for the greatest proportion of emissions upstream,” said Aumonier. “We use those techniques, recognizing that they have their limitations.”

“The next stage is to start to map out the supply chains themselves, but in a relatively straightforward manner, using generic suppliers and generic data,” said Aumonier. “Ultimately to pursue the ISO standard or GHG protocol you'd need more precise data for the actual supply chains involved. That's more onerous but also more exciting and rewarding.”

“Our clients will make judgments as to what is their objective in starting to look at these issues,” said Aumonier. “If you want to look at a specific product, you need to look at a specific supply chain.”

After Reporting, Mitigation

The CDP 2013 supply chain report showed scant progress in GHG reduction projects. “Seven of the ten sectors report investment [in GHG reduction projects] falling from 2012 or 2011 levels, or from both,” states the report. “They also increasingly focus on investments with shorter payback periods, which tend to deliver only incremental benefits.”

CDP sees a lot of potential for collaboration between major wholesale customers and their suppliers, reporting 427 GHG cutting initiatives at suppliers that were prompted by their customers. And the potential for more action is huge: respondents identified “2,186 customer-supplier collaborative opportunities that have not yet been implemented,” states CDP, adding that customer-supplier collaborations

“are more than twice as likely to see a financial return from their emissions reductions investments, and almost twice as likely to reduce emissions than those who don't engage with their value chain.”

In this regard, Wal-Mart's experience is relevant. In 2010, Wal-Mart committed to eliminate 20 million tCO₂e cumulatively from its global supply chain by the end of 2015. The firm estimated it had eliminated more than 7.575 million tonnes by the end of 2013 and was on track to cut a cumulative 18 million by the end of 2014, then exceed its goal the following year.

These reductions were accomplished by projects designed to cut energy usage, avoid methane emissions from food waste, increasing recycling and other measures. For example, an initiative in Brazil to improve the sustainability of products and packaging inspired leading beverage supplier Ambev to increase the recycled content of its Guaraná Antarctica PET bottles to 100%, reducing emissions by more than 500 tons of CO₂e annually, according to Wal-Mart's website.

The retailer also has three “system innovation” initiatives in which it focuses on “big-ton GHG opportunities. “These include:

- Fertilizer optimization, in which Wal-Mart is “asking stakeholders and suppliers to develop, support and adopt tools, programs and information that help producers optimize nitrogen use, yield and profitability;
- Increasing the supply of recycled plastics for the vast volume of plastic packaging that Wal-Mart and other retailers rely on; and
- Driving energy efficiency in suppliers' factories by integrating “energy-efficiency technologies and practices into standard business procedures.”

How one judges Wal-Mart's GHG reduction projects and its transparency

with regard to its overall carbon footprint probably depends on how one feels about Wal-Mart. The retail chain is the focus of a great deal of criticism from unions and NGOs who contend its negative impacts on workers and communities outweigh the benefits it brings in jobs and low-prices.

As might be expected, some of the firm's critics have dismissed Wal-Mart's ambitions and claims around GHG mitigation. In November 2013, the Institute for Self Reliance published Wal-Mart's Assault on the Climate: The Truth Behind One of the Biggest Climate Polluters and Slickest Greenwashers in America.

While CCBJ didn't analyze the report in depth, one key analytical flaw jumped out: ILSR contended that Wal-Mart's GHG intensity was three times as high as Costco's, without noting that neither firm's GHG reported intensity included supply chain emissions. A more objective research outfit would also have mentioned Costco's poor scope 3 showing on the Verdantix scorecard and the fact that WalMart is starting to analyze its suppliers' emissions and investing in supplier GHG mitigation projects.

But the attack underscores the issues on the line for Wal-Mart and other major retailers and consumer goods firms. With supply chain emissions representing 90% or more of their GHGs, these firms must disclose their scope 3 reporting methodologies and the boundaries they use to calculate and allocate supplier emissions.

Other Scope 3 GHGs Can Also Unlock Value

While supply chain emissions are the biggest scope 3 source for retailers and consumer goods manufacturers, other scope 3 categories represent large opportunities for better measurement and reporting—not to mention mitigation of GHGs and bottom-line cost savings.

"There are 15 categories within scope 3 that may or may not apply to every company," said Deloitte's Matheson. "The majority of companies who have started with scope 3 are most likely doing the more obvious ones first, especially business travel."

"One of the more challenging ones to calculate accurately for a retailer is capital goods," said Matheson. "That would include everything involved in the manufacturing of their fleet vehicles and construction of their stores, distribution centers and offices."

"Suddenly you're looking at everything using a common metric—greenhouse gases—and you start to see hotspots, opportunities that you didn't see before."

Quantifying emissions in this category requires calculating the embodied energy and carbon in vehicles and buildings—not how much fuel or electricity they consume. "There's work being done to develop emission factors for capital goods but right now there's not a lot of differentiation between different types of trucks for example, so the emission factors don't take into account a greener manufacturing process, if applicable."

"When we talk with our clients about what scope 3 categories to look at, we suggest they focus on those where they can influence change and derive value in the future," said Matheson. "For example, a consumer goods manufacturer could take inventory of the upstream impacts of the metals, plastics and other materials it uses. A food manufacturer can look at the corn, sugar and fertilizer that goes into a box of cornflakes."

"Often they'll find surprises that can lead to cost savings as well as GHG sav-

ings," said Matheson. "Maybe there are contracts that could be streamlined and materials that could be substituted to shift purchases to a supplier with a lower environmental footprint."

"This is true of all carbon accounting. Suddenly you're looking at everything using a common metric—greenhouse gases—and you start to see hotspots, opportunities that you didn't see before."

These linkages between GHG management and bottom-line value were borne out to some extent by recent CDP analyses that show higher return on equity for firms with high CDP performance scores. While CDP is careful not to imply causation, Simpson says this data shows, "at a very high level, taking action on climate change can deliver superior financial returns."

"This dispels the myth that taking action on climate change might damage profitability," said Simpson. "We think doing a good job managing your climate change impacts and exposures is a proxy for good management."

"Companies that are well run and energy efficient save money on energy costs," said Simpson. "Companies with strong research and development investment are innovating new low-carbon products and services."

"HP's Moonshot server system for example uses 89 percent less energy than comparable servers."

"As yet financial markets are not pricing in action on climate change, and that's frustrating for corporations who are acting. This data does show a real opportunity for investors to place premiums on companies that will be winners in the transition to a low carbon economy." ⚙

Climate Finance Ramps Up Slowly

Fast-start finance exceeds commitments, but deadlines loom to fulfill Cancun pledges; AECOM Australia sees increase in adaptation work.

Financing low-carbon development and climate-resilient communities and infrastructure in developing countries will be one of the major challenges of the 21st Century. Given the fact that developed countries are most responsible for historic greenhouse gas (GHG) emissions—while much of the necessary GHG mitigation must be accomplished in poorer developing countries—global climate negotiators have agreed that very large amounts of climate finance, at favorable or even concessionary terms, must be channeled from developed to developing countries.

At the 2010 Cancun global climate meeting, developed countries promised to ramp up climate-related finance to developing countries to reach \$100 billion annually by 2020, starting with \$30 billion in “fast start finance” from 2010 through 2012. According to data from World Resources Institute and other sources, developed countries exceeded that commitment by the end of 2012, pledging \$35 billion.

Now the focus is on the Green Climate Fund, established by the UNFCCC to receive and disburse the \$100 billion in annual contributions pledged at Cancun. Administered by the World Bank, the GCF reported having received total contributions of only \$37 million at the end of Q1 2014.

But at the G20 meeting in November 2014, a dozen developed countries made or increased pledges totaling \$10 billion.

The United States and Japan led the pledge round, committing \$3 billion and \$1.5 billion. The funding from the United States, however, will have to be appropri-

ated by Congress. Coverage by Politico.com and other news media indicated that such an appropriation is doubtful. Politico quotes leading Senate and House Republicans stating their opposition. Although environmental NGOs point out that the Bush Administration made a \$2 billion commitment to a World Bank climate fund, U.S. Congressional politics have trended far more conservative since 2010.

Increasing pledges to the GCF will be vitally important to securing an agreement at the December 2015 Paris UNFCCC climate meeting. However, with European economies still growing at less than 1%, and the OECD warning in November 2014 about “serious risks of persistent stagnation” in Europe, Russia and Japan, the prospects for bulking up the GCF are certainly not excellent in the short term.

The GCF will also face issues that have come up in the short history of Fast Start Finance. As the first phase of large-scale climate finance, the FSF experience can be highly relevant to future climate finance initiatives—not to mention those consultants and professional service firms who seek to win contracts to help developing countries mitigate and adapt to climate change.

Show Us The (New) Money

FSF pledges and disbursements have tapered off since 2012, although projects funded are still underway. The actual amounts, sources and destinations of financial flows are difficult to track because of the complexity of the architecture of funders, recipients and go-betweens.

Money from donor countries is channeled through a variety of multilateral entities as well as committed bilaterally through agreements between countries. There’s also private climate finance, most of which is project finance equity or debt for renewable energy projects. (See chart.)

Developing countries and climate NGOs are eager for these funds to be

measured accurately and not simply classified as climate finance because a donor country labeled a certain pot of money as “climate finance.” As the Cancun agreement states, the \$100 billion should be “new and additional,” money, not existing official development assistance (ODA) with a new brand.

A great deal of FSF money may not have been new and additional. A November 2013 report on FSF by WRI, Overseas Development Institute and the Institute for Global Environmental Strategies, reported that “Contributing countries have taken different approaches to defining what qualifies as FSF ... For the most part, they have not used strict thresholds for assessing what is additional.”

“[Many countries] reported as FSF projects, programmes and funds that they were already supporting before the FSF period,” according to the report. Of the top five donor countries—Germany, Japan, the UK, USA and Norway—only Germany mobilized a new source of finance (carbon revenues).

The FSF experience also makes clear that the GCF may not become the dominant or even the most important climate funding vehicle. While the UN, developing countries and NGOs want it to become the central financing vehicle, the WRI report authors point out that “this approach would be a major departure from the current practices of countries such as Japan and the USA, which have relied heavily on bilateral channels, and have also counted diverse forms of finance as FSF.”

Adaptation Funding Grows From Small Percentage

The Cancun agreement also specified that climate funding would be balanced between adaptation and mitigation projects, and the GCF has agreed to this balance as well. Through 2012, however, mitigation projects received 71% of the \$35 billion in FSF climate funding, ac-

Top 10 Recipients of Fast Start Finance and Official Development Assistance

Adaptation FSF		Mitigation FSF		Total FSF		Total ODA	
Top 10	Amounts (Million US\$)	Top 10	Amounts (Million US\$)	Top 10	Amounts (Million US\$)	Top 10	Amounts (Million US\$) (2011 figures)
1. Bangladesh	272	India	5,308	India	5,676	Afghanistan	5,160
2. Vietnam	266	Indonesia	1,950	Indonesia	2,878	Democratic Republic of Congo	4,423
3. Philippines	235	Brazil	1,098	Brazil	1,622	Vietnam	4,091
4. Niger	224	Kenya	891	Mexico	1,176	India	3,634
5. Ethiopia	178	South Africa	836	Vietnam	1,140	Pakistan	2,307
6. Pakistan	160	Mexico	758	Kenya	1,046	Kenya	2,105
7. Cambodia	156	Thailand	644	South Africa	843	Haiti	1,879
8. Mozambique	126	Egypt	538	Thailand	677	Ethiopia	1,740
9. Nepal	124	Morocco	527	Philippines	608	Bangladesh	1,636
10. Kenya	112	Vietnam	523	Morocco	592	Indonesia	1,607

Source OECD Aggregate Aid Statistics and FSF data set. Highlights indicate countries that are top-10 recipients of both ODA and FSF

According to the WRI report; adaptation projects received only 18%, while 9% went to projects with multiple objectives.

The report authors and consultants interviewed by CCBJ say this is mostly due to the ability of project sponsors to leverage private investment and debt for mitigation projects, most of which are energy-related. These projects also tend to be much larger ticket items, especially renewable energy project, public transport infrastructure and efficient thermal power projects.

The average spending for mitigation projects in the FSF period was \$13 million, while the average adaptation-focused project cost \$4 million, according to the WRI report.

AECOM Sees Demand for Adaptation Work Increase

“Mitigation projects are generally tied to broader energy, growth and economic

development efforts,” said Guillaume Prudent-Richard, an associate director for AECOM Australia. “There’s greater private sector participation in mitigation projects than adaptation, with industry players and domestic capacity already established; it is also easier to measure and report on mitigation compare to adaptation.”

Prudent-Richard and other consultants in this field told CCBJ they see an increasing trend toward funding resilience and adaptation work, however. “In the early 2000s when AECOM first began working in the climate change arena in earnest, investment in adaptation was almost seen as a failure of mitigation,” said Prudent-Richard. “Since then, leaders are seeing that we need to invest in both. We want to do as much as we can to avoid impacts with mitigation, but you have to acknowledge that there will be unavoidable impacts and we need to prepare for them.”

Like his counterparts at Mott MacDonald (see profile in this edition), Prudent-Richard said that he’s already seeing an increase in adaptation funding. “Now it’s a question of facilitating that growth notably with a better awareness of the loss and damages that are associated with current disasters and how these are likely to increase in the future,” he said.

Michael Furniss, an independent consultant working on climate change education and vulnerability assessment in developing countries, reports a shift in funding from mitigation to adaptation in the forestry sector. “That’s partly because a lot of the forestry mitigation has been set up already. There are a lot of potential REDD+ projects and silviculture projects that are prepared and ready to go. The monitoring methods have been codified, the trainings have been done. The work isn’t done by any means, but there’s a little bit more space now for adaptation work.”

Furniss says this reflects the priorities of people in developing countries such as the government, academic and NGO representatives he has worked with in Thailand and Ecuador. “The developed countries tend to come in to developing countries very interested in reducing emissions. That’s important and everybody needs to do whatever they can in that area. But people in developing countries point out that their emissions are small compared to ours. They’re very interested in adaptation.”

In forestry, Furniss commented, there are strong linkages between mitigation and adaptation. “Forests that are protected for carbon sequestration also become the anchor for species conservation, for watershed protection and other ecosystem services that are at risk from climate change,” he said. “Protected areas lessen those risks.” (More on adaptation below.)

Low-Carbon Development Still The Exception

Of course, it would be disastrous to give up on mitigation in developing countries, which are building new power plants and developing other fossil energy resources at a fast pace to accommodate their people’s needs for basic services and their growing middle classes’ demand for comforts and conveniences that Westerners take for granted. “For developing countries, the priority is getting people out of poverty, providing access to safe water and energy,” said Prudent-Richard. “They need to make quick progress, so they tend to take a carbon-intensive approach.”

The World Bank and other development banks have in the last couple of years sought to provide more capital for low-carbon projects and less to high-carbon ones. Last year, the bank announced it would only fund coal-fired power plants in “rare circumstances” for “countries with no feasible alternatives to coal” to meet basic energy needs.

In September 2014, the World Bank Group announced a \$100 million Pilot Auction Facility for Methane and Climate Change Mitigation to stimulate investment in projects that capture methane at landfills, livestock operations and wastewater treatment facilities. “The development banks are focusing on demonstrating that low-carbon investments are not always the more expensive investment,” said AECOM’s Prudent-Richard.

Last year, The World Bank announced it would only fund coal-fired power plants in “rare circumstances” for “countries with no feasible alternatives to coal” to meet basic energy needs.

Andreas Dahl-Jørgensen, a managing director with **Climate Advisers**, told CCBJ that while this kind of funding is important it “is not creating the systemic price signals that would allow the private investment flows that already exist to be directed from the brown economy to the green economy.”

As covered extensively in CCBJ’s 2013 edition on global carbon markets, the UNFCCC and climate policy advocates globally are searching for private climate finance structures that can replace the Clean Development Mechanism, which still exists but has become largely irrelevant since Europe changed its rules to accept credits only from least-developed countries. CDM credits have also been trading at less than \$1 for for about two years due to oversupply caused by the recession.

Beyond CDM: The Search For New Market Mechanisms

The two main instruments being discussed are sectoral crediting—in which the global cement industry, for example,

would share technology and funding to lower the GHGs associated with cement production in developing countries—and Nationally Appropriate Mitigation Actions (NAMAs).

Developing countries are proposing draft NAMA plants to the World Bank’s Partnership for Market Readiness. Their proposed efforts cover a wide range of activities, from improving commercial and industrial energy efficiency to developing new urban bus rapid transit systems and low-carbon greenfield communities.

The NAMA process has a long way to go before NAMAs can provide CDM-style quantifiable GHG reductions that will be approved for compliance by Europe and other developed country governments. “I see the climate finance discussion moving in the wrong direction. It is treated as a political necessity to get a climate deal rather than a way to increase global ambition,” said Dahl-Jørgensen. “There’s a faith that we can succeed without the price signals. People hope the costs [of low-carbon technologies] go down fast, and that that will make public policy less important.”

“We need more attention on promoting an incentive structure for the private sector,” said Dahl-Jørgensen. “It doesn’t necessarily have to be fungible offsets but it does have to be funding that targets, the externality which is carbon.”

The critical backdrop, of course, is the UN climate dialogue, in which all countries need to outline their GHG reduction targets by Q2 2015. As discussed in the page one overview, the outcome of Paris is likely to be a continuation of the “pledge and review” framework, where countries make unilateral commitments and report annually on their progress. Developed countries will commit to absolute reductions, while developing countries will commit to either absolute or relative targets, where they reduce the carbon intensity of their economies—as China

and many others already have done—and continuing to ramp up their monitoring, reporting and verification (MRV) protocols and procedures.

Bilateral and multilateral offsetting schemes are already emerging, led by Japan with Joint Crediting Mechanism (JCM) that recognize credits for investments by Japanese emitters in emissions reduction projects in developing countries. In contrast to the CDM, there is no central administrator and each project is administered by a joint committee made up of Japanese officials and those from the host country. California is pursuing negotiations with Acre, Brazil, and Chiapas, Mexico, on possible forest offset accreditation.

The ideal solution sought in Copenhagen in 2009—an internationally accepted crediting mechanism, with the value of offset credits supported by ambitious mitigation targets in developed countries—will most certainly not manifest next year. Dahl-Jørgensen does not think that is feasible, nor desirable. But he does think that closing the mitigation gap between what the national pledges will deliver and what science requires will take renewed focus on international cooperation.

“A large amount of cost-effective mitigation will need to take place in developing countries beyond what they can reasonably be expected to finance on their own, despite their increasing capacity to take action,” said Dahl-Jørgensen. “Ten billion to the Green Climate Fund may be symbolically and politically important, but it will not deliver those reductions.”

“Countries should come together through international mitigation partnerships. Developing countries can put forward additional ambition they can achieve with external support beyond their pledges for own action,” Dahl-Jørgensen continued. “In return, developed countries should pledge additional mitigation they will secure outside their borders on top of

their current domestic pledges. Focusing on tons instead of dollars will increase ambition, and create incentives for the private sector to align their investments. I am hopeful we can achieve such a second bite of the apple in Paris. There will be five years to figure out the details of the mechanisms before the 2020 commitment period begins.”

Average Adaptation Project: \$4 Million

Shifting the lens back to adaptation, as mentioned above, participants and observers in this market see an increasing shift in climate finance from mitigation to adaptation, which is also referred to as resilience. The largest projects funded in the FSF period were flood control and water and wastewater infrastructure. One of the largest was \$66 million for flood risk management on three river basins in the Philippines provided by the Japan International Cooperation Agency (JICA). (The FSF report authors took note that this also may be an example of traditional ODA project branded as a climate.)

The largest projects funded in the FSF period were flood control and water and wastewater infrastructure.

Most were much smaller, with average price tag being \$4 million; and many smaller projects of less than \$1 million “focused on training, capacity-building, personnel exchanges, study tours, and conferences and workshops,” according to the report.

AECOM Takes On Adaptation Projects in Asia

AECOM recently completed an approximately \$200,000 project assessing the costs and benefits of adaptation on the Pacific island nations of Vanuatu and Solomon Islands. “It was a technical

assistance and capacity building project involving public sector managers in undertaking economic analyses of adaptation projects,” said Prudent-Richard. He said he expected the project would be useful in securing additional adaptation funding.

“It will allow them to put numbers in front of the prospective donors, with evidence of the net benefits of investing in adaptation,” he said. This is part of the long-term perspective needed by developing country governments and the private sector, Prudent-Richard said. “You’re not going to transform these countries in two years or four years. You have to build the capability, change the policy and regulatory framework and strengthen the enforcement of the regulatory framework.”

In 2014, AECOM was awarded a research and development project by the Asian Development Bank to bring climate change adaptation and disaster risk management expertise to land use planning and urban redevelopment in Asian cities, said Prudent Richard. “We’re looking at incentives, how do you get home and building owners and developers to do certain things. You can reform policy, you can develop tools, but none of that has meaning if you can’t get people to take ownership and climate-proof their dwelling.”

In three pilot cities in Vietnam, Nepal and the Philippines, AECOM and its collaborators are evaluating both positive incentives—such as grants, loans and certification—and negative incentives such as fines or higher development fees for builders who don’t take into account climate change and disaster management.

The project also includes approaches to improve consideration of climatic and non-climatic disaster in land use planning (through prohibitions in hazard prone area and promoting development in safer areas), building codes, urban renewal programs (avoiding rebuilding ‘as is’ in areas already affected). “There’s a special focus

on public schools, public buildings and critical infrastructure making sure they are built with consideration of natural hazards and long term climate change.”

For large infrastructure projects, AECOM educates host-country government managers and investors in a risk-based approach. “When a government is procuring or delivering design and engineering services for an infrastructure project, whether a power station, a drainage network or a school building, it’s important that public managers and decision makers have a methodology that they can use to screen for climate change risk and disaster risk, analyse the risks and select risk treatment options in a transparent and cost efficient manner.

He said the products developed for the project are aimed at building the capacity in public sector agencies that are strapped for expertise and funds to perform such analyses. “The key is that the investment you put into climate change adaptation or disaster risk management needs to be proportional to the sort of project and the services you’re going to deliver, in relation to the design life, level of investment, criticality of the service, et cetera,” he said.

“Overall we are seeing a greater convergence between climate change adaptation, disaster risk management and building resilience,” said Prudent-Richard. “Through the work AECOM is doing with the World Bank, ADB and UNISDR in that space we see great opportunities for mainstreaming these approaches and unifying the efforts in responding to climatic and non-climatic risks now and in the future.”

Goal: > \$100 Billion Annually

Agriculture, water and sanitation were the largest areas receiving adaptation-related FSF funding, and many projects were actually long-standing development projects “modified to integrate climate concerns,” according to the WRI report.

These included USAID’s Feed the Future and Famine and Early Warning Systems Network as examples. The Education Sector Support Programme in Nigeria (ESSPIN) program funded by the UK’s Department for International Development (DFID) is another, according to Mott MacDonald executives.

“Overall we are seeing a greater convergence between climate change adaptation, disaster risk management and building resilience” said Prudent-Richard.

While there is an imperative to classify climate funding as new and additional vs. existing, there is strong logic behind the approach of simply ramping up existing development aid to address potential climate impacts. “The kinds of problems and impacts that climate change brings for the most part are the same things we’ve always been dealigned with: floods, droughts, insect infestations, shortages of water, forest fires,” said Furniss.

“[Similarly] adaptation measures aren’t mysteries or new things, although we might do them in different areas and use different versions of them based on vulnerability assessments.”

Furniss has been involved in USAID-funded vulnerability assessments in Ecuador, Colombia and Peru. Collaborators on the vulnerability assessments for Andean countries included U.S. Forest Service employees and university faculty.

Vulnerability assessments should underpin all resilience and adaptation planning, according to Furniss. “You can’t really build resilience if you don’t know vulnerability,” he said. “We need to do vulnerability assessments to figure out which places are vulnerable to which

kinds of impacts. The way we respond will flow from that assessment

“What you find with these kinds of assessments is that there are a lot of differences across the landscape and it’s very useful to draw these differences out,” said Furniss. “Not everything is equally vulnerable, and not all vulnerabilities are equally remediable or reversible.”

A hydrologist and geomorphologist, Furniss emphasizes a point highlighted by David Viner of Mott MacDonald (profile, p.25) adaptation work is not always helped, and can be hindered by involvement of some climate scientists. “The problem is lack of appreciation for what adaptation involves. It is not climatology; but people call for climate scientists to do this work, which they are not qualified for,” said Furniss. “Adaptation doesn’t have to do with weather, climate and meteorology. It has to do with a sense of the landscape, the society and the infrastructure. You need engineers, hydrologists, foresters and public health people.”

As this article explains, the massive job of financing low-carbon development and climate resiliency in developing nations is just getting started. The future demands will be enormous—as will the opportunities for firms with the right expertise, products and capacity to operate and deliver solutions in developing countries.

According to the WRI report, a 2008 estimate by the UN Development Programme put adaptation finance needs for developing countries at \$86 billion annually by 2015. The UNFCCC estimated \$28 billion–\$67 billion per year by 2030. A 2010 World Bank study estimated it \$70 billion–100 billion per year from 2010 to 2050. “For mitigation, estimates of annual needs range from US\$63 billion to US\$565 billion by 2020, and from US\$264 billion to US\$565 billion by 2030.” ☼

Zero-Deforestation Palm Oil Movement Gains Traction

Climate Advisers describes itself as “mission-driven policy and politics shop working to deliver a low-carbon economy.” Reducing deforestation in developing countries is one of its main initiatives, and Managing Director Andreas Dahl-Jørgensen discussed the fast-moving development of corporate commitments to source “zero-deforestation” commodities.

Before joining Climate Advisers in 2013, Dahl-Jørgensen held posts in the carbon finance unit of the World Bank and as a climate negotiator and policy adviser for the Norwegian government on REDD (reduced emissions from deforestation and forest degradation), leading their bilateral partnership with Indonesia.

CCBJ: What’s the recent background to what you and your colleagues call the “cascade of commitments” by major corporations to sourcing zero-deforestation commodities?

Dahl-Jørgensen: Back in 2010 at the Cancun COP meeting, we made quite a bit of progress on REDD as a mechanism in the UN. But a year later in Durban, when countries essentially decided that 2020 was the new 2012, the prospects for any kind of demand for REDD credits from developed countries was put on hold. Countries are still working on developing REDD using fast start finance and ODA-based support.

In the meantime a parallel process began that didn’t get much attention at first: A pledge by the Consumers Forum, a collection of 400 of the largest consumer goods companies such as Wal-Mart and Unilever, to eliminate deforestation from their supply chain for palm oil, soy, beef, pulp and paper by 2020.

This was a fantastic development. Not only would it dramatically reduce emis-

sions if implemented, but also be an additional political force for policy change in developing countries as well as mobilizing demand for REDD. At first, though, it was hard to merge the UNFCCC process with voluntary corporate commitments. While aligned on goals, they have very different backgrounds and perspectives. In the last year or so we’ve seen these two worlds aligning.

The Consumer Goods Forum came out with a statement in June 2014 calling for a global climate agreement that includes REDD. This was a foreign concept to them before, but now they’re seeing in REDD an opportunity to implement the governance changes they’ll need to allow them to remove deforestation and human rights abuses in their supply chains, and to prove it.

“The Global Forest Watch can now give real-time alerts of deforestation or fires, identifying which company’s concession, time, date and exact location.”

Then at the UN Climate Summit this September, NGOs and indigenous groups and corporations joined governments in announcing the New York Declaration on Forests.

CCBJ: Aside from familiar corporate brands like Unilever and Procter & Gamble, which big players in the commodities business are signing on to this approach?

Dahl Jørgensen: In December 2013, Wilmar International announced a groundbreaking “No Deforestation, No Peat, No Exploitation” commitment. [With \$44 billion in 2013 revenue] Wilmar is the largest palm oil trading firm, buying from hundreds of palm oil production companies and selling to hundreds

of consumer companies. Wilmar’s market share is about 45%, while its largest customer, Unilever, has a market share of about 3%.

Wilmar’s announcement was a seismic event for the industry, and the aftershocks are still reverberating through the supply chain, as my colleagues and I wrote in a recent report by the Climate and Land Use Alliance. The turnaround by the company can be traced to the recognition in early 2013 by founder and chairman Kuok Khong Hong that NGOs were going to intensify their attacks on the company, and that its largest customers in its most lucrative markets, Europe and the U.S., were going to eliminate unsustainable palm oil from their supply chains by 2020, in line with the Consumer Goods Forum’s pledge.

Wilmar was also deeply affected by public criticism at its Singapore headquarters over Indonesia’s forest fires and the harmful haze. Kuok sensed a need to update Wilmar’s image and to renew its implicit license to operate in its own country and region—or face government fines, civil lawsuits, public shame and potentially a declining market share. After the announcement, more consumer companies have been realizing that if Wilmar goes deforestation free, they can prove their products are deforestation free.

Also in New York, there was a joint statement from Golden-Agri Resources, the largest palm oil plantation operator in Indonesia, Wilmar, Cargill and the Indonesian Chamber of Commerce calling upon the Indonesian government to codify all elements of their commitments into Indonesian law, and to enforce that law. That represents a very significant shift in the political economy of deforestation.

CCBJ: How about verification of these pledges?

Dahl-Jørgensen: Currently there are a lot of different company policies on how fast and how deep their commitments will

Cascade of Corporate Commitments to Zero-Deforestation Palm Oil

Top Tier*	
Nestlé	First to announce in 2011
Wilmar	Dec. 6, 2013
Hershey's	Dec. 19, 2013
Kellogg's	Feb. 14, 2014
Golden Agri-Resources	Feb. 28, 2014
Mars	March 12, 2014
General Mills	March 24, 2014
Safeway	March 25, 2014
Johnson & Johnson	May 1, 2014
Pepsico	May 26, 2014
Mondelez	June 4, 2014
Cargill	July 29, 2014
ConAgra Foods	August 1, 2014
Second Tier	
Unilever	Dec. 11, 2013
L'Oreal	Jan. 30, 2014
Delhaize	Feb. 17, 2014
Cérélia	Feb. 21, 2014
Orkla	March 20, 2014
P&G	April 9, 2014
Danone	May 23, 2014
PZ Cussons	August 18, 2014

*Top tier commitments contain more immediate, measurable and stringent environmental and social standards than second tier. Source: *Disrupting the Global Commodity business*, Climate Advisers, et al, for the Climate and Land Use Alliance

be implemented. It will take time to meet all the pledges and set up verification. For Wilmar, which buys from 80% of the producers, to verify that they're actually deforestation free will take time. They're transparent about their progress and they're not there yet.

Another set of actors will be required to verify that they're fulfilling their commitments. Now some of the key players on the ground in Indonesia are Greenpeace and the Tropical Forest Trust, which have entered into partnerships with Wilmar, Golden Agri Resources and Asia Pulp and Paper. There is also a revolution going on in remote sensing. The Global Forest Watch can now give real-time alerts of deforestation or fires, identifying which company's concession, time, date and exact location. This allows anyone anywhere to monitor company performance, and can help local law enforcement react to illegal deforestation.

CCBJ: Indonesia's greenhouse gas (GHG) emissions are the third largest in the world after China and the United States, with about two-thirds coming from the destruction of rainforests and peatlands. And the country still has an enormous amount of high-carbon land at risk. You're enthusiastic about newly elected President Joko "Jokowi" Wiwodi. Can you share your reasons for optimism?

Dahl-Jørgensen: I am cautiously optimistic. In 2009, Indonesia pledged to cut emissions by up to 41% relative to business as usual by 2020. Of the 1.2 billion tons CO₂ to be cut annually—more than Germany's total emissions—about 90% is planned to come from reduced forest and peat destruction. In 2010, Norway pledged to pay up to \$1 billion if Indonesia reduces its emissions.

Since then, studies confirmed that the loss of natural forests has actually dramatically increased. Without dramatic and immediate reforms, deforestation rates are unlikely to plunge any time soon. The worst-case scenario is illustrated by the new "One Map" that overlays all the issued concessions, across palm oil to mining to pulp and paper etc. It shows enormous potential deforestation from concessions already issued. And new concessions are still being issued. So there are

already years of additional deforestation 'in the system,' so to speak.

But if you want to know where a super tanker like the Indonesian economy is headed, you need to know if the steering wheel has been turned to a new direction. There are lots of indications that it has, even before Jokowi's election. Here's what we see below the surface:

1. **Disruptive transparency** that "exposes the mess." The extent of the concessions that had been given out was previously not known. For the first time, all the data from different ministries are being collected and disclosed on the One Map.
2. **Fundamental land-use reforms.** The "moratorium" on new concessions in primary forests and peat, enacted in 2011 and extended at least until 2015, is a good starting point. A review of existing concessions, many of which were issued illegally, is under way. Land swaps are being considered to protect forest areas under legal concessions.
3. **Ending impunity.** The president's special enforcement units are reviewing existing concessions. About \$9 million in fines have been issued and some executives jailed.
4. **Indigenous rights.** Following an unprecedented commitment to respect indigenous rights made in 2011, a landmark 2013 court ruling gave indigenous peoples formal rights to their customary lands, and these claims are being included on the One Map.

Lastly, there's the sea change in the private sector that we discussed.

Outgoing President Yudhoyono deserves credit for setting the vision, putting some of his best reformers on the job and for taking political risks by giving them space to initiate reforms. Yet, he didn't go far enough. There are three big reasons to be excited about a Jokowi presidency. First, while environmental issues didn't

feature strongly during the campaign, the things he did say were good, even if lacking specifics.

He stated that Indonesia has “pursued economic growth too aggressively and not paid attention to the environment.” He wants to “eradicate illegal logging” and “enforce environmental laws,” including by deploying drones, restore 2 million hectares of degraded forests annually and protect the remaining 20 million hectares.

Second, Jokowi agreed to implement the reforms requested by the indigenous peoples’ organization AMAN, which campaigned for him—the first presidential candidate ever to receive the group’s support.

Third is his stance on good governance and social justice. To reduce emissions in Indonesia, what matters is not what the president thinks about climate change but what he or she does to tackle governance issues. Jokowi’s entire platform rests on tackling corruption and red tape and increasing transparency.

Jokowi surely won’t turn the Indonesian supertanker over night. His coalition does not hold a majority in parliament, and the opposition seems eager to protect the status quo forces. President Jokowi may need to learn to play the political game of favors to get things done. But it’s hard to see how one could have asked for a president more aligned with the anti-deforestation agenda than Jokowi. The recently announced merger of the ministries of forestry and environment is hopefully an indication that he wants the clean up the way Indonesia manages its natural resources.

CCBJ: You mention transparency. Indonesia, like many developing countries, is notoriously corrupt. What makes you think he’ll succeed in changing this endemic problem?

Dahl Jørgensen: The Indonesian government recognizes that there are significant

governance challenges. Addressing those will take time. The revolution in transparency that we see now will help, though.

Now the moment there is a fire, you can receive an email alert through Global Forest Watch that World Resources Institute has developed. On the public concession data, you can see on which concession there’s a fire the moment it happens. This creates opportunities for local groups and indigenous people to say ‘this is a breach of the moratorium right here on the website.’

CCBJ: Back to the larger issue of REDD credits across tropical countries, there’s a concern that CCBJ has covered in the past that because of the volume of potential GHG reductions, REDD credits will depress the price of GHG allowances and allow emitters in developed countries to comply with national targets without making enough effort to abate their own emissions. What do you think?

Dahl-Jørgensen: I actually share that concern. Sufficient ambition/demand is critical if one is to include additional supply. Right now there’s already an oversupply in the EU market, for example. But I think there are ways of getting around the issue. Countries could propose a separate pledge for international mitigation, on top of their domestic pledges. Europe’s goal of “at least 40%” reductions 2030 is entirely domestic, which is a different framework than before 2012, when offsets and international emissions trading could be used for compliance.

Now if the EU were to say we can do 40% at home, but to be in line with the two degree target, let’s also do a say a billion tons abroad, you could actually have a dual commitment that would create demand for credits, including from REDD, from developing countries without diminishing Europe’s domestic ambition. It will take political will for sure, but seems more realistic than Europe strengthening its domestic goal by a similar amount. ⚙

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With Lawsuits Pending, Power Markets Digest Clean Power Plan

New market opportunities for efficiency and renewables; proposed CPP creates demand for counsel and scenario planning.

Excoriated as a “dagger in the heart” of the middle class by top Senate Republican Mitch McConnell, the Environmental Protection Agency’s proposed Clean Power Plan (CPP) is an unprecedented attempt by the agency to leverage its Clean Air Act authority to put the U.S. electric power sector on a path to 30% greenhouse gas (GHG) reductions by 2030.

“I don’t think we’ve ever seen a plan directed toward the power sector that is this comprehensive and that could lead to such fundamental changes,” said Steve Fine, a vice president of ICF International (ICFI), a management and policy consulting firm with long experience working with the electric power industry.

A handy summary of the CPP’s potential reach was provided in October 2014 by one of EPA’s staunchest opponents on climate policy, the Competitive Enterprise Institute. “Some states without renewable energy mandates will have to adopt them; some with renewable energy quota or tax incentives will have to increase them,” wrote CEI’s Marlo Lewis. “In many states, grid operators will have to replace traditional ‘economic dispatch’ with ‘low-carbon dispatch,’ giving priority to generating units with the lowest emissions profile rather than those with the lowest cost. In many states, policymakers will have to adopt new or more aggressive electricity demand-reduction programs.”

While Lewis casts these goals as abuses of President Obama’s executive power, anyone who thinks climate change is a serious threat should rejoice. And for businesses in many segments of the

energy and climate industries tracked by CCBJ, the CPP represents a potential long-term economic stimulus plan that would dwarf the impact of the 2009 Recovery Act.

Legal challenges came quickly after the June 2, 2014 publication. By August, coal mining company Murray Energy Corp. and 12 coal-reliant states had sued the EPA, and these were likely just the first broadsides in a multi-year legal battle, with opponents hammering away at its weak spots (more below).

Even without litigation and a Republican-led Congress, the final shape of the plan is still highly uncertain. But it is already influencing planning assumptions for utilities, independent power producers and other electricity market participants—although consultants differ on how useful CPP scenario models will be until state implementation plans are proposed.

The CPP also probably heralds new opportunities for energy service companies (ESCOs), energy efficiency and demand response technology and service providers and renewable energy developers because renewable energy and energy efficiency are included among the four building blocks which EPA says states can build their individual Best System of Emission Reductions (BSER). Those building blocks are:

- Increase the efficiency (i.e., lower the heat rate) of existing coal-fired power plants;
- Dispatch combined-cycle gas power units more often and for longer periods of time to displace higher-emitting coal plants;
- Develop more low- and no-carbon power resources, including wind, solar and preserve what EPA defines as “at-risk” nuclear power;

- Increase end-use energy efficiency measures to reduce electricity usage.

Let’s look at the energy efficiency (EE) and demand response (DR) businesses: Currently, utility incentives, cost savings and—for demand response (DR)—wholesale electricity revenues provide the ROI for investments.

Unless states choose the portfolio method of complying—in which an entity such as the state or an integrated utility would meet the standard using a portfolio of renewable and nuclear generation, energy efficiency and fossil generator emission reductions—the CPP will create a carbon price. This will happen either through a tradable rate based system or mass-based cap and trade system (more below).

Fossil generators or utilities would pay that carbon price to entities such as an EE or DR project developer or host or to low- or no-emission generators. Energy service companies (ESCOs), EE and DR technology and service providers would be able to factor in long-term carbon prices to sweeten their offers to large energy users.

With the portfolio approach, there would be no carbon price, but new policies and incentives for efficiency and renewables.

Analysis Group Encourages Energy Efficiency at Water Utilities

Susan Tierney, a senior advisor with economic, financial and strategy consulting outfit Analysis Group, told CCBJ that she and her colleagues are encouraging states to target energy efficiency at water utilities as a CPP compliance strategy. “States could avoid generating electricity on the margin, lowering their carbon emissions, and at the same time reducing costs associated with water supplies, which are becoming increasingly precious in many communities,” Tierney said.

She pointed to firms like United Water, which are already timing their pumping operations for more favorable electricity pricing. CCBJ readers may remember our past coverage of ENBALA, which is networking water utility pump loads together and dispatching real-time DR fast enough to provide frequency regulation. A carbon price—or new incentives driven by CPP compliance—would enhance the ROI on these types of projects.

The caveat for EE and DR, however, is that EPA will require robust monitoring and measurement systems to validate claimed reductions associated with these approaches. This will be true for all greenhouse gas (GHG) reduction strategies used to comply, but quantifying EE reductions to meet state and utility requirements is already a complex art; with federal rules, it will probably get more difficult—and provide new opportunities for firms in the evaluation, management & verification (EM&V) niche.

Coal Heat Rate Target: 6%

EPA estimates that 43% of the CO₂ reductions associated with the CPP will be accomplished by building blocks 1 and 2. With reference to number 1, improving the heat rate at existing coal-fired electrical generating units (EGUs), EPA estimates that with O&M improvements or capital upgrades, the average plant can increase its efficiency by 6%.

Steam turbine upgrades top the list of capital upgrade options, followed by cooling tower rebuilds, according to a story on the CPP published by Black & Veatch. “Other equipment upgrades that can improve the heat efficiency rate [include] intelligent soot blowing, condenser retubing, condenser ball cleaning systems, and modifications to air heater systems to improve heat transfer and reduce leakage, among others.”

Both the ROI on such investments—and the technical limit to how much heat rates can be improved—are linked to the

age and location of the plant, as well as the extent to which it has been upgraded for performance or air quality in recent years.

Andy Byers, associate vice president and lead regulatory advisor in **Black & Veatch’s** energy business, told CCBJ he and his colleagues question whether a 6% average heat rate improvement can feasibly be achieved across the coal fleet in each state. “There are economic considerations that, either separately or in combination with the other proposed EPA building blocks, would likely preclude many coal plants from undertaking the necessary upgrades to achieve a 6 percent average across the state,” Byers said.

“It’s always a case by case situation,” he said. “There are some projects we’re working on now where we’re getting better than a 6 percent improvement, but those are plants that hadn’t done upgrades. A lot of plants whose owners have done upgrades, including APC upgrades, won’t achieve anything close to that 6 percent.”

As discussed in prior editions of CCBJ, generators and their engineering consultants need to tread carefully when improving heat rate lest they cause the upgrade to trigger New Source Review under the EPA. “An NSR could effectively tell a utility that if it proceeds with the improvement, the company may also have to upgrade or install new air quality control technology,” according to text on Black & Veatch’s website. “Owners should at least do a study to determine the risks and opportunities ... a high level review, screen the viabilities and then evaluate.”

Black & Veatch and other consultants also point out that constraints on gas pipeline capacity will make it difficult for many existing gas-fired EGUs to achieve the higher levels of dispatch envisioned in block 2. “With the exception of the Southeast, power generators ... have been hesitant to make long-term commitments to pipeline capacity since that would make their units less competitive in their respec-

tive capacity and electric energy markets,” wrote Black & Veatch’s Denny Yeung.

“A natural gas power plant that makes a long-term pipeline capacity commitment will be paying daily pipeline demand charges for 10 to 15 years, even on days when it is not dispatched,” Yeung elaborated in an email to CCBJ. “This new incremental pipeline capacity will more than likely be more expensive than the existing pipeline capacity, so when these costs are incorporated into the capital costs and marginal costs, these units will be at a cost disadvantage to other units trying to bid into the same market.”

ICF also flagged the need for gas pipeline infrastructure in its white paper on the CPP: “Generators will also need to know whether they have access to adequate gas pipeline infrastructure, and the delivered cost of the fuel, should they need to rely on gas-fired generation to a greater degree than in past years.”

State Requirements Vary Dramatically

In a philosophy that harkens back to the communist motto, “From each according to his ability, to each according to his need,” the better positioned a state is to make reductions, the more reductions EPA expects it to make.

The CPP sets state-by-state reduction targets based on each state’s existing generation mix and environmental policies, such as cap and trade in California and the Northeast and renewable portfolio standards in nearly 30 states. The targets are spelled out in emission rates—pounds of CO₂/MWH—that each state must achieve by 2030, with benchmark requirements for interim periods.

“The EPA projects that 15 states (mostly states that are heavily coal dependent) are projected to reduce emissions by less than 15%, while 15 other states (mostly hydro-rich states or states with substantial gas and coal capacity) will

Summary of EPA's Proposed Best System of Emissions Reductions

BSER Building Block	EPA Basis for BSER Determination	EPA Estimated Average Cost	% of BSER CO2 Reductions
1. Increase efficiency of fossil fuel power plants	EPA reviewed the opportunity for coal-fired plants to improve their heat rates through best practices and equipment upgrades, identified a possible range of 4–12%, and chose 6% as a reasonable estimate. BSER assumes all coal plants increase their efficiency by 6%.	\$6–12/ton	12%
2. Switch to lower-emitting power plants	EPA determined for re-dispatching gas for coal that the average availability of gas CCs exceeds 85% and that a substantial number of CC units have operated above 70% for extended periods of time, modeled re-dispatch of gas CCs at 65–75%, and determined 70% to be technically feasible. BSER assumes all gas CCs operate up to 70% capacity factor and displace higher-emitting generation (e.g., coal and gas steam units).	\$30/ton	31%
3. Build more low/zero carbon generation	EPA identified 5 nuclear units currently under construction and estimated that 5.8% of all existing nuclear capacity is “at-risk” based on EIA analysis. BSER assumes the new units and retaining 5.8% of at-risk nuclear capacity will reduce CO2 emissions by operating at 90% capacity factor.	Under Construction: \$0/ton “At-Risk”: \$12–17/ton	7%
	EPA developed targets for existing and new renewable penetration in 6 regions based on its review of current RPS mandates, and calculated regional growth factors to achieve the target in 2030. BSER assumes that 2012 renewable generation grows in each state by its regional factor through 2030 (up to a maximum renewable target) to estimate future renewable generation.	\$10–40/ton	33%
4. Use electricity more efficiently	EPA estimated EE deployment in the 12 leading states achieves annual incremental electricity savings of at least 1.5% each year. BSER assumes that all states increase their current annual savings rate by 0.2% starting in 2017 until reaching a maximum rate of 1.5%, which continues through 2030.	\$16–24/ton	18%

Sources and Notes: EPA, *Carbon Pollution Emissions Guidelines for Existing Stationary Sources: Electric Generating Units*, 40 CFR Part 60, EPA-HQ-OAR-2013-0602, RIN 2060-AR33, June 2, 2014 (“Proposed Rule”). Details of Block 1 on pp. 155–171, Block 2 on pp. 171–194, Block 3 on pp. 195–218, and Block 4 on pp. 219–236. EPA estimated average cost is calculated per metric ton of CO2 emissions reduction.

reduce emissions by more than 35%,” wrote **The Brattle Group** in its June 2014 Policy Brief.

One of the biggest disparities lies between what will be required from Minnesota and from Missouri. “The two states have similar 2012 fossil emissions rates of approximately 2,010 lbs/MWh ... but Minnesota faces a substantially lower 2030 CO2 emissions standard of 870 lbs/MWh compared to 1,540 lbs/MWh for Missouri,” wrote the policy brief’s authors.

“The discrepancy results from Minnesota’s larger renewables target and much larger proportion of installed gas [combined cycle] capacity that the EPA assumes can increase output to displace coal-fired generation.”

States are urged to cooperate across borders, and EPA estimates that total compliance costs will be \$1.5 billion less per year by 2030—with a carbon price of \$13 per ton vs. \$15—in a scenario with high levels of cooperation.

The rule also would allow a state to comply using a mass-based emissions cap, like the cap and trade laws governing electric power in the Northeast and all large GHG emitters in California. The state cap must be equivalent to what the state would achieve using the rate standard, incorporating assumptions about projected growth of electricity demand and generation.

“The mass cap approach will avoid the need for EM&V and crediting because efficiency efforts and non-emitting generation sources will lower absolute emissions, reducing pressure on the cap and contributing to compliance,” noted ICF in its Clean Power Plan White Paper. “However, submitting a plan with a mass cap will require that a state perform careful analysis to determine the cap to the satisfaction of EPA.”

“Should the mass cap include new sources and not correctly account for future demand growth, it may make compliance difficult and more costly. A rate standard, on the other hand, implicitly allows for growth in absolute emissions over time,” noted ICF’s author team for the paper. “A high-growth state such as Louisiana may choose to sacrifice the regulatory benefits of a mass cap in favor of a rate standard that will grant flexibility for growth in emissions.” Steve Fine of ICF also points out that the cap could be limited to existing units, with new units subject to a rate-standard under 111(b).

As mentioned above, states can also choose to comply by, in the words of a Policy Brief from The Brattle Group, “assigning a utility or state agency the responsibility of meeting the standard through a resource portfolio approach.”

Legal Challenges in Play

In discussing the legal challenges against the CPP, ICF’s Fine says the core of the legal debate will be “how far outside the fence can the agency go to regulate greenhouse gases from the power sector.”

While legislation such as the Waxman Markey bill passed by the House in 2009

National Annual Compliance Costs and CO2 Abatement in 2010

Scenario	Compliance Costs (2011\$B)	CO2 Avoided (MM tons)	Average Cost (2011\$/ton)
Non-Cooperation	\$8.8	594	\$15
Regional Cooperation	\$7.3	575	\$13

Sources and Notes: Reflects cost and CO2 differences between Base Case and Option 1. Compliance costs and from EPA’s Regulatory Impact Analysis (RIA), Table ES-4. Avoided CO2 from IPM for fossil units > 25 MW, EPA RIA reports slightly different numbers.

would have established a new federal cap and trade law, the EPA can only use Clean Air Act Authority. And the CPP’s BSER is a new and controversial approach to doing that to mitigate CO2.

“Everyone agrees that EPA has Clean Air Act authority over building block one, creating emission standards for fossil-fired power plants. Beyond that, people have all kinds of opinions on what kind of legal authority EPA has on the other building blocks,” Fine said.

“On block two, redispatching to gas, they went beyond the fence but stayed within the fossil generation realm. With block three, nuclear and renewables, they went beyond the fossil fuel realm to deal with emission-free generation sources. Some say they over-reached, others say these are integrated parts of the power generation system and therefore reasonable to include,” Fine continued.

“With block four, energy efficiency, people point out that regulated parties would have to rely on consumer behavior to achieve compliance,” said Fine. “In restructured states, owners of power generation have little control over what’s going to happen with energy efficiency, so the argument by some is that this is really beyond the pale of what EPA can do. Others, again see energy efficiency as part of the integrated electric picture and therefore fair game.”

The plan was still in the comment stage at CCBJ’s deadline—a period extended by EPA from mid-October to December 1

due to the huge interest (by mid-September, the agency had received 1.5 million comments).

In late October, EPA released a Notice of Data Availability (NODA) indicating that it had taken to heart concerns expressed by many that the pace at which the agency expects utilities to shift their generation mix from coal to existing gas units was too extreme.

The agency said it wanted further comment on possible adjustments to the proposed rules. “First, a phase-in schedule could be developed for increasing generation from existing natural gas facilities under building block 2,” wrote Utility-Dive.com. “The schedule would be based on the extent to which infrastructure improvements would be needed to use more existing gas generation and how long they would take to build.

CPP Creates Demand for Counsel and Consultancy

Second, the EPA announced it was open to comment on modifying building block 2, which mandates how quickly states must switch from high-emission generation, like coal, to lower-emission options, like natural gas.”

The final rule, now slated to be published in 2015, will likely include tweaks and changes that can’t be foreseen, as well as major modifications that result from any successful court challenges. But utilities and other electricity market participants are already engaging in analysis and planning around the CPP, in many cases with the help of professional service firms.

Crowell & Moring Identifies Three Phases of CPP Consulting

“Integrated resource planning firms, law firms and other consultants are getting engagements related to the Clean Power Plan,” said Cameron Prell, an attorney with Crowell & Moring’s Energy Group, who spoke with CCBJ in November 2014. “Utilities, independent power producers and even public sector agencies are reaching out for counsel.”

Prell sees the consulting work unfolding in three phases. “The first stage is dissecting the plan and figuring out what comments need to be submitted on the proposal. The second phase is thinking through strategically what is possible at the state level and regional level. What would a state or regional plan look like and how would that impact our business?”

“The third phase will be a range of activities based on what plans states decide to pursue. Initially the work there will be around how to make the legislative or regulatory changes, what moving parts need to be addressed and which ones are most important.”

In November 2014, Prell told CCBJ that while most of the engagements by his firm and others were related to analysis of the plan and preparation of comments, he reported there was already counseling being sought on phase two, shaping state plans.

B&V Models CPP Scenarios

Byers of Black & Veatch estimated in November 2014 that the company had between five and 10 full-time equivalent employees “just working on modeling scenarios [based on the CPP] for different electric utilities or power generators.”

“We’ve been helping them identify certain things within the building blocks that they have more or less control over and how they might plan for different scenarios,” said Byers. “We also do market

analysis, including running scenarios in a particular portion of the country based on what their generation is and how, state by state, certain programs may play out for them. This gives them a reference base to talk to their state regulators and to come up with comments on the rule itself.”

Byers says these analyses build on previous modeling that goes back to Waxman Markey and various state cap and trade initiatives that were sidelined after the 2010 elections. “A lot of utilities either wanted to follow that particular scenario [in Waxman Markey] closely or come up with different scenarios for the future price of carbon,” Byers said. “A lot of utilities have since continued to use a proxy price for carbon going forward, and many of the state utility commissions require them to do so as one of their future resource planning scenarios.”

ICF Serves Range of CPP Clients

ICF’s Fine says his firm is doing CPP-related work for a variety of clients including trade associations, the Natural Resources Defense Council and the Bipartisan Policy Center. “We’re also working with individual utilities, some private equity companies that have interests in the electric power market as well as independent power producers (IPPs),” said Fine.

“Companies and states need to understand the implications of choosing a rate-based system or mass-based caps, the implications of going it alone as a state versus joining regional configurations, and the pros and cons of various configurations, the impacts power prices at wholesale and retail levels, the value implications for a portfolio of generation assets,” Fine said.

Leidos: Rapid Change in Electric Power Industry Underpins Demand

In the view of at least one consultant, however, modeling exercises, while helpful in informing the design of the CPP, may

be of limited use from a resource planning perspective if conducted prior to the drafting of state plans. “With the actual state plans not firmed up, what are you going to model?” asked Fred Wellington, managing director of energy consulting for Leidos Engineering.

While scenario modeling and analyses are “fundamental parts of resource planning, the range of scenarios that are plausible [with the CPP] would create a situation where the modeling would be based on many assumptions built on other assumptions,” Wellington said. “The degree to which a utility can actually act with confidence on the results of such modeling would be slight.”

Wellington added that well ahead of the CPP’s release, the rapid pace of change in the electric power industry had already started driving growth in demand for resource planning advisory and consulting services. “It’s difficult to separate these regulations from the broader trend in the industry of utilities transforming their power supply and the way they work with their customers on energy efficiency, distributed generation and demand response,” he said.

“There’s a general trend away from the traditional way the industry has been structured, with large fossil fuel plants far from load transmitting power to load pockets where utilities manage the distribution, to one where customers, especially large commercial and industrial ones, have more choices in how they produce and manage their power,” Wellington added. (This topic is covered in depth in CCBJ’s Q3 2014 edition.)

“Resource planning is much more complicated than it was 10 years ago,” Wellington said. Because of this complexity, “There has certainly been an uptick in the number of RFPs out there for consulting services related to these fundamental changes in the industry over the last two to three years.”

While the CPP may strengthen the drivers for utility market transformation, “the details are up to the states, and it’s too early to tell,” Wellington said.

Driving Business for Consultants

Everyone agrees that the CPP will drive increasing business opportunities for consultants and vendors who can help utilities and other regulated parties, as well as state utility commissions and other policymakers, develop and implement the most cost-effective compliance strategies.

“Some of the historical expertise in the climate market space and renewable energy credit space is going to be pivotal in terms of providing accurate and useful counsel to entities that are either going to be creating or are considering the creation of regional or state market-based mechanisms,” said Prell. “A lot of this will run through professional service firms that have particular expertise with state commissions, with local environmental officials, governor’s offices and state legislatures.”

CPP and Renewable Energy Credits

Just how CPP compliance strategies based on renewable power will be integrated with renewable energy credit (REC) markets is a highly complex issue, according to Jürgen Weiss, head of **The Brattle Group’s** climate change practice.

Weiss points out that in the Northeast, state renewable portfolio standards (RPS) are not integrated with the Regional Greenhouse Gas Initiative (RGGI) cap and trade regime for power plants. “The state RPS systems create incentives to build more or less renewable generation in given states, and that clearly impacts the generation mix and the carbon emissions in the greater region.”

“The fact that Massachusetts may have a more aggressive RPS than say New Hampshire or New York means that Massachusetts may build more renewables and

thus displace some fossil generation on the margin, not just in Massachusetts but across the whole ISO New England footprint,” said Weiss. “That lowers the RGGI price relative to a situation in which Massachusetts had a less aggressive RPS, so in that sense, Massachusetts ratepayers may be subsidizing the rest of New England.”

“No politician in Massachusetts has been interested in bringing that up, but in reality a regional system will always result in cross subsidies,” said Weiss. “There have long been spillover effects from one state onto others, even though most energy regulation is and will remain at the state level.”

Black & Veatch’s Byers’ agreed that this will be a challenging issue for CPP implementation. “How do you give credit for renewable energy in the state that has the RPS, and where the consumers are paying for it, while the next state over where the wind turbines are located gets credit for the energy generation.”

“The same difficulty applies with energy efficiency,” continued Byers. “If you have an

energy efficiency program you may be reducing overall emissions from power plants in another state. There are some issues of equity that aren’t easily resolved unless you go on a more regional basis.”

Interstate trading of RECs is something that EPA has signaled it wishes to consider, although it will need to adjust language in the rule since it currently requires renewable generation be located within the state that will claim credit for the associated CO2 reductions, according to Fine.

“I live in Maryland, a PJM state with an RPS but without huge renewable resources,” he said. “So a lot of the renewable compliance comes from the local utility PEPCO buying RECs from the PJM system and even outside PJM from states like Iowa. This is a perfectly legal and legitimate way to do RPS compliance but there will need to be a reconciliation and alignment [in the final plan] between how the state rate is established and how a state like Maryland is able to use out-of-state RECs to count toward compliance.”

Power Prices Move Depending on the Approach that States Adopt

The form of regulation that states choose to comply with the Clean Power Plan will affect electricity prices and generator revenues. Potential scenarios include:

- Meeting the standard through a tradable emission rate limit, as EPA modeled the program, could result in credits to generation sources that emit below their state standard. Those credits may generate revenue, potentially lowering wholesale power prices through the transfer of payments from high emitting coal generators to low emitting sources such as gas generation, so long as such gas generators continue to be the marginal units setting prices.
- Under a portfolio approach, an entity such as the state or utility would meet the standard using a portfolio of renewable generation, energy efficiency and generator emission reductions at the source. Wholesale electricity prices could be little affected; instead costs would be primarily felt through retail rates.
- A mass-based cap and trade plan would add a positive dispatch cost to all emitting units, and all else being equal, result in higher wholesale and retail power prices.
- Generators in states that opt to join multi-state groups may benefit from lower-cost compliance options in the partner states, or from generating emission reduction credits for sale in those states. *Source: ICF*

Cooperation Scenarios Explored

Rationalizing and aligning how states account for CO₂ reductions achieved with cross-border renewable energy and energy efficiency points to the larger challenges—and opportunities—of inter-state cooperation for compliance with the CPP.

As mentioned above, EPA estimates that the average national carbon price with high levels of cooperation will be more than 10% lower than a scenario in which most states go it alone. In many states—Texas, Colorado, Utah, Wyoming, Tennessee—the “go-it-alone” carbon price would be over \$40. In West Virginia it would top out at \$101, in EPA’s estimates.

Brattle’s analysts point out that such large differences could create counter-productive behavior, like shifting “production from coal units in one state with more aggressive emission reduction standard to less efficient plants in another state with a less aggressive standard.”

They also wrote that there will have to be complex negotiations around how regulated parties—and electricity consumers—share the benefits of regional cooperation. Finally, they point out that states “fully within RTOs may find it easier to adopt cooperative market mechanisms than states not utilizing this wholesale structure.”

Some states, like California, whose projected carbon prices is \$12-13 due to its existing cap and trade system, might have to choose to shoulder a higher carbon price in order to join a regional compliance system. “There’s an obvious impetus for the states with the highest prices to join in, but not much impetus for the lower cost states,” said Fine.

With a dozen states suing the EPA over the CPP, a big question looming over the discussion is: what interim stance are those states power market participants and utility regulators taking? “My gut feeling is they are at least doing the

calculations, at least as a form of contingency planning,” said Weiss. “The plan should make them spend a little bit more time thinking through at least an alternative plan or planning exercise that involves some of the fossil generation becoming less attractive economically.”

Prell opined that some states were running such analyses to determine the costs of compliance, with an eye toward litigation as a possible alternative strategy. “They’re asking how they can establish their long-term planning objectives on a least-cost basis, which may result in a determination whether they’re willing to comply with a final rule or it may be they decide they need to pursue litigation. That’s the kind of calculus that’s going on. It’s more around cost than politics.”

“The most sophisticated utilities are looking at it in that manner rather than one of left-right dichotomies on policy,” said Prell. “For other players within the states, who are not necessarily running regulated utilities, this has more of a political flavor, with turf and jurisdiction issues.”

Not taking the risks and opportunities in the CPP seriously from the resource planning perspective could leave some state utilities in a tough spot, averred Prell. He pointed to the spread of distributed generation, energy storage, demand response and efficiency and the unprecedented challenge those technologies are creating for the traditional utility business models.

“We’re in the midst of a transformation of the utility business model because of the penetration of things like solar distributed generation and the potential for large-scale clean energy and energy storage,” Prell said.

“Those reticent or unconverted states that decide not to pursue any viable state plan may be compromising the ability of utilities within those states to use this process to address competitiveness concerns and issues around the evolution of the utility business model.” ⚙

The Brattle Group on Major Questions Facing States for CPP Compliance

- Determining whether to adopt the EPA’s proposed rates to be met by 2030 and beyond, or to choose the less stringent alternative rates that must be met sooner by 2025;

- Deciding whether to convert from a rate-based to a mass-based goal, which may be more compatible with the existing carbon emissions trading programs in California and the Regional Greenhouse Gas Initiative (RGGI) states;

- Choosing which CO₂ reduction measures to pursue to meet the target, including options beyond the four building blocks proposed, e.g., coal with carbon capture and storage (CCS);

- Electing to meet these targets in-state or through multi-state arrangements, and if multi-state, which states to group with and how to make equitable, efficient, and enforceable rules for governing the multi-state system;

- Determining whether and how to compensate zero-carbon supply resources, including existing hydro and most existing nuclear units that are not explicitly included in EPA’s rate-setting mechanism;

- Identifying the entity responsible for complying with the state or regional emissions standards, for example, by imposing rate standards on electrical generating units (EGUs) or on load-serving entities (LSEs), or by assigning a utility or state agency the responsibility of meeting the standard through a resource portfolio approach; and

- Determining how to equitably allocate allowances or rates among responsible EGUs or LSEs, for example, by auctioning allowances, allocating allowances, or setting unit-specific rates that may or may not consider historical emissions rates and fuel type. ⚙

ERM Plans for Continued Growth in Climate Strategy and Reporting

Demand is strong for managing software solutions and data.

Managing greenhouse gases (GHGs) is becoming an ever larger concern for a growing number of consumer-facing corporations, and in the process this is creating new and growing markets for professional service firms that can assist with measuring and reporting GHGs and assuring the reported data.

Consulting and professional service firms active in this space include Bureau Veritas, DNV GL, Deloitte, Environ, ERM, Ernst & Young, KPMG and many others. ERM, with \$940 million in fiscal year 2014 revenues and about 5,000 employees in more than 40 countries, is clearly a leading player. ERM Partners Simon Aumônier and Gregg Demers told CCBJ in Q4 2014 that carbon and climate risk management for large corporations is an area where the firm is seeing an increasing number of requests from clients for support.

A business driver that didn't exist eight or 10 years ago, voluntary corporate climate strategy and reporting came on ERM's radar when its clients began to experience more pressure from investors and other stakeholders. Demers remembers getting a call at ERM's Boston office in 2008 from a supermarket corporation that wanted to develop carbon reduction goals and strategies.

"At the same time, ERM was developing a climate change practice globally," said Demers. "I was able to connect up with ERM staff I had worked with in the past who had expertise in this area, and since then we've been able to work with many other clients to understand the challenges in this space and what oppor-

tunities they have to influence their emissions directly and across their value chain."

Four years ago, the company formalized a strategy to focus on key client sectors and seek ways to apply its skills globally, said Aumônier. "That has led to fairly significant growth in that period, and we're certainly planning for continuation of that."

Project engagements often follow clients' annual reporting cycles.

Aumônier and Demers estimated that over 100 full-time equivalent employees are engaged in climate strategy and reporting for ERM. The team has resources spread across the globe with expertise in strategic energy management, climate change adaptation services, carbon reduction strategies, product carbon lifecycle assessments and GHG management software selection and implementation.

Project engagements often follow clients' annual reporting cycles, according to Demers. "These metrics are tied to their investor reporting as well as their annual assessments of progress toward goals, especially their annual sustainability and CDP reports."

Sometimes projects are awarded based on a competitive RFP process, and in other cases firms contact ERM after hearing about its reputation in this space. "Typically, once we start working with a client, the engagements are continued without additional competition."

A typical project earns ERM a fee in the low six figures, although the amount varies greatly depending on the complexity of the engagement. "Sometimes we work with clients around a single site or a single product, and the fee would be smaller," said Aumônier. "In other cases, when we work with our colleagues in our

information solutions division to recommend and implement software solutions and even manage global data sets, those projects can be much larger."

This is a space where ERM has seen particularly fast growth, according to Demers. "Companies looking to identify and select third party software to manage things related to their climate change program often rely on us for independent advice and consulting," said Demers. "The amounts of data involved are absolutely huge, and we have a team that navigates the client through the whole process of selecting the vendors, importing the data and managing it for useful outputs."

ERM's position in the climate strategy and reporting space is underscored by its high profile in global climate dialogues and sustainable business forums. For example, ERM CEO John Alexander spoke on a panel hosted by the government of Indonesia at the September 2014 New York Climate Summit.

Demers highlights the firm's role as a co-chair of the World Business Council for Sustainable Development's Action 2020 program. "We've been contributing quite a bit of resources to help create additional momentum, and the business leadership you saw at the New York Climate Summit really grew out of earlier work by WBCSD and other consortiums."

Aumônier said that ERM demonstrates greater technical depth than many firms in the space, especially assurance firms. "We sell to that strength, our understanding of processes and operations, allied with our appreciation of strategy and the benefit of working with people at various levels in the business," he said. "A lot of our employees have industrial experience and bring to an assignment that expertise and understanding of exactly what a particular business is doing on the ground."

In terms of global growth, ERM has its eyes on major emerging economies such as Brazil, South Africa and China. As discussed on page 28, corporate leaders in Africa's second largest economy are indeed taking GHG reporting seriously. Growth in China will be driven largely by regulation.

ERM has the advantage of long relationships with multinational firms seeking to apply a global standard to their climate strategy and reporting.

Cost competitiveness and non-tariff trade barriers may make it difficult for ERM and other firms based in the United States, United Kingdom and other developed countries to pick up much work in some of these markets. In China, for example, the emerging market for certifying and verifying carbon offset projects in the pilot cap-and-trade schemes has been largely limited to domestic firms (see CCBJ's 2013 edition on global carbon markets).

But ERM has the advantage of long relationships with multinational firms seeking to apply a global standard to their climate strategy and reporting. Combined with continued growth in developed countries, ERM's climate strategy and reporting business will likely grow for some time. Additionally, work for existing clients will probably become more extensive as more firms seek to come to grips with their elusive supply chain emissions.

"As recently as a few years ago, some of our clients were just not interested in doing this at all," said Aumônier. "Now more and more of them are. The likelihood is that over the coming few years, there will be significant growth of interest in the field, and the work we do will also be more wide ranging and in-depth." ⚙

Mott MacDonald Brands Climate Resiliency Division

Calls for more practitioner input into IPCC and other climate panels

Over the last 18 to 24 months, Mott MacDonald, the U.K.-based global management, engineering and development consultancy, has sharpened its focus on climate change resilience and adaptation work, according to a team of senior executives interviewed by CCBJ.

After firming up the initiative internally, Mott MacDonald began in Spring 2014 to brand this specialty as its Climate Resilience Division. Ian Allison, global head of climate resilience, told CCBJ that while an accurate estimate of full-time equivalent employees working in climate resilience couldn't be offered because projects draw on technical units across the firm, "our projections show the business producing fees in the multi-millions."

A sign of the growing market "is the significant change in political rhetoric over the last 18 to 24 months," Allison said. "It has become more politically acceptable to talk about adapting to the changes in the climate that are already in place."

David Viner, principal advisor on climate resilience, added that until the last few years, government agencies in the United Kingdom tended to "push adaptation to the background because it seemed defeatist, as if we were giving up on mitigation." Not so anymore. The UK's Department for International Development (DFID), like the United States' Agency for International Development (USAID), are "building in climate resilience," into a wide range of development work, said Allison.

"Both agencies have whole programs of activities, from basic education of the population right through to high-level engagement with ministry-level officials," said Allison. "The generic term for this trend is 'mainstreaming climate change.'" As noted in the feature on climate resilience in developing countries, Allison pointed out that Australia's AusAID has de-emphasized climate change since Tony Abbott's Liberal-National coalition victory over pro-climate policy Labor in September 2013.

As documented in CCBJ's Q1 2014 adaptation edition, private asset owners based in the United Kingdom, United States and other developed countries are increasingly investing in climate impact analyses and resilience design and engineering for long-lived assets.

"In the U.K. and U.S., what we're seeing is that the majority of opportunities for flood protection and resilience tend to push away from the public sector and into the private sector," Allison explained. "Power sector infrastructure, for example, is surprisingly susceptible to both river and coastal flooding. There's certainly a substantial market out there as power systems become more and more complex and more and more interrelated."

Viner highlighted the concept of "active system resilience," which looks far beyond a single asset at how an organization or public agency can respond to extreme weather and other disasters. "We saw in New York after Hurricane Sandy how an individual asset could withstand the impacts but couldn't function because the people who worked there couldn't get to work," he said. "So we look upstream and downstream to make sure clients build their resilience back to their operations and even to their suppliers' operations."

Developing Countries Still Need Money

In developing countries, however,

the market for climate impact assessments and climate resilience design and engineering is almost exclusively a donor-funded activity. “That market is predominated by the aid agencies investing in understanding the broader impacts of climate change as they might directly impact on the indigenous populations or the mainstays of the economies such as food and agriculture,” Allison reported.

“From our point of view, we see adaptation funding gaining ground and coming to the fore in the next two, three to four years.”

In some large vulnerable cities in middle-income developing countries, Allison’s colleague Hero Heering, project director, finds that “in some cases, there is growing private sector interest in protecting” assets from climate impacts. “But that does not necessarily equate to investment by the private sector. For funding, the developing countries are looking at the major international finance institutions to address this issue with additional money.”

On the other side of the coin, international development funders like the Asian Development Bank and International Finance now routinely require climate risk assessments for infrastructure projects in developing countries. “International finance agencies as well as private financial institutions are requiring technical due diligence to understand climate risks related to projects and make sure they’re climate resilient,” said Viner. “We’ve undertaken these types of assessments across numerous types of infrastructure projects.”

Channeling more climate-related aid from developed countries to developing countries—as committed at the 2009 Copenhagen global climate meeting—is an essential building block for a post-2020 global agreement.

In a recent report on climate finance by the Overseas Development Institute, World Resources Institute and the Institute for Global Environmental Strategies, greenhouse gas mitigation projects were estimated to have received 71% of the approximately \$35 billion in fast start climate funding disbursed from 2010–2012. Adaptation projects received only 18% (9% went to projects with multiple objectives).

The emphasis on mitigation over adaptation “is part of the legacy situation, in which governments didn’t prioritize adaptation funding because of the signal it might send,” noted Allison. “But from our point of view, we see the adaptation funding gaining ground and coming to the fore in the next two, three to four years.”

Climate Work: from Add-On to Principle Scope

Another trend that Allison and his team see growing is the issuing of climate-specific project tenders instead of larger projects that incorporate a climate element. “If you go back two to four years, we were seeing climate resilience studies as part of a wider scope of work,” said Allison. “Increasingly now we see substantive submissions where adaptation to climate change and climate resilience are the principle scope. Adaptation is becoming a stronger focus for the big aid funding agencies.”

Heering reported that vulnerable Bangladesh in particular is the focus of increasing climate-specific projects. “We’re preparing a delta plan for Bangladesh that deals with water resources for the entire country to 2100 that will cover everything related to climate change impacts,” Heering.

In fact, aid-seeking developing country governments are even “re-labeling projects that would normally be funded under government activities as climate-resilient infrastructure projects or climate adaptation projects,” Heering said.

“There’s a lot of money now being committed into these areas, including the many climate fund instruments,” Allison said. (See chart on page 10). “In order for a broad selection of clients to access these funds, we’re seeing rebranding of what might have been a simple infrastructure project into something with a very strong climate change adaptation theme to it.”

“At the same time as the big funding agencies are increasingly devoting money in this direction, they’re also increasingly concerned to do quite thorough monitoring and evaluation to ensure that money is being appropriately spent and achieving some reasonable benefit,” reported Allison.

“We see growing interest in and funding for studies of how climate change will affect small island states which are very vulnerable to changes in temperatures and sea levels,” Allison said. “We did a study a couple years ago for Mauritius that looked at the long-term sustainability of the islands, with climate change considered as one of the key factors in that sustainability.”

In the transition economies of Europe—those countries that began to shift from a centrally planned economy to a market economy after the fall of the Soviet Union—agriculture is a primary driver for climate change adaptation and resilience planning. “Several Central and Eastern European countries are very vulnerable to the impacts of changing precipitation and snowmelt on agriculture,” Allison said. “A study we performed for the Asian Development Bank on Tajikistan, where agriculture is a mainstay of the economy, looked at the impacts on water resources of future reductions in snowmelt in spring.”

Large-Scale Opportunities

The Overseas Development Institute report mentioned above also noted that a large proportion of climate finance is offered in the form of export subsidies or

Climate Finance in Developing Countries

Fund	Pledged	Deposited	Income	Approved	Disbursed	Approved Overhead	Disbursed Overhead
Adaptation Fund (AF)	\$226.30	\$206.22	\$385.55	\$225.55	\$92.29	\$29.44	\$28.76
Amazon Fund	\$1,033.47	\$786.65	\$-	\$411.74	\$97.67	\$-	\$-
Australia's International Forest Carbon Initiative	\$189.57	\$67.06	\$-	\$125.54	\$31.70	\$33.50	\$15.90
Clean Technology Fund (CTF)	\$5,242.00	\$4,599.00	\$-	\$3,548.79	\$426.50	\$22.06	\$22.00
Congo Basin Forest Fund (CBFF)	\$186.02	\$164.65	\$-	\$95.38	\$53.01	\$-	\$-
Forest Carbon Partnership Facility - Carbon Fund (FCPF-CF)	\$388.40	\$280.62	\$-	\$0.74	\$0.37	\$4.04	\$4.03
Forest Carbon Partnership Facility - Readiness Fund (FCPF-RF)	\$355.13	\$257.93	\$-	\$113.45	\$39.33	\$9.87	\$9.70
Forest Investment Program (FIP)	\$599.00	\$530.00	\$-	\$279.24	\$5.13	\$-	\$-
GEF Trust Fund (GEF 4)	\$753.74	\$753.74	\$329.18	\$955.56	\$933.11	\$98.32	\$95.77
GEF Trust Fund (GEF 5)	\$1,350.00	\$776.74	\$-	\$721.36	\$278.62	\$72.51	\$28.90
Germany's International Climate Initiative	\$1,081.84	\$1,081.84	\$-	\$986.47	\$-	\$-	\$-
Global Climate Change Alliance (GCCA)	\$385.36	\$385.36	\$-	\$383.15	\$142.84	\$8.22	\$8.22
Global Energy Efficiency and Renewable Energy Fund (GEEREF)	\$169.50	\$163.50	\$-	\$76.57	\$-	\$-	\$-
Green Climate Fund (GCF)	\$54.89	\$36.69	\$-	\$-	\$-	\$54.81	\$7.32
Indonesia Climate Change Trust Fund (ICCTF)	\$21.01	\$11.21	\$-	\$9.51	\$5.03	\$2.94	\$2.73
Japan's Fast Start Finance	\$15,000.00	\$12,500.00	\$-	\$10,826.00	\$-	\$-	\$-
Least Developed Countries Fund (LDCF)	\$907.03	\$831.56	\$-	\$641.50	\$133.18	\$48.63	\$13.23
MDG Achievement Fund	\$89.50	\$89.50	\$-	\$89.52	\$89.52	\$-	\$-
Norway's International Climate and Forest Initiative	\$1,607.82	\$1,607.82	\$-	\$304.68	\$283.77	\$-	\$-
Pilot Program for Climate Resilience (PPCR)	\$1,160.00	\$973.00	\$-	\$771.78	\$40.84	\$-	\$-
Scaling Up Renewable Energy Program (SREP)	\$521.00	\$506.00	\$-	\$135.56	\$3.59	\$-	\$-
Special Climate Change Fund (SCCF)	\$344.34	\$299.11	\$-	\$227.53	\$216.35	\$17.51	\$11.11
UK's International Climate Fund	\$6,002.00	\$1,318.20	\$-	\$1,056.45	\$-	\$-	\$-
UN-REDD	\$248.84	\$215.22	\$2.26	\$193.46	\$181.55	\$-	\$-
Total	\$37,916.76	\$28,441.62	\$716.99	\$22,179.53	\$3,054.40	\$401.85	\$247.67

Source: Climatefundsupdate.org, accessed Nov. 6, 2014

credit enhancements designed to support a developed country's exporting industries. Japan is the largest practitioner of this approach, according to the report.

Allison and his colleagues report that they have not pursued these types of contracts. "Given the scale of the opportunities out there, our focus is very much on the aid-funded work in developing countries and the asset systems in developed countries," said Allison. "As far as I'm aware, we have not chased anything related to these export subsidies."

Heering pointed out that such "tied-aid" projects generally require contractors to "pre-finance or co-finance quite large amounts. So for a consultancy or engineering firm like ours, whose product is technical advice, it is quite difficult to get your return from those kinds of projects," he said.

Nigeria Education Project Adds Climate Change

Another trend is for large multi-year development projects to add climate change elements to extend the impacts of the original scope and to ensure that projects are executed with an eye on the changing climate. A key example is DFID's Education Sector Support Programme in Nigeria (ESSPIN), for which Mott MacDonald is programme designer.

In 2013, ESSPIN's mission to assess educational shortcomings and support government, teachers and communities in creating effective learning environments, was extended to include climate impacts. "The skills and knowledge provided through basic education bring benefits for environmental protection and people's ability to cope with the impacts of climate change," wrote DFID in a report on the business case for providing a cost extension for ESSPIN.

"ESSPIN is a £140 million education program designed predominantly to improve the structure and governance

of education in Nigeria," said Viner. "As a result of DFID's increasing awareness of the issues around climate change, the agency has mainstreamed climate into that program."

When CCBJ spoke with the Mott MacDonald team in early Q4, 2014, they were just getting started on the climate elements of ESSPIN. "We're initially going to work with the key government stakeholders, implementing knowledge exchange and knowledge management systems so they can take up this quite complex science," Viner said. "Ultimately the project will include teacher training schemes, improving the resilience of school buildings, also mitigation of greenhouse gases through such things as solar-powered water pumps."

"Practitioners can bring their language and terminology to the table. This surely will make the reports more relevant and provide a more robust evidence base."

Including Practitioners Would Make Climate Panels More Effective

As discussed in previous editions of CCBJ, infrastructure managers, asset owners and their consultants face a particularly difficult challenge in designing facilities for climate resilience given the range of uncertainty in future climate forecasts. Viner, who prior to joining Mott MacDonald in 2012 was a senior research scientist and climate program director at University of East Anglia, lead in climate adaptation at Natural England and director of a large global programme on climate change and sustainability for the international relations NGO British Council, says part of the problem lies in the lack of engagement by climate scientists with engineers and other practitioners who implement climate change solutions.

"Coming to work for Mott MacDonald, I learned there's a lot of experience on the ground here," Viner told CCBJ. "My colleagues in this firm have 10, 15, 20 years experience with how climate change will affect their specific sectors, such as water resources and other infrastructure."

Viner says the knowledge level at the firm—and presumably at other similarly large firms—is comparable to the professors and PhDs who serve on the Intergovernmental Panel on Climate Change (IPCC) working groups and author teams. Yet IPCC for the most part doesn't include many of these on-the-ground practitioners.

In an October 2014 article for *Nature Climate Change*, Viner and Candice Howarth of the Global Sustainability Institute at Anglia Ruskin University, reported that the latest Working Group II report on impacts, adaptation and vulnerability included no "practitioner experience, evidence and case studies that demonstrate how adaptation is being carried out on the ground."

"They provide an observational, top-down account rather than a practitioner-led evidence base," wrote Viner and Howarth. So what, one might ask? Can't engineers and infrastructure planners read scientific reports?

Viner told CCBJ that while the engineers and planners at his firm and others—what he calls the "practitioner community"—have no trouble understanding what the scientists are saying, "what's coming out of Working Group II is not in a language or form that can be acted upon."

"My co-author and I are suggesting that IPCC and other climate assessments like those done by the UK's Royal Society and the United States' National Academy of Sciences need to include practitioners within their writing teams so they can avoid some of the abstract language that the academic adaptation community uses."

Changing the composition of scientific panels would have to start with national governments. “The IPCC authors are nominated by their countries, so government officials responsible for nominating authors need to be made aware that a practitioner from the consulting environment can bring something useful to the table,” said Viner.

“We need to include the practitioner perspective in the IPCC Working Group II Report to build in the evidence from the large knowledge base that practitioners hold,” said Viner. “Furthermore practitioners can bring their language and terminology to the table. This surely will make the reports more relevant and provide a more robust evidence base.”

Noting that IPCC authors do not receive compensation from the United Nations, Viner contends that many firms would still be happy to fund a senior executive’s participation for the exposure and business development benefits. “When you’re an IPCC author, that’s good for you professionally and for your employer,” said Viner, noting that the time he put into externally reviewing an IPCC report in 2013 was funded by Mott MacDonald.

Viner would also like to see more climate scientists participating in the forums where climate change practitioners share their knowledge, namely professional conferences on affected sectors such as hydropower and water resources.

Viner mentioned in particular the Hydro 2014 hydropower conference held at Cernobbio, Lake Como and the October 2014 forum on Climate Change: Building the Age of Resilience organized by the UK’s Charter Institution of Water and Environmental Managers. (CIWEM’s conference is co-sponsored by Mott Macdonald, infrastructure and business services group Mouchel, sustainability consultancy Ricardo-AEA.) ✨

South African Corporations Rank Highly for Disclosure

KPMG shares perspective on emissions reporting, with mitigation just beginning and a carbon-tax vote ahead.

A country of 53 million with the second highest GDP in Sub-Saharan Africa, South Africa is a leading player in the global drive to mitigate greenhouse gas emissions. President Jacob Zuma was one of the first signatories to the Copenhagen Climate Accord, in which major developing countries pledged for the first time to begin reducing the growth of their emissions.

After years of debate, a carbon tax is on track for a vote in the legislature next year, with implementation expected in 2016.

Well ahead of the public policy curve, 80 of the country’s 100 largest corporations have been reporting their GHG emissions to the CDP. In 2014, they achieved an average disclosure score of 87 out of 100, according to CDP’s November 2014 report on the South African business response to climate change.

Most of the JSE 100 aren’t reporting their scope 3 emissions from suppliers, capital goods, upstream transportation and distribution or and the rest of the 15 scope 3 categories outlined in the **World Resources Institute’s** GHG Protocol. And despite progress, only 51% (up from 41% in 2013) are achieving net emission reductions.

“And although 76 per cent of companies have set emission reduction targets, these do not match either the scale of the challenge, or the global emission reduction targets promised by South Africa,” wrote the country’s minister of environmental affairs, B E E Molewa.

Of course, these challenges are common across much of the developed world, as discussed in the feature story on GHG management for consumer facing firms

on page 9. For South Africa and other developing countries—where economic development is still the main social and political priority—the fact that 80 of the JSE 100 are reporting to CDP, with three-quarters of them setting GHG reduction goals, speaks to the political support for climate change mitigation and adaptation in corporate boardrooms.

A key cheerleader is the **National Business Initiative**, a consortium of businesses interested in greater sustainability and climate resilience. “NBI acknowledges the challenges of growing our businesses to have a positive impact on inequality, poverty and job creation, while simultaneously reducing our emissions,” said NBI Joanne Yawitch in the 2014 CDP report.

Well ahead of the public policy curve, 80 of the country’s 100 largest corporations have been reporting their GHG emissions.

“[The] companies who are achieving absolute reductions are setting the example for the rest of us. We need to accelerate our business efforts, set more ambitious targets, work with government to ensure an appropriate enabling environment, and work with each other to drive innovation and reduce our emissions.”

Support for the carbon tax among the JSE 100 is difficult to gauge, but at least one indication shows that opposition is less intense than might have been expected. In a May 2013 summary of comments on its initial carbon tax proposal the National Treasury reported that very few business respondents were opposed to carbon pricing in any form. All of the 30 business associations—and all but two of 40 companies—responding either supported the proposed tax, would support it with tweaks or would support some sort of carbon pricing.

Examples of JSE100 Carbon Reduction Targets Reported Through CDP 2014

Company	Target	Year	Scope and description
Anglo American	19% from 2011	2015	Scope 1 and 2: "Our overall targets for greenhouse gas (GHG) emission reduction is 19%, against the projected business-as-usual (BAU) level in 2015."
British American Tobacco	80% from 2000	2050	Scope 1 and 2: "Reduce our emissions by 46% by 2017; by 50% by 2030; and 80% by 2050 against our 2000 baseline of 1.52 tonnes per million cigarettes equivalent."
Exxaro Resources	5% year-on-year reduction	2013	Scope 2: For key Business Units: "Annual emission target based on electricity usage target which is set as a range of intensities dependent on tonnage achievement. Improvements measured as change in electricity used at achieved tonnage against target electricity usage at that same tonnage."
FirstRand	34% reduction from 2008 levels	2020	Scope 1+2+3: "Due to FirstRand exceeding their carbon emissions reduction target and saving 24% against the Baseline Year of 2007/2008 FY, a decision was made, after reviewing operations and projected emissions reductions projects, to increase the absolute emissions reduction target to 34% by 2020, in line with the South African government commitment at COP15 in Copenhagen."
Harmony Gold Mining Co	2% reduction from 2014 (2005 base year)	2018	Scope 1 and 2: "Since the target reached completion in this reporting year, Harmony has since reviewed its strategy and has published a new emission intensity reduction target. This target, encompassing the South African and PNG operations, involves a 2% Scope 1 and Scope 2 emission-intensity reduction between 2014 and 2018, with 2005 as a base year. This is a realistic target, which is set against the backdrop of a 15% emission intensity reduction achievement between 2005 and 2013."
Nedbank	7% reduction per employee based on 2013	2020	Scope 1+2+3: "The new target is a 7% reduction based on end-of-2013 levels. This implies a target of 7.08 tCO ₂ e per FTE by the end of 2020."
Old Mutual	20% from 2010	2020	Scope 1 and 2: "The data concerning investment property portfolio including base year emissions relates purely to current properties, to ensure any reduction figure is accurate and not related purely to removal of properties. The portfolio includes the property asset management business and properties invested in and managed to create value and client returns."
RCL Foods	20% and 30% from 2010	2020	Scope 1 and 2: "RCL Foods targets GHG emissions in line with Government's target of a 34% reduction by 2020. kWhs consumed from the grid is targeted to reduce by 30% by 2020. Fuel used in vehicles is targeted to reduce by 20% by 2020."
Sappi	23% from 2000	2015	Scope 1 and 2: "The South African target follows an SA industry initiative to achieve a 15% reduction in specific purchased fossil fuels by 2015."
Tongaat Hulett	20% from 2013	2020	Scope 1: "Tongaat Hulett has updated its baseline from 2011 to 2013 considering improved reporting. The business is committed to reducing its greenhouse gas emissions by 5% per annum for the next 5 years and is targeting at least a 20% reduction by 2020 from a 2013 baseline."

Source: Selected on basis of providing examples of good practice from among the targets reported, CDP South Africa Climate Change Report 2014

KPMG Achieves Leading Role in South African Carbon Initiative

KPMG South Africa's senior manager for climate change and sustainability services Marijke Vermaak told CCBJ that many large businesses support the need for carbon pricing "A lot of stakeholders question why South Africa, with our current economic challenges, would create an additional burden on companies by increasing their costs. But the counter-argument is that if it's done in the right way, in the longer term it should actually stimulate growth, create jobs and incentivize the economy to move toward a green economy."

Seeing the carbon legislation coming down the line has been a major factor in motivating large South African companies to get serious about measuring and reporting their emissions to the CDP.

"The voluntary reporting helps companies get their house in order, making sure their governance process, systems and procedures are in place for a future when there will be some requirement for assurance and verification," said Vermaak.

"Preparing their reports for the CDP also allows companies to understand their emissions profiles, the risks and opportunities arising from climate change and related legislation," said Vermaak. "CDP is about a lot more than reporting your carbon emissions."

Vermaak also describes the corporate governance ethic in South Africa as advanced. "We're seen as one of the top nations for integrated reporting," she told CCBJ. "Our leading companies are taking corporate governance and reporting around sustainability very seriously."

"South Africa is also quite competitive, and the CDP has created some nice competition in the area of carbon and sustainability reporting," Vermaak said. "Companies are taking it seriously and trying to get the top spots for recognition."

National prestige and politics are also on the line. "There's a driver in that our president made a voluntary commitment at the Copenhagen climate negotiations to reduce emissions against a business-as-usual baseline."

"We're seen as one of the top nations for integrated reporting."

"More importantly, though, is the policy imperative toward a greener economy and a low-carbon economy," said Vermaak. "South Africa is particularly carbon intensive largely because of the fact that most of our electricity comes from coal. We also have a lot of heavy industries like mining, which have quite high emissions profiles. Transitioning to a lower carbon, greener economy is referenced in all our major macro-economic policy documents."

Supporting a Low-Carbon Transition

KPMG has been the lead sponsor for CDP in South Africa for seven years, coordinating with the sustainable business association National Business Initiative (NBI). "In that time, CDP reporting has evolved from an initiative about disclosure and transparency to one with a focus more around performance," Vermaak observed. "Most South African companies are getting very high scores on the disclosure side, and the response rate is really high. But we're not seeing major improvements in performance yet. So now the focus is moving toward performance rather than disclosure."

As in the United States and most other developed countries, the scope 3 emissions from suppliers, capital goods investment, upstream transportation and distribution and other categories. "Especially in the retail space, scope 3 is where your largest impact is. Retailers generally have a very small direct carbon footprint, so the focus

should be on scope 3," said Vermaak.

She reports that scope 3 reporting is "improving," but only about half of the consumer companies in the JSE 100 are reporting those outside-the-wall emissions. "And those should be taken with a pinch of salt because there's no set methodology yet to report on scope 3. Some corporations are just reporting their fleet emissions."

"It's also a fact that many of their suppliers aren't very forthcoming with this information," Vermaak said. As discussed in the story about carbon reporting and management by consumer-facing firms in this edition, suppliers face significant time and logistical burdens in reporting, especially when major retail customers request information in different formats. Consultants in this space are offering solutions, but compared to scope 1 and scope 2 emissions, accurate and consistent reporting of scope 3 emissions has a long way to go internationally.

KPMG employs between 25 and 30 professionals on its climate change and sustainability team in South Africa, according to Vermaak. "We also do draw on various other parts of the company when we need to. We work very closely with the integrated reporting team and with our tax team around tax issues. Sustainability is also an area that overlaps with management consulting."

Beyond CDP reporting and assurance, KPMG's climate and sustainability team has "done a lot of consulting work helping companies understand this evolving regulatory landscape, helping facilitate their engagement with governments and their understanding of the impact of proposed regulations and legislation," Vermaak said. "We assist them in understanding what their potential liabilities would be and develop strategies to mitigate those."

Of course, the firm provides assurance of CDP and other sustainability reports. "Assurance is really about confidence. If

it's information that is material to the way you run your business or something your stakeholders are interested in, you want to be comfortable that the numbers you're reporting are correct and that you're representing the risks correctly."

"From the external perspective, assurance gives you comfort that the numbers you're reporting publicly are correct," said Vermaak. "Obviously with the move to greater regulation, assurance of this information may no longer be optional. Once you're paying taxes on it, it will need to be assured just as financial information is."

Opportunities in a Cost-Conscious Market

As described in CCBJ's prior coverage of carbon and sustainability measurement and reporting, the range of professional service firms playing in the space extends from the traditional environmental consulting firms such as ERM and Environ through to software specialists and up to KPMG and its competitors in the Big Four audit, tax and advisory firms.

As South Africa enters the age of mandatory carbon pricing, a whole new industry will emerge to assist regulated firms. Vermaak reports that energy efficiency tax incentives already in place are stimulating the growth of businesses in that sector.

"We're starting to see accredited bodies emerging to verify efficiency improvements," said Vermaak. "Energy service companies are involved in getting the financing and implementing solutions."

In terms of meeting efficiency goals, Vermaak points out that the key driver is the immediate constraints on electricity supply more than future carbon pricing. "We have been in and will be for a while in the situation of having a constrained electricity supply. This has created imperatives for companies to do some hard work improving their energy efficiency." ✨

More Cities Take Action on Climate Change

New business opportunities abound in helping cities mitigate and adapt.

All eyes will be on Paris next year as nations prepare their national targets for greenhouse gas (GHG) reduction in the months leading up to the pivotal December 2015 Conference of the Parties on Climate Change. However; companies that are in the business of reducing GHG emissions should also be looking at other cities, namely the hundreds of municipalities that have made commitments to reducing their own GHGs and making their communities more resilient to extreme weather events.

Originally known as the C20 when founded in 2005, the group of large cities committed to climate action grew to the C40 within a year and today stands at 71, according to the **C40 Cities Climate Leadership** website. The C40 includes Member Megacities with a population of 3 million, or 10 million in their metro areas—or are expected to reach those benchmarks by 2025, Innovator Cities such as Amsterdam that are "internationally recognized for barrier-breaking climate work," and Observer cities like Singapore whose applications for full membership are pending.

A parallel effort, the Compact of Mayors was announced at the September 2014 UN Climate Summit in New York, which aims to mitigate city-based GHG emissions and increase cities' resilience to climate change. The Compact signatories work alongside C40, ICLEI Local Governments for Sustainability, United Cities and Local Governments and UN-Habitat, and have committed to use "robust, rigorous and consistent reporting standards," such as the Carbons Climate Registry or CDP Cities in order to report on their city's GHG reduction progress.

While the Compact didn't announce how many mayors had signed on, earlier research by C40 and Arup, the design, planning and engineering consultancy that has been C40's strategic adviser and research partner since 2009, tallied at least 228 cities with GHG reduction goals in 2013. Collectively representing about 480 million people, the cities' combined goals are expected to equate to an annual reduction of 454 million metric tons of carbon dioxide.-equivalent (MtCO₂-e) by 2020 and a cumulative total of 13 GtCO₂-e by 2050.

Cities' top opportunities for cutting GHGs lie in passenger and freight transport, energy efficiency and waste management.

That amounts to barely 1% of total GHG emissions worldwide. Despite the lack of a multilateral, national deal on climate change, cities are taking action voluntarily, mostly to deliver savings equivalent to huge percentage reductions versus their baselines.

With climate activism gaining momentum it is likely that more cities will set GHG reduction targets. It is expected that citizens frustrated with the lack of progress in senates and parliaments will continue to put more pressure on mayors and other elected city officials to take action on climate change.

Cities are beginning to band together in mutual support through inspiration and shared learning. "When one city raises the bar, whether through a groundbreaking recycling initiative or a successful buildings-retrofit program, the solution provides a blueprint from which other cities can learn," wrote mayors Anne Hidalgo, Paris, Eduardo Paes, Rio de Janeiro, and Park Won-soon, Seoul, on the Huffington Post just before the September 2014 New York summit.

“For example, Santiago de Chile’s new public-transport system was inspired by Bogota’s Transmilenio, which itself was influenced by Curitiba’s rapid-transit bus system. Likewise, Rotterdam’s flood-prevention measures have been implemented by other delta cities around the world, from Ho Chi Minh City and Jakarta to New Orleans.”

Four Sectors Targeted

With often little control over power generation, industry or agriculture, the cities’ top opportunities for cutting GHGs lie in passenger and freight transport, energy efficiency and waste management. As outlined by C40 and the **Stockholm Environment Institute**, the primary mitigation strategies in these sectors include:

Urban Passenger Transport: Land-use planning for compact urban communities, expanding public transit, deploying measures to improve vehicle efficiency (including electrification) and transport demand and flow management, such as variable speed zones and better signal timing.

Urban Road Freight Transport: Implementing better urban freight logistics management, and instituting measures to increase urban road freight vehicle efficiency.

Urban Building Energy Use: Tightening building energy codes and standards, implementing or expanding retrofit programs or efficiency requirements for lighting and appliances, providing incentives for district energy and/or solar PV in residential and commercial buildings.

Urban Waste Management: Increasing waste recycling, and landfill management for methane capture.

The reduction of energy wasted in buildings – or the generation of power on-site with low-carbon or no-carbon technologies such as combined heat and power or solar PV – is by far the larg-

est class of GHG reduction measures, according to C40 and SEI. SEI estimates that new policies to require highly efficient heating systems in new residential buildings could deliver 15% of the total urban GHG reductions by 2050. Energy efficiency policies in total can be expected to yield 61% of the urban-led GHG cuts.

Payback Period is a Problem

As discussed in prior CCBJ editions on energy efficiency (most recently Q2 2014), financing is a perpetual challenge for implementing energy efficiency retrofits and requiring the deepest energy-conservation measures in new buildings. For the retrofit market, commercial and industrial entities look to limit their capital investments to energy upgrades with simple payback of two to three years.

For municipally owned buildings, the performance contracting business model—in which payment is based on delivered energy savings—offered by energy service companies (ESCOs) will play a major role in city ambitions. “I definitely think ESCOs will be a big part of the solution,” said Paula Kirk, an **Arup** associate director who is the company’s lead on the C40 work. “Local authorities that are not energy suppliers, generally don’t have the skills and expertise to deliver energy projects, and they’re very much reliant on the [energy efficiency] industry and utility companies.”

“ESCO’s ability to finance the project is certainly one important element, but helping them with the expertise to design and deliver the project is critical as well.”

On the C40 website, several case studies highlight the role of ESCOs in financing and implementing energy efficiency retrofits on public buildings. In Paris, the ESCO NOV’ECOLES Paris (a special purpose vehicle backed by EDF Optimal Solutions, Caisse des Dépôts et Consignations and France Infrastructure), signed in 2011, is a performance contract

to upgrade 100 schools. As of September 2014 contracts were pending for 200 more schools.

While the model is generally successful, there have been many cases in which conflict has ensued over what savings are attributable to the ESCO’s measures and what should be credited to changes in operations or staffing patterns. “That’s where the C40 network can come into play,” said Kirk. “Other cities around the world that have successful experiences with ESCOs can help others learn how they did it and how they can replicate that success.”

Of course, municipal buildings represent only a small proportion of the built environment, and for a variety of reasons, private firms are less receptive to the ESCO value proposition. Financing energy efficiency upgrades are being refined by firms like Metrus, Schneider Electric, Siemens and others who are bringing third-party financing to private-sector energy upgrade business.

A key initiative in this regard in the United States is the Investor Confidence Project (ICP) spearheaded by the Environmental Defense Fund and sustainable real estate experts, building mechanical systems companies and Connecticut’s Clean Energy Finance and Investment Authority.

ICP is creating a standard set of energy efficiency project protocols and collecting data on outcomes so that building owners will be able to look to industry standards for confidence that an upgrade performed according to the protocols will provide the promised savings.

To succeed in its mission to achieve massive cuts in building energy waste, the C40 will likely have to get more active with this movement. So far, according to an August 2014 statement from the Cities Climate Financing Leadership Alliance—which incorporates C40, CDP, ICLEI as well as development banks and NGOs—

the focus is exclusively on public infrastructure.

Reducing Car-Dependency

After energy efficiency, the most powerful tool in the cities' toolbox is in passenger transport. Better urban planning to reduce the car-dependency of neighborhoods is a long-term goal but "mode shift and transit efficiency," are the most robust near-term measures for cutting GHGs by 2050.

A favored strategy in many cities—and one backed up by a C40 network—is bus rapid transit. This transit mode uses dedicated lanes, signal prioritization, tram-style bus stops and other measures to improve bus mobility and increase ridership without the large costs and long time frames required to build light or heavy rail transit systems.

The C40 Bus Rapid Transit (BRT) Network is currently working with 13 cities to introduce BRT or to improve existing BRT systems, according to the C40 website. A September 2014 interview on C40's website highlighted the strategies of two leading cities: Buenos Aires—which won the Citizen's Choice Award at the 2014 C40 & Siemens City Climate Leadership Awards for its Plan for Sustainable Mobility, of which the BRT is a key component—and Johannesburg, has started to implement a BRT network.

Buenos Aires aims to bring four more BRT corridors online in 2014, increasing

Urban Abatement by Sector in the Urban Action Scenario, 2030 and 2050

Sector	Action	Abatement, GtCO ₂ e		Share of total Abatement, %	
		2030	2050	2030	2050
Buildings, Residential	New building heating efficiency	0.6	1.2	16%	15%
	Heating retrofits	0.4	0.5	12%	7%
	Appliances and lighting	0.4	0.9	12%	11%
	Fuel switching / solar PV	0.1	0.2	3%	3%
Buildings, commercial	New building heating efficiency	0.3	0.5	7%	7%
	Heating retrofits	0.2	0.2	6%	3%
	Appliances and lighting	0.3	0.7	8%	8%
	Fuel switching / solar PV	0.1	0.2	3%	3%
	Subtotal, buildings	2.4	4.5		
Transport, passenger	Urban planning—reduced travel demand	0.2	0.5	5%	6%
	Mode shift and transit efficiency	0.4	1.0	11%	12%
	Car efficiency and electrification	0.2	0.9	7%	11%
Transport, freight	Logistics improvements	0.1	0.2	2%	3%
	Vehicle efficiency	0.1	0.3	3%	4%
	Subtotal, transport	1.0	2.9		
Waste	Recycling	0.2	0.3	4%	4%
	Landfill methane capture	0.0	0.3	0%	4%
	Subtotal, waste	0.2	0.6		
Total		3.7	8.0		

Source *Advancing climate ambition: cities as partners in global climate action*; A report to the UN Secretary-General from the UN Secretary General's Special Envoy for Cities and Climate Change, in partnership with the C40 Cities Climate Leadership Group

daily ridership to 1.2 million passengers. GHG reductions associated with the expansion will come to 49,000 tonnes CO₂-e annually, according to city spokespersons.

Firms such as Alstom, BAE Systems, New Flyer and Siemens are champions in the introduction of BRT and are marketing BRT-configured vehicles with features such as low floors and multiple doors to

minimize "dwell" time and an increasing number of fuel-efficient and alternative-fuel options.

A Typology for Cities: Arup Conducts Research for Third Major Report on Climate Action

Current research being conducted by Arup for C40 in preparation for its third

major report on Climate Action in Megacities, or CAM 3.0 is designed to quantify the potential GHG reductions in as many as 3,000 cities, to evaluate factors that can affect how aggressively individual cities are capable of cutting GHGs and to provide some guidance on the best strategies.

A key part of this research is the development of a series of typologies for different classes of cities, then modeling the potential for climate action based on the track records of cities with similar typologies, according to Kirk.

While the results aren't expected until Q3 2015, Kirk told CCBJ in October 2014 that the results thus far were "very interesting in terms of understanding what the different factors are in how cities can set and meet more ambitious targets." When interviewed, Kirk reported that she and her team had developed 14 typologies, each with a range of variables, and might develop several more if needed to reflect the diversity of the world's cities.

In terms of practical impact, Kirk says she and her colleagues and their clients at C40 expect that the typology models will help city leaders craft appropriate, politically winnable solutions. "The solutions from one city will be more likely to be replicable in another city with the same typology mix and less likely to be appropriate for cities with sharply different typologies," Kirk said.

Scandinavian and Northern European cities currently rank as having the highest commitments to reducing GHGs against a business-as-usual scenario, according to Kirk. She notes the commitments of some top cities in the region such as Oslo—aiming for 100% reductions by 2050—and Copenhagen, which has targeted 100% by 2030.

"Scandinavian cities tend to have more typologies in common such as; the character of the city, population, rate of population growth, GDP, political structure, climate, cooling or heating require-

ments, and water sources," Kirk said. One thing the typology research should reveal is "which other cities could be aiming for those ambitious targets as well."

A key factor that enables a city to set and achieve robust GHG reduction goals is the reach of the mayor's power. Mayors who share power with elected councils are more likely to have success with programs that provide new opportunities—such as bicycle rental programs—and are more likely to face barriers on tougher issues such as congestion charging for dense downtowns (a policy that can have many benefits beside GHG reductions).

A lot of our clients are in cities, and we see that cities can take action much quicker than nations. The most innovative thinking and best practice solutions often come out of cities.

"In order to implement something like congestion charging, a mayor needs to be able to control city roads and street furniture," Kirk said. "In London, the mayor worked with local authorities to use cameras to enforce and control the congestion charge because they have control over the street furniture that the devices would have to be attached to." Achieving collaboration with local councils delayed the project some months, Kirk estimates. "But it would have scuppered the project entirely if the local authorities had been against the idea."

"Copenhagen and New York tried to implement congestion charging and for different reasons, failed to achieve that," said Kirk. "At Arup we try to break down the governance and technical issues in order to identify the characteristics of the cities that make different solutions feasible."

Focus on Adaptation Increases; Arup Expands Role in Data Analysis

Kirk reports that climate resilience and adaptation is climbing on the C40 agenda. "Adaptation has really come to the fore in the last couple years," she said. "It wasn't a huge area when we did our first report in 2011 because the C40 was primarily focused on mitigation."

"In volume two of our work, we reported that 98% of cities reported that climate change is a risk to their cities," Kirk explained. "And some of the most frequently reported actions were around adaptation, particularly assessing flood risks and planning for climate change."

According to Kirk, Arup's work with the C40 "is very much aligned with Arup's ethos of shaping a better world. Arup believes that cities are very much at the heart of achieving that. A lot of our clients are in cities, and we see that cities can take action much quicker than nations. The most innovative thinking and best practice solutions often come out of cities."

Whilst Arup was engaged to collect data for the first report, the data collection is now operated through the online CDP portal. Arup's role in analyzing the data has grown with each report as analysis delves deeper into correlation between Mayoral powers and actions taken, as well as trends and replicability of various solutions," according to Kirk. ✨

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