

BCG

THE BOSTON CONSULTING GROUP



Bridging the gap

The role of green projects
in scaling climate
investments

Many thanks go to the contributing companies



Table of Contents

1. Executive Summary	4
2. Introduction	7
3. Green Projects	9
3.1 Alternative Fuels: On the Verge of Getting to Scale.....	9
3.2 Clean Transport: Established Players Moving Ahead	9
3.3 Reusable Resources: The Circular Thinkers	10
3.4 Renewable Energies: Revolutionizing the Energy Sector	12
4. Green-Project Financing Options	17
5. Investment Community: A Growing Focus on Sustainability.....	21
6. Matching Financing Instruments and Maturity Stages.....	25
7. Conclusion	27
7.1 Recommendations for Companies	27
7.2 Recommendations for Investors	28
8. Appendix: Case Studies	29
8.1 LanzaTech: Scaling New Technologies with the Right Partners	29
8.2 UPS: The Cleanest Mile Is the Mile Not Driven.....	30
8.3 Qantas: Increasing Fuel Efficiency with More Than 100 Initiatives.....	31
8.4 Closed Loop Fund: Partnering Up for Recycling Infrastructure.....	32
8.5 Novozymes: Creating Clean Fuel from Waste	33
8.6 Philips Lighting: A New Business Model that Improves Recycling	34
8.7 Iberdrola: Moving from Conventional Generation to Wind Power.....	35
8.8 EDP Renewables: Driving Growth and Profitability Through Renewables.....	36
8.9 CLP Group: Ambitious Sustainability Targets Mean a Growing Focus on Renewables	38
8.10 Allianz: A Shortage of Good Projects, but Lots of Money for Good Projects.....	40
8.11 Yes Bank: Responsible Banking Requires a Strong Business Case and Is Not Guided by Philanthropic Intent.....	41
8.12 Old Mutual: Investing in Sustainable Agriculture and Renewable Energy	42



Executive Summary

International climate talks in Paris set an ambitious goal: limiting global warming to 2°C by 2100. Reaching that goal will require investing an additional \$1 trillion per year until 2050 in clean energy and other sustainability projects. But current investment levels are still far below that target level, which was also the overarching concern in very recent UNFCCC Cop23 ("World climate conference") talks in Bonn. As the public sector is struggling to advance the financing the pressure on the private sector is increasing as discussions in Bonn showed.

In the hope of finding ways to accelerate investment, the World Business Council for Sustainable Development (WBCSD) joined forces with The Boston Consulting Group (BCG) to create a fact base for business leaders and investors. What types of projects are succeeding? What financing options are available? And how does the investment community think about sustainability investing?

Key findings of the report include the following:

- First and foremost, green investments need to be financially attractive to the target investor. In terms of risk-return profiles, the case studies demonstrate that green investments have a high potential for risk mitigation—for example, due to regulatory changes and resource scarcity—but they also deliver above-average returns, thus increasing their attractiveness to investors.
- Green investors and investment vehicles are diverse, varying, for example, in their preferred investment stage—startup, intermediate-stage, or late-stage development—and in their risk profile. In general, funding options

increase in the later stages of maturity as markets stabilize, risks decrease, and potential returns become more predictable.

- Various potential sources of funding are available for green projects; and depending on the stage of maturity, different combinations of debt and equity instruments can apply. Nine different instruments—in several combinations—are presented in the thirteen case studies included in this report.
- This report presents four critical industries—alternative fuels, clean transport, reusable resources, and renewable energy. Together these industries account for almost half of all greenhouse gas emissions. Still, we found leading companies that managed to line up investment capital, conduct successful green projects, and present best practices as inspiration to others while also delivering competitive or even superior returns.
 - Biofuel development, which is still in its early stages, offers potentially significant positive effects for the climate, with an emissions reduction of 80% compared to fossil fuel.
 - Clean transportation solutions rely on advanced technologies, but these markets have not fully evolved. Companies that seek either to reduce the number of vehicles on the road (for example, through route optimization) or to help vehicles to run cleaner (for example, through emission controls, assisted driving, or alternate power sources) are closer to the mainstream.



- In terms of maturity, reusable-resource technologies are similar to clean transportation. Initiatives aim to reduce landfill through increased recycling, by using different technologies and targeting different materials, depending on the market needs.
- The renewable-energy sector can rely on proven technologies such as for example wind and solar power, as well as on a stable market framework. These technologies present strong business opportunities and will attract up to 60% of the projected \$11.4 trillion that Bloomberg New Energy Finance estimates will be invested in global power generation by 2040, yielding strong growth and profitability along the way.

All the companies we profile in this report recognize the importance of green business practices, but they share something else as well: a belief that financial returns are a key part of the decision-making process. Our research revealed the following:

- Companies should treat green projects as they would any other business initiative: they should assess the risk-return profile and create a strong business case before proceeding. At the same time, they should aim to gain a competitive advantage—as they would with any other strategic project—and assess the environmental and social aspects of even non-green projects.
- In building their portfolios, investors should consider both environmental impact and financial returns. Projects and technologies that have the biggest environmental and financial impact will attract the most attention and demand—and deliver the largest returns. Investors should continue to monitor the landscape and learn about new technologies, industries, and locations with strong potential.
- For companies and investors alike, there is no excuse for

not going green. Suitable risk-return profiles are available in a wide array of industries, technologies, markets, and locations:

- **Think creatively.** To attract investment capital, companies may need to rethink their development of green projects to make them more attractive. For their part, investors need to come up with creative financing options that meet the needs of the green market.
- **Capitalize on low interest rates.** Low rates make traditional investment vehicles less attractive, so green projects offer a relatively high return to investors. For companies that have matured past the startup stage, it's cheaper to borrow when rates are low.
- **Work for better regulatory support and incentives.** Countries with supportive regulatory and tax environments attract more green projects and investors. Also, certain financing vehicles emerge only if the government has provided sufficient support beforehand.
- **Don't ignore emerging markets.** Exploring new locations may take companies and investors alike out of their comfort zone, but emerging economies offer interesting projects, superior returns, and innovative financing—and they are crucial to achieving ambitious targets for reining in CO₂ emissions.
- **Keep two-way communication open, and bridge the language gap.** With green initiatives, the interests of investors and companies should fundamentally align. Technological understanding and transparency with regard to project risks and impacts are key to correcting any misalignment.



Introduction

Scientists and journalists have written extensively about environmental damage and climate change caused by global economic development—and about the need to find and fund green solutions. Nations engaged in international climate talks have set a goal of limiting additional global warming to an increase of 2°C by 2100. And an increasing number of countries are calling for an even more ambitious target: an increase of just 1.5°C. According to International Energy Agency (IEA) estimates, however, limiting global warming to 2°C will require investing an additional \$1 trillion per year until 2050 in clean energy and other sustainability projects.

Current investments fall far below that level. However, especially now as governments are increasing regulation but still struggling to advance the financing the pressure on the private sector is increasing. As recent talks at the UNFCCC Cop23 ("World Climate Conference") demonstrated, business will need to be part of the solutions. Yet, the challenges and risks involved—uncertain access to financing, the lack of green business know-how among investors, concerns about suitable risk-return profiles, and the need to shift to a long-term investment horizon—have encouraged corporations and investors to remain on the sidelines. What would it take to convince companies to fill their pipelines with green projects and to persuade capital markets to invest in them?

The answer is simple: projects must be financially attractive. Without a compelling business case, managers and investors alike find it difficult to justify diverting capital from conventional projects to green initiatives. Although recent research has revealed that investors' attitudes toward sustainability are on the upswing, until now little research has been done on green projects and their returns, the key factors that contribute to their success, or the range of financing options available.

To gain a better understanding, the World Business Council for Sustainable Development and The Boston Consulting Group joined forces to survey the sustainability landscape. Our goal was to answer the following questions:

- What corporate projects or lines of business aimed at reducing CO₂ levels are succeeding?
- What criteria did companies apply when they selected those green projects?
- How did companies finance their projects?
- What are those projects' current and projected financial returns and environmental impacts?
- Which financing options and structures are currently available for sustainability projects?
- What best practices and recommendations can we extract from our findings?

Our research confirmed that green practices are good not only for the environment but also for business, delivering outstanding financial returns to investors with different appetites. In the pages that follow, we describe successful projects, map the landscape of available financing options, and offer insights into how the investment community views green initiatives.



3 Green Projects

The sustainability initiatives that companies have developed fall into four categories: alternative fuels, clean transport, resource reuse, and renewable energy. Conventional industries that contribute to these four clusters account for about 45% of global greenhouse gas (GHG) emissions today, so the potential of projects like those we showcase below is high. In the following subsections, we present abstracts of each case study; the companies' full stories appear in the Appendix.

3.1 ALTERNATIVE FUELS: ON THE VERGE OF GETTING TO SCALE

Combustion of coal, natural gas, and oil for electricity is the world's largest source of air pollution, accounting for 25% of global GHG emissions, according to the US Environmental Protection Agency (EPA). As a result, the potential of cleaner low-carbon fuels and other alternative fuels to reduce emissions in industries such as transportation is very promising. WBCSD's below50 initiative aims to create a critical mass of developers, users, and investors to enlarge the global market for the world's most sustainable fuels. As low-carbon-fuel technologies evolve, new approaches are emerging.

LanzaTech: Scaling New Technologies with the Right Partners

Founded in New Zealand in 2005, LanzaTech uses a microbe-based fermentation process to produce fuels and chemicals from industrial waste gases. Ten years after its founding, LanzaTech became a partner of ArcelorMittal, the world's largest steel producer. Construction of the €87 million flagship pilot project, which will be located at ArcelorMittal's steel plant in Ghent, Belgium, is underway, with €10.2 million financed under the European Commission's Horizon 2020 program for R&D. Finding customers isn't a problem for LanzaTech. "We face other challenges," says Freya Burton, the company's chief sustainability and people officer. "If your technology was developed after fuels legislation was written, it can find itself excluded from the fuel market and from financial incentives. This delays commercial scale-up." Still, LanzaTech managed to obtain significant funding in four rounds of financing from both venture capital firms and strategic investors, including Mitsui & Co. and the New Zealand Superannuation Fund. After the close of Series D, Nigel Gormly, head of direct investment for the New Zealand Superannuation Fund, referring to the advantages of investing in early-stage technologies, said, "The fund is well diversified, and expansion capital's risk-return profile is a good match for growth-oriented investors with a long time horizon."

3.2 CLEAN TRANSPORT: ESTABLISHED PLAYERS MOVING AHEAD

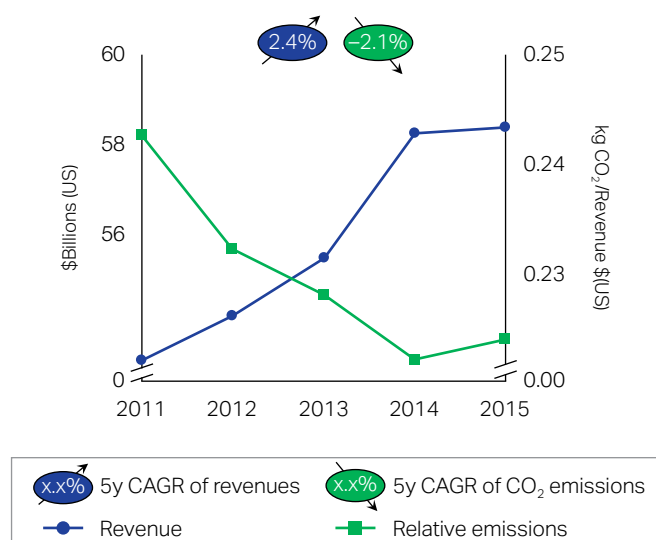
Combustion of fossil fuels such as gasoline, diesel, and jet fuel releases vast amounts of CO₂ into the atmosphere, accounting for 65% of GHG around the world. According to the EPA, the transportation industries account for 26% of GHG emissions in the US and 23% of such emissions in the EU, making it the second-largest source of CO₂ and other emissions, after electricity production. Clean transportation solutions attempt to reduce CO₂ emissions in one of two ways: by reducing the number of vehicles on the road (through carpooling, shuttle services, or route optimization to increase fuel efficiency) or by helping vehicles run more cleanly (through emission controls, real-time cruise control, new types of fuel, or electric power). The latest report of the WBCSD Road Freight Lab on GHG reduction potentials investigates those measures to select the most suitable options for companies that rely on road freight. Because alternative fuels and electric engines are still not fully scalable, the companies showcased in this chapter focus on route optimization and draw on big data and analytics.

UPS: The Cleanest Mile Is the Mile Not Driven

In 1980, mindful of gasoline costs and impatient with the slow progress of alternative fuel generation, UPS began developing cleaner options on its own. Since 2007, the company has invested more than \$750 million in efforts to increase efficiency and test alternative fuels such as compressed natural gas (CNG), liquid natural gas, electricity, propane, and ethanol. "No one fuel fits all markets," says Mike Britt, the company's director of maintenance and engineering, "and the cleanest mile is the mile not driven." Today, the company has more than 7,200 alternative fuel and advanced technology vehicles, as well as 18 CNG fueling stations. UPS plans to invest \$100 million to add 12 additional CNG fueling stations and 380 new CNG tractors by the end of 2017. Typically, the biggest challenge is not improving the technology itself, but getting the infrastructure in place. To this end, collaboration is critical. Once the infrastructure is up and running, most alternative fuels and technologies are competitive with conventional fuels, according to Britt. The CNG example showed that operating costs were 50% lower with that fuel than with gasoline once the infrastructure was there.

Besides embracing cleaner technologies, UPS seeks the most cost-efficient and environmentally friendly ways to deliver packages—a task made more challenging by regional, regulatory, and infrastructure differences across the globe. By

FIGURE 1: Revenue and CO₂ Emissions at UPS, 2011–2015



Source: S&P Capital IQ.
 Note: kg CO₂/\$ (US) = kilograms of CO₂ equivalent per dollar (US) of revenue; 5y CAGR = five-year compound annual growth rate.

capitalizing on big data and analytics, UPS aims to optimize delivery routes for each parcel delivered. UPS acknowledges the importance of clean technologies in the transportation sector and takes a proactive stance to help shape the evolving regulatory environment. As Britt explains, “We’d rather be in the kitchen than be on the menu.”

The company’s investments are paying off. Since 2007, the carbon intensity of its small-package deliveries has decreased by approximately 15%. With its big-data-analytics On Road Integrated Optimization and Navigation (ORION) technology, UPS now saves 10 million gallons of fuel per year, thereby eliminating 100,000 tons of CO₂ emissions. UPS’s sustainability projects compete with all of its other capital projects for financing. Because the company is reluctant to take on debt, most investments receive internal funding. UPS also receives early-stage technology grants of about \$10 million per year. Overall, UPS has managed to deliver strong revenue growth while decreasing its CO₂ emissions, proving that going green needn’t hurt financial performance—and can even enhance it. (See Figure 1.)

Qantas: Increasing Fuel Efficiency in Hundreds of Ways

Similarly, Australia-based airline Qantas has cut its emissions by 3.4% per year while achieving compound annual revenue growth of 2.0% and more than doubling its earnings before interest and tax (EBIT) margin from 3.2% in 2011 to 7.2% in 2015. (See Figure 2.) During the same time period, Qantas’s operating costs as a percentage of revenue declined by 1.1%.

Like UPS, Qantas treats fuel efficiency as a strategic priority, for both business and environmental reasons. Fuel accounts for one-third of its total operating costs, and fuel consumption is responsible for more than 97% of the airline’s total GHG emissions. Last year, the airline’s fuel efficiency program saved \$39 million (in Australian dollars), which is equivalent to \$29 million in US dollars. The company aims to improve its fuel efficiency by an additional 1.5% per year on average until 2020, through various measures. Like UPS, Qantas uses analytics for

route optimization and other efficiency efforts: “Data is key to optimizing fuel efficiency,” says Murray Adams, group manager of fuel optimization at Qantas.

Green investments at Qantas must go through the same approval process—and show the same rate of return—as any other capital investment. To finance green investments, Qantas uses bank loans and internal funding. “But we might consider alternative instruments for our sustainability projects in the future,” says Megan Flynn, group manager for environment and strategy. To that end, Qantas plans to invest more than \$17 billion in fuel efficiency projects, including updating its fleet with Boeing Dreamliners, which are 20% more fuel efficient than previous-generation aircraft.

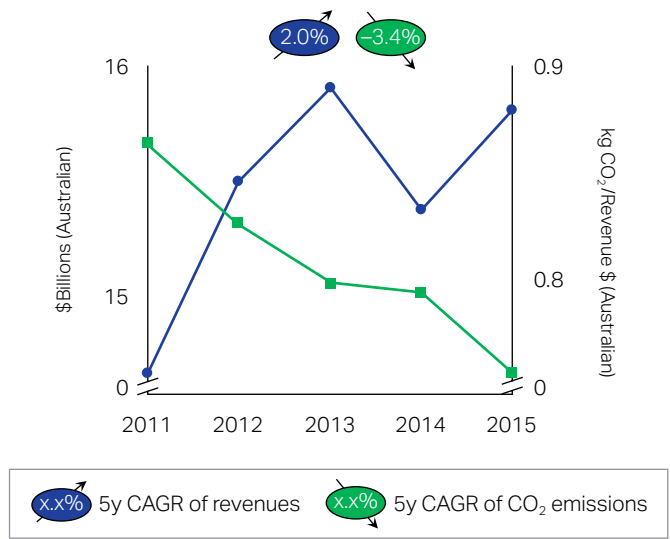
3.3 REUSABLE RESOURCES: THE CIRCULAR THINKERS

Global economic development and population growth have severely strained the earth’s limited supply of minerals, water, fuel, and other natural resources. Recent studies indicate that the world’s population is consuming resources at a rate 50% faster than they can be replaced. If consumption were to continue at its current rate over the next 33 years, the planet would have to be more than double its actual size to meet the demand in 2050. Companies that rely on natural resources face unexpected price swings and supply shortages that may hinder production, disrupt earnings, and derail growth plans.

Closed Loop Fund: Partnering Up for Recycling Infrastructure

Industry leaders such as Wal-Mart, Coca-Cola, Unilever, 3M, and Procter & Gamble launched the Closed Loop Fund (CLF) to finance infrastructure-level recycling projects. Each member company sees the value of—and has a financial interest in—a flourishing recycling industry, and each contributes to the fund. “The recycling industry in the United States suffers from a supply problem, not a demand problem,” says Rob Kaplan, managing director of the CLF. “Companies want to use

FIGURE 2: Revenue and CO₂ Emissions at Qantas, 2011–2015



Source: S&P Capital IQ.
 Note: kg CO₂/\$ (Australian) = kilograms of CO₂ equivalent per dollar (Australian) of revenue;
 5y CAGR = five-year compound annual growth rate.

recycled materials, but suppliers can't provide the needed quantity and quality because the infrastructure is lacking." The \$100 million fund offers below-market rate and even zero-interest loans to governments, municipalities, and companies. To increase recycling infrastructure far beyond the fund, CLF uses its unique, catalytic capital to attract co-investors (which participate with CLF at a monetary ratio of 3:1) and build confidence to improve the inflow of capital. Although the loans aim to return principal to the fund, CLF members profit far more from their improved access to recycled materials. The CLF aims to reduce GHG emissions by 50 million tons and to divert more than 20 million tons of waste from landfill to reuse by 2025. Besides improving the environment, owners of recycling infrastructure can expect to see a financial payback. For

instance, for each ton of waste diverted from landfill, cities usually save around \$50—plus they can sell the recycled materials. The CLF expects that its projects will save US cities \$1.2 billion by 2025.

One recipient of CLF funding is QRS of Maryland LLC, a joint venture in Baltimore between QRS and Canusa Hershman. The venture received a \$2 million loan to build a plastic recovery facility (PRF) that focuses on sorting, cleaning, and flaking especially hard plastics—those numbered 3 to 7 in recycling code—which contain PVC and other types of plastic. The facility will be a showcase, since only about 30% of US communities can process and recycle those materials today. The PRF will build a market for materials that currently go to landfill, and planners expect the facility to reduce GHG emissions by more than 670,000 tons over the next ten years.

CLF is managed by Closed Loop Partners, an asset management firm that focuses on building the circular economy by investing in sustainable materials, packaging, advanced recycling systems, and infrastructure. The firm has launched a new venture fund to help commercialize early-stage innovation and expand its investment opportunities in the waste and recycling space.

Novozymes: Creating Clean Fuel from Waste

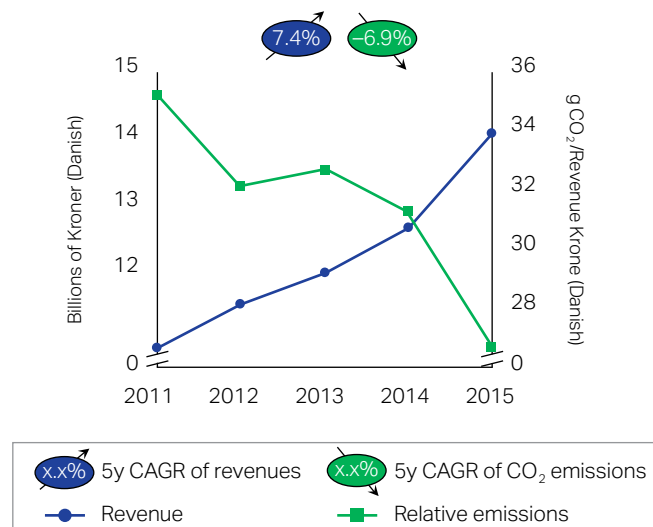
In 2000, the Danish Biotech company Novo split into three independent companies. Two of these, Novozymes and Novo Nordisk, continue to operate side by side in Denmark's Kalundborg industrial compound. Shortly after the split, Novozymes began developing enzymes that are key components in transforming biomass into environmentally friendly fuel. Each of the two former corporate siblings recently made double-digit-million-dollar investments in a waste-to-gas reactor that turns wastewater from their two plants into biogas that can generate heat and electricity. The Kalundborg district uses the generated heat, and the facility feeds excess electricity into the grid, creating additional income. "Our joint wastewater treatment unit with Novo Nordisk has gone from a net energy consumer to a net energy producer," says Jes

"As global population and consumption of resources grow, the future of our planet depends on the success of the circular economy. Closed Loop Partners is investing philanthropic, venture, and debt capital to commercialize innovation and scale solutions that turn waste into value, reduce greenhouse gases, and save money. The more confidence these solutions generate among conventional investors as investment opportunities, the more capital will flow into them."



— **Rob Kaplan**, Managing Director, Closed Loop Partners

FIGURE 3: Revenue and CO₂ Emissions at Novozymes, 2011–2015



Source: S&P Capital IQ.
 Note: g CO₂/Krone (Danish) = grams of CO₂ equivalent per krone (Danish) of revenue;
 5y CAGR = five-year compound annual growth rate.

Tobiassen, director for environmental operations in Novozymes' Kalundborg plant.

The joint venture also benefits from Danish government subsidies for producing renewable energy. By cutting the two factories' CO₂ emissions by 21,000 tons per year, the reactor will help Novozymes reach its goal of reducing its CO₂ footprint by 25% by 2020. The joint venture also produces 47,000 MWh (megawatt-hours) of energy—equivalent to the productive capacity of seven offshore wind turbines. Novozymes also expects customer application of its solutions to save 100 million tons of CO₂ annually by 2020. In 2015, the reactor yielded CO₂ savings of about 60 million tons; and the corresponding figure for 2016 should be about 63 million tons. Aside from the environmental benefits, the investment is likely to be highly profitable. Like Qantas and UPS, Novozymes managed to achieve strong business growth from 2011 through 2015 while sharply cutting its CO₂ emissions. (See Figure 3).

Philips Lighting: A New Business Model That Improves Recycling

Although the global phase-out of incandescent light bulbs led to relatively energy-efficient models, it posed a challenge for traditional lighting companies like Philips Lighting. The new model bulbs lasted longer and carried new possibilities such as connectivity, affecting customer demand and relations. To differentiate its offerings and to grow in LED technology, Philips Lighting began to explore new sources of revenue. One idea was to offer lighting as a service, instead of as a product. The inspiration for the new business came from a simple insight, according to Frank van der Vloed, general manager of Philips Lighting Benelux: "People are interested in our performance, not our products."

Light as a service (LAAS) is a pay-as-you-go utility model. By shifting from a purchase mindset to a leasing mindset, Philips Lighting offers a perfect example of circular thinking. Philips Lighting retains ownership of the lighting fixtures that it leases to customers, who pay an agreed-upon service fee up front for

the light itself. Retaining ownership of its products makes recycling much easier for Philips Lighting, since the company can reuse its fixtures rather than having to make new ones—and expend more raw materials—every year.

Demand for the service is growing quickly. In 2015 it accounted for just a small part of Philips Lighting's commercial business in the Benelux countries—but double the percentage from the previous year. Schiphol Airport in Amsterdam provides a showcase for the new model. Instead of negotiating a lighting replacement contract, Schiphol signed a five-to-ten-year LAAS agreement for an LED lighting system. "These systems have a substantial residual value at the end of their lifetime," says van der Vloed. "Now that Philips Lighting maintains ownership of the product, we can provide the service to customers for a lower price." The volume of service contracts for the new model is still low. But since LAAS produces steady payment streams, Philips Lighting can remove the underlying assets from the balance sheet and sell them to banks or pension funds, or use them to set up an asset-backed security. Philips Lighting financed the start of the new business model with internally generated funds.

We've seen that the market for alternative fuels has not yet reached scale, and that clean transport and reusable resource efforts tend to be smaller, internal efforts. But renewable energies have become mainstream, driven by regulatory incentives and investor interest.

3.4 RENEWABLE ENERGIES: REVOLUTIONIZING THE ENERGY SECTOR

According to EPA estimates, electricity and heat from coal, oil, and gas account for 25% of the world's greenhouse gases. Besides being a leading source of harmful CO₂ emissions, fossil fuels are finite, nonrenewable resources. By contrast, renewable energies such as wind and solar power can be continually replenished—and they don't harm the environment. They also present a strong business opportunity. By 2040, renewables will attract up to 60% of the total investment in

global power generation capacity (\$11.4 trillion) according to Bloomberg New Energy Finance estimates.

Iberdrola: Moving from Conventional Generation to Wind Power

A multinational energy utility headquartered in Bilbao, Spain, Iberdrola is one of the world's largest producers of wind energy. Committed to fighting climate change, Iberdrola has set a target of reducing its CO₂ emissions in 2030 by 50% against a 2007 baseline, and becoming carbon-neutral by 2050. Iberdrola currently owns more assets for generating alternative energy than for producing conventional energy, and 66% of its installed capacity is emission-free. The company's CEO, Ignacio Galan, says, "In anticipation of the energy transition, Iberdrola has committed to sustainable solutions that require greater electrification of the global economy." The focus on renewables is paying off financially, too. For the first half of 2016, the company's renewables segment reported a net profit of 19%, compared with 17% for the network business and 6% for energy generation.

Not surprisingly, Iberdrola plans to expand its renewable segment further. Between 2016 and 2020, the company expects to invest €7.7 billion in its installed capacity for renewables and expects the investment to earn high average annual returns. Iberdrola intends to focus on countries with stable regulatory environments, in order to reap the benefits of incentives such as regulated long-term contracts, feed-in tariffs, and tax credits. The company relies on green bonds to finance a significant portion of its investments. It is a recognized leader in the use of this new financing instrument (which directs all capital raised toward clean energy projects) and has issued three such bonds (with decreasing coupon rates reaching a low of 0.375% in September 2016). (See Figure 4.) Iberdrola has become a market maker: "We are a green company, so we support green financing instruments," says Guillermo Colino Salazar. "We want to drive this market forward. This has been a clear strategic directive from the highest management level."

EDP Renewables: Driving Growth and Profitability through Renewables

Like Colino Salazar, Rui Antunes, director of investor relations at EDP Renewables (EDPR), sees considerable investor appeal in renewable energy. "Renewable assets are a good investment not only for the environment, but for returns," he says. The renewables subsidiary of EDP, Portugal's largest industrial group, EDPR engages in developing, constructing and operating renewable energy assets in Europe, North America, and Brazil. EDPR focuses on onshore wind energy, which is the most competitive renewable technology in terms of total cost. In accordance with its business plan for 2016 through 2020, the company aims to expand its solar portfolio and continue to develop offshore wind projects. These technologies represent an immediate, economically competitive way to counter climate change. In 2015, EDPR's green electricity reduced the company's CO₂ emissions by 18.7 million tons compared with an equal quantity of electricity from fossil fuels.

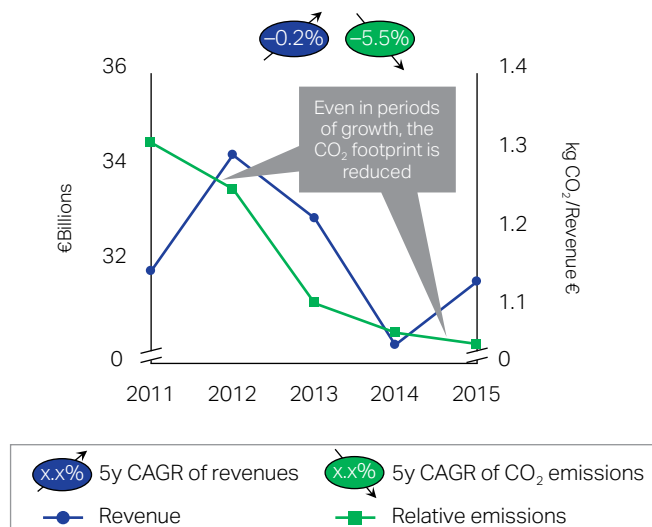
EDPR's renewable projects compete with conventional investments for funding from the parent company. Only

"EDPR's role is to generate environmental and economically sustainable renewable energy for its clients, providing clean energy while minimizing climate change and maximizing project returns."



— João Manso Neto, CEO, EDP Renewables

FIGURE 4: Revenue and CO₂ Emissions at Iberdrola, 2011–2015



Source: S&P Capital IQ.

Note: kg CO₂/€ = kilograms of CO₂ equivalent per euro of revenue; 5y CAGR = five-year compound annual growth rate.

projects that offer the biggest payback receive approval; the required threshold is a spread of 40% between the cost of capital and the internal rate of return. But not all funding comes from the mother company. During the global economic downturn, when cash was tight and investors had a lower cost of capital than EDP did, EDPR developed an independent, self-funding model called the Asset Rotation Model. Like an external yieldco (see page 18), this internal program sells minority stakes in operational projects and then reinvests the capital it raises in new projects. EDPR sells a minority stake, up to 49% of its projects, at a single-digit dividend, but it can reinvest that money at double-digit rates of return, which makes the model highly profitable.

CLP Group: Ambitious Sustainability Targets Point to Renewable Energy

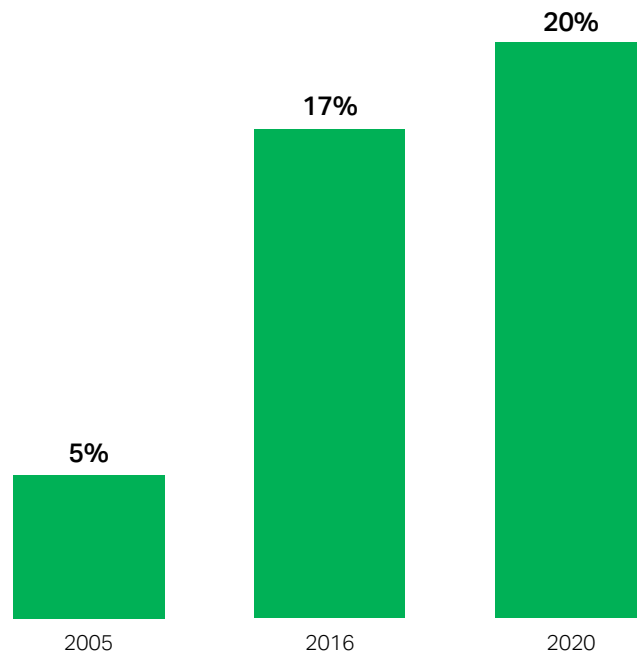
Sustainability is of high strategic importance to CLP, a Hong Kong-based energy utility active throughout the Asia Pacific region. In Hong Kong, CLP operates a vertically integrated electricity supply business. In Mainland China, India, Southeast Asia, Taiwan, and Australia, CLP invests in the energy sector. China's energy sector is especially interesting. Although the country's CO₂ emissions have increased sharply in the past decade, the government is commitment to reversing this trend

and investing in renewable energy, to make China a key player in environmental cleanup efforts.

In 2007, CLP set a target of decreasing its CO₂ emissions by 75% by 2050. The company currently owns more than 80 assets with 18 GW (gigawatts) of equity-generating capacity plus 5 GW of capacity purchased from existing projects. Of this capacity, 16.8% is renewable energy, more than three times its 2005 figure of about 5%, and CLP expects renewable energy to account for up to 20% by 2020. (See Figure 5.) Also by 2020, the carbon intensity of CLP's generating portfolio will have decreased by about 30% from the 2007 level.

All the companies we profile in this report recognize the importance of green business practices, but they also share a belief that financial returns must be a key part of the decision-making process. Large investors are more likely to invest in green projects if the return is comparable to or better than the return from traditional investments. Generally, investors expect newer, riskier projects or technologies to deliver higher returns. For companies seeking to finance their projects, the maturity of the project or technology in question largely determines their ability to obtain funding from investors or other sources—and the options available to them. (See the sidebar "Maturity Stages of Clean Energy Projects.")

FIGURE 5: Renewable Energy Generation Capacity (%) at CLP



Source: CLP Sustainability report and company profile

MATURITY STAGES OF CLEAN ENERGY PROJECTS

Early or Startup Stage: In this initial scale-up stage, the technology is not yet completely proven and markets do not yet exist. Supply and demand are evolving, many different players are trying to reach scale in a fragmented market, regulatory uncertainty is pervasive, and corporate strategic investors are willing to take real risks to accomplish their sustainability goals. Most alternative fuel projects (such as LanzaTech) are in this early stage. With regard to capital costs, interest rates usually do not apply to early-stage investments.

Middle Stage: The technology is proven and developed, but the market is still evolving. No companies in this stage have achieved operating scale, but those with sufficient volume can meet the demands of more-established companies seeking to gain a first-mover advantage. Many reusable

resource projects fall into this stage, since they tend to be smaller in scale and relatively new, even though they may be up and running. Clean transport solutions such as UPS's route optimization technologies for reducing emissions and fuel consumption tend to fall into this middle-stage category, too.

Late Stage: The technology is mature, markets and infrastructure are well-defined, participants may enjoy regulatory support and incentives, and a solid regulatory framework is in place. Most forms of renewable energy (such as onshore wind and solar PV) are in this late stage in some markets. Growth and returns in renewables are high because the technologies are reliable, competitively priced, supported by government subsidies, and backed by some form of risk mitigation. In terms of cost of capital, most late-stage investments fall in the range of 5% to 10%.





4 Green-Project Financing Options

A number of financial instruments are available for green projects. (See Figure 6.)

Grants: Different types of institutions, including national governments and regional and global supranational organizations, distribute public grants, with a total market volume of \$14 billion in climate finance in 2014 and an annual growth rate of 21% since 2011. Companies must follow specific application procedures and meet specific requirements to be eligible for such funding. A downside to grants is their limited availability, but because they require neither interest payments nor payback, they can significantly reduce the weighted average cost of capital of sustainability projects.

Government and Public Loans: Loans from government agencies and public institutions offer a source of cheap debt money, but they tend to be limited to specific innovation types or geographies or both. The interest rates, payback periods, and other conditions of such loans are less rigid than those of market loans, with more than half of the total loans extended at below market rates. The market volume has been stable around \$70 billion since 2012.

Private-Sector Loans: The private sector sometimes steps in with green funding when the public sector falls short. The lender sets the interest rate individually per project, and rates are usually attractive. Particularly in developed economies, low interest rates increase the attractiveness of debt finance, especially via bank loans. But like public loans, private loans primarily target specific technologies or sectors, from which the lender has a relatively high expectation of benefiting.

Internal Financing: Many companies prefer to finance their climate-related sustainability projects internally, using available cash or infusions of capital from the parent company. When possible, internal financing is relatively cheap—with no interest payments and few restrictive covenants—but the company must weigh potential returns from a project against other investment opportunities, such as debt money. Internal financing can have a positive effect on capital costs and can lower the company's tax obligations.

Venture Capital: Unlike traditional sources of capital, such as bank loans and corporate equity, venture capital requires no interest or dividend payments. Instead, venture capital firms invest funds in a startup in return for an ownership share, which they hope will be worth considerably more in the future as the company grows. Such ownership shares are usually sold at some point to a larger company or to the public through an initial public offering (IPO). The market volume for venture

capital is relatively low in comparison to the market volume for grants and loans—amounting to \$4 billion in 2015—and a higher cost of capital applies, with return expectations of 30% to 40%.

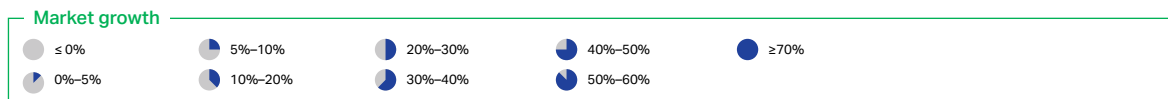
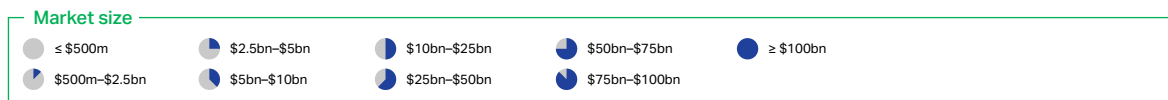
Private Equity: In 2015, the total market volume of private equity in climate finance amounted to \$27 billion. The private equity market is subdivided into corporate finance and project finance. Corporate finance involves equity funds investing directly in the equity of a company, using funds from private investors to provide equity capital independent of public stock markets. Besides being invested directly in a company, equity can be invested in projects, either as debt or as equity. For practical purposes, the pool of debt financing is infinitely large, but it has strict risk-return and asset-liability match criteria. The pool of equity finance is somewhat smaller than that of debt, but it is still a massive pool of capital for use in building capital assets. For both project finance debt and equity in connection with new technology solutions, providing the structural de-risking that an investor wants can be a challenge. Another climate finance vehicle used in private equity project financing—primarily in the US—is tax equity, which allows investors to profit from tax benefits available to owners of renewable energy projects. To take advantage of the tax benefits, the investor owns a majority of the project for a certain period; then, when the investor has realized these benefits, ownership reverts to the developer.

Yieldcos: Yieldcos are special equity instruments listed on the stock exchange. These vehicles give investors high returns and provide a steady source of new capital to project developers. Composed of bundles of operating assets from different projects, yieldcos are costly to set up and administratively complex; however, they run with minimal overhead, impose very low operating costs, and can generate substantial revenue streams. For instance, yieldcos that bundle assets from wind farms generate stable income from the electricity generated and can pay substantial dividends to investors. The downside of this instrument is that hedge funds have used yieldcos as a source of extraordinary high dividends and then cashed out their holdings much sooner than expected, resulting in a loss in market capitalization of \$16 billion for the seven US-listed yieldcos by the start of 2016, based on estimates from Environmental Finance.

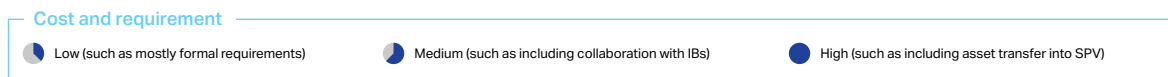
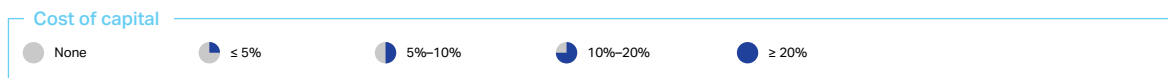
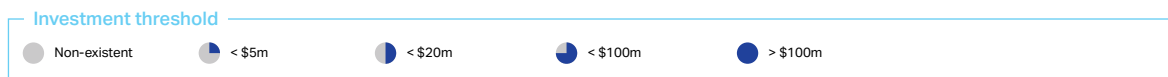
Asset Rotation Model (ARM): The asset rotation model—like the one deployed by EDPR—is a special-purpose vehicle (SPV) created to hold a specific and defined set of assets. The investor can buy a stake at the wind farm SPV, or the seller can create a sub-holding that owns the wind farm SPV and the

FIGURE 6: Financing Vehicles for Green Projects

MARKET ATTRIBUTES				INSTRUMENT ATTRIBUTES				PROJECT ATTRIBUTES				
Options for externally financing projects	Market size	Market growth	Typical investors	Investment threshold	Cost of capital	Cost and requirement	Investment horizon	Technology stage	Typical industries	Regional presence	Typical example	
Early	Public grants (1)			Governments and DFIs		None		Variable	Variable	All, esp. R&D heavy	Worldwide	LanzaTech
	Concessional/public loans (2)			Governments and DFIs				Variable		All industries	Worldwide	Closed Loop Fund
	Venture capital (3)		n.a.	Institutional investors		None ¹				Tech industries	US, Asia	LanzaTech
Mid	Private equity (4)		n.a.	Institutional investors		None ¹				All industries	US, Europe	Various
Late	Green bonds (5)			Institutional investors						Large infrastructure	Worldwide	Iberdrola
	Currency green bonds (6)			Institutional investors						Large infrastructure	Asia Pacific	Yes Bank
	Yieldcos (7)			Institutional investors				Unclear-too new		Energy	North America, UK	NRG
	Asset-backed securities (ABSs) (8)			Institutional investors				Asset driven		Variable, (e.g. solar photovoltaics)	Mostly US	SolarCity



Typical investors
Banks, insurance companies, pension funds, hedge funds, REITs, investment advisors, endowments, mutual funds, development banks, public investors/governments, and private equity funds



Source: BCG analysis.

Note: DFIs = development finance institutions; REITs = real estate investment trusts; IBs = international banks; SPV = special-purpose vehicle.
¹Financial gain is realized via equity appreciation when investor exits.

investor buys a stake at the sub-holding level. The investor profile is typically oriented toward long-term returns—for example, pension fund or sovereign funds that are looking for cash yield and are relying on the seller's capabilities to operate and maintain the wind farms. Unlike yieldcos, ARMs are not listed on the stock exchange, and the seller makes no commitment to continuously grow the dividend. The benefits of an ARM include a choice of suitable investors, less exposure to market volatility, and less regulatory oversight, as it is not a public entity and thus is not obligated to comply with regulatory requirements related to listed entities. Usually, a company subsidiary, whose asset structure and legal status make it independent of the parent company with regard to financial obligations, creates the ARM in such a way that the parent company's financial situation does not affect the subsidiary's obligations.

Green Bonds: A green bond is a bond issued by both public and private institutions. Green bonds are very similar to conventional bonds, but their proceeds are reserved for funding green projects. Green bonds are priced very tightly, with comparable coupons to ordinary bonds. In 2007, the European Investment Bank and World Bank issued the first green bond. Supranational agencies dominated the green bond scene in its early days, later joined by municipalities. Over the past three years, numerous companies have joined the green bond issuing community—from utilities to renewable energy companies to brands such as Apple and Starbucks. The global green bond universe is estimated at almost \$700 billion, of which \$118 billion qualifies as labeled green bonds. Given each green bond's inherent mitigative or adaptive climate risk aspect, and the issuing entity's usually very strong credit rating, green bonds have become impressively popular in the investor community, with issuances often being oversubscribed multiple times.

Green Bonds in Local Currency: Foreign currency bonds (such as masala bonds in India) are a subcategory of green bonds. Because they are denominated in a foreign currency and listed on a stock exchange abroad, these bonds tend to attract foreign investors. For the issuer, the bond moves the currency risk to the investor, whose returns depend on the current value of the currency. Foreign investors do not regard

this arrangement negatively, however: they have more experience in currency hedging and can handle the currency risks much better than single projects or companies can. The current estimated volume of outstanding currency green bonds ranges between \$500 million and \$2.5 billion. Despite the relatively small size of this market, currency green bonds have shown strong growth rates of above 70% in the past three years.

Green Asset-Backed Securities (ABSs): An asset-backed security (ABS) is a financial security backed by a loan, a lease, or a company's accounts receivable. Green asset-backed securities, a special form of ABS backed by corporate assets, represent another financing option for sustainability projects. Since the issuance of the first green ABS in 2013, the market has grown significantly, with issuance volume growing \$1 billion to 2 billion per year. The Japanese car-manufacturer Toyota is a corporate pioneer in integrating an ABS model into its green bond program, having issued three asset-backed green bonds since 2014. Toyota used the bond proceeds mainly to fund new retail finance and lease contracts for certified low-emission and hybrid Toyota and Lexus models; the company's existing standard car-loan portfolio served as the underlying ABS.

Credit Enhancement: A credit enhancement reassures the lender that the borrower will repay the loan, often by offering collateral or a third-party guarantee. This type of insurance policy can minimize risk, lower costs, and increase the attractiveness of a green investment for large investors. One increasingly popular type of credit enhancement in renewable energy financing is the power purchase agreement (PPA), a contract between the offtaker (often a state-owned electric utility) and an independent power producer, in which the offtaker agrees to buy the producer's electricity. Corporate renewable PPAs, in particular, have been gaining support, as the recent WBCSD report "Corporate Renewable Power Purchase Agreements: Scaling Up Globally" details. Another increasingly common form of credit enhancement takes the form of green loans for energy-efficient investments in buildings; these instruments link the loan repayment obligations to the homeowner's overall tax bill (a so-called property-assessed clean energy loan).





Investment Community

A Growing Focus on Sustainability

In addition to company case studies, we looked at how members of the investment community in different regions and industries are shifting their portfolio focus to greener investments. The four case studies that follow—on BlackRock, Allianz, Yes Bank, and Old Mutual—illustrate how each company has found a way to make climate investments commercially viable. BlackRock, Allianz, and Yes Bank focus on renewable energy projects, but apply different financing strategies. Old Mutual focuses on agricultural projects while emphasizing environmental and social factors. All four companies are willing to expand their green investments if the risk-return profiles continue to be attractive.

BlackRock: Investing in Renewables Has Become Mainstream

BlackRock is the world's largest asset management firm, with \$5.1 trillion in assets under management and with clients ranging from large institutional investors to small capital investors. The firm believes that multiple factors have pushed renewables into the mainstream of the power and investment industries, starting with their increasing cost competitiveness. Globally, renewable power generation is one of the most active sectors for infrastructure investment, accounting for 20% to 30% of global infrastructure deal volume. BlackRock currently manages \$2.8 billion in equity assets devoted to investments in renewable infrastructure projects and has made investments in 90 wind and solar projects globally, equivalent to more than 2 GW of power production.

"The growth of renewables infrastructure investment over the last decade has been a great success story with proven mature technology, increasingly cost competitive power, and increased recognition of the need for regulatory stability combining to drive renewable power into the investment mainstream," says Alan Synnott, head of product strategy for BlackRock's Real Assets business.

Besides its direct investments in sustainable infrastructure projects, BlackRock has other investments in climate-related sustainability projects—for example, through green bonds. Because these increase the liquidity of the funding, they have an impact on renewable energy investments. Green bonds are especially interesting to investors who would like to direct investment toward environmentally beneficial projects but are reluctant to change their traditional asset allocation. They see growing investor interest in green bonds along with significant

support from sovereign bodies. Examples include green bond issuance guidelines for China and India, as well as direct issuance from Poland and France.

For investors interested in equity investments, BlackRock has a public equity fund called the BGF New Energy Fund, with a volume of \$900 million. This fund invests in clean power and other projects with climate change implications. Besides its diverse investments in green projects, BlackRock tries to deliver an impact report for investors, in order to increase transparency. This report includes environmental, social, and governance KPIs—for example, carbon offset volume and related employment. With its diverse investments and its efforts to increase transparency, BlackRock stands apart from other investors.

Allianz: A Shortage of Good Projects but Lots of Money for Good Projects

An insurer, Allianz has acknowledged the risks of climate change and climate inaction for many decades. More recently, it has also recognized the financial attractiveness of alternative, renewable energy investments. Allianz sees renewables as a strategic business opportunity—one that helps it diversify its portfolio by providing cash yields that are independent of how the general capital markets perform. Since 2005 the insurance giant has invested €3.5 billion in 70 projects—primarily onshore wind farms and solar parks, which show competitive risk-return profiles.

Like BlackRock, Allianz—with \$2 trillion, the world's fourth-largest asset manager—has announced plans to increase its direct investment in renewable energy. Together, these two companies have \$6.9 trillion in assets under management, which, according to BCG's 2015 Global Asset Management Report, amounts to almost 10% of the world's total assets under management. Also like BlackRock, Allianz targets markets that have stable regulatory environments and investment incentives, such as Europe and the US. The firm sometimes partners with companies that use the tax credits from their wind farm investments to reduce the taxable income of their core businesses. Allianz sets up joint ventures in the US with top-quality partners that have a similar, long-term investment approach, such as Bank of America and EDF Renewable Energy in New Mexico, and State Street and E.ON Climate & Renewables in Texas. Allianz plans to expand its partnerships with these companies.

Yes Bank: Responsible Banking Requires a Strong Business Case and Is Not Guided by Philanthropic Intent

Starting from scratch as a greenfield bank in 2004, Yes Bank has made responsible banking a pillar of its philosophy and growth. Now the fifth-largest private sector bank in India, Yes Bank has built a leading portfolio of renewable projects, mainly in the areas of solar and wind energy. The bank has given the Indian market innovative financing options and in the past financial year alone has financed projects with a total installed capacity of 1300 MW.

The bank offers innovative project funding through leveraging relationships with multilateral and development financial institutions such as the International Finance Corporation (IFC) and the Asian Development Bank. It has also been a pioneer of green bonds in India. The first green bond that Yes Bank issued, in 2015, was initially expected to raise \$80 million—but it was oversubscribed twice and raised a total of \$160 million. Various domestic and foreign institutions, including pension funds and insurance companies, bought the ten-year bond. Yes Bank issued its second green bond in August 2015 as a private placement to the IFC, with the IFC using the proceeds from another green bond of the same size issued in the offshore rupee market to pay for the placement. Yes Bank issued this IFC bond under the organization's 3-billion-rupee (the equivalent to \$44 million) offshore rupee masala bond program; the bond was the first masala issue to be listed on the London Stock Exchange.

The unique alliance between Yes Bank and IFC may serve as a model for other emerging market issuances. Local currency green bonds have appeared in China (so-called green dim sum bonds), Japan (green samurai bonds), and Australia (green kangaroo bonds), amounting to a total market volume in currency green bonds of about \$1.3 billion—up from just \$400 million in 2014.

WHAT MOTIVATED US?

Namita Vikas, group president and managing director for climate strategy and responsible banking at Yes Bank, is one of the initiators of green bonds in India and a strong advocate of sustainability. He says of his bank's philosophy, "We believe sustainability needs to be ingrained in corporate strategy to achieve sustainable growth." Focusing on a commitment made at the UN Climate Summit in September 2014, Yes Bank strengthened its emphasis on green finance. "We wanted to demonstrate that financing green projects is feasible in developing markets—as those will be the game-winning regions," Vikas says. By 2006, the bank had a good understanding of risk return profiles for the renewable energy segment in the Indian market, and this knowledge has been critical in establishing the bank as a leader in green financing. Its responsible banking strategy has enabled Yes Bank to be a strong contributor for sustainable development in India.

"Climate change has brought the world to a stage at which transition to a low-carbon economy is the only way forward. Yes Bank has been a strong advocate for climate action. The bank's launch of India's first ever green-infrastructure bonds highlights its commitment to playing the role of a catalyst by unlocking innovative financial mechanisms toward achieving India's goal of combating climate change."



— Rana Kapoor, Managing Director, Yes Bank

Old Mutual: Investing in Sustainable Agriculture and Renewable Energy

Unlike BlackRock, Allianz, and Yes Bank, which focus on renewables, Old Mutual invests in African agriculture, achieving high returns while paying special attention to the needs of its work force through the use of nonfinancial KPIs. Old Mutual proves that the risk-return profiles of investments in the developed world are not necessarily more favorable than those in Africa and other emerging economies. Since 2010, the international investment, savings, insurance, and banking group has invested \$250 million—mainly from pension funds—in African agriculture, with a strong focus on achieving environmentally and socially beneficial results. Because the agricultural sector is a major emitter of GHGs and other environmentally damaging substances, sustainability projects have high potential.

Unlike many investors, Old Mutual considers environmental, social, and governance (ESG) issues crucial to managing investment risk. For example, the company considers factors such as health care and education for farm workers, water security, pesticide use, job creation, and the conversion rate of temporary work contracts to permanent ones. Duncan Vink, managing director at Old Mutual, says that this approach makes good business sense: "Healthier farm employees are more productive, and cutting down on pesticides positively affects the cost side." Besides having positive nonfinancial effects, Old Mutual's projects have delivered high profits, securing average returns of 16% in South African Rand (10% in real returns, factoring in the exchange rate) at a default rate of zero. One reason for this strong performance is that Old Mutual takes complete ownership of the farms it invests in, and aggregates farms to achieve economies of scale and boost profitability.

Many investors complain of a shortage of qualified projects, but Vink notes that Old Mutual is never short of transactions and its pipeline is full. He says that the only thing constraining the group's investments in African agriculture is a lack of available capital—due in large part to the perception by many investors that Africa is too risky. Although multinational companies have shown a growing interest, many large investors remain reluctant to explore the opportunities.





6 Matching Financing Instruments and Maturity Stages

Financing vehicles and green projects tend to vary depending on their stage of maturity and investor requirements. (See Figure 7.)

Players in the early stage rarely have access to bank loans or the equity market, so they typically rely on grants, government or public loans, private sector loans, and venture capital for financing. Established companies may be able to finance all or part of their projects internally, with available cash flow.

Companies in the middle stage may not be eligible for government support, and most grants are too small to supply the scale of financing needed. Neither do these companies generate enough attention to produce a stable and supportive regulatory environment, which would increase investor confidence. Instead, they may self-fund with internal cash flow, use internal or external loans, or attract private equity from investors.

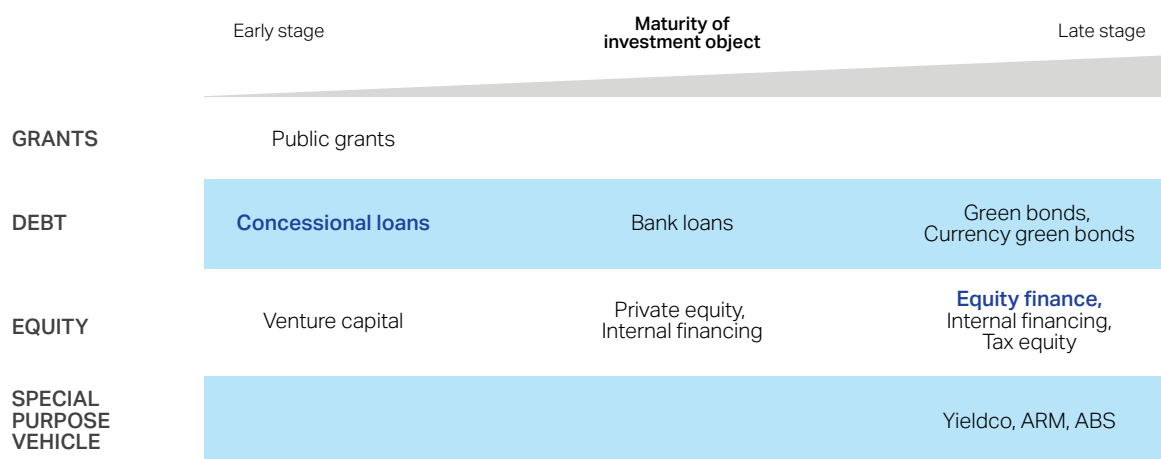
For players and projects in the late stage, investor security makes large-scale investments possible, enabled by complex

equity and debt instruments such as SPVs and green bonds. Companies with proven technologies and reliable returns are especially attractive to investors with explicit fiduciary duties and investment restrictions, such as pension funds. Funding options tend to increase as companies or technologies reach later stages of maturity, markets stabilize, risks decrease, and potential returns become more predictable.

Positive and negative incentives come into play as well. (See Figure 8.)

High-volume financial instruments such as yieldcos, green bonds, asset-backed securities, and ARMs tend to appear when governments create positive incentives. Financing vehicles are mixed in the “no incentive” and “license to operate” categories. High-volume instruments are critical to making real progress toward the \$1 trillion investment goal—and this highlights the importance of positive government regulation.

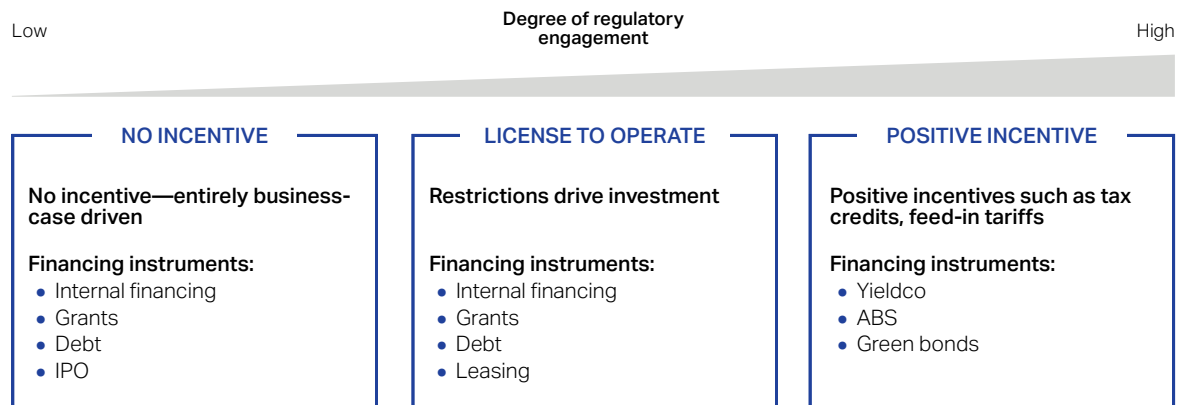
FIGURE 7: Financing vehicles for different maturity stages



Source: BCG analysis.

Note: ARM = asset rotation model; ABS = asset-backed security.

FIGURE 8: Financing instruments and regulatory influence



Source: BCG analysis.

Note: ABS = asset-backed security.



7 Conclusion

If we are to achieve our ambitious targets for reduced global CO₂ emissions, companies in a broad range of industries must develop more successful green projects in the areas of renewables, alternative fuels, clean transport, and resource reuse. In turn, these success stories will attract additional investors, creating a continuous cycle of sustainable development and funding. Attractive green projects with suitable risk-return profiles are available to all investors, along with a multitude of financing options. Below, we distill the key insights and recommendations from the preceding chapters.

7.1 RECOMMENDATIONS FOR COMPANIES

The green companies and projects we have examined in this report represent different industry sectors, stages of maturity, and financing mechanisms. As early-stage explorers of sustainability, all faced some degree of risk and all took a leap of faith without knowing for certain what the outcome would be. For other companies interested in going green, the following guidelines can improve the odds of success—and of attracting investors:

- **Treat green projects as you would any business project.** Assess the risk-return profile and make a strong business case before moving forward. Factor in the environmental impact for a better sense of the true return.
- **Think strategically.** Create a competitive advantage, not just a business case, with your sustainability projects, as with any other strategic project. Consider involving your supply chain partner in financing/securitization.
- **Establish a green mindset across the organization.** Encourage employees to suggest ideas for shrinking your carbon footprint, and assess the environmental and social

aspects of even non-green projects.

- **Be transparent with potential investors.** They'll need to evaluate the project's risks and likely returns—and disclosure regulations are likely on the horizon anyway. Some potential investors will also want to know what environmental impact your project will deliver. Promote your green projects in the investors' language, just as you would for other projects, and overcome the communication gap.
- **Familiarize yourself with different financing options.** Look beyond conventional instruments—new financing and securitization tools continue to emerge. Seek suitable public grants or concessional loans to decrease your cost of capital, especially in early stages. Financing options such as targeted loans programs may be available from private industry, too.
- **Plan for future stability.** Aim for long-term supply and sales contracts for your business to decrease investor risk, especially in early-stage projects.

QUESTIONS TO ASK ABOUT FINANCING OPTIONS

How can companies identify the best financing options for their projects? The following questions offer some guidance:

1. Is my project or technology in the early stage, middle stage, or late stage of maturity?
2. How much financing do I need, and for how long?
3. Are low-cost or no-cost options—such as grants, tax shields, or government subsidies—available to me?
4. How will I meet my future financing needs—through equity, debt, special-purpose vehicles, or other means?
5. In what region will I be seeking funding?
6. How can I package and present my project to minimize risk and increase returns for investors?



7.2 RECOMMENDATIONS FOR INVESTORS

Investors differ in geographical and industry focus, in green projects specialization, in maturity stage of their investment targets, and in types of financing offered. Despite these differences, all investors seek a strong return—especially if the risk is high—and most find identifying the right projects to be a challenge. Some investors have yet to explore green investing at all, preferring to allocate their capital to more conventional investments. We recommend the following:

- **Be open to green companies and projects.** Good projects are available with suitable risk profiles for most investors—and as a bonus you'll attract new customer segments and (eventually) help the planet.
- **Watch and learn.** Continue to monitor the landscape and learn more about emerging technologies, markets, industries, and geographies with strong potential.
- **Consider an investment's environmental impact and financial return.** Those with the biggest environmental and financial impact will likely attract the most attention and demand—and deliver the biggest returns.
- **Investigate financing options.** Explore innovative financing vehicles and assess their business potential.

We leave companies and investors alike the following takeaways:

- **There are no excuses for not going green.** Suitable risk-return profiles are available in an array of industries, technologies, markets, and geographies.
- **Think outside the box.** To attract investment capital, companies may need to rethink the way they develop

green projects to make them more attractive, and investors need to devise creative financing options to meet the needs of the green market.

- **Keep two-way communication open, and bridge the language gap.** The interests of investors and companies with green initiatives align fundamentally. Technological understanding and transparency about project risks and impacts are crucial to avoiding or correcting any misalignment.
- **Don't ignore emerging markets.** Exploring new geographies—especially those outside the developed world—may take companies and investors out of their comfort zone, but emerging economies are crucial to achieving CO₂ targets.
- **Capitalize on low interest rates.** Low rates make traditional investment vehicles less attractive; green projects offer investors a relatively high return. For companies that have matured past the startup stage, it's cheaper to borrow when rates are low.
- **Work to improve regulatory support and incentives.** Countries with supportive, reliable, and clear regulatory and tax environments attract more green projects and investors.

We extend our sincere thanks to the companies and investors that shared their green initiatives with us, and we hope that this report encourages the reallocation of capital to climate-related sustainability projects. As Christiana Figueres, executive secretary of the UNFCCC, noted at the end of the Paris Climate Conference in December 2015, "You cannot build what you cannot finance."



QUESTIONS TO ASK ABOUT GREEN INVESTMENT OPPORTUNITIES

There is no single perfect investment for everyone. Narrow the field by asking yourself these questions:

1. What is my target risk-return profile?
2. What volume and time horizons are suitable to my investment strategy?
3. What are my target geographies and markets?
4. Which are the best ways to improve my return and minimize my risk?
5. Which financial instruments match my strategy and my fiduciary duty?
6. Do environmental and social KPIs make an investment more attractive?
7. How can I foster communication and transparency with companies that are seeking funding?
8. How can I assess the future value of my investment assets and projects in a way that includes nonfinancial factors that may have significant financial impact?

8

Appendix

Case Studies

The case studies in this appendix are more-detailed versions of the abstracts that appear in the main section of the report.

8.1 LANZATECH

Scaling New Technologies with the Right Partners

Founded in New Zealand in 2005, LanzaTech uses a microbe-based fermentation process to produce fuels and chemicals from industrial waste gases. Ten years after its founding, LanzaTech became a partner of ArcelorMittal, the world's largest steel producer. Construction of the €87 million flagship pilot project, which will be located at ArcelorMittal's steel plant in Ghent, Belgium, is underway, with €10.2 million financed under the European Commission's Horizon 2020 program for R&D. Using LanzaTech's technology, the plant will have a capacity of 64,000 tons of bioethanol per year. Every ton of bioethanol produced will reduce ArcelorMittal's CO₂ emissions by 2.2 tons—or by over 100,000 tons of emission per year when the plant runs at full capacity.

In addition to its industrial partnerships with ArcelorMittal, LanzaTech has partnered with BaoSteel and Shougang Steel in China, and Virgin Atlantic in the UK. The latter partnership recently reached a milestone, when LanzaTech's Shougang demonstration plant converted ethanol it had produced into 1,500 gallons of low-carbon, drop-in jet fuel. Other successes include over 55,000 hours of industrial demonstration scale testing data, which LanzaTech uses to

prove the scalability of its technology, and independent evaluations by technology experts during each funding round.

Finding customers isn't a problem for LanzaTech. "We face other challenges," says Freya Burton, the company's chief sustainability and people officer. "If your technology was developed after fuels legislation was written, it can find itself excluded from the fuel market and from financial incentives. This delays commercial scale-up." And this is true even though LanzaTech expects a high return rate.

Still, LanzaTech managed to obtain significant funding in four rounds of financing from both venture capital firms and strategic investors, including Mitsui & Co and the New Zealand Superannuation Fund. After the close of Series D, Nigel Gormly, head of international direct investment for the New Zealand Superannuation Fund, offered this summary of the advantages of investing in early-stage technologies: "The fund is well diversified, and expansion capital's risk-return profile is a good match for growth-oriented investors with a long time horizon."





8.2 UPS

The Cleanest Mile Is the Mile Not Driven

According to the latest WBCSD LCTPi report, road freight generates 2.230 million tons of CO₂ per year. UPS is a major player in this field, with a delivery fleet of 110,000 vehicles at last count. With so many vehicles on the road, the company recognizes that fuel costs and efficiencies have an enormous impact on its bottom line. In 1980, mindful of gasoline costs and impatient with the slow progress of alternative fuels, UPS began developing cleaner options on its own. Since 2007, the company has invested more than \$750 million in efforts to increase efficiency and test alternative fuels such as compressed natural gas (CNG), liquid natural gas, electricity, propane, and ethanol. “No one fuel fits all markets,” says Mike Britt, UPS’s director of maintenance and engineering, “and the cleanest mile is the mile not run.” Today, the company has more than 7,200 alternative fuel and advanced technology vehicles, as well as 18 CNG fueling stations. UPS plans to invest \$100 million to add 12 new CNG fueling stations and 380 new CNG tractors by the end of 2017.

Besides embracing cleaner technologies, UPS has made a mission of finding the most cost-efficient and environmentally friendly ways to deliver packages—a task made more challenging by regional, regulatory, and infrastructure differences across the globe. By capitalizing on big data and analytics, UPS aims to optimize delivery routes for each parcel delivered. Moreover, UPS encourages its customers to help reduce emissions by buying so-called carbon offsets for their parcels. These offsets help compensate for the CO₂ emissions of one project, sector, or region by reducing CO₂ emissions by the same amount in another project, sector, or region.

These initiatives and the CNG fueling stations and vehicle purchases reflect UPS’s efforts to diversify its fuel sources and reduce its environmental impact. Typically, the biggest

challenge is not the technology itself, but getting the infrastructure in place. To this end, collaboration is critical. Once the infrastructure is up and running, most alternative fuels and technologies are competitive with conventional fuels, according to Britt. For example, the operating costs for CNG were 50% lower than for gasoline once the infrastructure was in place.

By rigorously analyzing the total cost of ownership of different fuels, UPS has confirmed that the business case for alternatives is stronger than for conventional fuels in some regions. That edge will likely increase as technologies advance, and UPS plans to continue testing and investing in alternatives. This proactive stance extends to helping shape the evolving regulatory environment as well. As Britt says, “We’d rather be in the kitchen than be on the menu.”

The company’s investments are paying off. Since 2007, the carbon intensity of its small package deliveries has decreased by approximately 15%. With its big-data-analytics On Road Integrated Optimization and Navigation (ORION) technology, UPS now saves 10 million gallons of fuel per year, eliminating 100,000 tons of CO₂ emissions. UPS’s sustainability projects compete with all of its other capital projects for financing. Because the company is reluctant to take on debt, most investments receive internal funding. UPS also receives early-stage technology grants of about \$10 million per year. UPS is also a great example of the decoupling of emissions and revenues: the company experienced strong revenue growth even while sharply decreasing its CO₂ emissions through improvements in its routing, loading, use of electrical vehicles, and training of drivers.

8.3 QANTAS

Increasing Fuel Efficiency with More Than 100 Initiatives

By focusing on fuel efficiency and routing techniques, the Australia-based airline Qantas cut its CO₂ emissions by 3.4% per year while still achieving compound annual revenue growth of 2.0% and more than doubling its EBIT margin from 3.2% in 2011 to 7.2% in 2015. As a result, its operating costs as a percentage of revenue declined, with a CAGR of -1.1%. Like UPS, Qantas is concerned with the cost of fuel, with the affect of CO₂ on the environment, and with fuel efficiency.

At Qantas, fuel accounts for a third of the company's total operating costs, and fuel consumption is responsible for more than 97% of the airline's total greenhouse gas emissions. Since fuel costs and emissions are directly linked, Qantas set up a single department to develop strategies and policies aimed at keeping both as low as possible.

Qantas aims to improve fuel efficiency by 1.5% per year on average until 2020 through a variety of measures. Some, such as upgrading to more fuel-efficient aircraft, require a large investment and have a major impact. Its smaller initiatives—more than 100 at last count—make incremental differences that add up and pay off, says Murray Adams, group manager of fuel optimization at Qantas. Last year, Qantas saved \$39 million (in Australian dollars, equivalent to \$ 29 million in US dollars) from its fuel efficiency program. By decreasing its fuel consumption, the airline has reduced its 2014-to-2015 carbon emissions by 98,350 tons compared to its 2013-to-2014 emissions, while increasing returns.

Efficiency initiatives are another important focus. "Data is key to optimizing fuel efficiency, and every new generation of aircraft is providing us with more and more data to work with" says Adams. The latest SMARTer2020 report by the Global e-Sustainability Initiative demonstrates how increased use of information and communication technology could cut the projected 2020 GHG emissions by 16.5%. Qantas uses GE Aviation's Required Navigation Performance capability, which optimizes flight approaches to airports. Using aircraft data such as height and profile, the software designs descent paths that require less fuel. For example, a continuous

descent minimizes fuel consumption by using less thrust, while also reducing time in the air and noise.

Another improvement involves using a ground power unit to provide electricity for air conditioning and other onboard systems while the plane is on the ground. Previously, these systems ran on an auxiliary power unit powered by jet fuel. In a 2013 report, Qantas estimated that the replacement technology saved more than 125,000 GJ (gigajoules) of energy per year. Where possible, Qantas also switched to lightweight materials in its aircraft to decrease aircraft weight and fuel consumption. For example, the airline replaced aluminum with carbon fiber in certain parts. In a 2013 report, Qantas stated that weight reduction initiatives (including potable water optimization and lightweight pantry equipment) reduced the airline's annual energy consumption by more than 25,000 GJ. Overall, these initiatives cut Qantas's carbon emissions by 2% or 259,241 tons in the period 2013 to 2014.

Green investments at Qantas must to go through the same approval process—and show the same rate of return—as any other capital investment. To finance those investments, Qantas uses bank loans and internal funding. "But we might consider alternative instruments for our sustainability projects in the future," says Megan Flynn, group manager for environment and strategy. To that end, Qantas plans to invest more than \$17 billion in fuel efficiency projects, including updating its fleet with Dreamliners, which are 20% more fuel efficient than previous-generation aircraft.

Although biofuels don't play a major role at Qantas yet, in 2012 the airline conducted the first Australian flight using a 50/50 blend of unleaded kerosene and biofuel. The performance was impressive: the turbine powered with biofuel showed a 1% to 2% improvement in fuel efficiency and stayed a few degrees cooler. "Biofuels proved their advantages," says Flyn van Ewijk, group manager for sustainable fuel "The challenge lies in commercialization to enable supply."





8.4 CLOSED LOOP FUND

Partnering Up for Recycling Infrastructure

Industry leaders such as Wal-Mart, Coca-Cola, Unilever, 3M, and Procter & Gamble launched the Closed Loop Fund (CLF) to finance infrastructure-level recycling projects. Each member company sees the value of—and has a financial interest in—a flourishing recycling industry. “The recycling industry in the United States suffers from a supply problem, not a demand problem,” says Rob Kaplan, managing director of the CLF. “Companies want to use recycled materials, but suppliers can’t provide the needed quantity and quality because the infrastructure is lacking.” The \$100 million fund offers below-market rate and even zero-interest loans to governments, municipalities, and companies. Although the loans aim to return principal to the fund, CLF members profit far more from their improved access to recycled materials.

The CLF’s goals are to reduce GHG emissions by 50 million tons and to divert more than 20 million tons of waste from landfill by 2025. Besides improving the environment, owners of the recycling infrastructure can expect to see a financial payback. For instance, for each ton of waste diverted from landfill, cities usually save around \$50—plus they can sell the

recycled materials. The CLF expects that its projects will save US cities \$1.2 billion by 2025.

One recipient of CLF funding is QRS of Maryland LLC, a joint venture in Baltimore between QRS and Canusa Hershman. The venture received a \$2 million loan to build a plastic recovery facility (PRF) that focuses on sorting and recycling especially hard plastics—those numbered 3 to 7 in recycling code—which contain PVC and other types of plastic. The facility will be a showcase, since only about 30% of US communities can process and recycle those materials today. Planners expect the PRF to reduce GHG emissions by more than 670,000 tons over the next ten years.

CLF is managed by Closed Loop Partners, an asset management firm that focuses on building the circular economy by investing in sustainable materials, packaging, advanced recycling systems, and infrastructure. The firm has launched a new venture fund to help commercialize early-stage innovation and expand its investment opportunities in the waste and recycling space.

8.5 NOVOZYMES

Creating Clean Fuel from Waste

Biotech company Novo was an early advocate for the environment. In 1994, it became the first company in Denmark to issue an environmental report, and it was among the first to consider three bottom lines—the financial, social, and environmental aspects of its business. In 2000, Novo split into three independent companies. Two of these, Novozymes and Novo Nordisk, continue to operate side by side in Denmark's Kalundborg industrial compound. Shortly after the split, Novozymes began developing enzymes that are key components in turning biomass into environmentally friendly fuel.

Each of the two former corporate siblings recently made double-digit-million-dollar investments in a waste-to-gas reactor that transforms wastewater from their two plants into biogas that can generate heat and electricity. The Kalundborg district uses the generated heat, and the facility feeds excess electricity into the grid, creating additional income. "Our joint wastewater treatment unit with Novo Nordisk has gone from a net energy consumer to a net energy producer," says Jes Tobiassen, director for

environmental operations in Novozymes' Kalundborg plant. The joint venture also benefits from subsidies granted by the Danish government for producing renewable energy.

By cutting the two factories' CO₂ emissions by 21,000 tons per year, the reactor will help Novozymes reach its goal of reducing its CO₂ footprint by 25% by 2020. The joint venture also produces 47,000 MWh (megawatt-hours) of energy—equivalent to the productive capacity of seven offshore wind turbines. Aside from the environmental benefits, the investment is expected to be highly profitable, with returns on investment amounting to more than 40%. Novozymes also expects customer application of its solutions to save 100 million tons of CO₂ annually by 2020. In 2015, the reactor yielded CO₂ savings of about 60 million tons, and the corresponding figure for 2016 should be about 63 million tons.

From 2011 through 2015, Novozymes achieved strong business growth while sharply cutting its CO₂ emissions, thanks to advances in energy efficiency, and reductions in water, raw material, and chemical consumption.





8.6 PHILIPS LIGHTING

A New Business Model That Improves Recycling

Although the global phase-out of incandescent light bulbs led to relatively energy-efficient models, it posed a challenge for traditional lighting companies like Philips Lighting. The new model bulbs lasted longer and carried new possibilities such as connectivity, affecting customer demand and relations. To differentiate its offerings and to grow in LED technology Philips Lighting began to explore new sources of revenue. One idea was to offer lighting as a service, instead of as a product. The inspiration for the new business came from a simple insight, says Frank van der Vloed, general manager of Philips Lighting Benelux. “People are interested in our performance, not our products.”

Light as a service (LAAS) is a pay-as-you-go utility model, a classic example of circular-economy business models that shift a transaction’s focus from sale of an asset or product to a leasing service. Philips Lighting retains ownership of the lighting fixtures that it leases to customers, who pay an agreed-upon service fee up front for the light itself. Because it still owns its products, the company can reuse the fixtures rather than having to make new ones—and expend more raw materials—every year. It is also motivated to design fixtures that retain maximum value for subsequent reuse or recycling.

Demand for the service is growing quickly. In 2015 it accounted for just a small part of Philips Lighting’s commercial business in the Benelux countries—but double the percentage from the previous year. Schiphol Airport in Amsterdam provides a showcase for the new model. Instead of negotiating a lighting replacement contract, Schiphol signed a five-to-ten-year LAAS agreement for an LED lighting system. The LED fixtures are designed to minimize waste. When parts wear out, the servicer can remove single components rather than replacing the whole system. The LED-based LAAS service has reduced the airport’s energy bill and carbon footprint by 50%.

The LAAS model benefits Philips Lighting as well as its customers. Besides increasing customer retention, the model delivers top- and bottom-line growth. Customers save

money on fixtures and energy costs, while getting the convenience of an inclusive solution that covers maintenance and energy supply. “These systems have a substantial residual value at the end of their lifetime,” says van der Vloed. “Now that Philips Lighting maintains ownership of the product, we can provide the service to customers for a lower price.” The LAAS model targets specific commercial customers, such as warehouses, airports, hotels, theaters, retailers, and parking lots. When selling the service, Philips Lighting focuses on the cost savings, not the positive effect on the environment. “Sustainability is not always a top-five priority,” explains van der Vloed. “There are only a few companies that take it seriously, and those are our typical customers. When you will be responsible for the performance and maintenance of the products, and you know that you will get your product back at the end upfront, you look differently towards the product design. We learned a lot from our first customer cases, and therefore we will launch in 2017 a series of fixtures which are especially designed for a circular economy. These are upgradable, modular build and easier to maintain and disassemble. This will make our business model and offering towards customers even better, and it shows that you have to assess all parts of your business when implementing a new business model.”

Philips Lighting’s value proposition also includes nonfinancial KPIs, such as Lives Improved, Green Product Sales, Green Operations (CO₂ reduction, health and safety) and Green Innovation (investments, energy efficiency, recycling).

Philips Lighting used internally generated funds to finance the start of the new business model. Because the model is new, the volume of service contracts is still low. But since LAAS produces steady payment streams, the company can remove the underlying assets from the balance sheet and sell them to banks or pension funds, or use them to set up an asset-backed security. LAAS and other environmentally friendly initiatives helped Philips Lighting reduce its overall CO₂ footprint, while increasing revenues.

8.7 IBERDROLA

Moving from Conventional Generation to Wind Power

Iberdrola, a multinational energy utility headquartered in Bilbao, Spain, is one of the world's largest producers of wind energy. Iberdrola operates three lines of business: energy networks, energy retail, and energy generation. Committed to fighting climate change, Iberdrola has set targets of reducing its CO₂ emissions in 2030 by 50% against a 2007 baseline and becoming carbon-neutral by 2050. Today, Iberdrola owns more assets for generating alternative energy than for conventional energy, and 66% of its installed capacity is emissions-free. According to company CEO, Ignacio Galan, "In anticipation of the energy transition, Iberdrola has committed to sustainable solutions that require greater electrification of the global economy."

Iberdrola's focus on renewables is paying off financially. For the first half of 2016, the company's renewables segment reported a net profit of 19%, compared with 17% for the network business and 6% for energy generation. Not surprisingly, Iberdrola plans to expand its renewable segment further. Between 2016 and 2020, the company expects to invest €7.7 billion in its installed capacity for renewables and expects the investment to earn high average annual returns. The company will focus its renewable-energy investments on countries with stable regulatory environments in order to reap the benefits of incentives such as regulated long-term contracts, feed-in tariffs, and tax credits.

One significant impending addition to the Iberdrola portfolio is a €1.4 billion investment in the 350-MW Wikingen wind farm, which will include 70 wind turbines. Situated in the Baltic Sea area, the investment has the support of a guaranteed compress tariff of €190/MWh for a period of 12

years, substantially decreasing the project's financial risk. The Wikingen wind farm will reduce CO₂ emissions by 600,000 tons per year compared to conventional generation.

Iberdrola is relying on green bonds to finance a significant portion of these investments. The company has used this new financing instrument to issue three bonds (with decreasing coupon rates reaching a low of 0.375% in September 2016), and it considers itself a market maker: "We are a green company, so we support green financing instruments," says Guillermo Colino Salazar. "We want to drive this market forward. This has been a clear strategic directive from the highest management level."

In the future, regulations may call for application of external standards to such bonds to confirm that companies use their proceeds for the intended purposes—much as approved verifiers ensure that climate bonds adhere to specific standards. Many investors would welcome this development. According to the latest WBCSD report "Pathways to Scale Finance for Renewable Energy," three key barriers continue to hold back investors from the green bond market: price, culture, and issuer reluctance. The current premium for a green bond is minor at 2 to 3 basis points in the primary market (and 20 points in the secondary). The culture barrier is simply that investors have long-term experience with fossil fuel assets but not as yet with renewables. Finally, issuer reluctance seems to be rather low, as issuances are often oversubscribed and investor demand is high. From 2011 through 2015, Iberdrola's strong focus on renewable energy drive down the company's CO₂ emissions rate.





8.8 EDP RENEWABLES

Driving Growth and Profitability through Renewables

Rui Antunes, director of investor relations at EDP Renewables (EDPR), says that renewable energy has strong investor appeal: "Renewable assets are a good investment not only for the environment, but for returns." The renewables subsidiary of EDP, Portugal's largest industrial group, EDPR engages in developing, constructing, and operating renewable energy assets in Europe, North America, and Brazil. EDPR focuses on onshore wind energy, which is the most competitive renewable technology in terms of total cost. Its Business Plan for 2016 through 2020 calls for the company to expand its solar portfolio and continue to develop offshore wind projects. These technologies represent an immediate, economically competitive way to counter the climate change. In 2015, EDPR's green electricity reduced the company's CO₂ emissions by 18.7 million tons compared with an equal quantity of electricity from fossil fuels.

"In terms of growth and profitability, renewable sources like wind and solar PV are the best options, and attract the most capital," says Antunes. He thinks EDPR has an edge over its competitors because it specializes in wind and has

developed deep knowledge and efficiencies. For instance, the site of a wind farm or the positioning of turbines can lead to higher returns. EDPR also has an in-house design team to help keep costs low.

EDPR's renewable projects compete with conventional investments for funding from the parent company. Only projects that offer the biggest payback receive approval; the required threshold is a spread of 40% between the cost of capital and the internal rate of return. But not all funding comes from the mother company. During the global economic downturn, when cash was tight and investors had lower cost of capital than EDP did, EDPR developed an independent, self-funding model called the Asset Rotation program. This internal program sells minority stakes in operational projects and then reinvests the capital it raises in new projects. EDPR is selling up to 49% of its projects at a single-digit dividend, but it can reinvest that money in new projects paying double-digit returns, which makes this model highly profitable. "Basically it's a private yieldco model," says Antunes, "but with the advantages that come with not being listed on the markets and without the commitment on



ongoing asset and dividend growth.” Those advantages include a choice of suitable investors, less exposure to market volatility, and less regulatory oversight.

Yieldcos worked well in the US when dividends and stock prices were rising. But when hedge funds discovered this financing option, looking for short-term investment instead of investing long term, hence exiting their money too early, the respective yieldcos started facing liquidity issues and could not deliver the high dividend requests of former investors. Decreasing demand led to the downfall of some major yieldcos and the vehicles fell out of fashion. With the strengthening stock market, yieldcos seem to be recovering. Nevertheless, Antunes believes that the yieldco model will face the similar challenges in the future that could put in question the long term success of this financing vehicle.

Antunes expects EDPR’s regional focus of investments to shift away from Europe because of the current installed overcapacity there. To minimize investment risk, the company prefers markets with a stable and supportive regulatory environment. The US, for example, has solid fundamentals for

wind demand driven by defined dynamics such as onshore wind cost competitiveness, renewables portfolio standards established by each state, demand from commercial and industrial companies (which were responsible for about 50% of all power purchase agreements signed in 2015), extended production tax credits with phase-down, and coal power plant retirement based on lifecycle and toxins emission. EDPR expects that 65% of its capacity between 2016 and 2020 will be in North America (including Canada and Mexico). For EDPR, cost of capital is the decisive criterion when choosing a financing option. In the US, the company financed 50% to 60% of its investments with tax equity, which requires having a local partner that can use the tax credits. One such partner is Google, which invested \$240 million in the Waverly wind project in Kansas. Waverly has secured a 20-year power purchase agreement to help reduce investment risk and increase cash-flow visibility. For EDPR, the cost of recent tax equity structures has been around 7%.



8.9 CLP GROUP

Ambitious Sustainability Targets Mean a Growing Focus on Renewables

Sustainability is of high strategic importance to CLP, a Hong Kong-based energy utility active throughout the Asia Pacific region. In Hong Kong, CLP operates a vertically integrated electricity supply business; outside Hong Kong, it invests in the energy sector in Mainland China, India, Southeast Asia, Taiwan, and Australia. China's energy sector is especially interesting. Although the country saw strongly increasing CO₂ emissions in the past decade, China's commitment to decrease such emissions and its strong investments in renewables give the nation a key role to play in combatting the climate change. CLP's business includes power generation, transmission, and distribution, and retail activities in electricity and gas. CLP ownership is divided among family owners, public investors, and institutional investors, both in Hong Kong and abroad. Therefore, while short-term profitability is an important consideration, the company also has a strong focus on long-term goals and on sustainable business.

Because of its ownership structure and long-term commitment, CLP has always been a purpose-driven organization—the purpose being to provide “reliable safe energy in a sustainable way.” The company invested heavily in ways to reduce emissions from its current fossil-based power generation and in new, non-fossil-based power

generation, with the clear policy of “installing 1 MW renewable energy capacity for every MW fossil,” says Geert Peeters, CFO of CLP Holdings. According to Peeters, it is “important to scale things up,” in order to move renewables further into the mainstream segment. This is a very long-sighted view, as the company's previous focus was on fossil- and nuclear-based generation; and despite not being subject to external regulatory pressure, CLP chose to make sustainable investments a key priority. Back in 2007 the company decided to increase its sustainability efforts and aim to decrease emissions by 75% by 2050.

CLP currently owns more than 80 assets with 18 GW of equity generating capacity and 5 GW of purchase capacity. Of this capacity, 16.8% takes the form of renewable energy generation capacity. This number has more than tripled from about 5% in 2005 and the company expects it to increase to 20% by 2020. Accordingly, the carbon intensity of CLP's generating portfolio should decrease from 2007's level by about 30% by 2020.

To reach those targets, CLP relies on evolving renewable technologies—for example, the increasing implementation of wind energy in its Asia-Pacific markets, especially in India and Mainland China. CLP further seeks to foster sustainability in



its projects by engaging local sources and inviting them to invest in their own infrastructure and thus to benefit from the returns. This often occurs through local banks, but also through other lenders such as citizen life insurance companies. Engaging the local community and increasing the number of stakeholders facilitates sound decisions, as leveraging local knowledge makes choosing the right projects more likely. Of course, investors need their financial risk to pay off, too. To bring those interests together, CLP started its innovative pooled-financing model: Unlike the common model, in which multiple lenders fund individual projects, this model brings together multiple lenders to fund a portfolio of projects, distributing the investment across multiple endeavors. This innovative model helped increase the competitiveness of renewable in comparison to conventional energy projects. As Peeters says, "Renewable energy projects do not have the same IRR as historic thermal projects if calculated only on current value, but they are competitive in terms of IRR when modeling in the future asset value and considering the risk of potential stranded fossil fuel assets."

In the first round, in 2013, CLP used the model for ten projects across six states in India. Initially, the model covered four operational projects totaling 267.5 MW, but later it expanded to encompass six more projects in the framework.

Today, CLP has three different stages inside this product:

1. Pooling and scaling of assets to achieve critical mass in investment size
2. Attracting long-term money and investors by attaching different credit enhancement mechanisms (such as tax shields) to the aggregated assets
3. Creating a stand-alone green financial product (a green bond)

CLP Wind Farms India, the first corporate issuer of green bonds in South Asia and Southeast Asia, raised 6 billion rupees (\$90 million) through the sale of the bonds. With a diversified funding base ranging from traditional term lending banks and financial institutions to mutual funds, insurance companies, and other long-term debt providers, CLP laid a solid base for sustainable future growth in the green bond market. Furthermore, CLP is considering the issuance of so-called transition bonds, signaling to the market the company's commitment to low carbon solutions but also acknowledging the fact that the transition requires time and collective efforts (and should not destroy old capital).



8.10 ALLIANZ

A Shortage of Good Projects, but Lots of Money for Good Projects

As an insurer, Allianz has acknowledged the risks of climate change and climate inaction for many years. More recently, it has also recognized the financial attractiveness of alternative, renewable energy investments. Allianz sees renewables as a strategic business opportunity, one that helps diversify its portfolio by providing cash yields that are independent of how the general capital markets perform. Since 2005 the company has invested €3.5 billion in 70 projects—largely onshore wind farms and solar parks, which show competitive risk/return profiles.

Allianz targets markets with stable regulatory environments and investment incentives, such as Europe and the US. The firm sometimes partners with companies that use tax credits from their wind farm investments to reduce the taxable income of their core businesses. Allianz sets up joint

ventures in the US with top-quality partners that have a similar, long-term investment approach, such as Bank of America and EDF Renewable Energy in New Mexico, and State Street and E.ON Climate & Renewables in Texas. Allianz plans to expand its partnerships with these companies.

Although these activities have a positive environmental effect and reduce GHG emissions, the main decision criterion is the profitability of the project. “The reason we invest in renewable energy is that these investments provide a good risk-return profile,” says David Jones, head of renewables at Allianz. “Renewables provide cash yields uncorrelated to general capital market performance.” Allianz expects to expand its investments in renewables, although, Jones says, “There is a shortage of good projects, and there is excess money for good projects.”

8.11 YES BANK

Responsible Banking Requires a Strong Business Case and Is Not Guided by Philanthropic Intent

India has an ambitious goal of installing 175 GW (gigawatts) of renewable capacity by 2022, and India's Yes Bank has committed to mobilizing \$5 billion by 2020, toward climate action. It has also undertaken to finance 5 GW (of which about 1.3 GW has already been financed in 2015 and 2016) in renewables, using innovative financing mechanisms.

Starting from scratch as a greenfield bank in 2004, Yes Bank has made responsible banking a pillar of its philosophy and growth. Now the fifth-largest private sector bank in India, Yes Bank has built a leading portfolio of renewable projects, mainly in the areas of solar and wind energy. The bank has given the Indian market innovative financing options, and in the past financial year alone has financed projects with a total installed capacity of 1300 MW.

The bank offers innovative project funding through leveraging relationships with multilateral and development financial institutions such as the International Finance Corporation (IFC) and the Asian Development Bank. It has also been a pioneer of green bonds in India. The first green bond that Yes Bank issued, in 2015, was initially expected to raise \$80 million—but it was oversubscribed twice and raised a total of \$160 million. Various domestic and foreign institutions, including pension funds and insurance companies, bought the ten-year bond. Yes Bank issued its second green bond in August 2015 as a private placement to the IFC, with the IFC using the proceeds from another green bond of the same size issued in the offshore rupee market to pay for the placement. Yes Bank issued this IFC bond under the organization's INR 3-billion-offshore rupee masala bond program; the bond was the first masala issue to be listed on the London Stock Exchange. (See Figure 9.)

This approach gave the Indian market a new financing opportunity by externalizing the currency risk to investors, who have more experience and thus can handle the associated risk better than project owners. Twelve issuances

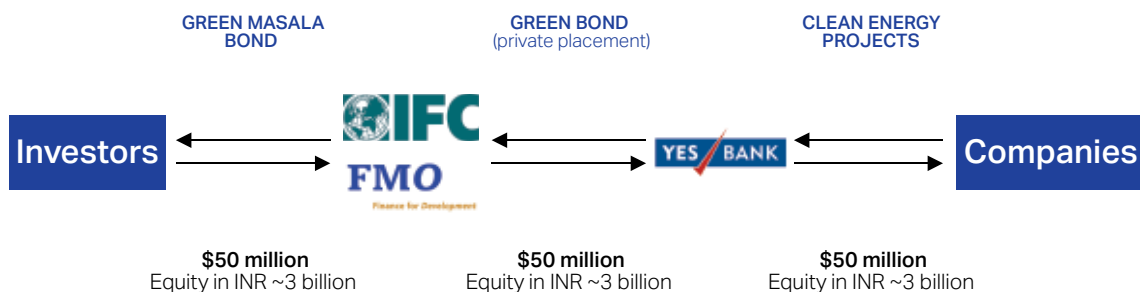
later, India accounts for 3% of the global green bond market and is working toward creating its own market, now that new reforms allow banks to issue masala bonds.

The unique alliance between Yes Bank and IFC may serve as a model for other emerging market issues. Yes Bank pioneered the partnership with a development bank for issuing green currency bonds in the Indian market, but other currency green bonds with different partnerships surged in other markets—for example, in China (so-called green dim sum bonds), Japan (green samurai bonds), and Australia (green kangaroo bonds), amounting to a total market volume in currency green bonds of about \$1.3 billion—up from just \$400 million in 2014.

While providing coupon rates that are comparable to those of conventional bonds, green bonds are expected to receive a pricing benefit of up to 2% above conventional bonds in the near future—as in the case of some credit-enhanced green bonds in India—according to Srinath Komarina, group executive vice president of Yes Bank. Today 2.5% of the bank's exposure lies in the renewable energy sector, mostly in operational projects in wind and solar energy. The bank continually tracks the impact of its investments and has contributed to the elimination of about 1.7 million tons of CO₂ emissions per year—a number that continues to grow.

Why is Yes Bank so successful? "We have had a long-standing focus on mainstreaming sustainability in our operations, and are equipped with domain expertise which has enabled us in creating a comparative advantage amongst our peers," says Chaitanya Kommukuri, senior manager for responsible banking at Yes Bank.

FIGURE 9: Green Masala Bond Offering at Yes Bank



Source: Yes bank company information.
Note: INR = Indian rupees.



8.12 OLD MUTUAL

Investing in Sustainable Agriculture and Renewable Energy

Old Mutual proves that the risk-return profiles of investments in the developed world are not necessarily more favorable than those in Africa and other emerging economies. Since 2010, the international investment, savings, insurance, and banking group has invested \$250 million—mainly from pension funds—in African agriculture, with a strong focus on achieving environmentally and socially beneficial results. Because the agricultural sector is a major emitter of GHGs and other substances that are environmentally damaging, sustainability projects have high potential.

Unlike many investors, Old Mutual considers environmental, social, and governance (ESG) issues crucial to managing investment risk. The company integrates those factors into the investment process to improve the analysis of all investments and the standards of practice. Among the

factors considered in their agricultural investments are health care and education for the farm workers, water security, pesticide use, job creation, and the conversion rate of temporary to permanent work contracts to permanent ones. Duncan Vink, managing director at Old Mutual, says that the approach makes good business sense: “Healthier farm employees are more productive, and cutting down on pesticides positively affects the cost side.”

Besides having positive nonfinancial effects, Old Mutual's projects have delivered high profits, securing average returns of 16% in rand (10% in real returns, factoring in the exchange rate) at a default rate of zero. One reason for this strong performance is that Old Mutual takes complete ownership of the farms it invests in, and aggregates farms to achieve economies of scale and boost profitability. Unlike other



private equity investors in Africa, Old Mutual doesn't invest in processing or any other downstream steps of the food production value chain. It does not leverage its 100% direct investments in upstream farms and farmland with any debt capital, and assets undergo a full due diligence and credit check in advance. Moreover, the investment group takes standard measures to control risk, such as placing liens on crops, which Old Mutual applies for as in its infrastructure investments.

Old Mutual also invests in forms of renewable energy, through Old Mutual Alternative Investments and its subsidiary African Infrastructure Investment Managers (AIIM), another division within the Old Mutual Group. AIIM has experience as both an equity investor and a project developer. One recent investment example is the joint venture with Hydroneo Afrique targeting small and medium-size hydropower plants.

Over the next five years, an installed capacity of 200 MW is expected to serve growing energy demands in Africa, focusing on Cameroon, Ivory Coast, Gabon, Ghana, and Mozambique.

Many investors complain of a shortage of qualified projects, but Vink notes that Old Mutual is never short of transactions and its pipeline is full. He says that the only thing constraining the group's investments in African agriculture is a lack of available capital—due in large part to the perception by many investors that Africa is too risky. Although multinational companies have shown a growing interest, many large investors remain reluctant to explore the opportunities.

Disclaimer

This report is released in the name of WBCSD. Like other reports, it is the result of collaborative efforts by WBCSD staff, experts and executives from member companies. Drafts were reviewed by a wide range of members, ensuring that the document broadly represents the majority view of WBCSD members. It does not mean, however, that every member company or WBCSD agrees with every word.

Please note that data published in the report reflect the status of November 2017.

About World Business Council for Sustainable Development

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

Peter White is the vice president and COO of the WBCSD. You may contact him by email at white@wbcسد.org.

Christopher Walker is the Director North America and responsible for sustainable finance within the WBCSD. You may contact him by email at walker@wbcسد.org

Dominik Breitinger was formerly the director for sustainable finance at WBCSD and responsible for engagement with the capital markets.

WBCSD contributors

Yi Sun, Associate, Finance Initiative, WBCSD

Felicity Glennie-Holmes, Director of Communication, WBCSD

Acknowledgments

The authors would like to thank the participating companies and their representatives, who greatly enhanced the outcome of the report with their valuable insights and contributions.

About The Boston Consulting Group

The Boston Consulting Group (BCG) is a global management consulting firm and the world's leading advisor on business strategy. We partner with clients from the private, public, and not-for-profit sectors in all regions to identify their highest-value opportunities, address their most critical challenges, and transform their enterprises. Our customized approach combines deep insight into the dynamics of companies and markets with close collaboration at all levels of the client organization. This ensures that our clients achieve sustainable competitive advantage, build more capable organizations, and secure lasting results. Founded in 1963, BCG is a private company with more than 90 offices in 50 countries. For more information, please visit bcg.com.

Holger Rubel is a senior partner and managing director in the Frankfurt office of The Boston Consulting Group and is the global head of the sustainability topic. You may contact him by email at rubel.holger@bcg.com.

Ulrich Pidun is a director in the firm's Frankfurt office, a core member of the worldwide Corporate Development practice, and the global topic leader for Corporate Strategy. You may contact him by email at pidun.ulrich@bcg.com

Alexander Meyer zum Felde is a principal in BCG's Hamburg office and an expert principal on the sustainability topic. You may contact him by email at meyer.zum.felde.alexander@bcg.com.

BCG Contributors

Frank Klose, senior partner and managing director

Dominik Eisenbeis, consultant

Hanna Marie Asmussen, associate

Jennifer Sauter, visiting associate

Martha Craumer, senior writer

Matthew Clark, global marketing director, strategy

World Business Council
for Sustainable Development

WBCSD India office,
4th floor, Worldmark 2,
Aerocity, New Delhi 110 037
India

WBCSD Secretariat
Maison de la Paix
Chemin Eugène-Rigot 2B
CP 2075 1211 Geneva 1
Switzerland

www.wbcsd.org

