Investing in Climate Change 2011

The Mega-Trend Continues: Exploring Risk & Return

February 2011

Whitepaper available online: http://www.dbcca.com/research

Carbon Counter widget available for download at: www.Know-The-Number.com

DB Climate Change Advisors
Deutsche Bank Group

Climate Change Investment Research

Mark Fulton
Managing Director
Global Head of Climate Change Investment Research
New York

Bruce M. Kahn, Ph.D.
Director
Senior Investment Analyst: New York

Nils Mellquist
Vice President
Senior Research Analyst: New York

Emily Soong
Associate
New York

Jake Baker
Associate
New York

Lucy Cotter
Associate
London

We would like to thank the following individuals from Deutsche Bank for their insight:

Paul Buchwitz, Christopher Burnham, Tom Curtis, Mark Dominik, Gisele Everett, Sarah Foley, Holger Frey, Justine Gordon, Bart Grenier, Jamie Guenther, Eric Heymann, Nicolas Huber, Tobias Just, Frank Kelly, Nektarios Kessidis, Marc Khouzami, Christoph Klein, Matt Kondratowicz, Roelfien Kuijpers, Stephen Lieu, Sabine Miltner, Landy Pheloung, Alex Preininger, Franziska Reh, William Reid, Laura-Susan Shuford, Paul Spence, Dominik Thumfart, Elizabeth Zieglmeier

We would like to thank the following other individuals for their insight:
Hewson Baltzell, Michael Carboy, Daris Delinis, Mario Lopez-Alcala, Craig Metrick

Table of Contents

Editorial

Kevin Parker
Member of the Group Executive Committee
Global Head of Asset Management

In previous reports we looked at the performance potential of climate change related investment. In this report, we shift our focus to examine in more detail how investors can manage the multifarious risks that ultimately are driven by the potential physical impact of climate change on industry and society.

This shift in focus reflects the considerable uncertainty both in markets and in government policy related to climate change throughout 2010. In response to this uncertainty, institutional investors are giving greater consideration than ever before to climate change in their assessment of asset allocation. It is confirmation of the importance of this trend among investors that Mercer Investment Consulting has just published a report looking at the issue of climate change risk at a portfolio level.

I believe that we have, in fact, reached a critical point in our industry. It is the point at which all the talk about climate change begins to translate into action. While politicians and others in some parts of the world prevaricate, asset owners everywhere are starting to move. Naturally, their first impulse is to identify where in their portfolios the climate risk lies. Their next impulse is to adjust their allocations to take account of this. To do so effectively and efficiently, they need a new intellectual framework and set of tools. And they need them now.

We have therefore used this report to study the risks associated with climate change investing across different asset classes and provide frameworks to understand how asset managers can handle those risks. And we examine how various climate change strategies can be added to a portfolio as investors make their allocations. We believe our report complements Mercer's portfolio level work by digging more deeply into the question of risk in different asset classes than any climate research of which we are aware.

And I would like to emphasize that we eat our own cooking. As fiduciary investors, our own response to greater client focus on climate risk is two-fold. We have, first of all, built climate change information into the fabric of our investment process, ensuring that it is taken carefully into account as investment decisions are made at the portfolio level. We are, for instance, not only signatories to the UN Principles for Responsible Investment but have trained our entire staff in the PRI. We also provide our portfolio managers with tools and information critical to climate change that inform the choices they make. Secondly, we are developing innovative strategies across all asset classes – public and private equity, bonds, real estate and infrastructure - that are designed to help clients understand and manage climate risk.

It is extremely encouraging to see that in many parts of the world governments are responding to increasing investor demand for policy frameworks friendly to climate change investment. Also contained in this report is our updated global data base of policy initiatives. It clearly shows that, despite often challenging economic conditions, countries as diverse as Germany, China and Brazil are forging ahead in creating policy frameworks that provide what we call TLC – Transparency, Longevity and Certainty. Even in the US where the federal government continues to hesitate, a great deal is happening at the state level in places like California, Texas and New Jersey.

What we are seeing is the intersection of two critical trends. On one hand, investors are increasingly getting to grips with the risks inherent in climate change. On the other, the investment opportunity steadily continues to improve globally. In this powerful combination lies the solution to unlocking the investment capital necessary to defeat climate change.

Key Themes

Mark Fulton
Managing Director
Global Head of Climate Change Investment Research
New York

Investing in Climate Change 2011 looks at the key investment drivers in climate change strategies and how they play out at the asset class level in terms of risk and return. In this introductory section we look at the paper in terms of eight key themes:

1. **The megatrend persists:** Managing risk and return for investors.

2. **Exploring risk for investors:** How to manage economic, technology, and most particularly policy risk and overall portfolio risk – overall risk hedge for climate in portfolios.

3. **Policy:** Key driver for cleaner energy.

4. **Chinese leadership:** It is not just the number of new policies, but rather the ambitious scale, scope and commitment to foment major structural change.

5. **US Federal policy** has disappointed in relative terms. Global investors have to rely on key states, such as California, New Jersey and Texas.

6. **Natural Gas** as a lower-emission transition fuel in the US.

7. **Climate markets** and returns have offered varied performance across asset classes and sub-sectors.

8. In the run up to and following **Cancun**, global policy makers recognized the need for a more in-depth dialogue to explore how public and private sector funds could most effectively deliver support to renewable energy scale-up and energy access in developing countries.

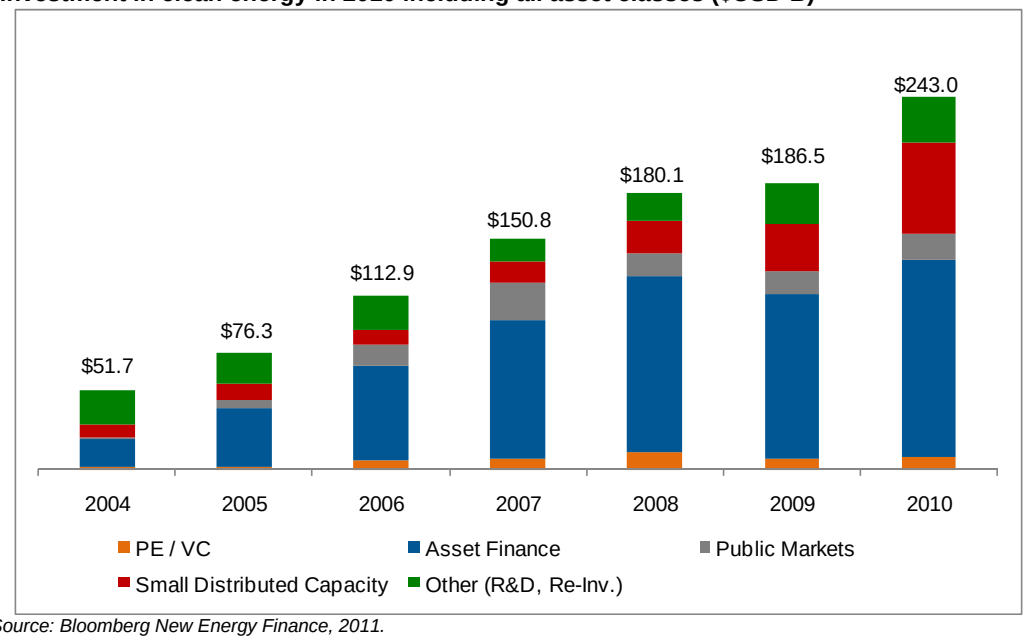
1. The megatrend persists: Managing risk and return for investors.

Climate change is a long-term trend which will affect the value of assets in the real economy and will produce long-term investment opportunities. We define the Climate Change Investment Universe as those companies that mitigate climate change by developing low-carbon emissions technologies or adapt to climate change; e.g. companies that foster energy efficiency and cleaner energy, or respond to new pressures on society and the economy from climactic changes, such as food production and water management. The transition to a lower carbon economy creates opportunities for active asset managers, but also requires understanding the supply and demand dynamics of traditional energy commodities such as natural gas, coal, oil as well as agricultural commodities. Total capital deployed continues to rise, although on a global basis needs to rise significantly to support climate stability.

According to Bloomberg New Energy Finance (BNEF), investment in clean energy asset classes has increased since 2004, and investment in 2010 was the largest year yet on record. Asset finance (investments in large scale clean energy projects) is the largest single area of investment. This is an infrastructure play. Small-scale renewable energy investment (much of which is solar PV in Germany) is captured in the small distributed capacity category. This figure is only reported

by BNEF once a year, so it is not always recorded in intra-year investment totals. Additional breakdown of the asset class level investments is reviewed in the Markets chapter of the document.

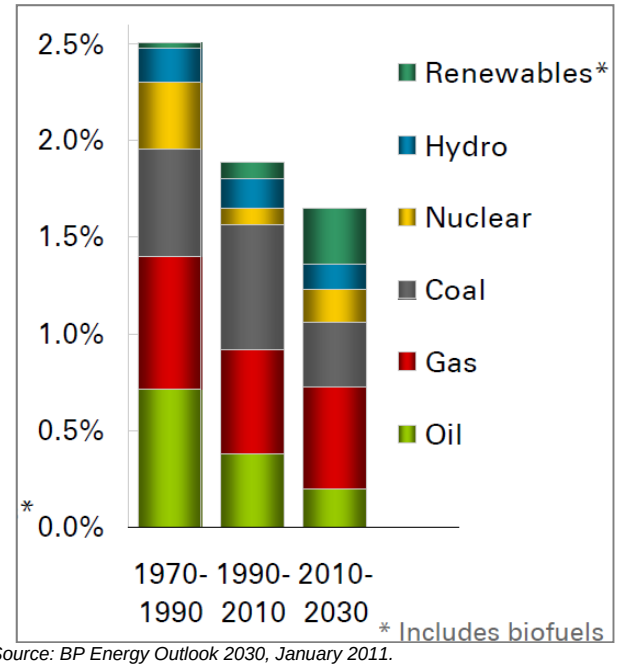
Total global investment in clean energy in 2010 including all asset classes ($USD B)



Source: Bloomberg New Energy Finance, 2011.

BP recently concluded that world primary energy consumption grew by 45% over the past 20 years and is expected to grow by another 39% over the next 20 years. Non-OECD energy consumption will comprise the lion's share of global energy growth by 2030, expected to be 68% higher by 2030 than today. BP also finds that the fuel mix will change, with renewables gaining share at the expense of coal and oil. BP estimates that renewables will represent the fastest growing sector, projected to grow at 8.2% p.a. between 2010 and 2030.

Contributions to growth



Source: BP Energy Outlook 2030, January 2011.

Key Themes

2. Exploring risk for investors: How to manage economic, technology, and most particularly policy risk and overall portfolio risk – overall risk hedge for climate in portfolios

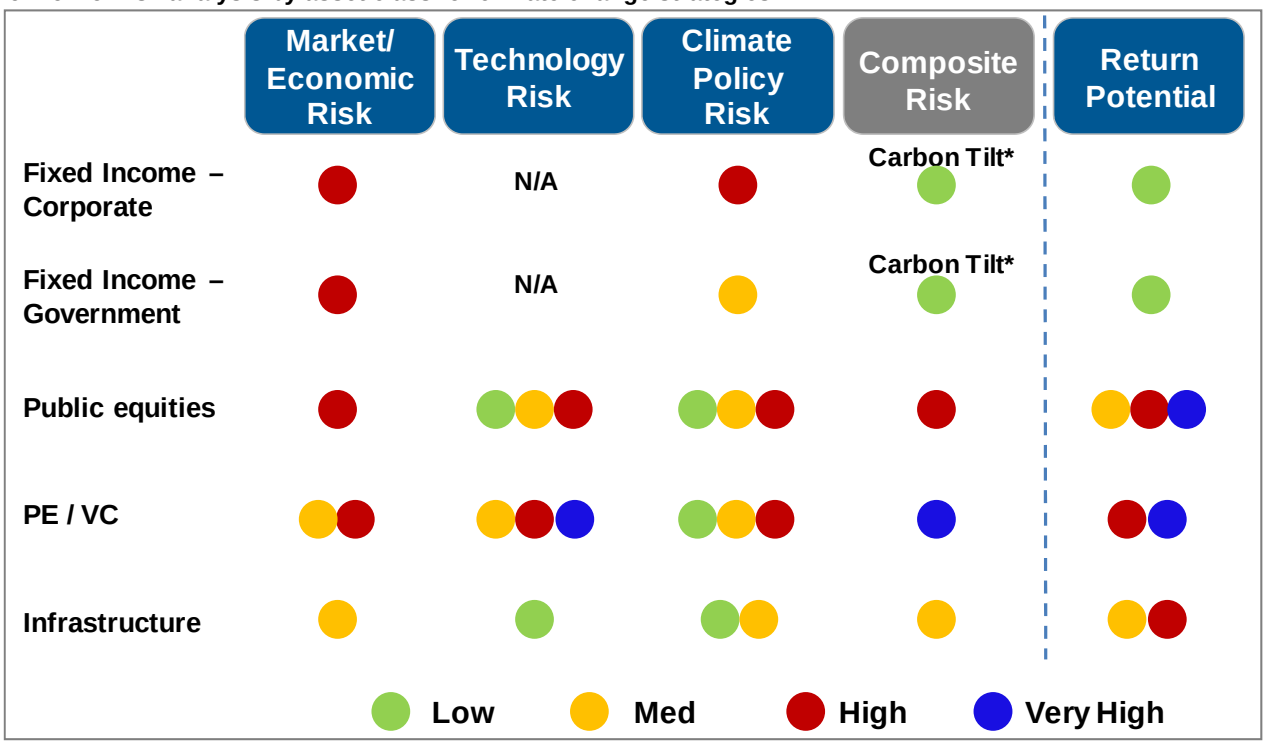
Our investment thesis rests on this longer-term mega-trend of climate change which creates opportunities across asset classes. However, markets, economies and policy support for climate change industries can be volatile and generate asset-class specific risks that require in-depth understanding and active management. Markets, such as the public equity markets, are volatile and movements in prices can be dramatic. Economic cycles are also volatile, and the recent recession is evidence that systemic risk can impact all asset values. Many renewable energy technologies are in different maturity stages, and therefore require different levels of funding, coming from different sources of capital. Often financing of renewable energy will be subject to the variable rate of adoption and commercialization of new technologies. And finally government policy volatility, or more obviously lack of policy, can result in short-term asset mis-pricing and a reluctance to deploy capital. Policy and incentives are key drivers in many of the markets because many climate change investments such as wind and solar are not yet commercially viable on their own. This does vary by sector, however, and in some sectors large incentive support is not needed, even though market adoption is only just beginning.

In Investing in Climate Change 2010, we focused on quantitative returns and risks rather than unpacking the constituents of risk by asset class. This last year, 2010, exhibited significant uncertainty in markets and climate change related policies. Investor focus thus turned to looking at risk. This reflected a shift in institutional asset allocation trends towards a portfolio level consideration of climate change (See the recent report from Mercer Responsible Investment Consulting entitled *Climate Change Scenarios - Implications for Strategic Asset Allocation* at www.mercer.com/climatechange). The portfolio level and investment process seeks to hedge climate "impact" risk. A CIO or other investor can focus on how various climate change strategies can be added to a portfolio, its impact on hedging the climate impact risk as well as the portfolio level risks such as diversification / correlation. In this section, we seek to evaluate the risks associated with climate change investing across the different asset classes and provide frameworks for investors to understand how asset managers manage those risks.

And while the above-mentioned risks certainly require management, the returns investors look for partly reflect the nature of the asset classes and are commensurate with the risks inherent in each asset class. Despite recent volatility, the return potential for public equities can be significant and since the end of 2006, clean tech equities have outperformed the MSCI World, where investors are looking for secular movements in a variety of industries across the climate change universe. The Private Equity and Venture Capital asset class also continues to show opportunity for capital deployment and exit opportunities to strategic buyers and into the IPO market. More measured returns, yet with lower risk, will come from the infrastructure markets, where returns are in the low double digits, but have a more secure yield embedded into the return. Investors can seek out strong risk-adjusted returns from the climate change tilted fixed income asset class, which can act as a hedge against further development expansion of carbon markets. And finally, investors can deploy a carbon overlay strategy using carbon offset credits to hedge their carbon price risk at a portfolio level.

Key Themes

Overview of risk analysis by asset class for climate change strategies:



** Carbon Beta TM is a product of MSCI, formerly Risk Metrics and Innovest. Source: DBCCA analysis, 2011.*

In this paper, we analyze risk by climate change asset class and map it across three primary categories – economic / market risk, technology risk, and climate policy risk. These pillars aggregate to produce a composite / price risk. The asset class' risk is then viewed quantitatively in conjunction with return potential at an asset class proxy or climate change public equity sub-sector level. Investors pursue asset allocation as a function of these two measures and seek to meet their individual investment goals at a portfolio level. Summaries of the asset class level findings are listed below.

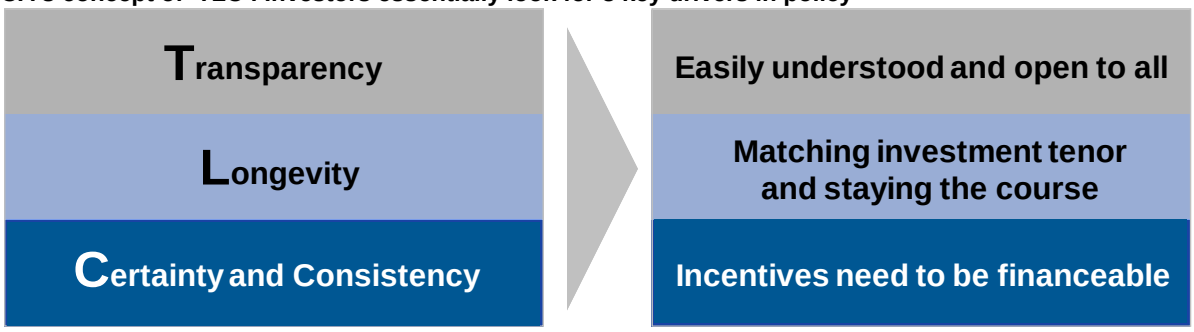
- **Bonds:** In the context of a climate change asset class, we view bonds as the application of a climate or carbon tilt to a traditional fixed-income strategy. In this context, climate change bonds offer a relatively low risk hedge on future carbon risk. The tilt seeks to identify either long or short opportunities that are positioned to be most impacted by future climate and carbon impacts on markets and companies. As a strategy, fixed income is inherently a risk-hedge approach.
- **Public markets:** Climate change public equities are companies engaged in the mitigation of or adaptation to climate change and its effects, including cleaner energy, energy efficiency, agriculture, and water. Climate change public equities are relatively high risk and are strongly exposed to economic / market risks. Investors can allocated to relatively higher or lower technology and policy risk positions, with renewable energy operators potentially representing less technology risk than a PV module manufacturer. Returns in the asset class have recently been affected by increased policy uncertainty and the scale back of some incentives, although energy efficiency and agriculture have outperformed. Risks can be managed via policy knowledge and sector selection.
- **PE/VC:** Climate change PE/VC investments seek to invest through the early-stage development of private companies. As such, the asset class is typically exposed to higher technology and business model risks at the earlier-stage, which are somewhat moderated as companies move into the expansion stage of capital requirements. VC/PE offers potentially high returns, and as an asset class it has varying degrees of policy risk exposure. Investors can mitigate risk through sector selection and policy knowledge.
- **Infrastructure:** Climate change infrastructure strategies seek to invest at a project level in operating assets such as renewable energy or cleaner energy power plants. As an asset class, infrastructure has relatively low technology risk

and offers investors the ability to "lock-in policy" after the financial close of an investment. The return profile of the asset class is based on steady long-term contracted cash flows.

3. Policy: Key driver for cleaner energy

Investments in the renewable energy sector are frequently driven by government policy and so are subject to government policy risk. Transparent, long-lived and certain polices, TLC, provide the investor with the framework to mobilize capital. However, when these polices lack TLC, increased risk to these investments range across asset classes.

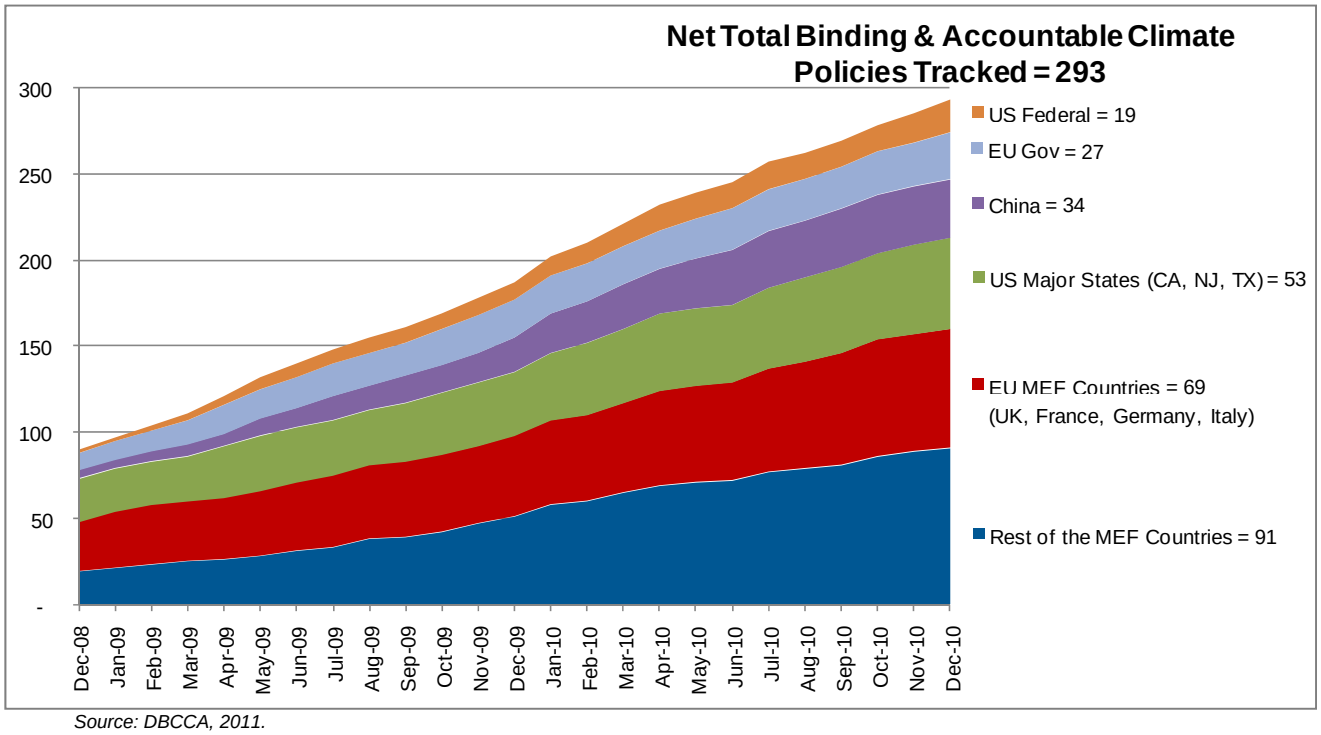
DBCCA's concept of 'TLC': Investors essentially look for 3 key drivers in policy



Source: DBCCA, "Paying for Renewable Energy: TLC at the Right Price: Achieving Scale through Efficient Policy Design," 2009; DBCCA analysis, 2010.

In terms of policy momentum, we have tracked binding and accountable announcements from the MEF countries in a rigorous approach. It shows continued strong momentum on a global scale, with Europe overall a core backbone, China strong, the US Federal level lagging, but key US states moving forward.

Policy momentum is evident in many countries other than the US Federal level.



Source: DBCCA, 2011.

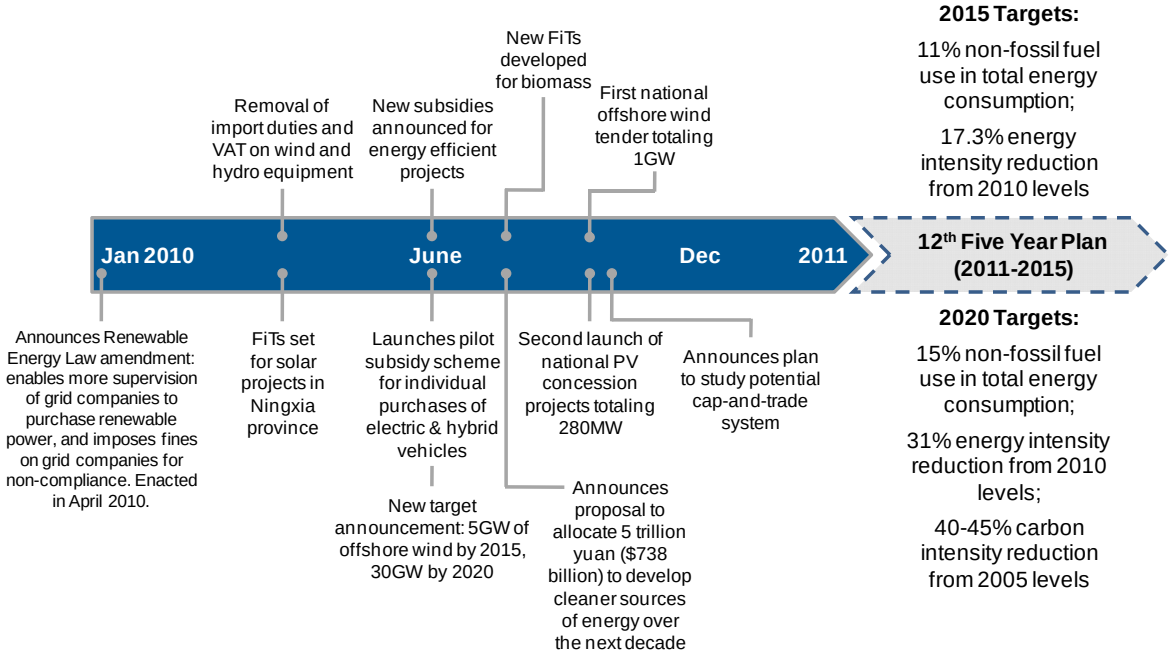
Key Themes

4. Chinese leadership: It is not just the number of new policies but rather the ambitious scale, scope and commitment to foment major structural changes.

The number of national climate policies in China is twice as large as that of the US at the federal level. While China is a strong emerging policy leader in mitigating policy, it is the magnitude of its policies, especially its incentives and mandates, that are supported by investment and enabling legislation that intend to drive changes to the Chinese power system Some significant examples of China's ambitious policies are set out below:

Three national targets on non-fossil fuel use: (1) 15% renewables in primary energy consumption by 2020; (2) 35-40% energy intensity reduction by 2015 from 2005 levels; and (3) 40-45% carbon intensity reduction by 2020 from 2005 levels.

China renewable energy expansion



Source: DBCCA analysis, 2011.

Stringent capacity targets by sector for 2020: (1) 27GW of biomass power from 3GW today; (2) 3GW of waste-to-energy power from 1.5GW today; (3) 20GW of solar PV power from 300MW today; and (4) 150GW of wind power from 25.5GW today. In 2009, China installed more wind capacity than any other country. Additionally, China is planning for substantial growth in nuclear generation resources, growing from ~11GW in place at the end of 2010 to an estimated 70-80GW by 2020. This significant increase, accounting for 5% of 2020 generation capacity, is contained within the "15% non-fossil fuel by 2020" target.

On the transportation front, China's Ministry of Science and Technology has suggested that approximately 1 million electric vehicles could by sold by 2020, out of an estimated 40 million new vehicle fleet. To accommodate this, China is planning to have in place 10 million charging stations by 2020.

With the majority of the 1979-1999 vintage housing stock in China deemed unsuitable for the future by the Ministry of Housing and Urban-Rural Development, China plans to demolish and rebuild that capacity over the next 20 years. This is in addition to the annual 2 million square meters of construction that is tied to basic economic expansion. With an emphasis on energy efficiency, many of the newly constructed buildings will likely be proving grounds for all manner of green construction (and reclamation) techniques.

China's National Development and Reform Committee implemented a new FIT program for wind energy in 2009. The Chinese wind energy FIT is differentiated based on four wind energy zones. China became the first jurisdiction outside Europe to implement wind energy tariffs differentiated by geographic location.

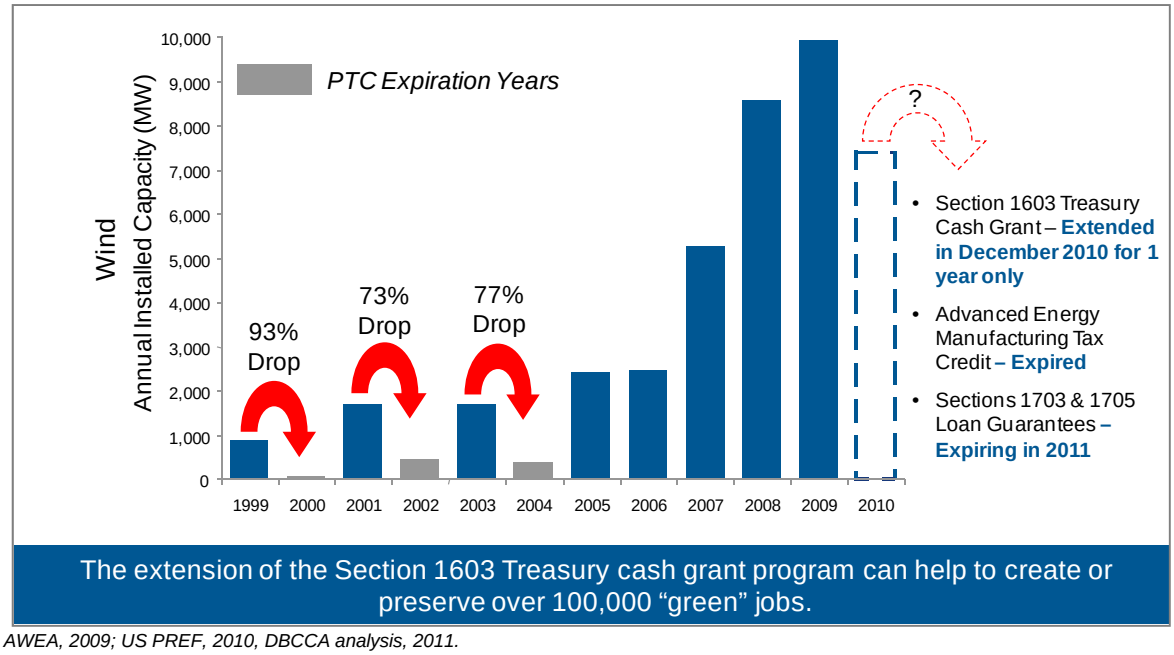
In July 2010, government announced a plan to allocate approximately 5 trillion yuan ($738 billion) over the next decade as a means to develop cleaner sources of energy, including nuclear and gas, to reduce emissions. China has reportedly been considering the introduction of either a cap-and-trade system or carbon tax in the forthcoming 12th Five Year Plan. Additionally, we expect to see a range of resource taxes and fees levied on those industries that consume natural resources as primary inputs to their businesses. China expects to use these proceeds from the prospective taxes and fees to address environmental damage mitigation in certain provinces. The upshot of this will be higher costs for both energy and primary industry output and thus could serve to narrow adverse costs differentials between traditional and cleaner energy sources.

While the forthcoming 12th Five Year Plan has yet to be approved and published by the Chinese government, it appears that more than half of the major policy initiatives in the plan will target some aspect of clean energy, energy efficiency or environmental improvement. The central government believes that up to 15 million new jobs could be created by these policy initiatives.

5. US Federal policy has disappointed in relative terms. Global investors have to rely on key states, such as California, New Jersey and Texas

The United States exhibits less TLC than other countries in its policy framework at a federal level, as it still has a long way to go in order to demonstrate a comprehensive and stable regulatory framework. Nonetheless, there is policy action being developed at the state-level. California, Texas and New Jersey continue to lead the expansion and adoption of clean technologies within the US. The three states have the highest installed capacity in wind and solar. Policy development, particularly in California, has been a key driver of these markets.

Annual installed wind capacity in the US: The historical expiration of the Production Tax Credit has lead to capacity drops.



Source: AWEA, 2009; US PREF, 2010, DBCCA analysis, 2011.

Key Themes

Example: U.S. Market Annual Solar PV Installations (MW)

	2007	2008	2009	2010E	2011E	2012E	2013E
California	91.8	176	220	550	1,200	1,750	2,500
New Jersey	20.4	22.5	57	125	250	350	400
Florida	0	0	36	35	60	50	60
Colorado	12	22	23	30	60	75	100
Arizona	3	6	23	35	60	70	100
Hawaii	3	9	14	23	60	99	150
New York	4	7	12	19	31	52	86
Massachusetts	2	5	10	15	55	80	100
Connecticut	3	5	9	14	15	25	41
North Carolina	0	4	8	10	25	50	60
Nevada	16	15	2	6	15	20	50
Oregon	1	5	3	8	15	15	25
Texas	0	0	2	10	55	70	75
Pennsylvania	0	0	2	15	30	55	70
Others	7	16	25	54	254	349	237
Non Grid	60	64	40	50	40	40	40
TOTAL	**222**	**356**	**485**	**1000**	**2,225**	**3,150**	**4,094**

Source: Barclays Capital Research, SEIA.

In our tracker work, we tracked 54 net binding and accountable climate policies for CA, NJ and Texas, almost three times greater than the number of policies tracked for the US at the federal level. Some recent significant policies for these three states include:

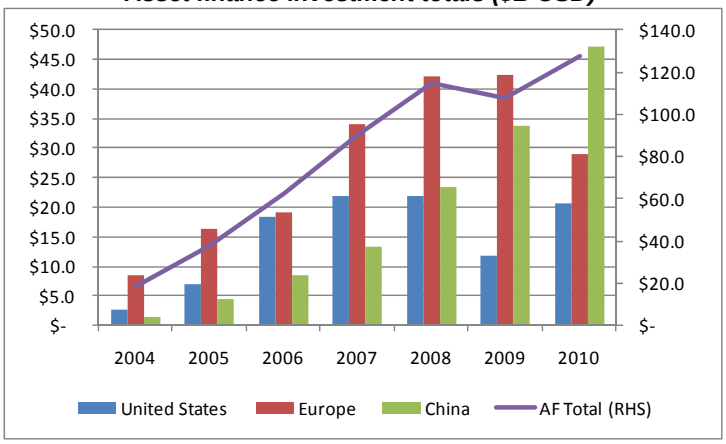
- **CA:** On September 23, 2010 the California Air Resources Board unanimously adopted a Renewable Electricity Standard of 33% by 2020. In December 2010, California's Air Resources Board approved rules for a carbon market, which will limit the GHG emissions and set up a cap-and-trade scheme.
- **NJ:** The state has set an 80% reduction target of greenhouse gas emissions from 2006 levels by 2050. In August 2010, New Jersey Governor signed into law the Offshore Wind Economic Development Act which will create a program that requires utilities to have a to-be-determined % of their power sold in the state come from offshore wind. The bill also created tax incentives for certain businesses engaged in manufacturing wind energy equipment.
- **Texas:** The state has enacted a mandate to produce 5,880 MW of renewables by 2015 and 10,000 MW by 2025. Texas renewable energy is heavily dominated by wind installations not reflected in the PV chart above.

Investment data shows that project investment in clean energy in the US is not as large and is not growing as fast as other regions. It has rebounded from lows seen in 2009, but China and Europe outpace the country. However, the US remains the primary area of focus for venture capital and expansion stage private equity investors. Venture capital firms often invest in the US but seek to deploy clean technology globally to regimes with policy regimes embodying stronger TLC.

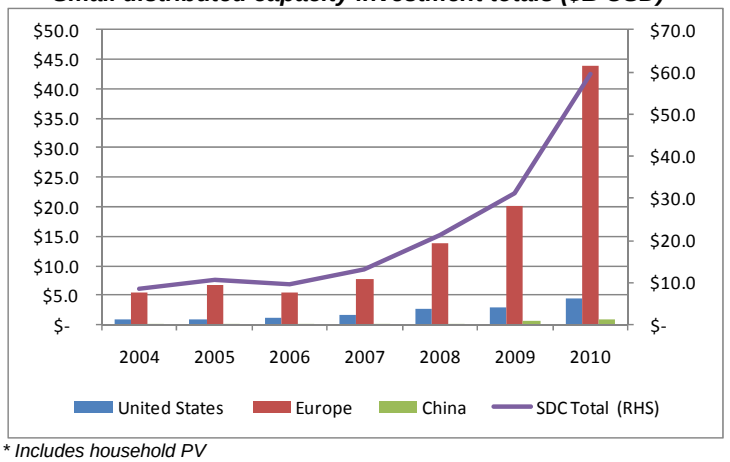
Key Themes

Comparing key financing flows across the world

Asset finance investment totals ($B USD)

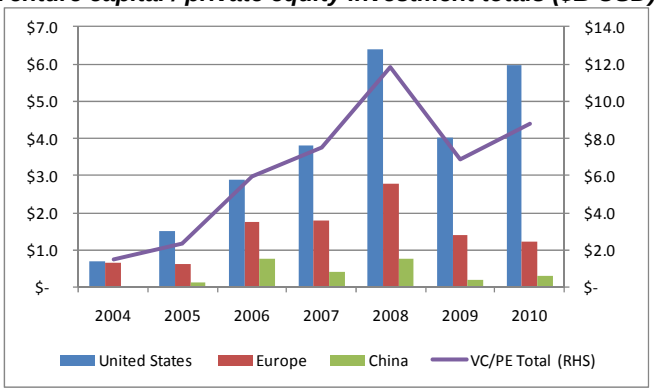


Small distributed capacity investment totals ($B USD)*



** Includes household PV*

Venture capital / private equity investment totals ($B USD)



Source: Bloomberg New Energy Finance, 2011.

Key Themes

6. Gas as a lower-emission transition fuel in the US

DBCCA Electricity Supply Mix Forecast

US Electricity Supply (% total kWh)	2005A	2009A	2020E	2030E	Comment
Coal traditional	50%	47%	34%	21%	Reduced to meet emissions target and comply with EPA regulation
Coal	0%	0%	0%	1%	Limited deployment 2020-2030 with government R&D support
Natural gas	19%	23%	30%	35%	Coal to gas fuel switch, underutilized assets, strong new build
Natural gas	0%	0%	0%	0%	No deployment, assume that gas is viable post 2030 and cheaper $/MWh than coal
Petroleum	3%	0%	0%	0%	No additions; existing capital stock remains for reliability but hardly used
Nuclear	19%	20%	21%	23%	Modest gains from nuclear steam generation "uprates" and limited new builds
Wind and solar (intermittent)	0%	2%	9%	14%	Large capacity additions; transmission and dispatchability limit growth vs potential
Baseload renewables (geothermal & hydro)	7%	8%	6%	6%	Share decreases modestly as only very limited new builds
Total	**100%**	**100%**	**100%**	**100%**	
Renewables share total (intermittent and baseload)	9%	10%	15%	20%	Doubling of share 2010 to 2030 due to wind and solar additions to meet RPS
Electricity Demand (kWh)	4,055	3,784	3,978	4,181	0.5% CAGR growth due to energy efficiency and operational improvements
CO2 emissions (mn metric tons)	2,397	2,200	1,691	1,347	Emissions reduced substantially due to the coal to gas fuel switch and build-up in renewables
% CO2 emissions reduction vs. 2005		**-8%**	**-29%**	**-44%**	

Source: EIA, DBCCA analysis 2010.

Given the start-stop nature of renewable energy deployment, a coal-to-natural gas fuel switch in the US would help to ensure a reliable electricity system that is not only much cleaner but also more environmentally sustainable. A significant switch by the US electricity sector from coal to natural gas-fired generation would be the most secure, least cost approach to lower emissions. (On the basis of publicly available data, burning natural gas creates approximately half the amount of CO2 compared with coal). These reductions would be realized by using domestically abundant and secure sources of energy based on known technology that can easily be deployed at reasonable cost.

In our paper, *Natural Gas and Renewables: A Secure Low-Carbon Future Energy Plan for the United States* (November 2010), we set out a pathway where coal's share of power generation decreases to 22% by 2030 compared to 47% in 2009, while the share of natural gas generation increases from 23% in 2009 to 35%. Wind and solar increase from 2% in 2009 to 14% in 2030. Renewables, natural gas and nuclear energy contribute 41%, 35% and 16%, respectively, to the reduction in power sector CO2 emissions by 2030. Total electricity sector natural gas demand increases to 9.7 Tcf per year in 2030 versus 6.9 in 2009, a 2.8 Tcf incremental increase. US aggregate natural gas consumption increases to 27 Tcf in 2030 compared to 22.6 Tcf in 2009. Total electricity sector coal demand decreases from 930 million tons per year in 2009 to 460 tons per year in 2030. We forecast total installed US renewable capacity to increase from 34.7 GW in 2009 to 126 GW in 2020 and 219 GW in 2030. Transmission grid improvements need building out to accommodate renewables and are expected to total $41 billion through 2020 and will reach $158 billion by 2030. We expect that at least 32,000 miles of transmission lines will be built by 2020.

Key Themes

Capital investment in new gas-fired generation to replace the retiring coal fleet totals $39 billion between 2010 and 2030, resulting in 13,000 MW of cumulative natural gas additions from 2010-2020 and 20,500 MW of cumulative additions from 2020 to 2030.

7. Climate markets have offered varied performance across asset classes and sub-sectors

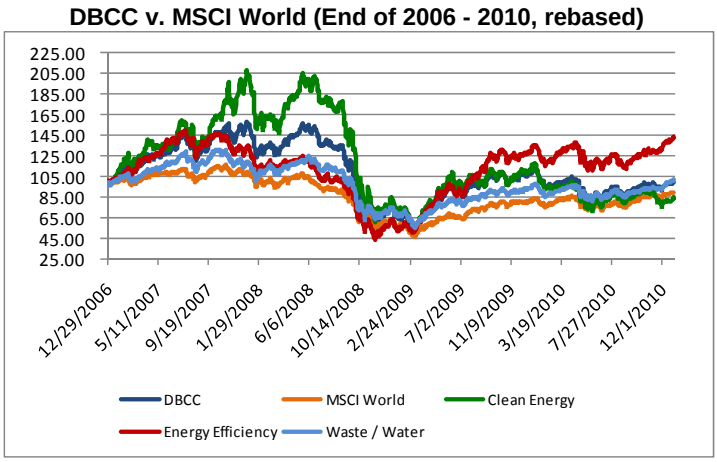
Returns have varied significantly across asset class proxies, sectors, and time frames. Recent returns have been driven by policy headwinds and strong cross-asset correlation in the financial crisis. PE, VC, and Infrastructure represent proxies for the climate change asset classes, with expectations that actual climate asset returns have been and will be stronger, as seen in part by relevant IPOs, acquisitions, and project level IRRs. Clean energy has faced significant policy challenges, leading to recent underperformance in particular and high historical volatility. Energy efficiency has performed well in the public equity markets. It is a future area for project level investment, and it requires less policy support than other climate sectors. Agriculture has performed strongly in public equity markets with the recent run up in commodity pricing, and the long-term investment theme presented in DBCCA's 2009 Investing in Agriculture paper persists.

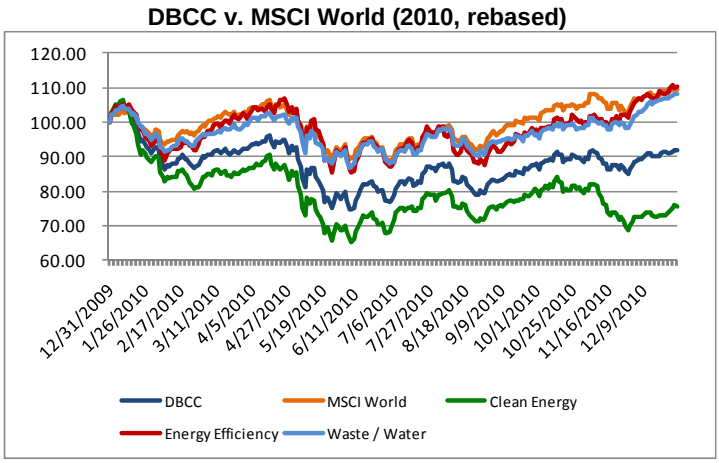
		1YR	2YR ANN	3YR ANN	4YR ANN	4 YR Vol
Asset Class Proxies	MSCI ACWI (Global Public Equities)	10.4%	20.5%	-6.4%	-2.6%	25%
	Infrastructure Proxy	9.1%	17.2%	-5.2%	0.2%	23%
	Bonds Proxy (Lehman Agg)	9.9%	15.3%	13.6%	13.1%	8%
	Private Equity Proxy (Cambridge Res.)	6.0%	-2.9%	-0.4%	7.2%	13%
	Venture Capital Proxy (Cambridge Res.)	1.1%	-6.0%	-2.5%	3.1%	9%
Energy	Crude Oil (WTI)	15.1%	43.1%	-1.6%	10.6%	46%
	Natural Gas (Nat'l Balancing Pt.)	75.9%	2.1%	6.7%	24.6%	63%
	Natural Gas (Henry Hub)	-27.4%	-13.3%	-16.1%	-6.4%	65%
Climate Public Equity	DBCC (Clean Tech Public Equities)	-8.3%	17.2%	-13.9%	-0.1%	36%
	Clean Energy (Public)	-24.3%	3.6%	-25.2%	-4.1%	47%
	Energy Efficiency (Public)	10.4%	54.2%	1.8%	9.3%	38%
	Waste Management & Water (Public)	-3.1%	11.8%	-8.6%	-2.3%	25%
	Public Agribusiness (DXAG Index)	22.2%	41.4%	-0.9%	16.6%	38%

Source: DBCCA analysis, 2011.

Clean energy public equities have a small-cap bias, and many feature capital intensive and cyclically exposed business models. The DB NASDAQ OMX Clean Tech Index is an accurate representation of the global clean tech industry, covering clean energy, energy efficiency, transport, waste management and water. The index is a collaboration between DB Climate Change Advisors (DBCCA), a member of the Deutsche Bank Group, and NASDAQ OMX. The price return clean tech index has outperformed the MSCI World Index from the end of 2006 by 9.8% on an absolute basis; on an annualized basis, the DBCC returned (0.1%) and the MSCI World returned (2.6%). There has been strong recent performance from the energy efficiency sector through the end of 2010. The water theme has returned a less volatile but more consistent and stable return, and clean energy has seen periods of strong outperformance and higher volatility. From the start of 2009, the relative bounce back in some commodity and energy prices also contributed to the rebound off the bottom of the market in 2009, although natural gas prices remain depressed. During 2010 political uncertainty over government incentive programs such as Feed-in-Tariff revisions and sovereign credit fears initially placed negative downward pressure on the clean tech theme. Policy uncertainty remains a key risk factor for the sector, but as our policy tracker work shows, there is still broad support globally.

Key Themes

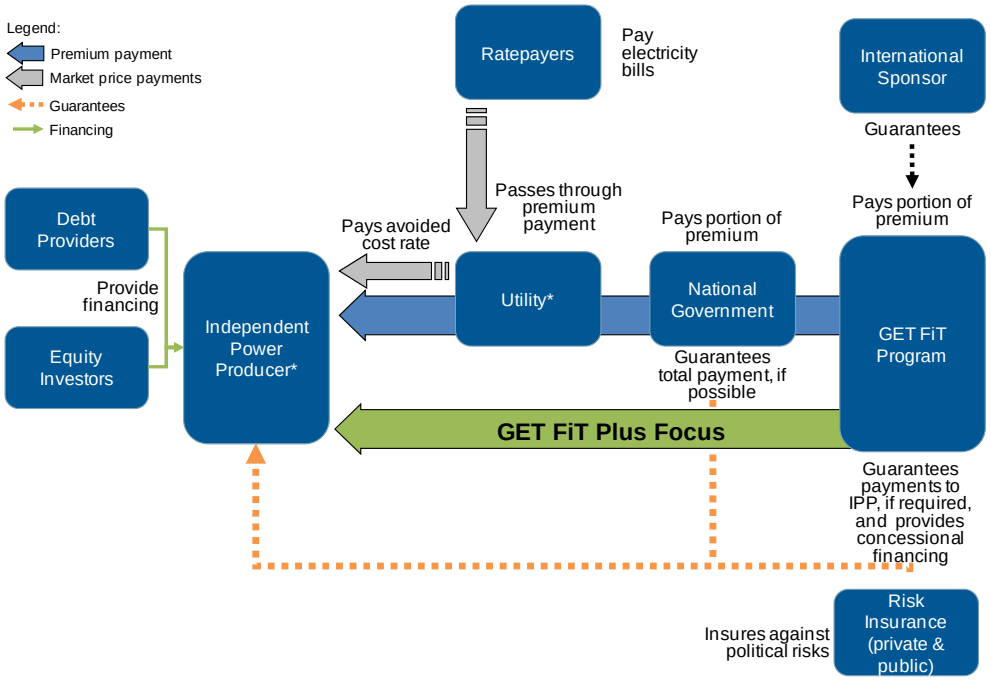




Source: Bloomberg, Nasdaq OMX.

8. In the run up to and following Cancun, global policy makers recognized the need for a more in-depth dialogue to explore how public and private sector funds could most effectively deliver support to renewable energy scale-up and energy access in developing countries.

The GET FiT Program is structured to address a broad range of risks and barriers faced by investors and financiers



Source: DBCCA analysis, 2010.

Direct financial support and risk mitigation strategies can create the financial conditions necessary to attract domestic and international capital. In developing countries, however, renewable energy projects can also face an array of non-finance challenges. GET FiT seeks to address the challenges by coordinating existing resources in the energy sector and directly involving domestic players in the development of renewable energy expertise and capacity.

Key Themes

The Global Energy Transfer Feed-in Tariffs (GET FiT) Program is a concept to specifically support both renewable energy scale-up and energy access in the developing world through the creation of new international public-private partnerships, with the public partner implementing a strong and transparent regulatory environment and funding for the renewable premium while the private sector deploys capital to fund the projects, as well as using concessional and loan guarantee financing particularly in hybrid structures.

- GET FiT identifies the key public sector financing instruments, outlines their potential impacts both quantitatively and qualitatively, discusses their constraints and availability, and considers the potential for hybrid public sector approaches.
- GET FiT recognizes the need to establish an enabling environment for RE technologies and the key role that technical assistance plays to support developing country governments' efforts to create such an environment.

GET FiT insures a maximum incentive capture at least cost to the funding partners. Importantly, it would provide what is crucial for private investors: Transparency, Longevity and Certainty – TLC.

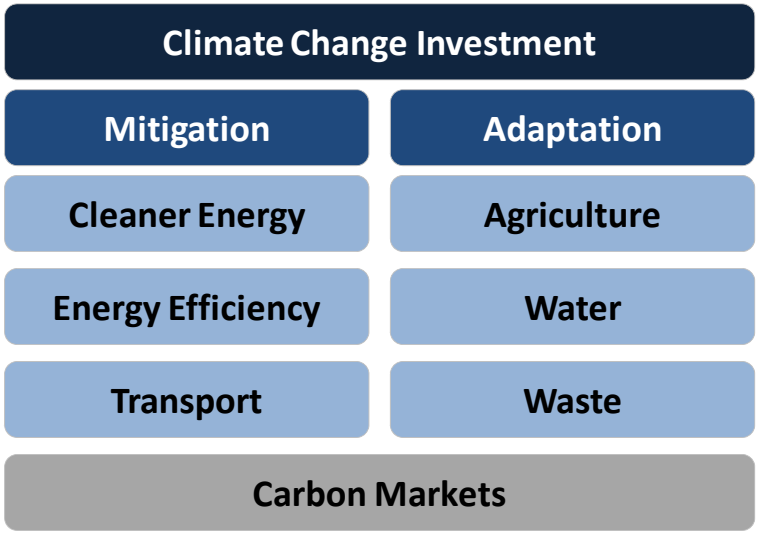
I. Climate Change Investment Thesis

Bruce M. Kahn, Ph.D.
Director
Senior Investment Analyst: New York

Section I: Introduction

Climate change is a long-term trend which will affect the value of assets in the real economy and will produce long-term investment opportunities. We define the Climate Change Investment Universe as those companies that mitigate climate change by developing low-carbon emissions technologies or adapt to climate change; e.g. companies that foster energy efficiency and cleaner energy, or respond to new pressures on society and the economy from climactic changes, such as food production and water management. The transition to a lower carbon economy creates opportunities for active asset managers, but also requires understanding the supply and demand dynamics of traditional energy commodities such as natural gas, coal, oil as well as agricultural commodities.

Climate change investment spans both the mitigation and adaptation themes, and covers a wide variety of investable sectors.



Mitigation covers investments that serve to reduce or remove greenhouse gas emissions from the atmosphere. Adaptation covers investments that seek to respond to the physical effects of climate change. Carbon markets act as an enabler for both themes, and thus span both categories (For a full description of the Climate Change Investment Universe, See Appendix 1)

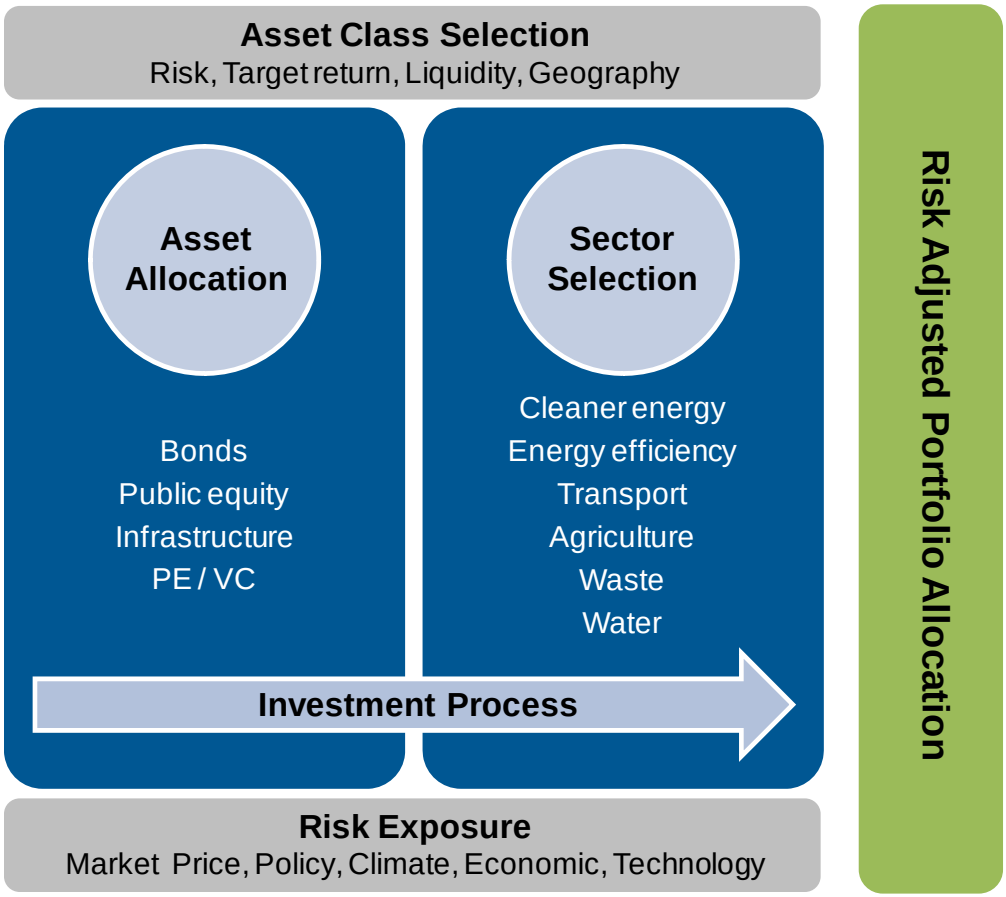
Our investment thesis rests on this longer-term mega-trend of climate change which creates opportunities across asset classes. However, markets, economies and policy support for climate change industries can be volatile and generate asset-class specific risks that require in-depth understanding and active management. Markets, such as the public equity markets, are volatile and movements in prices can be dramatic. Economic cycles are also volatile, and the recent recession is evidence that systemic risk can impact all asset values. Many renewable energy technologies are in different maturity stages, and therefore require different levels of funding, coming from different sources of capital. Often financing of renewable energy will be subject to the variable rate of adoption and commercialization of new technologies. And finally government policy volatility, or more obviously lack of policy, can result in short-term asset mis-pricing and a reluctance to deploy capital. Policy and incentives are key drivers in many of the markets because many climate change investments

I. Climate Change Investment Thesis

such as wind and solar are not yet commercially viable on their own. This does vary by sector, however, and in some sectors large incentive support is not needed, even though market adoption is only just beginning.

One obvious way to reduce exposure to climate policy risk is to invest in the least policy-exposed asset classes. The asset class with the most advantaged method of managing that risk, through contracted cash flows is preferable. However, investment returns can be commensurate with risk, so accepting and managing policy risk in higher returning assets is also a valid approach.

Illustrative Risk Adjusted Portfolio Allocation



Portfolio allocation requires in depth analysis of asset class attributes, sector selection and risk exposure. Climate change investing is a lens through which we assess these factors in light of the unique attributes such as climate change related policy, technology risk and market/economic risk, in order to capture the upside opportunities, while managing the downside risks of climate change.

In Investing in Climate Change 2010, we focused on quantitative returns and risks rather than unpacking the constituents of risk by asset class. This last year, 2010, exhibited significant uncertainty in markets and climate change related policies due to the global economic recession, governmental budget problems, and the lack of credit. Investor focus has thus turned to looking at risk. This reflects a shift in institutional asset allocation trends towards a portfolio level consideration of climate change. Investors, such as CIO's can focus on how various climate change strategies can be added to a portfolio, their impact on mitigating the climate impact risk and the portfolio level risks such as diversification / correlation. In this section, we seek to evaluate risks associated with climate change investing across the different asset classes and provide frameworks for investors to understand how asset managers manage those risks.

I. Climate Change Investment Thesis

Climate risk, the exposure a given investment has to the physical impact of climate change is actually very hard to measure and manage. Our colleagues at Mercer Responsible Investment Consulting have attempted to understand this dynamic. They have launched a public report on February 15, 2011, entitled Climate Change Scenarios - Climate Change Scenarios - Implications for Strategic Asset Allocation[1]. The study utilizes scenario analysis and risk factor analysis to quantify the potential investment impacts of climate change for larger, global investors across their asset allocation, Mercer developed a three-factor framework to examine climate change risk: technology, policy, and physical impacts, or TIP™. The Mercer model shows that uncertainty around climate change poses material risks to portfolios out to 2030, the time horizon for the project. While technology investment is seen as a positive contributor to returns over the life of the study, uncertainty around policy contributes significant levels of risk across scenarios. In our analysis, we build on these conclusions to look in-depth at asset class characteristics, current policy incentives, and technology development that may encourage investment.

And while the above-mentioned risks certainly require management, the returns investors look for partly reflect the nature of the asset classes and are commensurate with the risks inherent in each asset class. Despite recent volatility, the return potential for public equities can be significant, where investors are looking for secular movements in a variety of industries across the climate change universe. The Private Equity and Venture Capital asset class also continues to show opportunity for capital deployment and exit opportunities to strategic buyers and into the IPO market. More measured returns, yet with lower risk, will come from the infrastructure markets, where returns are in the low double digits, but have a more secure yield embedded into the return. Investors can seek out strong risk-adjusted returns from the climate change tilted fixed income asset class, which can act as a hedge against further development expansion of carbon markets. And finally, investors can deploy a carbon overlay strategy using carbon offset credits to hedge their carbon price risk at a portfolio level.

Section II: Long-term Asset Class Risk and Return Attributes

Asset classes have a variety of attributes that provide investors with portfolio level diversification. In climate change investing these asset classes each have their own traditional attributes plus attributes specific to climate change due to the unique challenges of the physical impacts of climate change. The table below first reviews the traditional attributes of the asset classes most widely used in climate change investing. Most asset classes are global in nature, yet differ in their liquidity, types and sophistication of investment vehicles and their target returns. (Note that we have not included commodities or timber at this time, even though they are a component of the climate change universe). At the portfolio level, risk and returns are managed by examining the volatility of returns of an asset class but also the degree to which the asset class is correlated to others and how much diversification benefit the asset class provides to the portfolio.

Institutional asset owners such as pension funds, endowments and foundations, traditionally evaluate risks across and between asset classes in light of the timeframe and the return potential to meet their long-term liabilities. These institutions also evaluate fund management teams and their operating histories, but they tend not to evaluate individual investments or projects. Investment fund managers are concerned less often with cross-asset class interactions, but review risk at both a deal / investment level and at a portfolio level. At the deal / investment level, fund managers perform deep analysis of all significant risk and return factors potentially affecting the investment. At a portfolio level, managers evaluate the interaction between investments and the exposure of the aggregate portfolio to external factors. Depending on the asset class, managers seek to optimize or reposition the portfolio as market conditions shift.

1 http://www.mercer.com/climatechange. The project was completed by Mercer's Responsible Investment and Financial Strategy Group collaborating with the International Finance Corporation and the Carbon Trust as industry sponsors, 14 Asset Owner partners as well as the Grantham Research Institute at LSE as climate change research partner.

I. Climate Change Investment Thesis

Asset class descriptions

	Fixed Income	Public Equity	Private Equity / Venture Capital	Infrastructure
Description	Publicly traded debt securities issued by corporations or governments	Publicly traded equity securities issued by corporations	Earlier-stage investment in private companies	Project level ownership of infrastructure-related assets
Risk	Low	Med	High	Med
Target Return	3-6%	5-20%	20-30%	10-15%
Volatility	Low	High	Low	Low
Liquidity	Med-High	High	Low	Low
Vehicles	Direct / Fund	Direct, Active & Passive Funds, Hedge Funds	Direct, Fund, Fund of Funds	Direct/Fund

Source: DBCCA analysis, 2011.

Each asset class has attributes that are unique for climate change investing. Each asset class provides a set of returns opportunities associated with mitigating and adapting to climate change as well as a unique set of investment risks that require management. As asset managers, we seek to understand these risks and manage them accordingly. Finally, we consider here, not the weighting to each asset class, but the various dynamics within each asset class.

From an investment perspective, we manage asset pricing risk, which is the potential volatility of the investment itself, in terms of the price of purchase and the value of exit or sale. This encompasses the volatility of the value during the holding period. We also take into consideration macroeconomic factors such as GDP, interest rates, inflation, etc. which can have a strong influence on the strength of the investment.

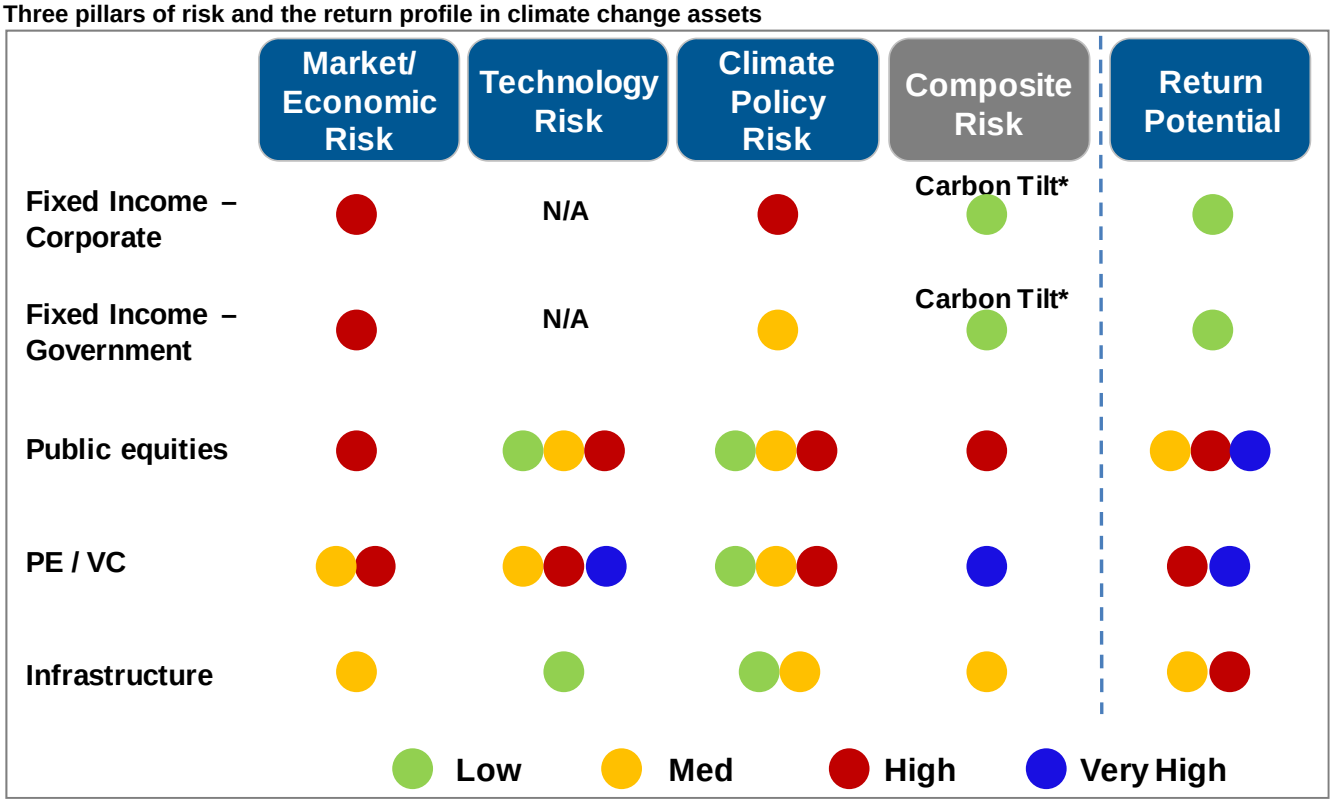
Each asset class also has various exposures to technology risk. While Public Equities are subject to the spectrum from low to high in technology risks, as is Private Equity and Venture Capital, Infrastructure investing takes very little to no technology risk, as does the fixed income asset class. The overwhelming risk that climate change investors face today is the climate policy risk, the degree to which an investment is subject to policy changes or incentive programs. In the next section we outline how these risks are identified and managed in each asset class by looking at the risk and return characteristics in climate sectors.

In this paper, we analyze risk by climate change asset class and map it across three primary categories – economic / market risk, technology risk, and climate policy risk. These pillars aggregate to produce a composite / price risk. The asset class' risk is then viewed quantitatively in conjunction with return potential at an asset class proxy or climate change public equity sub-sector level. Investors pursue asset allocation as a function of these two measures and seek to meet their individual investment goals at a portfolio level. Summaries of the asset class level findings are listed below.

We evaluate return potential for each asset class based on historical returns and future prospects of the asset class. Fixed income return expectations range from 3-6%, where as public equities return expectations are 6-10%. Due to the high risk/return potential of PE/VC, we have scored this asset class as Very High risk with a return potential from 20-30%. And finally, due to the conservative nature of infrastructure investing we have scored this asset class a medium risk with medium to high returns in the 10-15% range in the near term.

I. Climate Change Investment Thesis

Three pillars of risk and the return profile in climate change assets



** Carbon Beta TM is a product of MSCI, formerly Risk Metrics and Innovest. Source: DBCCA analysis, 2011.*

Fixed Income

Fixed Income investing for climate change

Bonds, publicly traded securities issued by corporations and governments, are typically seen as lower risk than other asset classes because they are senior in the capital structure. Bonds have a target yield in today's interest rate market of anywhere between 3-6% and are influenced by spreads relative to benchmarks and interest rate expectations. They are globally issued, have high liquidity.

Corporate bond return profiles are driven by the credit quality, earnings and liquidity of the underlying corporations as well as other variables, including macro-economics, such as interest rate fluctuation, currency changes and inflation, and regulatory changes. Performance of corporate bonds within the climate change context stems primarily from the corporations' exposure to carbon pricing.[2] As the world continues to explore ways of limiting global carbon emissions through policy enactments, many corporations will eventually face increases in costs due to paying for carbon emissions. This will have an impact on corporate balance sheets, and ultimately credit ratings and cost of capital. Therefore, depending on the composition of the underlying holdings and associated regulatory regimes, many fixed income portfolios could have a large exposure to climate policy, whether in the form of mandated carbon emissions reductions or other similar measures.

2 In the case of Risk Metrics Carbon Betz, a number of factors are also take into account, such as low carbon fuel standards, fuel economy standards, low-carbon energy sources, energy efficiency measures and building codes, among others.

I. Climate Change Investment Thesis

Description of the Risks for Climate Change Fixed Income Investing

Economic Risk

Corporate bonds can be subject to "fat tail" events that have significant impacts to corporate balance sheets, but can also be subject to chronic deterioration of the business due to climatic impacts. Government bond returns are also driven by credit ratings, interest rates and inflation and are subject to budget deficits and extreme event risks. Moreover, climate change will have an impact on economic growth, potentially disrupting economies and causing large public expenditures, which may impact spreads.

Technology Risk

Typically large-cap corporate bond issuers do not have much technology risk. However, issuers may have increasing exposure to the consumption, usage and production of conventional technologies along its value chain instead of low-carbon technologies. This could potentially impact corporate balance sheets from two sources. First, in-house risk due to fulfillment of emissions reductions, and secondly, upstream supply chain risk and downstream product usage and disposal risk.

In the transition to a lower carbon economy, debt will comprise 6 out of the 10 trillion dollars needed for low-carbon energy[3] and some of these debt issuances will come from corporate balance sheets. This presents an opportunity for new sources of debt capital to finance renewable energy. In that case, there may be some technology risk, but presumably this will be adjusted for in the bond rating at issuance.

Policy Risk

A corporate bond portfolio that integrates a carbon price into its investment process is subject to different potential global carbon market developments as discussed in policy section. In effect, tilting a bond portfolio to best-in class carbon management will reduce the impact of a discussion or actual implementation of carbon pricing. From our experience, such a tilt also tends to produce overall lower downside risk.

How to manage climate change fixed income risks: The carbon market hedge

Climate change risk exposures can be assessed by comparing the performance of a given bond relative to its peers and a company's positioning with respect to risk factors that result from climate change, including regulatory risks and opportunities and its ability to benefit from a carbon-constrained economy. Companies that reduce their carbon footprints and demonstrate responsible environmental policies are likely to face fewer risks and benefit from lower costs of capital.

In a climate ratings system, companies are evaluated for climate risks relative to their sectors. The carbon intensive sectors clearly have more risk to their businesses than those less carbon intensive companies. Therefore, the rating system evaluates each sector relative to itself and does not make comparisons between carbon intensive and carbon non-intensive industries. The ratings can serve as a leading indicator for management quality and long-term financial performance. In particular, ratings can identify companies that are relatively better positioned to perform in a low-carbon economy. These companies are considered to be more efficient, innovative and with well-managed risks. Such ranking systems also can highlight higher risk companies.

Credit strategies that carefully select securities which are well positioned for future carbon policy or other similar measures generally show an almost similar return versus a credit model "un-hedged" to carbon policy during a period of weak and geographically variegated carbon policy. However, experience has shown a lower risk profile relative to a benchmark, due to the fact there are already some carbon markets in place, the risk of carbon legislation in the US and the litigation pressures on large emitters and the general proxy for good management that the carbon signal provides.

3 HSBC, 2011 estimate.

I. Climate Change Investment Thesis

Using a series of data sources, we can fine tune our credit models to have greater exposure to the best managed companies, or those best positioned to respond well to subsequent carbon and environmental policy. In the mid-to-long-term, carefully selected portfolios with the carbon tilt may even outperform a "classic" credit model portfolio and also the benchmark as some countries will continue or start to punish emissions. Finally, in today's market conditions, above-average rated companies which operate in a jurisdiction without an explicit carbon price consider carbon in their strategy and so are better positioned to perform in an increasingly carbon-constrained economy.

Public Equity

Public equity investing for climate change

Public equity investing for climate change investors generally falls into thematic strategies. Climate change funds typically cover stocks that include renewable energy and its value chains, energy efficiency technologies, transportation stocks including vehicles, batteries, and fuels. More and more specialized funds are including agriculture and water management as well as waste management. Typically the drivers of return in public equities are related to macro-economics, sector drivers and the business cycle. Manager skill and investment style and process are also key components to success. Stock specific factors such as price-to-earnings multiples, revenue and margin growth are also key factors that drive stock prices. Historically renewable energy, as a sector, has moved in sync as a group and in lock-step with energy commodity prices. However, more recently, due to diminishing incentives across the industry and lower natural gas prices, there is subtle evidence of a decoupling of renewable energy to oil. Often it is small to mid-cap stocks that comprise the universe.

Public equity investment highlights the distinction between asset owners and fund managers. As mentioned earlier, risk analysis varies between these two categories of investors. Asset owners are concerned with the higher level macro-conditions affecting markets, the inter-relation between sectors, and the operating history of target fund managers. Fund managers focus on the details of individual investments and portfolio level exposure. Both types of investors track similar indicators, but the nature of their responses and actions varies given the different scale of focus.

Description of the Risks for Climate Change public equity Investing

Economic Risk

The economic risks are rated as high in the table on page 22, as Climate Change public equity tends to exhibit a strong correlation to all public equity in the time of a crisis. Many stocks are capital intensive and cyclical.

Technology Risk

Technology risk can be low, medium and / or high in any number of stocks. For example, the IPO of an automobile battery company exhibits high technology adoption risk, whereas a leading Energy Services Company (ESCO), a producer of energy efficiency technologies such as advanced thermostats, shows medium technology risk and a utility company generating cleaner power a low risk. For the wind and solar stocks, there has been considerable technology risk during the market adoption phase. Now, due to greater experience and moving down the learning curve of technology (the Moore's law of clean tech), the move to low cost manufacturing of turbines and modules in China has put pressure on European technology manufacturers, such as in Germany. Therefore, the risk of holding German solar stocks became too high as manufacturing moved to China. This is also due in part to the strong incentives China has put in place to finance manufacturing of clean tech equipment in China.

Policy Risk

Public stocks are affected by climate policy and are often seen as the real time barometer of the industry's strength. The trickle-up effect of policy risk is most strong and immediate in the pricing of public stocks. Public market investors are

forecasters of earnings and therefore discount the future policy uncertainty into today's price. Take, for example, the announcement of the change in the Spanish Fit which resulted in a large sell off of renewable stocks in anticipation of a drop in demand for projects and equipment. This tumult has now been further exacerbated by the Spanish solar industry announcements of its intention to sue the Spanish government over the retroactive tariff reduction.

Policy risks associated with subsidies are a significant risk. Once a new technology has been introduced and subsidized, e.g. for the solar industry, the related stocks experience multiple expansion. Exceptionally high profits are realized as the subsidies are often quite generous in the beginning, when the government wants to give strong incentives to grow that industry, and competition is quite low. However, the threat of incentive cuts will always weigh on the stock performance and drive investors to lower cost producers.

How to manage climate change public equity risks

Again, stocks are the ultimate measure of risk / return in the climate change market due to their forward looking nature. Public equity investors in climate change, while varying by investment mandate and benchmark, have the same tools to manage portfolio risk as all equity managers have: allocation to cash, weighting of the portfolio and in some cases using shorts or derivatives to protect positions. However, as climate policy has a significant impact on these sectors, public equity investors need to stay abreast of policy changes even more acutely than their more generalist portfolio managers, who pay attention to broad economic policy.

There are other climate change policies that are not at risk such as the US-CAFE rules or the worldwide phase out of incandescent light bulbs or the European initiative to make all meters smart by 2022. Here public equity investors can look at the stocks that are related to those restrictions and experience lower volatility compared to stocks that are dependent on subsidies. Therefore, when managing policy risk in public equities, one can balance the weighting of companies that have high policy risk due to a direct industry incentive with allocations to companies where the risk is lower due to a restrictive policy.

Private Equity (PE) and Venture Capital (VC)

PE/VC investing for climate change

Climate change investors in Private Equity are seeking global exposures to attractive risk-adjusted investment returns ranging from 20-30%, by investing in a diversified portfolio of businesses across the clean tech investment universe. The investments are diversified across various sectors, company life-cycle phases and geographies. As companies reach commercialization, they face high cash demands and a significant scarcity of capital, the so called "valley of death". Private Equity directly addresses this market disconnect. Companies generally cannot commercialize without this growth capital. Our analysis covers the earlier stage VC and later stage expansion capital stages of PE / VC investment. We do not address larger leveraged buyouts. As discussed in Chapter IV on Markets, the two earlier stages of PE feature different risk/return profiles. Earlier stage VC invests in very immature companies with potentially significant binary risk that a technology or business model will not develop. Expansion PE looks to fund the growth and development of established businesses to full commercial scale.

Description of the Risks for Climate Change PE/VC Investing

Economic Risk

PE/VC is subject to negative economic conditions by the failure of businesses to grow revenues due to harsh economic conditions. For example, when industrial demand for power decreases in the case of a recession, the demand for a new replacement technology becomes less a priority for large off-takers. This delay in new technology adoption can leave early

and expansion stage companies in difficult positions, often causing these companies to go out of business. Therefore the economic conditions can be a serious risk. For example, $32 billion dollars was raised for PE/VC in 2000-2008, but during the crisis, the flows dropped to $6.8 billion in 2009, only to rebound in 2010 to close to $7 billion (as of3Q2010). PE/VC Funds typically invest through economic cycles (3-5 year investment periods), and target exits come across relatively large periods of time (12-24 months), allowing a "window" to be found. However, more recently, capital efficiency has become a serious concern, where investors who had earlier pursued asset and capital intensive business models are now pursuing capital light investments. Therefore, the economic risk generally is medium to high for PE/VC investing..

Technology Risk

The drivers of return in Private Equity (growth or expansion capital versus the large LBO PE) and VC are in its purest form, the rate of adoption and commercialization of new technologies. The results can range from a binary outcome (zero return on investment and loss of capital) to several multiples of return. Often times the use of leverage and the cost of that debt can have a significant impact on returns as well as the time it takes to deliver the return. That is why PE/VC funds tend to have long lock up periods such as seven or ten years. PE/VC investors are willing to take that technology risk due to their convictions of the technology working and being adopted. They tend to mange this technology risk by investing in many companies in similar technology spaces. Therefore, the technology risk can range from medium to high to very high.

Policy Risk

These private companies are also subject to the same policy risks as the infrastructure asset class. Only infrastructure projects are able to "lock-in" the economics of the underlying projects. Policy risk can also range from low to high, depending on the investments sought after by portfolio managers. Therefore depending on the underlying company, PE/VC investors have low, medium, and high technology and policy risk.

How to manage climate change PE/VC risks

Policy risks are managed by assessing the degree of transparency, longevity and certainty (TLC) in the policy frameworks where investee companies are operating. Loan guarantees and Feed-In–tariffs have been used to help not only the economics of building renewable power projects, but can also be a substantial factor in the economics of the holding company ("HOLDCO") in which PE/VC investors are taking stakes. The sensitivity to returns of policy drift is high, and PE/VC investors are very careful to make investments where a clear and certain path to revenues is unencumbered by the policy risks. Execution risk is a critical feature of PE/VC investing. PE/VC investors seek assurance that the management can execute on their idea and that the markets are ready for their products, keeping in check the other more traditional economic factors, such as the direction of commodity prices, inflation, and currency exchange rates.

Managing technology risk is a great challenge for this asset class. On the one hand, VC's risk-return profile is all based on technology risk, market adoption rate, quality of service, etc. and attempts to uncover those technologies with the best chances of widespread adoption. On the other hand, Growth or Expansion PE seeks to minimize technology risk and deploy capital into firms that have worked out the problems of technology and are now seeking broad scale up. Often, both VC/PE opportunities seek technologies that offer cost reductions or significantly better product performance. More often PE investors may seek out firms where the business model is not new, but is much better executed and able to take advantage of government policy better.

Infrastructure (developed and commercially proven assets)

Infrastructure investing for climate change

Infrastructure investors (as distinct from developers) typically finance established sustainable energy projects such as natural gas, solar and wind power generators and electricity transmission and distribution. These investments seek a 10-

15% gross return with a 5-6% current cash yield. Some of the opportunities in infrastructure included buying low value or distressed assets, taking advantage of the low (er) cost of natural gas and meeting the growing demand for energy security in many nations. While many such projects are subject to macro-economic downturns, these types of investments taking only limited technology risks. Infrastructure investors typically focus on the final operating stage of a clean energy project's lifecycle with an emphasis on cash flow. Other sources of capital help to finance the early stages of development and construction. These stages feature different risk and return profiles than operational stage investments.

Description of the Risks for Climate Change Infrastructure Investing

Economic Risk

Typically these projects are lower risk to investors because the energy revenues being generating are under contract, with credible counterparties therefore giving a high level of confidence in the associated cash flow. Also, these projects carry with them some inflation/deflation protection as these are real assets, not intangibles. There is also a high barrier to entry for project developers as there is a complex regulatory and capital raising environment.

Technology Risk

Infrastructure funds take on limited technology risk by only utilizing technologies that have been commercially proven at scale and therefore generate lower rates of return than Private Equity and Venture Capital.

Policy Risk

Cleaner energy infrastructure projects are subject to policy risk in that the economics of any one project often rely on some sort of government incentive, be it a Feed-in-Tariff, tax credit or other support mechanism, such as a direct grant or loan guarantee. Traditional energy has been exposed to regulatory and policy risks for decades and thus managers should not react any differently in the renewable energy sector. The good news for project level investment is that once an existing policy is locked into that project, say an upfront cash grant or a Feed-in-Tariff, unless the policy is retroactively changed, the cash flows and economic enhancement provided by the policy is secure. However, policy changes to future support mechanisms can leave the whole sector vulnerable to growth opportunities and capital flows in the long run. Weighing these up, we synthesize this asset class as having a medium risk.

How to manage climate change infrastructure risks

Risk to investors in energy infrastructure projects include price volatility of the feedstock and the power sold, as well as regulatory risks. Price volatility is typically managed through hedges and fuel supply contracts and the power is typically sold via contracted off-take agreements, referred to in the US as Power Purchase Agreements (PPA's) and tariffs where Feed-In-Tariffs are available in other regions. The key to managing the regulatory risk in these infrastructure projects is to lock in the cash flow to the project during the window of policy certainty. The overall risk to the infrastructure fund manager is deployment of the capital in a timely manner as well as identifying the best policy framework in the right geography and administrative level (federal, state, local). Other risks include the operating risk and other industrial risks typical of all infrastructure projects.

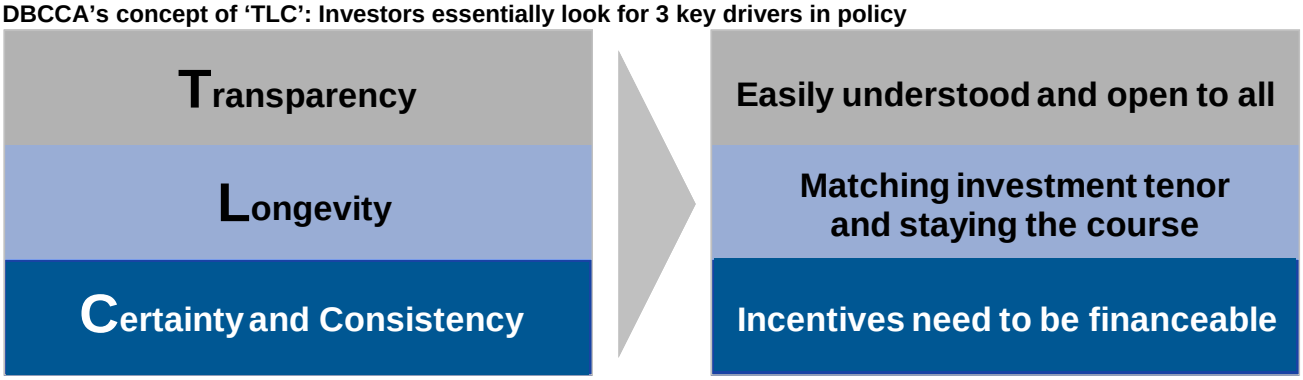
Section III: The Climate Change Policy Risk Framework: A Renewable Energy Case Study

Climate change investing covers a broad range of sectors as mentioned above. We find the cleaner energy sector to be subject to greater policy risk than some of the other climate sectors. Therefore, to illustrate how climate policy risk translates into investment risks, we will use the renewable energy sector as an example. Note that water infrastructure, waste management projects and potentially large transportation infrastructure related to mobility and to agriculture may also be subject to some of these risks.

I. Climate Change Investment Thesis

Investments in the renewable energy sector are frequently driven by government policy and so are subject to government policy risk. Policies that demonstrate Transparency, Longevity an Certainty or "TLC", provide investors with the framework to mobilize capital. However, when polices lack TLC, investors will face increased risk across asset classes.

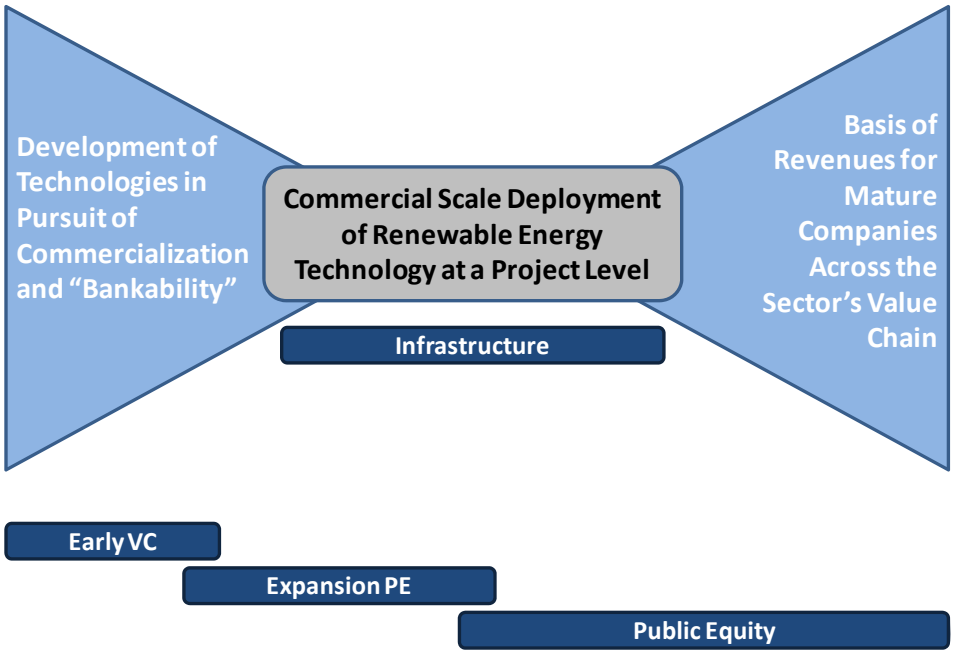
DBCCA's concept of 'TLC': Investors essentially look for 3 key drivers in policy



Source: DBCCA, "Paying for Renewable Energy: TLC at the Right Price: Achieving Scale through Efficient Policy Design," 2009; DBCCA analysis, 2010.

Renewable energy project finance, such as for wind farms and solar parks, is one of the largest and most capital-intensive investment opportunity in the Climate Change theme. These projects are a prime customer for renewable energy equipment and services, such as solar modules or wind turbine manufacturers, often provided by private companies or larger public companies. Therefore, the risks inherent in the policy supporting such projects trickle-up to the companies that are relying on revenue from such equipment sales, and in the case of public project developers, the power generation revenues themselves. And while private companies and projects are all subject to policy risk, the public markets are the real-time indicators of how such risk is being priced.

Policy risk most acutely impacts the industry at the project investment level (e.g. the incentive stack driving returns). Renewable energy infrastructure investors participate at the focal point of clean technology, with the "project" serving as the "customer" for an upstream supply chain that relies on this demand to fund earlier stage technology development activities and provide revenues for later stage firms and their connecting value chain.



I. Climate Change Investment Thesis

Policy Connectivity

The infrastructure asset class, where the focus is on building power plants using solar energy or wind energy as the fuel (feedstock), often rely on government incentives because these technologies are not yet commercially viable on their own. As an example, in the US, tax credits, loan guarantees and cash grants have proven to be successful mechanisms for building renewable energy power projects. For example, over the past decade approximately 52 GW of renewable energy capacity to date in the US has been largely catalyzed by the tax credit system.

In addition, government stimulus funding has also helped to move projects along. One of the most successful outcomes of the American Recovery and Reinvestment Act was the Section 1603 Treasury Cash Grant program, where project developers were provided with cash grants of 30% of project costs to help pay the high upfront capital cost of renewable energy projects, making some "marginal" projects economical. Importantly, the program also filled the market void left from the reduction in tax equity capacity due to the 2008-2009 financial crisis. As of February 2011, some 83% of all section 1603 grants were directed to wind projects.

Globally, feed-in tariffs have been a successful policy mechanism for renewable energy deployment in many countries. Where a FiT is a government-guaranteed payment for power generated by renewable energy, the degree in which this payment is long-lived and certain is critical to the deployment of capital. The best example of this is the German FiT system. And while the payment was passed on to the consumer, the policy did result in over 36 GW of renewable capacity over the past decade. Furthermore, as the costs for solar PV came down faster and stronger than expected, an adjustment of the FiT was necessary with respect to the economics of the projects as well as the political dynamics. If the FiT were not reduced in Germany, the political resistance against the FiT would have increased thereby causing increased policy risk.

Another success story of policy certainty for renewable power is China. The government announced a new FiT for wind and biomass in 2009 and 2010, and also a potential $738 billion plan to develop renewable energy over the next decade. Ontario's Green Energy and Green Economy Act also seeks to deploy significant capital into its renewable energy markets. The Ontario government also enacted North America's first comprehensive FiT program, aiming to install 25 GW of new renewable capacity by 2025.

Policy Risk

However, in the US, due to the disappearance of the tax equity investor during the financial crisis and the stop-start nature of the Production Tax and Investment Tax Credits over the past few years, project finance has declined in sync with those lapses. Often these projects' financial models rely on the cash grant or the tax credit for part of the investment return. Therefore, when those incentives expire, or appear at risk of expiring, project returns are threatened. Also as the fiscal stimulus spending comes to an end project economics will also suffer. While the mechanism in the US of the Production and Investment Tax Credits and Section 1603 differs from the guaranteed payment stream of the FiT, the fall-off of cash flows from expiring policies or reductions in tariff levels, both result in diminished economics for project-level financing.

Furthermore, FiTs are sometimes subject to the risk of wavering governmental support. For example, last year the Spanish government announced it would re-evaluate its FIT system and as a result has now, retroactively, changed the amount of tariff that will be paid to power generators with long-term contracts. This change disrupts the financing of the projects that rely on these tariffs to make their projects economical by changing the return profile. Furthermore, this erodes investor confidence in governmental support of the sector not only in Spain, but potentially more widely across Europe. However, there were many design feature issues in Spain and the government carried the cost on it budget. When Germany announced it was looking to cut tariffs in line with cost, this caused volatility in stock markets. But it was still a rational policy response to declining costs. Although at a company level, there are winners and losers.

These developments in the project finance markets have important ramifications for other assets classes. Private Equity and Venture Capital make investments in new disruptive technologies or proven technologies that have yet to be commercialized. When the policies supporting the renewable energy industry are lacking in TLC, it makes it difficult for PE investors to assess the real market size for a potential investment or for VC investors to be convinced of the end market for a new technology. Supportive programs such as the FiT or the loan guarantee program have been successful for some companies that have received loan guarantees. But for others, a lack of policy support has proved detrimental. Wind power projects are expected to drop in the US by 25% in 2010, due to the uncertainty of the incentives as well as the impacts from the recession, lower natural gas prices and the delayed drop in equipment prices reaching the US markets. And while turbine prices have fallen significantly (reportedly as high as 85%) due to increased competition and larger scale projects, the risk to project financing was the start and stop PTC which had repercussions to the purchase orders for turbines. Also, the failure of some IPO's for wind project developers made clear the importance of tax equity financing and the impact of reducing cash flows from project financings. Overall, there will be winners and losers across each of the asset classes in the renewable energy sector due to the lack of TLC. The key point for investors is that staying up to date on policy developments is important for navigating these markets.

Section IV: Climate Change Investing Returns

In order to understand the return attributes of climate change investing, we are required to use proxy indices for most asset classes. This is because we do not have good long-term data for returns in the clean tech Private Equity, renewable energy infrastructure or bond asset classes. We do have returns stemming from individual company investments (IPOs and M&A exits) plus projected IRR's from renewable energy projects or energy efficiency retrofits, but due to the nascence of this field, good long-term track records and credible indices simply do not exist. What we do have is sufficient data on public equities in the climate change sector.

Therefore, last year in our Strategic Asset Allocation exercise, we developed proxies from the quantitative risk and return attributes of the non-public asset classes and used other public equity indices to represent the public equity asset class. This year, we are using our own DB NASDAQ OMX Clean Tech Index (DBCC) to track public equity and using the returns data from the broad asset class indices to help us look at relative returns and correlations of climate change investing.

Our analysis focuses on climate asset class proxies, measures of traditional energy, and specific climate change sectors in the public equity area. Energy efficiency and agriculture have been strong performers, with efficiency driven by strong demand growth and bullish commodity markets for agriculture. Returns have varied significantly across the other asset class proxies, sectors, and timeframes. As discussed earlier, recent returns have been driven by policy headwinds and strong cross-asset correlation in the financial crisis. PE, VC, and Infrastructure represent proxies for the climate change asset classes, with expectations that actual returns have been and will be stronger, as seen in part by relevant IPOs, acquisitions, and project level IRRs, which is further detailed in Section IV. Clean energy has faced significant policy challenges, leading to recent underperformance in particular and high historical volatility in public equities.

I. Climate Change Investment Thesis

Annualized returns and volatility across asset class proxies, traditional energy, and climate public equity sectors.

		1YR	2YR ANN	3YR ANN	4YR ANN	4 YR Vol
Asset Class Proxies	MSCI ACWI (Global Public Equities)	10.4%	20.5%	-6.4%	-2.6%	25%
	Infrastructure Proxy	9.1%	17.2%	-5.2%	0.2%	23%
	Bonds Proxy (Lehman Agg)	9.9%	15.3%	13.6%	13.1%	8%
	Private Equity Proxy (Cambridge Res.)	6.0%	-2.9%	-0.4%	7.2%	13%
	Venture Capital Proxy (Cambridge Res.)	1.1%	-6.0%	-2.5%	3.1%	9%
Energy	Crude Oil (WTI)	15.1%	43.1%	-1.6%	10.6%	46%
	Natural Gas (Nat'l Balancing Pt.)	75.9%	2.1%	6.7%	24.6%	63%
	Natural Gas (Henry Hub)	-27.4%	-13.3%	-16.1%	-6.4%	65%
Climate Public Equity Sectors	DBCC (Clean Tech Public Equities)	-8.3%	17.2%	-13.9%	-0.1%	36%
	Clean Energy (Public)	-24.3%	3.6%	-25.2%	-4.1%	47%
	Energy Efficiency (Public)	10.4%	54.2%	1.8%	9.3%	38%
	Waste Management & Water (Public)	-3.1%	11.8%	-8.6%	-2.3%	25%
	Public Agribusiness (DXAG Index)	22.2%	41.4%	-0.9%	16.6%	38%

Source: Bloomberg, NASDAQ OMX, DBCCA

Among asset class proxies, public equities, infrastructure, and private equity are strongly correlated. Bonds are not very correlated to other asset classes, and venture capital is moderately correlated with equities and infrastructure, although it has a higher correlation to private equity. Public equity, infrastructure, private equity, and venture capital are moderately correlated to crude oil. Bonds are not correlated with crude oil. None of the asset class proxies are strongly correlated with natural gas. Because it is difficult to get direct proxies for climate change asset classes in sectors other than public equity, we only analyze correlations among climate change sectors within public equities, and this shows that climate change public equity sectors are highly correlated to global public equity markets. They are weakly correlated to bonds, and have moderate correlation with infrastructure, climate change public equity sectors are moderately correlated to crude oil and weakly correlated to natural gas. Climate change public equity sectors are moderately to highly correlated with each other. Crude oil and natural gas are not strongly correlated to each other, yet given time lags in the commodity system, correlations between oil and natural gas would be higher. Both energy prices are dependent on macro-economic environment. Finally, although not shown here, carbon markets had very low correlation to any other market index.

I. Climate Change Investment Thesis

Climate change correlations across asset class proxies, traditional energy, and climate public equity sectors.

Q1 2007 - Q4 2010	MSCI ACWI (Global Public Equities)	Infrastructure Proxy	Bonds Proxy (Lehman Agg)	Private Equity Proxy (Cambridge Res.)	Venture Capital Proxy (Cambridge Res.)	Crude Oil (WTI)	Natural Gas (Nat'l Balancing Pt.)	Natural Gas (Henry Hub)	DBCC (Clean Tech Public Equities)	Clean Energy (Public)	Energy Efficiency (Public)	Waste Management & Water (Public)	Public Agribusiness (DXAG Index)
MSCI ACWI (Global Public Equities)	1.00												
Infrastructure Proxy	0.94	1.00											
Bonds Proxy (Lehman Agg)	0.38	0.51	1.00										
Private Equity Proxy (Cambridge Res.)	0.81	0.73	-0.01	1.00									
Venture Capital Proxy (Cambridge Res.)	0.67	0.56	-0.18	0.94	1.00								
Crude Oil (WTI)	0.66	0.48	0.04	0.73	0.67	1.00							
Natural Gas (Nat'l Balancing Pt.)	0.03	0.00	-0.02	0.20	0.34	0.10	1.00						
Natural Gas (Henry Hub)	0.16	0.20	0.07	0.40	0.34	0.40	0.55	1.00					
DBCC (Clean Tech Public Equities)	0.90	0.85	0.32	0.78	0.67	0.78	-0.03	0.27	1.00				
Clean Energy (Public)	0.78	0.73	0.29	0.73	0.67	0.78	0.03	0.32	0.96	1.00			
Energy Efficiency (Public)	0.89	0.85	0.27	0.70	0.54	0.60	-0.28	0.03	0.87	0.72	1.00		
Waste Management & Water (Public)	0.93	0.85	0.35	0.77	0.65	0.74	0.01	0.26	0.94	0.83	0.85	1.00	
Public Agribusiness (DXAG Index)	0.81	0.74	0.33	0.76	0.67	0.79	0.15	0.36	0.87	0.86	0.70	0.78	1.00
	Asset Class Proxies					Energy			Climate Public Equity Sectors				

Source: Bloomberg, NASDAQ OMX, DBCCA Analysis. Note: Infrastructure is the UBS Infrastructure Index, Bonds is the Lehman Global Aggregate, DBCC and sub-sectors are from the DB NASDAQ OMX Clean Tech Index, Ag is the DXAG Index, PE and VC are the Cambridge Associates Indexes.

We believe the global shift to a low-carbon economy has significant investment implications for fixed income portfolios. Companies that look to reduce their carbon footprints and demonstrate responsible environmental policies are likely to face fewer risks and benefit from lower costs of capital. While we believe that a carefully selected fixed income portfolio that considers companies' environmental and carbon policy--related risks can provide a risk mitigating factor to the overall portfolio's exposure to carbon policy risk, at times that strategy can outperform a non-carbon policy tilted benchmark. The fixed income strategies seek downside risk protection, with relatively low volatility, over a credit cycle and may deliver excess annual returns. Our experience has already demonstrated this feature in the ESG space and we expect it to continue in carbon tilted portfolios.

Additionally, a carbon overlay strategy using carbon offset credits as described in our policy section can serve as a carbon neutrality / risk management solution to provide a carbon neutrality position for portfolios as well as accessing the diversification benefits of carbon as an asset class. There is the potential fundamental price appreciation of carbon as well as using carbon neutralization projects to incentivizing the corporate sector by taking carbon certificates from the market.

Overall, climate change investing across various asset classes can provide some portfolio diversification due to various asset correlations. Investors should consider the correlations of the asset class when looking at asset class weighting. PE/VC, infrastructure and fixed income, all have moderate to low correlation to Public equity and therefore provides the diversification Portfolio managers are seeking. The climate change sectors within these asset classes maintain this diversification attribute.

I. Climate Change Investment Thesis

Section V: Investment Summary – A Long-term Opportunity

Climate change investing is a long-term theme. Navigating the various risks across various asset classes requires due diligence. Many investors now approach this as a risk management issue to be embedded in the investment process. But the rewards are there too. Financial returns from a portfolio of climate change investments can provide competitive returns. Over the past few years and in 2010, energy efficiency and agriculture were strong performers with lower correlation to the broader market and very low correlation to natural gas prices. However, renewable energy suffered from policy uncertainty. As climate policy matures and economic recovery progresses, more climate change sectors such as renewable energy can emerge as winners in the long term.

Indeed, in the longer-term, the continued deployment of new technologies in clean energy and energy efficiency, financing the transition to a lower carbon economy and identifying the leaders in this transition will deliver the returns investors require for their portfolios. And while climate change policy is a strong driver of these markets, the demand for energy security and energy efficiency are also strong driver. Nevertheless, we have seen in 2010 that these themes are subject to market, economic and policy risks in the short term.

Public equities can capture these long-term trends in many sectors. In the long-term, allocations to Private Equity / Venture Capital should deliver returns commensurate with the asset class. We are confident that the policy frameworks continue to emerge globally to support these investments and that the clean technology revolution is underway. Clean tech expansion equity will grow, but not unlike other sectors in that asset class. Yet, our thesis is that these sectors are the growth story of this coming decade. This argument holds true for infrastructure investing as well. The world is poised to build large amounts of energy generating assets including natural gas, solar parks and wind farms. Finally, we believe that fixed income portfolios tilted for carbon management as well as a carbon overlay strategy, will yield superior downside risk protection as the world moves to a lower carbon economy.

II. The Investors

The Investors

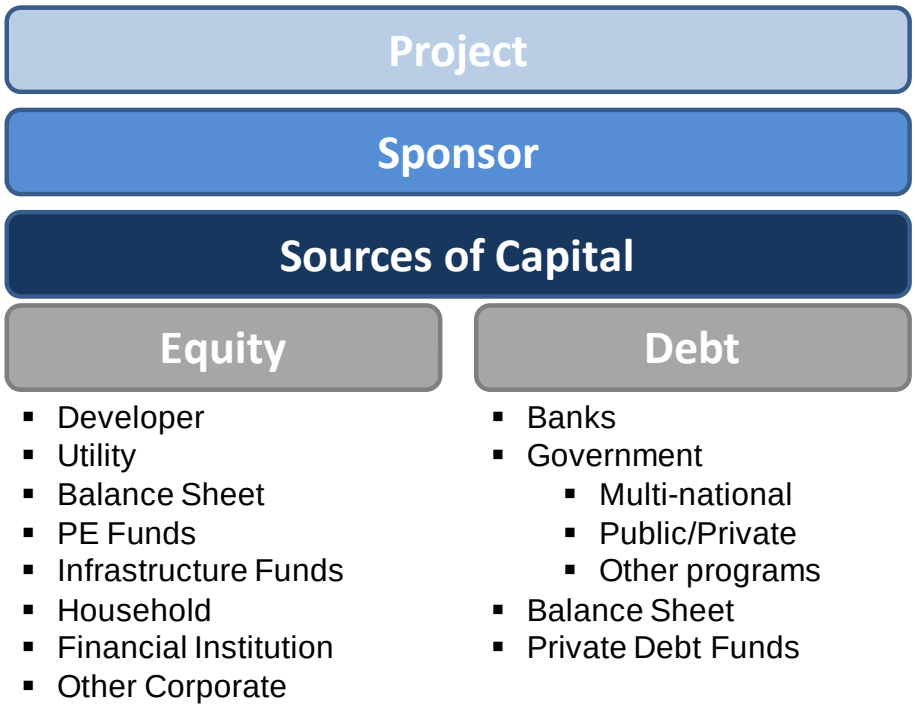
Financial investors in climate change vary broadly from institutional investors (endowments, pension funds, insurance companies), and indeed importantly corporate and to individuals. Interest in the space has grown substantially over the years. And while the interest continues to grow, there have been some periods of concerted interest followed by periods of skepticism or de-priorization. We think that the momentum behind institutional investors in demanding increased disclosures around climate change will result in increased capital deployment in the climate change sectors. Additionally, a move towards more climate sector policy stability will help investors become more comfortable deploying capital. Individual investors are also using climate change investing in their portfolios to diversify their portfolios as well as gain exposure to the growth opportunities.

While some financial investors approach this in terms of using specific strategies to change the shape of their overall risk and returns at a portfolio level, many are looking at systematically incorporating climate risk analyses into all asset classes as yet another investment factor when it comes to looking at any potential investment.

In terms of capital deployment, although there is little data to directly draw upon, corporations are using their balance sheets to deploy capital across all climate change sectors. Importantly, corporations have also continued to grow their commitment to sustainability broadly and climate change more specifically. Investors require solutions that provide returns as well as well-educated risk management. They are also demanding thematic expertise in the field and that asset managers lead the debate and provide thought leadership on the theme. The key is that all investors continue to invest in this space. As we have pointed out the sources of capital for any given investment require many different investor types with a broad range of risk-return profiles. Climate Change offers investors a broad spectrum of opportunities.

II. The Investors

Tracing the sources and uses of capital can be complex in terms of who is the ultimate investor. We show a project finance example.



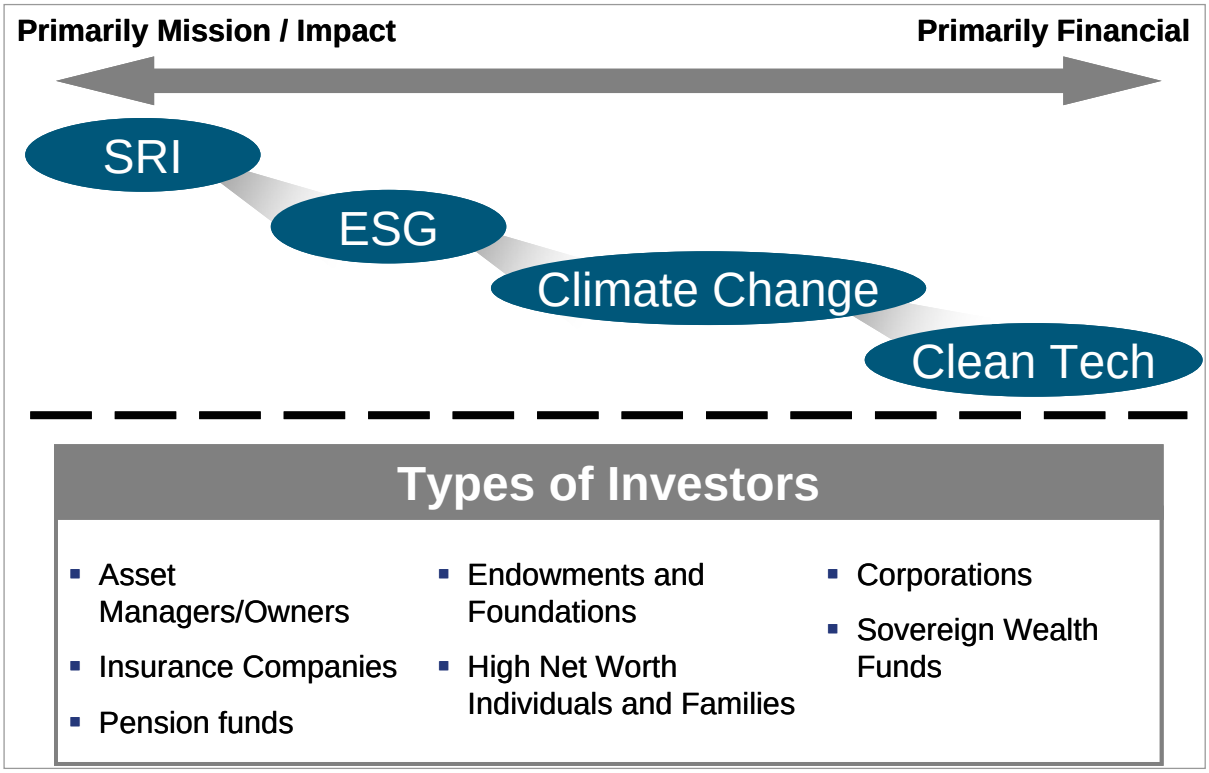
Source: DBCCA analysis, 2011.

Investment in clean energy projects funnels through several layers of aggregation. Investor types are split primarily by debt vs. equity.

- Clean energy projects are typically directed by sponsors. Sponsors arrange capital from a variety of funding sources. They also work to optimize the capital structure between debt and equity depending on the requirements of the project and the investor.
- Sponsors include developers, utilities, households (small-scale solar in Germany, for example), and other corporate and financial institutions
- Equity and debt capital have distinct sources, although there is some overlap between them
- Clean energy projects are also segmented by stage, which, although not shown here, shapes the source of capital
- Availability of financing is a key constraint for project level investment
- Institutional investors such as pension funds or endowments usually invest in PE or infrastructure strategies directly.

II. The Investors

Investment mandates are both hierarchical and distinct in their specific focus on climate change sectors and strategies. Many different types of investors will be interested in climate change.

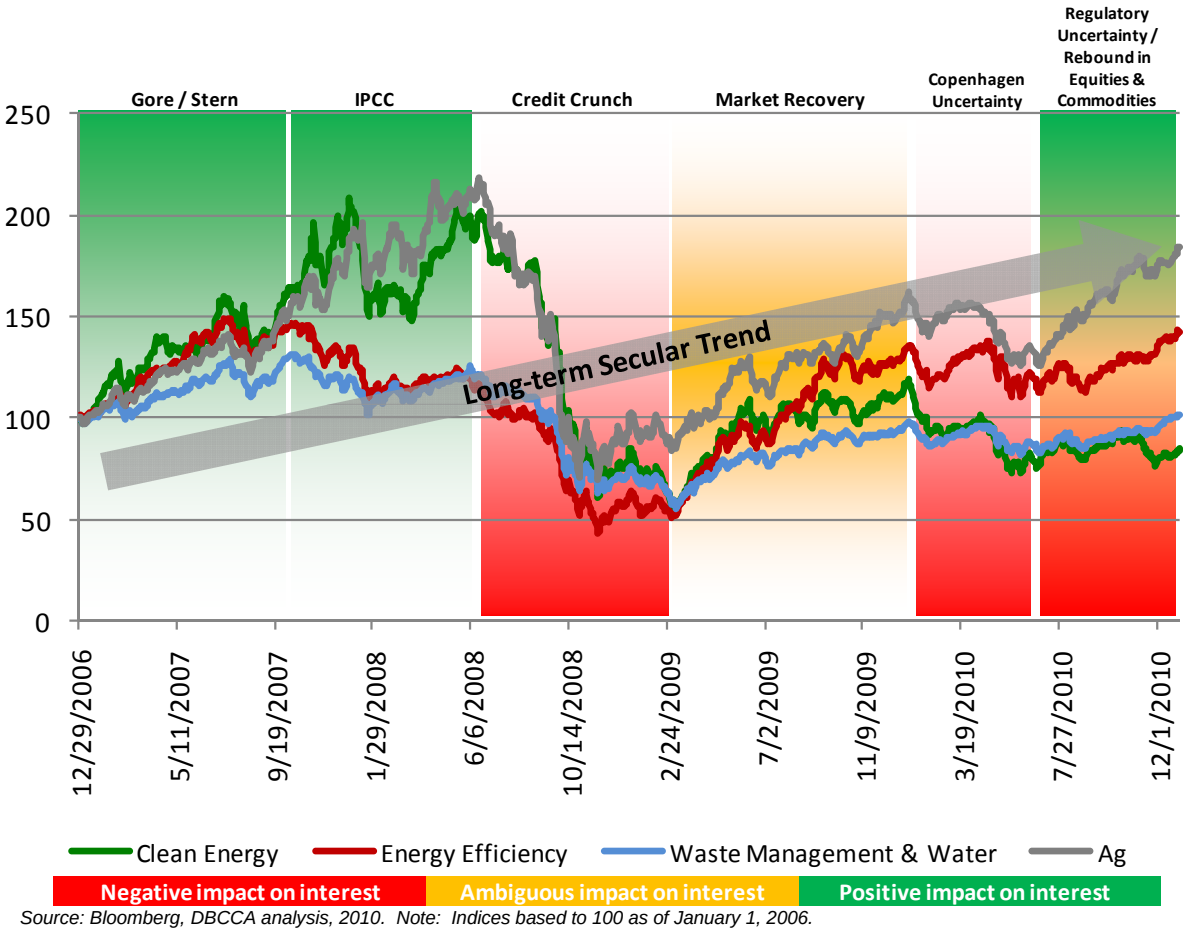


In the context of climate change investing, we use two primary filters to understand the goals and perspectives of different investor mandates

- These filters are investment focus and type of investor
- Investment focus means the philosophy or approach that the investor is using to evaluate opportunities and can include Socially Responsible Investment (SRI), Environmental, Social and Governance (ESG), or climate change and clean tech focused investors
- The type of investor covers the different kinds of organizations and institutions investing, whose goals and timeframe can be generally grouped together
- The different types of investors include asset managers, insurance companies, pension funds, endowments, etc
- These groups broadly overlap and are not absolute boundaries. It is important for investors to understand where they fall within the buckets and to appreciate how their investor type should shape their approach to asset allocation and risk budgeting.
- Investors can pursue climate change investment opportunity through evaluating how they have performed in the past, what we forecast and how an investor can use strategic asset allocation to capture alpha opportunities from these markets while maintaining their investment goals, whether it be liability driven, such as pension funds, wealth accumulation for families, or mission driven for the endowment/foundation investor.
- Different investors will seek different asset strategies requiring a multitude of investment options within the universe of climate change investment

II. The Investors

Major catalyst events drive investor interest /sentiment in climate change sectors, supporting the underlying positive secular trend.



Source: Bloomberg, DBCCA analysis, 2010. Note: Indices based to 100 as of January 1, 2006.

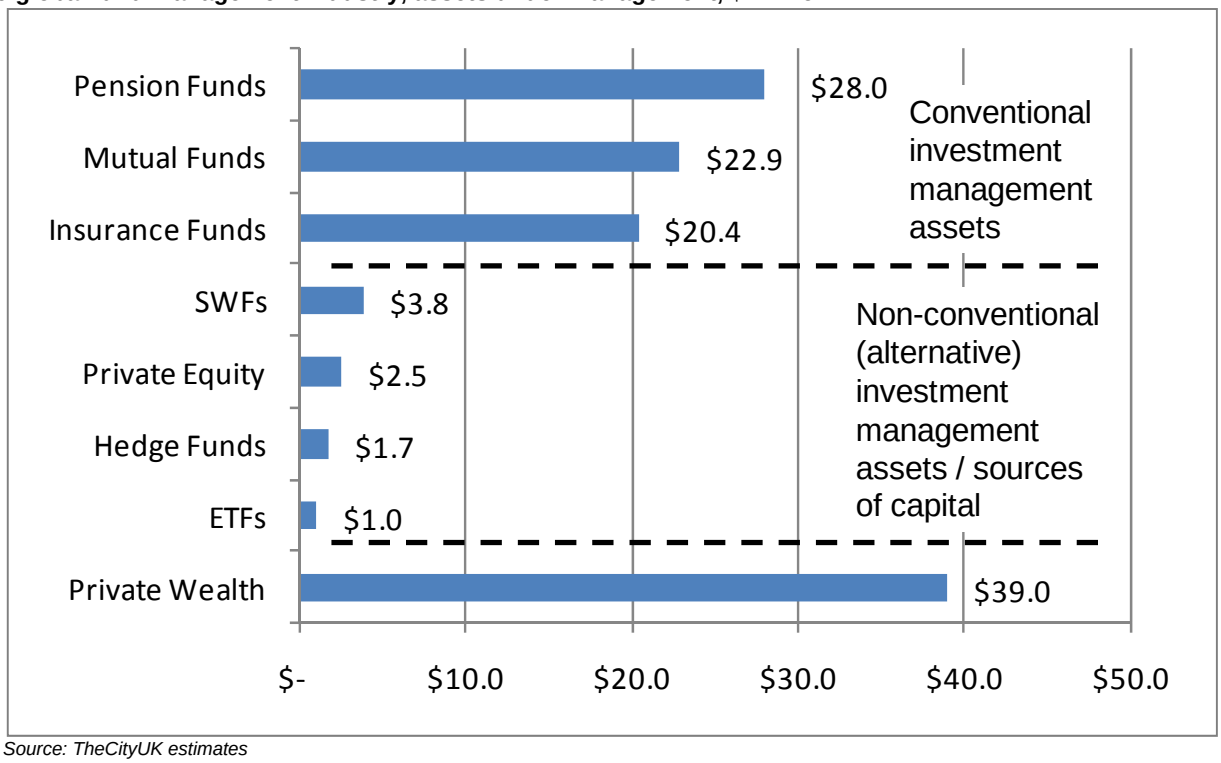
We believe that climate change investment is a secular trend driven by the underlying science, government policy, and market opportunities. Investor interest in climate change has been shaped by major events, reports and educational milestones. General market trends also influence investor sentiment towards climate change sectors. Energy security and economic and industrial policy are also key drivers.

- We recognize public interest in climate change will fluctuate around other priorities such as jobs and the economy.
- We believe investors will continue to be attracted to climate change because of the long-term structural changes and opportunities. We see three main pressure groups ensuring that climate change remains on the public and corporate agenda.
    1. International organizations are likely to continue demanding climate change initiatives.
    2. Government action is likely to be driven in part by public demand for policies, and the possibility to create jobs and growth.
    3. We believe the science and the impact on the planet will continue to prove the case.
- At the same time, energy security and economic and economic and industrial policy remain critical for many governments and investors.
- As discussed elsewhere, 2010 saw challenges to public equities, as policy uncertainty and the potential for retroactive cuts to incentives challenged investor sentiment.

II. The Investors

The fund management industry has a large amount of capital to deploy.

2009 global fund management industry, assets under management, $ Trillion



Source: TheCityUK estimates

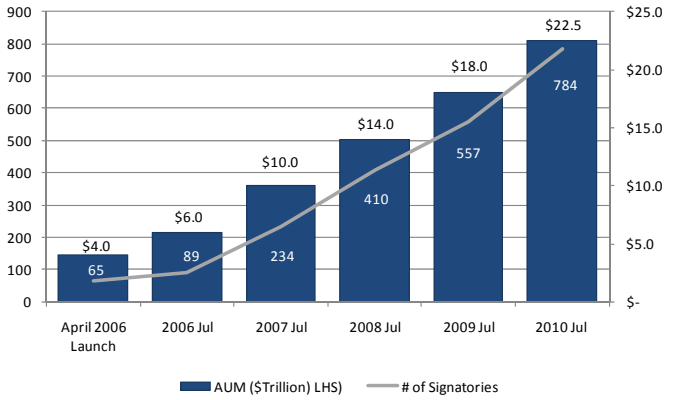
Large amounts of capital exist across the fund management industry. Mitigation and adaptation to climate change will require large investment dollars.

- The fund management industry has a large variety of capital sources.
- Capital is distributed into a variety of vehicles and asset classes.
- The various asset owners and managers combined have significant capital resources available for investing in the climate change sector.
- The majority of the assets are held in OECD countries, yet they are invested in a global manner.
- There is obviously significant capital available in investment markets. However, the risk / return profile needs to be acceptable to these investors. In climate change sectors, government action is required to create Transparency, Longevity and Certainty.

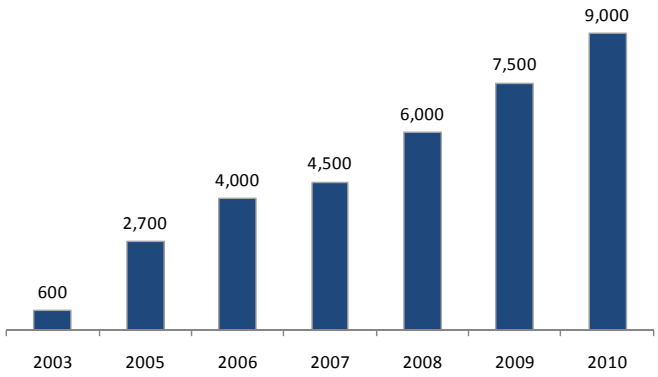
II. The Investors

Many institutional investors have embraced responsible investing and climate change as part of their process.

Over 540 signatories, $20 trillion AuM



Assets represented by Investor Network on Climate Risk, $ billion



Source: UN PRI. *Source: INCR.*

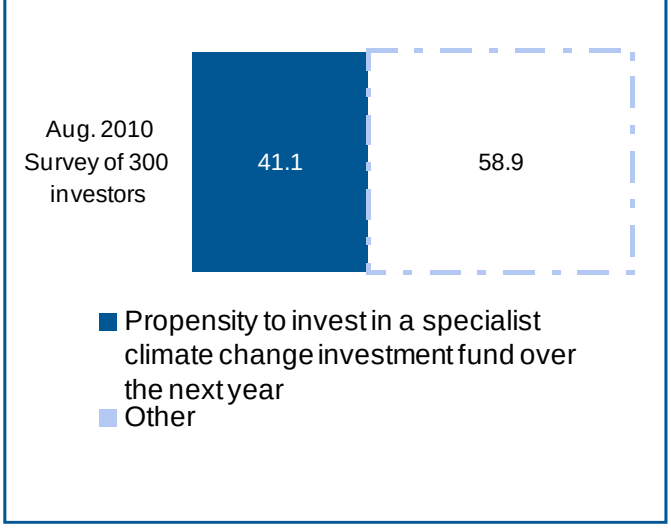
As evidenced by various high profile agreements, institutional investors are publicly demonstrating their interest in climate change as an investment driver.

- The Investor Network on Climate Risk (INCR) is a network of 80 institutional investors and financial institutions, with more than $8 trillion of assets under management. They seek to better understand the financial risks and investment opportunities posed by climate change.
- The Institutional Investors Group on Climate Change (IIGCC), established in 2001, is a collaborative network of European pension funds and other institutional investors that seek to address the investment risks and opportunities associated with climate change. There are currently over 50 members, with assets of over EUR 4 trillion under management.
- The Carbon Disclosure Project (CDP) collects and distributes information on the business risks and opportunities presented by climate change and greenhouse gas emissions data from over 2,500 organizations in some 30 countries, including some of the world's largest companies. They currently represent over 470 institutional investors with over $55 trillion of assets under management. .
- A significant number of mainstream investors have "turned a corner" on how they put responsibility into practice, according to the third annual assessment of signatories to the Principles for Responsible Investment (PRI). Key findings show signs of a growing culture of active ownership and collaboration among investors.

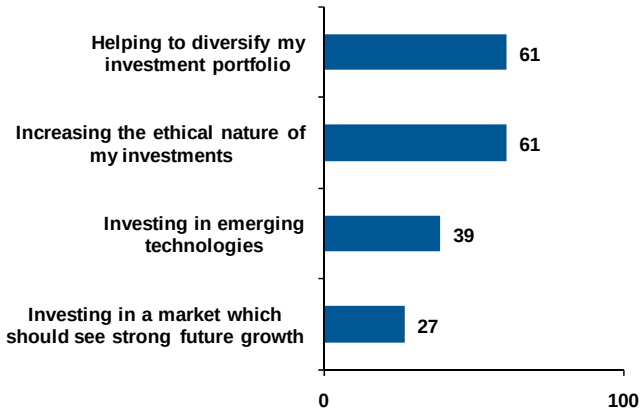
II. The Investors

Retail investors maintain interest in climate change sectors, according to UK DWS Investor Sentiment Survey.

Close to half of investors surveyed are inclined to invest in climate change over the next year



Top reasons for investing in Climate Change Funds overall:



Source: DWS August 2010. Note: Survey was taken of 300 investors in the United Kingdom.

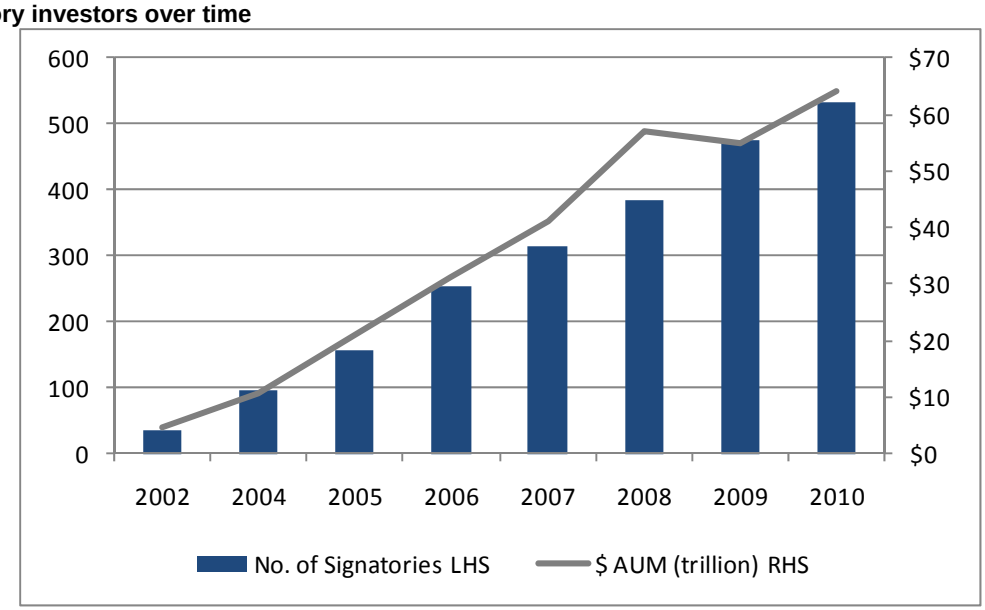
DWS Survey shows investor interest

- The Climate Change Investment Monitor has risen from 40.2 in April 2010 and now stands at 41.1 in August 2010. This represents a small increase in overall investor propensity to invest in Climate Change funds.
- The greatest positive shift has occurred amongst larger investors, those who have over £100K invested in equities.
- Investors' top two reasons for investing in Climate Change funds are to diversify their investment portfolio and increase the ethical nature of their investments.
- On average personal investors have around half their portfolio invested for the longer-term (7+ years). Larger investors typically hold a slightly higher proportion of longer-term investments than smaller investors.
- The vast majority of investors see Climate Change as one of the most important challenges facing the world (even if most believe the scientific arguments have been overstated). 81% believe that companies involved in combating Climate Change are likely to attract investors in future.

II. The Investors

Institutional investors support the disclosure of carbon reduction initiatives and risks.

CDP signatory investors over time



Source: CDP. DBCCA analysis, 2010.

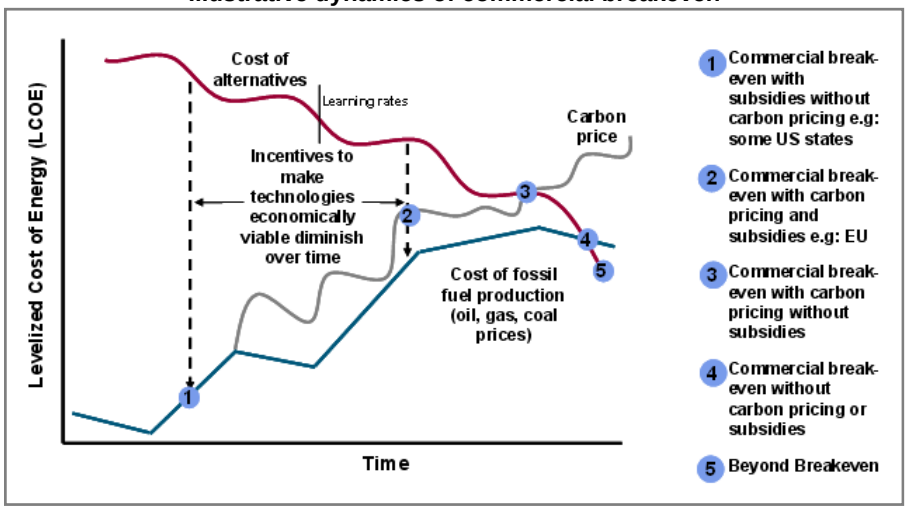
Increasing corporate investment in reduction of their own carbon footprint highlights the fundamental shift to a low-carbon future. Investors seek to access this information via the Carbon Disclosure Project.

- The Carbon Disclosure Project (CDP), which gathers data on behalf of over 530 institutional investors, has encouraged around 2,500 organizations in some 30 countries around the world to measure and disclose their greenhouse gas emissions and climate change strategies through CDP, in order that they can set reduction targets and make performance improvements.
- Signatories to the CDP have grown over the past decade, demonstrating increased interest in assessing risks and opportunities from climate change. The AUM supporting CDP have grown from $4.5 trillion in 2002 to $64 trillion in 2010.
- Corporations have disclosed a large amount of investment to reduce emissions via the CDP
- The high level of corporate investment is evidence of the impact that government regulation and public awareness has had on the world's companies.
- Investment in future emissions reductions projects is expected to increase, as increasing policy momentum continues to provide further TLC on a country by country basis.

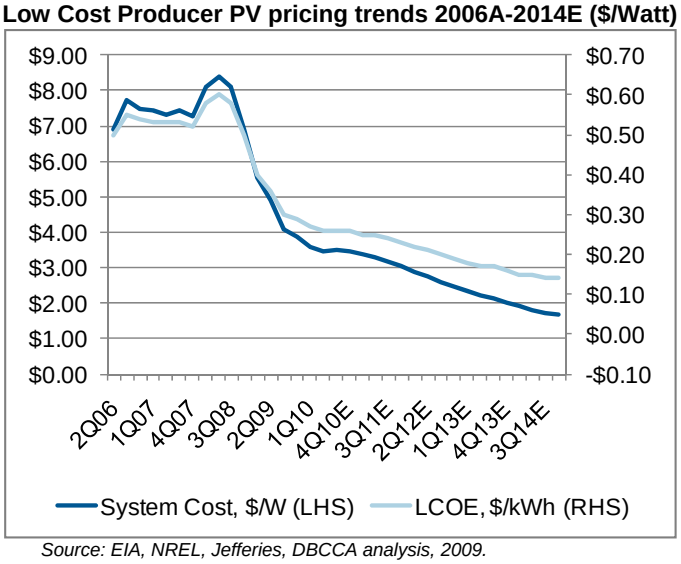
III. Policy Developments: Key Investment Drivers

Government policy support can help low-carbon energy technologies achieve scale-up and commercial viability, leading to the ability to compete with fossil fuels at grid parity. By 2014, as costs come down, we expect renewable energy economics for most technologies to become increasingly competitive with on-peak conventional energy.

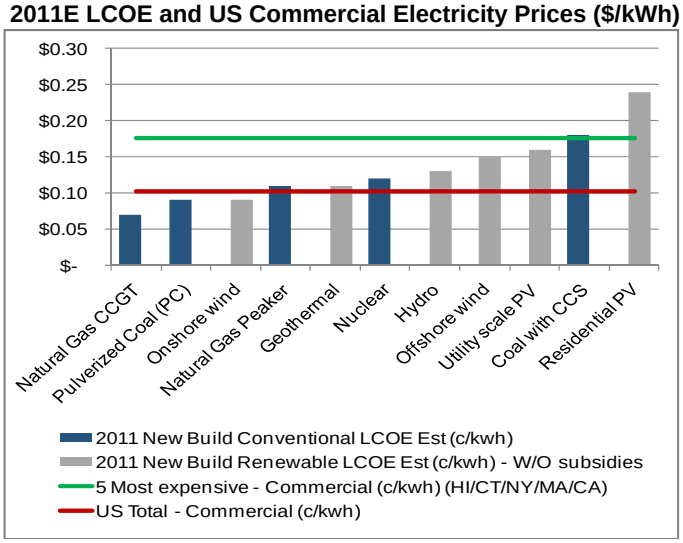
Illustrative dynamics of commercial breakeven



Low Cost Producer PV pricing trends 2006A-2014E ($/Watt)



2011E LCOE and US Commercial Electricity Prices ($/kWh)



Source: EIA, NREL, Jefferies, DBCCA analysis, 2009.

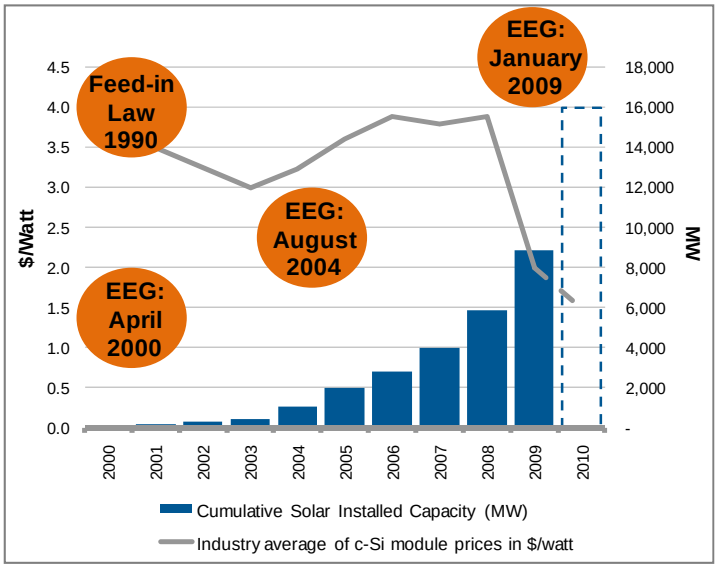
There is no single perfect tool for comparing technology cost of power generation technology given the wide range of variables that impact cost and performance. An accepted metric for evaluating different types of generation is the life cycle cost of electricity production, typically expressed as the levelized cost of energy (LCOE). A Word of Caution: LCOE model outputs represent averages for a given technology and are highly sensitive to the modeling assumptions used. In particular, models are especially sensitive to the capital cost, capacity factor, fuel price assumption and assumed discount rate. Moreover, the "value" of different resources to the grid system is highly location specific and can change over time.[4]

[4] *Please see DBCCA's Report, Natural Gas and Renewables: A Secure Low Carbon Energy Plan for the United States, p. 24, November 2010*

III. Policy Developments: Key Investment Drivers

Nevertheless, focused and sustained government support can help drive investment and technological advances for mitigation and adaptation technologies and help lower their LCOE until such time as they can compete on their own. Of importance, government support can help reduce costs and stimulate market development, moving technologies towards grid parity, thereby decreasing investor risk. Today, only onshore wind energy is broadly competitive with traditional fossil fuels, but even this has been challenged by low natural gas prices in North America due to the proliferation of shale gas. Over the next few years, we expect more renewable energy technologies to become competitive with on-peak and average electricity prices as learning curves and economies of scale benefits drive down costs relative to fossil-fuel fired generation.

- Without policy or regulatory intervention, current market-based energy prices do not reflect the costs associated with GHG emissions and therefore are less expensive than many low carbon technologies. Therefore government policy frameworks remain a key focus for investors in the renewable energy sector until renewables compete head on with fossil fuels. Countries with less effective, sustainable or ambitious policies in place will pose higher *policy risk* to investors, inhibiting investment flows and therefore market adoption.
- At a technology level, as outlined in "Investing in Climate Change 2010," various wind and solar technologies will move progressively towards grid parity depending on the market structure, credit conditions/availability of financing, energy supply/demand fundamentals and the specific conditions in a particular country or market. Unit growth in solar PV modules, in particular, is highly sensitive to changes in government policy and relative expected investor returns and cost trends among different regions and countries. This was evidenced in 1H2010, with the pull forward of demand for solar PV in Germany based on expectations of a reduction in the feed-in tariff.
- Onshore wind energy is already economically competitive in many markets but has been challenged recently by reduced electricity demand, a reduction in appetite for tax shields (in the US) and lower natural gas prices, which impede developers from executing long-term power purchase agreements (PPAs) necessary to finance the projects.
- Macroeconomic factors that can impact the lifecycle costs of different electricity generation technologies include investment flows, economies of scale benefits, technical improvements or new innovations and incentives. The costs of renewable generation—particularly solar PV—are generally continuing to improve on a year-to-year basis, and by 2014 we expect solar to be economically competitive based on LCOE with on-peak electricity provided by simple-cycle combustion natural gas-fired turbines as illustrated in the previous charts above. Even today, utility-scale solar projects often compete with the avoided cost of natural-gas fired generation in certain markets with favorable solar irradiance, such as California.
- In terms of incentives leading to scale which then leads to cost reductions, the exhibit below shows this in action in Germany.

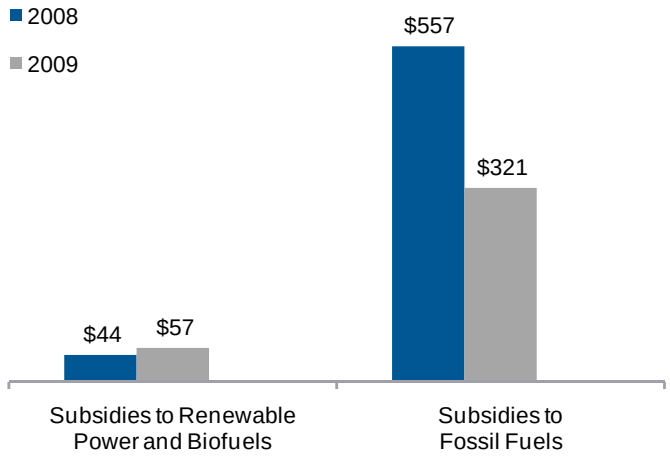


Source: DBCCA analysis, 2011.

III. Policy Developments: Key Investment Drivers

Fossil fuels are currently subsidized six times as much than renewable energy.

Worldwide government support ($ billion) to renewable power, biofuels and fossil fuels



Energy Type	Incentives per energy unit USc$/kWh (2007)	Time for scale-up*
Renewable energy (excluding hydro)	5.0	<20 yrs
Biofuels	5.1	<20 yrs
Fossil Fuels	0.8	60+ yrs

*Source: IEA (2010). Note: Excludes renewable heat or other emerging low-carbon technologies such as CCS; Preliminary estimates based on GSI (2010), taken from World Energy Outlook G20 Joint Report 2010; DBCCA Analysis, 2010. *Source: DBCCA analysis. Note: "Time for scale-up" for renewable energy and biofuels is based on the origination of the US PTC and ITC. The PTC was launched in 1992. However, the ITC was not launched until 2005.*

Traditional fossil fuel energy sectors have received large absolute incentives in the past, exceeding incentives to the renewable energy sector by a wide margin on an absolute basis.

- We believe in evaluating the costs and benefits of energy policy. One area that requires further study and inclusion in analysis is the role of fossil fuel incentives. The energy sector has traditionally received large incentives across all generation types, with renewables and alternatives receiving a relatively small share.
- A common risk critique of clean energy sectors is that they are primarily supported by government incentives or that they are uniquely dependent on such public sector funding. However, a 2010 study by the International Energy Agency (IEA) shows that renewables and alternatives have traditionally occupied a relatively small portion of total public subsides. In 2009, incentives provided to fossil fuels totaled $312 billion compared to just $57 billion for renewable energy and biofuels.
- The net effect of fossil fuel incentives is a distortion in the energy price to a below-market reference level, which affects behavior and impacts wealth transfers between producer, consumer and governments. On the production side, incentives are generally allocated to tax breaks, cash grants, or enshrined in regulation, protecting producers. On the consumption side, which is more common in developing markets, governments regulate fuel prices and sell them below market to consumers at a fixed price.
- But on a cost per kWh basis, renewable energy and biofuels are subsidized at a much higher rate than fossil fuels (see table above). However, these incentives have existed for over 60 years and now represent large absolute dollar amounts, though this is low on a $/kWh basis. In their early development, such fossil fuel incentives would have been much higher on a $/kWh basis we believe. Renewable energy is still in early stages of scale up.

III. Policy Developments: Key Investment Drivers

As a result of policy, a significant number of jobs are expected to be created in low-carbon sectors.

Estimates of actual jobs created:

Source	Actual No. of jobs	Region examined	Time-frame	Sector/Other considerations
UNEP, ILO, IOE, ITUC (2008) Green Jobs: Towards decent work in a sustainable, low-carbon world	2,300,000	Worldwide	2008	Renewable energy sector (directly and indirectly through supplier industries)
Clean Edge, Clean Tech Job Trends 2010	300,000	Worldwide	2010	Solar
	500,000	Worldwide	2010	Wind
WWEA	550,000	Worldwide	2009	Wind Energy
Ren21	3,000,000	Worldwide	2009	Renewable energy sector
UNEP	1,500,000	China	End of 2009	Renewable energy sector
	300,000	*China*	*Incremental in 2009*	*Renewable energy sector*
	600,000	China	End of 2009	Solar thermal industry
	266,00	China	End of 2009	Biomass Energy
	55,000	China	End of 2009	Solar PV (installation & manufacturing)
	22,000	China	End of 2009	Wind power
Ren21	250,000	China	2009	Solar Hot Water
Ren21	700,000	Brazil	2009	Bio-ethanol
European Wind Energy Association	192,000	EU	2009	Wind
German Government Study	259,000	Germany	2006	Renewable energy sector direct and indirect jobs
Solar Foundation	100,000	US	End of 2010	Solar power
	50,000	US	End of 2009	Solar power
World Economic Forum	40,000	US	At June 2010	Bio-refinery industry
Renewable UK	9,200	UK	2010	Large-scale onshore and offshore wind

Projections of jobs to be created:

Source	Potential No. of jobs	Region examined	Time-frame	Sector/Other considerations
WWEA	1,000,000	Worldwide	2012	Wind Energy
UNEP, ILO, IOE, ITUC (2008) Green Jobs: Towards decent work in a sustainable, low-carbon world	12,000,000	Worldwide	2030	Biofuels-related agriculture & industry
	2,100,000	Worldwide	2030	Wind Energy
	6,300,000	Worldwide	2030	Solar PVs
World Economic Forum	800,000	US	2022	Commercialization of second and third generation biofuels
European Wind Energy Association	250,000	EU	2020	Wind
	88,000	EU	2015	Wind
	450,000	EU	2020	Wind - Cumulative
	23,000-60,000	UK	2020	Offshore wind
Anaerobic Digestion and Biogas Association	40,000	UK	2020	Biomass
Carbon Trust (2008)	40,000-70,000	UK	2020	Jobs created along the supply chain if 29 GW of offshore wind capacity is installed.

III. Policy Developments: Key Investment Drivers

Continued from previous page.

Source	Potential No. of jobs	Region examined	Time-frame	Sector/Other considerations
German Government Study	400,000-500,000	Germany	2020	Renewable energy sector direct and indirect jobs
	710,000	Germany	2030	Renewable energy sector direct and indirect jobs

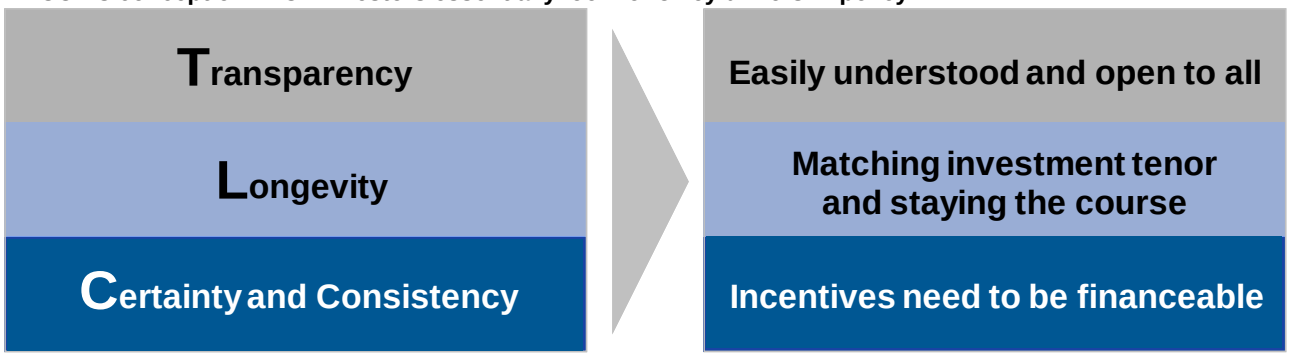
A key focus of recent policy has been the development of 'green' jobs. The total global potential for job creation is large with an estimated 20 million green jobs created by 2030 in solar, wind and biofuels-related industries – and the potential has yet to be fully explored.

- Due to the scope of job losses in the recent economic downturn, many studies have examined the potential for job creation from green technology and services. Studies have ranged from forward looking to historical reviews, with a variety of geographies analyzed.
- The large potential for green job creation indicates that governments should look to continue their support for clean tech sectors as a key lever to help move economies out of the downturn and stimulate local industries.
- According to a 2010 Clean Edge Research report, the solar PV industry represented around 300,000 direct and indirect jobs globally in 2009, whilst the wind sector represented more than 500,000 direct and indirect jobs.
- Brazil and China account for the lion's share of renewable energy employment globally, concentrated in the bioethanol and solar sectors respectively. Many of these jobs cannot be exported as they are heavily based on local skills in installation, operations and maintenance.
- In the US, the solar power industry doubled the number of people that worked in the industry from 2009 to 2010, from 50,000 in 2009 to 100,000 in 2010. In 2011 it is expected to grow by 26% to around 125,000. According to the Solar Foundation, the solar industry is creating jobs at a much faster rate than the overall US economy, which is expected to grow at ~2%.
- A further high employment sector in the US is the biorefinery industry. In June 2010, this sector employed 40,000 people in the US, and according to the World Economic Forum this figure could reach 800,000 by 2022 with the commercialization of second and third generation biofuels.
- The link between government policy and green jobs is clear as policy is crucial in determining where firms and jobs gather. Germany is one of the most prominent examples of FiTs resulting in increased job growth in the renewable sector with some 65,000 people employed directly in its solar PV market and the thermal solar sector employing around 15,000 in production, installation and maintenance by the end of 2009. German government estimates suggest that employment overall in Germany's renewable energy sector could reach 700,000 by 2030.
- In other regions, FiTs for renewable energy in Ontario are expected to create 70,000 jobs in the solar PV sector. As a result of the introduction of FiTs in the UK in April 2010, the developer Solar Century has said that it witnessed sustained growth in the first 6 months following the FiT introduction and that its workforce reached 350 by August, up from 200 in January 2010. Additionally in January 2011, Sharp announced that it was to employ 300 new workers at its North Wales solar cell manufacturing plant in response to the growing appetite for solar energy in the UK since the start of the FiT scheme.
- Estimates for the number of people employed in renewable energy and clean energy sectors in the future vary considerably, but all portray considerable growth globally and regionally.

III. Policy Developments: The Framework

There are three key drivers that investors look for in policy.

DBCCA's concept of 'TLC': Investors essentially look for 3 key drivers in policy



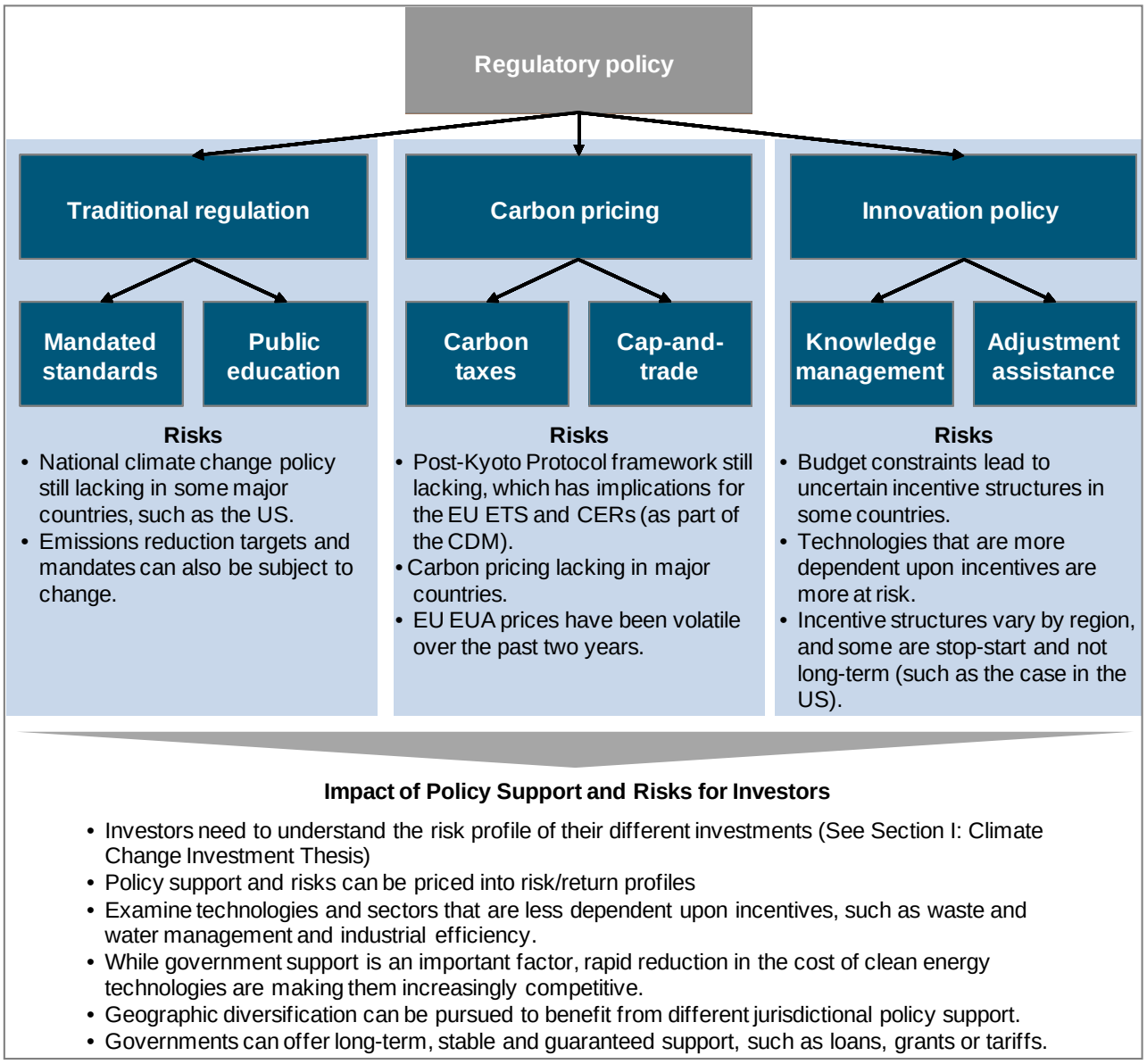
Source: DBCCA, "Paying for Renewable Energy: TLC at the Right Price: Achieving Scale through Efficient Policy Design," 2009; DBCCA Analysis, 2010.

'TLC': Transparency, Longevity and Certainty, drives investment. As investors, this has been our message to policy makers.

- Before investors will commit large sums of capital to the renewable energy sector anywhere in the world there must be transparent, long-term and certain regulations governing carbon emissions, renewable energy and energy efficiency. In short, investors need 'TLC'.
- Investors need transparency in policies to create understanding and a level playing field. Longevity means policy has to match the timeframe of the investment and stay the course. Certainty refers to knowing that incentives are financeable and can be trusted in the financial return calculation and again are likely to be maintained over the course of the investment. In economic terms, TLC should result in a lower cost of capital for projects while still delivering a fair and market-related return to capital. A TLC framework, therefore, sets the benchmark for measuring the policy risk associated with a particular policy regime.
- Our research has focused specifically on the mandates and incentives that can best complement the emerging clean energy, energy efficiency and carbon markets, which we believe hold the long-term policy solution. Among the many policy options, Feed-in Tariffs (FiTs) with advanced price discovery features show significant potential for enabling scale deployment of renewable energy and creating jobs. Delivering on national targets through complementary policies on the ground right now is ever more important.
- Without an international agreement on carbon emissions, investors will be reliant on the quality of the regulation provided by individual countries, as large disparities exist between countries in relation to the regulatory 'TLC' and volatility in policy they provide.

III. Policy Developments: The Framework

Governments can utilize three broad policy levers to address clean energy deployment barriers, and the risks associated with each of these can be factored into climate change investing.



Regulatory policy remains the core to climate change investing and carbon mitigation. Policies are characterized by traditional regulation, carbon pricing and innovation policies. To date, the layering of traditional mandates and standards backed up by innovation policy incentives have been the key drivers for investors and will continue to be so for many years to come. We believe it will take a long time for carbon markets to become hedgeable and fungible.

- Today, most climate change policy around the world is concentrated either in traditional regulation (renewable portfolio standards, biofuels mandates, efficiency standards, building codes and emissions standards) or in innovation policy (that is incentives such as feed-in tariffs, tax credits, direct subsidies and funding for research and development).

III. Policy Developments: The Framework

- Many mitigation opportunities, such as biofuels in the US or wind in Europe, are influenced both by traditional regulation and innovation policy (see following pages).
- Carbon pricing is, as of yet, an emerging regulatory tool, given its still modest price, superimposed on the European regulatory system through the European Emissions Trading Scheme and the Kyoto Protocol Mechanisms.
- We believe that events in Copenhagen have placed more emphasis at the state and national level for now across all these policy areas, but particularly traditional and innovation policy.
- In general, investors look to maximize incentive capture from all available policies.

Policy risk/volatility can be priced into risk/return profiles.

- Given the varying set of policies by country or region, it is important for investors to examine all existing policy support mechanisms and policy gaps for a particular country when determining the risk/return profile. In some countries, such as the United States, policy volatility remains high in comparison to other countries such as Germany.
- Some countries determine their support at the federal or national level, while some leave it up to individual states and provinces. Policy risks can be inter-related with macroeconomic volatility at those levels (such as state or federal budget constraints), technology or sector volatility, physical climate risks and political sentiment.
- Nonetheless, we believe that policy risks can be examined and managed when investing in low-carbon energy sectors. It can be managed through geographic diversification, utilizing guaranteed government support where it exists, considering technologies that have benefited from policy support and are now realizing lower costs, or looking at technologies that are less dependent upon incentives, such as waste and water management.
- ***See Section I: Climate Change Investment Thesis for a further discussion by asset class.***

III. Policy Developments: State of Global UNFCCC Negotiations & Carbon Markets

COP-16 successfully secured Copenhagen Accord agreements, but a post-Kyoto Protocol framework remains uncertain.

Issue	Copenhagen Accord	Cancun Outcome
Emissions reduction pledges	▪ Developed country targets and developing country actions (invited countries to submit targets and actions)	▪ Includes developed country targets and developing country actions as part of the decision (so-called anchoring of pledges)
Transparency	▪ Developed country monitoring, reporting, and verification. ▪ Developing country national communication with domestic monitoring review and verification subject to international consultation	▪ Adds detail to the content, frequency, and review of emissions reduction and financial pledges for developed, major developing, and lesser-developed economies ▪ Establishes details of the international consultation and analysis process for major developing countries
Financing	▪ $30 billion of "new and additional" resources from developed countries between 2010–2012 ▪ Goal to mobilize $100 billion a year in public and private finance by 2020 ▪ High-Level Panel on finance goal ▪ Sought to establish Green Climate Fund	▪ Locks in the amounts listed in the Copenhagen Accord for fast-start and long-term financing ▪ Establishes a Green Climate Fund as the operational entity for climate finance ▪ Establishes the World Bank as the interim trustee for the fund ▪ Establishes a Transitional Committee and Standing Committee within the COP with the goal of improving the facilitation of the fund
Technology	▪ Sought to establish a new Technology Mechanism (expressed desire but could not execute outside the realm of the COP)	▪ Establishes a Technology Mechanism to facilitate the technology development and transfer. Will include a Technology Executive Committee and Climate Technology Center (agreement describes the functions of both)
Reducing Emissions for Deforestation and Forest Degradation (REDD)	▪ Agreed on the crucial role of REDD and the need to provide positive incentives to such action and enable mobilization of resources from developed countries	▪ Establish a process for developing countries to reduce emissions in the forest sector in such a way that could enable external financing for these efforts
Adaptation	▪ Agreed that developed countries shall provide adequate, predictable, and sustainable financial resources, technology, and capacity building to support adaptation in developing countries ▪ Prioritized adaptation for the most vulnerable developing countries and stated that a balanced allocation of funding should go to mitigation and adaptation	▪ Establishes Cancun Adaptation Framework to enhance adaptation action ▪ Establishes an Adaptation Committee to promote implementation of enhanced action ▪ Establishes a work program to study and address loss and damages associated with climate change

Source: Center for Strategic and International Studies 2010.

***Market opportunities trump multilateral discourse*[5]**

- The UNFCCC COP-16 negotiations held in Cancun, Mexico concluded on December 11, 2010 with 193 nations passing the Cancun Agreements, a set of decisions resulting from the meeting. Though some agreements were successfully secured, the investment community questions whether or not this will be enough. Rather than focusing on the extension of the Kyoto Protocol, negotiators concentrated on making incremental progress on moving the Copenhagen Accord forward.
- **Significant achievements include:** (i) formal recognition of the pledges made to the Copenhagen Accord which re-emphasizes our view that individual country/national policies are the key drivers of action; (ii) the establishment of a

[5] *DB Research, "Beyond Cancún: Market opportunities trump multilateral discourse," January 2011.*

new Green Fund to mobilize $100 billion of capital annually by 2020 for climate change mitigation and adaptation in developing countries; (iii) continuation of the CDM after the expiration of the Kyoto Protocol and the inclusion of CCS as an eligible technology type under the CDM; (iv) establishment of a REDD+ mechanism; (v) a continued focus on adaptation efforts; and (vi) further agreements on monitoring, reporting and verification of countries' emissions reduction targets and mitigation actions.

- In addition to the Cancun Agreements, the negotiations also spurred further public-private action. For instance, the US pledged $300 million through OPIC to support private equity clean energy investments in developing countries. The UK discussed the development of its Climate Public-Private Partnership Fund with the Asian Development Bank. The fund would provide private equity for low-carbon energy build-out in Asia. Germany also discussed its Global Climate Partnership Fund, which aims to mobilize $500 million to developing nations. The German Environment Ministry and KfW have already contributed about $100 million to the Fund.
- **Outstanding risks include:** (i) An international binding emissions reduction target was not agreed, leaving individual countries to submit targets. The risk of such an approach is that piecemeal action will not create a global framework capable of limiting global warming to 2^{o}C; (ii) A market-based mechanism for forestry was dropped; (iii) A post-Kyoto Protocol framework was not concluded; and (iv) real progress on generating $100 billion annually by 2020 for developing nations has yet to be made. Investors will look closely for this between now and the next set of negotiations in Durban, South Africa.
- **Additional risks include:** (i) International carbon markets and prices in 2011 will depend on bottom-up initiatives in certain jurisdictions; (ii) It is now questionable whether or not the EU will raise its 2020 emissions reduction target to 30% within the next 12 months, from 20% currently; (iii) The market risks getting ahead of itself if it believes that the Cancun Agreements will lead to an international binding agreement; (iv) No new sources of demand for CERs have been secured. This means that a lot of work still has to be done by national governments to introduce domestic policies and targets that will create the demand for the credits generated from new CDM projects.
- ***Please see DB Research's "Beyond Cancún: Market opportunities trump multilateral discourse" published in January 2011 for a further analysis on COP-16.***

Carbon markets – The most optimistic scenario

- In this context, it is useful to look at the "highest" level of policy in the climate policy world: carbon markets. Let us consider what would happen if:
    - EU raises its emissions reduction target to 30% so that the cap is significantly tighter in EU-ETS with correspondingly higher demand for offsets (it is estimated that total extra demand for offsets over 2013 - 2020 under this scenario would be up to 800 mn).
    - Australia moves to establish a market in 2013, retaining the original idea of allowing unlimited use of offsets (would generate demand for offsets of about 80 mn per year).
    - Japan establishes a mandatory domestic market from 2013 with demand for offsets similar to what we estimate for Australia (70 - 80 mn per year).
    - China establishes a domestic market possible 2012 - 2014.
    - California begins its cap-and-trade market in 2012, and US reconsiders federal legislation after next presidential election.
- If all of this panned out as described above, then there would be a lot of momentum for linking the different markets by 2020, but there is a huge amount of political will required across the world to make such a scenario come about.
- In recognizing this momentum, the World Bank announcement the establishment of the Partnership for Market Readiness at COP-16 in Cancun. The program will allow countries to share their experience, foster new and innovative carbon market instruments, harness financial flows and build market readiness capacity for countries to increase their mitigation efforts. Australia, the European Commission, the US and Norway have all committed pledges to the platform. Germany, Japan and the UK have announced similar intentions too. The Partnership is aiming to raise $100 million and will become operational in early 2011.

III. Policy Developments: State of Global UNFCCC Negotiations & Carbon Markets

GET FiT Plus is a proposal for a Global Energy Transfer Feed-in Tariffs Program which explores public-private-partnerships (PPPs) to leverage private capital and fund research, development, and deployment of low-carbon technologies in developing countries. *(See Appendix for further details)*

Investment requirements for electricity in the Universal Modern Electrical Access Case (UMEAC) ($ billions)

	2010 - 2015	2016 - 2030	2010 - 2030
Africa	81	262	343
Sub-Saharan Africa	80	262	342
Developing Asia	127	214	342
China	1	0	1
India	52	130	182
Other Asia	74	84	158
Latin America	5	3	7
Developing Countries*	210	478	698
World**	**223**	**477**	**700**

**Includes Middle East Countries; **includes OECD and transition economies. Source: IEA*

Following Cancun, global policy makers encouraged the need for a more in-depth dialogue and research to explore which public and private sector funds could be most effectively delivered to support renewable energy scale-up and energy access in developing countries, and that incentives such as FiT's are crucial to derisk private sector investment.

- GET FiT Plus identifies the key public sector financing instruments, outlines their potential impacts both quantitatively and qualitatively, discusses their constraints and availability, and considers the potential for hybrid public sector approaches.
- GET FiT Plus recognizes the need to establish an enabling environment for RE technologies and the key role that technical assistance plays to support developing country governments' efforts to create such an environment.

Fast Start Finance and the Call for Universal Energy Access

- At the United Nations Climate Change Conference in Copenhagen 2010, industrialized countries set a goal of mobilizing $100 billion per year by 2020 to support mitigation and adaptation activities in developing countries.
- Under Fast Start Finance, $30 billion has been agreed for the period 2010-12 – and some of this may be able to be used in the near-term to fund GET FiT country cases. In the longer term, the UN High Level Advisory Group on Climate Change Financing notes that it is "challenging but feasible to reach the goal of mobilizing $100 billion annually for climate actions in developing countries by 2020," but the political commitment necessary to scale up financing to the required level is yet to be reached.
- To achieve this goal the Secretary-General of the United Nations Ban Ki-moon established the High-level Advisory Group on Climate Change Financing (AGECC) who in April of 2010 ambitiously proposed the goal of universal access to modern energy services by 2030.

Universal Energy Access

- There are 1.5 billion people around the world today (or over 20% of the global population) without access to electricity, of which 85% reside in rural areas and world electricity demand is expected to double between now and 2030, with most of this stated growth occurring in developing regions where population growth is outpacing that of electrification rates.

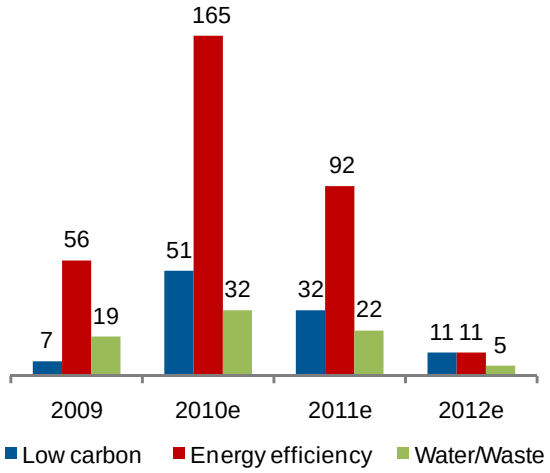
III. Policy Developments: State of Global UNFCCC Negotiations & Carbon Markets

- The AGECC has estimated the amount of needed to fund global modern energy access at $35-40 billion per year in loan capital and subsides, basing this assumption on the IEA 2009 developing country reference case for universal energy access.
- The total cost of universal access to modern energy is only 3%, or $756 billion of the cumulative investment in global energy-supply infrastructure between 2010 and 2030.
- Clean energy in developing regions offers numerous benefits, including energy security, curbing greenhouse gas emissions to mitigate against climate change, spurring socioeconomic development, and job creation.

III. Policy Developments: Global Stimulus

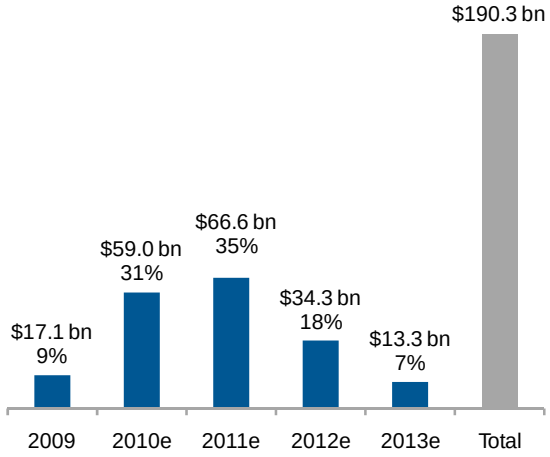
The flow of government stimulus capital into low-carbon energy sectors peaked in 2010, with China allocating the bulk of capital. 2011 will still see a notable amount of funding deployed.

Estimates of green stimulus spending



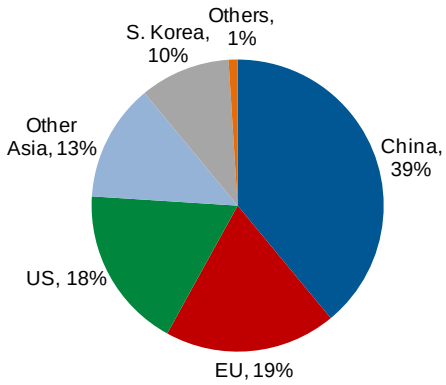
Source: HSBC, 2010.

Annual profile of spending on renewable energy stimulus only



Source: Bloomberg New Energy Finance, 2010.

Country allocation of 2010 green stimulus



Source: HSBC, BNEF, DBCCA analysis, 2010.

In 2009, it was estimated that a total of $521 billion of green stimulus capital was committed by governments around the world. This included investment into low carbon technologies (renewables, CCS and other), energy efficiency (buildings, low carbon vehicles, rail and grid) and water/waste sectors. Committed stimulus capital has been deployed at a slower rate than expected, but will continue to flow within the next two years. The fall-off of stimulus capital afterwards represents a risk to investors.

- By the end of October 2010, it was estimated that approximately $194 billion of stimulus capital had been fully spent, driven by an increased pace of spending in China. In fact, China ($105 billion) dominated the amount of green stimulus spending in 2010, followed by the EU and US.
- Energy efficiency sectors received the highest amount of stimulus capital in 2010, especially areas such as modal shift, grid and building efficiency measures (insulation and lighting particularly).
- Regarding clean technologies only, approximately $51–59 billion of stimulus capital was spent in 2010, with an estimated amount of $32-67 billion to be spent in 2011.
- It is expected that approximately $240 billion of green stimulus capital will be spent in 2010.

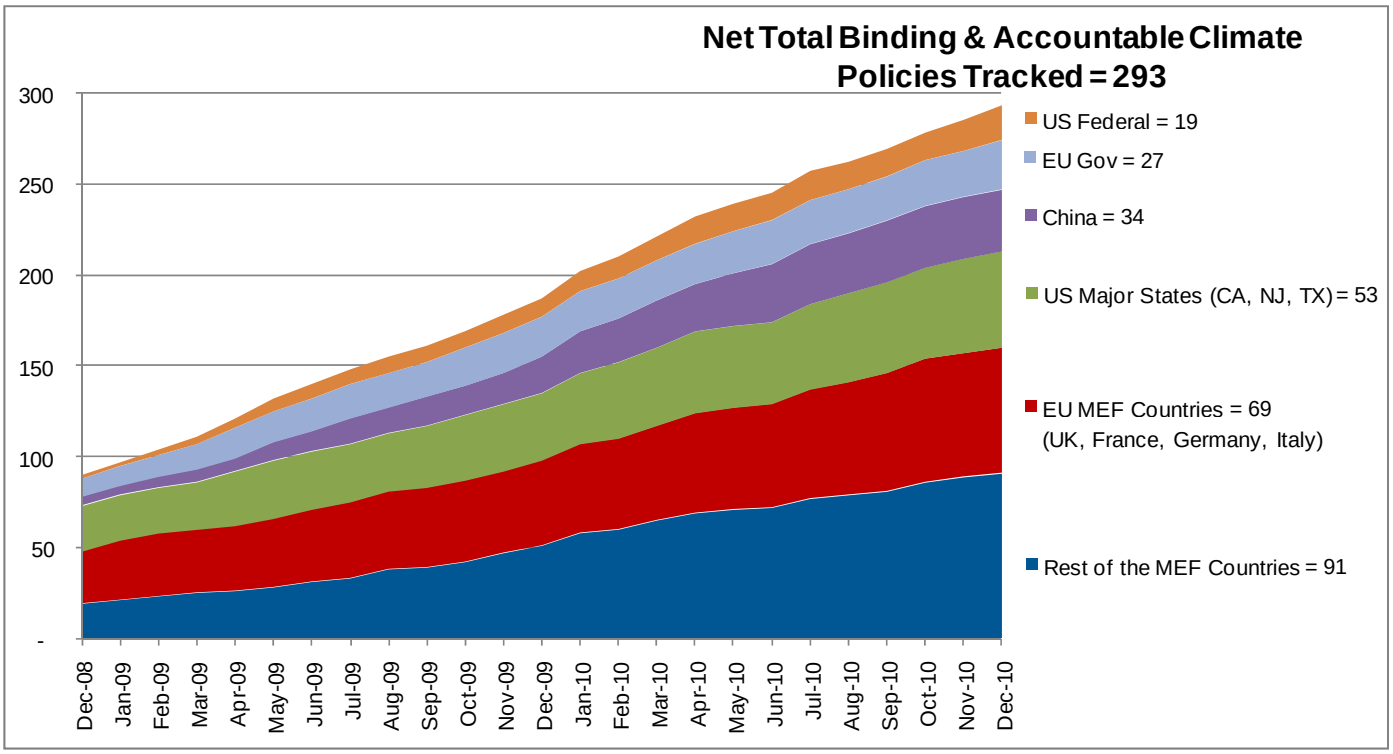
III. Policy Developments: Global Stimulus

- In 2011, it is estimated that green stimulus spending will range from $140–160 billion, with energy efficiency once again comprising the lion's share.
- However, stimulus capital is expected to dry up within the next two years, which presents a risk to investors that are looking to invest in projects with longer financing horizons.
- Furthermore, there are risks that stimulus capital directed to climate change mitigation efforts could be clawed back in 2011 or diverted elsewhere. For example, US stimulus capital was redirected to help finance the "cash for clunkers" program, and then approximately $1.5 billion of stimulus capital was used for state-aid programs in 2009.
- There has been further speculation that parts of Australia's stimulus capital may be diverted to different programs as well.

III. Policy Developments: Tracking Momentum and TLC

Policy momentum across the world continues

Cumulative Binding & Accountable climate policies tracked for MEF Countries, EU Government and Major US States. *Note: The number of net policies represents the difference between positive & negative policies.*



Source: DBCCA analysis, 2011. Please see Appendix for further details.

Commitments to tackle climate change and reduce emissions are noticeably different by region and country. At the national level, Asia and Europe continue to experience the greatest momentum, while the United States (with some limited state exceptions) has yet to adopt federal emissions reductions targets, standards and incentives and therefore experiences less momentum here.

- Historically, we have tracked the momentum or frequency of climate policy announcements since June 2008. (For an assessment of the strength of overall policy regimes, please see our "Global Climate Change Policy Tracker" report from October 2009.) We last published our policy momentum results in our "Global Climate Change Policy Tracker – The Green Economy; The Race is On" report from March 2010, which depicted the momentum of binding legislation, aspirations and policy proposals. While momentum surrounding these policy types has been significant over the past two years, we believe it is useful to focus on the core fundamental legislation moving climate change markets. As shown in the chart above, we have tracked **293 net binding and accountable climate policies (which while not legally binding, are significant statements of intended action) for the Major Economies Forum (MEF) on Energy and Climate Change countries, overarching EU government and major US states (California, New Jersey, Texas)** made since June 2008, of which **33** represent emissions reduction targets, **84** mandates and standards (such as renewable energy targets and efficiency standards) and **176** supporting policies (including incentives such as feed-in tariffs and tax credits).
- The US, China and EU comprise the lion's share **(69%)** of this total.
    - **EU:** The EU is still the leading driver of climate policy action, with EU government and EU MEF countries comprising **33%** of the total. The EU's call for an emissions reduction of 80% by 2050 compared to 1990

levels represents the magnitude of its policy commitment. In addition, Germany is aiming to derive 80% of its electricity from renewable energy sources by 2050.

- **US:** When looking at both federal policies and major state policies for CA, NJ and Texas, the US comprises **25%** of the total. It is important to note that the US tally is primarily comprised of **state-level** policy actions, which we believe cannot be ignored. Announcements made for **California, Texas and New Jersey comprised 74%** of the total US figure, with the remaining **26% representing federal-level policies**. A more detailed look at these states can be found in the Appendix. This confirms that the US has to rely on a state-level policy approach to mitigate climate change, and that this is a critical component of evaluating the US's policy risk environment. At the federal level, the US still lags behind countries such as China, Germany and other European nations. In President Obama's State of the Union speech on January 25, 2011, he set a proposed target to derive 80% of US power from renewable energy, nuclear, clean coal and natural gas by 2035. In addition, the President is aiming to submit a budget to Congress which would allocate $8 billion a year to research and development for clean energy technologies, a one-third increase. However, such an ambition would require strong support from all sides.
- **China:** China comprises **12%** of the total count. The **number of national climate policies in China is twice as large as that of the US at the federal level**. China is a strong emerging policy leader in mitigation policy, with significant weight and magnitude to its policies, especially its incentives. So here, the actual number of policies does not capture the magnitude of these policies. China's 12th Five Year Plan is expected to provide the legislative and investment support needed to drive rapid change in the Chinese power industry. See page 66 for an in-depth look at China's specific policies.

- Over the course of 2010, we have also witnessed growing attention towards the revision of policies, particularly around feed-in tariffs. As outlined in our "FiTs Adjust While Delivering Scale in 2010" report , many European countries began to adjust their feed-in tariffs to reflect degression schedules, declining costs and increasing capacity. Such tariff reviews have become the norm and are understandable from a societal cost/benefit perspective; and ultimately, such tariff adjustments are a sign that FiT policies are indeed successful in driving down costs. We have tracked 4 downward FiT rate revisions that are binding or accountable, but we have classified these as Neutral, as these still have positive investment environments. There have been further similar proposals made in other MEF countries such as Italy and France, but these are not captured in the chart above as their status remains in proposal stages. It has been speculated that the Italian government would have to pay for 6GW worth of incentives at the 2010 FiT rate, which implies an incentive burden of €44 billion over the next 20 years. As a result, there is a significant risk of incentive cuts in to control market growth in 2011. Though not part of the MEF, Spain also has a critical proposal in place to reduce FiTs, possibly even retroactively. This presents extreme policy risk to investors in Spain, creating lack of certainty and longevity.
- ***Please see the Appendix for further details on policy momentum and significant policy announcements made in non-MEF countries in 2010.***

III. Policy Developments: Tracking Momentum and TLC

2010 saw its share of government policy volatility.

Positive policy developments		Pending/Tentative policy developments		Risky policy developments	
Feed-in Tariffs	20+ different countries/regions/states announced new or expanded FiTs in 2010 YTD.	**COP-16 in Cancun, Mexico**	No final legally binding deal on emissions reduction was produced, but some progress was made, such as the official acknowledgement of individual country commitments and the establishment of the Green Climate Fund	**US Climate Policy**	Federal climate legislation in the US is still on the back-burner.
US EPA Regulation – HAP & BACT	Under the PSD Tailoring Rule, the EPA has required large power plants to evaluate and install best available control technologies (BACT) in order to receive or renew operating permits starting January 2011. Under court order, the EPA is expected to develop maximum available control technology standards for Hazardous Air Pollutants (HAP MACT) by March 2011. The HAP MACT currently requires that existing power plants match the emissions levels of the top 12% performing plants.	**Potential EU 30% Target**	The European Commission is looking to increase the EU Emissions Target to 30%.	**Changes to FiT tariffs**	Potential retroactive FiT cuts in Spain and actual retroactive changes in the Czech Republic have caused uncertainty in the market. The market was also volatile in other countries such as Germany, France and Italy, which have seen accelerated downward tariff reviews to reflect declining costs.
US SEC Interpretive Guidance	SEC issued interpretive guidance for public companies to disclose climate change-related impacts.	**Germany aims for 80% renewables**	Germany is planning to derive 80% of its electricity from renewables by 2050.		
EU Directive on Building Efficiency	The EU will require new buildings to be "nearly zero energy" by 2020, boosting energy efficiency and renewable heat.	**China to boost clean energy sources**	Proposed $738 billion plan to develop cleaner sources of energy over the next decade, as well as a study on cap-and-trade and carbon prices.		
Defeat of Proposition 23	Proposition 23, which would have blocked California's GHG law, was defeated, setting an example of sustained support.	**EPA regulation of GHGs**	Though the EPA has introduced BACT regulation, the EPA has yet to mandate a specific level of emissions reduction, as it tries to regulate GHGs under the Clean Air Act. Congressional push-back may also inhibit any progress.		
US Renewable Incentives	US Section 1603 Treasury Cash Grant was extended in December 2010 for an additional year.	**EPA looks at support for water technology**	EPA plans to work with universities & technology developers to accelerate the development of certain water treatment technologies.		
New UK Climate Policies	The new Government laid out strong climate policy proposals, including a new RPS and expanded FiTs.				

Source: DBCCA analysis, 2011.

III. Policy Developments: Tracking Momentum and TLC

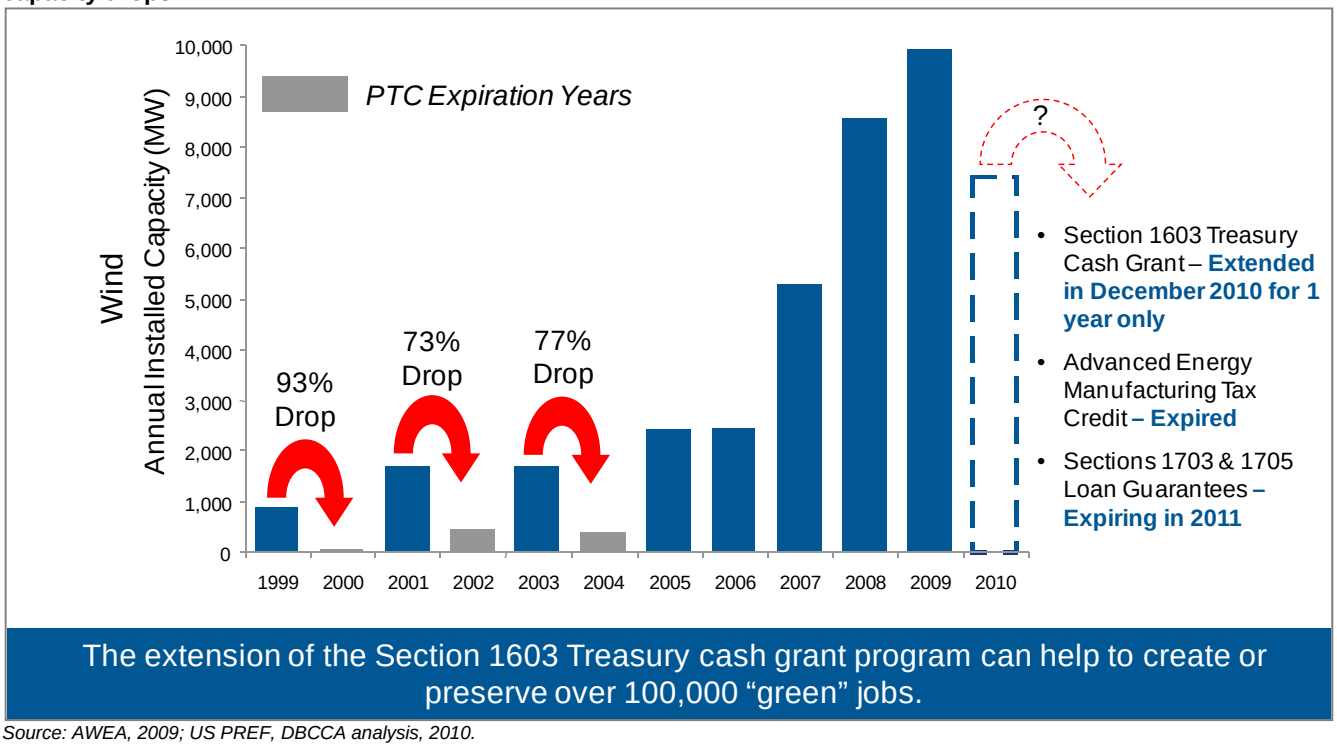
Though policies in 2010 have fluctuated, we remain positive in our policy outlook for 2011.

- 2010 experienced a variety of policy developments, particularly by region, as outlined above. The key policy issues still up for debate from 2010 represent positive policy momentum in the run-up to 2011.
- Key **positive** developments in 2010:
  - **Feed-in Tariffs:** In 2010, there was the continued adoption of FiTs by new geographies and the expansion of existing programs.
  - **US Section 1603 Treasury Cash Grant Program:** The Section 1603 Treasury Cash Grant, as approved from the American Recovery and Reinvestment Act, was officially extended for an additional year in December 2010.
  - **US EPA regulation:** The US EPA has required GHG emissions reporting by any facility that produces at least 75,000 tonnes per year, starting in January 1, 2011. As of 2011, facilities are also subject to Best Available Control Technology (BACT) standards.
  - **US SEC Interpretive Guidance:** The SEC approved on January 27, 2010 to issue an Interpretive Guidance on Climate Risk Disclosure to public companies in the US. The purpose of the Guidance is to ask companies to provide transparency, accountability and disclosure around the principles of material climate impacts.
  - **UK Climate / Environmental Policies:** The new Government demonstrated commitment to a low-carbon economy in 2010 by funding renewable technologies in its Comprehensive Spending Review, upholding the feed-in tariff (FiT) and the Renewable Heat Incentive schemes implemented by the former government as well as supporting the establishment of a Green Investment Bank. The government has also launched key consultations on energy market reform that will include a proposed emission performance standard for coal plants and a carbon floor price.
  - **Defeat of California's Proposition 23:** Early in 2010, opponents of California's clean energy and climate policies began circulating petitions for signatures to qualify an initiative (Proposition 23) on the November 2010 ballot that would effectively block the state's global warming initiative (AB32). However, Proposition 23 was defeated, and California will now move forward with its global warming policy.
- Key **pending** developments from 2010:
  - **COP-16 in Cancun, Mexico:** The negotiations in Cancun did not deliver a legally binding international agreement to reduce emissions (See page X).
  - **China:** China is considering a $738 billion commitment to low-carbon energy sources over the next decade. In 2010, the country also decided to study a potential cap-and-trade and carbon tax system.
  - **Potential EU 30% emissions reduction target:** The EU Climate Commission presented a proposal for increasing the region's emissions target to 30% by 2020. However, though still under consideration, it is likely that this would only happen as a result of an international climate deal and economic stability in the EU.
- Key **risk** developments in 2010:
  - **US Climate Policy:** There is still no federal climate legislation in the United States. With the European Union and China pulling ahead in their national climate targets and initiatives, the opportunity for significant action continues to wane.
  - **FiT changes:** There was speculation in 2010/2011 that Spain would change its FiTs retroactively for renewable energy projects. In addition, the Czech Republic changed the terms of its FiT retroactively for projects that have already been implemented in 2009 and 2010. The uncertainty created over retroactivity has left investors and policymakers on the edge of their seats. In January 2011, Spain's leading solar power trade body, ASIF, announced that it will sue the Spanish government over two royal decrees that would reduce tariffs retroactively, claiming that the solar sector has lost 30% of its workforce as a result. There were also additional downward FiT revisions to tariff degressions. While this also caused uncertainty, they were mostly in line with market costs.

III. Policy Developments: Tracking Momentum and TLC

Uncertainty over short-term US federal policy frameworks has caused repeated fall-offs in renewable capacity additions as support measures have approached expiration.

Annual installed wind capacity in the US: The historical expiration of the Production Tax Credit has lead to capacity drops.



Source: AWEA, 2009; US PREF, DBCCA analysis, 2010.

US renewable policies at the federal level need to include more elements of TLC to spur investment. Thus far, the US clean energy industry has relied on federal incentives that require extensions and state-level action. Though there have been various climate policy proposals presented in Congress, an overarching federal climate plan has yet to be passed. The implication of federal climate legislation would be significant for investment, jobs and economic growth.

- In many ways, the US relies more on a **state-level** approach through Renewable Portfolio Standards (RPS) for generating an increase in renewable energies, though many of these do not include any enforcement measures or penalties. In some states such as California, Texas and New Jersey, there is a rigorous framework that is leading to scale-up, while in others, a lack of incentives leaves the outlook uncertain. Some states have also introduced limited feed-in tariff legislation. A more detailed look at some of the large state-level renewable energy markets can be found in the table on page 63.
- Renewable energy projects in the US have traditionally relied much in the short term on the complementary Investment Tax Credit (ITC) and Production Tax Credit (PTC) tax equity programs to get financed at the federal level. Due to lack of longevity, this produced an on-again, off-again pattern in renewable deployment, as depicted above.
- Since the financial crisis, the tax equity market has not been strong and so the American Recovery and Reinvestment Act of 2009 introduced the Section 1603 Treasury cash grant. This indeed has been successful in generating projects in the past year (especially when combined with the Advanced Energy Manufacturing Tax Credit to encourage domestic production), with the Lawrence Berkeley National Laboratory estimating a gain of 143,000 jobs as a result in

wind and the Solar Energy Industries Association estimated 58,000 jobs in solar. This has also allowed the US to retain a strong position in project financing in the past two years or so, although China has become dominant.

- But these programs sunset in 2011 and the renewable project pipeline is already under pressure as the tax equity market still struggles. As outlined in a paper released on September 16, 2010 by the U.S. Partnership for Renewable Energy Finance (PREF), this would have put over 100,000 jobs at risk. Fortunately, the Section 1603 Treasury cash grant program was extended for an additional year in December 2010 through the US tax package. The Department of Energy's Sections 1703 and 1705 Loan Guarantee Programs for early and later stage clean energy projects also sunset in 2011.
- Experts estimate that the US will have installed 7.4 GW of wind capacity in 2010, representing a 25% decrease from 2009. Given the historical decrease in installed capacity when incentives expire, the continued extension of incentive structures in the US is critical for the continued scale-up of renewables and reduction of policy risk for investors.

III. Policy Developments: Best-in-Class

Best-in-Class incentive structure

TLC policy example: Illustration of best practice advanced FiT for developed countries

FIT Design Features	Key Factors	TLC at the Right Price
Policy & Economic Framework	"Linkage" to mandates & targets	Yes
Core Elements	Eligible technologies	All renewables eligible
	Specified tariff by technology	Yes
	Standard offer/ guaranteed payment	Yes
	Interconnection	Yes
	Payment term	15-25yrs
Supply & Demand	Must take	Yes
	Who operates (most common)	Open to all
Fixed Structure & Adjustment		
How to set price	Fixed vs. variable price	Fixed
	Generation cost vs. avoided cost	Generation
	IRR target	Yes
How to adjust price	Degression	Yes - ending at LCOE breakeven
	Periodic review	Yes
	Grid parity target	Yes
Caps	Capacity / Generation / Monetary cap	Depends on context
Policy interactions	Eligible for other incentives	Yes - eligible to take choice
Streamlining	Transaction costs minimized	Yes

Feed-in tariffs can provide the foundation for a strong, transparent, and financeable regulatory framework.

- Well-designed feed-in tariffs, which incorporate the design elements listed in the table above, support a mandated renewable energy target by efficiently creating TLC for an investor with a pathway to grid parity, subject to transparent price discovery. The concept of TLC in certain policy regimes is discussed in greater detail in the following pages.
- In our "Paying for Renewable Energy: TLC at the Right Price" whitepaper, we stated that FiTs set a premium price for generated renewable electricity and pay for each kilowatt-hour (kWh) of power fed onto the grid. These minimum price guarantees are typically higher than the conventional electricity market price to ensure a favorable but fair return on investment.
- FiTs can be structured either by setting a fixed price for power generated by eligible sources and fed onto the grid, or by setting a fixed premium rate, which is paid on top of the market price, for power generated by eligible sources and fed onto the grid.
- The core elements of feed-in tariff policies are:
    1. A defined set of eligible technologies.
    2. Tariff pricing differentiated by technology.
    3. A standard offer (frequently expressed through a contract) for a guaranteed payment for renewable electricity generation.
    4. Guaranteed interconnection for all renewable generators.
    5. Payments over a long timeframe.

III. Policy Developments: Best-in-Class

Climate Change policy risks vary substantially around the world. Investors will look to deploy capital in countries that offer robust policy support regimes and the best investor criteria of Transparency, Longevity and Certainty ('TLC').

Country	Emissions Control			Financial Support				Long-term Grid Improve-ment Plan	Budget Strength (Deficit as % of GDP in 2010)
	Binding Emissions Target	Renewable Electricity Standard	Long-term Energy Efficiency Plan	Feed-in Tariff	Long-term Govt-based "Green Bank"	Tax Benefits	Long-term Funding Programs		
Germany	✓	✓	✓	✓	✓	✓	✓	✓	3.6%
China	✓	✓	✓	✓	✓	✓	✓	✓	1.6%
United Kingdom	✓	✓	✓	⏳ *Microgen FiTs*	⏳ *Proposed*	✓	✓	⏳ *Proposed*	11.5%
United States	⏳	⏳ *State-Level*	⏳	⏳ *State, Local*	⏳	✓	⏳	⏳	10.0%
California	✓	✓	✓	✓	X	✓	✓	✓	1.0%
Texas	X	✓	✓	X	X	✓	✓	⏳	2.2%
New Jersey	✓	✓	⏳	X	X	✓	✓	⏳	2.1%
Ontario	✓	✓	✓	✓	X	✓	✓	✓	3.1%
India	⏳	⏳ *State-Level*	✓	⏳ *State, Region*	X	✓	⏳	✓	5.5%

Source: DBCCA Analysis, 2010. ⏳= Policy exists at a sub-national level; ⏳= Policy is only in tentative or planning stages.

Climate change policy regimes vary by region and country, and often need to be assessed within their own context. Policy support and risks will therefore vary by region, country or state.

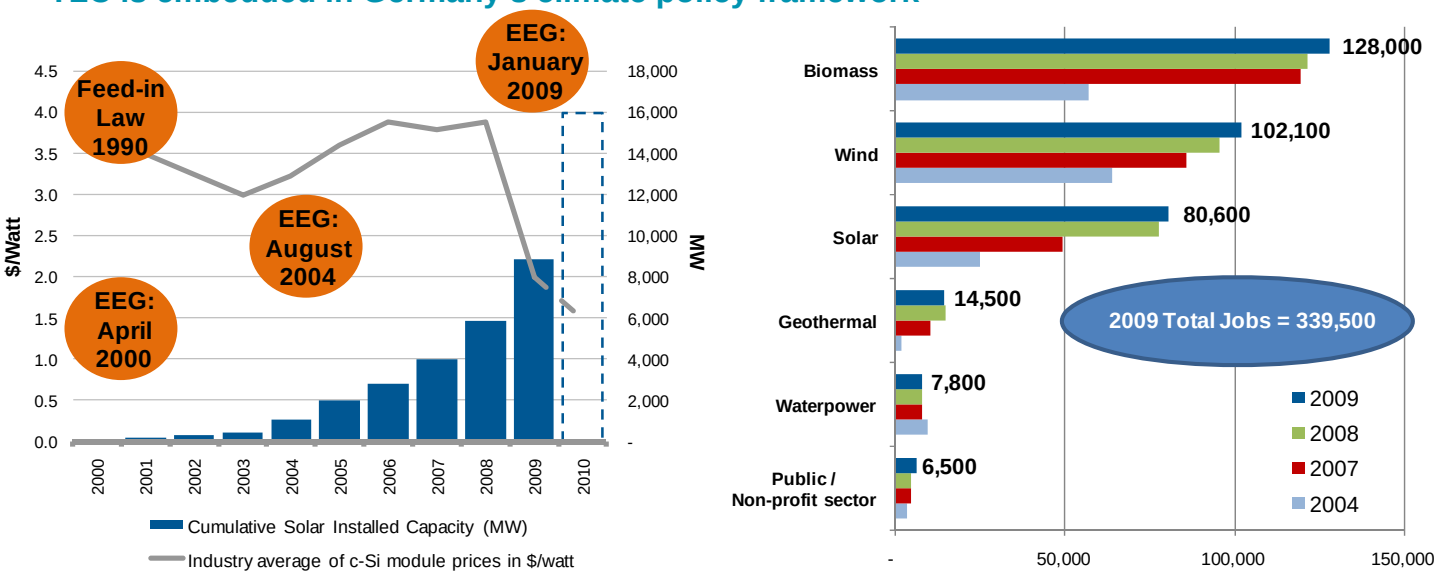
- Policy regimes contain a variety of interrelated elements, and in the case of climate change, there are different types of targets set with the goal of reducing emissions, increasing the penetration of renewables, boosting energy efficiency or transforming an industry or sector.
- The most attractive areas for investors in renewable energy will be those that offer the most robust policy regimes.
- Regions that have national binding emission and renewable targets, long-term efficiency plans, national FiT schemes and other incentives such as funding programs and grid improvement plans are seen as offering the most 'TLC' to investors.
- The key developments in policy remain at a country and regional level, with countries such as Germany and China continuing to take significant steps that could potentially set the benchmark for other regions. These countries have developed robust policy frameworks, including clearly defined national targets, strong incentives and integrated plans, which can lead to more green jobs in their economies, increased innovation and a growth in technology adoption.
- The UK also measures up well in most categories and therefore it exhibits strong elements of 'TLC.' However, policies will need to demonstrate low volatility in the coming years.
- **By contrast, the United States exhibits less TLC in its policy framework at a federal level, as it still has a long way to go in order to demonstrate a comprehensive and stable regulatory framework.** Nonetheless, there is policy action being developed at the state-level. California, Texas and New Jersey continue to lead the expansion and

adoption of clean technologies within the US. The three states have the highest installed capacity in wind and solar. Policy development, particularly in California, has been a key driver of these markets.

- As an important lead indicator, the existence of very large public sector deficits can, but certainly not always as in the case of the UK, lead to policy changes if climate policies need direct budgetary support.

III. Policy Developments: Best-in-Class

TLC is embedded in Germany's climate policy framework



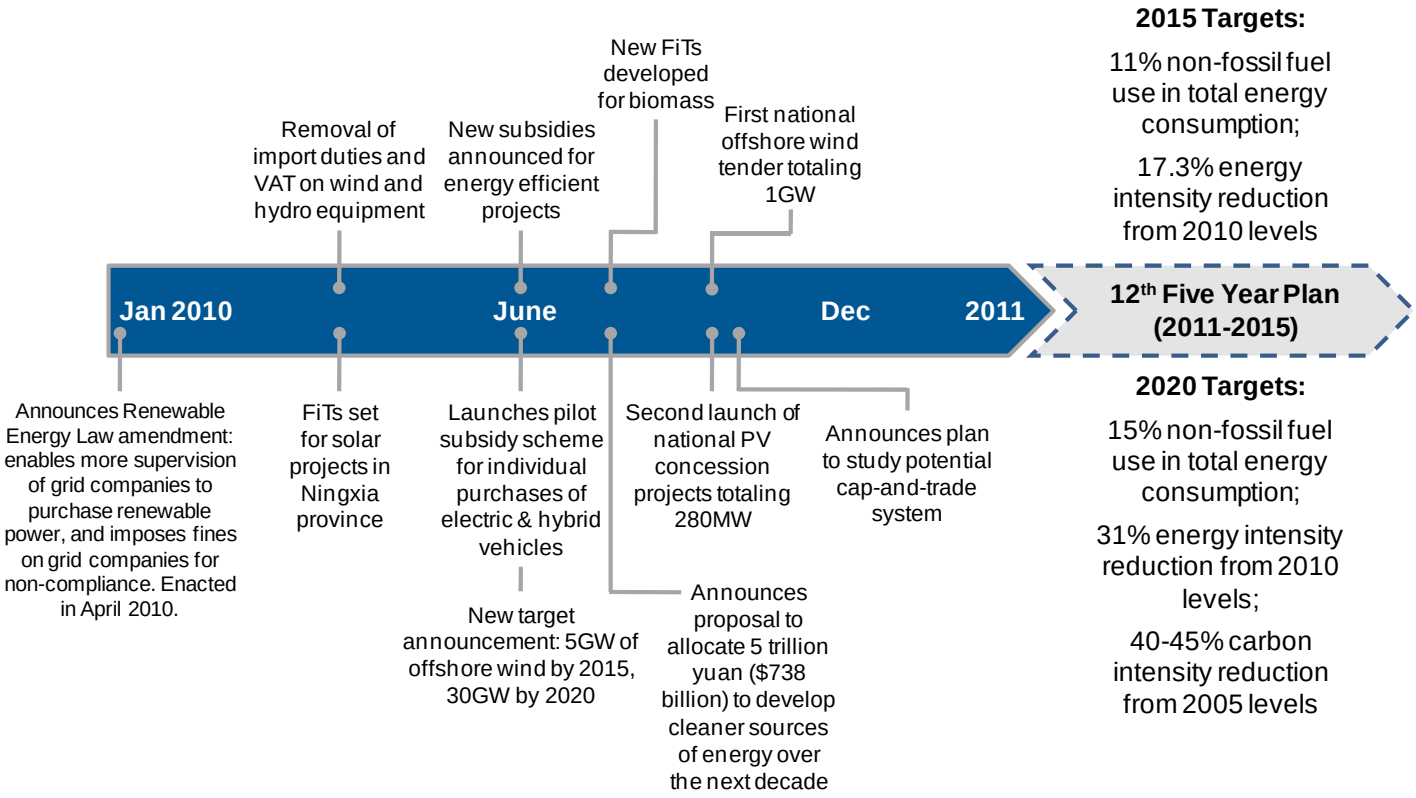
Source: DBCCA analysis, 2011.

Looking around the world, many countries embody TLC in their climate and energy policies and are therefore achieving high installed capacity, green jobs and capital deployment. Germany, in particular, has been an early adopter of supporting climate policy mechanisms such as feed-in tariffs, which are an integral underpinning of any prosperous green economy.

- The main policy mechanism supporting Germany's renewable energy sector has been the feed-in tariff, which provides certainty of long-term cash flow to projects. In the passage of the German EEG in 2000 and updated in 2009, Germany established a feed-in tariff regime that supports the EU mandated goal of 20% renewable energy as a share of electricity by 2020. In addition, Germany set an accountable target to achieve 80% of its electricity power from renewables by 2050.
- Germany's FiT system embodies TLC for investors: standard offer, transparent contracts with up to 20 years of longevity, with guaranteed certain payment streams and to ensure "right pricing" for electricity consumers, a tariff degression over time to match all reductions in technology costs, with an end target of grid parity with fossil fuels.
- The revision to German FiTs this year reflected the significant drop in solar PV prices in particular. While this proved to generate risk in the public markets, the long-term returns to investor have been preserved. Germany's move to reduce its FiT is NOT evidence that it is backing away from TLC but evidence that its TLC policies are working exactly as they were designed to do as renewable industries scale up and costs fall. In January 2011, Germany announced another potential revision to its FiTs in July 2011, depending on the amount of installations from March to May. As in 2010, the proposed tariff adjustment should catalyze higher demand in the months leading up to July.
- There have been tangible benefits resulting from Germany's feed-in tariff and other climate legislation. Germany has experienced a rapid increase in solar PV installations from 2008 to 2009, with an expected record surge in 2010 (a record 8GW of capacity is expected to be installed), while $/watt costs fell dramatically.
- The additional benefit of Germany's policies has been green job creation. They have created over 300,000 jobs, which represents an 87% increase from the number of green jobs in 2004. This covers direct employment in production, operation, maintenance and fuel provision as well as indirect employment in other sectors induced by the demand from the RE industry. The biomass sector has attracted the most jobs, followed by wind and solar. By 2020, the German government is aiming to create 500,000 new jobs in the renewable energy sector.
- Germany clearly represents an example of how renewables and jobs can be scaled-up, while reducing policy risk, for other countries around the world, including the US.

III. Policy Developments: Best-in-Class

China renewable energy expansion



Source: DBCCA analysis, 2011.

China's rapid economic boom and industrial transformation has led it to be the major contender in the "green" race, as it is a fast adopter of clean technologies, with a significant amount of installed capacity. It has made serious commitments to reducing its emissions levels and increasing renewable generation capabilities to drive this.

- China has been a rapid adopter of climate policies at every level. Overall, it enacted a Renewable Energy Law in 2005 and amended it in 2009, which enabled more supervision of grid companies to purchase renewable power and imposed fines on grid companies for non-compliance. It is worth noting that this legislation also addressed perverse structural incentives within the government administrative processes. Under this recently implemented legislation, provincial officials are now required to demonstrate compliance with national climate change and energy policies rather than simply meeting economic output goals.
- It announced three national targets on non-fossil fuel use: (1) 15% renewables in primary energy consumption by 2020; (2) 20% energy intensity reduction by 2010 from 2005 levels (with another 15-20% reduction to this being considered for their next Five-Year Plan); and (3) 40-45% carbon intensity reduction by 2020 from 2005 levels. In addition, China enacted stringent capacity targets by sector for 2020: (1) 27GW of biomass power from 3GW today; (2) 3GW of waste-to-energy power from 1.5GW today; (3) 20GW of solar PV power from 300MW today; and (4) 150GW of wind power from 25.5GW today. In 2009, China installed more wind capacity than any other country, bringing its wind capabilities in line with countries such as Germany and even close to the US. Additionally, China is planning for substantial growth in nuclear generation resources, growing from ~11GW in place at the end of 2010 to an estimated 70-80GW by 2020. This significant increase, accounting for 5% of 2020 generation capacity, is contained within the "15% non-fossil fuel by 2020" target.

III. Policy Developments: Best-in-Class

- To support this build-out, China's National Development and Reform Committee implemented a new FIT program for wind energy in 2009. The Chinese wind energy FIT is differentiated based on four wind energy zones. China has become the first jurisdiction outside Europe to implement wind energy tariffs differentiated by geographic location.
- In addition to wind FiTs, local Chinese governments have created FiT systems for solar projects in certain provinces. Most recently, in July 2010, China announced that it would set national tariffs for electricity generated from biomass projects.
- On the transportation front, China's Ministry of Science and Technology has suggested that approximately 1 million electric vehicles could be sold by 2020, out of an estimated 40 million new vehicle fleet. To accommodate this, China is planning to have in place 10 million charging stations by 2020.
- With the majority of the 1979-1999 vintage housing stock in China deemed unsuitable for the future by the Ministry of Housing and Urban-Rural Development, China plans to demolish and rebuild that capacity over the next 20 years. This is in addition to the annual 2 million square meters of construction that is tied to basic economic expansion. With an emphasis on energy efficiency, many of the newly constructed buildings will likely be proving grounds for all manner of green construction (and reclamation) techniques.
- In July 2010, government officials announced a potentially staggering plan for the Chinese clean energy industry. Officials stated they are proposing a plan that would allocate approximately 5 trillion yuan ($738 billion) over the next decade as a means to develop cleaner sources of energy, including nuclear and gas, to reduce emissions.
- Finally, China has reportedly been considering the introduction of either a cap-and-trade system or carbon tax. According to some sources, a carbon trading scheme has been proposed for 2011 – 2015, possibly for one specific industry (such as power or steel). In addition, the Chinese Ministry of Finance (MOF) in conjunction with China's Energy Research Institute (ERI) launched a report titled, "China's Carbon Tax System Framework Design," which analyzed the feasibility of a carbon tax in China, and concluded that such a mechanism would represent the most efficient method of tackling carbon emissions, and should be implemented in China as early as 2012.
- Additionally, we expect to see a range of resource taxes and fees levied on those industries that consume natural resources as primary inputs to their businesses. China expects to use these proceeds from the prospective taxes and fees to address environmental damage mitigation in certain provinces. The upshot of this will be higher costs for both energy and primary industry output and thus could serve to narrow adverse costs differentials between traditional and cleaner energy sources.
- While the forthcoming 12th Five Year Plan has yet to be approved and published by the Chinese government, it appears that more than half of the major policy initiatives in the plan will target some aspect of clean energy, energy efficiency or environmental improvement. The central government believes that up to 15 million new jobs could be created by these policy initiatives.

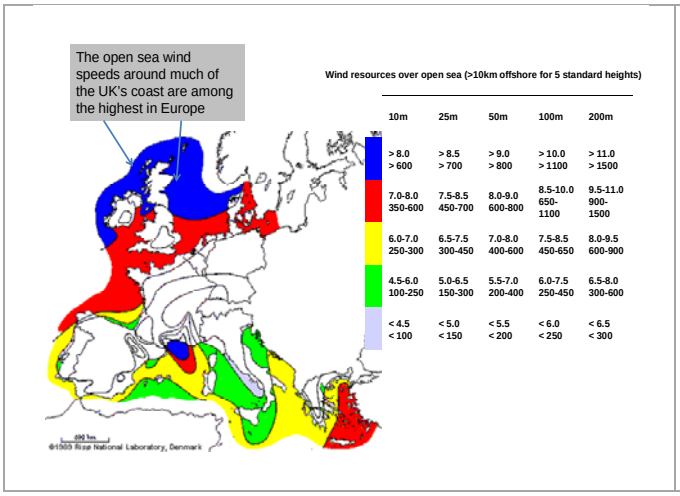
Risks

- Despite all of these efforts, the country still faces many challenges and risks, such as weak enforcement of some aspects of the law and a heavy reliance on administrative measures. Due to a lack of full political transparency, investors should be aware of the consequential risk.
- Furthermore, traditional fossil fuel sources (such as coal) are expected to grow more than renewables in absolute terms, and a lack of incentives for grid distribution companies to purchase renewable power is also an impediment.

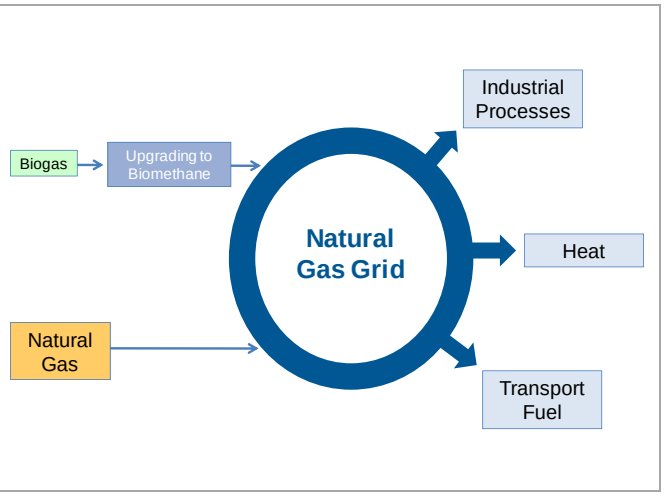
III. Policy Developments: Best-in-Class

The UK has excellent renewable resource potential and has implemented key support policies such as FiTs and a proposed RHI. The UK is now planning vital reviews of electricity networks to help drive the deployment of renewable energy to meet its 2020 targets.

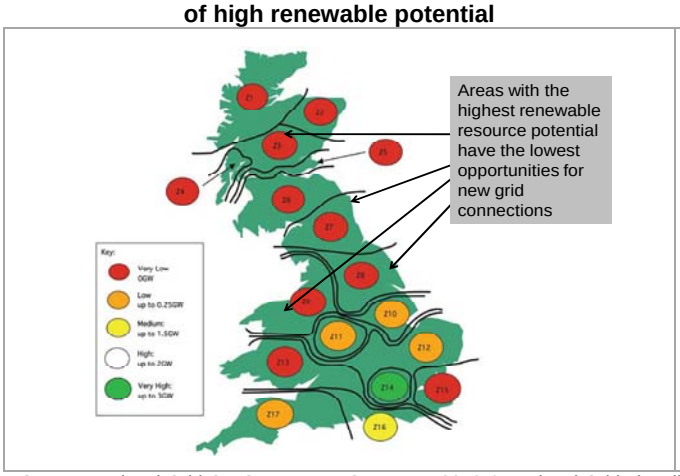
The UK has excellent offshore wind resources



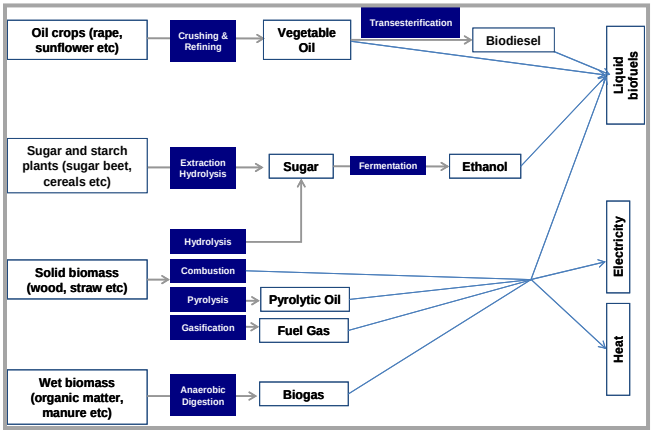
Biomethane grid injection is a large untapped market for heat



Grid connectivity opportunities do not tally with areas of high renewable potential



There are various biomass/bioenergy feedstocks eligible for the FiT and RHI



Source: National Grid GB Seven Year Statement 2010 © National Grid plc, all rights reserved; DBCCA Analysis, 2010; European Wind Atlas, Riso National Laboratory, Denmark, 1989 Copyright Risø DTU NGVA Europe; European Biomass Association.

As of April 1, 2010, businesses, consumers and communities in the UK started to benefit from feed-in tariffs (FiTs) for electricity generated from small-scale renewable and low carbon generation technologies, and the Renewable Heat Incentive is expected to start in June 2011.

- The UK has a target to reach 15% of all energy from renewable sources by 2020. This means that by that time around 35-40 GW of power generating capacity must come from renewable sources.
- The majority of this will have to come from wind power, both onshore and offshore. Offshore wind is viewed as having the most potential and could possibly deliver over £60 billion of investment by 2020. The UK Crown Estate has identified potential offshore wind development sites that would add close to 50 GW in capacity.
- In addition to wind power, biomass is viewed as a scalable technology for the UK market. Biomass covers a range of renewable fuel sources derived from organic matter which can be converted into bio-energy/biogas through the process of anaerobic digestion and subsequently used to generate heat or power.

III. Policy Developments: Best-in-Class

- The UK largely missed out on the initial growth of renewable energy experienced in countries like Germany and industry experts cite a lack of robust policy as the primary reason for this lag.
- However, in April 2010 the former UK government introduced FiTs for small generation. The UK FiT is paid to small scale generators (<5 MW of generating capacity). Official statistics from the UK energy regulator show that 2010 saw a record **10-fold increase** in the expansion of solar power in the UK, with total generating capacity of 43 MW.
- In addition to the FiTs, the UK government has committed to the introduction of a groundbreaking Renewable Heat Incentive to stimulate the renewable heat sector.
- Heating accounts for 50% of UK energy consumption and associated CO2 emissions. Therefore, renewable heating technologies could make a significant contribution towards carbon reduction and renewable energy targets.
- The tariffs proposed so far are those formulated by the previous government early in 2010. Confirmation that the government will progress with a RHI in June, 2011 has been met with widespread support from the anaerobic digestion and renewable energy industry, demonstrating a firm commitment to the sector.
- Within the RHI there is a proposed tariff for injecting upgraded biogas, biomethane, into the natural gas grid. It is estimated that if all UK biomass resources were used, biomethane could substitute for 48% of residential gas demand, representing significant untapped renewable heat potential.
- Much of the UK's high-voltage electricity transmission system is heavily reinforced in former coal-mining regions, but has limited capacity in many areas that are best suited for renewable energy generation.
- The grid infrastructure was built to transmit a maximum of 75 GW of electricity, but by 2020 it will need to carry as much as 120 GW.
- The Electricity Market Reform (EMR) consultation was launched in December 2010 with two key aims: to tackle the growing investment gap between what would be expected to meet the government's renewable energy targets and what is actually being spent; and to enhance security of electricity supply.
- The four key policies announced in the consultation were:
  - A carbon floor price being applied to all fossil fuels used for generation of power in the UK. The consultation on price floor documents options at: £20, £30 and £40/tcO2 by 2020 and £70/tCO2 by 2030.
  - Renewable FiT with contract for difference resulting in a top up payment to low carbon generators if wholesale prices are low but clawing back money for consumers if prices become higher than the cost of low carbon generation.
  - A capacity mechanism that will ensure there remains an adequate safety cushion of capacity as the amount of intermittent low carbon generation increases.
  - An emissions performance standard that reinforces the existing requirement that no new coal is built without CCS technology.
- As discussed in our publication, "UK Renewable Investment Opportunity: Creating Industries & Jobs," Transparency, Longevity and Certainty (TLC) in policy is key for investment markets and the UK policy environment has demonstrated recent commitment to this framework. The announcement of the EMR consultation process is in keeping with this approach and we view all 4 proposal areas as significant for policy action.

Risks:

- Establishing a viable base for the renewable sector in the UK is vital. The UK FiTs were scheduled to be reviewed in 2013 and in the government's October Spending Review last year it was agreed that this timetable will remain in place "unless higher than expected deployment requires an early review." The risk now is that the government will use the 2010 solar growth figures as a basis to re-balance solar market demand in 2011 at the expense of maximizing job and industry growth potential.
- In the UK's Comprehensive Spending Review, FiTs were categorized as a Treasury protected expenditure, and thus there is also some sort of 'capped' monetary value assigned to the scheme, with an intention to make cost savings of £40 million in 2014/2015 adding uncertainty to the potential scope of the scheme. Additionally, the UK Government allocated £860 million in funding for the Renewable Heat Incentive which is scheduled to be introduced in June 2011. The government chose not to take forward the previous administration's plans of funding this scheme through a Renewable Heat Levy as this was seen as too complex. However, the notion of a "capped" monetary value assigned to

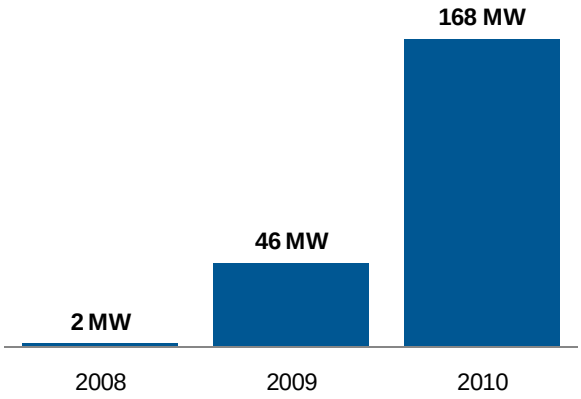
the scheme carries its own complexity and risk to the potential scope of the scheme as there is no clear indication of what the funding mechanism of the RHI will be once this money has been allocated.

- Proposed changes to the energy market in the UK as a result of upcoming consultations, along with planning reform and a potential review of the feed-in tariff scheme are outstanding policy issues which could potentially threaten investor certainty in the renewable energy space, unless dealt with in a timely manner with a long-term outlook. Investment decisions need long-term policy certainty in order for developers to invest in renewable installations.

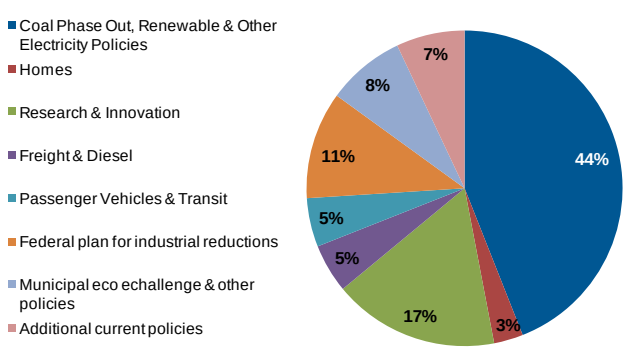
III. Policy Developments: Best-in-Class

Ontario Green Energy and Green Economy Act, and impact of FiT

Ontario's annual solar PV capacity



Where Ontario's 2014 GHG reductions will come from



Source: Interstate Renewable Energy Council (IREC), 2010; http://www.ontario.ca; DBCCA Analysis, 2010.

Ontario's Green Energy and Green Economy Act has spurred significant growth in the province's renewable energy capacity and represents an exemplary case of how governments can create 'TLC' in energy policy.

- Significantly expanding the amount of renewable generation has been a key part of the Ontario government's energy strategy in recent years. The province instigated a mandate in 2007 that called for all coal-fired generating facilities to be closed by 2014, marking a shift towards low-carbon energy sources.
- In May 2009, Ontario enacted its Green Energy and Green Economy Act (GEA) with a vision to position itself as a global leader in the development of renewable energy, clean distributed energy and conservation, while creating thousands of jobs. A new report released from the Institute for Local Self-Reliance in January 2011 details that Ontario's efforts have resulted in the promise of 43,000 jobs in support of 5,000 MW of clean energy projects. It is estimated that the cost per job created is comparable to or below non-energy related job incentive programs in the United States.
- Designed specifically to accelerate the growth of wind, solar and other renewable energies, the GEA is North America's first comprehensive FiT program and aims to deliver 10,000 MW of new installed renewable energy capacity by 2015; and 25,000 MW by 2025.
- Ontario's FiT has been structured to encourage community-owned power, an effort that has not been achieved anywhere else in North America. This is in addition to Ontario's microFiT scheme which guarantees grid connection for homeowners and farmers. There are currently ~20,000 applications for this scheme.
- In 2010, Ontario installed 168 MW of solar PV, compared to 46 MW in 2009 and ~2 MW in 2008. This rate of change over the three years is truly stunning and a testament to the FiT policy's success in attracting capital flows.
- In total, the Ontario Power Authority (OPA) has received a high number of applications under the FiT policy, totaling 9,000 MW in combined capacity, exceeding what the transmission system can handle at this time. The OPA has put in place a process that seeks to fast track energy projects called renewable energy approvals (REA) and ensure that sufficient grid capacity is available in a timely fashion. Nevertheless, we expect that connection and delivery of renewables projects will drive transmission expansions over the next 5-7 years.
- In January 2010, Samsung announced a $7 billion decision to build 2,400 MW of wind and solar generating capacity and four manufacturing plants in Ontario. This was followed by an announcement in April 2010 that 184 new private sector green energy projects totaling 2,500 MW, including a 300 MW offshore wind project, had been approved.
- The new contracts are expected to generate around $9 billion of private sector investment.

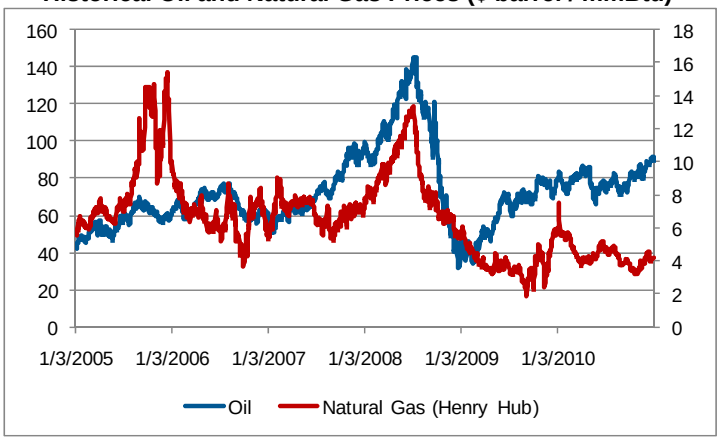
III. Policy Developments: Best-in-Class

- It is estimated that in 3-5 years there could be as much as 4,000 MW of new renewable capacity in Ontario, and the OPA estimates that the FiT will stimulate billions of dollars in new manufacturing, design, construction and engineering investment in Ontario.
- As with any comprehensive FiT policy that generates a strong volume response, the sustainability of the policy mechanisms that exist today must balance short-term success with long-term prospects. 2011 marks both the first two-year review, scheduled for mid-year, and also the Ontario Provincial Election in October. The impact of the October election is largely tied to the issue of public opinion. In this regard, there must be compelling evidence that the FiT program is delivering integrated economic benefits in terms of jobs growth that more than offset its impact on rising electricity bills.

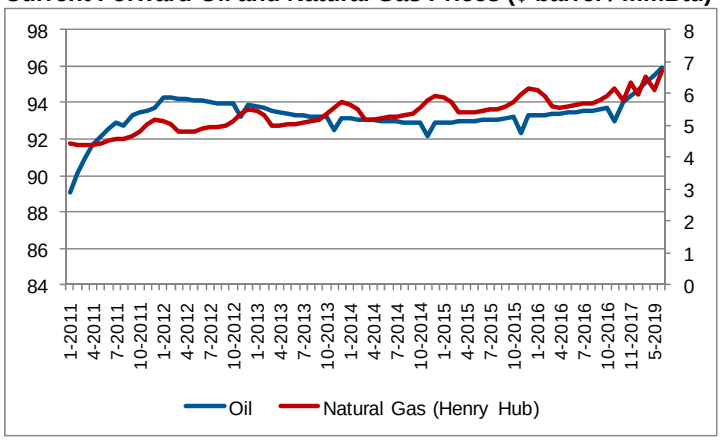
IV. Climate Change Investment Markets and Asset Classes: Overview

While oil prices have rebounded and are expected to trend higher, natural gas prices remain low, creating headwinds for clean energy because natural gas sets power prices.

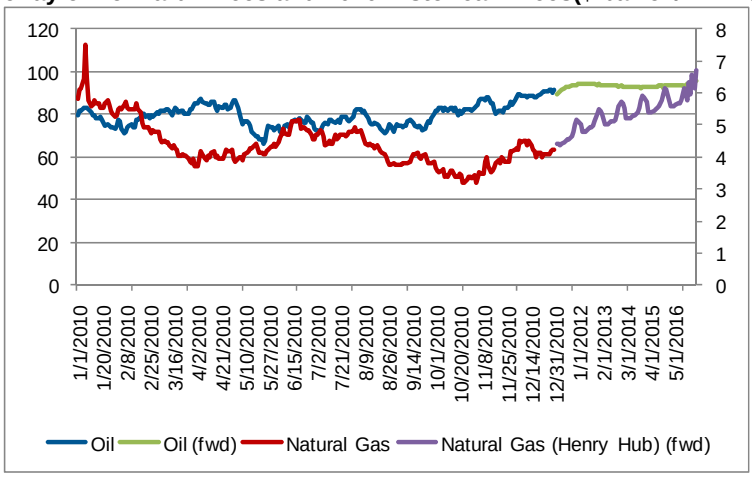
Historical Oil and Natural Gas Prices ($ barrel / mmBtu)



Current Forward Oil and Natural Gas Prices ($ barrel / mmBtu)



Overlay of Forward Prices and 2010 Historical Prices($ barrel / mmBtu)



Source: Bloomberg 2011.

Renewable electricity generation economics are driven by the relative costs and energy pricing compared to traditional fossil fuels net of subsidies. In order to earn an acceptable return, renewable generation competes with the marginal cost of either the avoided cost of a newly built fossil asset (typically natural gas generation) or else depends on long-term contracted power purchase agreements (PPAs), which are typically heavily influenced by natural gas prices. Current market expectations in North America are for natural gas prices to remain in $4-6/mmBtu trading range over the next few years, which challenges wind energy PPAs in particular.

- A key area of economic exposure for climate change sectors is the relative pricing of traditional fossil fuels, oil and natural gas. Simply put, high fossil-fuel prices are bullish for renewable energy, low prices are not. Oil affects transport markets more, while natural gas and coal drive power markets.
- Although oil prices haves rebounded sharply from lows in the low $30 range reached in the depths of the 2008/2009 credit crisis, following a peak above $140, North American natural gas prices have decoupled from the oil price, ending a longer term trading relationship. Over the past 18 months, the price of natural gas has reached historically low volatility and price stability is at historical lows, currently hovering around $4, despite a very cold winter cycle, driven in

part by La Nina. In 2009 and 2010 inventories were above the 5-year seasonal average, due in large part to the rapid emergence of low-cost shale supplies. European natural gas remains around $10.

- Forward oil price curves indicate that oil prices are expected to remain elevated and may have difficulty keeping pace with global demand growth without potentially retesting 2008 highs. Longer term there is an issue of "peak" oil supply. Forward natural gas price curves show an expectation of relative increases, although the expected change is small relative to historical volatility
- Natural gas supplies are expected to remain very high, as shale gas supplies in the US are expanded and come on line and other non-tradition or so-called "unconventional" gas resources assets are developed globally.

IV. Climate Change Investment Markets and Asset Classes: Overview

DB Global Markets' economic view

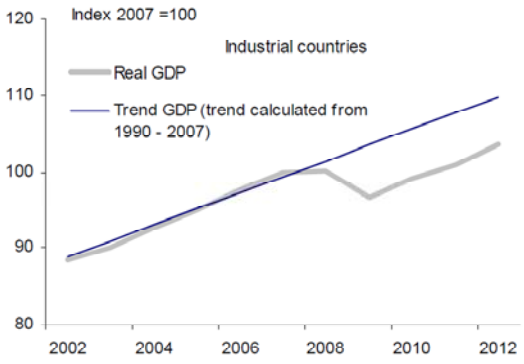
Key aggregates in industrial countries

(% yoy, unless stated)	2007	2008	2009	2010F	2011F	2012F
GDP	2.4	0.1	-3.6	2.5	2.0	2.5
Private consumption	2.2	0.1	-1.3	1.5	1.7	2.2
Investment	1.1	-4.6	-17.3	7.9	4.3	4.5
Gov't consumption	1.7	2.3	2.1	1.3	1.5	1.1
Exports	7.0	3.1	-12.4	11.8	5.9	4.8
CPI	2.2	3.3	0.0	1.4	1.6	1.6
Fiscal balance, % of GDP	-1.2	-3.3	-8.0	-7.3	-7.3	-5.4

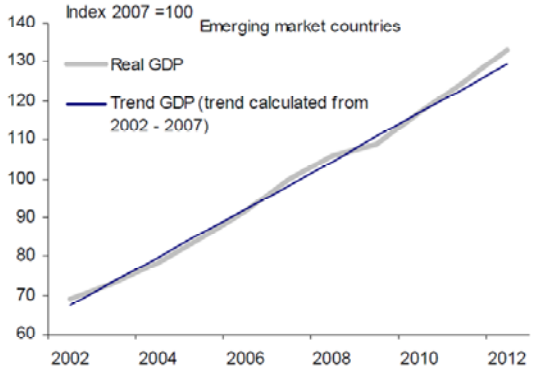
Key aggregates in emerging market countries

(% yoy, unless stated)	2007	2008	2009	2010F	2011F	2012F
GDP	8.8	5.9	2.5	7.5	6.2	6.4
Private consumption	8.0	6.8	4.0	6.4	6.4	6.4
Investment	12.7	7.3	3.0	11.3	8.3	7.8
Gov't consumption	6.4	8.6	6.7	4.8	5.2	4.8
Exports	12.9	8.3	-9.2	15.4	9.6	10.1
CPI	5.6	7.9	3.3	5.2	5.4	5.0
Fiscal balance, % of GDP	-0.2	-1.6	-4.4	-3.6	-3.1	-2.7

Industrial Countries: Slow recovery from deep recession



Emerging Markets: Strong recovery from shallow recession



Source: DB Global Markets.

Overview of global economic expectations.

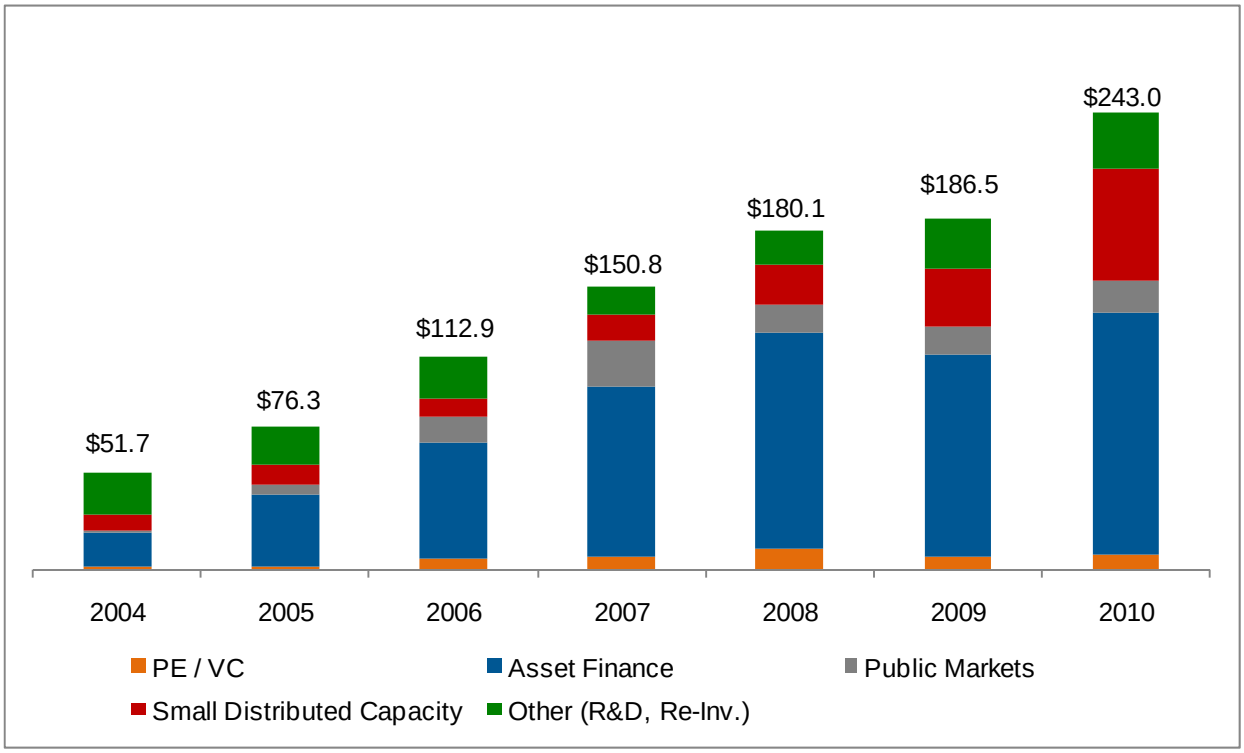
- Following its deepest downturn on record, the global economy has bounced back to modestly above-trend growth in 2010, and DB Economists project it to grow at a rate of near 4% in 2011 and slightly faster in 2012.
- This overall pattern combines two very different pictures: one for economies that have been hit hard by the effects of deflating real estate bubbles and sovereign debt crises, and a second for those that suffered more modestly and indirectly from spillovers as global activity declined. The first group, primarily the US and much of Europe, suffered a huge drop in output relative to trend and is likely to struggle to close large output gaps slowly over time. The second group, primarily emerging markets, showed only a modest decline relative to previous trend paths and should move above trend in the period ahead. Global inflation has already rebounded from recession-induced lows. DB Economists expect it to pick up modestly but remain at or below target in the US, Europe, and Japan, and to remain elevated at 6% or more in emerging markets on average. Unlike much of its peer group, Germany continues to rebound strongly.
- Emerging market and dollar bloc central banks have been raising policy rates since the second half of 2009, in some cases by more than 200 bps already. With inflation returning toward target levels, DB Economists expect the ECB to raise rates by Q3 2011; our US team has the Fed beginning by year end 2011.
- Two key risks are the potential for a widened sovereign debt crisis in Europe if further measures are not taken to quell current market stress, and a widening inflation problem in Ems, especially Asia, if greater monetary restraint is not imposed there.

IV. Climate Change Investment Markets and Asset Classes: Overview

- Economic attributes of climate change asset classes:
  - Climate Equities: small cap companies, capital intensive, cyclical
  - PE/VC: Longer term focus so less exposure
  - Infrastructure: Lower exposure, less cyclical
  - Bonds: Cyclical exposure with interest rates

IV. Climate Change Investment Markets and Asset Classes: Overview

Total global investment in clean energy in 2010 including all asset classes.



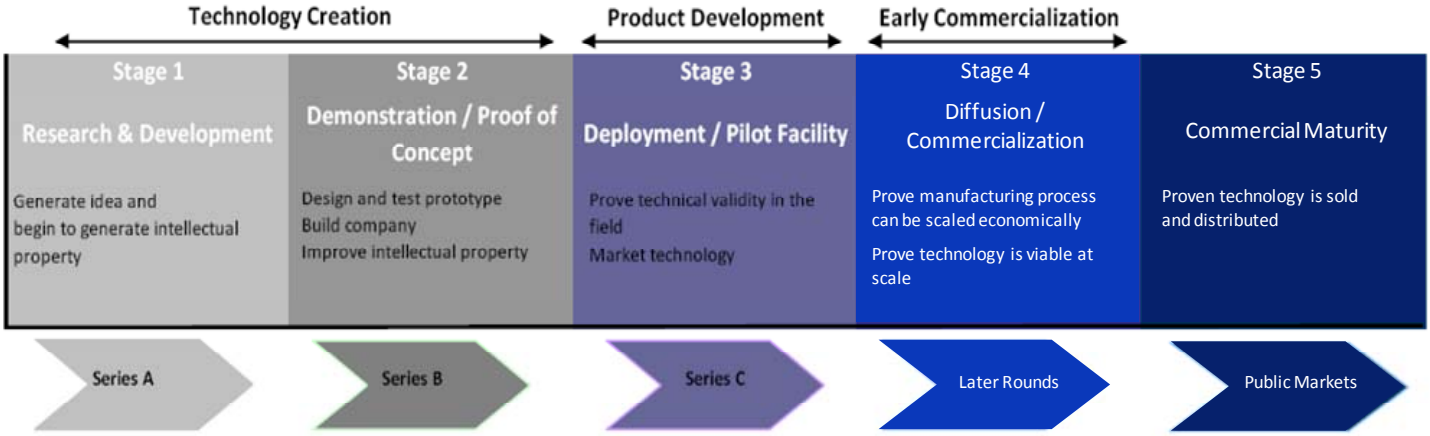
Source: Bloomberg New Energy Finance, 2011.

Clean energy investment in 2010 was $243 billion, with increases seen across all asset classes.

- The largest investment asset class in 2010 was, as usual, asset finance of utility scale projects such as wind farms, solar parks and biofuel plants. This rose 19% to $127.8 bn last year.
- Small distributed capacity (SDC) investment increased to $59.6 bn in 2010. Germany and other European countries had significant SDC investment.
- PE / VC investment totaled $8.8 bn. This increased over 2009 but it was below the high in 2008 of $11.8 bn.
- China had the largest investment total of any one country, with $51.1 bn.
- This chapter reviews capital flows and investment markets across climate change asset classes. In particular, it looks to investigate the risk factors and drivers of each asset class. At an asset class level, it also discusses the approaches used by investors to manage risks affecting each asset class. Note that the different perspectives of institutional investors and asset owners are addressed in the introduction.
- Grid parity remains the long-term goal for sectors on both an economic, technology, and policy perspective. In some regions, relative to on peak power prices, market leaders are seeing costs at or near grid parity equivalents. As increased scale and efficiency drive costs down across sectors, grid parity will be more broadly reached. In the near future, particularly if energy costs rise, clean energy will be cost competitive directly with traditional sources across most geographies, leading to a large potential increase in the deployment and scale of assets. This will also lead to growth across supporting and related technologies, such as the smart grid or demand response.

IV. Climate Change Investment Markets and Asset Classes: Private Equity / Venture Capital

Climate change PE / VC deploys capital to scale the development of private technologies and companies. PE / VC investing features multiple stages of risk/return as technologies and companies mature.



Source: Bloomberg New Energy Finance, 2011.

As technologies and companies in the early stages of development overcome certain kinds of risks and operational challenges, new challenges emerge. Earlier stages are related to proof of concept and technology development, while later stages move on to proof of business model and the challenges of commercialization. By their nature, earlier stage investments tend to be riskier than later stage investments, so investors seek certain attributes to achieve success.

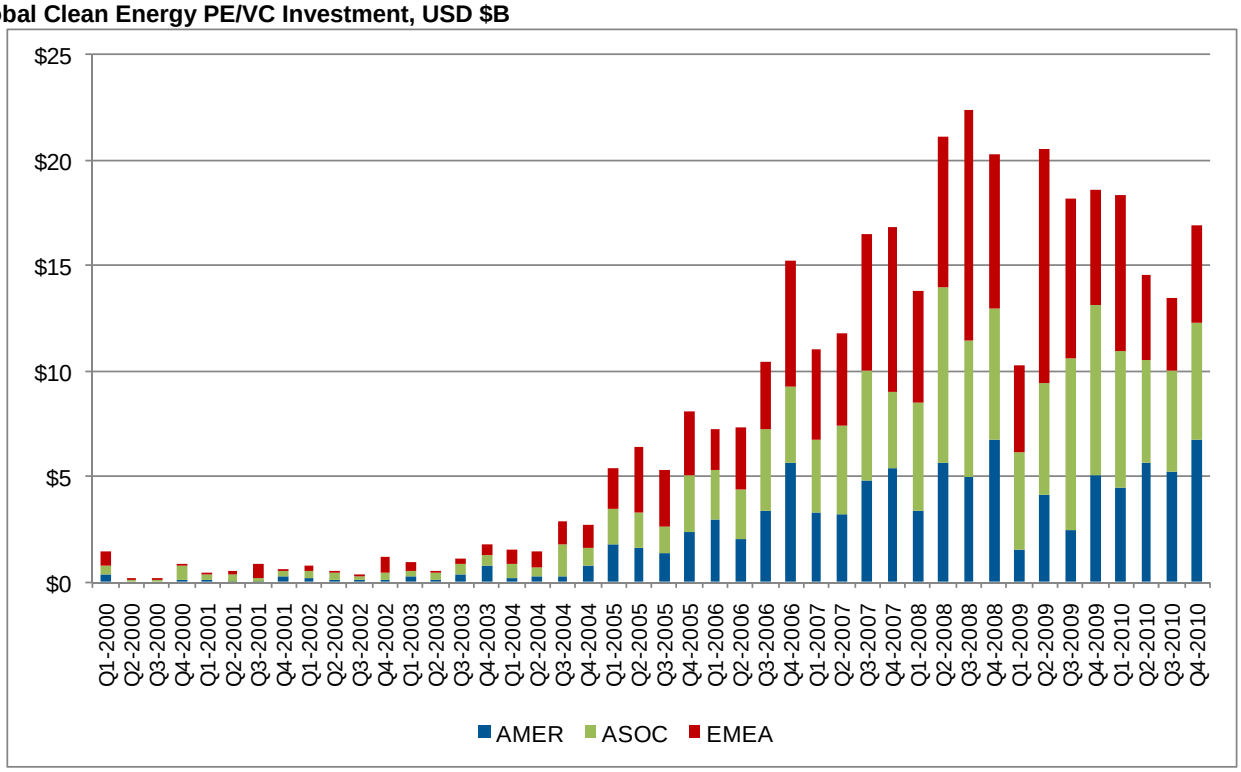
- Capitalization history: Earlier stage VC focuses on companies that have not had significant outside capital from professional investors. Capital usually consists of some "friends and family" or angel stage investment money, in addition to early R&D stage grants. Expansion stage PE focuses on companies that have experienced extensive early-stage investment and now require capital to reach cash-flow breakeven and to fund growth or expansion for commercialization.
- Technology development: Earlier stage VC focuses on companies still in the process of developing and proving the viability of their key technology or business model. Expansion stage PE focuses on technologies and/or business plans that are established and therefore have lower risk and are ready for broader commercialization.
- Expansion stage PE generally involves taking "execution risk" (e.g., ability to scale manufacturing, market adoption) as opposed to early stage VC's "binary risk" (e.g., the core technology does not work as expected).
- Investment returns distribution: Investment returns commensurate with the risk.
- As companies reach commercialization, many companies face high cash demands and a significant scarcity of capital. Expansion PE addresses this market disconnect. Companies generally cannot commercialize without this growth capital. This dynamic is not universally applicable; there are many investments that diverge from broader trends.
- There are many companies that are currently seeking $50-200 M in funding for first-of-a-kind plants. Some of these companies successfully receive funding, but there is currently a bottleneck in financing these types of projects.
- We use the term PE / VC to primarily refer to early stage venture capital and expansion stage private equity. Later stage PE / Buyouts are not addressed directly.
- **Risk Management:** Policy risks are managed by identifying the proper TLC policy frameworks. Loan guarantees and feed-in–tariffs have been used to help not only renewable power projects, but also make up a substantial factor in the economics of the holding companies in which PE investors are taking stakes. The sensitivity to returns of policy drift is high, and PE investors should be very careful to make investments where a clear and certain path to revenues is unencumbered by the policy risks. Execution risk is a critical feature of PE investing. PE investors seek assurance that the management can execute on their idea and that the markets are ready for their products, both from the

perspective of competitive development but also relative to other more traditional economic factors, such as the direction of commodity prices, inflation, and currency exchange rates.

IV. Climate Change Investment Markets and Asset Classes: Private Equity / Venture Capital

Global clean technology PE/VC investment is dominated by the Americas. In recent years, investment trends have been volatile, although investment appears to have leveled off at approximately pre-2008 levels.

Global Clean Energy PE/VC Investment, USD $B



Source: Bloomberg New Energy Finance, 2011.

PE/VC investment trends show recent volatility but appear to have settled around the level of $8 billion per year reached pre-2008. The Americas lead investment in the theme, although different periods have seen strong investment in Europe. Investors are beginning to focus on investments in Asia, although investment totals do not yet reflect this focus. The global financial crisis has impacted investment totals generally, while policy uncertainty in the US has also caused headwinds.

- PE/VC investment in clean energy increased steadily through 2008, but the uncertainty of the global financial crisis introduced a degree of volatility to the investment trends of the asset class in recent quarters. Fundraising for the asset class rebounded in 2010, which should herald increased investment in the future.
- 2010 was the third highest year on record for PE/VC investment in clean energy. Investment totals appear to have leveled off around $8 billion, similar to 2007, following a decrease in 2009 from 2008.
- The largest area of investment was the Americas, followed by Europe, the Middle East and Africa. Q4 2010 saw more than $1 billion in deals. This figure, however, is about less than half of the $2.5 billion deployed in the beginning of 2010.
- Although volatile and hit by the financial crisis, PE/VC showed an ongoing positive upturn over the last 6 years.
- In Q4 2010 PE/VC decreased by about $0.2 billion compared with Q3 2010, with the Americas being the only region to post an increase. The Americas region accounted for about 90% of new investment in Q4 2010. The United States attracted the majority of all venture capital money spent on renewable energy worldwide.
- PE/VC funds have cumulatively raised over $25B of capital in the last 10 years, as tracked by Bloomberg New Energy Finance. 2010 saw $5.2 B of new capital, compared to the recent low of $2.1 B in 2009

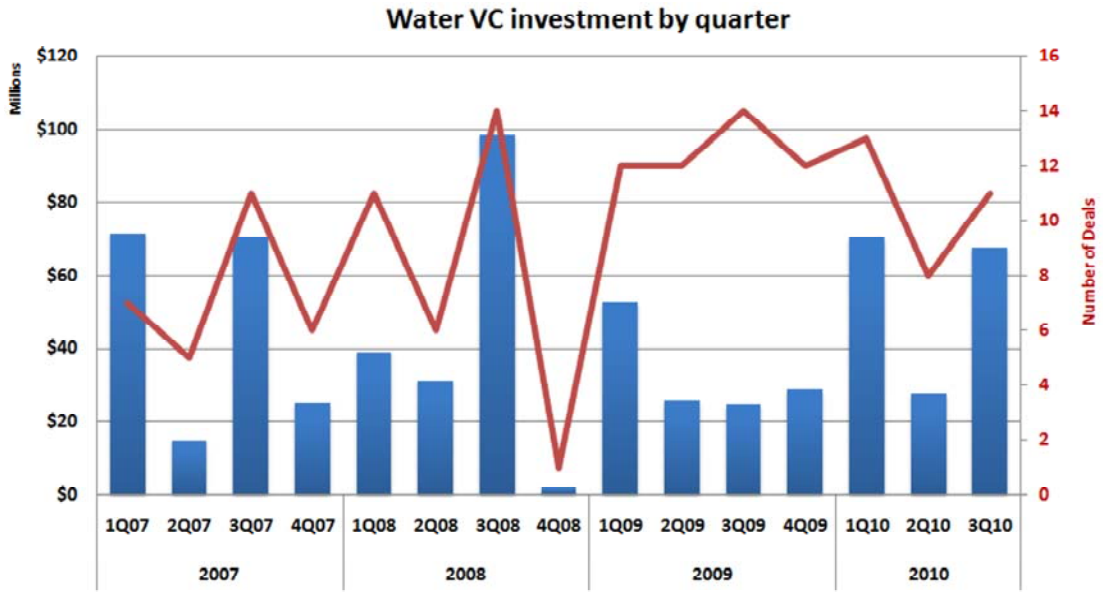
IV. Climate Change Investment Markets and Asset Classes: Private Equity / Venture Capital

- PE expansion capital saw the most dollars invested and the second largest amount of deals completed. Series B investments were the second largest area of focus.
- Solar deals received the largest investment amount in dollars and number of deal at $2.2 B. Wind and efficient transport were roughly tied for second largest, with $1.29 B and $1.20 B respectively.

IV. Climate Change Investment Markets and Asset Classes: Private Equity / Venture Capital

Water venture capital investment has seen a recent uptick and remains a key area of investor interest. It continues to be highly volatile.

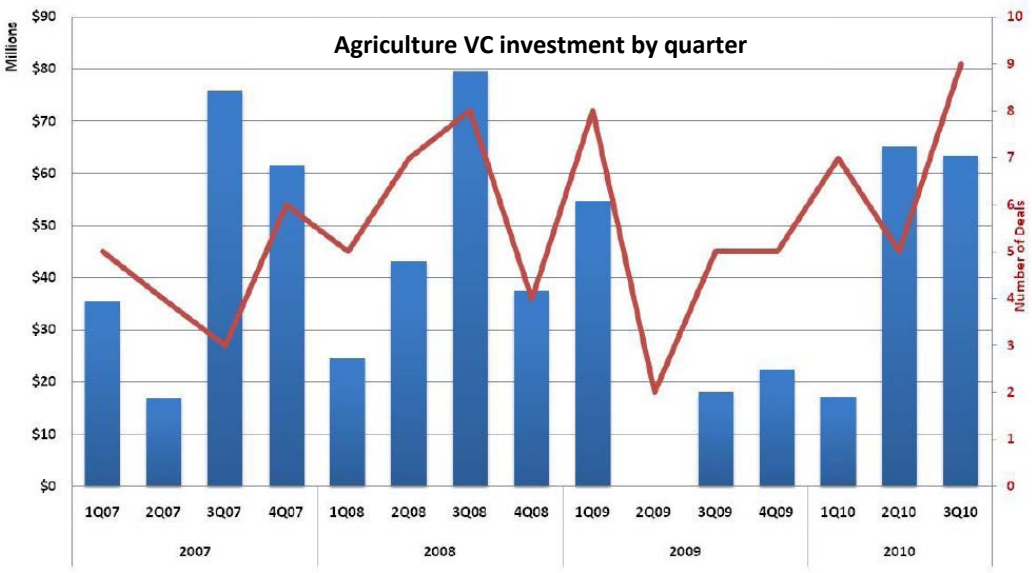
Global venture capital in water ($m)



Source: Cleantech Group, 2010.

There has been significant but volatile investment into agricultural venture capital companies.

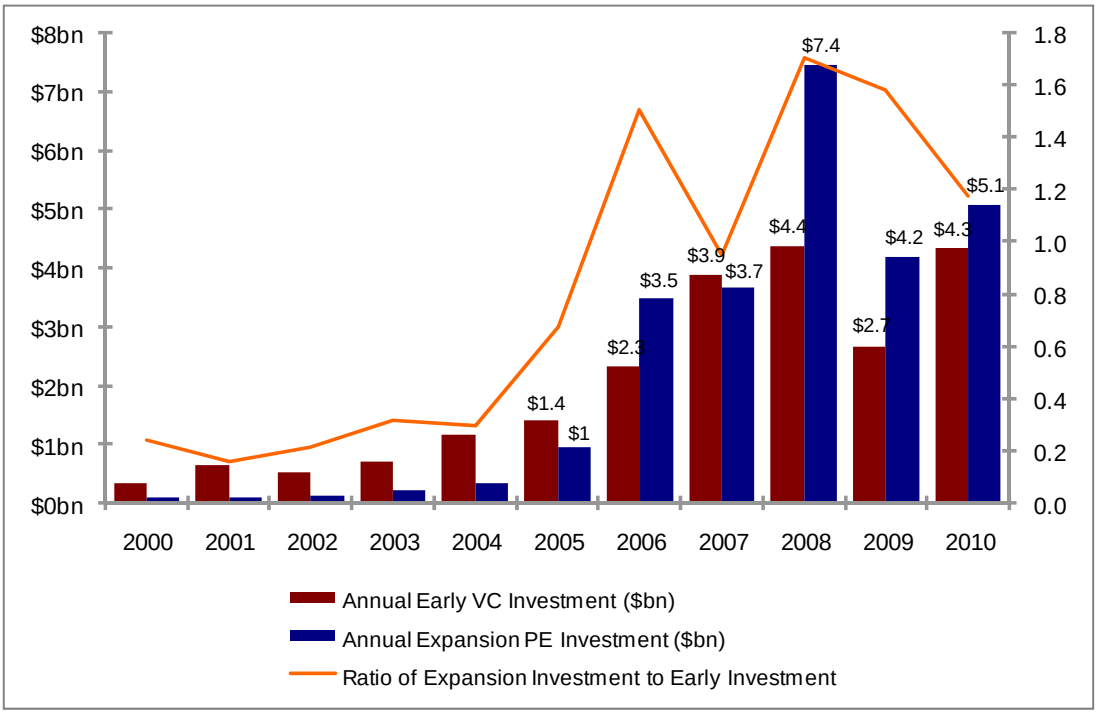
Global venture capital in agriculture ($m)



Source: Cleantech Group, 2010.

IV. Climate Change Investment Markets and Asset Classes: Private Equity / Venture Capital

The share of expansion stage PE investment has grown rapidly.



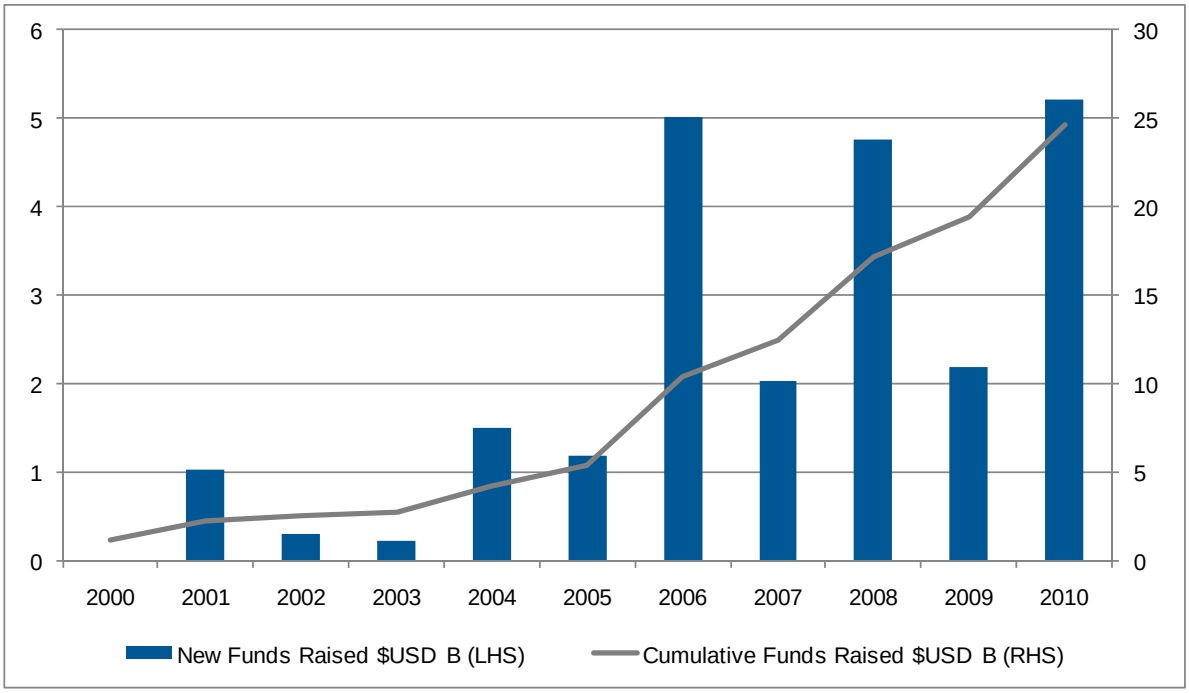
Source: Bloomberg New Energy Finance, 2011.

As companies develop and mature from earlier stages into expansion and growth stages, investment requirements become more capital intensive and deal sizes increase.

- Clean energy VC/PE investments are gravitating towards the PE expansion stage as companies mature.
- The ratio of the amount of PE expansion capital deployed over VC investment in 2010 vs. 2000 is ~5 times greater.
- The pool of early investment capital deployed over the past 4-5 years now requires substantial levels of growth or expansion capital to prove viability at a commercial stage
- Both stages of investment have recently experienced some volatility, as broader market uncertainty during the credit crisis slowed the rise of investment totals across the theme. This is an example of risk factors affecting the asset class.
- Nonetheless, 2010 had the second largest amount of capital deployed across either stage of investment (Note: this analysis excludes some later stages of PE/buyouts counted in earlier charts).
- Investor interest has rebounded from the lows of the credit crisis, and significant capital is being put to work across the theme.

IV. Climate Change Investment Markets and Asset Classes: Private Equity / Venture Capital

PE/VC fundraising for clean energy has increased strongly, although it has been volatile over recent years.



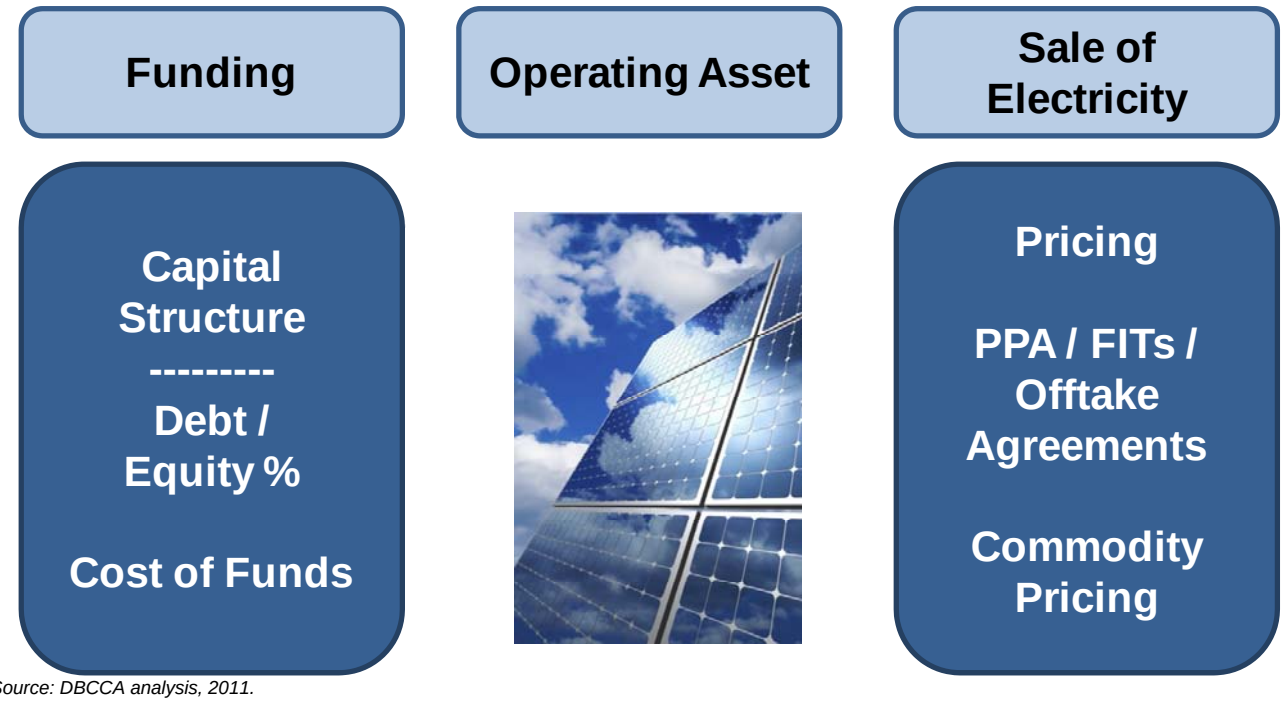
Source: Bloomberg New Energy Finance, 2011.

According to Bloomberg New Energy Finance, investor sentiment for climate change PE/VC investment rebounded off of the low of 2009.

- Fundraising in clean tech PE/VC rebounded off of the lows immediately following the credit crisis and reached the largest year on record.
- Corporate and strategic investors are increasingly interested in the space, in addition to more traditional sources of capital such as institutional and high-net worth investors. 2010 saw a $30 M investment by Panasonic in Valero, and although closed in very early 2011, Valero invested $50M in biofuels maker Mascoma. Corporate and strategic investors are also deploying money as LPs into PE/VC funds.
- A major focus on innovation is driving the entry of investors and corporations to the space.
- As existing technologies move down the experience curve and become cost-competitive with conventional technologies even on an unsubsidized basis, the pathway for new innovative technologies will become clearer.
- With 275 funds and $5.4 billion raised, the United States had the largest amount of new capital flowing into the sector, which was $1.2 billion and 74 funds more than was raised in 2009.

IV. Climate Change Investment Markets and Asset Classes: Infrastructure

Infrastructure investments in clean energy are comprised of three basic areas of focus.



Source: DBCCA analysis, 2011.

Infrastructure investment is dependent on project level economics, which means that after financing, most risks are of a local and project specific nature. These risks can be generalized to reflect the attributes of the asset class.

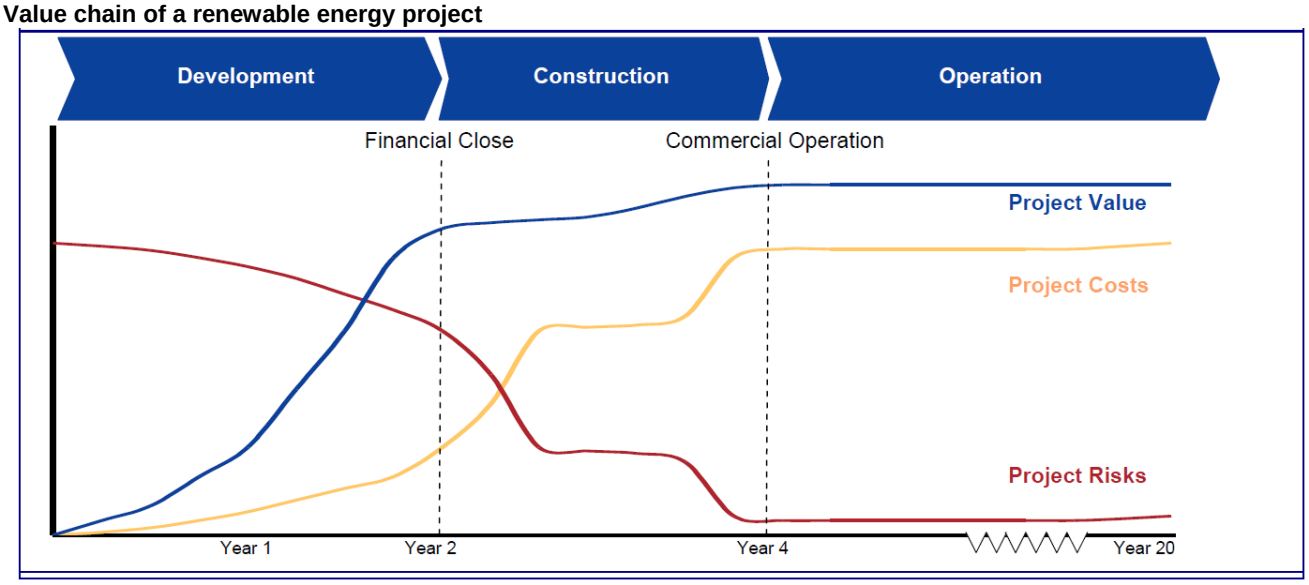
- As an asset class, infrastructure investment focuses on establishing long-term contracted cashflows from physical operating assets. Infrastructure investors seek to de-risk all components that affect the certainty of these cashflows.
- Infrastructure investment in climate change sectors is driven by project level economics. Project level economics can vary across geographies and by technology sector. Risks to the asset class occur inherently at the local / project level, although diversified portfolios of projects can distribute and mitigate the risks.
- At their most basic, project level economics are a function of supply and demand considerations. For example, current trends forecast an oversupply of turbines and solar PV modules in 2011, which should reduce average selling prices. This will have the impact of improving project level IRRs and increasing the volume of projects installed in 2011, all other variables being equal.
- A requirement of infrastructure investment is “bankable” technology. Bankable technologies are those technologies which are sufficiently mature to qualify for bank financing options. Currently, wind and solar technologies are the largest areas of focus for infrastructure investors in climate change sectors, although within the framework of “cleaner” energy, many investors are also considering natural gas assets
- Some areas, such as energy efficiency, are more difficult for infrastructure investors to access. The deployment of LEDs is a major trend across climate change investments, but it is not easily invested in from an infrastructure perspective. Most LED installations are self-financed by building owners, with limited use of outside financing.
- Infrastructure investments involve the actual operation of a physical asset, introducing an element of operational risk to investments. These risks can be mitigated through investments in experienced teams with proven track records.
- Infrastructure also faces some liquidity risks, as investors must hold a relatively illiquid asset for longer periods of time. This is mitigated by streams of contracted, steady cashflows generating cash yields to investors across the hold-period.
- **Risk Management:** Risk to investors in energy infrastructure projects includes price volatility of the feedstock and the power sold, as well as regulatory risks. Price volatility is typically managed through hedges and fuel supply contracts

and the power is typically sold via contracted off-take agreements, referred to in the US as Power Purchase Agreements (PPAs), and tariffs where feed-in-tariffs exist in other regions. The key to managing the regulatory risk in these infrastructure projects is to lock-in the cash flow to the project during the window of policy certainty. The overall risk to the infrastructure fund manager is deployment of the capital in a timely manner as well as identifying the best policy framework in the right geography and administrative level (federal, state, local). Other risks include the operating risk and other industrial risks typical of all infrastructure projects.

IV. Climate Change Investment Markets and Asset Classes: Infrastructure

The project value chain offers distinct financing/capital requirements and opportunities

Value chain of a renewable energy project



Source: Deutsche Bank AFL.

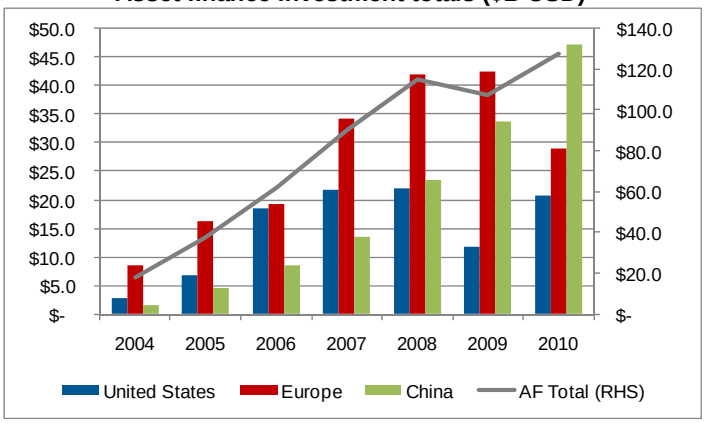
Different investment entry points across the lifecycle of an infrastructure investment project offer various amounts of risk and reward to investors. The capital and asset intensive nature of a clean energy project requires investors to segment the development of the project into distinct phases, each offering a different investment profile.

- Infrastructure investors focus on the later operational stage of clean energy project investments. Earlier stages feature distinct risk/reward profiles and are funded by other types of investors, as discussed in Section II.
- **Development**
  - Relatively small development equity
  - Highest risk: > 20% return requirement
  - Hold period depends on take-out: Max. 2 years
- **Construction**
  - Investment size small through site development, ramps up during equipment purchase and down-payments
  - Mezzanine returns: 12-18%
  - Short hold periods, taken out by long-term debt or equity
- **Operation**
  - Large investments to buy/finance operating assets
  - Lowest risk: ~10-15% return requirements
  - Long hold periods: >10 years
  - Opportunities for “tax efficient” investments using structures such as leveraged leases

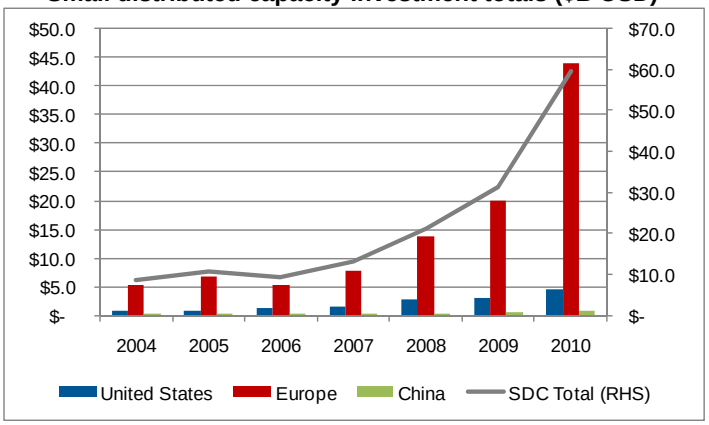
IV. Climate Change Investment Markets and Asset Classes: Infrastructure

Project investments in clean energy (asset finance and small distributed capacity) remain the largest asset class by dollars invested.

Asset finance investment totals ($B USD)



Small distributed capacity investment totals ($B USD)



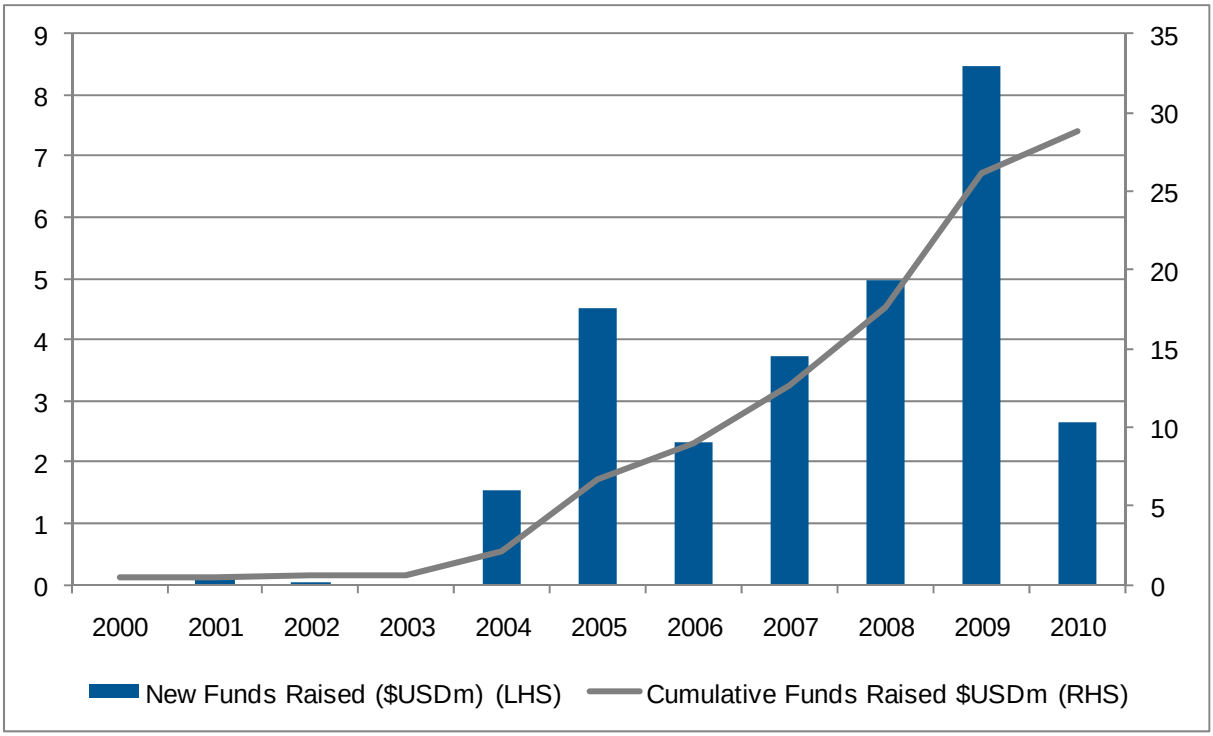
Source: Bloomberg New Energy Finance, 2011.

Clean energy infrastructure investment has deployed large amounts of capital and remains the largest asset class for investment. It has rebounded strongly off lows seen during the depths of the credit crisis and remains a strong area of growth. Governments continue to seek the deployment of clean energy assets, while pricing and equipment costs are decreasing globally. Access to affordable financing remains an area of focus.

- Infrastructure investments were the largest area of investment for clean energy in 2010, seeing significantly more investment than the PE/VC asset class. This is a reflection of both investor interest and the large amounts of capital required for the space.
- Small-scale renewable energy investment (much of which is solar PV in Germany and in Europe) is captured in the small distributed capacity category. This figure is only reported by BNEF once a year, so it is not always recorded in intra-year investment totals. Markets with strong feed-in-tariffs lead the world in small-scale investment, as reflected in Europe's regional dominance of the category.
- As a secular growth theme, Asia, and in particular China, has seen a steady increase in the amount of investment to clean energy in recent years. Chinese wind installations totaled more than half of the global figure.
- Due to the stable, long-term policies put forth by the Chinese government and easier access to credit, a huge amount of money was deployed in 2010. With $6.5 billion – 24% more than in Q1 2009 -in the first quarter of 2010, China saw the largest amount of renewable energy investment in the world.
- Uncertainty in the early part of the year about various incentive schemes created headwinds, as governments reviewed the costs of incentive programs in light of budgetary constraints. However, the structured roll-back of some feed-in-tariff schemes and the potential expiration of incentives in the US led to demand being pulled forward into the end of 2010.
- Recently, the potential of retroactive incentive cuts in Spain and the Czech Republic have raised concerns, but investors do not seem to believe that similar repeals will occur across the larger, more established geographies.
- Policy TLC remains an important force in encouraging investors to deploy capital at a regional level, and the strongest connection between policy environments and the deployment of capital can be seen in the market feedback of strong infrastructure investment totals flowing to geographies with strong policy TLC.
- Infrastructure as an asset class can be a means to mitigate policy risk in portfolios, as once an investment is made, the policy regime at the time of the investment is effectively "locked-in."

IV. Climate Change Investment Markets and Asset Classes: Infrastructure

Bloomberg New Energy Finance tracks fundraising totals for clean energy project equity and project debt funds. Dedicated funds are one source of project capital.



Source: Bloomberg New Energy Finance, 2011.

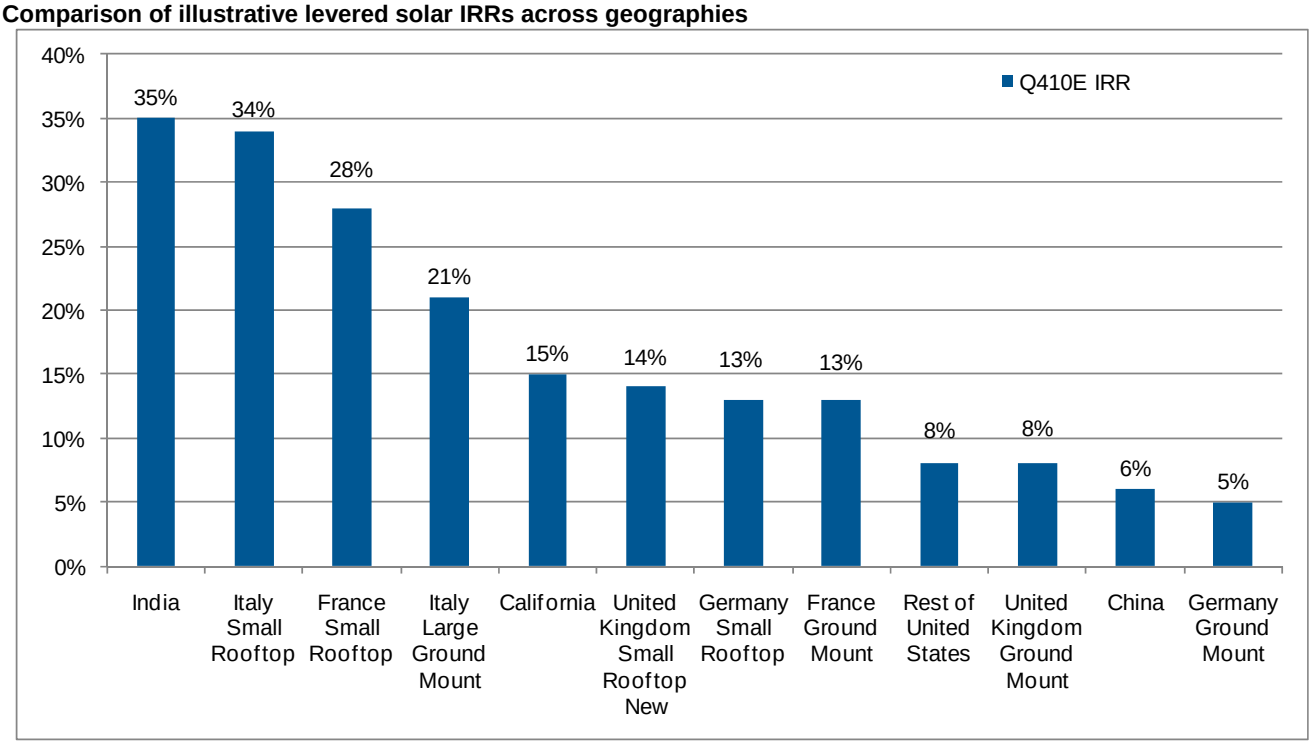
According to Bloomberg New Energy Finance, 2010 clean energy infrastructure fundraising decreased relative to 2009, although 2009 was elevated by a single $5B fund that closed.

- Nearly $30B of cumulative clean energy project equity and project debt funds have been raised since 2000.
- Of this, 87% is focused on project equity, with most project debt coming from traditional lenders.
- 2010 saw $2.6B of new capital raised. 2009's total of $8.45 B was composed of a major $5B individual fund from APG Infrastructure.
- Without that fund, the fundraising picture shows challenges for dedicated vehicles since the credit crisis.
- As project-level equity IRRs remain positive, we expect a rebound in fundraising totals
- The disconnect between fundraising totals and project-level investment is made up by the existence of PE backed developers, utilities funding projects, corporate funded projects, and other sources of capital. Additionally, some PE funds are investing directly at a project level, in addition to funding the project developers.
- The complexity of fully tracing the project finance capital flows is discussed in The Investors chapter.

IV. Climate Change Investment Markets and Asset Classes: Infrastructure

Renewable infrastructure projects can offer attractive levered IRRs to investors.

Comparison of illustrative levered solar IRRs across geographies



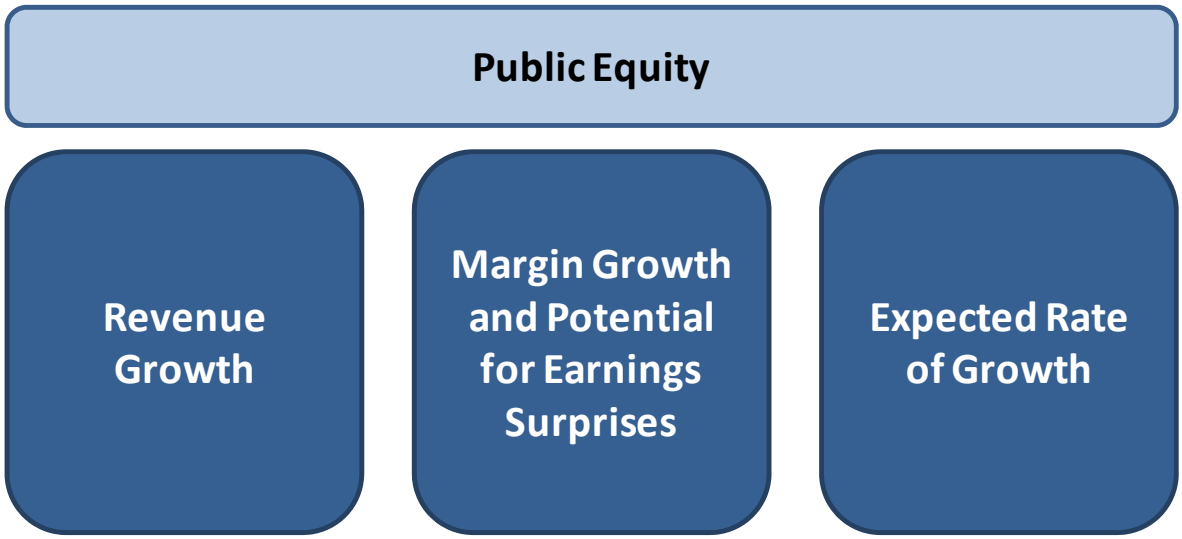
Source: Bloomberg, Barclays Capital research. Note: The implied time period varies based on the country's feed-in-tariff policy. Assumes$1.65/W ASPs; $1.70/W BoS Costs, Interest Rate: 5%, India Interest Rate: 12%. Irradiance and tariffs vary by region.

Net of incentives, renewable projects offer attractive levered returns.

- Renewable projects (solar used as example) present attractive IRRs to investors, particularly in countries with strong policy incentives.
- Without policy intervention, market prices do not reflect the costs associated with GHG emissions and therefore do not provide appropriate incentives for low-carbon technologies. Therefore, government support remains a key focus for investors in the renewable energy sector. Countries with less effective, stable or ambitious policies will pose a higher risk to investors. Attractive incentives can be an effective policy tool for accelerating renewable asset deployment and "locking–in" returns and minimizing future policy risk, provided there are no retroactive changes.
- Infrastructure investments hinge upon the establishment of long-term stable cash flows. As such, they focus only on proven technology. Projects happen when cash flows can be locked down with enough certainty to arrange financing.
- Challenges also exist around operational risk (that the asset doesn't perform as expected) or if there's too much leverage.

IV. Climate Change Investment Markets and Asset Classes: Public Equity

Public equity investments in climate change sectors are based on the same macro-elements as all public equity investments; the particular structural drivers, however, are unique.



Source: DBCCA analysis, 2011.

While the investment thesis for climate change public equities is structurally similar to all public equities (growth will occur at a top line and/or bottom line level, faster than the market expects), there are a number of specific sector and thematic risks to climate change investments as listed below.

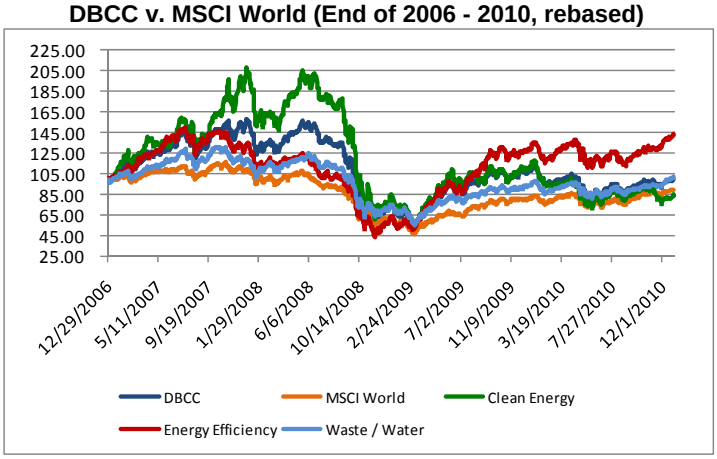
- According to a recent Deutsche Bank coverage analyst report, industry risks include (1) government subsidization and policy changes, (2) a shift in the competitive landscape/market share shifts, (3) time to commercialization of technologies and applications, (4) the rate of technology progression toward grid price parity, (5) concrete metrics and perception regarding competing and non-competing energy sources, (6) potential value chain margin compression as the technology industry matures, and (7) general economic risk.[6]
- The nature of risk exposure to policy depends on the type of policy supporting a given firm. Firms relying on direct incentives and subsidies, such as solar firms, see multiple expansion at the onset of the policy regime. Uncertainty or scale-back in these programs affects the trading multiple of the firm. Other firms are supported by restrictive policies on conventional technologies, such as LED manufacturers and the related restrictions on incandescent bulbs, and may see less policy-related volatility once the bans are enacted.
- **Risk management:** How to manage climate change public equity risks. Again, stocks are one of the only quantitative measures of risk / return in the climate change market. Public equity investors in climate change have the same tools to manage portfolio risk as all equity managers have: allocation to cash, weighting of the portfolio and in some cases using shorts or derivatives to protect positions. However, as climate policy has a significant impact on these sectors, public equity investors need to stay abreast of policy changes even more acutely than more generalist portfolio managers.
- There are other climate change policies that are not at risk such as the US-Cafe rules or the worldwide phase-out of incandescent light bulbs or the European initiative to make all meters smart by 2022. Here public equity investors can look at the stocks that are related to those restrictions and expect that they will experience lower volatility compared to stocks that are dependent on subsidies. Therefore when managing policy risk in public equities, one can balance the weighting of companies to some that have high policy risk due to a direct industry incentive as well as allocations to companies where the risk is lower due to a restrictive policy.

[6] *Deutsche Bank Research, Solar Photovoltaic Industry: 2011 Outlook – FIT cuts in key markets point to oversupply. January 5, 2011. Peter Kim, Hari Polavarapu.*

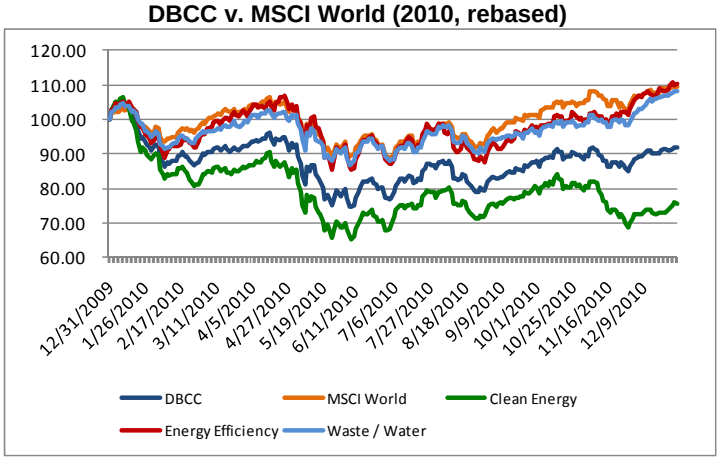
IV. Climate Change Investment Markets and Asset Classes: Public Equity

Clean tech public equities have faced challenges relative to global public equities.

DBCC v. MSCI World (End of 2006 - 2010, rebased)



DBCC v. MSCI World (2010, rebased)



Source: Bloomberg, Nasdaq OMX.

Driven primarily by policy uncertainty and headwinds, 2010 was a difficult year for clean tech public equities.

- Clean energy public equities have a small-cap bias and many feature capital intensive and cyclically exposed business models
- The DB NASDAQ OMX Clean Tech Index is an accurate representation of the global clean tech industry, covering clean energy, energy efficiency, transport, waste management and water. The index is a collaboration between DBCCA and NASDAQ OMX.
- The price return clean tech index has outperformed the MSCI World Index from the end of 2006 by 9.8% on an absolute basis; on an annualized basis, the DBCC returned (0.1%) and the MSCI World returned (2.6%). There has been strong recent performance from the energy efficiency sector through the end of 2010.
- The water theme has shown a less volatile but more consistent and stable return. Clean energy has seen periods of strong outperformance and higher volatility.
- From the start of 2009, the relative bounce-back in some commodity and energy prices also contributed to the rebound off the bottom of the market in 2009, although natural gas prices remain depressed. During 2010 political uncertainty over government incentive programs such as Feed-in-Tariff revisions and sovereign credit fears initially placed negative downward pressure on the clean tech theme.
- There are more companies emerging and gaining share in China and other parts of Southeast Asia.
- Policy uncertainty remains a key risk factor for the sector, but some recent policy decisions, such as the defeat of California's Prop 23 ballot initiative, can be seen as providing positive support for the theme.

IV. Climate Change Investment Markets and Asset Classes: Public Equity

Valuations both actual and forecast vary across clean technology sectors, as measured by the DBCC Index. Earnings are expected to increase.

		LTM PE	1 YR FWD PE	LTM EV / EBITDA	1 YR FWD EV/EBITDA
MSCI World*		15.9	14.2	11.5	11.2
DBCC	Average	24.6	18.4	11.0	8.9
	Median	18.6	17.3	9.3	8.5
Clean Energy	Average	23.8	17.4	12.0	8.9
	Median	16.1	12.5	9.9	8.1
Energy Efficiency	Average	22.5	18.2	11.7	8.9
	Median	17.9	16.9	9.7	8.6
Waste	Average	37.8	22.9	9.9	9.1
	Median	25.3	20.5	9.3	8.8
Water	Average	19.0	18.2	9.3	9.6
	Median	19.0	17.2	9.2	9.6

*Source: Capital IQ, Bloomberg. *Sourced from Bloomberg consensus estimates.*

Analysts expectations vary widely by sector, although valuations look reasonable based on forward earnings.

- Expectations are for a period of component oversupply (such as turbines and PV modules), so companies with strong and defensible pipelines should be better positioned.
- The oversupply will drive down ASPs for many components, which will create some strong headwinds for companies coupled with existing exposure to lower current electricity pricing.
- Many analysts expect the secular energy efficiency theme to occur with both economic and incentive-driven support for various components.
- Waste's current high valuation is driven by several speculative outliers in the theme, with large valuation run-ups tilting the valuations of the names.
- Lower beta across the water space and in some of the utility names in the energy space could offer investors opportunities with more stable, visible earnings and less exposure to swings in sentiment.
- Installation growth remains strong, although it is shifting across geographies as investors follow project-level returns.
- Secular growth in climate changes sectors will continue, driven by innovation, cost reduction and new market penetration opportunities, although headwinds persist at the individual company.
- Low natural gas prices present additional challenges to electricity price exposed names
- Policy remains the key area of focus for investors, with incentives still in place to provide strong potential returns but the possibility of cuts coming as governments review costs associated with programs. Some programs, such as Europe's FITs, have already begun to see cuts, although they remain a strong example of TLC. Orderly cuts can offer a degree of certainty which will enhance and support investor interest, as future expectations are modified without unnecessary surprises.
- Note that although natural gas and related firms are included in our Cleaner Energy level of the climate change investment universe, they are not reflected in these valuations.

IV. Climate Change Investment Markets and Asset Classes: Public Equity

Equity raises have been volatile over recent years, although returns have proven strong for companies that have raised capital.

Global Clean Tech Data (IPO deal size >$100 mil, includes US)

Year	Clean Tech IPOs	Total Proceeds (in mil)	Average Return†
2006	15	$4,813.0	-7.1%
2007	26	$12,915.9	31.8%
2008	6	$3,808.5	-41.7%
2009	4	$2,889.8	51.6%
2010	24	$8,968.0	26.9%
TOTAL	**75**	**$33,395.2**	**17.5%**

Source: Renaissance Capital, Greenwich, CT

†Returns measured from offer price to year end close (average is simple-weighted).

US Clean Tech Data (Proposed Market Cap >$50 million)

Year	Clean Tech IPOs	Total Proceeds (in mil)	Average Return†
2006	9	$1,938.9	-3.5%
2007	12	$2,942.3	78.5%
2008	4	$804.0	-55.7%
2009	3	$591.4	82.3%
2010	11	$1,364.8	23.9%
TOTAL	**39**	**$7,641.3**	**30.7%**

Source: Renaissance Capital, Greenwich, CT

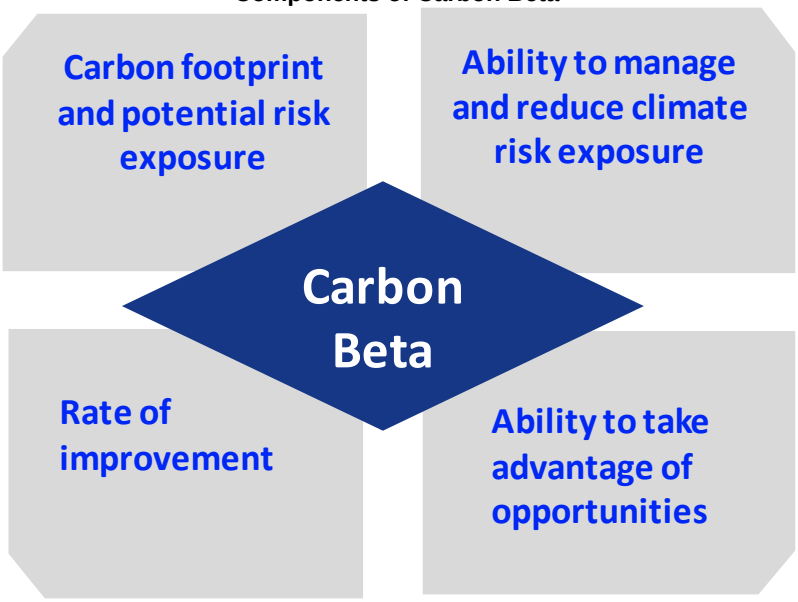
In data calculated by Renaissance Capital, initial public offerings (IPOs) for clean energy firms have rebounded off of lows during the credit crisis, although they have not regained their pre-crisis highs.

- The strength of the IPO market reflects the underlying health and risk appetite of the capital markets.
- In the recent economic downturn, public market new issue equity financing became expensive and unavailable to many companies.
- A healthy IPO market helps private equity investors by providing a comparison to private market values and a benchmark by which to potentially time and value exits.
- IPOs also helps the climate change sector; as more companies come to market, liquidity increases.
- Of note, 29 of 75 deals in the past 5 years have been in Asia, with a larger number of firms choosing to list in the region recently. 85% of deals by market value in 2010 IPO'd in Asia, and 53% of deals by market value were in China or Hong Kong.
- The largest deal of 2010 was Enel Green Power, a large renewable energy operator / developer from Italy.
- IPO demand is both a function of public market investor demand and of the strength of underlying companies.
- At a certain scale of both development and capital requirement, climate change companies require sufficient capital to need access to public markets. The lack of broad public market financing is a risk factor for investors looking to exit earlier stage investments and indicative of the broader risks facing public market investments.

IV. Climate Change Investment Markets and Asset Classes: Public Equity

Tools like MSCI's Carbon Beta allow investors to analyze public equity climate risk at a portfolio level. This is part of a trend towards incorporating analysis of climate risks into investment processes.

Components of Carbon Beta



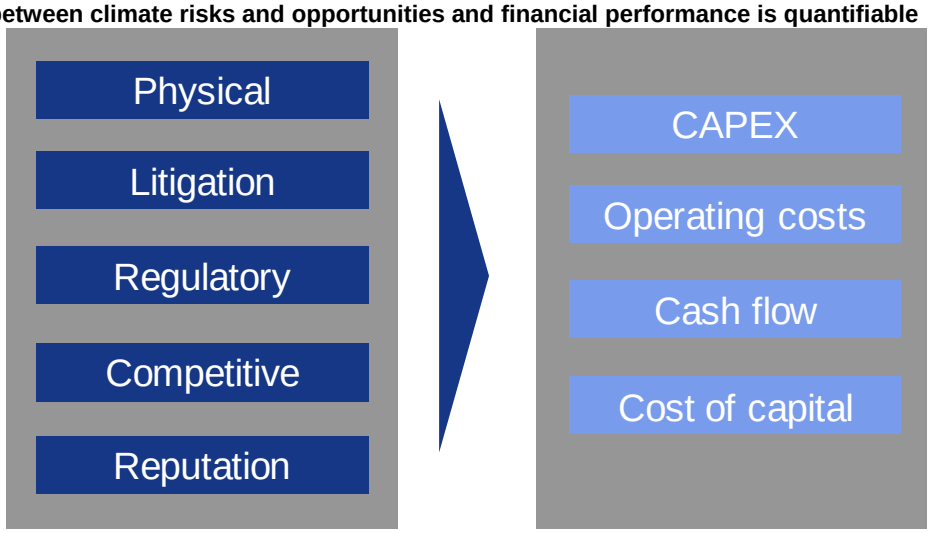
Climate change investment can involve allocations to sector specific strategies or a broader integration of climate risk analysis into core investment processes.

- Net carbon rating is defined as a function of four key variables at a company level
- Footprint alone doesn't tell the whole story of potential climate risk – it ignores:
  - Companies' ability to manage or reduce climate risk
  - Companies' regulatory risk exposure
  - Company and sector improvement over time
- Carbon Beta can also be used as a tool to evaluate climate risk and create optimizations within the fixed income asset class.

IV. Climate Change Investment Markets and Asset Classes: Fixed Income – Managing carbon market risk

Climate change poses financial risks to companies, which have a direct potential impact on the fixed income asset class.

The correlation between climate risks and opportunities and financial performance is quantifiable



Source: Risk Metrics, DBCCA Analysis

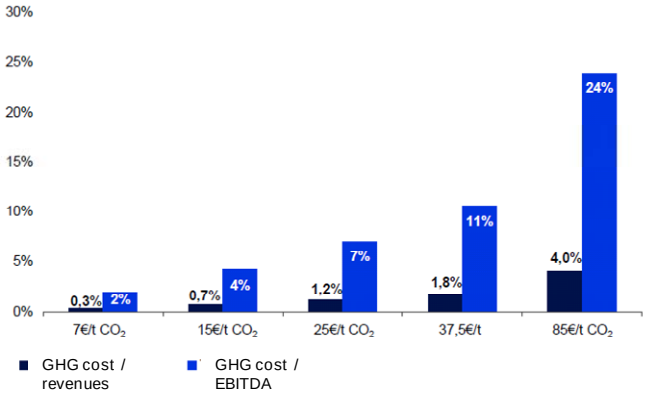
Climate change impacts and related factors have direct impacts on businesses and their underlying cashflows.

- As the world continues to explore ways of limiting global carbon emissions through policy enactments, a corporation faces increases in costs due to paying for its impacts from climate change and its carbon emissions.
- Fixed income portfolios typically consist of corporate and government bonds. Return profiles are driven by many variables including macro economics such as interest rate fluctuation, currency changes and inflation, as well as regulatory changes.
- This has an impact on a corporate balance sheet and ultimately its credit rating and its cost of capital. Therefore, fixed income portfolios have a large exposure to climate policy, namely carbon emissions reductions.
- In general, using a climate ratings system to manage a portfolio of bonds can be used as a leading indicator for management quality and long-term financial performance. In particular, ratings can identify companies that are relatively better positioned to perform in a low-carbon economy.
- These companies are considered to be more efficient, innovative and with well-managed risks. Such ranking systems also can highlight higher risk companies.
- Credit strategies hedged for carbon policy will likely offer similar returns to unhedged credit models during the period of low and geographically varied carbon policies.
- Performance of corporate bonds within the climate change context stems from the corporations exposure to carbon pricing. Experience has shown a lower risk profile relative to a benchmark, due to the fact there are already some carbon markets in place, the risk of carbon legislation in the US and the litigation pressures on large emitters and the general proxy for good management that the carbon hedge signal provides.

IV. Climate Change Investment Markets and Asset Classes: Fixed Income – Managing carbon market risk

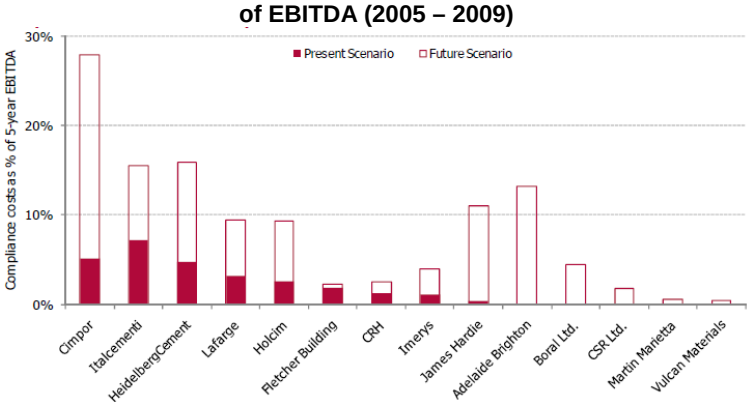
Climate Change policy can have a direct impact on corporate financial strength.

Average share of potential greenhouse gas-related cost on revenues and EBITDA (in %)



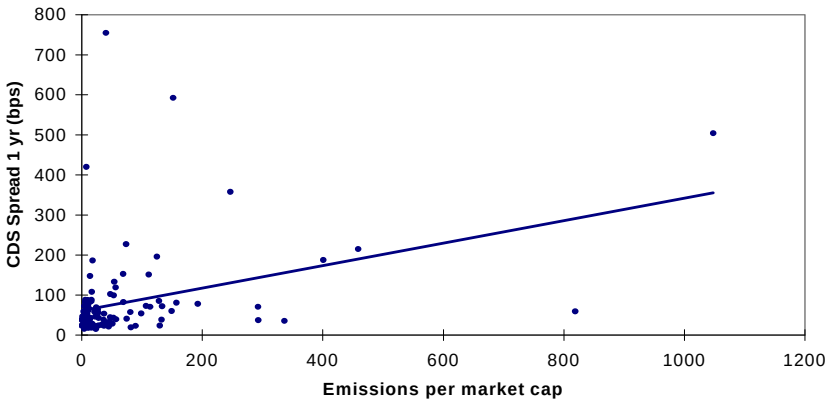
Source: Carbon Disclosure Project 2010, Germany 200 Report, DBCCA.

Cost for compliance with emission reduction targets as a share of EBITDA (2005 – 2009)



Source: Carbon Disclosure Project 2010, Germany 200 Report, DBCCA.

Carbon intensity is a significant factor for corporate refinancing costs



Source: DB Advisors, Morgan Stanley, September 2009.

Financial implications will depend on a carbon price and industry.

- Modern strategic risk management has to face and to deal with the consequences from climate change
- Regulatory risks (reduction targets for CO_2 emissions) transform into financial risk for several asset classes (e.g. stocks, corporate bonds, etc.) and need to be quantified, managed and hedged
- Carbon inefficient firms tend to have a higher credit default swap spread (and thus investors demand higher risk premia)
- Carbon intensity and refinancing costs likely to be positively correlated (correlation ~48%).
- Recent research has shown that the credit standing of borrowing firms is influenced by legal, reputational, and regulatory risks associated with environmental incidents, and that between 1995 and 2006, environmental concerns were associated with a higher cost of debt financing and lower credit ratings, and that proactive environmental practices were associated with a lower cost of debt. (Bauer and Hann, 2010).

IV. Climate Change Investment Markets and Asset Classes: Fixed Income – Managing carbon market risk

Carbon beta is a tool used to evaluate climate risks and can be applied to the fixed income asset class.

Illustrative company rankings

Rating Scale
AAA
AA
A
BBB
BB
B
CCC

Carbon Beta™	
Company Rating	A
Carbon Improvement Vector:	▲

Carbon Scores	
Carbon Management Strategy:	10
Carbon Risk Exposure:	3.5
Carbon Strategic Opportunities:	9
Carbon Performance Improvement:	9

Industry Carbon Combined Intensity	
Carbon Combined Intensity [a]	4
Carbon Direct Intensity:	5
Carbon Indirect Intensity:	5
Carbon Market Sensitivity:	3
Sales (USD millions):	$22,959
Market Cap. (USD Million):	$19,403

Compliance Costs

WACCRT™[c]			-16.5%
Industry Discount Rate [d]			9.2%
	Exp. Case	Min.Case	Max. Case
Carbon Price ($/t CO2e)	$28	$18	$45
Annual Cost of Compliance ($1000)	$312,538	$190,522	$501,579
Exposure (% of EBITDA)	17.2%	10.5%	27.7%
NPV of Abatement Costs ($1000)	$1,315,420	$835,176	$2,112,022
Exposure (% of Mkt. Cap.)	6.8%	4.3%	10.9%

Company Carbon Positioning

Scope 1: Direct Carbon Emissions (t CO2e):	31,700,000 *r*
Scope 2: Electricity Indirect Carbon Emissions (t CO2e):	NR
Scope 3: Other Indirect Carbon Emissions (t CO2e):	NR
Industry Average Direct Carbon Emissions (t CO2e):	8,891,174
Direct Carbon Emissions Ratio: [e]	3.57
Carbon Intensity (t CO2e /USD sales in millions):	1,381
Industry Average Carbon Intensity (t CO2e /USD sales in millions):	758
Direct Carbon Intensity Ratio: [f]	1.82

Source: MSCI (Innovest/Risk Metrics), DBCCA Analysis. See list of footnotes on page 99.

To measure potential climate risks in a fixed income portfolio, external climate and carbon risk tools are utilized.

- Evaluating climate change performance of corporations is a specialized expertise. MSCI (Risk Metrics/Innovest) Carbon Beta examines critical, company-specific factors that affect any issuer's exposure to risk due to climate change.
- The Carbon Beta™ analytics platform evaluates three primary elements:
  - Industry sector exposures
  - Company specific carbon analysis
  - Carbon Financials
- Carbon Beta ratings are based on four key dimensions of climate risk – not one.
  - Carbon Management Strategy
  - Carbon Risk Exposure
  - Strategic Carbon Profit Opportunities
  - Improvement Trend
- Energy intensity and fuel source mix. Firms that are relatively more dependent on carbon-intensive fossil fuels, notably coal, face higher costs relative to their peers as regulation makes it costly to emit carbon.
- Product mix. The direct, indirect, and embedded carbon intensity of a firm's products directly affects its risks as the cost of carbon emissions rises.
- Marginal abatement costs. Some companies may have greater ability than others to reduce costs through conservation or technological improvements that put their energy consumption on a more sustainable footing.
- Technology trajectory. Progress to date in adapting production technologies to a carbon-constrained world can lead to significant reduction in total risk.

- Risk-management capability. How aware is the company of its exposure to climate-change risks? What measurement and reporting systems are in place to track changes in its risk profile? How does it integrate climate-change concerns into its research and development activities?
- Upside potential. Climate change creates opportunities as well as risks. Demand for new products and services may create substantial revenue opportunities for some companies. In addition, certain firms may be well-positioned to profit from the sale of emissions rights under cap-and-trade control systems, which are in effect in Europe and are likely to start soon in the United States.
- **Sector Leaders:** Minimal, well-identified carbon risks and liabilities, with a strong ability to meet any losses which might materialize. Extremely well-positioned to handle any foreseeable tightening of regulatory requirements and strongly positioned strategically to capitalize on carbon-driven profit opportunities.
- **Sector Laggards:** Significant doubts about management's ability to handle its carbon risks and liabilities, and where these are likely to create a serious loss. Well below-average ability to capitalize on carbon-driven profit opportunities.

Footnotes to *Illustrative company rankings*:

(a) Carbon Combined Intensity. In order to identify industry sectors that are the most exposed to climate change risks and opportunities, Innovest has developed a three pronged approach to rate the specific risks of sectors along their entire value chain: upstream, internal and downstream. This composite Carbon Intensity factor (0-lowest exposure, 5-highest exposure) is derived from the three categories of carbon intensities: Direct, Indirect, and Market Sensitivity. The index reflects the relative carbon risk exposure of the sectors along the entire value chain.

(b) Compliance costs are calculated as the cost of mitigating emissions above the limit established by a target applied to a baseline level. In the model, it is assumed that permits are being grandfathered up to the baseline level minus the abatement target. Additionally, the permits corresponding to the exceeding emissions above the target imposed to the baseline are being purchased in the market.

(c) Weighted Average Country Carbon Reduction Target (WACCRT™). The WACCRT™ refers to the expected emissions reduction targets according to applicable legislations where a company has relevant assets, domestically and internationally. In this sense, the metric shows a weighted average for the restrictions that a firm faces in the countries and regions it operates during the mandated compliance period.

(d) Industry Discount Rate. The industry discount rate is calculated from the Weighed Average Cost of Capital (WACC) from each specific industry as of January, 2007. For calculating it, we used the weighted average of the cost of equity and after-tax cost of debt, weighted by the market values of equity and debt. For the weights, there were used cumulated market values for the entire sector.

(e) Direct Carbon Emissions Ratio. The ratio between the direct CO2 emissions (tonnes of CO2e) of the company and the industry average direct carbon emissions. It is a measure of the company's current or potential emissions abatement requirement that the company faces in its sector. If the Direct Carbon Emissions Ratio is greater than 1, the company is considered to have a relatively high risk exposure in its sector.

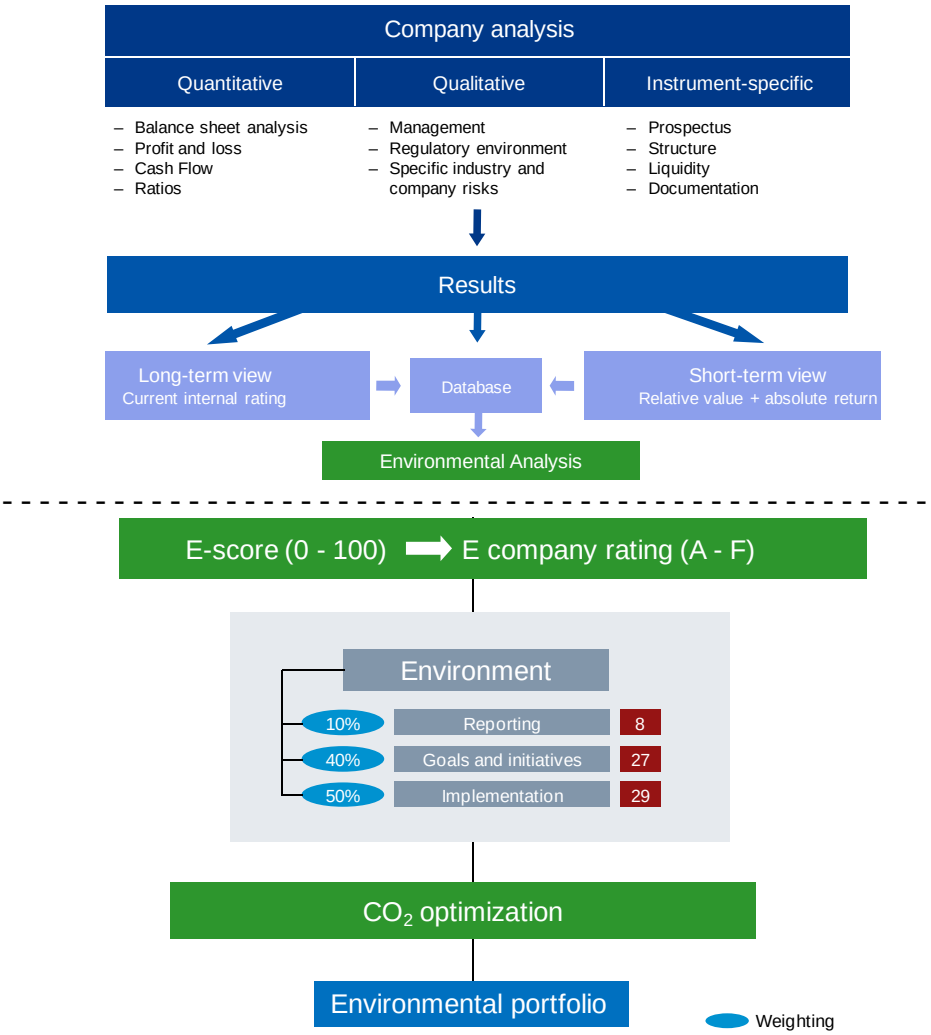
(f) When specific industry output is available (e.g., MWh in the Electric Utilities sector), it is used instead of revenues to calculate the firm and sector s Carbon Intensity. However, CI in monetary terms is a practical measure to compare carbon efficiencies across sectors.

Source: MSCI (Innovest/Risk Metrics), DBCCA Analysis, 2011.

IV. Climate Change Investment Markets and Asset Classes: Fixed Income – Managing carbon market risk

At an asset class, portfolio, or security level, fundamental risk factor research can be integrated with environmental and carbon risk ratings.

Original and timely credit analysis is the foundation for generating alpha



Source: DBCCA analysis, 2011.

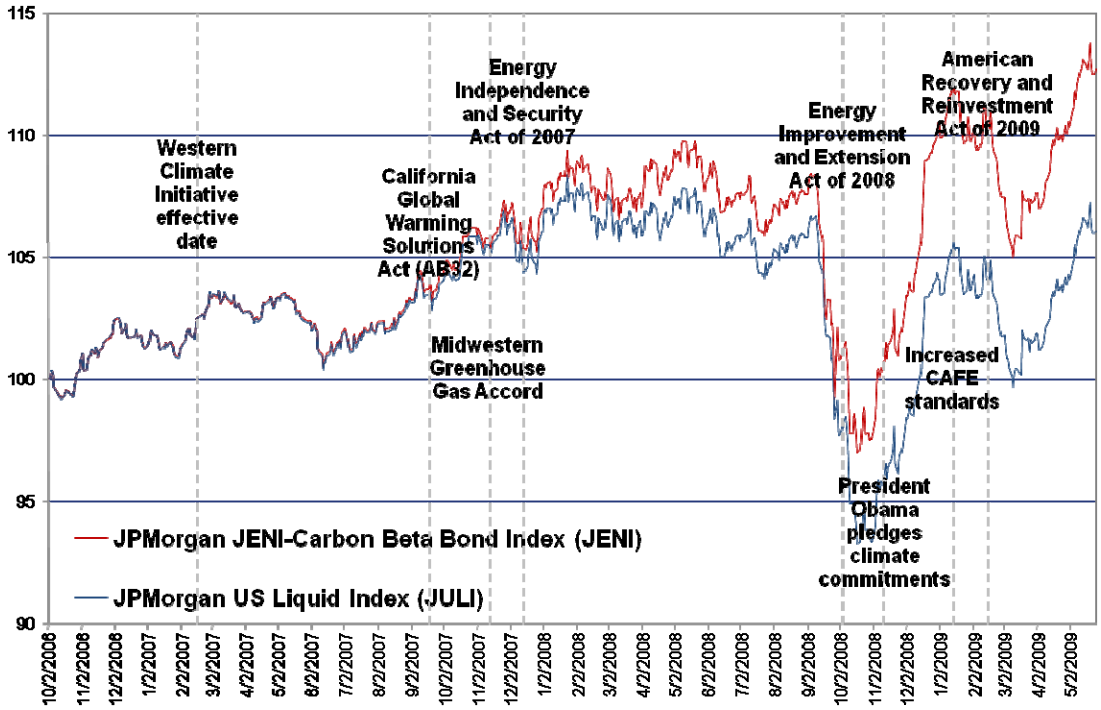
Climate risk is analyzed and incorporated in the context of existing fixed income processes.

- Credit strategies hedged for carbon policy generally expect an almost similar return versus a credit model un-hedged to carbon policy during the period of low and geographically variegated carbon policy.
- However, experience has shown a lower risk profile relative to a benchmark, due to the fact there are already some carbon markets in place, the risk of carbon legislation in the US and the litigation pressures on large emitters and the general proxy for good management that the carbon hedge signal provides.
- Using a series of data sources, investors can fine tune our credit models to have greater exposure to the best managed companies, or those who are best positioned to respond well to subsequent carbon and environmental policy.
- In the mid to long-term term, carbon hedged portfolios may even outperform a "classic" credit model portfolio and also the benchmark as some countries will continue or start to punish emissions.

- Finally, in today's market conditions above average rated companies which operate in a jurisdiction without an explicit carbon price consider carbon in their strategy and so are better positioned to perform in an increasingly carbon constrained economy.
- Liquidity: As part of a fixed income allocation, the asset class could serve as a liquid component that includes climate change as a risk factor
- Climate change: Carbon compliance costs – these may be substantial and include the cost for abating emissions to achieve compliance with current regulations as well as greenhouse gas (GHG) emission reduction targets set by mandatory national and international regimes.
- Declining demand for carbon-intensive products – decline in marginal consumer demand for carbon intensive products and services.
- Avoiding business risk – reputational risk due to perceived high carbon footprint and lack of initiatives to reduce emissions regardless of mandatory targets.
- Normal research process are applied but exposures are adjusted based on whether issuers' carbon ratings are strong or weak
- Both long and short positions result from the ratings.
- In this example, carbon and environmental ratings are incorporated in the context of an environmental framework rather than a pure carbon framework.

IV. Climate Change Investment Markets and Asset Classes: Carbon Overlay – Managing carbon risk

Illustrative backtests show the potential impact that carbon risk filters can have on fixed income. JENI Carbon Beta Bond Index vs. US Liquid Index (JULI)



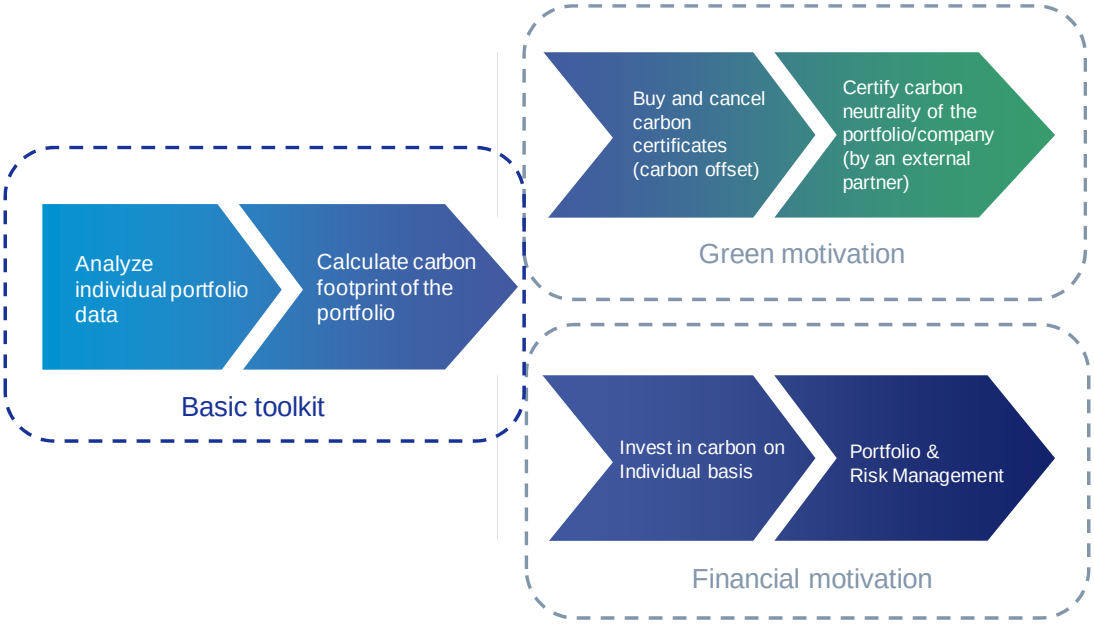
Source: Risk Metrics, JP Morgan, DBCCA analysis, 2011.

Illustrative backtests show that climate filters may have an impact on performance.

- As an illustration of using a Carbon Beta tilt to fixed income portfolios, the JPMorgan Environmental Index-Carbon Beta corporate bond index was developed to assess the impact of climate change tilting to bond portfolios. (Note this index has been discontinued but serves as a good example).
- The Carbon Beta index closely followed the JPMorgan US Liquid Index (JULI), an established benchmark for US high-grade investors, and was constructed with virtually the same industry-wide sector allocations.
- Back-testing confirmed that the JENI-Carbon Beta closely replicated the return characteristics of the JULI, while at the same time reducing exposures to issuers' financial risks arising from climate change.
- Movements in the carbon tilted portfolio were closely aligned with movements of various climate change policies.
- Such a strategy demonstrated to investors the benefits of a sophisticated environmental analysis that provides insights into companies' management quality, strategic vision, and longer-term performance potential.

IV. Climate Change Investment Markets and Asset Classes: Carbon Overlay – Managing carbon risk

Carbon overlay strategy



Source: DBCCA analysis, 2011.

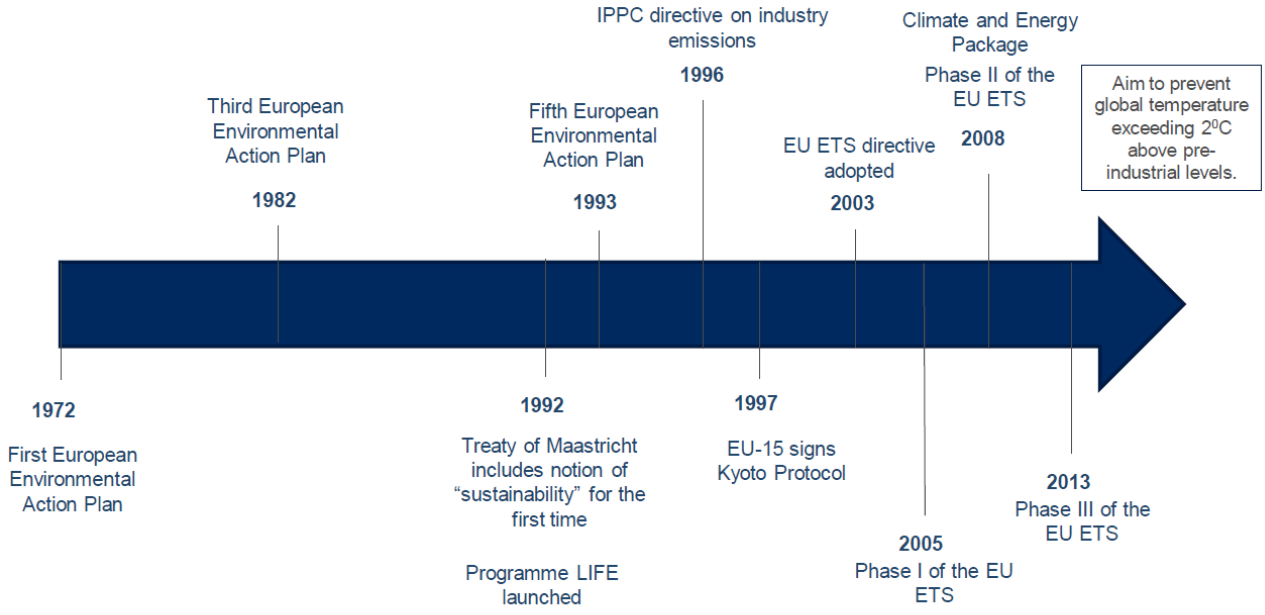
Risk reduction from a non-monetary standpoint – e.g. risks from pollution, legal and reputational risks – have to be considered in a portfolio context.

- Portfolio managers can use a carbon neutrality / risk management solution to hedge overall carbon risk using carbon credits as an asset class.
- Investors have a financial motivation to this for the following reasons:
  - Portfolio diversification while including a mostly uncorrelated asset class
  - Potential fundamental price appreciation of carbon
  - Front running theory – carbon as new asset class in the long run
  - Hedging financial risk caused by potential carbon price increases (e.g. equities)
- Investors have a "green" motivation to do this for the following reasons:
  - Investment behavior as a corporate citizen
  - Complying with UN Principles of Responsible Investing (UN PRI)
  - Public opinion
  - Institutional clients may use carbon neutralization projects as differentiating factor versus their peers to gain a competitive advantage with their own clients (e.g. insurance companies)
  - Incentivizing the corporate sector by taking carbon certificates from the market.

IV. Climate Change Investment Markets and Asset Classes: Carbon Overlay – Managing carbon risk

The EU ETS is the largest carbon market in both value and volume.

Climate and carbon market-related policy in Europe



Source: Bloomberg New Energy Finance.

The Kyoto Protocol is a result of the United Nations' Framework Convention on Climate Change (UNFCCC) signed in 1992. Under the Protocol, a total of 39 industrialized countries were given specific emissions reduction targets to be met during the 2008-2012 period against 1990 levels.

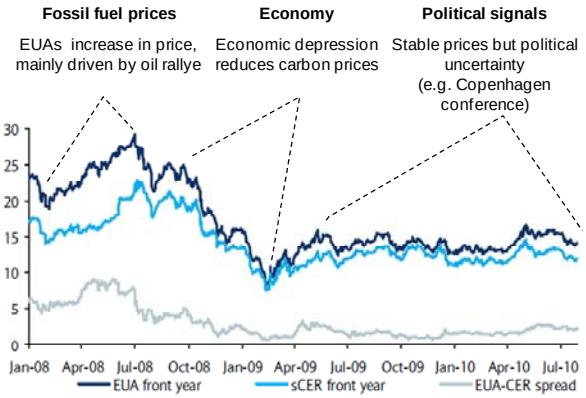
- Though developing countries were not given specific targets, they are critical to carbon markets, as outlined in our Policy Developments section. Developed and developing countries were referred to as 'Annex 1' and 'Annex 2' countries, respectively.
- Carbon markets involve contracts in which one party pays another in exchange for a given quantity of emissions reduction. Transactions can be divided into two types:
  - **Allowance-based transactions:** the buyer purchases emission allowances credited and allocated (or auctioned) by regulators under cap-and-trade systems. Examples include the European Union Allowance (EUA) under the EU Emissions Trading Scheme (EU ETS) and the Assigned Amount Units (AAUs) under the Kyoto Protocol.
  - **Project-based transactions:** the buyer purchases emission credits from a project that can verifiably demonstrate reduction in greenhouse gas emissions. If the focus of the project or investment is another developed country it is included in the Joint Implementation (JI) Framework of the Kyoto Protocol. If the investment is in a developing country, it is included under the Clean Development Mechanism (CDM) of Kyoto. CDM projects generate Certified Emission Reductions (CERs) while JI projects generate Emission Reduction Units (ERUs).

.

IV. Climate Change Investment Markets and Asset Classes: Carbon Overlay – Managing carbon risk

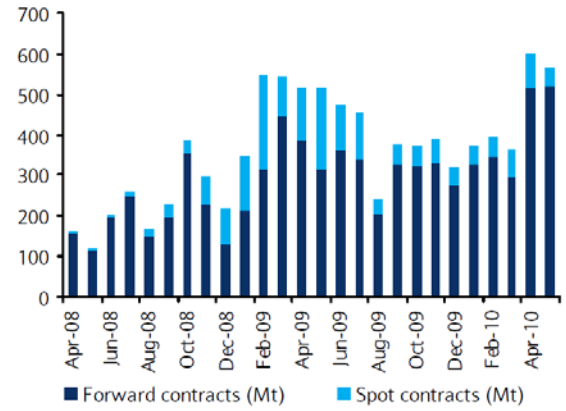
Overview of carbon markets and opportunities

Price development of EUA und CER*



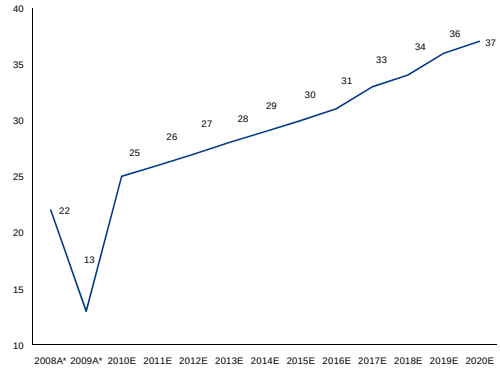
*As of August 5, 2010. *EUA: European Union Allowance, CER: Certified Emission Rights. Source: ECX, Barclays Capital.*

EUAs: Traded volume in spot / forward contracts



*As of August 5, 2010. *EUA: European Union Allowance, CER: Certified Emission Rights. Source: ECX, Barclays Capital.*

Projected carbon price increase (forward curve), based on potential 30% EU reduction target until 2020 (in EUR)



Source: DB Global Markets Research, December 2010.

Carbon correlation to financial and commodity markets

	Carbon	Gas	Coal	Power	Oil	DJI	DAX	REXP	EUR	Gold
Carbon	1.000									
Gas	0.315	1.000								
Coal	0.039	0.107	1.000							
Power	0.447	0.539	0.202	1.000						
Oil	0.126	0.111	0.019	0.215	1.000					
DJI	-0.016	-0.021	0.071	0.049	0.060	1.000				
DAX	0.079	0.043	0.176	0.167	0.199	0.497	1.000			
REXP	0.008	0.063	-0.011	-0.011	-0.021	-0.455	-0.339	1.000		
EUR	0.034	0.033	0.093	0.067	0.022	0.152	0.076	0.179	1.000	
Gold	0.066	0.105	0.254	0.237	0.348	0.371	0.341	-0.038	0.395	1.000

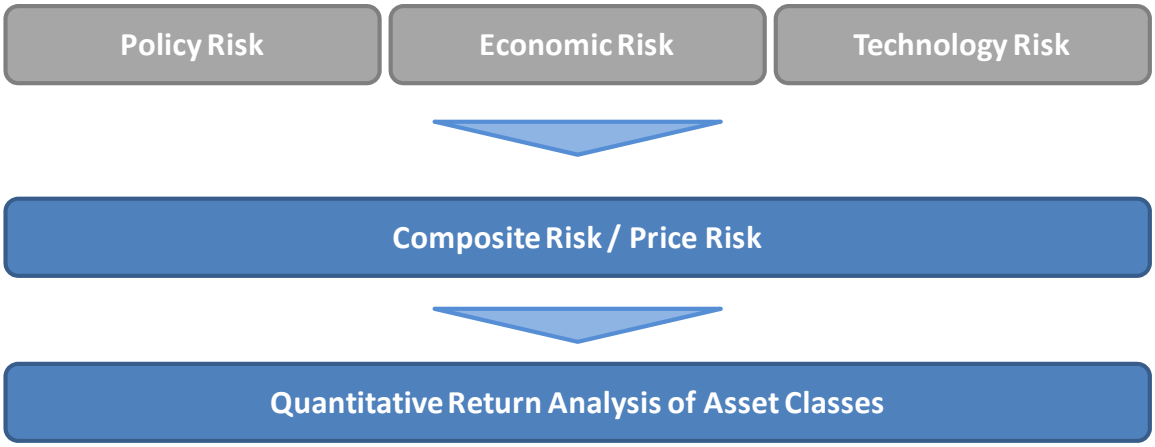
Source: Aquila Capital 2008.

Carbon markets are playing an increasingly important role in capital markets.

- The EU ETS is the largest carbon market in both value and volume. The EU ETS saw 5.2 billion metric tons of EUAs traded for an average price of €13.99 per metric ton and accounted for 81% of total trades in 2010. Furthermore, Point Carbon predicts that EUAs will reach €22/t in 2011 rising to €25/t in 2012. By 2020, Point Carbon predicts that EUAs will cost €36/t.
- The carbon market is characterized by a low correlation to other energy markets and its uncorrelation compared to other asset classes. Therefore, it constitutes an ideal investment away from the stock, bond and currency markets, hence contributing to the diversification of traditional portfolios.
- After a phase of rather low liquidity and increased volatility, the carbon market has stabilized with increased trading volumes and tight bid/offer spreads.

IV. Climate Change Investment Markets and Asset Classes: Quantitative Risk / Return

To analyze risk and return quantitatively, we look at both asset class proxies and climate change subsectors where data is available.



Source: DBCCA analysis, 2010.

Only climate change public equity has sufficient public data for quantitative analysis of risk and return. For the other asset classes, we use proxies to look at the interaction between the different asset classes.

- For Public markets we evaluate the DB NASDAQ OMX Clean Tech Index, its related sector level sub-indexes and the DXAG Index for Agribusiness. We use the MSCI ACWI to represent global public equities.
- For infrastructure, the UBS World Infrastructure index was used to represent the infrastructure asset class.
- For bonds we use the Lehman Global Aggregate given its broad use as a global bond benchmark.
- For PE and VC, we use the Cambridge Associates quarterly return benchmarks.
- Crude oil and natural gas are also analyzed, given their important impacts to the theme.

IV. Climate Change Investment Markets and Asset Classes: Quantitative Risk / Return

Climate change correlations across asset class proxies, traditional energy, and climate public equity sectors.

Q1 2007 - Q4 2010	MSCI ACWI (Global Public Equities)	Infrastructure Proxy	Bonds Proxy (Lehman Agg)	Private Equity Proxy (Cambridge Res.)	Venture Capital Proxy (Cambridge Res.)	Crude Oil (WTI)	Natural Gas (Nat'l Balancing Pt.)	Natural Gas (Henry Hub)	DBCC (Clean Tech Public Equities)	Clean Energy (Public)	Energy Efficiency (Public)	Waste Management & Water (Public)	Public Agribusiness (DXAG Index)
MSCI ACWI (Global Public Equities)	1.00												
Infrastructure Proxy	0.94	1.00											
Bonds Proxy (Lehman Agg)	0.38	0.51	1.00										
Private Equity Proxy (Cambridge Res.)	0.81	0.73	-0.01	1.00									
Venture Capital Proxy (Cambridge Res.)	0.67	0.56	-0.18	0.94	1.00								
Crude Oil (WTI)	0.66	0.48	0.04	0.73	0.67	1.00							
Natural Gas (Nat'l Balancing Pt.)	0.03	0.00	-0.02	0.20	0.34	0.10	1.00						
Natural Gas (Henry Hub)	0.16	0.20	0.07	0.40	0.34	0.40	0.55	1.00					
DBCC (Clean Tech Public Equities)	0.90	0.85	0.32	0.78	0.67	0.78	-0.03	0.27	1.00				
Clean Energy (Public)	0.78	0.73	0.29	0.73	0.67	0.78	0.03	0.32	0.96	1.00			
Energy Efficiency (Public)	0.89	0.85	0.27	0.70	0.54	0.60	-0.28	0.03	0.87	0.72	1.00		
Waste Management & Water (Public)	0.93	0.85	0.35	0.77	0.65	0.74	0.01	0.26	0.94	0.83	0.85	1.00	
Public Agribusiness (DXAG Index)	0.81	0.74	0.33	0.76	0.67	0.79	0.15	0.36	0.87	0.86	0.70	0.78	1.00
	Asset Class Proxies					Energy			Climate Public Equity Sectors				

Source: Bloomberg, NASDAQ OMX, DBCCA Analysis. Note: Infrastructure is the UBS Infrastructure Index, Bonds is the Lehman Global Aggregate, DBCC and sub-sectors are from the DB NASDAQ OMX Clean Tech Index, Ag is the DXAG Index, PE and VC are the Cambridge Associates Indexes.

Longer term, climate change sectors have been less correlated to other indices, although they have recently been more highly correlated.

- Our analysis tracks asset class proxies, measures of traditional energy, and specific climate change public equity sectors.
- Among asset class proxies, public equities, infrastructure, and private equity are strongly correlated. Bonds are not very correlated to other asset classes, and venture capital is moderately correlated with equities and infrastructure, although it has a higher correlation to private equity.
- Public equity, infrastructure, private equity, and venture capital are moderately correlated to crude oil. Bonds are not correlated with crude oil. None of the asset class proxies are strongly correlated with natural gas.
- Because it is difficult to get direct proxies for climate change asset classes in sectors other than public equity, we only analyze correlations among climate change sectors within public equities
- Climate change public equity sectors are highly correlated to global public equity markets. They are weakly correlated to bonds, and have moderate correlation with infrastructure. Climate change public equity sectors are moderately correlated with crude oil and weakly correlated to natural gas. Climate change public equity sectors are moderately to highly correlated with each other.
- Crude oil and natural gas are not strongly correlated to each other.

IV. Climate Change Investment Markets and Asset Classes: Quantitative Risk / Return

Annualized returns and volatility across asset class proxies, traditional energy, and climate public equity sectors.

		1YR	2YR ANN	3YR ANN	4YR ANN	4 YR Vol
Asset Class Proxies	MSCI ACWI (Global Public Equities)	10.4%	20.5%	-6.4%	-2.6%	25%
	Infrastructure Proxy	9.1%	17.2%	-5.2%	0.2%	23%
	Bonds Proxy (Lehman Agg)	9.9%	15.3%	13.6%	13.1%	8%
	Private Equity Proxy (Cambridge Res.)	6.0%	-2.9%	-0.4%	7.2%	13%
	Venture Capital Proxy (Cambridge Res.)	1.1%	-6.0%	-2.5%	3.1%	9%
Energy	Crude Oil (WTI)	15.1%	43.1%	-1.6%	10.6%	46%
	Natural Gas (Nat'l Balancing Pt.)	75.9%	2.1%	6.7%	24.6%	63%
	Natural Gas (Henry Hub)	-27.4%	-13.3%	-16.1%	-6.4%	65%
Climate Public Equity Sectors	DBCC (Clean Tech Public Equities)	-8.3%	17.2%	-13.9%	-0.1%	36%
	Clean Energy (Public)	-24.3%	3.6%	-25.2%	-4.1%	47%
	Energy Efficiency (Public)	10.4%	54.2%	1.8%	9.3%	38%
	Waste Management & Water (Public)	-3.1%	11.8%	-8.6%	-2.3%	25%
	Public Agribusiness (DXAG Index)	22.2%	41.4%	-0.9%	16.6%	38%

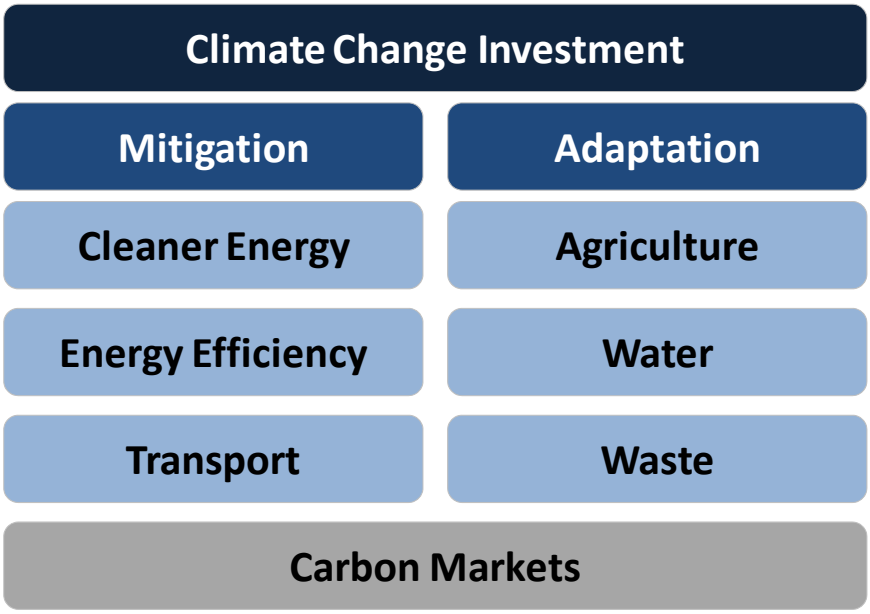
Source: Bloomberg, NASDAQ OMX, DBCCA

Returns have varied significantly across asset class proxies, sectors, and timeframes.

- As discussed earlier, recent returns have been driven by policy headwinds and strong cross-asset correlation in the financial crisis. Energy efficiency and agriculture have been strong performers, with efficiency driven by strong demand growth and bullish commodity markets for agriculture.
- PE, VC, and Infrastructure represent proxies for the climate change asset classes, with expectations that actual returns have been and will be stronger, as seen in part by relevant IPOs, acquisitions, and project level IRRs
- Clean energy has faced significant policy challenges, leading to recent underperformance in particular and high historical volatility

V. Growth Outlook for Climate Change Sectors

Climate change investment spans both the mitigation and adaptation themes, and covers a wide variety of investable sectors.

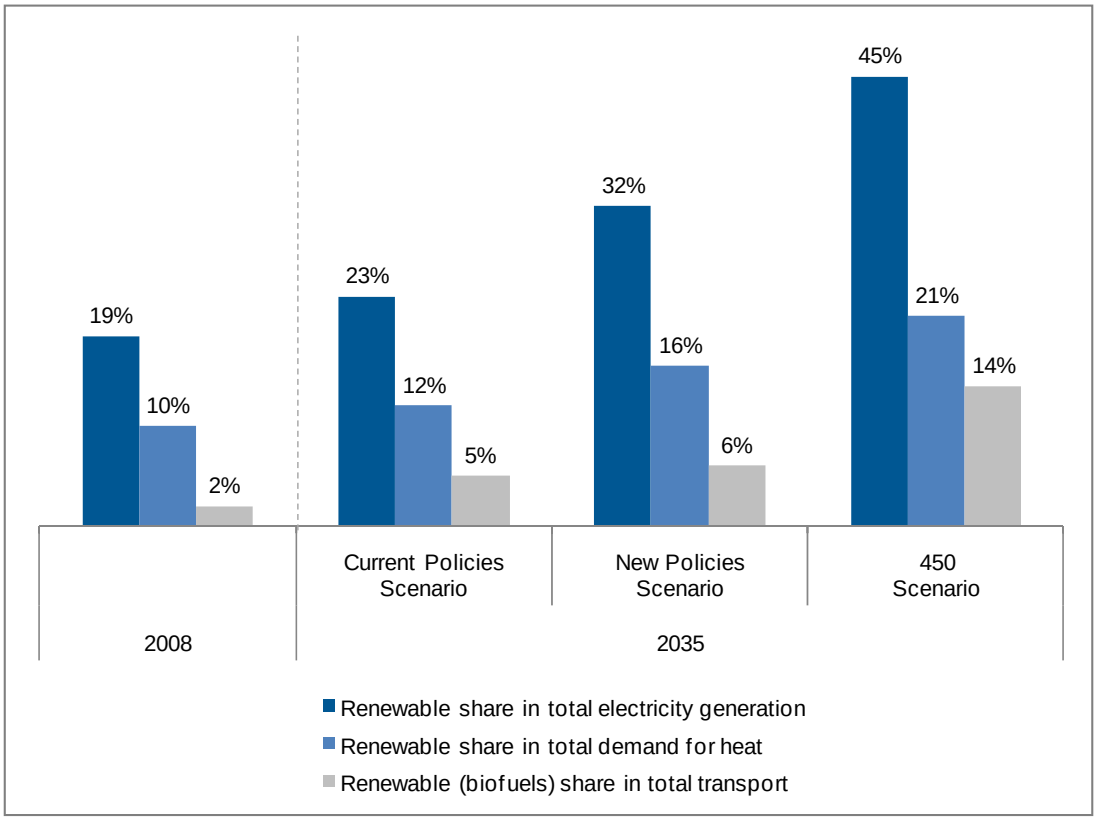


Source: DBCCA analysis, 2011.

Mitigation covers investments that serve to reduce or remove greenhouse gas emissions from the atmosphere. Adaptation covers investments that seek to respond to the physical effects of climate change. Carbon markets act as an enabler for both themes, and thus span both categories.

V. Growth Outlook for Climate Change Sectors

The share of clean technologies in the overall energy mix is gaining momentum, with a strong outlook ahead.



Source: IEA World Energy Outlook 2010.

- According to the IEA's World Energy Outlook report, a significant increase in renewable energy supply and share of total by 2035 is projected in all of their three scenarios. They expect government policy to drive the majority of this growth. The IEA's Current Policies Scenario is equivalent to their Reference Scenario, which accounts for only those policies that had been formally adopted by mid-2010. The New Policies Scenario accounts for the broad policy commitments that have already been announced and assumes "cautious implementation" of national pledges to reduce greenhouse gas emissions by 2020. The 450 Scenario accounts for the implementation of stronger pledges and policies after 2020, including the removal of incentives for fossil fuel consumption. This scenario aims to limit the concentration of GHGs in the atmosphere to 450 parts per million of CO_{2e} and limit global warming to 2°C.
- The largest increase in renewables occurs in their 450 Scenario. Renewable output for electricity in this scenario would rise from 3,774 TWh in 2008 to 14,508 TWh in 2035, representing a 284% increase. Renewable output for heat would rise from 312 Mtoe in 2008 to 790 Mtoe in 2035, representing a 153% increase. Lastly, renewable output for transport would rise from 45 Mtoe in 2008 to 386 Mtoe in 2035, representing a massive increase resulting in a market by 2035 that is seven times greater than that of 2008. The IEA finds that biofuels for transport will grow more rapidly than renewables for heat and electricity because of a relatively low base, and because of a higher penetration of advanced biofuels in the 450 Scenario.
- In order to reduce CO_2 emissions by 50% by 2050, the IEA finds that $46 trillion of incremental investment would need to be poured into the industry between now and then. This represents 17% more investment than in the Reference Scenario. Over the past three years, annual investment in clean energy technologies averaged approximately $165 billion. In order to achieve this level of reduction, investments would need to reach $750 billion per year by 2030 and rise to over $1.6 trillion per year from 2030 to 2050.

V. Growth Outlook for Climate Change Sectors

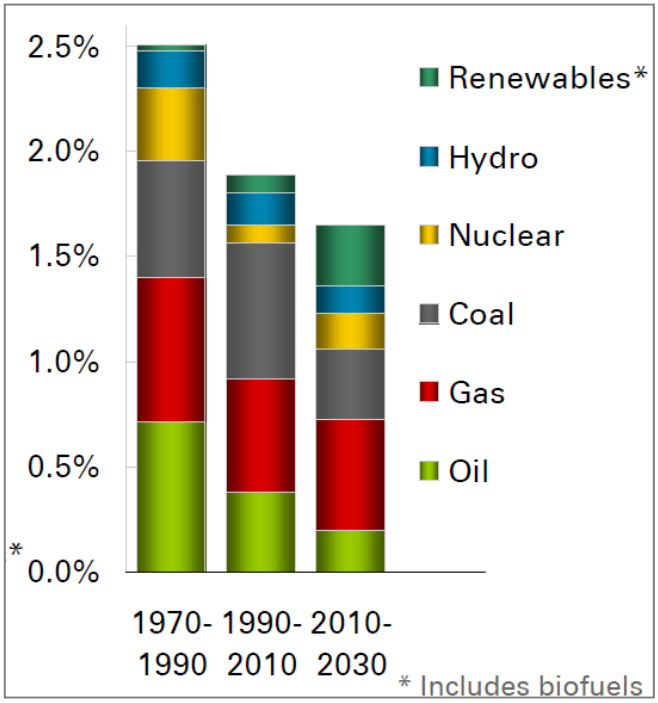
The $46 trillion would need to be allocated across the following sectors:

Sector	Incremental investment required to reach the IEA BLUE scenario, $ trillion, 2010
Electricity	9.3
Transport	23.0
Industry	2.0
Residential and Services	12.3
Total Investment	**46.6**

Source: IEA Energy Technology Perspectives 2010; DBCCA analysis 2011.

- The IEA finds that the European Union, China, India and the United States will continue to drive demand. Onshore and offshore wind, solar PV and solar thermal, biomass and hydro will continue to be the dominant renewable energy sectors.
- Another study conducted by the European Renewable Energy Council (EREC) is closely in line with the IEA report, predicting that 48% of the global energy supply could come from renewables in 2040. This is under an Advanced International Policy scenario that makes the assumption that additional support measures to the existing ones are implemented, and therefore cumulative growth rates for renewables are achieved.
- BP recently concluded that world primary energy consumption grew by 45% over the past 20 years and is expected to grow by another 39% over the next 20 years. Non-OECD energy consumption will comprise the lion's share of global energy growth by 2030, expected to be 68% higher by 2030 than today. BP also finds that the fuel mix will change, with renewables gaining share at the expense of coal and oil. BP estimates that renewables will represent the fastest growing sector, projected to grow at 8.2% p.a. between 2010 and 2030.

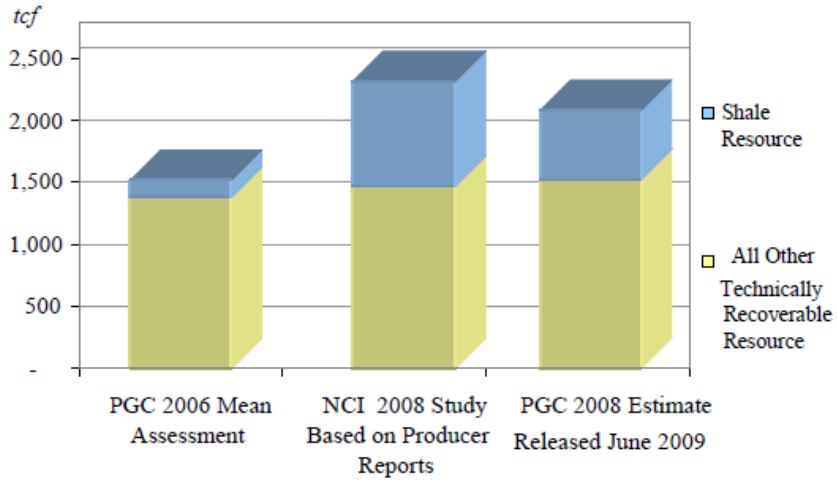
Contributions to growth



Source: BP Energy Outlook 2030, January 2011.

V. Growth Outlook for Climate Change Sectors

Natural gas supply has expanded rapidly as unconventional shale reserves have been developed.



Source: Navigant Consulting, "Natural Gas Supply The Role of Shale Gas," December 2009.

Expanded supply of natural gas has shifted pricing expectations lower, driving the economics of electricity generation.

- Over the past 18 months, the game has changed in North America with respect to natural gas supply fundamentals. Dramatic productivity, technological and environmental best practice improvements throughout the exploration and production (E&P) supply chain have reduced the cost curves and substantially increased the potential resource base.
- According to a 2009 report from the Colorado School of Mines, the US now holds some 1,800 trillion cubic feet of natural gas, one third of it shale, which is the equivalent of 320 billion barrels of oil, or close to a 200-year supply.
- Lower natural gas prices are likely here to stay. We expect these new supply sources to introduce new relative stability in US natural gas prices, clipping the tops and tails of historic price volatility. Accordingly, it appears more likely that natural gas prices will normalize in the $4.50 to $6.50/mmBtu range, as compared to the extreme lows and highs of $2 to $14 that played out from 2000-2008.
- We foresee adequate supply available below $6/mmBtu to satisfy annual US natural gas demand through 2030, which is likely to trigger expanded use for electricity generation as gas-fired generation replaces inefficient coal plants that have higher emissions.
- The pace of shale development depends on drilling activity, not on high capital, long lead time and infrastructure investment. This should dampen year-on-year price volatility as gas producers can respond more quickly to market needs. Within this price range, most of the US shale plays are economically viable, which suggests that there should be no supply shortages whatsoever between now and 2020. A recent MIT study concluded that some 62% of the estimated mean projection of the recoverable shale gas resource could be economically developed with a gas price at or below $6/mmBtu.
- Finally, switching coal to natural gas and renewable energy with a modest buildup of nuclear energy is achievable and could lead to a 29% reduction in CO2 emissions from the US power sector by 2020 and a 44% reduction by 2030 compared to a 2005 baseline. The coal to gas fuel switch is a practical lower carbon alternative over the next 20 years for the US power sector. This fuel mix would put the US electricity sector roughly at the midpoint of the 80% aggregate reductions in CO2 emissions required by 2050 compared to a 2005 baseline.

V. Growth Outlook for Climate Change Sectors

A coal-to-natural gas fuel switch in the US would help to ensure a reliable electricity system that is not only much cleaner but also more environmentally sustainable.

DBCCA Electricity Supply Mix Forecast

US Electricity Supply (% total kWh)	2005A	2009A	2020E	2030E	Comment
Coal traditional	50%	47%	34%	21%	Reduced to meet emissions target and comply with EPA regulation
Coal CCS	0%	0%	0%	1%	Limited deployment 2020-2030 with government R&D support
Natural gas	19%	23%	30%	35%	Coal to gas fuel switch, underutilized assets, strong new build
Natural gas CCS	0%	0%	0%	0%	No deployment, assume that gas CCS is viable post 2030 and cheaper $/MWh than coal
Petroleum	3%	0%	0%	0%	No additions; existing capital stock remains for reliability but hardly used
Nuclear	19%	20%	21%	23%	Modest gains from nuclear steam generation "uprates" and limited new builds
Wind and solar (intermittent)	0%	2%	9%	14%	Large capacity additions; transmission and dispatchability limit growth vs potential
Baseload renewables (geothermal & hydro)	7%	8%	6%	6%	Share decreases modestly as only very limited new builds
Total	**100%**	**100%**	**100%**	**100%**	
Renewables share total (intermittent and baseload)	9%	10%	15%	20%	Doubling of share 2010 to 2030 due to wind and solar additions to meet RPS
Electricity Demand (kWh)	4,055	3,784	3,978	4,181	0.5% CAGR growth due to energy efficiency and operational improvements
CO2 emissions (mn metric tons)	2,397	2,200	1,691	1,347	Emissions reduced substantially due to the coal to gas fuel switch and build-up in renewables
% CO2 emissions reduction vs. 2005		**-8%**	**-29%**	**-44%**	

Source: EIA, DBCCA analysis 2010.

A significant switch by the US electricity sector from coal to natural gas-fired generation would be the most secure, least cost approach to lower emissions. (Burning natural gas creates approximately half the amount of CO2 compared with coal). These reductions would be realized by using domestically abundant and secure sources of energy based on known technology that can easily be deployed at reasonable cost.

- We expect coal's share of power generation to decrease to 22% by 2030 compared to 47% in 2009, while the share of natural gas generation increases from 23% in 2009 to 35%. Wind and solar increase from 2% in 2009 to 14% in 2030.
- Renewables, natural gas and nuclear energy contribute 41%, 35% and 16%, respectively, to the reduction in power sector CO2 emissions by 2030.
- Total electricity sector natural gas demand increases to 9.7 Tcf per year in 2030 versus 6.9 in 2009, a 2.8 Tcf incremental increase.[7] US aggregate natural gas consumption increases to 27 Tcf in 2030 compared to 22.6 Tcf in 2009. Total electricity sector coal demand decreases from 930 million tons per year in 2009 to 460 tons per year in 2030.
- We forecast total installed US renewable capacity to increase from 34.7 GW in 2009 to 126 GW in 2020 and 219 GW in 2030. Transmission grid improvements need building out to accommodate renewables and are expected to total $41 billion through 2020 and will reach $158 billion by 2030.
- We expect that at least 32,000 miles of transmission lines will be built by 2020[8].
- Capital investment in new gas-fired generation to replace the retiring coal fleet totals $39 billion between 2010 and 2030, resulting in 13,000 MW of cumulative natural gas additions from 2010-2020 and 20,500 MW of cumulative additions from 2020 to 2030.

[7] *480,000 MW x 6.9 mmBtu/MWh x24 hours x 365 days x 35% capacity factor; then divide by 1.05 to convert to Tcf and then divide by 1,000,000,000*
[8] *ITC Holdings Corp 2010 Investor Day Slides, p.7*

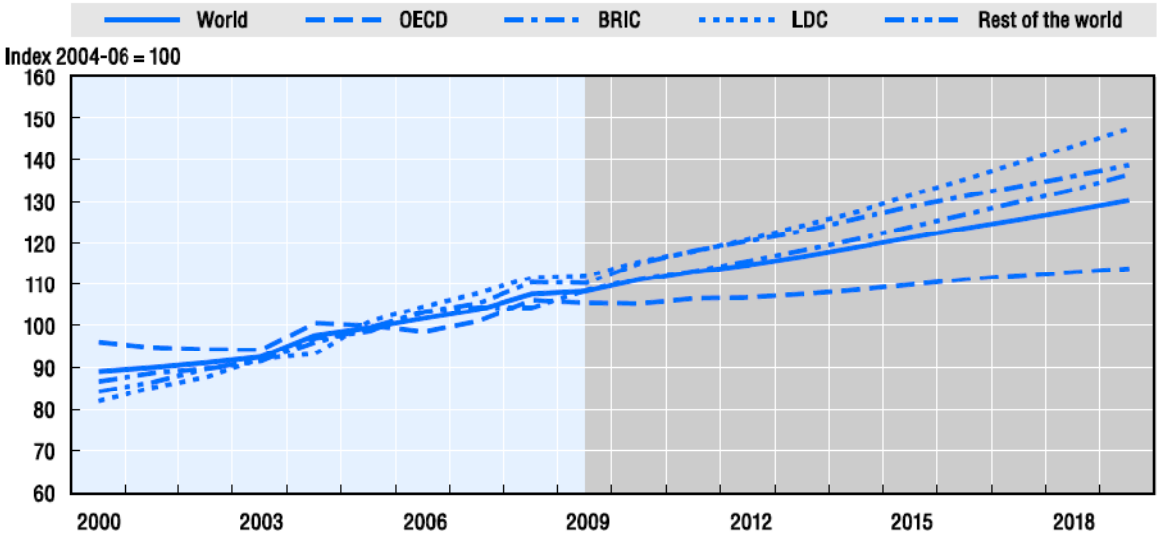
V. Growth Outlook for Climate Change Sectors

- Incremental natural gas pipeline capacity additions of about 10-12% of the total current pipeline network will likely be necessary.
- Total cumulative power sector generation capital spending for new units is $858 billion from 2010 to 2030, with peak spending occurring in 2020.
- The total industry costs of the new fuel mix are manageable, due in large measure to an improvement in utilization of already built natural gas plants. We expect annual generation cost of delivered electricity to increase from $272.8 billion in 2009 to $384 billion in 2030, a compound annual growth rate (CAGR) of 1.6%.

V. Growth Outlook for Climate Change Sectors

In addition to low carbon technologies, the agriculture sector also requires additional support and investment

Net agricultural production for world and economic groups



Source: OECD and FAO Secretariats

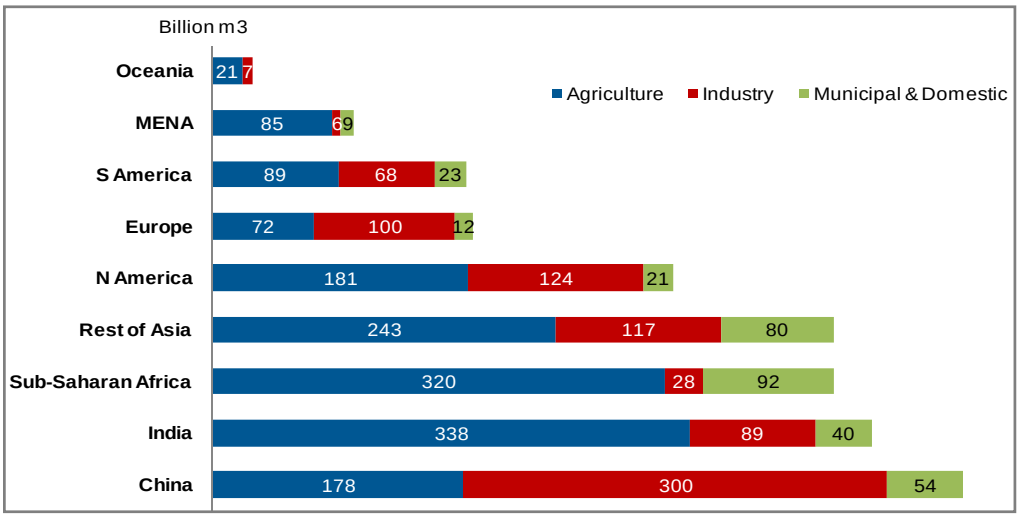
Agricultural production is growing much faster in developing countries, and key factors reinforce higher food demand and higher long-term prices for commodities.

- The agriculture sector has experienced a number of shocks in recent years with record high oil and commodity prices, food security fears and resultant trade restrictions, and the global economic downturn.
- While world net production of commodities will have grown 22% over the period to 2019, production in the OECD countries is projected to grow only 10%.
- For virtually all commodities, the projected growth to 2019 in imports and exports of developing countries exceeds that of the OECD countries. Only exports of processed protein meals increase faster in the OECD area by 2019.
- The FAO estimates that an additional $67 billion of investment will be needed each year due to a lack of infrastructure for efficient farming.
- On a per capita basis, production growth in least developed countries is struggling to keep up with rapid population growth.
- Agricultural trade declined sharply in 2009 due to the economic crisis but recovered sharply through 2010 with production closer to historical levels.
- As world demand for energy steadily increases, new government incentives, mandates and grant programs will ensure the increased growth of ethanol and biofuels demand which will in turn create additional demand for wheat, coarse grains, vegetable oils and sugar used as feedstocks. However, the potential conflict between nutrition and energy plants is a serious issue.
- Due to urbanization, industrial growth and diminishing water supplies, worldwide arable land has been depleted by -0.4% per year since 1970.
- Global agricultural production is anticipated to grow more slowly in the next decade than in the past one, but in the absence of unexpected shocks, growth remains on track with estimated longer term requirements of a 70% increase in global food production by 2050.

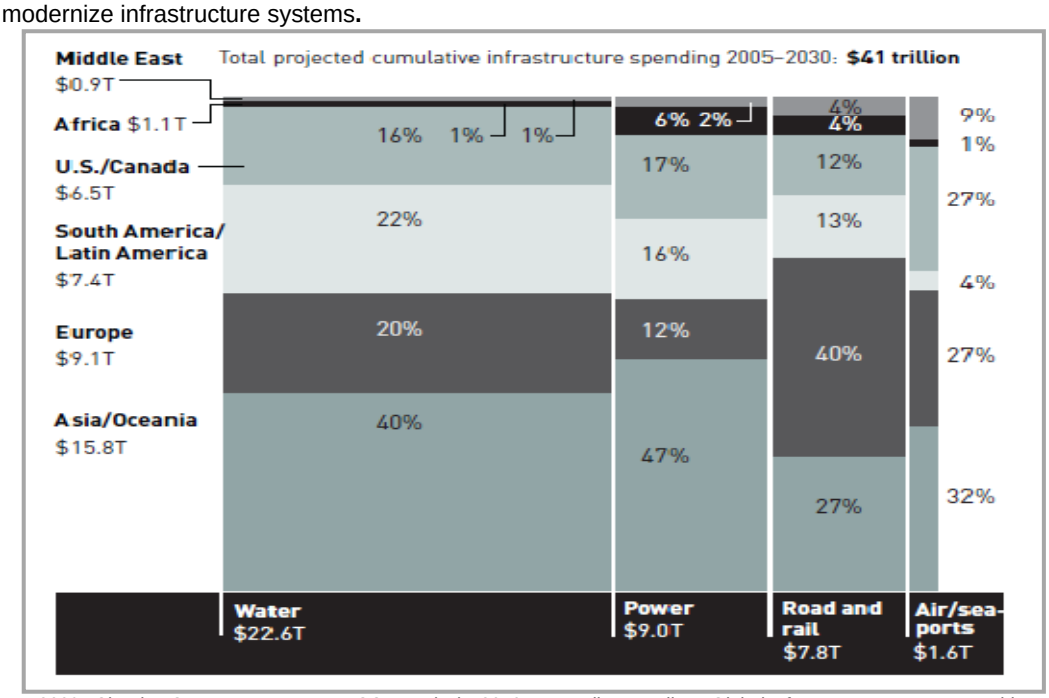
V. Growth Outlook for Climate Change Sectors

Water demand also remains as one of the key sustainability challenges.

Increase in annual water demand, billion m^3, from 2005-2030



The Infrastructure Challenge – percentages of total projected cumulative infrastructure investment needed during the next 25 years to modernize infrastructure systems**.**



Source: McKinsey, 2009: 'Charting Our Water Future'; DBCCA Analysis, 2010; Booz Allen Hamilton, Global Infrastructure Partners; World Energy Outlook; Organisation for Economic Co-operation and Development, Boeing, Drewry Shipping Consultants, US Department of Transportation.

Water demand is increasing rapidly, with consumption coming across multiple sectors. Agriculture consumes a majority of water globally.

- Key water investment opportunities fall into six main categories: Clean water; Conservation: reuse / recycle; Waste management; Energy mitigation; Next generation desalination; Storm water management.

V. Growth Outlook for Climate Change Sectors

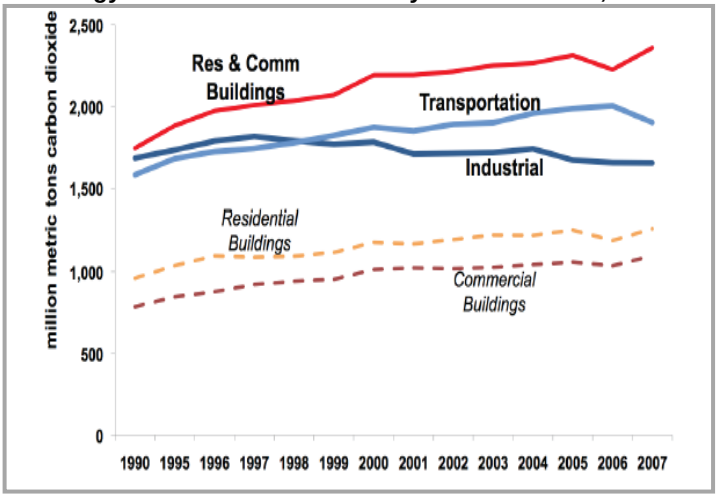
- Water stress can contribute to local or regional conflict. Also, there are huge water basins where large populations rely on a single watershed for their livelihood, such as the 1 billion+ people living directly along the Ganges River watershed. This makes the water issue a unique potential tipping point.
- China is expected to increase its water demand by 178 billion m^3 in industry, 300 billion m^3 in agriculture and 54 billion m^3 in the domestic sector by 2030, the highest projected demand growth globally.
- India, Sub-Saharan Africa and the rest of Asia are also regions with high anticipated water demand growth by 2030.
- As 71% of global water consumption, 3,100 billion m^3, is related to agriculture, the direct link between food and water is incredibly important and impacts almost all points of the economic value chain for both developing and developed societies.
- Without efficiency gains, the level of water demand in the agricultural sector will increase to 4,500 billion m3 by 2030.
- The impacts of global climate change on local water availability are likely to exacerbate the problem in many countries.
- DB Research has estimated that the global investment required for the global water market is likely to total €400-500 billion per year.[9] In addition to the challenge of an increasing physical demand for water, over the next 25 years, modernizing and expanding water infrastructure systems of major cities of the world will require investments of around $22.6 trillion.
- Regionally, Asia will have to allocate the highest portion, some 40%, of its cumulative infrastructure spend during 2005-2030 towards upgrading its water infrastructure in cities, totaling $15.8 trillion.
- Comparatively smaller investments of $1.1 trillion and $0.9 trillion in water networks will be needed in Africa and the Middle East respectively by 2030.

[9] *DB Research, "World Water Markets," June 1, 2010.*

V. Growth Outlook for Climate Change Sectors

Energy efficiency is both the largest and least expensive energy resource. Demand-side energy efficiency measures offer the best near-term solution for carbon emissions reduction.

US energy-related CO2 emissions by end-use sector, 2009



Share of cumulative abatement in IEA 450 Scenario between 2010-2035	
Energy Efficiency	**53%**
Renewables	21%
Biofuels	3%
Nuclear	9%
CCS	15%

Technologies by sector to increase energy efficiency

Sector	Examples of energy efficiency technologies	Potential barriers to address
Residential	Efficient HVAC and water heating, Efficient Lighting, Efficient Appliances, Building Insulation, Pipe Insulation, Smart Meters, Programmable Thermostats, Efficient Windows.	• Low awareness of cost benefit • Ownership issues • Information deficiency • Irrational decision-making • Lack of long-term policy development
Commercial	Efficient HAVC and water heating, Efficient Refrigeration, Lighting Controls, Water Temperature Reset, Energy Management Systems, CHP	• Low awareness of cost benefit • Ownership issues • Changing corporate strategies • Lack of fiscal incentives • Lack of long-term policy development
Industrial	Process Improvements, High Efficiency Motors, Insulation, Efficient HVAC and water heating, Variable Speed Drives, Efficient Lighting	• System inertia • Capital stock turnover • Inflexible labor market
Transport	Improved Aerodynamics, Advanced Low-resistance Tires, Advanced Combustion Engines, Lithium-ion Batteries; Hybrid Vehicles	• Habit • Irrational decision-making • Lack of fiscal incentives

Source: US DOE, EIA, 2009; EPRI, 2009; IEA World Energy Outlook, 2010; DBCCA Analysis, 2010.

Energy efficiency measures could account for 53% of world energy-related CO2 emission savings in the IEA's 450 Scenario relative to the Current Policies Scenario.

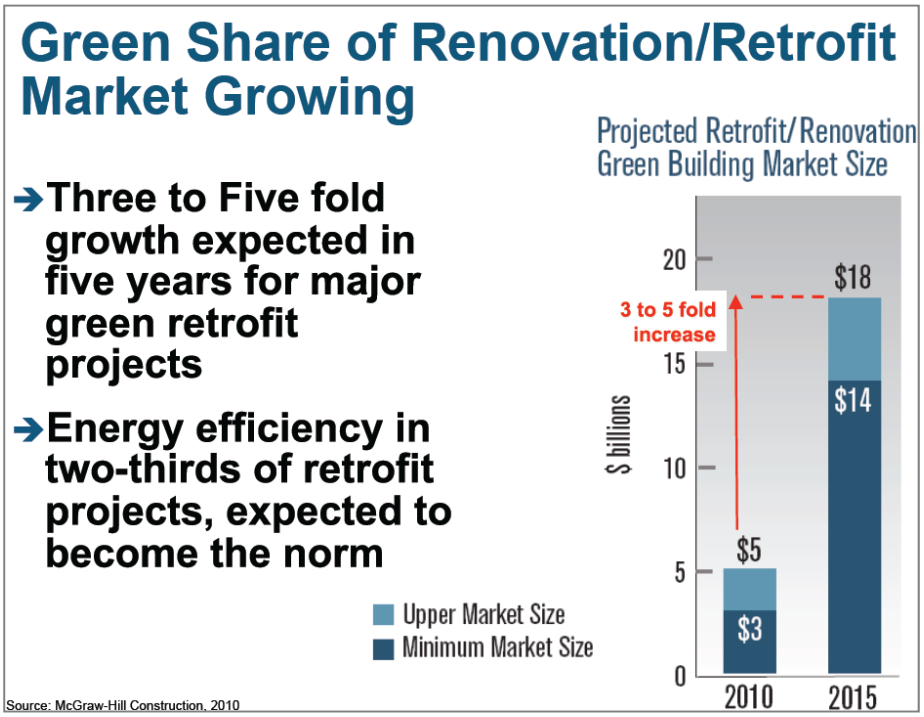
- Many energy efficient technologies are already commercially available and can be implemented at low cost compared to energy supply side emission reduction options such as renewable energy and carbon capture and storage projects.
- The IEA's analysis of technology deployment needed to achieve its 450 Scenario indicates that 53% of the emission reduction solution in 2020 can come from energy efficiency, compared to the Current Policy Scenario.
- The reasons for this are simple when looking at the numbers from various studies. According to a PNAS study, direct energy use by households accounts for around 38% of overall US CO2 emissions and is larger than the emissions of

any entire country except China, and an astounding 34% of the energy consumed in buildings is lost directly through building envelopes.

- With the majority of the 1979-1999 vintage housing stock in China deemed unsuitable for the future by the Ministry of Housing and Urban-Rural Development, China plans to demolish and rebuild that capacity over the next 20 years. This is in addition to the annual 2 million square meters of construction that is tied to basic economic expansion. With an emphasis on energy efficiency, many of the newly constructed buildings will likely be proving grounds for all manner of green construction (and reclamation) techniques.
- Energy efficiency in the US has the potential to reduce annual non-transport energy consumption by ~23% by 2020, according to McKinsey & Co's analysis of energy efficiency in the US.
- Cumulatively, the total investment in the new energy efficiency technology infrastructure would reach $7 trillion over the period 2008 through 2030, according to the IEA's WEO, 2009.
- The IEA believes that $2 trillion could be spent globally between 2010-2020 on end-use energy efficiency and power plant efficiency measures.
- The challenge for policy makers, business leaders and nations is to implement energy policies and fashion new financing mechanisms to unlock this underutilized energy efficiency opportunity.
- Energy efficiency retrofits in commercial buildings represent a $400 billion market opportunity in the US.
- The concept of a chain of processes is an important factor to consider when looking at recovering lost energy in manufacturing and industry as each process in the chain will carry an energy efficiency profile and the overall energy efficiency rate is the result of multiplying all efficiency rates of each link in the chain.
- There are 4 main sectors where energy efficiency improvements can be made: residential, commercial, industry and transport.
- Across each sector there are energy efficiency technologies that can be deployed today, but there are also some considerable social and regulatory barriers to take-up in each case.

V. Growth Outlook for Climate Change Sectors

Green buildings experience rapid growth at a scale requiring institutional investment.

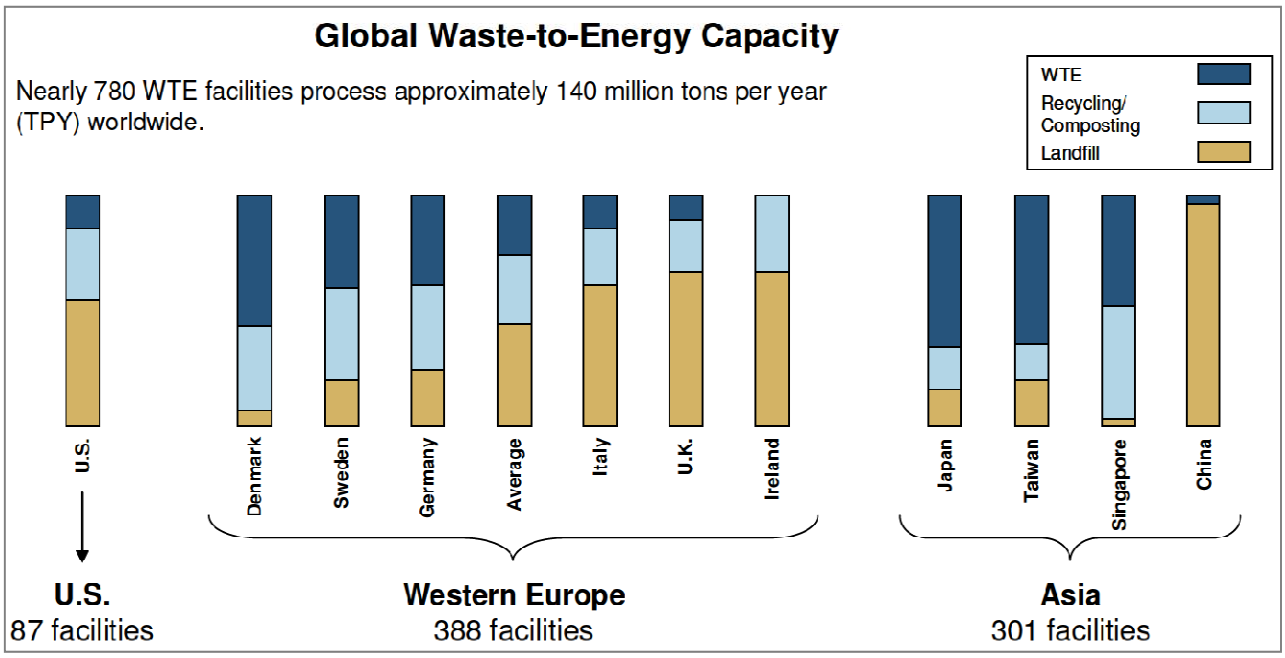


With the building sector accounting for approximately 35% of all greenhouse gas emissions, the shift towards adoption of green building techniques continues to look promising. Various regulations and building codes, particularly in the European Union, are becoming more stringent and therefore are driving demand for energy efficiency products.

- In general, the energy efficiency retrofit market remains strong as more companies try to evaluate their overall energy usage and seek relatively inexpensive energy "fixes" with quick payback periods. The energy management system market is growing very strong with companies aiming to capitalize on growing demand for this technology. As a result, the green certification market continues to gain momentum. It is estimated that the green building market will reach approximately $14-18 billion in value by 2015, from $3-5 billion today.
- The cost curve for green building products is also continuing to come down as the construction market increasingly demands environmentally-friendly products at lower price points. High demand, decreased prices and policy mandates continue to drive green building products into the mainstream.
- **Europe:** In May 2010, the European Parliament announced an official Directive to have all new buildings in the EU be nearly zero-energy by the end of 2020. The Directive also calls for a mandatory obligation to consider the feasibility of renewable energy sources. For existing buildings, member states should ensure that a building's energy performance certificate becomes a requirement.
- **United States:** At the federal level, the Energy Policy Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007 set out energy efficiency and sustainable design requirements for federal and other types of buildings. Furthermore, the two most well-known certifications for green buildings were founded in the US, known as ENERGY STAR and LEED. Moreover, a number of incentives exist at the state and local levels.

V. Growth Outlook for Climate Change Sectors

Waste-to-energy sectors are poised for strong growth internationally



Source: Jefferies, March 2010.

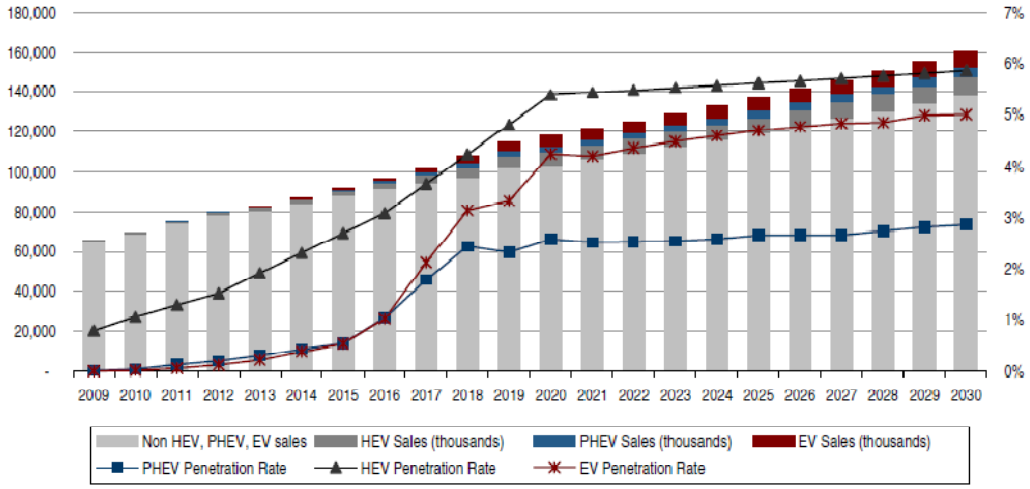
Global demand for waste-to-energy is expected to increase as solid waste generation continues to increase, landfill capacity decreases and energy costs rise. Strong growth will be seen internationally, specifically in Europe and Asia, with moderate growth in the US.

- The waste-to-energy sector is driven by global population expansion, which leads to increased landfill utilization. The growth of landfill utilization is garnering awareness and support over alternative landfill options such as waste-to-energy, especially in heavily populated areas. In addition, waste-to-energy is also a viable solution to help reduce greenhouse gas emissions.
- Worldwide there are approximately 780 waste-to-energy facilities, with 388 in Western Europe and 301 plants in Asia. Together they process about 140 million tons of waste per year.
- In the United States, approximately 87 waste-to-energy plants operated in 25 states in 2007. Those plants were responsible for processing an estimated 29 million tons of trash and have electricity generating capacity of 2.7 GW, which is enough to power over 2 million homes. The primary legislative driver of growth in the waste management sector has traditionally been state-level Renewable Portfolio and Electricity Standards. These have been subsidized by state and local level incentives.
- Though solid waste generation will trend upwards, with alternative landfill options generally increasing in the US, near-term political administrative hurdles and lack of awareness will make substantial top-line growth difficult.
- Waste-to-energy penetration is higher in Europe and Asia. The EU market is driven by the EU Landfill Directive and tightening emissions reduction standards. The UK, Ireland and Italy are expected to be strong waste-to-energy markets.

V. Growth Outlook for Climate Change Sectors

Positive long-term momentum for low-carbon vehicle development

Summary of forecast – HEVs, PHEVs, and EVs represent a small portion of vehicle sales



Source: Credit Suisse

Long-term market expansion of low-carbon vehicles is expected due to supporting policies and reduced cost for required components.

- Driven by an expected $15 billion of incentives, Credit Suisse has estimated that 1.1% of global vehicle sales will be electric by 2015, and 7.9% by 2030. Hybrid electric vehicles should reach 5.9% by 2030 from the current 0.6%. The market has estimated that automotive sales of electric vehicles will rise to over $400 billion by 2030.
- The world's automakers will introduce at least 120 different hybrid, plug-in hybrid, and electric vehicle models onto the market by 2012, compared with 29 (mostly hybrid) vehicles on the market in 2010, and 13 in 2008.
- Policy support in China and the US combined with rising fuel prices encourage growth in the alternative vehicle market. China's Ministry of Science and Technology has suggested that approximately 1 million electric vehicles could be sold by 2020, out of an estimated 40 million new vehicle fleet. To accommodate this, China is planning to have in place 10 million charging stations by 2020.
- The sale of batteries will increase to over $100 billion by 2030, and there is an expected volume growth of 10.8% in 2009-2020, driven largely by electric vehicles.
- There is an estimated $66 billion market for advanced lithium ion batteries that power alternative transport vehicles.
- Smart grid and smart meters are required to spur the alternative transport market, and incremental charging infrastructure spending could exceed $170 billion through 2030.
- In 2011, the outlook is that low-carbon vehicle developers will focus on cost reduction, competitiveness with traditional fuel sources and product penetration into the market.

V. Growth Outlook for Climate Change Sectors

Potential carbon market demand 2008-2012

	Potential demand ($MtCO_2e$)	Contracted CERs and ERUs		AAUs ($MtCO_2e$)	Residual demand ($MtCO_2e$)
		nominal ($MtCO_2e$)	adjusted for performance ($MtCO_2e$)		
EU	**890**	**1,736**	**829**	**38**	**198**
Government (EU-15)	350	238	114	38	193
Private sector (EU-ETS)	540	1,498	715	0	0 (-175)
Japan	**300**	**372**	**177**	**125**	**12**
Government of Japan	100	34	16	72	12
Japanese private sector	200	338	161	54	0 (-15)
Rest of Annex B	**32**	**25**	**12**	**0**	**20**
Government	25	22	10	0	15
Private sector	7	3	1	0	6
Total	**1,222**	**2,133**	**1,018**	**163**	**231**
Government	475	294	140	110	225
Private sector	747	1,839	878	54	6

Source: World Bank 2010

Global carbon markets will grow 15% in 2011, the most in three years, due to higher prices, increased demand for emission allowances from energy companies and It is expected that Europe will continue to be the primary global carbon through 2020 given the delay of progress in other countries such as the US, Japan and Australia.

- The value of the global market in carbon emissions permits increased 1% in 2010 to €92 billion ($120.9 billion) due to higher carbon prices, even though there was a 12% drop in the total traded volume at 7 billion metric tons of carbon emissions allowances and offsets.
- It is estimated that EU permits will average €16.50 ($21.30) a metric ton in the first half of the 2011, and prices in the second half of 2011 are estimated to be around €20.
- For 2013 it is predicted that there will be an average price of €30 for EU permits and €22 for United Nations credits eligible in the EU system.
- The European Union's emission trading scheme remained the main center of the global carbon market, with 5.2 billion metric tons of European Union Allowances (EUAs) traded for an average price of €13.99 per metric ton and accounting for 81% of total trades in 2010.
- The greatest decline was seen in the United States, where trade in a regional scheme in north-eastern states fell 76% and the Senate could not draft meaningful climate legislation.
- California's AB32 cap-and-trade program was approved by legislators, making way for the scheme's use of several carbon offset protocols.
- It is expected that Europe will continue to be the primary global carbon market through 2020, given the delay of progress on carbon legislation in the US, Japan and Australia. The world's carbon markets could reach up to €1.7 trillion in 2020 if these countries implement meaningful carbon mitigation policies.

The United Nations Clean Development Mechanism Market

- As of January 2011, the UN issued 500 million carbon credits under its Clean Development Mechanism (CDM).
- There are about 2,740 CDM projects registered across 70 developing countries, 855 of which have had credits issued.

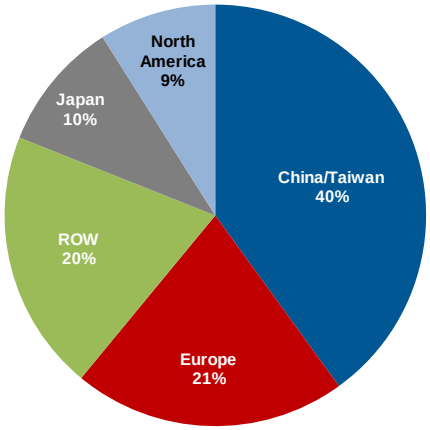
V. Growth Outlook for Climate Change Sectors

- China remained the largest CDM seller in 2010, although Africa and Central Asia - which were lacking CDM markets prior - increased their share as buyers seeking diversification.
- The CDM contains several structural obstacles which hinder its expansion, including the complexity and changing nature of regulations, inefficiencies in the regulatory chain and capacity bottlenecks.
- Currently it takes over three years for the average CDM project to make its way through the regulatory process and issue its first Certified Emission Reductions (CERs.)

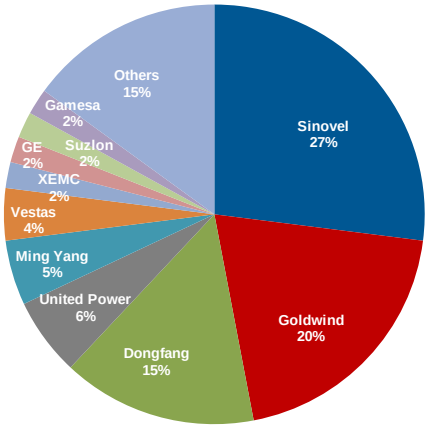
V. Growth Outlook for Climate Change Sectors

Asia and the rest of Europe dominate renewable manufacturing

Global PV Module Production by Region, 2009



Market Share of Wind Turbine Makers, 2009



Top 10 Clean-Tech Employers (Publicly Traded Pure Players)

Ranking	Company	Headquarters	Sector	Total employees
1	Vestas Wind Energy Systems	Denmark	Wind	20,730
2	LDK Solar	China	Solar	13,464
3	Suntech Power Holdings	China	Solar	12,548
4	Itron	US	Smart Grid	9,000
5	China BAK Battery	China	Energy Storage	8,200
6	Trina Solar	China	Solar	7,891
7	Baldor Electric Co.	US	Electric Motors	7,250
8	Gamesa Corporacion Technologica	Spain	Wind	6,721
9	Neo-Neon Holdings	Hong Kong	LED Lighting	6,505
10	Yingli Green Energy	China	Solar	5,813

Source: GTM Research; China Wind Energy Association; Clean Edge, 2010;Bank of America Merrill Lynch, October 2010; DBCCA Analysis, 2010.

Clean tech manufacturing is an increasingly lucrative sector for many economies, with especially high growth in Asia.

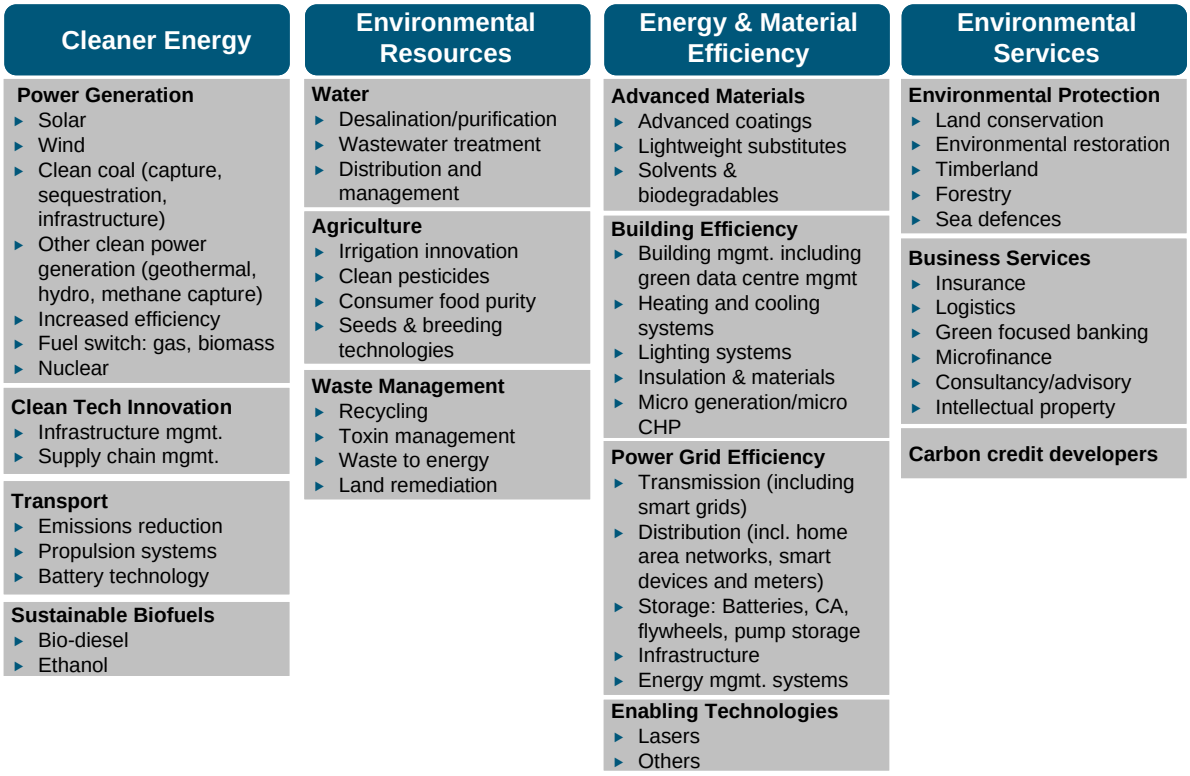
- Clean tech manufacturing is proving to be a robust job creator. Asian economies, particularly China, South Korea and Taiwan, are hiring thousands of factory workers to produce solar panels, lithium-ion batteries and wind turbine parts.
- Clean tech manufacturing is also proving to be a lucrative market, with revenues in the solar PV equipment manufacturing sector exceeding $10 billion in 2010.
- South Korea manufacturing firms were estimated to have committed over $3.4 billion to clean tech in 2010, according to Thomson Reuters. The funds will be used for R&D and manufacturing facilities related to solar cells, wind power and hydrogen fuel cells. A 2008 Morgan Stanley report concluded that South Korea would be one of the fastest growing solar markets during the next four years.
- In 2009 China surpassed the US to become the world's largest wind turbine market, producing 30% of the world's wind turbines. China also produced 40% of the world's global solar PV modules in 2009.
- It is expected that during the third quarter of 2010, 50% of all solar PV capacity installed globally will be derived from China and Taiwan. This regional manufacturing level will be lifted by the escalating domestic demand within China due to carbon emissions reduction initiatives.
- One of the reasons for China's dominance in the solar PV market is that the Chinese government is taking a leadership role in deploying solar projects and assigning zoning rights to domestic manufacturers.
- Chinese solar module developer LDK Solar Co. Ltd. is expected to have added a total of 1.42 GW worth of module and cell manufacturing capacity in 2010 in addition to 1.3 GW of c-Si module capacity and 120 MW of c-Si cell manufacturing capacity.

V. Growth Outlook for Climate Change Sectors

- A report by Clean Edge finds that whilst there is considerable growth in clean tech manufacturing in Asian economies, traditional European clean-tech leaders like Germany and Spain continue to expand their clean energy manufacturing capacity. More than 80% of Germany's solar PV sector production jobs are located in Eastern Germany.
- By 2009 over 60% of the US's wind capacity was sourced domestically. This is a growing market supporting the US labor market. The five US turbine manufacturers in operation in 2005 grew to 15 in 2009.

Appendix. Climate Change Investment Universe

The climate change investment universe is broad, covering many technology sectors and themes.



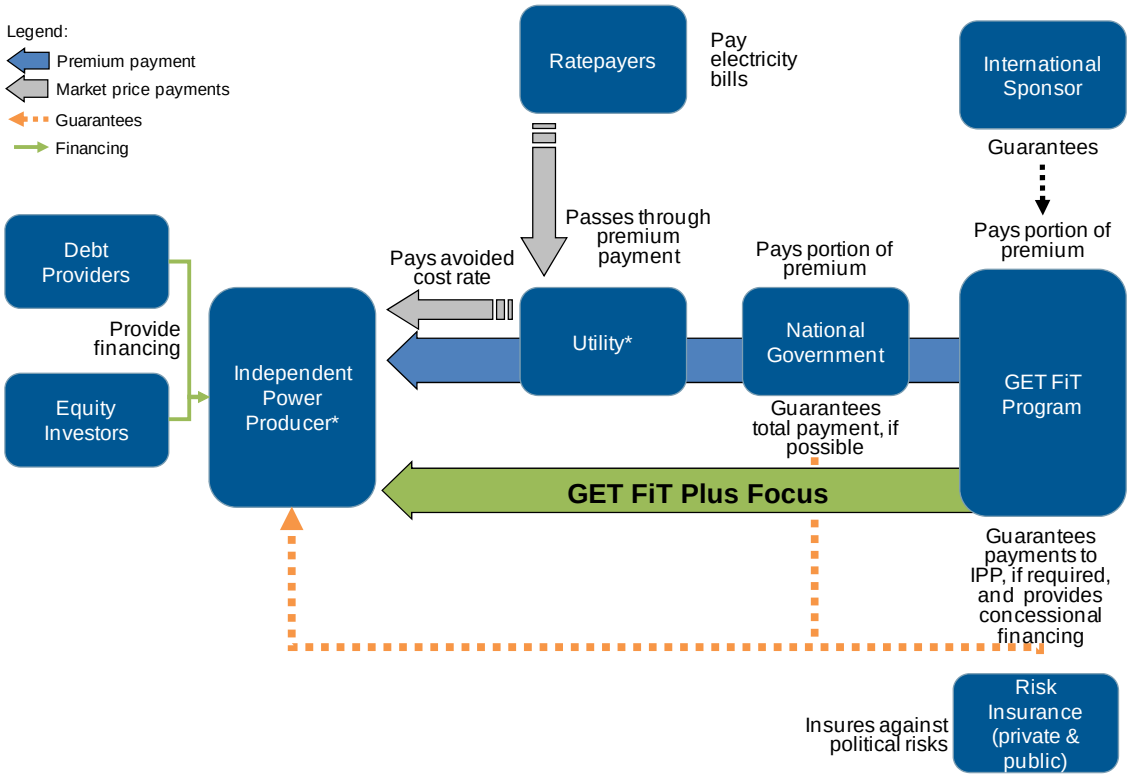
The climate change investment universe covers a broad and diverse set of sectors.

- The climate change investment universe to includes all companies that provide any of a diverse range of goods and services that further mitigation or adaptation to climate change.
- We have identified four broad sectors :
    i. Clean(er) energy - in 2009 we decided to emphasize cleaner energy so that in particular the potential for gas as a transition fuel with lower emissions than coal could be recognized under fuel switch. Biomass is even a zero emissions option here.
    ii. Environmental resources management including agriculture and water,
    iii. Energy and material efficiency and
    iv. Environmental services. Combined, these sectors represent a fast-growing multi-hundred billion dollar marketplace, which offers numerous and compelling investment opportunities.
- We expect the sectors related to adaptation to play an increasingly important role in the future, but current investment has focused heavily on the mitigation side.
- Nonetheless, financial investors are able to invest across all sectors.

Appendix. GET FiT

The GET FiT Program is structured to address a broad range of risks and barriers faced by investors and financiers.

The GET FiT Plus Focus



Source: DBCCA analysis, 2010.

Direct financial support and risk mitigation strategies can create the financial conditions necessary to attract domestic and international capital. In the developing world, however, renewable energy projects can also face an array of non-finance challenges. GET FiT would seek to address the challenges by coordinating existing resources in the energy sector and directly involving domestic players in the development of renewable energy expertise and capacity.

- **The Global Energy Transfer Feed-in Tariffs (GET FiT) Program focus**
- The Global Energy Transfer Feed-in Tariffs (GET FiT) Program is a concept to specifically support both renewable energy scale-up and energy access in the developing world through the creation of new international public-private partnerships, with the public partner implementing a strong and transparent regulatory environment and funding for the renewable premium while the private sector deploys capital to fund the projects.
- GET FiT Plus aims to support developing countries' scale of up renewable energy by providing the following Financial Support, Risk Mitigation and Technical Assistance.
- This combined approach would catalyse the supply of, and the demand for, private sector financing of renewable energy projects in both middle- and low-income countries, while also insuring maximum incentive capture at least cost to the funding partners. Importantly, it would provide what is crucial for private investors: Transparency, Longevity and Certainty – TLC.

Appendix. GET FiT

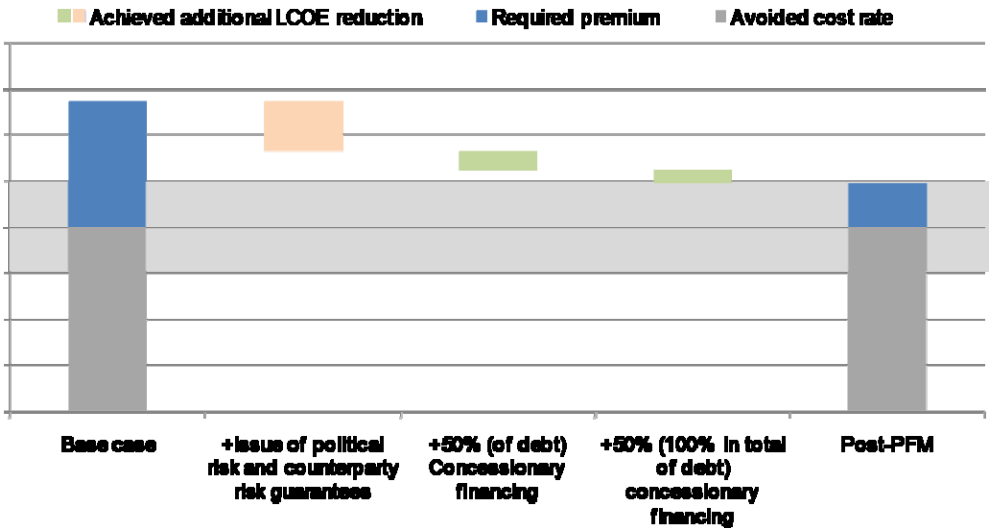
Financial support through performance-based incentives

- Feed-in-tariffs, and similar performance-based incentives, have proven to be effective and efficient mechanisms for creating investor security and driving rapid renewable energy growth. By 2008, fee-in tariffs had driven 75% of PV capacity and 45% wind capacity worldwide.
- The GET FiT Program envisages public sector entities partnering with developing countries to financially support policy structures that appropriately adapt best practices to national context, as part of broader, low carbon development strategies. Such policies would include:
- Primarily, the deployment of advanced feed-in tariff designs that target on-grid, commercialized, renewable resources at the right price and the focuses on the most appropriate technologies for local conditions
- Power purchase agreements ("PPAs") as a pre-FiT regulatory mechanism in countries that face grid integration constraints, or for technologies that have a limited in-country track record, with the ultimate goal of the implementation of broader FiT; and,
- The adaptation of FiT design principles to create performance-based incentives for decentralized multi-user energy generation, especially mini-grids, in rural areas not included in current grid expansion plans.
- In each of the three cases outlined above, the GET FiT Program proposes public sector funds to share above-market costs of renewable electricity with partner countries, whereas utilities would commit to purchasing electricity from generators at market price.

Appendix. GET FiT

There are various options for different public instruments, and sources for their funding, to cover the gap between the levelized cost of electricity (LCOE) of renewable energy and the target LCOE (Feed-in tariffs) as well as to reduce the gap by lowering the LCOE of renewable energy.

LCOE development wind – illustrative case



Source: DBCCA analysis, 2010.

The GET FiT Program would work with national and international partners to address a variety of risks and barriers faced by project developers, investors and financiers to activate development activity, reduce risk profile and so consequently reduce return expectations. Such tools may include:

- Renewable energy premium to the Independent power producer guaranteed by national government or by the GET FiT Program.
- Concessional financing to be provided by national governments or the Get Fit Program.
- Political risk and counterparty risk guarantees to mitigate sovereign risk and address concerns about the current or future creditworthiness of the utility.
- Currency risk mitigation through payments of GET FiT portion to be made in hard currency.
- The above aspects could then be used to both reduce the Levelized Cost of Energy and also to directly fund the premium depending on the appropriate structure for the domestic market as well as international donor working through Get FiT Program.

The importance of technical assistance

- More specifically, a GET FiT Program would help source technical assistance and capacity building focusing on areas such as:
- Advanced feed-in tariff policy design, including initial rate setting and ongoing review.
- Grid capacity and expansion cost analysis, resource assessments, project feasibility studies, and integrated energy planning processes for governments and government agencies.
- Grid management and renewable energy integration strategies for utilities.
- Financial due diligence and risk mitigation strategies for local financiers.
- Renewable energy project development, system construction and operation and maintenance services for local private sector players.

Appendix. Tracking Momentum

Significant policy announcements made in non-MEF countries in 2010

Europe	**Emissions Targets & Mandates** ▪ **Greece:** In July 2010, Greece set a target of achieving 20% power from renewable energy by 2020 in its National Action Plan submitted to the European Commission, an increase of 2% over its EU burden-sharing mandate of 18%. It also statement an investment commitment of €12 billion in environmental and energy projects over the next 5 years to boost its economy and create up to 192,000 jobs. **Feed-in Tariffs** ▪ **Czech Republic:** On November 9, 2010, the Czech Republic Parliament adopted an amendment on the retroactive impact of revenues from solar PV systems. This was confirmed by the Senate in December 2010. With immediate effect, PV plants that were guaranteed to receive the FiT payment for 20 years will have to pay a tax on the revenues generated. The solar PV sector has been concerned with the decision as this new condition changes the terms of the guarantee made to the operators of solar power plants already on the grid in 2009 and 2010. ▪ **Spain:** The Spanish Ministry of Industry has presented proposals to PV industry representatives that would reduce the FiTs paid to most existing solar parks and reduce payments to future projects by 45% for ground mounted schemes to 25% for large roof-top projects and 5% for smaller systems. There is also the potential debate of retroactively cutting FiTs that has been ongoing since December 2010. ▪ **Finland:** Finland announced in September 2010 that it intends to introduce a FiT for the next 12 years effective early in 2011 for wind and biogas power. ▪ **Slovakia:** In May 2010, Slovakia's government proposed cuts to renewable FiTs of up to 30%. ▪ **Malta:** In July 2010, Malta announced a FiT to be paid to customers who generate solar PV.
Asia	**Feed-in Tariffs** ▪ **Taiwan:** In December 2010, Taiwan announced that it may cut the FiT paid to generators of solar projects in 2011 due to declining costs of installing equipment, but may increase the FiT to wind power, according to the Bureau of Energy. ▪ **Thailand:** In July 2010, Thailand initiated a FiT scheme applicable to all forms of renewable energy.

N. America	**Emissions Targets & Mandates**
	▪ **Other US states:**
	  ▪ In December 2010, **Massachusetts** adopted a state target to cut GHG emissions by 25% below 1990 levels by 2020.
	  ▪ In November 2010, **New York** released a climate action plan with sweeping recommendations on how to cut GHG emissions by 2050.
	  ▪ In July 2010, the **Arizona** Corporation Commission voted to regulate electric utilities to reduce the amount of power they sell by 22% by 2020 through energy efficiency measures.
	  ▪ In May 2010, the **Oklahoma** House passed House Bill 3028 which creates a renewable energy target of 15% power by 2015. This was signed into law on May 28.
	  ▪ In March 2010, **Colorado** increased its RPS to 30% by 2020, from the previous 20% under House Bill 1001.
	  ▪ In April 2010, a key **Connecticut** legislative committee backed a bill that would cut the mandated RPS to 11.5% of total power sales by 2020, from 20%.
	  ▪ The **New Mexico** Environmental Improvement Board has approved a state cap-and-trade program for cutting CO2 emissions.
	
	Feed-in Tariffs
	▪ **Ontario:** The Ontario Power Authority (OPA) revised the micro FiT in the province's FiT program splitting it into 2 tranches. The microFiT had applied for all solar PV projects less than 10 kW and paid $0.802 CAD/kWh for 20 years. OPA had originally proposed the tariff only for rooftop solar PV systems,

Appendix. Tracking Momentum

	however it expanded the definition to include ground-mounted systems. On July 2 the OPA proposed breaking up the microFiT into 2 tranches, one for roof and one for ground-mounted systems, cutting the ground mounted tariff to $0.588 CAD/kWh and making cuts retroactive. But the actual changes are more modest. OPA ruled that the new ground mounted tariff would pay $0.642 CAD/kWh and would not be retroactive. ▪ **Other US states:** In October 2010, **Hawaii** regulators approved a new FiT scheme that will offer long-term predictable payments for clean energy installations up to 500kW.
LatAM	▪ **Chile**: Chile proposed a 20% RPS by 2020 in May 2010.
Africa	**Emissions Targets & Mandates** ▪ **Nigeria:** In September 2010, Nigeria announced the intention to be Carbon Neutral by 2025. ▪ **Morocco:** In June 2010, Morocco released an Integrated Wind Energy Program to develop a series of wind farms to reach 2 GW capacity by 2020.
Middle East	**Emissions Targets & Mandates** ▪ **Israel:** Introduced in January 2011, the Israel Clean Air Act is the first large scale legislation governing Israeli air pollution and stipulates that factories must apply for emissions permits in order to operate. **Feed-in Tariffs** ▪ **Turkey:** In December 2010, Turkey's government approved legislation setting guaranteed prices for energy produced from renewable sources (FiTs), including bonus incentives for using Turkish produced equipment. ▪ **Israel:** In July 2010, Israel fixed FiTs for solar power and removed restrictions on the number of domestic installations.

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: MEF countries, EU Government, Major US States (California, New Jersey, Texas)

MEF + EU Gov + US States	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	17	37	36	**90**	92	2	-
Jan-09	17	39	41	**97**	99	2	-
Feb-09	18	41	45	**104**	106	2	-
Mar-09	18	43	50	**111**	113	2	-
Apr-09	20	44	57	**121**	123	2	-
May-09	20	48	64	**132**	134	2	-
Jun-09	20	51	69	**140**	142	2	-
Jul-09	20	54	74	**148**	150	2	-
Aug-09	21	56	78	**155**	157	2	-
Sep-09	21	57	83	**161**	164	3	1
Oct-09	22	58	89	**169**	172	3	1
Nov-09	25	59	94	**178**	182	4	1
Dec-09	26	61	100	**187**	191	4	1
Jan-10	31	64	107	**202**	207	5	2
Feb-10	31	64	115	**210**	215	5	3
Mar-10	31	65	125	**221**	226	5	3
Apr-10	31	68	133	**232**	238	6	3
May-10	32	71	136	**239**	245	6	3
Jun-10	32	72	141	**245**	252	7	3
Jul-10	32	74	151	**257**	264	7	4
Aug-10	32	75	155	**262**	270	8	4
Sep-10	33	77	159	**269**	277	8	4
Oct-10	33	79	166	**278**	286	8	4
Nov-10	33	80	172	**285**	294	9	5
Dec-10	33	84	176	**293**	302	9	5

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: MEF countries

MEF Countries Only	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	13	24	18	**55**	56	1	-
Jan-09	13	26	22	**61**	62	1	-
Feb-09	13	28	26	**67**	68	1	-
Mar-09	13	28	29	**70**	71	1	-
Apr-09	13	28	33	**74**	75	1	-
May-09	13	32	38	**83**	84	1	-
Jun-09	13	34	43	**90**	91	1	-
Jul-09	13	36	48	**97**	98	1	-
Aug-09	14	38	52	**104**	105	1	-
Sep-09	14	39	55	**108**	110	2	**1**
Oct-09	15	40	57	**112**	114	2	**1**
Nov-09	18	40	61	**119**	122	3	**1**
Dec-09	19	42	67	**128**	131	3	**1**
Jan-10	24	43	74	**141**	145	4	**1**
Feb-10	24	43	79	**146**	150	4	**2**
Mar-10	24	44	88	**156**	160	4	**2**
Apr-10	24	47	94	**165**	169	4	**2**
May-10	25	49	97	**171**	175	4	**2**
Jun-10	25	50	101	**176**	181	5	**2**
Jul-10	25	52	109	**186**	191	5	**3**
Aug-10	25	52	112	**189**	195	6	**3**
Sep-10	26	53	116	**195**	201	6	**3**
Oct-10	26	55	122	**203**	209	6	**3**
Nov-10	25	56	127	**208**	215	7	**4**
Dec-10	25	58	130	**213**	220	7	**4**

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: EU Government, EU MEF countries

EU Gov + EU MEF Countries	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	10	18	11	**39**	40	1	-
Jan-09	10	18	16	**44**	45	1	-
Feb-09	11	19	17	**47**	48	1	-
Mar-09	11	20	18	**49**	50	1	-
Apr-09	12	21	20	**53**	54	1	-
May-09	12	22	21	**55**	56	1	-
Jun-09	12	24	22	**58**	59	1	-
Jul-09	12	26	23	**61**	62	1	-
Aug-09	12	26	24	**62**	63	1	-
Sep-09	12	26	25	**63**	64	1	-
Oct-09	12	26	28	**66**	67	1	-
Nov-09	12	26	29	**67**	68	1	-
Dec-09	12	26	31	**69**	70	1	-
Jan-10	12	26	33	**71**	72	1	-
Feb-10	12	26	34	**72**	73	1	-
Mar-10	12	26	36	**74**	75	1	-
Apr-10	12	26	39	**77**	78	1	-
May-10	13	27	39	**79**	80	1	-
Jun-10	13	27	41	**81**	82	1	-
Jul-10	13	28	43	**84**	86	2	1
Aug-10	13	28	45	**86**	88	2	1
Sep-10	14	29	46	**89**	91	2	1
Oct-10	14	30	49	**93**	95	2	1
Nov-10	14	30	49	**93**	95	2	1
Dec-10	14	32	50	**96**	98	2	1

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: EU Government

EU Gov	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	2	6	2	**10**	11	1	-
Jan-09	2	6	3	**11**	12	1	-
Feb-09	3	6	3	**12**	13	1	-
Mar-09	3	7	4	**14**	15	1	-
Apr-09	4	8	5	**17**	18	1	-
May-09	4	8	5	**17**	18	1	-
Jun-09	4	9	5	**18**	19	1	-
Jul-09	4	10	5	**19**	20	1	-
Aug-09	4	10	5	**19**	20	1	-
Sep-09	4	10	5	**19**	20	1	-
Oct-09	4	10	7	**21**	22	1	-
Nov-09	4	10	8	**22**	23	1	-
Dec-09	4	10	8	**22**	23	1	-
Jan-10	4	10	8	**22**	23	1	-
Feb-10	4	10	8	**22**	23	1	-
Mar-10	4	10	8	**22**	23	1	-
Apr-10	4	10	8	**22**	23	1	-
May-10	4	11	8	**23**	24	1	-
Jun-10	4	11	9	**24**	25	1	-
Jul-10	4	11	9	**24**	25	1	-
Aug-10	4	11	9	**24**	25	1	-
Sep-10	4	11	9	**24**	25	1	-
Oct-10	4	11	10	**25**	26	1	-
Nov-10	4	11	10	**25**	26	1	-
Dec-10	4	13	10	**27**	28	1	-

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: EU MEF countries

EU MEF Countries	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	8	12	9	**29**	29	-	**-**
Jan-09	8	12	13	**33**	33	-	**-**
Feb-09	8	13	14	**35**	35	-	**-**
Mar-09	8	13	14	**35**	35	-	**-**
Apr-09	8	13	15	**36**	36	-	**-**
May-09	8	14	16	**38**	38	-	**-**
Jun-09	8	15	17	**40**	40	-	**-**
Jul-09	8	16	18	**42**	42	-	**-**
Aug-09	8	16	19	**43**	43	-	**-**
Sep-09	8	16	20	**44**	44	-	**-**
Oct-09	8	16	21	**45**	45	-	**-**
Nov-09	8	16	21	**45**	45	-	**-**
Dec-09	8	16	23	**47**	47	-	**-**
Jan-10	8	16	25	**49**	49	-	**-**
Feb-10	8	16	26	**50**	50	-	**-**
Mar-10	8	16	28	**52**	52	-	**-**
Apr-10	8	16	31	**55**	55	-	**-**
May-10	9	16	31	**56**	56	-	**-**
Jun-10	9	16	32	**57**	57	-	**-**
Jul-10	9	17	34	**60**	61	1	**1**
Aug-10	9	17	36	**62**	63	1	**1**
Sep-10	10	18	37	**65**	66	1	**1**
Oct-10	10	19	39	**68**	69	1	**1**
Nov-10	10	19	39	**68**	69	1	**1**
Dec-10	10	19	40	**69**	70	1	**1**

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: US Federal & Major States (California, New Jersey, Texas)

US Fed + States	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	2	8	17	**27**	27	-	**-**
Jan-09	2	8	17	**27**	27	-	**-**
Feb-09	2	8	18	**28**	28	-	**-**
Mar-09	2	8	20	**30**	30	-	**-**
Apr-09	3	9	23	**35**	35	-	**-**
May-09	3	11	25	**39**	39	-	**-**
Jun-09	3	11	26	**40**	40	-	**-**
Jul-09	3	11	26	**40**	40	-	**-**
Aug-09	3	11	27	**41**	41	-	**-**
Sep-09	3	11	29	**43**	43	-	**-**
Oct-09	3	11	31	**45**	45	-	**-**
Nov-09	4	12	31	**47**	47	-	**-**
Dec-09	4	12	31	**47**	47	-	**-**
Jan-10	4	14	32	**50**	50	-	**1**
Feb-10	4	14	36	**54**	54	-	**1**
Mar-10	4	14	38	**56**	56	-	**1**
Apr-10	4	16	40	**60**	61	1	**1**
May-10	4	16	40	**60**	61	1	**1**
Jun-10	4	16	40	**60**	61	1	**1**
Jul-10	4	16	43	**63**	64	1	**1**
Aug-10	4	17	43	**64**	66	2	**1**
Sep-10	4	18	43	**65**	67	2	**1**
Oct-10	4	18	43	**65**	67	2	**1**
Nov-10	5	18	46	**69**	71	2	**1**
Dec-10	5	18	49	**72**	74	2	**1**

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: US Federal

US Federal Only	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Jun-08	-	1	-	**1**	1	-	-
Jul-08	-	1	-	**1**	1	-	-
Aug-08	-	1	-	**1**	1	-	-
Sep-08	-	1	-	**1**	1	-	-
Oct-08	-	1	1	**2**	2	-	-
Nov-08	-	1	1	**2**	2	-	-
Dec-08	-	1	1	**2**	2	-	-
Jan-09	-	1	1	**2**	2	-	-
Feb-09	-	1	2	**3**	3	-	-
Mar-09	-	1	3	**4**	4	-	-
Apr-09	-	1	4	**5**	5	-	-
May-09	-	3	4	**7**	7	-	-
Jun-09	-	3	5	**8**	8	-	-
Jul-09	-	3	5	**8**	8	-	-
Aug-09	-	3	6	**9**	9	-	-
Sep-09	-	3	6	**9**	9	-	-
Oct-09	-	3	6	**9**	9	-	-
Nov-09	1	3	6	**10**	10	-	-
Dec-09	1	3	6	**10**	10	-	-
Jan-10	1	3	7	**11**	11	-	-
Feb-10	1	3	8	**12**	12	-	-
Mar-10	1	3	9	**13**	13	-	-
Apr-10	1	5	9	**15**	15	-	-
May-10	1	5	9	**15**	15	-	-
Jun-10	1	5	9	**15**	15	-	-
Jul-10	1	5	10	**16**	16	-	-
Aug-10	1	5	9	**15**	16	1	-
Sep-10	1	5	9	**15**	16	1	-
Oct-10	1	5	9	**15**	16	1	-
Nov-10	1	5	11	**17**	18	1	-
Dec-10	1	5	13	**19**	20	1	-

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: Major US states (California, New Jersey, Texas)

US States Only (CA, TX, NJ)	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	2	7	16	**25**	25	-	**-**
Jan-09	2	7	16	**25**	25	-	**-**
Feb-09	2	7	16	**25**	25	-	**-**
Mar-09	2	7	17	**26**	26	-	**-**
Apr-09	3	8	19	**30**	30	-	**-**
May-09	3	8	21	**32**	32	-	**-**
Jun-09	3	8	21	**32**	32	-	**-**
Jul-09	3	8	21	**32**	32	-	**-**
Aug-09	3	8	21	**32**	32	-	**-**
Sep-09	3	8	23	**34**	34	-	**-**
Oct-09	3	8	25	**36**	36	-	**-**
Nov-09	3	9	25	**37**	37	-	**-**
Dec-09	3	9	25	**37**	37	-	**-**
Jan-10	3	11	25	**39**	39	-	**1**
Feb-10	3	11	28	**42**	42	-	**1**
Mar-10	3	11	29	**43**	43	-	**1**
Apr-10	3	11	31	**45**	46	1	**1**
May-10	3	11	31	**45**	46	1	**1**
Jun-10	3	11	31	**45**	46	1	**1**
Jul-10	3	11	33	**47**	48	1	**1**
Aug-10	3	12	34	**49**	50	1	**1**
Sep-10	3	13	34	**50**	51	1	**1**
Oct-10	3	13	34	**50**	51	1	**1**
Nov-10	4	13	35	**52**	53	1	**1**
Dec-10	4	13	36	**53**	54	1	**1**

Source: DBCCA analysis, 2011.

Appendix. Tracking Momentum

Cumulative Binding and Accountable Climate Policies Tracked for: China

China	NET Emissions Targets	NET Mandates & Standards	NET Supporting Policy	NET Total	Positive Total	Negative Total	Neutral Total
Dec-08	1	1	3	**5**	5	-	**-**
Jan-09	1	1	3	**5**	5	-	**-**
Feb-09	1	1	4	**6**	6	-	**-**
Mar-09	1	1	5	**7**	7	-	**-**
Apr-09	1	1	5	**7**	7	-	**-**
May-09	1	2	7	**10**	10	-	**-**
Jun-09	1	2	8	**11**	11	-	**-**
Jul-09	1	2	11	**14**	14	-	**-**
Aug-09	1	2	11	**14**	14	-	**-**
Sep-09	1	2	13	**16**	16	-	**-**
Oct-09	1	2	13	**16**	16	-	**-**
Nov-09	2	2	13	**17**	17	-	**-**
Dec-09	2	2	16	**20**	20	-	**-**
Jan-10	2	4	17	**23**	23	-	**-**
Feb-10	2	4	18	**24**	24	-	**-**
Mar-10	2	4	20	**26**	26	-	**-**
Apr-10	2	4	20	**26**	26	-	**-**
May-10	2	5	22	**29**	29	-	**-**
Jun-10	2	6	24	**32**	32	-	**-**
Jul-10	2	6	25	**33**	33	-	**-**
Aug-10	2	6	25	**33**	33	-	**-**
Sep-10	2	6	26	**34**	34	-	**-**
Oct-10	2	6	26	**34**	34	-	**-**
Nov-10	2	6	26	**34**	34	-	**-**
Dec-10	2	6	26	**34**	34	-	**-**

Source: DBCCA analysis, 2011.

Disclaimer

DB Climate Change Advisors is the brand name for the institutional climate change investment division of Deutsche Asset Management, the asset management arm of Deutsche Bank AG. In the US, Deutsche Asset Management relates to the asset management activities of Deutsche Bank Trust Company Americas, Deutsche Investment Management Americas Inc. and DWS Trust Company; in Canada, Deutsche Asset Management Canada Limited (Deutsche Asset Management Canada Limited is a wholly owned subsidiary of Deutsche Investment Management Americas Inc); in Germany and Luxembourg: DWS Investment GmbH, DWS Investment S.A., DWS Finanz-Service GmbH, Deutsche Asset Management Investmentgesellschaft mbH, and Deutsche Asset Management International GmbH; in Australia, Deutsche Asset Management (Australia) Limited (ABN 63 116 232 154); in Hong Kong, Deutsche Asset Management (Hong Kong) Limited; in Japan, Deutsche Asset Management Limited (Japan); in Singapore, Deutsche Asset Management (Asia) Limited (Company Reg. No. 198701485N) and in the United Kingdom, RREEF Limited, RREEF Global Advisers Limited, and Deutsche Asset Management (UK) Limited; in addition to other regional entities in the Deutsche Bank Group.

This material is intended for informational purposes only and it is not intended that it be relied on to make any investment decision. It does not constitute investment advice or a recommendation or an offer or solicitation and is not the basis for any contract to purchase or sell any security or other instrument, or for Deutsche Bank AG and its affiliates to enter into or arrange any type of transaction as a consequence of any information contained herein. Neither Deutsche Bank AG nor any of its affiliates, gives any warranty as to the accuracy, reliability or completeness of information which is contained in this document. Except insofar as liability under any statute cannot be excluded, no member of the Deutsche Bank Group, the Issuer or any officer, employee or associate of them accepts any liability (whether arising in contract, in tort or negligence or otherwise) for any error or omission in this document or for any resulting loss or damage whether direct, indirect, consequential or otherwise suffered by the recipient of this document or any other person.

The views expressed in this document constitute Deutsche Bank AG or its affiliates' judgment at the time of issue and are subject to change. This document is only for professional investors. This document was prepared without regard to the specific objectives, financial situation or needs of any particular person who may receive it. The value of shares/units and their derived income may fall as well as rise. Past performance or any prediction or forecast is not indicative of future results. No further distribution is allowed without prior written consent of the Issuer.

The forecasts provided are based upon our opinion of the market as at this date and are subject to change, dependent on future changes in the market. Any prediction, projection or forecast on the economy, stock market, bond market or the economic trends of the markets is not necessarily indicative of the future or likely performance.

For Investors in the United Kingdom:
Issued in the United Kingdom by Deutsche Asset Management (UK) Limited of One Appold Street, London, EC2A 2UU. Authorised and regulated by the Financial Services Authority. This document is a "non-retail communication" within the meaning of the FSA's Rules and is directed only at persons satisfying the FSA's client categorisation criteria for an eligible counterparty or a professional client. This document is not intended for and should not be relied upon by a retail client.

When making an investment decision, potential investors should rely solely on the final documentation relating to the investment or service and not the information contained herein. The investments or services mentioned herein may not be appropriate for all investors and before entering into any transaction you should take steps to ensure that you fully understand the transaction and have made an independent assessment of the appropriateness of the transaction in the light of your own objectives and circumstances, including the possible risks and benefits of entering into such transaction. You should also consider seeking advice from your own advisers in making this assessment. If you decide to enter into a transaction with us you do so in reliance on your own judgment.

For Investors in Australia:
In Australia, Issued by Deutsche Asset Management (Australia) Limited (ABN 63 116 232 154), holder of an Australian Financial Services License. An investment with Deutsche Asset Management is not a deposit with or any other type of liability of Deutsche Bank AG ARBN 064 165 162, Deutsche Asset Management (Australia) Limited or any other member of the Deutsche Bank AG Group. The capital value of and performance of an investment with Deutsche Asset Management is not guaranteed by Deutsche Bank AG, Deutsche Asset Management (Australia) Limited or any other member of the Deutsche Bank Group. Investments are subject to investment risk, including possible delays in repayment and loss of income and principal invested.

For Investors in Hong Kong:
Interests in the funds may not be offered or sold in Hong Kong or other jurisdictions, by means of an advertisement, invitation or any other document, other than to Professional Investors or in circumstances that do not constitute an offering to the public. This document is therefore for the use of Professional Investors only and as such, is not approved under the Securities and Futures Ordinance (SFO) or the Companies Ordinance and shall not be distributed to non-Professional Investors in Hong Kong or to anyone in any other jurisdiction in which such distribution is not authorised. For the purposes of this statement, a Professional investor is defined under the SFO.

For Investors in MENA region:
This information has been provided to you by Deutsche Bank AG Dubai (DIFC) branch, an Authorised Firm regulated by the Dubai Financial Services Authority. It is solely directed at Market Counterparties or Professional Clients of Deutsche Bank AG Dubai (DIFC) branch, which meets the regulatory criteria as established by the Dubai Financial Services Authority and may not be delivered to or acted upon by any other person.

I-020925-1.2