

# Global Climate Change Policy Tracker

The Green Economy: The Race is On

March 2010



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# Editorial Letter



**Kevin Parker**

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The climate change summit in Copenhagen in December produced no international agreement but it is clear now that it was also no failure. Copenhagen served to raise awareness of the problem all over world, and that in turn forced governments to focus on the issue. The net effect has been to catalyze a rush of new policy announcements that has dramatically improved the outlook on limiting greenhouse gas emissions.

In this report, we have identified no less than 154 new policy announcements globally just since October, in the run-up to the conference. This is the highest number of new government initiatives ever recorded on this issue in a four month period. Progress can be traced directly to the summit and the Copenhagen Accord which called on countries to state publicly what they were doing about climate change.

We calculate that, in total, the new policy initiatives listed here will, if supporting policies are successfully implemented, bring Planet Earth two gigatons (Gt) closer to stabilizing carbon concentrations in the atmosphere at 450 ppm. Obviously, that's good news.

The explosion of new policy demonstrates that governments give little credence to the recent attempts to undermine the legitimacy of climate change science. The 'skeptics' arguments – which we will deal with in a forthcoming report – fail to negate the core science and there are, in any case, many other sound reasons including energy security and green growth for promoting clean energy legislation.

The spate of new initiatives also confirms what we have asserted: that the fight against climate change is not primarily a matter of international agreements but a collective of country and regional initiatives. The criticism of Copenhagen's failure to reach a binding multinational contract misses the fundamental point. The solution lies with national governments establishing optimal national policy frameworks that foster the investment, job and wealth-creation that the clean energy revolution will bring.

It is clear from all this proposed legislative action that governments are at last understanding that they are in a race to secure a leading position in the emerging global low-carbon economy. Countries with more TLC – transparency, longevity and certainty - in their policy frameworks will simply attract more investment and will build new industries, technologies and jobs faster. We are confident of this because it's already happening in countries such as Germany and China.

As with any race, there will be winners and losers. Our report shows that the gap between competitors is widening. But the overwhelming majority of that global 2 Gt improvement mentioned above comes from new policies announced by just two countries: China and Brazil. This is a strong indication of the ambition of these nations to take a lead in reducing carbon emissions, and is confirmation that they are working hard to pull ahead of the pack. Germany, meanwhile, is already well established as the leader. And in this report we also put the UK on watch for an upgrade in its risk rating because of proposed legislation on micro-generation feed-in tariffs.

In contrast, the US contribution to planned emission reductions has been dismal. Very little significant regulation is happening at a Federal level while Congress continues to argue over what should be done. Most of the activity in America is currently taking place state by state. We have long argued that the states must continue to press ahead with climate legislation but the effect on the US policy structure as a whole is inevitably patchy and inconsistent. While Congress stumbles, America continues to fall behind.

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# Introduction

## Global Climate Change Policy Tracker Update

As the global economy recovers from the economic downturn of 2008-2009, DB Climate Change Advisors (DBCCA) looks forward to 2010 as a year when clean energy-related sectors will continue to grow in part from the increasing momentum of government policies designed to help catalyze and drive growth in clean tech sectors. Over the past two years, we have tracked over 500 global climate change policy initiatives with a particular focus on greenhouse gas (GHG) emissions reduction targets, renewable, industry and sector mandates, as well as supporting policy mechanisms, including incentives. Although the United Nations Framework Convention on Climate Change (UNFCCC) COP 15 meeting in Copenhagen did not deliver a legally binding international agreement to reduce emissions, the Copenhagen Accord shifted the focus to countries reporting individual action and initiatives, with over 80 countries submitting letters of commitment or acknowledgement through February 2010.

The key developments in policy remain at a country and regional level, with countries such as the United Kingdom, 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, increased innovation and a growth in technology adoption. Germany, in particular, has been an early adopter of supporting climate policy mechanisms such as a carbon price and advanced feed-in tariffs (FiTs), which is an integral underpinning of any prosperous green economy. The UK's recent introduction of micro-generation FiTs, if enacted, also represents a strong step in this direction. China's rapid economic boom and industrial transformation has led it to be a major contender in the race; for instance, its installed renewables capacity per unit of GDP exceeds that of both Germany and the US<sup>1</sup>. It has made serious commitments to reducing its emissions levels and increasing renewable generation capabilities, especially in the wind sector, and has also committed to the Kyoto Protocol's Clean Development Mechanism. On the other hand, countries such as the US lag behind where political debates over climate change-related policy actions are hindering opportunities and leadership in this space, which curtail the possibilities of a successful green, low-carbon economy. It is undeniable that there is increased visibility around individual countries that are taking a more serious approach towards climate policy and technology scale-up, differentiating them from those without similar action plans – hence, we believe that the “race is on” for countries to achieve a green economy. We continue to believe that for the next few years, policy will be developed at this level, and therefore, this is where clean tech investors should stay focused.

As we look ahead, continued government policy action will help create “green” jobs and spur increased capital investment; however, many mitigation technologies will still require stronger supporting policies and incentives to help propel commercial-scale viability. Transparency, longevity and certainty (TLC) should be key components of any policy construction and determine market response. Therefore, we continue the monitoring and examination of these policy trends through our Global Climate Change Policy Tracker (Tracker), to assess regulatory risks or attractiveness associated with a particular country or region. Investors can use these assessments in their due diligence processes when overall market conditions and risks are evaluated for a potential investment, which is applicable across various assets classes such as private equity / venture capital, project finance and public markets.

Since we last published our October 2009 Tracker, we have collected additional information on 154 new climate policy announcements. From this database, we have modeled the impact of 34 new emissions targets and mandates through 2020, which brings a total number of 125 different countries, states and provinces represented. The modeling was conducted by researchers at the Columbia Climate Center at Columbia University's Earth Institute. In this update, we present the new targets that have been announced and implemented, and furthermore, we also present a new set of supporting policies announced since October 2009, with a special focus on the UK's new feed-in tariffs. These supporting policies represent all of the underlying incentives and integrated plans that help drive overall climate policy achievement.

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<sup>1</sup> Center for American Progress, “Out of the Running?” March 2010.

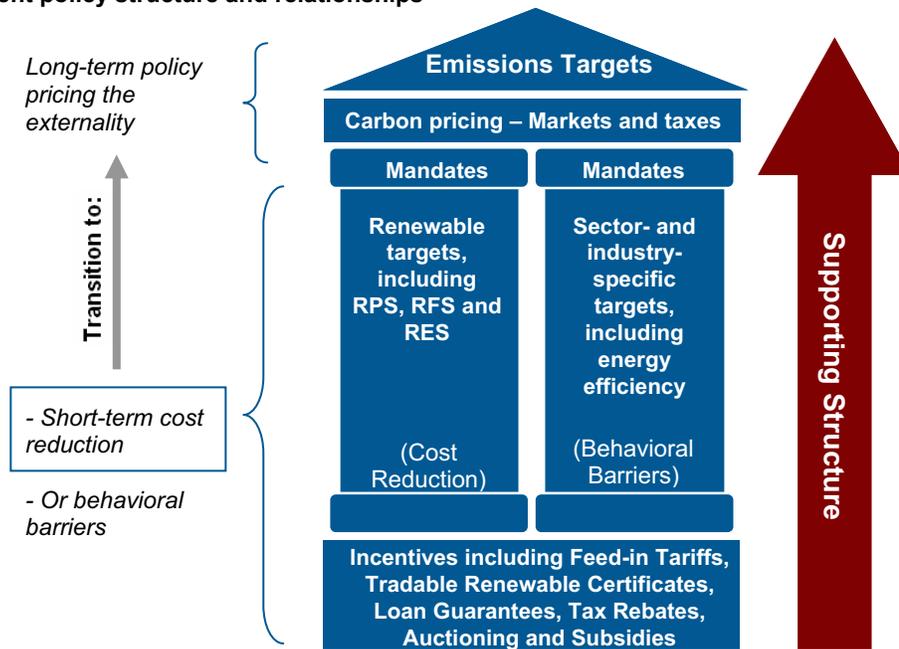
# Introduction

## Methodology

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 efficiency, or transforming an industry or sector. We divide these targets into two sets:

- **Emissions targets**, which aim to reduce greenhouse gas emissions by a specified level by a set year. These targets can be supported by carbon pricing, either through carbon taxes or cap-and-trade regimes. Furthermore, we have now also classified “**emissions intensity**” targets here, as they are overarching goals without specific industry or sector measures attached. Many of these reclassifications will have taken place for targets submitted to the **Copenhagen Accord (CA)**. Reclassifying these targets here results in a significant shift in overall abatement potential from mandates to emission targets, as targets submitted from some countries, such as China, to the CA have substantial potential abatement;
- **Mandated renewable, industry and sector targets**, which support emissions targets in that they may require a minimum proportion of renewables in fuel pool or electric power mix, stipulate increased industrial efficiency, or mandate other actions, such as reduced deforestation or the phase-out of inefficient appliances. We have not at this time modeled detailed building efficiency codes.

### Stylized current policy structure and relationships



Source: DBCCA analysis, 2009.

Separately, underlying all of the targets described above are **supporting policy mechanisms** that help drive overall achievement. As a means to execute a mandate, and thus an emissions target, supporting policy mechanisms are put in place to help developers overcome cost and behavioral issues in order to adhere to these mandates. A range of mechanisms that support overarching targets and mandates are currently in place, with financial incentives being critical to taking technologies down the cost curve when in a commercial scale-up development phase. Incentive schemes can range across feed-in tariffs, markets for tradable renewable energy certificates (RECs), reverse auctioning for renewable capacity, tax credits, loan guarantee schemes and government-backed funds. Still other policies, such as net metering and grid interconnection laws, are also key enablers for target achievement. We have not modeled the impact of these supporting policy mechanisms, but present all of the information we have collected on these since October 2009.

# Introduction

Importantly, at this still early stage of scaling up mitigation technologies and responses to GHG emissions, a mix of policy looks optimal. While ultimately in a pure market context, a single carbon price signal in a deep and liquid market with hedgeable futures would seem desirable, the scale-up of renewables requires learning incentives in its early stages and energy efficiency certainly suffers barriers that can be addressed by policy. These elements can be made consistent by carbon caps being adjusted for renewable targets for instance as in Europe.

We continue to focus in this study on the Major Economies Forum (MEF) on Energy and Climate Change countries, which account for approximately 75% of global GHG emissions today. By 2020, on a Business-as-Usual (BAU) pathway the US, EU and China between them account for approximately half of global emissions. We present a special focus on the US, as it is a large, historical emitter with significant pending climate legislation. The special focus includes a detailed view on the US emissions pathway with and without implementation of the proposed American Clean Energy and Security Act (ACES).

## UK policy regime on “Upgrade” watch

In this update, we do not rate each new mandate according to our previous policy assessment framework, but we have re-evaluated our MEF country risk assessments. In doing so, we recognized that the United Kingdom’s new micro-generation feed-in tariff (FIT), when finally enacted, would represent a significant improvement in the country’s overall incentive and integrated plan schemes. This is combined with the April 2009 introduction of differentiated support levels for varying renewable technologies, also known as “banding,” into the UK’s Renewable Obligation Certificate (ROC) markets, which are typically used for large-scale generation. We are looking at the possibility of boosting the UK’s risk assessment rating from a “2” to a “1” this year.

Further details on this and other countries to “watch” for are presented later in the update.

## Overall MEF country risk assessment and capital flows

MEF Country	Overall Risk Assessment (1 = lower risk, 2 = moderate risk, 3 = higher risk)	Cap Inv 2000 - 2009 (\$ m)	GDP 2009 (2009 \$ bn)
Australia	1	6,801	819
Brazil	1	20,770	2,024
China	1	72,436	8,767
France	1	8,078	2,113
Germany	1	38,597	2,812
Japan	1	1,549	4,141
Canada	2	9,616	1,287
India	2	9,907	3,548
Indonesia	2	601	969
Mexico	2	1,268	1,473
Russia	2	113	2,103
South Africa	2	334	489
South Korea	2	1,916	1,343
United Kingdom	2 (+ Watch)	29,016	2,165
United States	2	67,600	14,250
Italy	3	9,026	1,756

Source: DBCCA analysis, 2010. Capital investment from New Energy Finance Industry Intelligence Database, 2010. Data only includes disclosed data, and may not fully encompass all deals. Data includes the following: (1) The figures include VC/PE for company deals, PE - Buy-out deals, but excludes PE for projects; (2) New build Asset Financing in clean energy (wind, biofuels, biomass, geothermal, mini-hydro, marine, & solar projects only). The figures exclude re-financing and project acquisition deals, bridge/construction type financing, and small scale projects; (3) Includes public market investment in clean energy. Private Investment in Public Equity (PIPE), and Over-the-Counter (OTC) deals are included. GDP data sourced from CIA World Factbook, 2010.

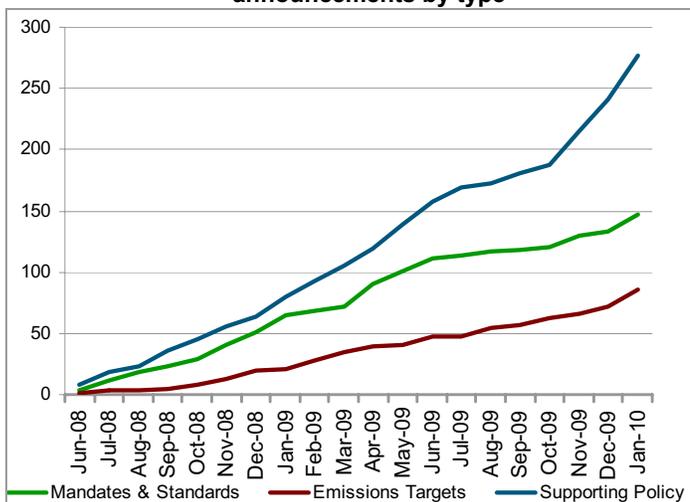
# A Look at Policy Momentum

## Copenhagen Accord catalyzes record number of climate policy announcements; Momentum indicates continued growth in 2010, with race to a green economy at the country and regional level

Since we first started tracking climate policies in July 2008, the number of global climate policy initiatives announced since then has increased substantially, with over 500 announcements made since we started tracking to date. Particularly, commitments to tackle climate change and reduce emissions were noticeably introduced towards the end of 2009 and beginning of 2010, mostly driven by international negotiations and the resulting Copenhagen Accord, which requested countries to submit voluntary targets by January 31, 2010. Over 80 countries around the world submitted emissions reductions targets, action plans or letters of commitment to the Copenhagen Accord, despite controversy over the legitimacy of climate change science over the past few months. Over and above announced emissions targets and mandates, supporting policy mechanisms such as incentives have comprised the bulk of announcements made over time, bolstering mandated markets and providing direct spending measures for emerging climate policies. Proposed targets submitted to the CA will require these supporting policies and incentives to back them up in order to successfully achieve emissions reductions. Without this legislation, these proposed targets may not be able to reach their full potential. Overall, the world saw a record number of climate policies announced in January 2010, almost double the number of policies announced the same month one year ago. This provides some indication of the expected continuation of climate policy growth throughout 2010, especially during the lead up to the next round of international negotiations in Mexico from November – December 2010.

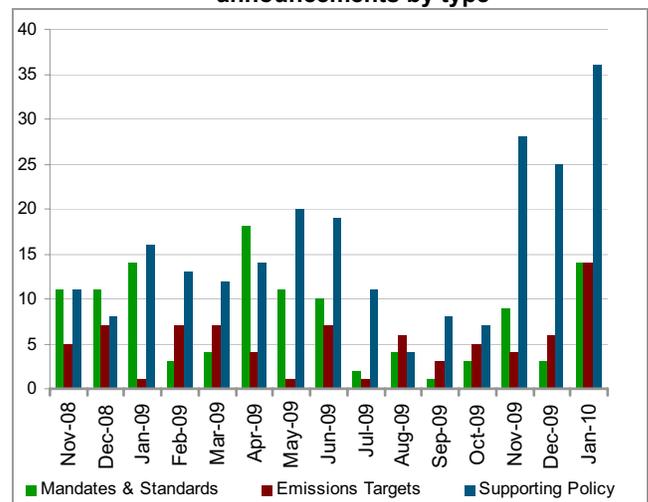
In tracking these policy developments, we have mapped out below the number of announcements by type. Investors can use these charts to understand the “policy momentum” in the climate change sector, noting that governments have increased their commitment to supporting this area. Once again, we group policies into mandates, emissions targets and also supporting policy mechanisms.

**Cumulative # of global policy / policy announcements by type**



Source: DBCCA analysis, 2010.

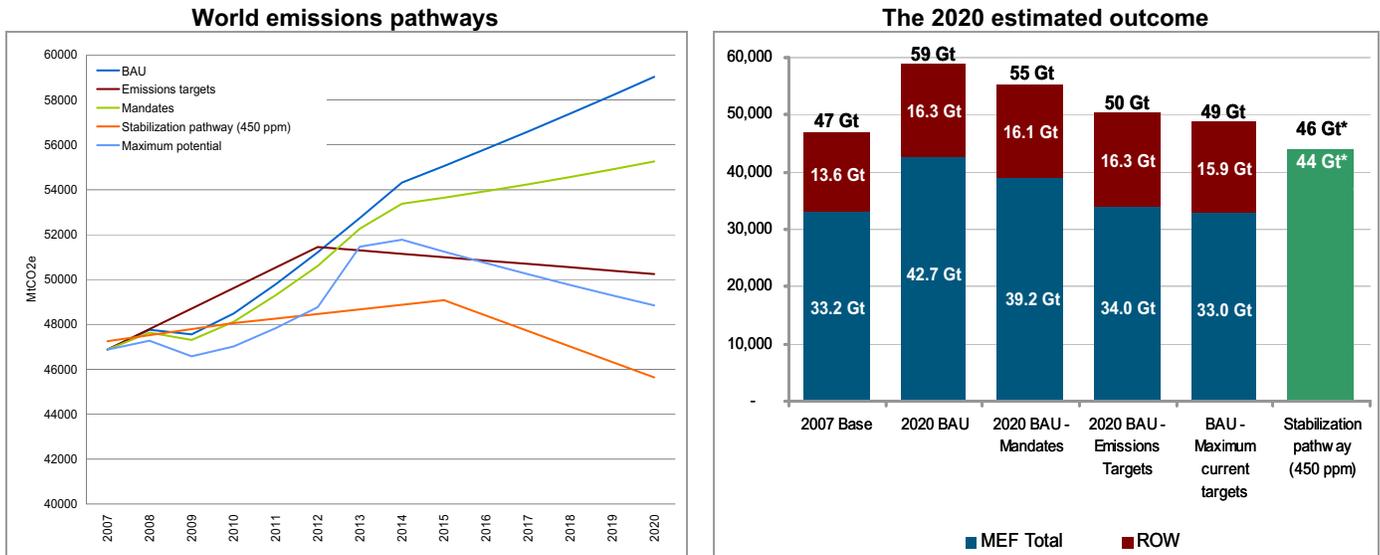
**Monthly # of global policy / policy announcements by type**



In addition to the emissions targets and mandates that we have modeled, the data presented above also includes 96 supporting policy mechanisms announced since October 2009, as well as 28 emissions targets and mandates that were not modeled because they are beyond the scope of our focus, while others lack sufficient data or information surrounding them.

# Global Climate Change Policy Tracker: Update

## Impact of climate change policy targets announced through January 2010



Source: CCC, DBCCA analysis 2010. Results consist of targets included in October 2009 Tracker through January 2010.

\* Range of 450 ppm pathways – 44 Gt source Project Catalyst estimates ([http://www.project-catalyst.info/images/publications/comparability\\_memo.pdf](http://www.project-catalyst.info/images/publications/comparability_memo.pdf)); 46 Gt source OECD Environmental Outlook to 2030 (2008, p. 140) estimates.

Gt CO <sub>2e</sub>	Emissions Targets	Mandates	Maximum Potential*
<b>October 2009 Tracker</b>	<b>55</b>	<b>52</b>	<b>51</b>
<b>February 2009 Tracker</b>	<b>50</b>	<b>55</b>	<b>49</b>
<b>Abatement Difference</b>	<b>↓ 5</b>	<b>↑ 3</b>	<b>↓ 2</b>
<b>Re-classifications / Adjustments</b>	<b>2.5</b>	<b>2.9</b>	<b>-</b>
<b>New Policies</b>	<b>2.8</b>	<b>0.07</b>	<b>2.0</b>
China (Mt CO <sub>2e</sub> )	1,250	-	860
Brazil	1,030	-	590
Japan	390	-	390
India	210	(5)	150
South Africa	200	-	190
Thailand	70	-	70
European Union	40	-	-
Canada: Quebec	30	-	-
New Zealand	30	1	30
Canada	20	-	20
Singapore	20	-	20
United States	10	-	10
Norway	10	-	10
Israel	10	20	20
Croatia	10	-	-
Kazakhstan	(10)	-	(10)
Moldova	(30)	-	(30)
Russia	(130)	-	(170)
Mexico	(150)	-	(150)
Ukraine	(220)	-	-
Spain	-	10	10
Morocco	-	10	-
United States - Colorado	-	10	-
United States - Alaska	-	10	-
Iran	-	5	10
Kuwait	-	5	10
United States - California	-	5	-

\* Maximum potential does not equal net change of emissions targets and mandates due to the way old, new and reclassified targets combine. All individual country figures are rounded to the nearest ten.

# Global Climate Change Policy Tracker: Update

## Summary of quantitative results:

- Emissions targets on their own, if fully achieved, now would reduce emissions by approximately **9 Gt in 2020** from BAU levels, including 2.8 Gt of new abatement resulting from new and superseded targets.<sup>2</sup>
- Announced mandates on their own, if fully achieved, now would reduce emissions by approximately **3 Gt in 2020** from BAU levels, including 71 Mt of new abatement resulting from new and superseded targets.<sup>3</sup>
- Maximum potential of world targets has now improved by approximately 2 Gt to **49 Gt**. It was previously 51 Gt in our October 2009 Tracker. This aggregated strongest combination of mandates and emission targets would reduce emissions by approximately **10 Gt in 2020** from BAU levels.
- The new maximum potential level **still misses the stabilization pathway of 450ppm by 3 – 5 Gt**, compared with 5 – 7 Gt from our October 2009 Tracker.

See “*Appendix I: New Climate Policy Targets since October 2009*” for full list and details of all new emissions targets, mandates and supporting policy mechanisms.

## Special Focus: US Emissions with & without American Clean Energy & Security Act (ACES)

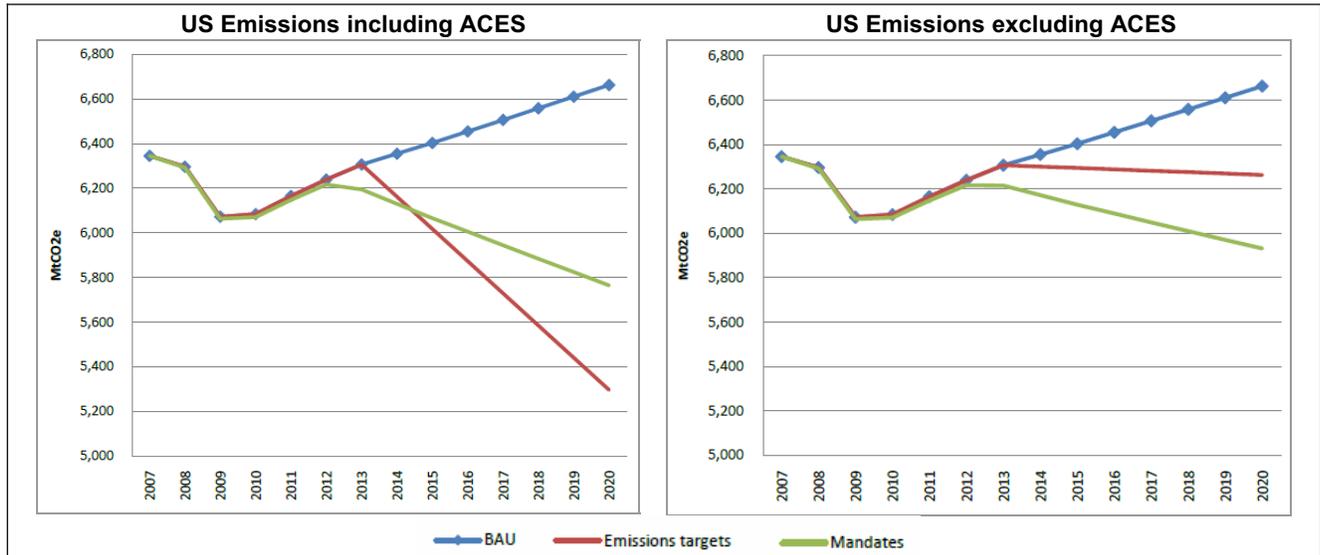
As the global community continues to strive for a legally binding international climate agreement in Mexico, the current spotlight remains on individual country actions, and how these could lead to the formation of a global agreement. Particularly, many developing countries are looking towards the large historical, developed emitters, such as the US, to take the necessary steps and lead global action – this remains as one of the primary points of debate in the global arena over climate policy development, particularly in the context of an international agreement. In planning for its participation in the next round of international negotiations, it is important for the US to address its own pending federal climate legislation and the challenges that it could face if this legislation is not recognized. To date, the US has struggled with how to implement a proper climate policy tool kit due to state vs. federal rights, political feasibility of financing renewable energy scale-up, ability to integrate renewables into the grid and ultimately, a stop-and-start approach with some incentive mechanisms, such as with the Production and Investment Tax Credits. Furthermore, achieving renewable energy goals has been primarily conducted on a state-by-state basis, either in voluntary or mandated target systems. Our results show that state mandates alone could provide approximately 300 Mt of abatement potential by 2020, representing the potentially ambitious impact of state-level action, if their incentives really support them properly. Thus far, the US has not passed official legislation ordering a federal emissions reduction target or renewable portfolio standard.

The findings of our update show that from an expected global BAU 2020 emissions level of 59 Gt, the maximum reduction that current policies could achieve still misses a pathway that might hold global warming to 2°C by 3 – 5 Gt. However, these figures include a critical piece of US pending legislation, which is the proposed American Clean Energy and Security Act (ACES), as passed by the US House of Representatives in 2009. If ACES were not implemented, and thus excluded, there would be another 644 Mt added to the gap between maximum potential and stabilization. ACES’s emissions target of a 17% reduction from 2005 levels by 2020 could alone contribute close to 1 Gt of emissions reduction by 2020. ACES’s RPS could further add another 170 Mt of incremental abatement potential to state mandates, which could provide approximately 300 Mt of abatement as mentioned earlier.

<sup>2</sup> Results also include 3.6 Gt of abatement from emissions targets included in our October 2009 Tracker plus 2.5 Gt from reclassifications and adjustments.

<sup>3</sup> Results also include 6.5 Gt of abatement from mandates included in our October 2009 Tracker minus 2.9 Gt from reclassifications and adjustments.

# Global Climate Change Policy Tracker: Update



Source: CCC analysis, 2010.

**Chart Summary (Figures rounded to nearest ten)**

2020 Emissions Level BAU= 6,660 Mt  
 2020 Emissions Level with ETs = 5,300 Mt  
 2020 Emissions Level with Mandates = 5,770 Mt

**Chart Summary (Figures rounded to nearest ten)**

2020 Emissions Level BAU= 6,660 Mt  
 2020 Emissions Level with ETs = 6,250 Mt  
 2020 Emissions Level with Mandates = 5,940 Mt

Breakdown is as follows:

		WITH ACES	WITHOUT ACES
US Federal Legislation	Emissions Targets	Abatement by 2020 (Mt)	Abatement by 2020 (Mt)
American Clean Energy and Security Act (Waxman-Markey)	17% reduction from 2005 levels of emissions in 2020; 83% below 2005 in 2050	949	0
Save Our Climate Act	\$10 per ton of carbon content tax on fossil fuels, increasing by \$10 a year until GHG emissions are below 80% on 1990 levels.	0	0
<b>Federal Total</b>		<b>949</b>	<b>0</b>
US State Legislation	Emissions Targets	Abatement by 2020 (Mt)	Abatement by 2020 (Mt)
<b>State Total (including US Western Climate Initiative)</b>		<b>411</b>	<b>411</b>
<b>US Emissions Targets TOTAL</b>		<b>1360</b>	<b>411</b>
US Federal Legislation	Mandate	Abatement by 2020 (Mt)	Abatement by 2020 (Mt)
American Clean Energy and Security Act (Waxman-Markey)	Combined renewable electricity and electricity savings 6% 2012; 20% in 2020	170	0
Energy Independence and Security Act of 2007	Renewable Fuel Standard of 36 billion gallons of biofuels by 2022.	261	261
Other	Fleet average of 35.5 MPG by 2016	169	169
<b>Federal Total</b>		<b>600</b>	<b>430</b>
US State Legislation	Mandate	Abatement by 2020 (Mt)	Abatement by 2020 (Mt)
<b>State Total</b>		<b>286</b>	<b>286</b>
<b>US Mandates TOTAL</b>		<b>886</b>	<b>716</b>
Maximum Potential		Abatement by 2020 (Mt)	
WITH American Clean Energy and Security Act (Waxman-Markey)		1360	
WITHOUT American Clean Energy and Security Act (Waxman-Markey)		716	

# Review of Country Risk Assessment

## MEF country risk assessment

To reiterate, we rated each mandate in our October 2009 Tracker, resulting in overall risk evaluation assessments for different policy regimes, with a special focus on MEF countries. Note: These ratings were not measuring the size of the ecological impact; i.e. this was not an environmental policy rating.

- Risk Assessment of “1” means that the regulatory regime is a lower risk for investors;
- Risk Assessment of “2” means that the regulatory regime is a moderate risk for investors;
- And Risk Assessment of “3” means that the regulatory regime is a high risk for investors.

We believe that our MEF country risk assessments still stand since the last time we published our October 2009 Tracker; however, we recognize that many countries are currently debating critical pieces of proposed climate legislation, which if enacted, could potentially change the assessment of a particular regime. We attempt to provide a snapshot of some of these significant proposals by the MEF countries – a “watchlist” of countries to look out for is presented below. As a special focus case study, we assess the UK’s proposed feed-in tariffs for micro-generation projects. A full description of this can also be found below.

MEF Country	Overall Risk Assessment (1 = lower risk, 2 = moderate risk, 3 = higher risk)	Cap Inv 2000 - 2009 (\$ m)	GDP 2009 (2009 \$ bn)
Australia	1	6,801	819
Brazil	1	20,770	2,024
China	1	72,436	8,767
France	1	8,078	2,113
Germany	1	38,597	2,812
Japan	1	1,549	4,141
Canada	2	9,616	1,287
India	2	9,907	3,548
Indonesia	2	601	969
Mexico	2	1,268	1,473
Russia	2	113	2,103
South Africa	2	334	489
South Korea	2	1,916	1,343
United Kingdom	<b>2 (+ Watch)</b>	29,016	2,165
United States	2	67,600	14,250
Italy	3	9,026	1,756

Source: DBCCA analysis, 2010. Capital investment from New Energy Finance Industry Intelligence Database, 2010. Data only includes disclosed data, and may not fully encompass all deals. Data includes the following: (1) The figures include VC/PE for company deals, PE - Buy-out deals, but excludes PE for projects; (2) New build Asset Financing in clean energy (wind, biofuels, biomass, geothermal, mini-hydro, marine, & solar projects only). The figures exclude re-financing and project acquisition deals, bridge/construction type financing, and small scale projects; (3) Includes public market investment in clean energy. Private Investment in Public Equity (PIPE), and Over-the-Counter (OTC) deals are included. GDP data sourced from CIA World Factbook, 2010.

# Review of Country Risk Assessment

## Select country watchlist: Who to look out for in 2010

1 = lower risk, 2 = moderate risk, 3 = higher risk

MEF Country	Current Overall Risk Assessment	Pending Climate Policies and Action	Potential Risk Assessment Change
United Kingdom	2	<ul style="list-style-type: none"> <li>The UK's Department of Energy &amp; Climate Change (DECC) introduced micro-generation FiTs and a Renewable Heat Initiative. The two schemes are currently still undergoing consultation. These will be attractive schemes for generators and investors if passed. (See Special Focus below)</li> <li>The consultation on the draft National Policy Statements for energy infrastructure closed on February 22, 2010. The government is now considering the responses and will publish an official response document later in 2010, together with the final National Policy Statements on Energy. The statements will define the national infrastructure needs for renewable energy, fossil fuels, oil and gas, storage, electricity networks and nuclear power.</li> <li>The UK's Infrastructure Planning Commission was set up under the government's 2008 Planning Act to streamline the application process for infrastructure projects. The goal of the Commission is to make the planning process more efficient and faster. The Commission was officially opened on October 1, 2009, but just started to accept applications for energy and transport sectors on March 1, 2010, and thus, has not been able to accelerate any critical energy infrastructure, such as the grid, up to this point.</li> </ul>	Upgrade

## Other key developments by MEF countries to watch for

Other MEF countries	Pending Climate Policies and Action
Australia	<ul style="list-style-type: none"> <li>The proposed Carbon Pollution Reduction Scheme (CPRS) by the Rudd Government was introduced into the country's Parliament for the third time on February 2, 2010. The scheme, which was split from an approved Renewable Energy Target in mid-2009, would put a price on carbon through an emissions trading scheme. The package of 11 bills was defeated on December 2, 2009. The Government said that the reintroduced bills in February 2010 include amendments negotiated with the Liberal Party late last year. If not passed, this could have significant implications for emissions reductions potential and the momentum of climate policy development going forward in Australia.</li> </ul>
France	<ul style="list-style-type: none"> <li>In September 2009, French President Nicolas Sarkozy unveiled plans for a carbon tax to be levied on fossil fuel users that do not fall under the EU ETS, namely households and businesses. The plan has faced significant opposition since its announcement, and in December 2009, France's Constitutional Council denied the approval of the tax which was planned to go into effect on January 1, 2010. The council said that too many polluters were exempted in the measure and the tax burden was not fairly distributed. On February 20, 2010 the French government announced that it would work towards implementation of a direct carbon tax by July 2010. A number of amendments to the original legislation have been proposed and consultations with industry groups are underway.</li> </ul>
Germany	<ul style="list-style-type: none"> <li>A draft bill emerged on February 22, 2010 in Germany proposing a ~15% feed-in tariff cut for both solar rooftop and free field installations, ~10% cut for conversion sites, and full elimination of subsidies for</li> </ul>

# Review of Country Risk Assessment

	<p>systems built on converted farmlands. The effective date for all of these cuts is July 1, 2010. Overall, the proposal is still targeting cumulative German solar capacity to grow from ~9GW this year to ~66GW in 2030. In early March, Germany's ruling coalition approved the proposed reductions for solar projects, moving the debate to parliament. As investors, we applaud the adaptive and relatively transparent policy review process.</p>
<b>Japan</b>	<ul style="list-style-type: none"> <li>■ The Japanese government launched a working group in November 2009 to study the expansion of its program for utility firms to purchase electricity generated from clean and renewable energy. The program would potentially place a FiT for excess electricity produced from renewable energy in homes, schools and hospitals. If approved, the proposal would have a positive impact on renewable installations.</li> </ul>
<b>India</b>	<ul style="list-style-type: none"> <li>■ India's Central Electricity Regulatory Commission (CERC) has announced FiTs for solar power. CERC is expected to put in place a solar FiT in 2010 that will govern the first phase of its National Solar Mission. For the next 3 years the power trading arm of Indian state run power utility NTPC will buy solar generated electricity at a fixed rate determined by CERC.</li> </ul>
<b>United States</b>	<ul style="list-style-type: none"> <li>■ Federal climate legislation is currently being debated by the US government. There has been speculation that a cap-and-trade proposal would be isolated from the rest of a climate or energy bill. The debate has been further fueled by the possibility of an "EPA backstop." Under the 2007 Supreme Court decision in Massachusetts v. EPA, it was found that carbon dioxide could be regulated under the EPA's Clean Air Act. The EPA has begun to outline how emissions would be regulated; specifying that only large emitters of GHGs would be subject to regulation before 2013, and smaller emitters would not be regulated before 2016. However, Congress has expressed that it would disapprove of any form of EPA regulation. As part of this growing reaction, Senators John Kerry, Lindsey Graham and Joe Lieberman may unveil a new climate bill this spring. Whether or not the EPA backstop will force legislation to be passed is still unknown, but it is now more important than ever to monitor these events.</li> <li>■ On January 27, 2010, the Securities and Exchange Commission (SEC) approved an interpretative release requiring public companies to discuss several items related to climate change. According to the SEC, the following must be disclosed: (1) direct effects of existing and pending environmental regulation and international treaties on the company's business and operations; (2) indirect effects of such legislation and regulation on a company's business, such as changes in demand for products that create or reduce GHG emissions; and (3) the effect on a company's business and operations related to the physical changes to our planet caused by climate change, such as rising seas, stronger storms, and increased drought.</li> </ul>
<b>Italy</b>	<ul style="list-style-type: none"> <li>■ The Italian government is planning to announce reductions to FiTs for solar power in the country; however, the announcement of the official plan has been delayed over the course of February 2010, and there is some speculation that the official announcement will not take place until May 2010. However, based on a draft decree that some media outlets obtained, the proposed tariff is to be €0.313/kWh, compared with €0.298 /kWh in the previous version starting in 2011, and will subsequently decline at the end of 2011 through 2013. Investors and solar energy market operators have said delays in unveiling the new plan would prevent them from drafting their own strategies and would potentially slow investment flows. The new incentive plan will reduce tariffs to reflect decreases in PV module prices.</li> </ul>

# Review of Country Risk Assessment

## Special Focus: UK Micro-generation Feed-in Tariff

In our “Paying for Renewable Energy – TLC at the Right Price” green policy paper published in December 2009, we identified the key features of an advanced FiT scheme that could deliver TLC at the right price. Below, we present once again these key features, and track how the characteristics of the UK’s proposed FiT look against this criteria.

<i><b>FIT Design Features</b></i>	<i><b>Key Factors</b></i>	<i><b>TLC at the Right Price</b></i>	<i><b>United Kingdom</b></i>
<i><b>Policy &amp; Economic Framework</b></i>	<i>"Linkage" to mandates &amp; targets</i>	Yes	Yes, 15% by 2020
<i><b>Core Elements</b></i>	<i>Eligible technologies</i>	<i>All renewables eligible</i>	<i>Anaerobic digestion, hydro, solar PV, wind, micro CHP pilot program</i>
	<i>Specified tariff by technology</i>	Yes	Yes
	<i>Standard offer/ guaranteed payment</i>	Yes	Yes
	<i>Interconnection</i>	Yes	Yes
<i><b>Supply &amp; Demand</b></i>	<i>Payment term</i>	<i>15-25yrs</i>	<i>10-25yrs</i>
	<i>Must take</i>	Yes	Yes
<i><b>How to set price</b></i>	<i>Who operates (most common)</i>	<i>Open to all</i>	<i>IPPs; communities; utilities</i>
	<i>Fixed vs. variable price</i>	<i>Fixed</i>	<i>Fixed and Variable</i>
	<i>Generation cost vs. avoided cost</i>	<i>Generation</i>	<i>Generation</i>
<i><b>How to adjust price</b></i>	<i>IRR target</i>	Yes	Yes, 5-8%
	<i>Degression</i>	Yes	Yes
	<i>Periodic review</i>	Yes	Yes
<i><b>Caps</b></i>	<i>Grid parity target</i>	Yes	No
	<i>Project size cap</i>	<i>Depends on context</i>	Yes
<i><b>Policy interactions</b></i>	<i>Eligible for other incentives</i>	<i>Yes - eligible to take choice</i>	Yes
<i><b>Streamlining</b></i>	<i>Transaction costs minimized</i>	Yes	Yes

In February 2010, the UK’s Department of Energy & Climate Change (DECC) issued its official response to the many months of prior consultation on a feed-in tariff (FiT) scheme. The UK has historically supported renewable energy generation through its Renewables Obligation (RO) program (via renewable obligation certificates (ROCs)), particularly for large-scale renewable generation systems; however, it has been acknowledged that this program did not take into account benefits for small-scale projects. Therefore, the February 2010 response declares the introduction of FiTs for small-scale, low carbon electricity generation, also known as micro-generation (the maximum capacity for the scheme will be set at 5MW), primarily aimed at households and residential installations. The scheme has been labeled as the “clean energy cashback” program, and offers a guaranteed payment for investment in renewable energy projects, while working in parallel with the existing RO program. Both policies are linked to the national target of achieving 15% of all energy supply from renewables by 2020. According to DECC, it is expected that the FiT scheme will support over 750,000 micro-generation installations and will have saved 7 million tonnes of carbon dioxide<sup>2</sup>. Although there are challenges that lay ahead for the program, we believe that the introduction of these incentives, if fully enacted, represent a positive move towards stronger enabling policies, and will ultimately help achieve the country’s emissions targets. Therefore, we will potentially boost the UK’s risk assessment from a “2” to a “1”.

Upfront, one of the most distinctive features of the UK FiT scheme is the inclusion of two different elements of payment: (1) The first element is a generation tariff, which is a payment from the electricity supplier for every kilowatt hour (kWh) generated and used on-site, (2) The second element is an export tariff, which is an additional payment for electricity fed into the grid. Generators are guaranteed a market for their “exported” energy at a long-term guaranteed price.

Other *attractive* aspects of the FiT are as follows:

- FiT levels will be **indexed to the Retail Price Index (RPI)** to account for inflation – this ensures that the rates of return are maintained for the life of the FiT for individual installations or new installations coming on. Each year, all of the tariff rates will be adjusted on the basis of changes in the RPI in the previous year. For example, in year 2 of the FiT scheme, an installation made in year 1 will be paid the updated “year 1” tariff, according to the RPI changes; similarly

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an installation made in year 2 will be paid the updated “year 2” tariff – and so on future years.

- The FiT scheme will undergo **periodic reviews**, which will be aligned with RO reviews. The first major review would be implemented in 2013, with a set program of reviews thereafter. Tariff levels, degression rates, eligible technologies, arrangements for exports, administrative / regulatory arrangements, interaction with other policies and accreditation and certification issues will all be subject to review during these periods.
- **Degression** of FiT rates have been delayed until April 2012, providing generators with tariffs at initial levels for two years. This will help stimulate early vintage investments. For solar PV, the degression rate was increased an additional 0.5% from 2015.
- Generous tariffs at micro-level for **solar** – the UK solar FiTs are among the better ones in the world, with the exception of building-mounted PV rates in France.
- The greater UK Energy Act 2008 (umbrella legislation that allows for FiTs) is expected to provide financial support for the use of renewables for household heating needs, which is introduced via the **Renewable Heat Incentive (RHI)**. The RHI would act as the world’s first FiT for heating purposes, which accounts for approximately 50% of UK emissions and more than half of household electricity bills. Some believe that this could have a greater impact on achieving emissions reductions, than the actual micro-generation FiTs themselves. The RHI would not take effect until 2011, and would cover technologies acting in air, water and ground source heat pumps, solar thermal, biomass boilers, CHP, use of biogas and bioliquids and the injection of biomethane into the natural gas grid. The proposal is to provide a general 12% IRR for RHI technologies. This would work alongside the micro-generation FiT scheme.
- In addition, the scheme also provides a special pilot program for supporting **Micro Combined Heat & Power (CHP)** systems, providing an initial market boost for the sector. Being an energy efficiency play, micro CHP has been granted a limited 10p/kWh generation tariff and a 3p/kWh FiT. The tariff will be geared towards micro CHP with a capacity of 2kW or less.

However, there remain *challenges* to the program as well:

- For most installations, the cost is concentrated in the up-front price of the generating equipment and its installation. DECC has stated that they will allow the general market to provide the necessary loans or other finance packages to help finance the initial costs associated with the uptake of small-scale technologies. This is unlike other countries such as Germany, which has a public sector bank KfW Entwicklungsbank, which provides soft loans to generators. For this installation equipment to be financed, **access to bank loans and credit risk** will be crucial. The primary issue is whether cash flows can be readily assigned to lending institutions, particularly with technologies such as micro CHP.
- Ofgem will be taking the lead role in monitoring and facilitating the financing of the FiT scheme. Ofgem will provide the central administrative functions for the program, including accreditation of generators, administration of the central FiT Register and administration of the “levelization” process. The “levelization” process attempts to ensure that the cost of the scheme is contributed to by all licensed electricity suppliers in proportion to their share of the UK electricity supply market. However, Ofgem will have to overcome various administrative hurdles to create a **streamlined and consumer-friendly process** for the FiT scheme.
- DECC has stated that the expected **rate of return** for projects included in the FiT scheme will be 5-8%. There is some skepticism that this may be too low to spur scale-up or uptake of installations. Some industry groups previously advocated for returns around 10% instead.
- There is some criticism that the **export tariff of 3p/kWh** is too low; the original proposal included a 5p/kWh rate. This was decreased because DECC believes that intermittent power has a lower value in the power system than fossil peaking capacity.
- **Existing systems remain ineligible** for the FiT, except those transferring from the Renewables Obligation (at the fixed rate of 9p/kWh). According to DECC, this was on the basis of the understanding that these installations already exist and have been installed and are operating without financial support. However, many experts disagree with this view.

<sup>2</sup> UK Department of Energy & Climate Change, “Feed-in Tariffs: Government’s Response to the Summer 2009 Consultation,” February 2010.

# Appendix I: New Climate Policy Targets since October 2009

## New climate change policy targets tracked since October 2009

### New Emissions Targets (Ordered by Abatement Potential amount)

Note: The figures listed in the "Superseded from..." column represent the original abatement potential associated with an older emissions target included in our October 2009 Tracker.

Country/ State	Target Description	Association w/ Copenhagen Accord	Abatement Potential by 2020 (Mt)	Superseded from... (Mt)
<b>China</b>	40-45% reduction in carbon dioxide emissions per unit of GDP by 2020 compared to 2005 levels ( <i>supersedes</i> )	Emissions Target Submitted	3,150	1,905
<b>Brazil</b>	36.1-38.9% reduction in emissions from 1990 levels by 2020	Emissions Target Submitted	1,025	
<b>India</b>	20-25% reduction in emissions intensity of GDP by 2020 in comparison to the 2005 level	Emissions Target Submitted	205	
<b>Japan</b>	25% reduction in GHG emissions from 1990 levels by 2020	Emissions Target Submitted	390	
<b>Canada</b>	17% reduction in GHG emissions below 2005 levels by 2020 ( <i>supersedes</i> )	Emissions Target Submitted	230	210
<b>South Africa</b>	34% reduction in emissions below BAU in 2020	Emissions Target Submitted	200	
<b>Mexico</b>	30% reduction in GHG emissions below BAU levels by 2020 ( <i>supersedes</i> )	Emissions Target Submitted	180	325*
<b>Thailand</b>	22.5% reduction in energy emissions in 2020 (mid-point of 15-30% specified reduction)	None	70	
<b>European Union</b>	20% reduction in maritime emissions from 2005 levels by 2020	None	35	
<b>Canada: Quebec</b>	20% reduction in GHG emissions from 1990 levels by 2020	None	30	
<b>New Zealand</b>	10-20% reduction in GHG emissions from 1990 levels by 2020	Emissions Target Submitted	30	
<b>Norway</b>	40% reduction in GHG emissions from 1990 levels by 2020 ( <i>supersedes</i> )	Emissions Target Submitted	20	15
<b>Singapore</b>	16% reduction in GHG emissions from BAU levels by 2020	Emissions Target Submitted	15	
<b>United States</b>	25% reduction in emissions from the dairy sector by 2025	None	10	
<b>Israel</b>	20% reduction in emissions below BAU by 2020	Emissions Target Submitted	5	
<b>Croatia</b>	5% reduction in emissions from 1990 levels by 2020 ( <i>supersedes</i> )	Emissions Target Submitted	5	0
<b>Kazakhstan</b>	15% reduction in emissions below 1992 levels by 2020	Emissions Target Submitted	-5	
<b>Moldova</b>	25% reduction in emissions from 1990 levels by 2020	Emissions Target Submitted	-30	

## Appendix I: New Climate Policy Targets since October 2009

<b>Russia</b>	22-25% reduction in GHG emissions below 1990 levels by 2020	Emissions Target Submitted	-130	
<b>Ukraine</b>	20% reduction in GHG emissions from 1990 levels by 2020	None	-220	

\* Original target: 50% reduction by 2050

### New Mandates / Standards (Ordered by Abatement Potential amount)

Note: The figures listed in the "Superseded from..." column represent the original abatement potential associated with an older mandate included in our October 2009 Tracker.

Country/ State	Target Description	Abatement Potential by 2020 (Mt)	Superseded from... (Mt)
<b>Spain</b>	22.5% of Gross Final Energy consumption from renewable in 2020 ( <i>supersedes</i> )	60	50
<b>India</b>	20 GW of solar capacity by 2022 ( <i>supersedes</i> )	50	55*
<b>United States - Colorado</b>	30% renewable generation by 2020 ( <i>supersedes</i> )	15	5
<b>Morocco</b>	2000 MW of solar capacity in 2020	10	
<b>United States - Alaska</b>	50% renewable by 2025 (modeled 20% in 2020)	10	
<b>Israel</b>	10% renewable electricity from utilities by 2020	10	
<b>Israel</b>	20% reduction in electricity consumption by 2020	10	
<b>United States - California</b>	50% increase in efficiency of televisions from 2013 model onwards	5	
<b>Kuwait</b>	5% of energy requirements from renewables in 2020	5	
<b>Iran</b>	2000 MW new renewable in 2015	5	
<b>Thailand</b>	Double ethanol use to 3 million liters/day in 2011	2 (in 2012)	
<b>New Zealand</b>	0.5% of oil companies' sales in 2008 to come from biofuels with obligation levels rising by 0.5% increments to 2.5% in 2012	1	

\* Original target: 20 GW solar by 2020

# Appendix I: New Climate Policy Targets since October 2009

## Supporting policy mechanisms announced since October 2009

Country/State	Supporting Policy Type	Supporting Policy Description
<b>Australia – New South Wales</b>	Feed-in Tariff	New South Wales revised its solar feed in tariff scheme, known as the Solar Bonus Scheme. It switched from a net feed in tariff model to a gross model where all power generated by a home solar power system will attract premium payment. Households in New South Wales with solar panels will be paid 60 cents per kWh for all electricity generated. The new NSW scheme will have a cap on the size of home solar power systems of 10kW and will run for 7 years ( <i>revision</i> ).
<b>Australia – Victoria</b>	Feed-in Tariff	Victoria enacted a net metered feed in tariff scheme in November, 2009. Households will be paid 60 cents for every excess kilowatt hour of energy fed back into the state electricity grid and the tariff is expected to run for 15 years.
<b>Canada – Ontario</b>	Feed-in Tariff	Ontario Power Authority will pay \$0.145 CAD/kWh for wind generation produced by farmers.
<b>China</b>	Feed-in Tariff	China is expected to soon issue a CNY 1.15/kWh National Solar Tariff.
<b>China</b>	Feed-in Tariff	China formally adopted a Renewable Law requiring grid operators to buy all the electricity produced by renewable energy generators.
<b>Czech Republic</b>	Feed-in Tariff	The Czech feed-in tariff for PV-generated power has been reduced by 5% from 2011. This is because the tariff was previously based on 15-year investment returns, but given technological advances PV developments reach investment return in much shorter time periods ( <i>revision</i> ).
<b>Finland</b>	Feed-in Tariff	Finland's plan to introduce a biogas feed-in tariff is moving forward. The target price for the biogas feed-in tariff is €83.5 per MWh for power production and €50 per MWh when utilizing CHP. According to the plan, this would only concern plants that produce more than 300 KVA of electricity.
<b>France</b>	Feed-in Tariff	The French Government disclosed new feed-in tariff rates for PV, biomass and geothermal power. The country's energy minister published new rates for solar PV projects with only minor variations to those announced in September, 2009, but applications for new projects filed since November, 2009 are set to be cancelled. The feed-in tariffs will remain unchanged until 2012 and will consist of lower-than-expected rates for some building integrated schemes and slightly higher rates for ground-based solar projects ( <i>revision</i> ).
<b>Germany</b>	Feed-in Tariff	Germany's Ministry of Environment announced 15% cuts in feed-in tariffs for solar rooftop projects from April 1, 2010, 15% cuts for ground-mounted projects from July, 1, 2010 and 25% cuts in rates for open-air projects on agricultural lands from July, 1, 2010 ( <i>revision</i> ).
<b>India</b>	Feed-in Tariff	The Indian Government announced the introduction of an obligatory feed-in tariff to be paid for wind energy that generators feed in to the grid. India's Ministry of New and Renewable Energy announced the scheme for Generation Based Incentives of \$0.01 per kWh of electricity fed into the grid from wind projects.
<b>India</b>	Feed-in Tariff	India will put into place a solar feed-in tariff in 2010 that will govern the first phase of its National Solar Mission. For the next 3 years the power trading arm of Indian state run power utility NTPC will buy solar generated electricity at a fixed rate determined by the Central Electricity Regulatory Commission.
<b>Japan</b>	Feed-in Tariff	Japan started its nationwide feed in tariff system in November, 2009. The tariff guarantees a long-term market to producers of renewable electricity.

## Appendix I: New Climate Policy Targets since October 2009

<b>Jordan</b>	Feed-in Tariff	Jordan's Government approved a Renewable Energy Law which requires that the National Electric Power Company (NEPCO) purchases all electricity generation from utility-scale renewable energy projects. It also stipulates that all citizens with solar energy systems or wind turbines will have the right to sell any excess electricity back to their electricity provider at the full retail rate.
<b>Malaysia</b>	Feed-in Tariff	The Malaysian Government announced that it is putting together draft legislation for a feed-in tariff system as part of a major overhaul of its renewable policy. The legislation is expected to be passed some time in 2010.
<b>The Philippines</b>	Feed-in Tariff	The Philippine Government is planning to have a feed-in tariff in place by June, 2010. The newly formed National Renewable Energy Board has started to study the FiT and will submit proposals by April, 2010.
<b>Serbia</b>	Feed-in Tariff	Serbia introduced a feed-in tariff for renewable electricity. The Ministry of Mining and Energy will guarantee €0.23 per kWh from solar plants, €0.12-€0.16 for biogas, €0.114-€0.136 for biomass, €0.95 for wind, €0.76-€0.104 for CHP, €0.85-€0.92 for waste and €0.78-€0.97 for small hydro.
<b>Slovakia</b>	Feed-in Tariff	Slovakia's electricity regulator approved feed-in tariff depreciation rates for renewable generation for 2010. The Regulatory Office for Network Industries announced the tariffs for energy production from mini-hydro, solar, wind, geothermal and biomass sources. The new tariff rates remain very attractive for new renewable energy projects in the country and are guaranteed for 15 years.
<b>Taiwan</b>	Feed-in Tariff	Taiwan's Ministry of Economic Affairs announced feed-in tariffs for renewable energy which will come into effect at the end of 2010.
<b>Thailand</b>	Feed-in Tariff	The Thai Government is planning to increase tariffs for biomass and biogas projects to make them more cost competitive ( <i>revision</i> ).
<b>Turkey</b>	Feed-in Tariff	The Turkish Government is to extend its current Renewable Energies Law to 2013. This comes after it was revealed that the Government had prepared a draft of a new law with expected feed-in tariffs for wind power. The u-turn means two things: firstly that the current feed-in tariffs for wind power - €50-55/MWh - will remain in force for the next three years, and secondly that the proposed feed-in tariff of €80/MWh for onshore wind and €170/MWh for offshore wind included in the draft of the new law will not be introduced for some time ( <i>revision</i> ).
<b>United Kingdom</b>	Feed-in Tariff	The UK Government released details of its proposed feed-in tariffs that are expected to go into place in April, 2010. The tariffs include the first incentives in the world for renewable heat and biogas injection into natural gas pipelines.
<b>United States - Indiana</b>	Feed-in Tariff	A bill to create a system of Advanced Renewable Energy Contracts, AB 1190, has been referred to Indiana's Assembly Committee on Commerce, Energy, Technology and Utilities. The bill is the first comprehensive proposal for a system of feed-in tariffs in the current legislative sessions across the US.
<b>United States - Wisconsin</b>	Feed-in Tariff	Wisconsin introduced AB 649 on January 6, 2010. AB649 includes a section creating a system of feed-in tariffs which directs the Public Utilities Commission to determine the specifics of the program. The bill must pass both the assembly and the senate and be signed by Governor Doyle before it becomes law.
<b>Australia - South Australia</b>	Tax Incentive	A new renewable tax incentive was introduced in South Australia to boost investment in the industry. From July, 2010 investors will get payroll tax rebates of up to \$5 million for large scale energy projects and up to \$1 million for wind power projects.
<b>Bangladesh</b>	Tax Incentive	Bangladesh's Government cut import duties on hybrid cars from 195% to 56% ( <i>revision</i> ).

## Appendix I: New Climate Policy Targets since October 2009

<b>Brazil</b>	Tax Incentive	The Brazilian Government announced that it aims to stimulate the use of flex-fuel low powered cars by a scale of tax incentives.
<b>Netherlands</b>	Tax Incentive	The European Commission approved higher tax incentives offered by the Green Funds Scheme of the Netherlands for projects enhancing the environment ( <i>revision</i> ).
<b>Netherlands</b>	Tax Incentive	The Dutch Government announced that it wants to introduce a 'green' road tax by the kilometer from 2012 aimed at reducing CO <sub>2</sub> emissions by 10% and cutting congestion by 50%. Each vehicle would be equipped with a GPS device that tracks kilometers travelled and data would be sent back to a collection agency to be billed to the car owner. Standard family saloon cars would be charged €3 cents per kilometer in 2012 rising to €6.7 cents in 2018 according to the proposed law.
<b>South Africa</b>	Tax Incentive	South Africa's National Treasury announced that it will introduce a new tax on vehicles designed to cut CO <sub>2</sub> emissions.
<b>United States</b>	Tax Incentive	President Obama unveiled a \$2.3 billion tax credit to boost jobs by promoting clean energy. The credit is expected to create 17,000 US jobs and be matched by \$5 billion in private capital.
<b>United States</b>	Tax Incentive	Two US Senators pledged to take up legislation in early 2010 to extend the \$1 per gallon biodiesel tax credit and an array of other tax breaks.
<b>United States</b>	Tax Incentive	The Obama administration announced support for expanding an existing tax credit program, aimed at assisting manufacturers of renewable energy equipment, by up to \$5 billion ( <i>revision</i> ).
<b>United States – Michigan</b>	Tax Incentive	The Michigan Legislature approved \$220 in tax credits for businesses developing battery packs that help motor companies develop components for electric vehicles.
<b>France</b>	Carbon Tax	France's Constitutional Council ruled against the proposed carbon tax due to too many exemptions that run counter to the aim of fighting climate change.
<b>France</b>	Carbon Tax	France's Government unveiled new proposals for its Carbon Tax in January, 2010. Consultations with business and industry will now follow.
<b>Mauritius</b>	Carbon Tax	The Government of Mauritius announced that it will impose a carbon tax on all apparatus that use excessive energy under an Energy Efficiency Bill which will be a legal framework to label all household electrical appliances.
<b>Australia</b>	Cap-and-Trade	The proposed Carbon Pollution Reduction Scheme (CPRS) was defeated on December 2, 2009. The Government reintroduced the bills in February 2010 including amendments negotiated with the Liberal Party late last year. If not passed, this could have significant implications for emissions reductions potential and the momentum of climate policy development going forward in Australia.
<b>Canada</b>	Cap-and-Trade	Ontario's legislature passed enabling provisions for its planned cap-and-trade scheme.
<b>Japan</b>	Cap-and-Trade	Tokyo and its surrounding prefectures are considering establishing an emissions quota trading system in an attempt to find an efficient way of cutting GHG emissions. The move in the greater Tokyo metropolitan area is expected to influence discussion on a national emission trading scheme.
<b>New Zealand</b>	Cap-and-Trade	New Zealand's Government passed a law through a key stage to put in place an amended scheme to cut carbon emissions. The Government minority pushed the legislation through, making its final passage a foregone conclusion. The scheme will start in July, 2010, but for a 2.5 year period industry will only have to meet 50% of their targets with a slow phase-out of assistance thereafter.

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<b>South Korea</b>	Cap-and-Trade	South Korea announced that it will launch a pilot GHG emission trading scheme by late 2010.
<b>United States – California</b>	Cap-and-Trade	California released draft rules for its greenhouse gas cap-and-trade plan that will be the most ambitious in the US. State law requires California to cut emissions to 1990 levels by 2020 and the draft rules shows California may take on even more than expected in its first round of cap-and-trade which will start in 2012.
<b>Bangladesh</b>	Grants/Subsidies	Bangladesh's Mutual Trust Bank launched a new loan scheme for renewable energy projects. Customers can avail a loan of up to \$432,000 to set up PV systems for household and irrigation, PV assembly plants, bio-gas and effluent treatment plants.
<b>China</b>	Grants/Subsidies	China's economic planning agency announced that it will offer CNY 2.99 billion worth of subsidies to producers of renewable energy for their operations in the first half of 2009.
<b>United Kingdom</b>	Grants/Subsidies	The UK Government launched a nationwide scheme to upgrade household heating systems. Under the scheme up to 125,000 households with working 'G-rated' boilers can apply through the Energy Saving Trust for a voucher which will entitle them to a £400 subsidy for a new 'A-rated' boiler or a renewable heating system.
<b>United States</b>	Grants/Subsidies	A bill is being considered in the US Senate to extend the Treasury Program for renewable energy, which has been a key support for project development in 2009.
<b>United States</b>	Loan Guarantee	The US Department of Energy issued the final rule amending regulations for its Loan Guarantee program.
<b>European Union</b>	Energy Labeling	Changes to the EU Eco Labeling scheme were agreed to include all energy-related products including windows, building materials, taps, shower heads etc within a year ( <i>revision</i> )
<b>India</b>	Energy Labeling	India announced that it would roll out mandatory labels for refrigerators, transformers, air conditioners and tube lights in January, 2010. Other appliances will remain under the voluntary labeling scheme.
<b>Taiwan</b>	Energy Labeling	Taiwan's government will soon begin promoting a carbon footprint labeling scheme to help local businesses gear themselves towards making products greener and help mitigate climate change. The planned system will be first applied to products such as PET-bottled beverages and CDs on a trial basis.
<b>United Kingdom</b>	Energy Labeling	Hilary Benn, the UK Environment Secretary announced that new Food Labels are planned that will show how much carbon was produced in the manufacture and transportation of food. Tesco, Pepsi and other leading brands are already displaying a 'carbon reduction label' on certain products.
<b>United States – Massachusetts</b>	Rebates	Massachusetts announced a plan to institute two new solar rebate programs using a combination of ratepayer funds and stimulus money to create incentives. Commonwealth Solar II and Commonwealth Solar Stimulus began early in 2010.
<b>Australia</b>	Green Certificates	Australia's Government Department of Climate Change created a new system of Renewable Energy Credits for systems up to 1.5kW. Those small systems are mainly comprised of PV systems, along with wind and hydroelectric installations. In the new REC system the energy production is not measured but estimated. The certificates are paid for in advance at the time the system is purchased for a lifetime of 15 years.
<b>India</b>	Green Certificates	India's Central Electricity Regulatory Commission announced regulations on renewable energy certificates, setting a category of certificates for solar power projects. Under the regulation, renewable energy project developers will have the option to sell

## Appendix I: New Climate Policy Targets since October 2009

		the renewable energy at preferential tariffs by the state electricity regulators or sell the electricity generation and environmental attributes associated with RE generation separately.
<b>United Kingdom</b>	Green Certificates	In the Pre-Budget Report, the UK Chancellor announced that offshore wind projects will be eligible for 2 Renewable Obligation Certificates between 2010 and 2014 rather than a reduction over time.
<b>United Kingdom</b>	Green Certificates	The UK Department for Energy and Climate Change confirmed the extension of its Renewable Obligation scheme until 2037 ( <i>revision</i> )
<b>Indonesia</b>	Planning/Access Rules	Indonesia is to allow some infrastructure projects, deemed in the public interest such as geothermal energy plants, to operate in protected forests. Under Indonesian law it is forbidden to undertake any activity that could impact on a forest conservation area, but the government would issue a new rule to allow some development in forests.
<b>United Kingdom</b>	Planning/Access Rules	The UK Government announced that it is planning to remove planning requirements for micro-generation in households and businesses. If the consultation goes through then barriers could be lifted as early as spring 2010.
<b>Japan</b>	Public Finance	Japan's Government unveiled plans to inject JPY800 billion into environmental measures under a new stimulus package.
<b>Jordan</b>	Public Finance	Jordan's Government approved a Renewable Energy Law including provisions to allow private companies with renewable projects to negotiate directly with the Ministry of Energy as well as a new Renewable Energy and Energy Efficiency Fund. The Renewable Energy and Energy Efficiency Fund will be a general funding facility that will finance energy efficiency and renewable energy projects.
<b>Spain</b>	Public Finance	The Spanish Government approved a €5 billion sustainable development stimulus package that was first announced in May, 2009. The stimulus approved in October, 2009 will target sustainable development-related infrastructure projects sponsored by local authorities and follows a €11 billion package that was announced in November, 2008.
<b>South Korea</b>	Public Finance	South Korea's Government announced that it will invest \$85.6 million in green buildings over the next year across the country.
<b>Taiwan</b>	Public Finance	Taiwan's Government is to invest \$786 million in renewable energy and energy efficiency projects over the next 5 years to help cut GHG emissions.
<b>United Kingdom</b>	Public Finance	Gordon Brown launched a £100 billion program to build thousands of offshore wind turbines that could power most of Britain's households during strong winds and are crucial to meeting the country's renewable targets. The Crown Estate announce which consortia are successful in bidding to develop the nine zones in the project, which is the most ambitious of its kind in the world.
<b>United States</b>	Public Finance	The US Department of Energy awarded \$60 million under the federal stimulus package to support transmission planning for the country's 3 main interconnection networks.
<b>United States</b>	Public Finance	The US Department of Energy awarded \$155 million to 4 industrial energy efficiency projects.
<b>United States - Illinois</b>	Public Finance	A new state law expanded the Illinois Finance Authority's (IFA) bonding authority for clean energy and carbon capture and storage projects to cover energy efficiency projects. Under legislation passed in July, 2009 only funding for renewable energy and CCS projects could be authorized by the IFA but this was

## Appendix I: New Climate Policy Targets since October 2009

		extended to include energy efficiency.
<b>United States – Phoenix</b>	Public Finance	Phoenix's Mayor started the Solar Phoenix program, one of the largest city-sponsored residential solar financing programs in the US. The program is expected to allow up to 1000 Phoenix homes to adopt solar power by the end of 2010. The program is made up by a possible \$25 million in financing by the National Bank of Arizona and allows homes to install solar systems with no upfront investment and a small monthly payment that is lower than previous electricity bills.
<b>Ethiopia</b>	Integrated Plan	Ethiopia formally submitted its letter to the UNFCCC containing nationally appropriate mitigation actions including its planned renewable projects throughout the country.
<b>Georgia</b>	Integrated Plan	Georgia formally submitted its letter to the UNFCCC detailing the intention to establish nationally appropriate mitigation actions in the context of sustainable development, supported and enabled by technology and capacity-building; to achieve a measurable, reportable and verifiable deviation from the baseline (below BAU) supported and enabled by technology; to establish the baseline or reference case against which the action shall be measures; all mitigation actions will be voluntary and nationally appropriate actions; to develop a low carbon growth plan and low carbon strategy and to take effort to build a low-carbon economy that ensures continued growth and sustainable development.
<b>India</b>	Integrated Plan	In November, 2009 India announced a domestic mitigation measure including new and tougher efficiency standards for industries and incentives to encourage clean industrial practices. A new law would include energy usage norms for companies spanning 9 sectors including cement, steel and power. The bill will emphasize more on energy efficiency than reducing emissions. Industries will be required to meet standards and those who fail to do so can buy energy efficiency certificates from industries who have met the standard. If successfully implemented the law would save around 10,000 MW energy a year.
<b>Jordan</b>	Integrated Plan	Jordan formally submitted its letter to the UNFCCC containing nationally appropriate mitigation actions for the transport sector and detailing environmental projects such as renewable projects and fuel switching intentions.
<b>Macedonia</b>	Integrated Plan	Macedonia formally submitted its letter to the UNFCCC indicating association with the Accord. The country's goals are to harmonize with EU legislation; ensure stability of energy supply' increase the share of renewable energy; improve energy efficiency; and reduce the use of carbon intensive fuels.
<b>Madagascar</b>	Integrated Plan	Madagascar formally submitted its letter to the UNFCCC indicating association with the Accord and detailing nationally appropriate mitigation actions..
<b>Mongolia</b>	Integrated Plan	Mongolia formally submitted letter to the UNFCCC detailing nationally appropriate mitigation actions..
<b>Morocco</b>	Integrated Plan	Morocco formally submitted its letter to the UNFCCC including nationally appropriate mitigation actions, mainly focusing on renewable plans.
<b>Republic of Congo</b>	Integrated Plan	The Republic of Congo formally submitted its letter to the UNFCCC including nationally appropriate mitigation actions on, mainly focusing on renewable plans.
<b>Sierra Leone</b>	Integrated Plan	Sierra Leone formally submitted its letter to the UNFCCC detailing nationally appropriate mitigation actions. Country goals include the establishment of a National Secretariat for Climate Change; institutional strengthening and capacity building for environmental protection; increasing conservation efforts in the country;

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		improving governance to maintain forested areas; setting air, water and soil quality standards; developing alternative energy sources; and developing energy efficiency programs.
<b>South Africa</b>	Integrated Plan	South Africa's Department of Environmental Affairs announced that it intends to complete the country's national climate change policy white paper by 2010.
<b>United States – New York City</b>	Integrated Plan	New York's City Council passed 4 pieces of legislation aimed at boosting energy efficiency in buildings. The initiatives require large building owners to keep an annual benchmark analysis of energy and water consumption, to be made available to tenants and potential tenants for cross-comparisons with other properties; establish a separate New York City Energy Code and details energy efficiency enhancements whenever buildings undergo major renovations; require owners of properties larger than 50,000 square feet to conduct a comprehensive energy audit of a structure every 10 years; and directs owners of commercial buildings greater than 50,000 square feet to upgrade lighting to more energy efficient systems by 2025.
<b>United States - Massachusetts</b>	Integrated Plan	Massachusetts Department of Public Utilities approved a 3-year, \$1.7 billion energy efficiency plan to cut state energy consumption 2.4% by 2012.
<b>Chile</b>	Implementation Capacity	Chile established its first Ministry of Energy to be responsible for pushing forward the country's green power agenda.
<b>China</b>	Implementation Capacity	The Chinese Government set up a National Energy Commission at the highest level state agency to manage energy issues.
<b>Japan</b>	Implementation Capacity	Japan's Government launched a working group to study the expansion of its program for utilities to purchase electricity generated from clean and renewable energy.
<b>United Kingdom</b>	Implementation Capacity	The UK's Infrastructure Planning Commission was officially opened on October 1, 2009. The UK's Infrastructure Planning Commission was set up under the government's 2008 Planning Act to streamline the application process for infrastructure projects.
<b>Australia – Queensland</b>	Enforcement/Compliance	Motorists in Queensland, Australia, will be able to offset their carbon emissions through a new scheme. The State Environment Minister and the Transport Minister announced the Reverse the Effect program where motorists will receive a flyer with their car registration renewable notice giving them the option to pay a fee to offset their carbon emissions. The state Government allocated \$4.5 million over 5 years to match motorists' contributions dollar for dollar.
<b>China</b>	Enforcement/Compliance	The Chinese legislature adopted an amendment to the renewable energy law, requiring utilities to buy all renewable electricity produced by generators. Failure to do this will result in fines up to an amount double that of the economic loss to the renewable energy company.
<b>United States</b>	Enforcement/Compliance	President Obama announced that he is to spur the development of hybrid and electric cars by allowing the low-to-zero emissions produced by one such car to count for 2 vehicles when an automaker's fuel efficiency standards are calculated.
<b>United States</b>	Enforcement/Compliance	The Securities and Exchange Commission (SEC) approved an interpretative release requiring public companies to discuss several items related to climate change. According to the SEC, the following must be disclosed: (1) direct effects of existing and pending environmental regulation and international treaties on the company's business and operations; (2) indirect effects of such legislation and regulation on a company's business, such as changes in demand for products that create or reduce GHG emissions; and (3) the effect on a company's business and

# Appendix I: New Climate Policy Targets since October 2009

		operations related to the physical changes to our planet caused by climate change, such as rising seas, stronger storms, and increased drought.
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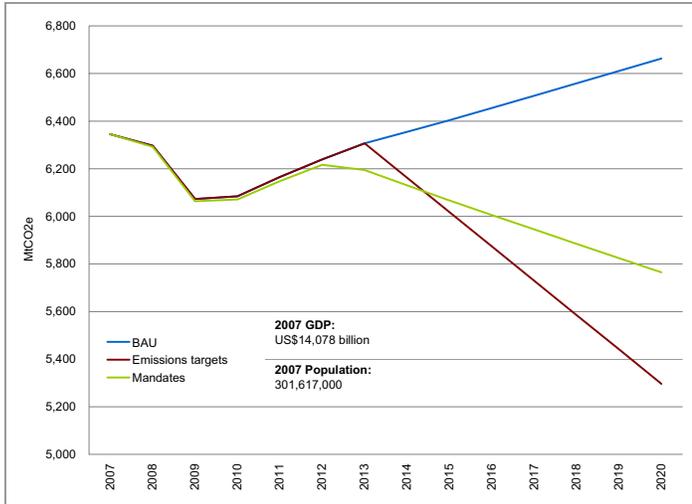
## Glossary of Supporting Policy Terms

Supporting Policy Mechanism Type	Definition
<b>Incentive</b>	Incentives, such as Feed-in Tariffs; Green Certificates; Tax Incentives; Rebates; Energy Labeling; Loan Guarantees; Grants/Subsidies; and Planning and Access Rules, can be financial or regulatory support mechanisms for Mandates. Cap-and-Trade schemes and Carbon taxes apply to Emission targets. They are a form of strategic assistance for installers of clean technology and climate change mitigation projects to offset the upfront cost of installing systems or eliminate barriers to uptake.
<b>Public Financing</b>	Government/state funding programs that provide budgetary support for incentive programs to spur renewable and clean tech industries/projects.
<b>Integrated Plan</b>	Detailed plans/programs that provide a framework to achieve a mandate or emissions target.
<b>Implementation Capacity</b>	Team or committee that has been assigned responsibility for implementing activities to achieve a mandate or emissions target.
<b>Enforcement/Compliance</b>	Mechanisms with penalties for non-compliance with a mandate or emission target.

# Appendix II: Regional Emissions Pathways

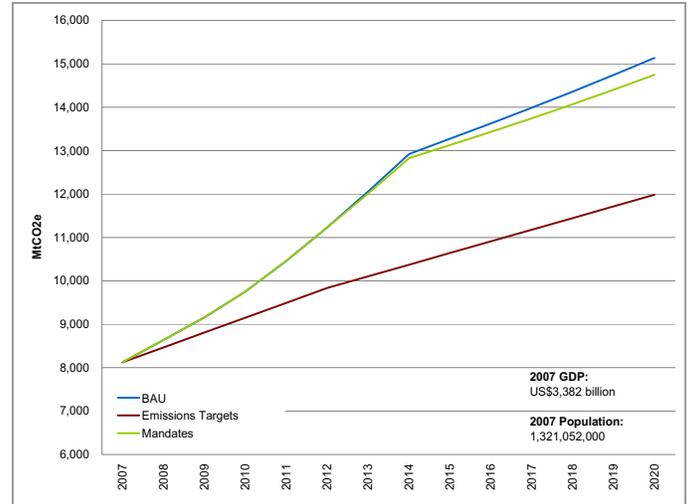
## Regional emissions pathways

### United States

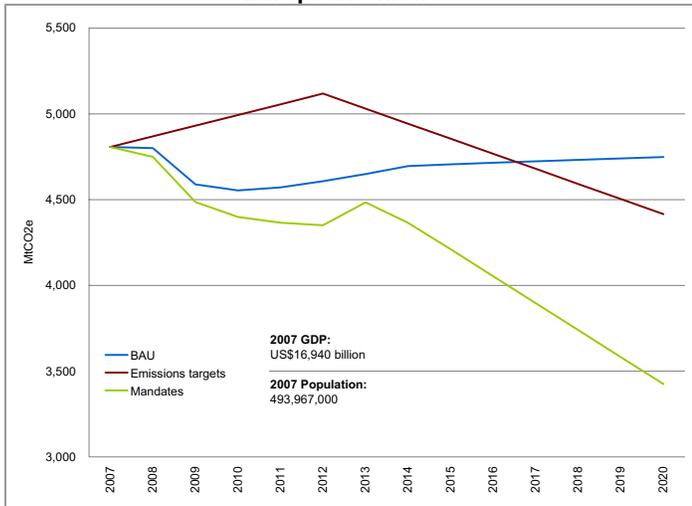


Note: Assumes the American Clean Energy and Security Act.

### China



### European Union



Note: In Europe, due to a 1990 starting base, many Eastern European countries generated excess carbon savings due to an economic recession and restructuring of the economy. This has been known as "hot air" and accounts for the worse outcome of emissions targets versus mandates, which subtract from BAU.

The recent economic recession has further relieved pressure on emissions targets. However, mandates reference off BAU in most cases, so they adjust down with BAU reductions.

Source: CCC, DBCCA analysis 2010.

## Appendix III: Energy Emissions Methodology

As the starting point for measuring the impact of the policies identified in this study, we have worked with researchers at the Columbia Climate Center Columbia University's Earth Institute to calculate a Business-as-Usual scenario based on projected growth in energy demand, beginning with 2007 data from the IEA (*Energy Balances* vol. 2009) and using the following key assumptions:

- Annual real GDP growth projections on a country-by-country basis for 2007-2014 (IMF World Economic Outlook, October 2009). Growth rates for 2015-2020 are not projected by the IMF, so for these years we use the average regional growth rates assumed by the IEA in its World Energy Outlook 2008. These growth rates are somewhat lower (2.7% worldwide) than those assumed by the IMF for the decade leading up to 2014 (3.4%).
- A global 1.5% annual decrease in energy intensity (measured as energy/RealGDP), which is equivalent to a 1.52% annual increase in energy productivity (RealGDP/energy). This reflects the autonomous efficiency improvement assumption that is common in many energy-forecasting models (Lackner and Sachs, 2006). We have modeled this assumption slightly differently than McKinsey & Co in its greenhouse gas mitigation cost curve, as they assume a 1.2% annual improvement in carbon productivity, or RealGDP/carbon (McKinsey & Co Version 2.0 GHG Mitigation Cost Curve, 2009 p. 24). Given that we are modeling energy demand, it seems more accurate to assume an improvement in energy – rather than carbon – productivity.

To illustrate this calculation, energy (measured as total primary energy supply) in France in 2020 is calculated as:

$$(\text{Energy}_{\text{France},2007}) \cdot (1-0.015)^{14} \cdot (1 + \text{GDPgrowth}_{\text{France},2008}) \dots \cdot (1 + \text{GDPgrowth}_{\text{France},2020})$$

Next, we estimate the corresponding CO<sub>2</sub> emissions using:

- The country-specific fuel mix from 2007 (the most recent year available in the IEA Energy Balances), assuming constant proportions in future years; and
- Carbon emissions factors in terms of MtCO<sub>2</sub>/Mtoe for OECD and non-OECD countries in 2006 from the IEA (WEO 2008, pp. 508-509, 522-523). For OECD countries, these are: 3.86 coal, 2.53 crude oil, 2.32 gas. For non-OECD countries, these are: 3.80 coal, 2.57 crude oil, and 2.20 gas. The IEA Energy Balance data presents total primary energy supply estimates for petroleum products separate from estimates for crude oil. We assume that all petroleum products are produced from crude oil and thus share the same carbon emissions factor. We assume that biomass has a net zero impact on carbon emissions, which is an acknowledged oversimplification of a complicated issue.

It is important to note that we considered using the reference case for CO<sub>2</sub> emissions from the IEA's *World Energy Outlook 2008* as the "Business-as-Usual scenario" against which to measure the impact of potential emissions reductions. The IEA reference scenario includes the impacts of oil prices and a variety of other factors on emissions, providing a high level of complexity and robustness that we cannot replicate. However, it also includes the "effects of those government policies and measures that were enacted or adopted by mid-2008" (IEA WEO 2008, p. 59). Thus using it as a baseline for assessing the impacts of the policies in this study would result in a misestimate of the impact potential emission reductions.

This analysis is also different from the IEA's biannual *Energy Technology Perspectives* report, which analyzes the energy and emissions impact of many different future technology scenarios. For example, they estimate the emissions profile of a future where carbon capture and storage technology is widely deployed and nuclear energy is more prevalent than today. In contrast, our Business-as-Usual scenario is exactly that – Business-as-Usual. The relative energy mix in each country is exactly the same as it was in our base year of 2007.

# Appendix III: Energy Emissions Methodology

## CO<sub>2</sub>e emissions

We have estimated projected emissions from non-CO<sub>2</sub> Kyoto greenhouse gases – CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub> – by using data assembled by the U.S. EPA (Global Anthropogenic non-CO<sub>2</sub> GHG Emissions, 1990-2020). This dataset, used by both McKinsey & Co and World Resources Institute (WRI), includes actual emissions for 1990, 1995, 2000, 2005 and projected emissions for 2010, 2015, 2020. We have assumed that intervening years are a simple linear interpolation of the surrounding years. We note two potential concerns with this dataset:

1. The EPA projections incorporate regional GDP growth rates estimated by the Energy Information Agency in 2001. These rates are obviously different from the October 2009 IMF country-specific growth rates we use to estimate CO<sub>2</sub> emissions from energy. We do not have enough information about the EPA model to re-parameterize their estimates based on more recent GDP growth projections.
2. The EPA data use the Global Warming Potential (GWP) conversion factors from the earlier IPCC reports. We have updated the CH<sub>4</sub> and N<sub>2</sub>O projections of CO<sub>2</sub>e emissions using the GWPs from the IPCC AR4. The EPA does not report disaggregated data for the other Kyoto gases, so these are still projected using the older GWPs.

Greenhouse gases regulated by the Montreal Protocol are included in the estimate provided by the Greenhouse Gas Counter we launched on June 18, 2009 near Penn Station in New York City. It is reasonable to include these gases in the stock of climate-forcing gases currently in the atmosphere - which is what the counter monitors - but since they are generally no longer emitted, we have not included them in our estimate of BAU greenhouse gas emissions. In addition, none of the other common inventories or projections (McKinsey & Co, WRI, etc.) include the Montreal gases in their CO<sub>2</sub>e emissions datasets.

## Land-use change and forestry emissions

The IPCC AR4 summarizes the range of estimates for Land Use, Land Use Change, and Forestry (LULUCF) (WG3, ch.9, table 9.2) and concludes that: “The picture emerging from Table 9.2 is complex because available estimates differ in the land-use types included and in the use of gross fluxes versus net carbon balance, among other variables. This makes it impossible to set a widely accepted baseline for the forestry sector globally. Thus, we had to rely on the baselines used in each regional study separately (Section 9.4.3.1), or used in each global study (Section 9.4.3.3). However, this approach creates large uncertainty in assessing the overall mitigation potential in the forest sector. Baseline CO<sub>2</sub> emissions from land-use change and forestry in 2030 are the same as or slightly lower than in 2000 (see Chapter 3, Figure 3.10).” This suggests that there is no definitive study and that existing studies have different methodologies and wildly different estimates. The range is 3 to 9 GtCO<sub>2</sub> per year worldwide between 1990-2005.

We have used data from Houghton, 2003, (whose estimates are included the IPCC table 9.2) and have assumed that the amount of deforestation in 2000 continues at the same level through 2020. The Houghton data are readily available, internally consistent (as opposed to using the IPCC range of estimates from various sources), and are used by McKinsey & Co and the World Resources Institute’s Climate Analysis and Information Tool.

Houghton’s 2003 dataset is available via the WRI website and represents emissions through 2000, allocated to individual countries. In the data documentation (<http://cait.wri.org/downloads/DN-LUCF.pdf>), Houghton states that “The errors associated with the regional estimates of carbon flux are substantial. The errors for individual countries are even larger because of the methods used to distribute the regional totals.” This is a strong warning about spurious precision in interpreting LULUCF estimates. Global emissions in 2000 are estimated at 7.6 GtCO<sub>2</sub>. Houghton has a more recent dataset (2008) with somewhat lower estimates, but these data are not available by country and are thus less useful for this project.

## Appendix III: Energy Emissions Methodology

Finally, current peat emissions from peat bogs rather than from peat combustion – which is included in the IEA’s coal category – are estimated by Hoojier et al 2006 (and included by McKinsey & Co, assuming constant future emissions). We have not investigated peat datasets, since there are no policies aimed at peat emissions in the tracker. Given the overall level of uncertainty with regard to terrestrial emissions (and the relatively small contribution from peat, estimated at 2.0 GtCO<sub>2</sub> per year, relative to 3-9 GtCO<sub>2</sub> range of land-use and forestry emissions in the IPCC AR4), we have excluded peat emissions.

### Cement process emissions

Cement emissions must be incorporated in a BAU scenario. The IEA dataset includes the energy emissions associated with the production of cement, but does not include the emissions produced by the cement calcination process.

Oak Ridge National Lab’s Carbon Dioxide Information Analysis Center (CDIAC) provides estimates of emissions from the cement calcination process for every country through 2006 (Marland, G., T.A. Boden, and R.J. Andres, 2008). This dataset is included in the World Resources Institute’s Climate Analysis and Information Tool dataset. In McKinsey & Co’s work, the CDIAC data was used to build proprietary cement estimates assembled from a number of additional sources, including the World Business Council on Sustainable Development (WBCSD)’s Cement Sustainability Initiative, the IPCC, the IEA, and the European Cement Research Academy. The CDIAC dataset’s advantage is that it is transparent and easy to disaggregate by country and year.

Using the CDIAC data, we assume that cement process emissions grow at the level of GDP growth in countries that remained below \$15,000 in GDP-PPP in the IMF’s forecast time period (2007-2014). In countries where GDP-PPP is projected to be above \$15,000 through 2015, we assume a constant level of process emissions. Finally, in those countries that are projected to hover around \$15,000 for most of the years between 2007-2014, we assume that process emissions grow at half the rate of GDP growth. These assumptions are obviously very simple, especially since they do not allow countries to move between the three groupings. In addition, we are also ignoring GDP-PPP growth after 2014. We think, however, that these assumptions allow us to estimate the approximate trend of cement process emissions (WWF-LaFarge Partnership, *Blueprint for a Climate-friendly Cement Industry*, 2008).

### BAU sensitivity analysis

Our BAU projects 59.0 GtCO<sub>2e</sub> emissions in 2020, with the majority of emissions from energy use. In comparison, McKinsey & Co projects Business-as-Usual emissions of 61.2 Gt in 2020. We believe that the difference is probably due to slightly different assumptions regarding cement process emissions and other greenhouse gases. For energy emissions, McKinsey & Co’s scenario incorporates the IEA WEO 2007, which projects emissions of 36.4 Gt in 2020, compared to our estimate of 37 Gt.

### BAU estimates (GtCO<sub>2e</sub>)

	2007	2010	2015	2020
CO <sub>2</sub> Energy	28.3	29.2	34.4	37.0
Other GHG	9.6	10.0	10.9	11.8
LULUCF CO <sub>2</sub>	7.6	7.6	7.6	7.6
Cement process CO <sub>2</sub>	1.4	1.6	2.2	2.6
<b>Total BAU estimate</b>	<b>46.9</b>	<b>47.6</b>	<b>55.1</b>	<b>59.0</b>

Source: CCC analysis, 2009.

Our projection of global energy emissions is approximately a half Gt higher than that of the IEA WEO 2008 and approximately 2.5 Gt greater than the most recent WEO (which is available in limited form at the time of drafting this report).

## Appendix III: Energy Emissions Methodology

We believe this difference has at least two explanations. First, we have used the IEA WEO 2008 growth rates, as the WEO 2009 growth rates are not yet public. As a result, we may be assuming higher growth for 2015-2020. Second, the IEA reference scenario includes the impact of announced (but not necessarily fully implemented) energy policies. Their estimate of the impact of these policies would naturally lower the reference scenario. In addition, the IEA also incorporates projections of energy prices and fuel-switching, as well as other behavioral complexities. These projections are rich in detail but somewhat opaque; the direction of their impact is therefore unclear.

Our global energy projections are comparable to the U.S. Energy Information Agency's high growth scenario (*International Energy Outlook*, 2009). On a country level, our estimates are close to those of the IEA and the EIA for the United States, the European Union, Russia, Japan, and India, but they are somewhat higher than the IEA and EIA projections for China.

### BAU energy emissions (GtCO<sub>2</sub>e) sensitivity analysis

	1990	2006	2007	2015	2020
<b>World</b>					
Earth Institute (1990 from WRI)	20.5		28.3	34.4	37.0
EIA reference case 2009	21.5	29.0		33.1	35.4
EIA high growth 2009	21.5	29.0		33.9	37.0
IEA WEO 2008	20.9	27.9		34.0	36.4
IEA WEO 2009 (limited pre-release)	20.9		28.8		34.5
<b>United States</b>					
Earth Institute (1990 from WRI)	4.9		5.7	5.6	5.8
EIA reference case 2009	5.0	5.9		5.9	6.0
EIA high growth 2009	5.0	5.9		6.1	6.2
IEA WEO 2008	4.8	5.7		5.8	5.8
IEA WEO 2009 (limited pre-release)	4.8		5.7		5.5
<b>Japan</b>					
Earth Institute (1990 from WRI)	1.1		1.2	1.1	1.1
EIA reference case 2009	1.1	1.2		1.2	1.2
EIA high growth 2009	1.1	1.2		1.2	1.3
IEA WEO 2008	1.1	1.2		1.2	1.2
IEA WEO 2009 (limited pre-release)	1.1		1.2		1.0
<b>European Union</b>					
Earth Institute (1990 from WRI)	4.1		3.8	3.7	3.7
IEA WEO 2008	4.0	3.9		4.0	3.9
IEA WEO 2009 (limited pre-release)	4.0		3.9		3.6
<b>Russia</b>					
Earth Institute (1990 from WRI)	2.2		1.5	1.6	1.7
EIA reference case 2009	2.4	1.7		1.9	1.9
EIA high growth 2009	2.4	1.7		1.9	2.0
IEA WEO 2008	2.2	1.6		1.9	1.9
IEA WEO 2009 (limited pre-release)	2.2		1.6		1.7
<b>China</b>					
Earth Institute (1990 from WRI)	2.2		5.9	10.2	11.7
EIA reference case 2009	2.3	6.0		8.2	9.4
EIA high growth 2009	2.3	6.0		8.4	9.9
IEA WEO 2008	2.2	5.6		8.8	10.0
IEA WEO 2009 (limited pre-release)	2.2		6.1		9.6
<b>India</b>					
Earth Institute (1990 from WRI)	0.6		1.4	2.0	2.3
EIA reference case 2009	0.6	1.3		1.6	1.8
EIA high growth 2009	0.6	1.3		1.6	1.9
IEA WEO 2008	0.6	1.3		1.8	2.2
IEA WEO 2009 (limited pre-release)	0.6		1.3		2.2

Sources: IEA World Energy Outlook 2008; IEA World Energy Outlook 2009 data from *How the Energy Sector Can Deliver on a Climate Agreement in Copenhagen* (IEA, October 2009); EIA International Energy Outlook 2009; World Resources Institute, *Climate Analysis Indicator Tool*, online at [www.wri.org](http://www.wri.org). CCC analysis, 2009.

# Appendix III: Energy Emissions Methodology

## 450 ppm CO<sub>2</sub>e stabilization scenario

For reference, we show a CO<sub>2</sub>e emissions stabilization pathway to reach 450 ppm of CO<sub>2</sub>e. This pathway is from the *OECD Environmental Outlook to 2030* (2008, p. 140) and was generated using the Netherlands Environmental Assessment Agency's FAIR model. The values for 2005, 2010, 2015 and 2020 are 46.7, 48.1, 49.1, and 45.6 Gt CO<sub>2</sub>e, respectively. These values fall within the range of stabilization scenarios developed in recent years as reported in the IPCC AR-4 WG-3 report.

## Estimates of target impact

There are two general categories of targets. Emissions policies represent a fixed reduction in emissions from a baseline, expressed either as emission reduction goal (such as the Kyoto reductions, or Brazil's target to reduce emissions from deforestation), a tax, or a cap-and-trade system. Mandates refer to policies that specify how emissions will be reduced – for example, by increasing the percentage of renewables in a country's electricity supply.

We have estimated the impacts of policies for two target years: 2012 and 2020. To model the impact of emissions policies, we have calculated the difference between the baseline year (such as 1990 for most of the Kyoto targets) and the target year (such as 2012 for the Kyoto targets). For baselines not in our dataset (e.g., a 10% reduction from 2000), we used World Resources Institute data (as our dataset closely follows their methodology). In many cases, targets are specified for a period beyond 2020, such as a 60-80 percent reduction by 2050. For these targets, we estimated the reduction by 2020 following the "20% by 2020" convention in most cases.

To represent the emissions pathways graphically we assumed that the abatement corresponding to the targets was applied linearly between 2007 and 2012 or between 2012 and 2020. We also took into account the nature of the target. Progress is thus portrayed for emission targets as a straight line for 2007-2012 or 2012-2020 for 2012 and 2020 targets respectively. The abatement corresponding to mandate targets was applied evenly to the Business-as-Usual (BAU) emissions throughout the time period corresponding to the target year.

There are many different types of renewable mandates, so modeling these targets requires various assumptions for each target. For RPS-fuel targets, we calculated the impact of additional biomass fuel above the existing level of biomass consumed by a country's road sector. We assumed that biofuel displaced a country's use of petroleum. For RPS-energy targets, we calculated the impact of additional renewables from the baseline level of renewables in the country's total primary energy supply. For RPS-electricity targets, we calculated the impact of additional renewable from the baseline level of renewables in the country's electricity consumption data. For energy and electricity targets, we assumed displacement of coal whenever possible. In countries with relatively low levels of coal, we assumed displacement of the predominant fossil fuel. In countries with moderate coal use and aggressive RPS targets, we assumed displacement of both coal and gas. These displacement assumptions are summarized below.

## Displacement assumptions by country

Fuel displaced	
<b>Coal</b>	Algeria, Australia, Belgium, Bulgaria, China, Canada, Czech Republic, Denmark, Estonia, EU-wide targets, Finland, Germany, Greece, Hungary, Ireland, Japan, Malaysia, Mexico, Morocco, New Zealand, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, South Africa, South Korea, Sweden, Taiwan, Turkey, United States.
<b>Coal/gas</b>	Austria, Brazil, France, the Philippines, United Kingdom.
<b>Gas</b>	Algeria, Argentina, Bangladesh, Italy, Latvia, Libya, Lithuania, Luxembourg, Netherlands, Nigeria, Switzerland.
<b>Petroleum</b>	Cyprus, Egypt, Jamaica, Jordan, Malta, Senegal.

Source: CCC analysis, 2009

# Disclaimer

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