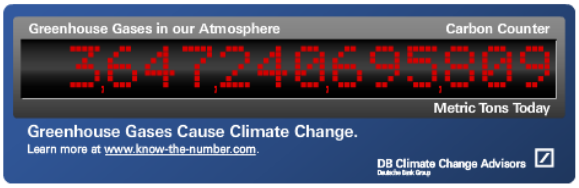
Global Climate Change Policy Tracker: An Investor's Assessment

Detailed Summary of Targets by Region and Country

October 2009

Green paper available online: http://www.dbcca.com/research



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

DB Climate Change Advisors
Deutsche Bank Group

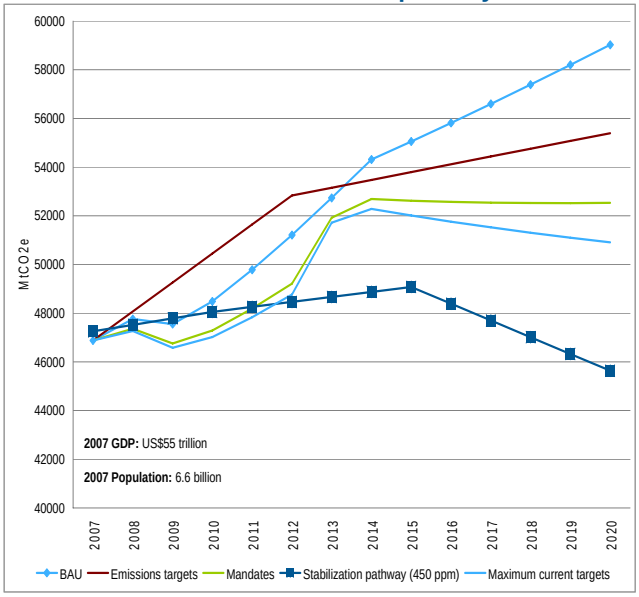
Summary of findings

EX 1: Overall risk assessment and capital flows

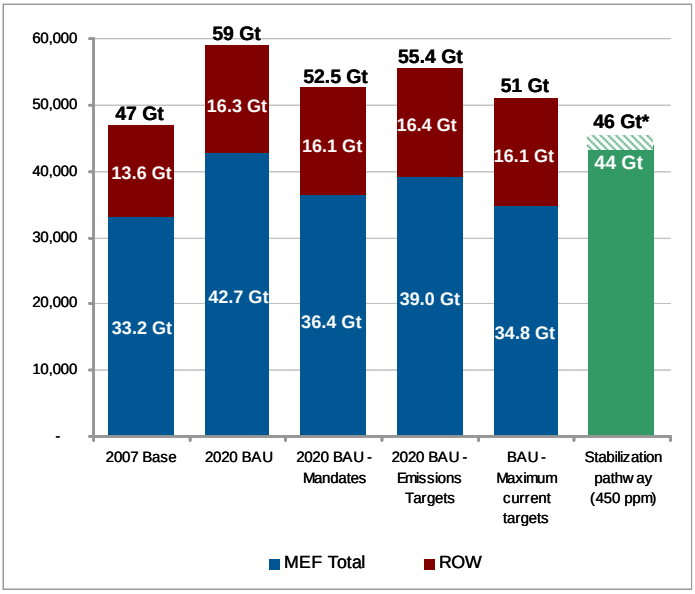
MEF Country	Overall Risk Assessment (1 = lower risk, 2 = moderate risk, 3 = higher risk)	Cap Inv 2000 - 2008 ($ m)	GDP 2008 (2008 $ bn)
Australia	1	5,427	800
Brazil	1	14,445	1,993
China	1	41,196	7,973
France	1	6,645	2,128
Germany	1	36,611	2,918
Japan	1	888	4,329
Canada	2	8,101	1,300
India	2	7,446	3,297
Indonesia	2	308	915
Mexico	2	135	1,563
Russia	2	113	2,266
South Africa	2	211	491
South Korea	2	1,916	1,335
United Kingdom	2	17,119	2,226
United States	2	52,120	14,260
Italy	3	6,421	1,823

Source: DBCCA analysis, 2009. Capital investment from New Energy Finance Industry Intelligence Database, 2009. 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, 2009.

EX 2: World emissions pathways



EX 3: The 2020 estimated outcome[1]



Source: CCC, DBCCA analysis 2009.

[1] *See Executive Summary, pages 23-24 for detailed analysis of MEF and ROW countries.*

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

Detailed Analytical Results by Country

EX 4: Detailed results by MEF countries

Note: *Mandates and emissions targets cannot be combined as mandates would be supporting emissions targets. We take the largest of either when calculating the world maximum potential.*

MEF Country[1]	Base (Mt CO_2e)	No policy BAU Emissions (Mt CO_2e)		Impact of Mandated Targets (Mt CO_2e)		Impact of Emissions Targets (Mt CO_2e)		Investor Risk Assess-ment	GDP	Capital flows to clean energy	
	2007	2012	2020	2012	2020	2012	2020		2008 ($ bn)	2008 ($ m)	2000-08 ($ m)
Australia	520	550	570	0	-50	30[3]	-90	1	800	518	5,427
Brazil	2,350	2,430	2,560	-220	-440	0	0	1	1,993	7,602	14,445
Canada	770	780	840	-10	-160	-170	-210	2	1,300	1,373	8,101
China	8,130	11,230	15,140	-1,390	-2,290	0	0	1	7,973	16,727	41,196
France[2]	500	490	510	-40	-50	40[3]	0	1	2,128	1,794	6,645
Germany[2]	930	860	880	0	-160	80[3]	-160	1	2,918	4,606	36,611
India	1,970	2,440	3,140	0	-50	0	0	2	3,297	1,614	7,446
Indonesia	3,160	3,240	3,380	0	0	0	-880	2	915	16	308
Italy[2]	520	480	490	0	-50	-10	0	3	1,823	3,231	6,421
Japan	1,350	1,270	1,280	-10	-180	-160	-200	1	4,329	253	888
Korea	630	680	720	-30	-70	-680	-160	2	1,335	574	1,916
Mexico	740	770	890	-10	-10	-120	-320	2	1,563	-	135
Russia	1,970	1,950	2,160	0	-490	1,040[3]	0	2	2,266	13	113
South Africa	510	530	600	0	-10	0	0	2	491	169	211
UK[2]	610	590	600	-20	-100	40[3]	-120	2	2,226	3,937	17,119
United States	6,350	6,240	6,660	-20	-1,170	0	-1,360	2	14,260	15,241	52,120
Other EU[2]	2,240	2,190	2,280	-200	-1,020	360[3]	-170	N/A	5,815	28,113	48,943
Total	**33,240**	**36,720**	**42,700**	**-1,950**	**-6,290**	**460**[3]	**-3,670**	**N/A**	**55,432**	**85,781**	**248,045**

Notes: All figures rounded to nearest ten. [1] Includes the European Union as a region, [2] Abatement estimates for individual countries do not include EU-wide abatements. Therefore, there will be additional emission reductions for these countries associated with EU-27 mandates and targets above the assessments given here. The abatement estimated for the EU-27 as a region does include EU-wide and individual country policies. [3] "Hot Air" is included in the emission target.

Source: CCC, DBCCA analysis, 2009. GDP data sourced from CIA World Factbook, 2009. Capital investment from New Energy Finance Industry Intelligence Database, 2009. Data only includes disclosed data, and may not fully encompass all deals. The figures listed should be viewed as "baseline" figures, as there may have been transactions that NEF has not captured in their database. 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.

Summary of Findings

EX 4a: Detailed results by other EU country

Note: *Mandates and emissions targets cannot be combined as mandates would be supporting emissions targets. We take the largest of either when calculating the world maximum potential.*

Other EU Country[1]	Base (Mt CO_2e)	No policy BAU Emissions (Mt CO_2e)		Impact of Mandated Targets (Mt CO_2e)		Impact of Emissions Targets (Mt CO_2e)		Investor Risk Assess-ment	GDP	Capital flows to clean energy	
	2007	2012	2020	2012	2020	2012	2020		2008 ($ bn)	2008 ($ m)	2000-08 ($ m)
Austria	80	76	77	-4	-6	-10	0	2	330	2	312
Belgium	134	128	130	-1	-31	-2	0	2	389	599	1,742
Bulgaria	68	68	79	0	-3	42[2]	0	2	94	860	1,095
Cyprus	7	7	8	0	-1	0	0	2	23	-	-
Czech Republic	144	141	147	-4	-9	29[2]	0	2	265	12	65
Denmark	61	58	60	-1	-10	-4	0	1	204	2,308	3,613
Estonia	23	19	20	0	-1	22[2]	0	2	27	89	361
Finland	73	68	70	-1	-10	1[2]	0	2	194	175	798
Greece	118	114	116	-7	-10	12[2]	0	3	343	73	1,240
Hungary	80	77	80	0	-8	35[2]	0	2	197	17	463
Ireland	61	54	54	0	-8	5[2]	0	2	188	232	2,398
Latvia	14	13	14	0	-1	14[2]	0	1	39	-	1
Lithuania	23	20	22	0	-1	26[2]	0	1	63	92	156
Luxembourg	11	10	10	0	-2	-2	0	2	39	-	-
Malta	2	2	2	0	0	0	0	3	10	-	-
Netherlands	232	218	221	0	-29	-15	0	2	672	587	1,391
Poland	377	406	430	0	-25	114[2]	0	2	668	1,018	1,299
Portugal	66	61	63	0	-8	9[2]	0	2	237	4,553	8,081
Romania	126	132	153	0	-9	122[2]	0	Not assessed	271	-	25
Slovakia	51	54	57	0	-5	15[2]	0	3	120	-	-
Slovenia	20	20	22	0	-2	-1	0	2	59	14	14
Spain	408	381	388	-25	-48	-65	0	2	1,403	18,402	43,258
Sweden	62	59	61	0	-11	14[2]	-19	1	344	604	1,113

Notes: [1] Abatement estimates for individual countries do not include EU-wide abatements. Therefore, there will be additional emission reductions for these countries associated with EU-27 mandates and targets above the assessments given here. The abatement estimated for the EU-27 as a region does include EU-wide and individual country policies. [2] "Hot Air" is included in the emission target.

Source: CCC, DBCCA analysis, 2009. GDP data sourced from CIA World Factbook, 2009. Capital investment from New Energy Finance Industry Intelligence Database, 2009. Data only includes disclosed data, and may not fully encompass all deals. The figures listed should be viewed as "baseline" figures, as there may have been transactions that NEF has not captured in their database. 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.

Summary of Findings

EX 5: Detailed results by ROW countries

Note: *Mandates and emissions targets cannot be combined as mandates would be supporting emissions targets. We take the largest of either when calculating the world maximum potential.*

Legend: N/a = Not available; N/A = Not Applicable

ROW Country	Base (Mt CO_2e)	No policy BAU Emissions (Mt CO_2e)		Impact of Mandated Targets (Mt CO_2e)		Impact of Emissions Targets (Mt CO_2e)		Investor Risk Assess-ment	GDP	Capital flows to clean energy	
	2007	2012	2020	2012	2020	2012	2020		2008 ($ bn)	2008 ($ m)	2000-08 ($ m)
Abu Dhabi	N/a	N/a	N/a	N/a	N/a	N/a	N/a	1	184	50	50
Algeria	140	150	180	0	-1	0	0	2	233	-	95
Argentina	380	410	480	0	-4	0	0	2	574	-	31
Bangladesh	130	150	190	0	-1	0	0	2	224	-	-
Belarus	90	100	110	0	0	30*	0	N/A	114	-	-
Cape Verde	N/a	N/a	N/a	N/a	N/a	N/a	N/a	2	2	-	-
Costa Rica	20	20	20	0	0	0	-20	2	48	110	210
Croatia	30	30	30	0	0	0	0		82	28	129
Egypt	230	270	330	0	-4	0	0	1	444	-	91
Iceland	0	0	0	0	0	0	-1		13	-	483
Jamaica	10	10	10	0	-1	0	0	2	21	-	26
Jordan	20	30	30	0	0	0	-2	1	32	-	-
Libya	50	50	70	0	-2	0	0	3	89	-	-
Madagascar	N/a	N/a	N/a	N/a	N/a	N/a	N/a	3	20	-	-
Malaysia	880	890	950	-5	-6	0	0	1	384	-	53
Mali	N/a	N/a	N/a	N/a	N/a	N/a	N/a	3	15	-	-
Morocco	50	50	60	-4	-4	0	0	2	137	-	303
New Zealand	70	70	80	0	0	-20	0	1	117	17	532
Nicaragua	60	60	60	0	0	0	0	2	17	-	153
Nigeria	430	470	540	0	-1	0	0	2	335	-	-
Norway	50	50	50	0	0	-2	-20	N/A	275	1,584	3,375
Pakistan	280	300	360	0	0	0	0	3	427	122	150
Paraguay	20	20	30	-1	-2	0	0	2	29	-	-
Philippines	220	230	260	-20	-30	0	0	2	318	160	2,501
Rwanda	N/a	N/a	N/a	N/a	N/a	N/a	N/a	2	10	100	103
Senegal	20	30	30	0	0	0	0	2	22	-	-
Switzerland	40	40	40	0	-2	10*	1*	2	317	140	1,500
Taiwan	310	310	390	-20	-100	0	-80	1	712	244	1,316
Tunisia	30	30	40	-4	-5	0	0	2	82	-	-
Turkey	450	460	510	0	-30	0	0	2	903	349	549
Ukraine	490	470	530	0	0	470*	0	N/A	340	13	13
Uganda	N/a	N/a	N/a	N/a	N/a	N/a	N/a	2	39	35	35
Other Countries	9,140	9,770	10,970	0	0	0	0	N/A	N/A	N/A	N/A
Total ROW	**13,640**	**14,490**	**16,330**	**-50**	**-190**	**490***	**-120**	**N/A**	**6,559**	**2,952**	**11,698**

Notes: All figures rounded to nearest ten. * "Hot Air" is included in the emission target.

Source: CCC, DBCCA analysis, 2009. GDP data sourced from CIA World Factbook, 2009. Capital investment from New Energy Finance Industry Intelligence Database, 2009. Data only includes disclosed data, and may not fully encompass all deals. The figures listed should be viewed as "baseline" figures, as there may have been transactions that NEF has not captured in their database. 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.

Summary of Findings

EX 6: Investor risk assessment by US state

US State	Final Rating (1 = Lower risk, 2 = Moderate risk, 3 = Higher risk)
Colorado	1
Florida	1
Hawaii	1
Illinois	1
Maine	1
Michigan	1
Minnesota	1
Nevada	1
New Hampshire	1
New Jersey	1
New Mexico	1
Oregon	1
Texas	1
Washington	1
Arizona	2
California	2
Delaware	2
Indiana	2
Kentucky	2
Maryland	2
Massachusetts	2
Missouri	2
Montana	2
New York	2
North Carolina	2
North Dakota	2
Ohio	2
Pennsylvania	2
Rhode Island	2
Vermont	2
Virginia	2
Wisconsin	2
Connecticut	3
South Dakota	3
Utah	3

Source: DBCCA analysis, 2009.

Summary of Findings

EX 7: Investor risk assessment by Canadian province

Canadian Province	Final Rating (Red = Higher risk, Yellow = Moderate risk, Green = Lower risk)
Alberta	1
British Columbia	1
Ontario	1
Quebec	1
Manitoba	2
Nova Scotia	2

Source: DBCCA analysis, 2009.

EX 8: Investor risk assessment by Australian state

Australia State	Final Rating (Red = Higher risk, Yellow = Moderate risk, Green = Lower risk)
New South Wales	1
South Australia	2

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Africa: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name / Description	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 1	Algeria	6% of electricity from renewables by 2015.	M	N/A	1	**2**	2	1	2	1	3	2	1	2
Target 2	Algeria	Export 6,000 MW of solar to Europe by 2020	M	N/A	15	**2**	2	2	3	2	3	2	1	2
Target 3	Cape Verde	Greening Cape Verde: 25% renewables in national energy production by 2010 and 50% by 2020; achieve 100% renewable electricity on one island over the same period	M	N/M	N/M	**2**	3	2	3	1	2	2	1	1
Target 4	Egypt	20% of electricity from renewable sources by 2020 (including 12% wind)	M	N/A	5	**1**	1	1	3	1	1	1	1	1
Target 5	Libya	10% of electric demand to come from renewable sources by 2020	M	N/A	1	**3**	3	2	3	3	3	2	3	3
Target 6	Madag ascar	75% of electric power to come from renewables by 2020	M	N/M	N/M	**3**	3	3	3	3	3	3	2	3
Target 7	Mali	15% contribution of renewable sources to the national energy assessment by 2020	M	N/M	N/M	**3**	3	2	3	3	3	3	2	3
Target 8	Moro-cco	National Program for Development of Renewable Energies and Energy Efficiency on the Horizon 2012: 10% of energy consumption and 20% of renewables in the electricity mix by 2012	M	5	5	**2**	3	1	3	3	1	2	1	2
Target 9	Nig-eria	Renewable Electricity Action Program: 5% of electricity from renewables by 2016 (excluding large hydro)	M	N/A	1	**2**	3	2	3	1	2	2	1	3
Target 10	Rwan-da	90% of electricity from renewable sources by 2012	M	N/M	N/M	**2**	3	3	3	2	3	2	1	2
Target 11	Sene-gal	National Strategy for Renewables: 15% share of renewable energy in the energy balance by 2025	M	N/I	N/I	**2**	2	1	3	2	1	2	1	2
Target 12	South Africa	Halt emissions growth by 2020-2025; stabilize for up to 10 years; then decline in absolute terms.	E	N/A	N/A									
Target 13	South Africa	10 TWh, equivalent to 4% electricity supply, from renewables by 2013	M	1	10	**1**	1	1	3	1	1	1	1	3
Target 14	Tuni-sia	10% of national energy demand from renewables by 2011 and 20% reduction of total demand by 2011.	M	5	5	**2**	1	1	3	2	1	2	1	2
Target 15	Ugan-da	National Energy Policy: 61% of energy consumption from renewable sources by 2017	M	N/M	N/M	**2**	2	1	3	1	2	1	1	3

Asia: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 16	Abu Dhabi	7% of power should come from renewable sources by 2020	M	N/M	N/M	**1**	1	1	2	2	1	1	1	1
Target 17	Bangla-desh	10% of electricity from renewable sources by 2020	M	N/A	1	**2**	1	1	3	2	3	1	1	2
Target 18	China	11th 5-year plan: 20% reduction in energy intensity from 2005 levels (measure of GDP) between 2006 and 2010	M	1395	1905	**1**	1	1	1	1	1	1	1	1
Target 19	China	National Development and Reform Commission Plan (2007): 10% of primary energy from renewable sources by 2010 and 15% by 2020	M	N/I	250	**1**	1	2	1	1	1	1	1	1
Target 20	China	National Development and Reform Commission Plan (2007): 30 GW of wind generating capacity by 2020	M	N/A	85	**1**	1	1	1	1	1	1	1	1
Target 21	China	20 GW of solar generating capacity by 2020	M	N/A	55	**1**	1	1	1	1	1	1	1	2
Target 22	India	10% of primary energy from renewable sources by 2012	M	N/I	N/I	**2**	2	1	2	2	1	2	1	2
Target 23	India	4-5% of electricity from renewable sources by 2012	M	N/I	N/I	**2**	2	1	2	2	1	2	1	3
Target 24	Indon-esia	15-17% of primary energy to come from renewable/alternative sources by 2025 (5% biofuels; 5% geothermal; 5% biomass, solar, wind, nuclear & hydro; and 2% coal liquefaction)	M	N/I	N/I	**2**	2	1	3	2	2	2	3	2
Target 25	Japan	Kyoto Protocol: 6% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	160	N/A									
Target 26	Japan	Action Plan for Achieving a Low Carbon Society: 60-80% cut in greenhouse gas emissions from current levels by 2050	E	N/A	200									
Target 27	Japan	The electric power sector will reduce emissions to 73% of 2008-2009 levels by the business year 2020-2021	E	N/I	0									
Target 28	Japan	3% of total primary energy from renewable sources by 2010	M	N/I	N/I	**1**	1	1	2	2	1	1	1	1
Target 29	Japan	39.5 mpg fuel efficiency standard by 2015	M	1	1	**1**	1	1	1	1	1	1	1	2
Target 30	Japan	Increase solar power by 55 times by 2030	M	N/A	165	**1**	1	1	2	2	1	1	1	1

Asia: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 31	Japan	National Wind Power Target: 3,000 MW wind power by 2010	M	10	10	**2**	2	2	2	2	1	3	1	2
Target 32	Jordan	7% of primary energy from renewable sources by 2015; 10% by 2020	M	N/A	1	**1**	1	1	2	2	1	1	1	2
Target 33	Malaysia	Fuel Diversification Policy: 5% of electricity generation from renewable sources by 2005; 10% by 2010	M	5	5	**1**	1	1	2	1	1	1	1	1
Target 34	Pakistan	10% of national primary energy from renewable sources (including hydro) by 2015; 20% by 2020	M	N/I	N/I	**3**	2	2	3	2	2	3	3	3
Target 35	Phillip-ines	Increase renewable energy capacity by 100% by 2013; have 9 GW of renewable capacity by 2020	M	20	30	**2**	1	2	3	2	2	2	2	2
Target 36	Phillip-ines	Phase out incandescent light bulbs by January, 2010	M	N/I	1	**3**	3	2	3	2	2	3	2	3
Target 37	South Korea	5% of electricity consumption from renewable sources by 2011	M	30	65	**2**	1	1	2	3	1	3	2	2
Target 38	South Korea	11% of energy consumption from renewable sources by 2030	M	Modeled as part of Target 37		**2**	1	1	2	3	1	3	2	2
Target 39	South Korea	Reach average fleet fuel efficiency of 40 mpg by 2015	M	N/A	1	**1**	1	1	2	3	1	1	1	1
Target 40	Taiwan	Sustainable Energy Policy: Reduce emissions to 2008 levels between 2016 and 2020 and to 2000 levels by 2025	E	N/A	80									
Target 41	Taiwan	Sustainable Energy Policy: Decrease energy intensity by 20% over 2005 levels by 2015 and 50% by 2025	E	N/A	75									
Target 42	Taiwan	Renewable Energy Development Act: 10% of electricity from renewable sources by 2010.	M	15	20	**1**	1	1	1	3	1	1	1	1

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 43	Europ-ean Union	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-90	N/A									
Target 44	Europ-ean Union	Energy and Climate Change Package (2008): 20% reduction in greenhouse gas emissions from 1990 levels by 2020; 30% reduction if an international agreement is reached	E	N/A	295									
Target 45	Europ-ean Union	Energy and Climate Change Package (2008): 10% reduction in greenhouse gas emissions from non-EU Emissions Trading Scheme (EU-ETS) sectors between 2013 and 2020	E	N/M	N/M									
Target 46	Europ-ean Union	EU Energy and Climate Package – Low Carbon Fuel Standard: CO2 emissions from new cars are limited to 120g CO2/km for 65% of new fleet in 2012; 75% in 2013; 80% in 2014; and 100% in 2015.	M	N/I	N/I	**1**	2	2	2	1	1	1	1	1
Target 47	Europ-ean Union	EU Energy and Climate Package: Power plants over 300MW must not emit over 500 grams of CO2/kWh from 2015.	M	N/I	N/I	**2**	2	2	2	1	1	3	2	2
Target 48	Europ-ean Union	Aviation Directive 2008/101/EC: 3% reduction in greenhouse gas emissions from aircraft flying into and out of the EU between 2012 and 2013 based on the 2004-2006 average as a baseline; 5% reduction in greenhouse gas emissions from aircraft flying into and out of the EU from 2013 onwards.	M	N/I	N/I	**2**	2	2	2	1	1	1	2	2
Target 49	Europ-ean Union	Fuel Quality Directive: Suppliers must ensure a 6% reduction in greenhouse gas emissions from the fuel production chain by 2020	M	N/M	N/M	**2**	2	2	2	1	1	2	2	2
Target 50	Europ-ean Union	European Commission 1997 White Paper: 'Energy for the Future: Renewable Sources of Energy': 12% of primary energy should come from renewables by 2010	M	245	N/A	**3**	3	2	3	2	1	3	3	3
Target 51	Europ-ean Union	EU Energy and Climate Directive: 20% of primary energy should come from renewables by 2020	M	N/A	775	**2**	2	2	3	2	1	1	1	2

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 52	Europ-ean Union	EU Energy and Climate Directive: 10% of transport fuels from renewable sources, including biofuels, hydrogen, and green electricity, by 2020	M	N/I	N/I	**2**	2	2	2	2	1	2	2	2
Target 53	Europ-ean Union	EU Energy and Climate Package: 20% reduction in primary energy consumption by 2020 through energy efficiency	M	N/A	430	**2**	1	2	2	2	1	1	1	2
Target 54	Europ-ean Union	EU Eco-Design Directive – Energy Efficiency Standard: Phase out incandescent light bulbs by 2012	M	15	N/A	**2**	2	2	2	2	1	1	1	2
Target 55	Austria	Kyoto Protocol: 13% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	10	N/A									
Target 56	Austria	EU Renewable Directive 2001/77/EC: 78% of electricity in the energy mix from renewables by 2010	M	5	N/A	**2**	2	2	3	1	1	2	1	2
Target 57	Austria	EU Directive 2009/28/EC: 34% of gross final energy consumption from renewable sources by 2020	M	N/A	5	**2**	2	2	3	1	1	1	1	1
Target 58	Belgium	Kyoto Protocol: 7.5% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	1	N/A									
Target 59	Belgium	EU Renewable Directive 2001/77/EC: 6% of gross electricity generation from renewable sources by 2010	M	1	N/A	**2**	2	2	2	1	1	2	2	2
Target 60	Belgium	EU Directive 2009/28/EC: 13% of gross final energy consumption from renewable sources by 2020	M	N/A	30	**2**	2	2	2	1	1	2	2	2
Target 61	Bulgaria	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1988 levels for the period 2008-2012	E	-40	N/A									
Target 62	Bulgaria	EU Directive 2009/28/EC: 16% of gross final energy consumption from renewable sources by 2020	M	N/A	5	**2**	1	2	3	2	1	2	2	2
Target 63	Cyprus	EU Directive 2009/28/EC: 13% of gross final energy consumption from renewable sources by 2020	M	N/A	1	**2**	2	2	3	1	1	2	2	3

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 64	Czech Republic	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-30	N/A									
Target 65	Czech Republic	EU Renewable Directive 2001/77/EC: 8% of gross electricity generation from renewable sources by 2010	M	5	N/A	**2**	2	1	2	2	1	3	1	3
Target 66	Czech Republic	6% share of renewable energy in primary energy by 2010 and 15-16% by 2030	M	N/M	N/M	**2**	2	1	2	2	1	3	1	3
Target 67	Czech Republic	EU Directive 2009/28/EC: 13% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**2**	2	1	2	2	1	3	1	3
Target 68	Denmark	Kyoto Protocol: 21% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	5	N/A									
Target 69	Denmark	20% of overall energy mix from renewable sources by 2011	M	1	N/A	**1**	2	1	3	1	1	1	1	1
Target 70	Denmark	EU Directive 2009/28/EC: 30% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**1**	2	1	3	1	1	1	1	1
Target 71	Estonia	Kyoto Protocol: 21% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-20	N/A									
Target 72	Estonia	EU Directive 2009/28/EC: 25% of gross final energy consumption from renewable sources by 2020	M	N/A	1	**2**	2	2	3	2	1	1	1	3
Target 73	Finland	Kyoto Protocol: 0% change in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements.	E	1	N/A									
Target 74	Finland	EU Renewable Directive 2001/77/EC: 31.5% of gross electricity generation from renewable sources by 2010	M	1	N/A	**2**	1	2	3	1	1	1	2	1
Target 75	Finland	EU Directive 2009/28/EC: 38% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**1**	1	2	2	1	1	1	2	1
Target 76	France	Kyoto Protocol: 0% change in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements.	E	-45	N/A									

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 77	France	EU Renewable Directive 2001/77/EC: 21% of gross electricity generation from renewable sources by 2010	M	35	N/A	**2**	1	1	3	1	1	2	1	3
Target 78	France	EU Directive 2009/28/EC: 23% of gross final energy consumption from renewable sources by 2020	M	N/A	50	**1**	1	1	3	1	1	1	1	2
Target 79	France	Phase out incandescent light bulbs by 2012	M	1	1	**1**	1	2	2	1	1	1	1	2
Target 80	Germany	Kyoto Protocol: 21% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	-80	N/A									
Target 81	Germany	Climate Protection Strategy: 40% reduction in greenhouse gas emissions below 1990 levels by 2020	E	N/A	160									
Target 82	Germany	EU Renewable Directive 2001/77/EC: 12.5% of gross electricity generation from renewables by 2010	M	N/I	N/I	**1**	1	1	1	1	1	1	1	1
Target 83	Germany	EU Directive 2009/28/EC: 18% of gross final energy consumption from renewable sources by 2020; 50% by 2050	M	N/A	135	**1**	1	1	1	1	1	1	1	1
Target 84	Germany	Energy Road Map 2020: 30% share of electricity consumption from renewable sources by 2020.	M	N/A	10	**1**	1	1	1	1	1	1	1	1
Target 85	Germany	Renewable Energies Heat Act: 14% increase in share of renewables in the heat supply by 2020	M	N/I	N/I	**1**	1	1	1	1	1	1	1	1
Target 86	Germany	Energy Road Map 2020: 11% cut in electricity consumption from 2005 levels by 2020.	M	N/A	20	**1**	1	1	1	1	1	1	1	1
Target 87	Greece	Kyoto Protocol: 25% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	-10	N/A									
Target 88	Greece	EU Renewable Directive 2001/77/EC: 20.1% of gross electricity generation from renewable sources by 2010	M	5	N/A	**3**	2	3	3	3	1	3	3	3
Target 89	Greece	EU Directive 2009/28/EC: 18% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**3**	2	3	3	3	1	3	3	3

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 90	Hungary	Kyoto Protocol: 6% reduction in greenhouse gas emissions below the average of 1985-1987 levels for the period 2008-2012	E	-35	N/A									
Target 91	Hungary	EU Directive 2009/28/EC: 13% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**2**	1	1	3	2	2	2	1	1
Target 92	Ireland	Kyoto Protocol: 13% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	-5	N/A									
Target 93	Ireland	EU Directive 2009/28/EC: 16% of gross final energy consumption from renewable sources by 2020	M	N/A	5	**2**	2	1	3	2	1	1	2	1
Target 94	Ireland	National Energy Plan: 40% of electricity from renewables by 2020	M	N/A	1	**2**	2	1	2	2	1	1	2	1
Target 95	Ireland	Biofuels comprise 10% of road transport fuels by 2020	M	N/A	1	**2**	2	1	2	2	1	2	2	3
Target 96	Italy	Kyoto Protocol: 6.5% reduction in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements.	E	10	N/A									
Target 97	Italy	EU Directive 2009/28/EC: 17% of gross final energy consumption from renewable sources by 2020	M	N/A	45	**3**	3	2	3	3	1	3	3	3
Target 98	Latvia	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-15	N/A									
Target 99	Latvia	EU Directive 2009/28/EC: 42% of gross final energy consumption from renewable sources by 2020	M	N/A	1	**2**	2	1	3	1	1	1	1	1
Target 100	Lithuania	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-25	N/A									
Target 101	Lithuania	National Target: 12% renewable energy sources in the primary supply by 2010	M	1	N/A	**2**	2	1	3	1	1	1	2	1
Target 102	Lithuania	EU Directive 2009/28/EC: 23% of gross final energy consumption from renewable sources by 2020	M	N/A	1	**2**	2	1	3	1	1	1	2	1

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 103	Luxem-bourg	Kyoto Protocol: 28% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	1	N/A									
Target 104	Luxem-bourg	EU Directive 2009/28/EC: 11% of gross final energy consumption from renewable sources by 2020	M	N/A	5	**2**	1	2	3	2	1	1	1	2
Target 105	Malta	EU Directive 2009/28/EC: 10% of gross final energy consumption from renewable sources by 2020	M	N/A	1	**3**	3	2	3	3	1	3	3	3
Target 106	Nether-lands	Kyoto Protocol: 6% reduction in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	15	N/A									
Target 107	Nether-lands	National Target: 20% of power generation should come from renewables by 2020	M	N/M	N/M	**2**	2	2	3	2	1	1	1	2
Target 108	Nether-lands	EU Directive 2009/28/EC: 14% of gross final energy consumption from renewable sources by 2020	M	N/A	30	**2**	2	2	3	2	1	1	1	2
Target 109	Poland	Kyoto Protocol: 6% reduction in greenhouse gas emissions from 1988 levels for the period 2008-2012	E	-115	N/A									
Target 110	Poland	EU Directive 2009/28/EC: 15% of gross final energy consumption from renewable sources by 2020	M	N/A	25	**2**	2	2	2	1	1	1	3	2
Target 111	Portugal	Kyoto Protocol: 27% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	-10	N/A									
Target 112	Portugal	EU Directive 2009/28/EC: 31% of gross final energy consumption from renewable sources by 2020	M	N/A	5	**2**	1	2	3	2	1	1	1	1
Target 113	Romania	Kyoto Protocol: 8% reduction in greenhouse gas emissions from 1989 levels for the period 2008-2012	E	-120	N/A									
Target 114	Romania	EU Directive 2009/28/EC: 24% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**2**	2	3	3	3	2	2	2	2

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 115	Slovakia	Kyoto Protocol: 8% reduction in greenhouse gas emissions from 1990 levels for the period 2008-2012	E	-15	N/A									
Target 116	Slovakia	EU Directive 2009/28/EC: 14% of gross final energy consumption from renewable sources by 2020	M	N/A	5	**3**	2	3	3	3	2	3	3	3
Target 117	Slovenia	Kyoto Protocol: 8% reduction in greenhouse gas emissions from 1986 levels for the period 2008-2012	E	1	N/A									
Target 118	Slovenia	EU Directive 2009/28/EC: 25% of gross final energy consumption from renewable sources by 2020	M	N/A	1	**2**	1	2	3	2	2	3	2	1
Target 119	Spain	Kyoto Protocol: 15% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	65	N/A									
Target 120	Spain	EU Renewable Directive 2001/77/EC: 30% of gross electricity generation should come from renewables by 2010.	M	25	N/A	**1**	2	1	3	1	1	1	1	1
Target 121	Spain	EU Directive 2009/28/EC: 20% of gross final energy consumption from renewable sources by 2020	M	N/A	50	**2**	2	1	3	1	1	2	1	1
Target 122	Spain	Renewable Energy Plan 2005-2010: 20 GW of installed wind capacity by 2010	M	N/M	N/M	**1**	1	1	3	1	1	1	1	1
Target 123	Sweden	Kyoto Protocol: 4% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements.	E	-15	N/A									
Target 124	Sweden	Swedish Climate Strategy Bill (2001/02:55): 4% reduction in greenhouse gas emissions for the period 2008-2012	E	N/I	N/I									
Target 125	Sweden	Integrated climate and energy policy: 40% reduction in greenhouse gas emissions below 1990 levels by 2020 for sectors outside the EU Emissions Trading Scheme; become carbon neutral by 2050	E	N/A	20									

Europe EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 126	Sweden	EU Directive 2009/28/EC: 49% of gross final energy consumption from renewable sources by 2020	M	N/A	10	**1**	2	1	2	1	1	1	1	1
Target 127	UK	Kyoto Protocol: 12.5% reduction in greenhouse gas emissions from 1990 levels for the period 2008-2012 under EU burden sharing agreements	E	-40	N/A									
Target 128	UK	UK Climate Change Act (2008): 34% reduction in greenhouse gas emissions below 1990 levels by 2020; 42% reduction if an international deal is agreed in Copenhagen	E	N/A	125									
Target 129	UK	EU Renewable Directive 2001/77/EC: 10% of gross electricity generation from renewables by 2010	M	15	N/A	**3**	3	2	3	3	1	3	2	3
Target 130	UK	20% of gross electricity from renewable sources by 2020	M	N/A	0	**2**	2	2	3	2	1	2	1	2
Target 131	UK	EU Directive 2009/28/EC: 15% of gross final energy consumption from renewable sources by 2020	M	N/A	105	**2**	2	2	3	1	1	1	2	3
Target 132	UK	All homes to be fitted with smart meters by 2020	M	N/M	N/M	**3**	3	3	3	3	1	3	3	2
Target 133	UK	Phase out incandescent light bulbs by 2012	M	5	N/A	**2**	2	1	3	1	1	1	2	1
Target 134	UK: Scotland	Climate Change (Scotland) Act 2009: 80% reduction in greenhouse gas emissions below 1990 levels by 2050, including aviation and shipping	E	N/M	N/M									
Target 135	UK: Scotland	Climate Change Bill: 31% of gross electricity consumption from renewables by 2011 and 50% by 2020	M	N/M	N/M	**2**	1	1	3	2	1	1	1	1
Target 136	UK: Wales	Source 100% of electricity from renewables by 2025	M	N/M	N/M	**2**	1	1	3	2	1	1	1	2

Europe Non-EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 137	Belarus	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-35	N/A									
Target 138	Croatia	Kyoto Protocol: 5% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	1	N/A									
Target 139	Iceland	Kyoto Protocol: 10% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012	E	1	N/A									
Target 140	Iceland	50-70% reduction in greenhouse gas emissions by 2050	E	N/A	1									
Target 141	Liechtens tein	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	N/M	N/M									
Target 142	Monaco	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	N/M	N/M									
Target 143	Norway	Kyoto Protocol: 1% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012	E	1	N/A									
Target 144	Norway	30% reduction in greenhouse gas emissions below 1990 levels by 2020	E	N/A	15									
Target 145	Norway	CO2 neutral by 2030 (in the context of a global agreement)	E	N/M	N/M									
Target 146	Russia	Kyoto Protocol: 0% change in greenhouse gas emissions from 1990 levels for the period 2008-2012	E	-1040	N/A									
Target 147	Russia	40% reduction in energy intensity per unit of GDP from 2007 levels by 2020	E	N/A	455									
Target 148	Russia	20% of power to come from renewables including hydropower (4.5% excluding hydropower) by 2020	M	N/A	35	**2**	2	2	3	2	1	3	1	3
Target 149	Switzer-land	Kyoto Protocol: 8% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	-5	N/A									
Target 150	Switzer-land	Reduce fossil fuel consumption by 20% by 2020	E	N/M	N/M									
Target 151	Switzer-land	Action Plan on Renewables: 24% renewable energy in total primary energy supply by 2020	M	N/A	1	**2**	1	2	2	2	2	3	1	1

Europe Non-EU Members: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 152	Turkey	10% wind and solar in the installed energy mix by 2020	M	N/A	35	**2**	1	2	3	2	2	2	2	3
Target 153	Ukraine	Kyoto Protocol: 0% change in greenhouse gas emissions from 1990 levels for the period 2008-2012	E	-470	N/A									

Latin America: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 154	Argentina	8% of electricity from renewable sources by 2016 (excluding large hydro)	M	N/A	5	**2**	2	2	3	2	2	2	2	3
Target 155	Brazil	Maintain a share of >80% power generation from renewables through 2030	M	N/I	N/I	**1**	1	1	2	1	2	2	1	1
Target 156	Brazil	Obtain 7,000 MW of power from non-hydro renewables between 2008 and 2010	M	1	1	**2**	2	2	3	1	2	1	1	3
Target 157	Brazil	72% reduction in deforestation by 2017 compared to 2006 levels	M	220	440	**1**	1	1	2	1	2	1	1	1
Target 158	Brazil	4% biodiesel blend requirement	M	N/I	N/I	**1**	1	1	1	1	2	1	1	1
Target 159	Costa Rica	Carbon neutral society by 2021	E	N/A	20									
Target 160	Costa Rica	80-90% of newly installed generation capacity from renewable sources (excluding thermal plants)	M	N/I	N/I	**2**	3	2	3	3	2	1	3	1
Target 161	Jamaica	Energy Policy 2009-2030: 11% of renewables in the energy mix by 2012; 12.5% by 2015; 20% by 2030	M	1	1	**2**	3	2	3	1	2	1	3	3
Target 162	Mexico	50% reduction in greenhouse gas emissions from 2002 level by 2050	E	N/A	325									
Target 163	Mexico	Law for the Use of Renewable Sources of Energy: 8% of power to come from renewables by 2012 (excluding large hydro)	M	5	5	**2**	2	2	3	3	1	2	3	3
Target 164	Nicara-gua	38% of electric power from renewable sources by 2011	M	1	1	**2**	2	2	3	3	2	2	2	1
Target 165	Paraguay	50% biofuels in the national fuel pool by 2013	M	1	1	**2**	2	2	2	2	2	2	2	3

North America – Canada: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 166	Canada	Kyoto Protocol: 6% reduction in greenhouse gas emissions below 1990 levels for the period 2008-2012	E	175	N/A									
Target 167	Canada	20% reduction in greenhouse gas emissions from 2006 levels by 2020; 60-70% reduction in emissions by 2050	E	N/A	210									
Target 168	Canada	Renewable Fuel Bill C-33: 5% ethanol and 2% biodiesel fuel blends by 2010.	M	5	5	**2**	1	2	2	2	1	2	1	1
Target 169	Canada: Alberta	Climate Change and Emissions Amendment Act: 50% reduction in greenhouse gas emissions intensity by 2020	E	N/A	115									
Target 170	Canada: Alberta	20% renewable by 2020	M	N/I	N/I	**1**	2	2	3	2	1	2	3	3
Target 171	Canada: British Columbia	Greenhouse Gas Reduction Targets Act: 33% reduction in greenhouse gas emissions below 2007 levels by 2020; 80% by 2050.	E	N/A	30									
Target 172	Canada: British Columbia	Greenhouse Gas Reduction (Vehicles Emissions Standards) Act: Reduce greenhouse gas emissions from vehicles by 30% relative to 2008 models by 2016	M	N/M	N/M	**1**	1	1	2	2	1	1	2	1
Target 173	Canada: Manitoba	Climate Change and Emissions Reductions Act: 6% reduction in greenhouse gas emissions below 1990 levels by 2012; 15% by 2020.	E	N/M	N/M									
Target 174	Canada: Manitoba	1,000 MW installed wind capacity 2016	M	N/A	5	**2**	1	1	3	2	1	2	2	1
Target 175	Canada: Nova Scotia	Renewable Energy Standard Regulations: 5% of the total electricity generation from new renewable sources by 2010; 10% by 2013.	M	N/I	N/I	**2**	2	2	2	1	1	1	2	2
Target 176	Canada: Ontario	6% reduction in greenhouse gas emissions below 1990 levels by 2014; 15% by 2020.	E	N/M	N/M									
Target 177	Canada: Ontario	Eliminate coal-fired power by December, 31st, 2014	M	N/A	30	**1**	1	1	3	1	1	1	1	1
Target 178	Canada: Quebec	Energy Strategy 2006-2015: 4,000 MW wind energy by 2015	M	N/A	10	**1**	1	2	3	1	1	1	1	1

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 179	United States	American Clean Energy and Security Act (ACES): 17% reduction in greenhouse gas emissions below 2005 levels by 2020; 83% below 2005 levels in 2050	E	N/A	1105									
Target 180	United States	Save Our Climate Act: 80% reduction in greenhouse gas emissions below 1990 levels by 2050	E	N/M	N/M									
Target 181	United States	Energy Independence and Security Act of 2007: 36 billion gallons of ethanol production by 2022.	M	N/A	260	**1**	1	1	1	1	1	1	1	1
Target 182	United States	American Clean Energy and Security Act: Combined renewable electricity and electricity savings of 6% 2012 rising to 20% by 2020	M	N/I	460	**NA: Awaiting Senate and House Bill Reconciliation**								
Target 183	United States	Fleet average efficiency of 35.5 miles per gallon by 2016	M	N/A	170	**1**	1	1	1	1	1	1	1	1
Target 184	United States: Regional Green-house Gas Initiative	Regional Greenhouse Gas Initiative (RGGI): Cap greenhouse gas emissions from power plants at current levels in 2009, and then reduce emissions by 10% by 2018 in 10 northeastern states, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont.	E	N/A	40									
Target 185	United States: Western Climate Initiative	Western Climate Initiative (WCI): 15% reduction in greenhouse gas emissions from 2005 levels by 2020 by 11 US states and Canadian provinces, including Arizona, British Columbia, California, Manitoba, Montana, Mew Mexico, Ontario, Oregon, Quebec, Utah, and Washington. 6 Mexican states, 6 US states and one Canadian province are also WCI observers.	E	N/A	200									
Target 186	United States: Arizona	Executive Order 2006-13: Reduce greenhouse gas emissions to 2000 levels by 2020; achieve a 50% reduction below 2000 levels by 2040.	E	N/A	1									
Target 187	United States: Arizona	15% of energy from renewables by 2025 (4.5% by 2012 from distributed energy resources)	M	N/A	10	**2**	2	2	2	1	1	1	2	3

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 188	United States: California	Assembly Bill 32: Reduce greenhouse gas emissions to 1990 levels by 2020	E	N/A	65									
Target 189	United States: California	Senate Bills 1078 and 107: 20% of electricity from three major utility providers must be produced from eligible renewable sources by 2010	M	15	N/A	**3**	2	3	3	3	1	3	2	3
Target 190	United States: California	Senate Bills 1078 and 107: 33% of electricity must be produced from eligible renewable sources by 2020	M	N/A	65	**2**	2	2	3	3	1	3	2	3
Target 191	United States: California	Assembly Bill 1109: 50% reduction in energy use for lighting in indoor residences and state facilities and a 25% reduction in energy use for commercial and outdoor lighting by 2018	M	N/A	1	**1**	1	2	2	2	1	1	1	1
Target 192	United States: Colorado	House Bill 1281: 20% renewable generation by 2020 for investor-owned utilities; 10% by 2020 for electric cooperatives and municipal utilities.	M	N/A	5	**1**	2	2	1	1	1	1	2	1
Target 193	United States: Connecti cut	10% reduction in greenhouse gas emissions from 1990 levels by 2020; 75% by 2050.	E	N/A	10									
Target 194	United States: Connec-ticut	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 195	United States: Connec-ticut	13% of total electricity generation from renewables by 2009; 27% of total electricity generation from renewables by 2020.	M	N/A	5	**3**	2	2	3	3	1	3	3	3
Target 196	United States: Delaware	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 197	United States: Delaware	Senate Bill 19 (2007): Retail electricity suppliers must purchase 20% of the electricity sold in the state from renewable sources by 2019 (2.005% from solar by 2019)	M	N/A	5	**2**	1	2	2	1	1	1	2	2
Target 198	United States: Florida	Executive Order 07-127: Reduce greenhouse gas emissions to 2000 levels by 2017 and 1990 levels by 2025; 80% reduction from 1990 levels by 2050.	E	N/A	10									
Target 199	United States: Hawaii	Act 234: Reduce greenhouse gas emissions to 1990 levels by 2020 (25% reduction)	E	N/A	5									

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 200	United States: Hawaii	House Bill 1464: Utilities must source 10% of electricity from renewables by 2010, 15% by 2015, 25% by 2020 and 40% by 2030	M	N/A	5	**1**	2	2	1	1	1	1	1	2
Target 201	United States: Illinois	Reduce greenhouse gas emissions to 1990 levels by 2020 and 60% below 1990 levels by 2050.	E	N/A	40									
Target 202	United States: Illinois	Clean Coal Portfolio Standard Act: 50% reduction in CO2 emissions from power plants between 2009-2015; 70% reduction in emissions for power plants from 2016-2017; 90% reduction in emissions for power plants built after 2017.	M	N/A	45	**1**	1	2	1	1	1	1	1	1
Target 203	United States: Illinois	10% of electricity generation from renewables by 2015; 25% of electricity generation from renewables by 2025 (with 75% of that from wind)	M	N/A	N/A	**1**	2	2	1	1	1	1	1	1
Target 204	United States: Indiana	Senate Bill 420: 15% of electricity generation from renewable sources by 2025	M	N/A	1	**2**	2	2	2	2	1	3	2	3
Target 205	United States: Kentucky	25% of total energy needs should be met through energy efficiency and conservation measures and renewable electricity by 2025.	M	N/A	5	**2**	2	3	3	2	1	1	2	3
Target 206	United States: Maine	Act to Provide Leadership in Addressing the Threat of Climate Change: 10% reduction in greenhouse gas emissions from 1990 levels by 2020; 75-80% below 2003 levels in the long-term.	E	N/A	5									
Target 207	United States: Maine	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 208	United States: Maine	10% of electricity generation from renewables by 2017	M	N/I	1	**1**	3	1	1	1	1	1	1	1
Target 209	United States: Maine	Achieve 2,000 MW of wind power capacity by 2015 and 3,000 MW by 2020	M	N/A	10	**2**	2	2	3	2	1	1	1	2
Target 210	United States: Maryland	Greenhouse Gas Reduction Act of 2009: 25% reduction in greenhouse gas emissions from 2006 levels by 2020	E	N/A	25									

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 211	United States: Maryland	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 212	United States: Maryland	Senate Bill 595: Provide 1% of retail sales from Tier 1 renewables and 2.5% from Tier 2 in 2006, gradually increasing to reach a level of 20% from Tier 1 in 2022 and 2.5% from Tier 2 by 2018.	M	N/A	5	**2**	2	2	2	1	1	2	2	2
Target 213	United States: Massach usetts	Massachusetts Global Warming Solutions Act: 10-25% reduction in greenhouse gas emissions below 1990 levels by 2020; 75-85% below 1990 levels in the long-term.	E	N/A	20									
Target 214	United States: Massa-chusetts	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 215	United States: Massa-chusetts	15% of electricity retail sales from renewable sources by 2020 and an additional 1% of sales from renewable sources each year thereafter.	M	N/A	10	**2**	2	2	1	1	1	2	1	2
Target 216	United States: Michigan	Senate Bill 213: 10% of electricity generation from all utilities from renewable sources by 2015	M	N/A	1	**1**	1	1	1	1	1	1	1	2
Target 217	United States: Michigan	Natural gas utilities must improve efficiency by 0.5% per year by 2011; electricity providers must improve efficiency by 0.75% per year by 2011.	M	N/I	N/I	**1**	1	2	2	1	1	1	1	2
Target 218	United States: Minne-sota	Next Generation Energy Act of 2007: 15% reduction in greenhouse gas emissions below 2005 levels by 2015; 30% reduction by 2025; 80% reduction by 2050.	E	N/A	25									
Target 219	United States: Minne-sota	Senate Bill 4: 25% of utility electricity generation from renewable sources by 2025	M	N/A	10	**1**	1	2	2	1	1	1	1	2
Target 220	United States: Missouri	Missouri Clean Energy Initiative (Senate Bill 54): 15% of electricity generation must come from renewables by 2021. There are incremental targets between now and 2021, including a 3% target by 2012, 7% by 2015 and 10% by 2020.	M	N/A	1	**2**	2	2	1	2	1	3	2	2

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 221	United States: Montana	Western Climate Initiative (WCI): 15% reduction in greenhouse gas emissions below 2005 levels by 2020	E	Modeled at the WCI aggregate level										
Target 222	United States: Montana	Montana Renewable Power Production and Rural Economic Development Act: 5% of retail electricity sales from eligible renewables for 2008-2009, 10% for 2010-2014, and 15% for 2015 and each year thereafter.	M	1	N/A	**2**	2	2	2	2	1	1	2	2
Target 223	United States: Nevada	Gibbons' Law (SB 395): 20% of electricity from renewable sources by 2015; 25% by 2025.	M	N/A	5	**1**	1	2	2	1	1	1	1	2
Target 224	United States: New Hamp-shire	Reduce greenhouse gas emissions to 1990 levels by 2010; 10% below 1990 levels by 2020; 75-85% below 2005 levels by 2050.	E	N/A	5									
Target 225	United States: New Hamp-shire	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 226	United States: New Hamp-shire	23.8% of electricity from renewable sources by 2025	M	N/A	1	**1**	1	2	1	1	1	1	1	1
Target 227	United States: New Jersey	Reduce greenhouse gas emissions to 1990 levels by 2020; 80% reduction from 2006 levels by 2050.	E	N/A	20									
Target 228	United States: New Jersey	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 229	United States: New Jersey	22.5% electricity from renewables by 2020 (2.12% from solar; 17.88% from other Class I renewables; 2.5% from Class II or additional Class I renewables)	M	N/A	15	**1**	1	1	1	1	1	1	1	1
Target 230	United States: New Mexico	Executive Order 05-033: Reduce greenhouse gas emissions to 2000 levels by 2012; 10% reduction in greenhouse gas emissions from 2000 levels by 2020; 75% below 2000 levels by 2050.	E	N/A	60									
Target 231	United States: New Mexico	Senate Bill 418: 10% of electricity to be derived from renewables by 2011; 15% by 2015 and 20% by 2020	M	5	N/A	**1**	1	1	2	1	1	1	1	1

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 232	United States: New York	State Energy Plan: 5% reduction in greenhouse gas emissions from 1990 levels by 2010; 10% reduction by 2020; and 80% reduction by 2050.	E	N/A	50									
Target 233	United States: New York	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 234	United States: New York	25% of electricity generation from renewable sources by 2013	M	N/A	20	**2**	2	2	2	2	1	1	1	1
Target 235	United States: New York	45% of electricity generation from renewable sources and efficiency by 2015	M	N/A	10	**2**	2	2	2	2	1	1	1	1
Target 236	United States: North Carolina	SB 3: 10% of retail sales for electric cooperatives and municipal utilities from renewable sources by 2018; 12.5% of retail sales for investor-owned utilities from renewable sources by 2021.	M	N/A	1	**2**	2	2	3	1	1	1	1	2
Target 237	United States: North Dakota	HB 1506: 10% of electricity generation from renewable and recycled sources by 2015	M	N/A	1	**2**	1	2	3	2	1	2	2	1
Target 238	United States: Ohio	SB 221: 25% of electricity from alternative energy resources by 2025, at least half of which must be generated from renewable energy resources	M	N/A	1	**2**	2	2	1	1	1	1	2	3
Target 239	United States: Ohio	SB 221: 22% savings in electricity consumption by 2025	M	N/A	15	**2**	2	1	2	2	1	2	2	3
Target 240	United States: Oregon	Oregon Strategy for Greenhouse Gas Reductions: Stabilize greenhouse gas emissions by 2010; 10% reduction from 1990 levels by 2020; 75% reduction from 1990 levels by 2050.	E	N/A	10									
Target 241	United States: Oregon	Oregon Renewable Energy Act (SB 838): 10% of total electricity generation from new renewables by 2015; 25% of total electricity generation from new renewables by 2025.	M	N/A	5	**1**	2	2	2	1	1	1	1	1
Target 242	United States: Penns-ylvania	18% of electricity from alternative energy sources during compliance year 2020-2021	M	N/A	15	**2**	1	1	2	1	1	1	2	3

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 243	United States: Penns-ylvania	Energy Conservation Bill: Electricity use should be reduced by 1% by 2011 and 3% by 2013; every home and business must be equipped with smart meters by 2023	M	N/I	N/I	**2**	1	1	2	2	1	1	2	3
Target 244	United States: Rhode Island	Rhode Island Greenhouse Gas Action Plan: Reduce greenhouse gas emissions to 1990 levels by 2010; 10% reduction from 1990 levels by 2020.	E	N/A	5									
Target 245	United States: Rhode Island	Regional Greenhouse Gas Initiative (RGGI): 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 246	United States: Rhode Island	16% of electricity generation from renewable sources by 2020	M	N/A	1	**2**	2	2	2	1	1	1	1	2
Target 247	United States: South Dakota	HB 1272: Combined conservation and renewable electricity standard of 10% by 2015	M	N/A	1	**3**	3	3	3	2	1	3	3	3
Target 248	United States: Texas	Install 2,000 MW of renewable electricity capacity by 2009; 5,880 MW by 2015; and 10,000 MW by 2025	M	N/A	10	**1**	1	1	2	1	1	1	1	1
Target 249	United States: Utah	Western Climate Initiative (WCI): Reduce greenhouse gas emissions to 2005 levels by 2020	E	Modeled at the WCI aggregate level										
Target 250	United States: Utah	Energy Resource and Carbon Emission Reduction Initiative: 20% of adjusted retail power from renewables by 2025	M	N/A	5	**3**	3	2	3	3	1	3	2	3
Target 251	United States: Vermont	Act 168: 25% reduction in greenhouse gas emissions from 1990 levels by 2012; 50% by 2028 and, if possible with reasonable effort, 75% by 2050.	E	N/A	5									
Target 252	United States: Vermont	Regional Greenhouse Gas Initiative: 10% reduction in greenhouse gas emissions from the power sector by 2018	E	Modeled at the RGGI aggregate level										
Target 253	United States: Vermont	Vermont Energy Act of 2009: 20% of electricity generation from renewable sources by 2017	M	N/I	1	**2**	1	1	3	2	1	2	2	2
Target 254	United States: Vermont	25% of energy consumed within the state must come from renewable sources originating in America's forests, farms, and ranches by 2025	M	N/A	1	**2**	1	2	3	2	1	2	1	2

North America – United States: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 255	United States: Virginia	Executive Order 07-59: 30% reduction in greenhouse gas emissions by 2025 against no specified baseline. Includes a goal to meet 19% of state electricity needs through efficiency initiatives.	E	N/M	N/M									
Target 256	United States: Virginia	15% of base year (2007) electricity sales from renewable sources by 2025; 12% by 2022	M	N/A	1	**2**	1	1	3	1	1	1	2	2
Target 257	United States: Washing-ton	Senate Bill 6001 and House Bill 2815: 1990 greenhouse gas emissions levels by 2020; 25% reduction by 2035; and 50% reduction by 2050.	E	N/A	15									
Target 258	United States: Washing-ton	15% of electricity from renewable sources by 2020, along with deployment of all cost-effective conservation by 2020	M	N/A	5	**1**	2	1	2	1	1	1	1	2
Target 259	United States: Wiscon-sin	Reduce greenhouse gas emissions to 2005 levels by 2014; 22% reduction from 2005 levels by 2022; 75% reduction from 2005 levels by 2050.	E	N/A	25									
Target 260	United States: Wiscon-sin	10% electricity generation from renewable sources by the end of 2015	M	N/A	1	**2**	2	1	3	2	1	1	1	2

Oceania: Summary of targets

Legend: *N/A = Not Applicable; N/M = Not Modeled; N/I = No Impact on BAU*

Target No.	Country	Target Name	Emissions (E) or Mandate (M)	Abatement 2012	Abatement 2020	Overall risk rating	Ratings							
							Incentives	Public Financing	Enforce-ment	Monitoring	Sovereign Credit Risk	Integrated Plan	Implem-entation Capacity	Historical Achieve-ment
Target 261	Australia	Kyoto Protocol: 8% maximum increase in greenhouse gas emissions from 1990 levels for the period 2008-2012	E	-30	N/A									
Target 262	Australia	Carbon Pollution Reduction Scheme (CPRS): Unconditional 5% reduction in greenhouse gas emissions from 2000 levels by 2020; 25% reduction by 2020 in the context of a global agreement; 60% reduction by 2050	E	N/A	85									
Target 263	Australia	Renewable Energy Target Scheme: At least 20% of electricity supply from renewables by 2020	M	N/A	35	**1**	1	1	1	1	1	2	1	2
Target 264	Australia	Phase-out of all incandescent bulbs by 2009 with full enforcement of new lighting standards by 2009-2010	M	N/I	5	**1**	1	1	1	1	1	1	1	1
Target 265	Australia: New South Wales	15% of electricity from renewable sources by 2020	M	N/A	5	**1**	2	1	3	1	1	1	1	1
Target 266	Australia: South Australia	33% of energy production from renewable sources by 2020	M	N/A	15	**2**	1	2	3	2	1	2	1	1
Target 267	New Zealand	Kyoto Protocol: 0% change in greenhouse gas emissions target from 1990 levels for the period 2008-2012	E	15	N/A									
Target 268	New Zealand	90% of electricity from renewable sources by 2025 (inclusive of large-hydro)	M	N/A	1	**2**	3	1	2	2	1	2	2	1
Target 269	New Zealand	20% reduction in lighting energy consumption by 2015	M	N/A	1	**1**	1	2	3	1	1	1	1	1

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:

$(Energy_{France,2007})*(1-.015)14*(1 + GDPgrowth_{France,2008})* \ldots *(1+ GDPgrowth_{France,2020})$

Next, we estimate the corresponding CO_2 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 MtCO2/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_2 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.

Energy Emissions Methodology

CO_2e emissions

We have estimated projected emissions from non-CO_2 Kyoto greenhouse gases – CH_4, N20, HFCs, PFCs, and SF_6 – by using data assembled by the U.S. EPA (Global Anthropogenic non-CO_2 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_2 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_4 and N_2O projections of CO_2e 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_2e 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_2 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 $GtCO_2$ 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 $GtCO_2$. 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.

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 $GtCO_2$ per year, relative to 3-9 $GtCO_2$ 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 $GtCO_2e$ 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.

EX 9: BAU estimates ($GtCO_2e$)

	2007	2010	2015	2020
CO_2 Energy	28.3	29.2	34.4	37.0
Other GHG	9.6	10.0	10.9	11.8
LULUCF CO_2	7.6	7.6	7.6	7.6
Cement process CO_2	1.4	1.6	2.2	2.6
Total BAU estimate	**46.9**	**47.6**	**55.1**	**59.0**

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).

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.

EX 10: BAU energy emissions ($GtCO_2e$) sensitivity analysis

	1990	2006	2007	2015	2020
World					
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
United States					
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
Japan					
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
European Union					
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
Russia					
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
China					
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
India					
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. CCC analysis, 2009.

Energy Emissions Methodology

450 ppm CO_2e stabilization scenario

For reference, we show a CO_2e emissions stabilization pathway to reach 450 ppm of CO_2e. 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_2e, 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.

EX 11: Displacement assumptions by country

Fuel displaced	
Coal	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.
Coal/gas	Austria, Brazil, France, the Philippines, United Kingdom.
Gas	Algeria, Argentina, Bangladesh, Italy, Latvia, Libya, Lithuania, Luxembourg, Netherlands, Nigeria, Switzerland.
Petroleum	Cyprus, Egypt, Jamaica, Jordan, Malta, Senegal.

Source: CCC analysis, 2009

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