Are We Heading to a Low Carbon World? Evaluation of Methodologies and Projections to Track Global and National Progress toward Decarbonization

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Abstract

The last five years have seen broad and deep advancements in regional, national and sub-national policies to mitigate future greenhouse gas (GHG) emissions, yet global projections consistently show additional action is still needed to meet decarbonization goals. Progress in this decade will be instrumental to ensure both the effective implementation of current policies and the adoption of additional policies to meet international and national GHG reduction goals.

Since 2009, ClimateWorks Foundation in conjunction with its partner network in Brazil, China, the EU, India, Indonesia, Mexico and the US has worked to estimate the projected impacts on future GHG emissions of many policies in implementation and development in these regions. Given the uncertainty inherent in these projections, meaningful comparisons of models, frameworks, and estimates by other organizations involved in similar efforts are important. This paper will discuss an assessment that spans geographies in order to review in detail major power sector regional, national and sub-national policies.

Comparisons will be made between global and national policy estimates by the Climate Action Tracker group and the International Energy Agency. By reviewing other independent analyses and reviewing key metrics, including those from Bloomberg New Energy Finance, this paper will build confidence around over 1 Gt CO_2e of expected reductions in 2020, explore the uncertainty around projections for future GHG emissions and highlight remaining opportunities for further policy efforts to achieve additional necessary reductions.

Context and Goals for the Paper

To meet GHG mitigation targets to limit dangerous climate change, global emissions must peak by 2020 and then decline dramatically by mid-century. The next five years will be critical to ensure that current policies are implemented effectively, strengthened as necessary, and/or additional policies are adopted to meet GHG reduction goals.

Estimates of the expected impact of current and proposed policies are vital to understanding progress to date and implications for the future. Efforts to project expected emissions reductions for specific policies and policy packages face many challenges and are inherently uncertain. Yet when considered in a broader context calibrated across several approaches, a combination of top-down evaluation efforts can be more accurate for projecting future emissions and more effective for promoting accountability than any single estimate.

Since projecting policy progress is highly uncertain, authors compared analyses of specific policy outcomes or projected abatement targets at the global, national, and regional level for several countries from different initiatives. Global analyses by ClimateWorks Foundation (ClimateWorks), the Climate Action Tracker (CAT), the International Energy Agency (IEA) and Bloomberg New Energy Finance (BNEF) point to over 1 Gt CO_2e of emissions reductions in the

power sector as demonstrable progress toward 2020 goals; however, the expected impacts of current and proposed policies will not be enough to limit future climate change.

This paper juxtaposes projected impacts from four analyses, highlighting differences and similarities in approach and results to address the confidence of future impact estimates.

Global Greenhouse Gas Abatement Cost Curve model

In 2008[1], ClimateWorks, with other sponsors, supported the development of McKinsey & Company's Global Greenhouse Gas Abatement Cost Curve model to inform strategic planning efforts. This model provided a globally consistent understanding of expected emissions and technical opportunities to reduce future emissions across all regions and sectors.

The model has a static Business-as-Usual (BAU) scenario, first developed from IEA's World Energy Outlook (WEO) 2007 with supplementary industry data and analysis. In the wake of the global recession, the model was updated with a new baseline to reflect post-crisis assumptions for the development of the global economy and associated emissions using more recent data and analysis from the WEO 2009.[2] This BAU scenario also includes natural decarbonization due to capital stock turnover, policies in legislation through 2007 and market-driven changes expected in the fuel mix and production technologies.

Authors have estimated future impacts and assessed progress in comparison with this frozen baseline scenario. Authors expanded and revised an in-house version of the cost curve model to improve on its utility in understanding opportunities for, and progress towards, public policies that will reduce future emissions. In subsequent years, authors and their partners developed two primary methods for estimating the future impact of climate, energy and land use policies on GHG emissions based upon the BAU scenario described above: (1) overall strategic targets for impacts in 2020 (compared to the above BAU scenario) of programmatic efforts in targeted countries ("Strategy Targets"), and (2) the expected impact of specific policies passed and implemented that were plausibly associated with the programmatic efforts the network of organizations were pursuing ("Policies in Implementation").

General Methodologies for Projecting Policy Impacts

ClimateWorks: Strategy Targets and Policies in Implementation

In 2010, authors developed a modeling tool to aggregate specific strategy targets set by ClimateWorks and its partner organizations across regions and sectors, building on the global cost curve model. This tool was designed to shed light on the total impact of expected emissions assuming current policy implementation and enforcement, in addition to highlighting successful

[1] ClimateWorks Foundation was founded in 2008 to broadly support public policies that prevent dangerous climate change and promote global prosperity. ClimateWorks partnered with an international network of affiliated organizations—the ClimateWorks Network—to support smart policies in the geographic regions and economic sectors that have the greatest potential for reducing greenhouse gas emissions.

[2] This baseline includes for Power, Buildings, Transport Air and Sea: IEA WEO 2009; for Transport Road: Car stock taken from Global Insight, km driven taken from IEA/WBCSD's transport model supplemented with internal analysis; for Industry: internal analysis, using different industry reports for growth and expert interviews on "natural decarbonization" -- factors are in the 0.1-0.5% range by sector; for Forestry: Houghton et al. 2007; for Agriculture, Waste: US EPA 2006.

policy advocacy efforts. Further, this tool utilizes a consistent methodology and baseline to facilitate a greater degree of standardization and consistency to quantify the expected policy impacts in 2020 while removing key areas of overlap or "double counting."

Each strategy target included expected impact estimates (magnitude of carbon abatement opportunity and/or an associated sector-specific metric) combined with estimates of probability (likelihood of success and implementation) in each region and sector. Generally, targets addressed impacts in 2020 based on programmatic goals for the next 3-5 years (e.g. 2011-2015). This included successful implementation of recently-adopted policies as well as development of new or more stringent policy options.

Sector-specific metrics were introduced to better understand proposed emission reductions drivers. Examples include national or regional estimates of installed renewables beyond the BAU scenario in the power sector and the shift of light-duty vehicle passenger kilometers to other modes in the transportation sector. The probability estimates were unique to each region and sector combination and were used to more realistically discount calculated impact. The discount factor applied depended on the relative magnitude of expected savings from implemented policies in that region and sector, relative to the target.

Regional partners reported quarterly on progress towards strategic goals and milestones with special attention to policies and measures passed and expected CO_2e savings in 2020. Beginning in 2011, authors began cataloging and aggregating these reported policies to estimate future impact.

In order to facilitate consistency, authors provided guidance regarding policy inclusion. This generally required a discrete action characterized by a vote, declaration or formal revision of an existing policy representing a shift into implementation phase. Thus, policies were not necessarily "counted" early in the stages of a policy announcement (e.g. light duty vehicle fuel efficiency standards in India were announced as early as 2009 but only shifted to an implementation phase in 2014). The criteria for policy inclusion and the methodology for estimating their expected CO_2e savings varied across sectors (e.g. specifically defined performance standards for major appliances, GW of coal plants announced for retirement, etc.).

Climate Action Tracker

The Climate Action Tracker project is a collaboration between Ecofys, Climate Analytics and PIK to track emission reduction commitments across countries since 2009 with an objective to assess current domestic policies and policy packages. This approach to policy impact assessment was developed by Ecofys/PBL and first applied to the top three policies of major emitters (Höhne et al. 2012; Roelfsema et al. 2013).

Building on that work, in 2013 the members of the CAT team (Ecofys and Climate Analytics) and ClimateWorks performed an internal review and comparison of the different approaches and expected results when estimating of specific policy impacts. This review highlighted several issues including the challenges of dealing with differing BAU projections and policy overlap.

The CAT team subsequently estimated emission reduction potentials and expected policy impacts for policies throughout the world in an effort to assess whether domestic policies will meet the pledged reductions for countries that have made commitments (CAT, 2013). This analysis calculated current emissions trends across a number of countries and regions while also highlighting their global implications.

International Energy Agency

The WEO, an annual publication by the IEA, provides critical analytical insights into trends in energy demand and supply. Since 1993, the IEA has provided medium to long-term energy projections using the World Energy Model. The model is a large-scale simulation designed to replicate how energy markets function and is the principal tool used to generate detailed sector-by-sector and region-by-region projections for the WEO scenarios.

In 2009, the WEO developed a Reference scenario based on IEA statistics for OECD and non-OECD countries, which authors have been using as the core baseline scenario for comparison. In 2013, the WEO presented projections for three scenarios. The Current Policies Scenario (CPS) is based on the implementation of government policies and measures that were enacted by mid-2013. The New Policies Scenario (NPS) – the primary scenario – takes into account broad policy commitments and plans that have been implemented, as well as those that have been announced with cautious implementation. The report also features a 450 Scenario (450) that sets out an energy pathway consistent with a ~50% change of meeting the goal of limiting the increase in average global temperature to 2°C compared with preindustrial levels.

Bloomberg New Energy Finance

BNEF draws its analysis from the contribution of technical experts across power technologies and geographical regions. To undertake its forecasts, BNEF uses a number of in-house models and assumptions including a power demand forecast, a capacity forecast, a small-scale PV model for consumer behavior and projections on the levelized costs of power technologies up to 2030.

The power demand forecast model is driven by varying national assumptions: economic growth (i.e. GDP from the IMF and World Bank, population growth from the UN), efficiency measures applied, improvement in transmission and distribution infrastructure and historical consumption patterns. The capacity forecast utilizes a partial equilibrium model of the world energy system (the Global Energy and Emissions Model) among others to project the total installed capacity by country and technology up to 2030. The levelized cost of electricity is projected using technology experience curves, fuel and carbon price forecasts and renewable technology resource curves.

Strengths and Weaknesses of Different Approaches

Each approach was designed to answer a specific question or address a unique audience. This requires tradeoffs and prioritization contributing to particular strengths and weaknesses.

ClimateWorks: Strategy Targets and Policies in Implementation

Strategy targets were updated annually and were intended as a directionally accurate though imprecise estimate of the likely impact of initiatives designed to support GHG emissions reduction policies. Each target linked to comprehensive strategic plans with interim goals backed by ClimateWorks and its partners. The targets were best available estimates based upon advocacy efforts by independent non-governmental organizations between 2009 and 2014.

The targets strove to be "ambitious yet feasible" and were designed as stretch goals. These targets were based upon a combination of advocated for policy outcomes often dependent on exogenous criteria outside the influence of the organizations. The targets did not necessarily relate to specific, known or previously-identified policies making it difficult to quickly evaluate if newly proposed policies represented progress towards goals.

As the amount and breadth of reported policies grew, authors modified the approach to aggregate individual policy estimates. A discount factor was applied to reported reductions based on "Likelihood of Implementation" in a given region and sector and was designed to represent the challenges to full and effective implementation. General adjustments for high level issues of double counting or overlapping of assumptions embedded in a BAU scenario were also included, though precise adjustments were not made for all policies.

For example, ClimateWorks considered expected savings from the Energy Efficiency Directive (EED) and the Energy Performances in Buildings Directive (EPBD) in Europe as overlapping and only counted the larger volume. In the United States, ClimateWorks compared the expected inclusion of gigawatts (GW) of renewable capacity associated with state-level Renewable Portfolio Standards with the BAU scenario and reduced the estimate accordingly.

Climate Action Tracker

The CAT project aims to assess the actual emission pathways resulting from policy impacts, not the proposed reductions chosen as policy targets. When possible, CAT analyzes existing policy scenarios. When all current policies are not included, CAT calculates a bottom-up quantification of policies or packages to combine with the scenarios. When no scenarios including policies exist, CAT develops its own scenarios based on BAU or activity data.

This approach focuses on updating estimates of the overall emissions trajectory for the country being considered and seeks to align the assessment by first checking if the policy is already included in the BAU. If not, the policy or policies are assessed using the data in line with the overall BAU. When policy impact values are derived from external sources, the policy impact is scaled comparing the BAU value in the external source to the reference BAU. Unlike ClimateWorks' approach, this methodology does not focus on estimating deviation from BAU for specific policies, rather focusing on estimating an updated emissions trend based on current policies. The CAT team reviews the most significant policies for each country and region.

International Energy Agency

To underpin the scenarios from the WEO the IEA maintains a list of energy and climate-related policies and measures that feed its modelling. However, the WEO does not attribute carbon savings to individual policies, but rather develops comprehensive global scenarios based on the suite of policies as well as changes in the broader macroeconomic environment. For this analysis, comparisons are drawn between the changes in key metrics and expected emissions in the 2009 Reference scenario and the 2013 Current Policy Scenario, New Policy Scenario and 450 Scenario.

This approach allows for a comparison of overall expected impacts, but these changes in projections are not only due to policy. Underlying drivers such as GDP and fuel prices also have significant effects on emission projections, and so these comparisons are meant to help bound the analysis of targets and policies.

Bloomberg New Energy Finance

For this analysis, capacity forecasts include the short term (up to 2016) in which build forecasts are based on known development pipelines as determined by BNEF sector experts and the medium term (up to 2020) in which build rates for clean energy technologies are determined by policy goals and BNEF's expectation of goals being met or exceeded. Long term (to 2030) build rates by BNEF are modelled economically based on an investment decision framework.

Comparison of Results and Metrics for Clean Energy in Selected Countries

For four regions—China, the European Union (EU), India and the United States (US)—authors present ClimateWorks strategy targets, expected reductions in 2020 and key differences in 2020 between the WEO 2009 reference scenario and the WEO 2013 New Policy Scenario. ClimateWorks' strategy targets in the power sector are defined in terms of renewable energy capacity above the BAU scenario and in coal avoided or retired beyond the BAU scenario. Authors compare policy impacts aggregated by ClimateWorks in the 2013 review with Ecofys and Climate Analytics and the metrics from the WEO scenarios and 2014 projections from BNEF. Authors draw insights on how differences in approach can increase understanding of the projections as well as what this analysis implies for the level of confidence in the estimates.

China

The ClimateWorks strategy target for China was the largest of the four regions. The expected reductions in 2020 are generally supported by this comparative analysis. Based upon the difference in the WEO scenario projections, the level of renewable energy capacity will greatly exceed the strategy target—a projection even further exceeded by BNEF. The target of 420 million tons of coal avoided does not yet appear to be met but overall expected reductions in the power sector are still sizeable, almost 600 Mt CO_2e compared to prior projections.

Table 1. Clean Power in China[3]

	CWF Strategy Target in 2020	Difference between WEO 2009 (REF) and 2013 (NPS)	CWF Expected Reductions in 2020
Renewable Energy above BAU	293 GW	349 GW	690 Mt CO_2e
Million tons of coal avoided	420 Mtce	209 Mtce	180 Mt CO_2e
Total Expected CO_2e Reductions		584 Mt CO_2e	870 Mt CO_2e

When comparing specific policies, ClimateWorks' expected reductions match most closely to the aggregate estimates in the WEO NPS (590 Mt CO_2e compared with 584 Mt CO_2e, respectively). The CAT estimates for increased renewables and the retirement of small

[3] The RE and coal metrics from the WEO shown in Figures 1, 4, 7 and 10 are for comparison with strategy targets from ClimateWorks. The IEA does not publish specific CO_2e reductions associated with these metrics. Thus, the Expected CO_2e Reductions are meant to be compared with each other, but are not a direct sum of shown metrics.

inefficient coal plants are similar to those of ClimateWorks, but the team did not assess policies related to Air Quality Standards, the Environmental Dispatch Rule, or the increased commitment to natural gas. These policies are complex and lack established methodologies for estimating effects on future emissions from coal-powered electricity generation or renewables growth. Given this uncertainty, ClimateWorks chose to count estimates of expected reductions associated with these policies but also included more conservative estimates available for these policies.

Table 2. Clean Power Associated Policies or Measures in Implementation (2008-13) in China

	CWF Expected Reductions in 2020	Ecofys/Climate Analytics Expected Reductions in 2020 from Related Policies
FIT for solar PV to increase PV capacity from 20 GW to 50 GW in 2020	30 Mt CO_2e	90-180 Mt CO_2e
Increase in wind target to 200 GW expected to add at least 75 GW of additional wind in 2020	170 Mt CO_2e	
Air quality standards (PM 2.5) and air quality management plans for major urban areas	170 Mt CO_2e	N/A
Coal retirement of small inefficient plants	100 Mt CO_2e	90-190 Mt CO_2e
China Environmental Dispatch Rule, to displace coal with natural gas for an additional 101 TWhs	30 Mt CO_2e	N/A
Target to increase natural gas to 10% of total energy supply by 2020	90 Mt CO_2e	N/A
TOTAL Expected CO_2e Reductions	**590 Mt CO_2e**	**180-370 Mt CO_2e[4]**

Table 3. Comparison of Key Clean Power Metrics in 2020 between IEA WEO and BNEF

		WEO 2009 (REF)	WEO 2013 (CPS)	WEO 2013 (NPS)	WEO 2013 (450)	BNEF Wind and Solar Market Outlooks (June 2014)
Renewable Energy	Solar (GW)	9	70	81	87	155
	Wind (GW)	74	180	210	225	195
	Other Renewables (GW)	259	371	400	405	
Power Generation	Coal (Mt CO_2e)	5115	5086	4495	3693	
	Gas (Mt CO_2e)	78	133	139	153	
	Coal (Mtce)	1833	1837	1624	1336	
	Total (Mt CO_2e)	5235	5238	4651	3863	

One aspect worth highlighting in China is the projected growth of solar from an estimate of 9 GW in 2020 (WEO 2009) to current estimates of 70 GW (CPS), 81 GW (NPS) and 155 GW

[4] The TOTAL Expected CO_2e Reductions from Ecofys/Climate Analytics would be 470-660 Mt CO_2e if one used the comparable values from ClimateWorks for the Air Quality, Environmental Dispatch, and Natural Gas policies.

in 2020 in the latest projections from BNEF. Total emissions from coal for power generation have decreased more than the total overall emissions from power generation, offset somewhat by an increase in emissions from natural gas for power generation.

European Union (EU)

In 2009, the European power sector was projected to construct the majority of new solar and wind energy capacity globally with relatively little new coal-generated facilities compared to other regions. A recent resurgence of coal means that much of the programmatic efforts (and successes) were achieved by preventing the construction of new coal facilities and supporting high-level government targets for renewable energy.

Table 4. Clean Power in the EU

	CWF Strategy Target in 2020	Difference between WEO 2009 (REF) and 2013 (NPS)	CWF Expected Reductions in 2020
Renewable Energy above BAU	151 GW	111 GW	220 Mt CO_2e
New coal avoided or coal retired above BAU	20 GW	9 GW	80 Mt CO_2e
Total Expected CO_2e Reductions		168 Mt CO_2e	300 Mt CO_2e

Installation of significant additional renewable energy capacity is expected in 2020 above the already impressive 2009 baseline projection with almost 170 Mt CO_2e saved compared to the Reference scenario. This demonstrates sizeable savings from the additional growth in renewable energy capacity and suggests that new generation capacity has continued to favor low carbon technologies over fossil fuels.

Table 5. Clean Power Associated Policies or Measures in Implementation (2008-13) in EU

	CWF Expected Reductions in 2020	Ecofys/Climate Analytics Expected Reductions in 2020 from Related Policies
70+ GW of new coal plants blocked	140 Mt CO_2e	N/A
Construction of 10 new unabated coal-fired power plants in the UK and 5 new coal-fired power plants in Germany was stopped	50 Mt CO_2e	N/A
TOTAL Expected CO_2e Reductions	190 Mt CO_2e	N/A

The associated policies reported to ClimateWorks focused on preventing new coal plants that could compete with new renewable generation facilities. The CAT team noted that attributing impacts from these policies in comparison to a baseline that did not anticipate additional coal is complex and is best considered as prevention of a worsening BAU scenario.

The Bloomberg New Energy Finance projections for solar energy in the EU also far exceed those of the WEO New Policies Scenario and 450 Scenario by as much as 57 GW, a difference higher than the total projected solar expected was in 2009.

Table 6. Comparison of Key Clean Power Metrics in 2020 between IEA WEO and BNEF

		WEO 2009 (REF)	WEO 2013 (CPS)	WEO 2013 (NPS)	WEO 2013 (450)	BNEF Wind and Solar Market Outlooks (June 2014)
Renewable Energy	Solar (GW)	48	112	118	124	175
	Wind (GW)	183	180	182	195	192
	Other Renewables (GW)	161	201	203	205	
Power Generation	Coal (Mt CO_2e)	834	811	759	670	
	Gas (Mt CO_2e)	376	304	285	258	
	Coal (GW)	182	175	173	163	
	Total (Mt CO_2e)	1250	1155	1082	963	

India

Of the four regions, India has the smallest projected emissions and smallest abatement potential in 2020. However, investment decisions made today will have lasting impacts for the country's power system and emissions beyond 2020. Efforts supported by ClimateWorks focused on accelerating cost-effective renewable energy generation capacity additions and projections have grown from 27 GW in WEO 2009 to 49 GW in the WEO 2013 NPS.

While growth in expected renewable energy capacity may now meet or exceed the strategy target (BNEF projects 69 GW of solar and wind in 2020), there has been an increase in emissions expected from coal for power generation. This limits the aggregate emissions reductions expected from additional renewable energy capacity and is likely related to changes in underlying drivers, e.g. GDP growth and higher than expected demand for coal generation.

Table 7. Clean Power in India

	CWF Strategy Target in 2020	Difference between WEO 2009 (REF) and 2013 (NPS)	CWF Expected Reductions in 2020
Renewable Energy above BAU	59 GW	49 GW	90 Mt CO_2e
Total Expected CO_2e Reductions		15 Mt CO_2e	90 Mt CO_2e

Table 8. Clean Power Associated Policies or Measures in Implementation (2008-13) in India

	CWF Expected Reductions in 2020	Ecofys/Climate Analytics Expected Reductions in 2020 from Related Policies
The National Solar Mission; the National Wind Mission; India's 12th five year plan raises RE capacity additions to 30 GW	60 Mt CO_2e	10 Mt CO_2e
TOTAL Expected CO_2e Reductions	60 Mt CO_2e	10 Mt CO_2e

The CAT policy projections associate only an additional 10 Mt of savings from current policies supporting solar and wind generation, based on comparison with a baseline from the WEO 2011 which assumed 15 GW of PV set to occur by 2020.

Table 9. Comparison of Key Clean Power Metrics in 2020 between IEA WEO and BNEF

		WEO 2009 (REF)	WEO 2013 (CPS)	WEO 2013 (NPS)	WEO 2013 (450)	BNEF Wind and Solar Market Outlooks (June 2014)
Renewable Energy	Solar (GW)	1	15	17	21	28
	Wind (GW)	26	33	48	49	41
	Other Renewables (GW)	58	64	69	77	
Power Generation	Coal (Mt CO_2e)	1042	1171	1054	913	
	Total (Mt CO_2e)	1151	1251	1136	1003	

Similar to China and the European Union, BNEF is projecting a significantly higher penetration of solar generating capacity. Also similar to China estimates, BNEF projects slightly lower installed capacity for wind generation than the WEO 2013 NPS or 450 Scenario.

United States (US)

The US power sector is undergoing a significant structural shift, in large part due to abundant low-cost natural gas. This helped expedite the retirement of coal plants and pre-empted the construction of new coal facilities. Programmatic efforts since 2009 had ambitious targets for both additional renewable energy capacity and coal avoided and retired beyond the BAU scenario.

Table 10. Clean Power (US)

	CWF Strategy Target in 2020	Difference between WEO 2009 (REF) and 2013 (NPS)	CWF Expected Reductions in 2020
Renewable Energy above BAU	100 GW	21 GW	140 Mt CO_2e
New coal avoided or coal retired above BAU	105 GW	45 GW	310 Mt CO_2e
Total Expected CO_2e Reductions		273 Mt CO_2e	450 Mt CO_2e

This analysis shows significant progress with expected savings of ~270 Mt CO_2e when comparing the latest WEO 2013 NPS projections. Further, the NPS scenario only includes "cautious implementation of carbon pollution standards on new power plants," so it does not account for recent policy actions within the last year such as the EPA's Clean Power Plan that authors expect will result in even greater reductions and progress toward the 450 Scenario.

Table 11. Clean Power Associated Policies or Measures in Implementation (2008-13) in US

	CWF Expected Reductions in 2020	Ecofys/Climate Analytics Expected Reductions in 2020 from Related Policies
New renewable energy and efficiency standards in multiple states	40 Mt CO_2e	14 Mt CO_2e
California increases it RPO to 33% by 2020	20 Mt CO_2e	
New EPA regulations, 45+ new coal plants stopped and 13% of coal fleet with confirmed retirement dates	170 Mt CO_2e	90-180 Mt CO_2e
EPA New Source Performance Standard for existing oil and gas wells	70 Mt CO_2e	N/A
TOTAL Expected CO_2e Reductions	300 Mt CO_2e	114-194 Mt CO_2e

By comparison, CAT projections also note that much of the expected renewable energy capacity from state RPS is now in the baseline with a smaller savings from additional policies.[5]

Table 12. Comparison of Key Clean Power Metrics in 2020 between IEA WEO and BNEF

		WEO 2009 (REF)	WEO 2013 (CPS)	WEO 2013 (NPS)	WEO 2013 (450)	BNEF Wind and Solar Market Outlooks (June 2014)
Renewable Energy	Solar (GW)	19	34	34	40	61
	Wind (GW)	92	90	94	109	94
	Other Renewables - (GW)	129	131	133	137	
Power Generation	Coal (Mt CO_2e)	2003	1676	1616	1298	
	Gas (Mt)	390	509	510	551	
	Coal (GW)	349	316	304	291	
	Total (Mt CO_2e)	2414	2201	2141	1860	

Expected renewable capacity has increased by ~20GW since 2009. Most state renewable portfolio standards (RPS) were already considered in the baseline scenario, yet this projection still seems low given changes in cost and growth of solar power as evident in the BNEF projections.

Similar to China but more pronounced, the overall savings from the reduction in coal is larger than the savings from the power generation sector as a whole. This is due to the increased demand for, and emissions from, natural gas for power generation and should serve as a reminder that natural gas is still a fossil fuel with significant GHG emissions of its own.

[5] Both ClimateWorks and the CAT team, at the time of this analysis, had not looked at the President's Climate Action Plan or the recently announced Clean Power Plan from the EPA. While implementation of these policies is still uncertain, these measures bode well for additional savings beyond these projections.

Conclusions, Recommendations and Next Steps

The goals of this paper were to explore projections around targeted GHG reductions in 2020 and in particular to increase the certainty around the likelihood of expected savings as well as to highlight remaining opportunities for further efforts to achieve necessary reductions. The analysis focused on independent estimates of reductions in 2020 and found that across four major regions—China, the European Union, India, and the United States—reductions of over 1 Gt of CO_2e are projected in the power sector based on a comparison between the WEO 2009 reference scenario and the WEO 2013 New Policies Scenario. While not precise, the multiple approaches in this paper suggest a degree of accuracy and certainty beyond any one estimate.

This projection of 1 Gt of savings is supported by a variety of policies in the four regions and is associated with significant increases in renewable energy capacity and coal avoided or retired beyond the BAU scenario. In the four year period (2009-2013), the change in these projections suggest that over 60% of the targeted CO_2e reductions in 2020 (~1040 Mt CO_2e out of ~1710 Mt CO_2e) may be achieved if policy commitments, as of mid-2013, are cautiously implemented. Additional data drawn from recent market outlooks for the renewable energy sector suggest even greater reductions may now be set to occur especially with the capacity for solar PV projected to possibly surpass even the most ambitious targets from a few years ago.

Conversely, this analysis suggests that about 40% of previously targeted reductions will fail to be realized without further action. New policy announcements since mid-2013 may further close this gap, and should be integrated into this analysis once independent, consistent assessments are available. Noticeable upticks in the projected emissions from coal for power and direct fuel consumption in many regions, and the growing emissions from newly built or highly-utilized natural gas generation capacity represent trends that run counter to long term decarbonization goals. To meet global mitigation targets and progress toward the 450 Scenario, further reductions in 2020 and then deepening of reductions in 2025, 2030 and beyond will be necessary.

Looking ahead, it will be important for independent research groups and non-governmental organizations to monitor and track policy implementation. Though many of these estimates are discounted, all estimates of future savings from policies assume a level of follow through on policy implementation that should not be taken for granted. Complete and thorough implementation can also achieve greater savings than those projected in this analysis. Further, broader exogenous trends can at times threaten expected savings from current policies or even lead to the rolling back or weakening of policies, suggesting independent analysts can provide a level of scrutiny and vigilance to monitor for the resurgence of higher emissions projections.

This analysis demonstrates tangible progress of over 1 Gt of emissions reductions to meet GHG reduction goals in 2020, but there is both the need and the room for additional policy efforts to achieve deeper decarbonization. To better understand global and national progress toward decarbonization, it is most effective to look at a broader set of leading metrics and/or policy targets rather than only projections of CO_2e emissions or expected reductions. Specific driver metrics may provide deeper insights into the pace and progress of decarbonization, as well as allow for a better understanding of where major gaps remain. In the year ahead, the groups discussed in this paper will continue working to build on and update their previous work, and these estimates should all be revisited accordingly.

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