



Aspen Global Change Institute Energy Project

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FROM PARIS TO MARRAKECH – PRIORITIES, PROGRESS, AND OBSTACLES

The COP22 meeting in Marrakech, Morocco embodied both the promise and the challenge of the climate task at hand. 113 countries ratified the Paris Agreement ahead of schedule (on November 4, 2016), just a few days before the convening in Marrakech. World leaders arrived at the COP22 meeting with a continued sense of momentum gained from COP21 in Paris, set to discuss adaptation and finance plans. But they also came with ambitions to address

the many unknowns that still exist: costs, metrics, timeframes, transparency procedures, verification methodologies, and more (Bateman and Mann 2016, Xu et al. 2016). These were the topics on the minds and agendas of over 200 world leaders as they convened in Marrakech.



Priorities at Marrakech

Usable Information

Official, reliable, vetted climate information will be a challenge in the future. As in the case of past IPCC reports, gathering and analyzing official information on a global scale is a time- and resource-intensive process. By the time official publications are released, data and information are often a year or more out-of-date. Timely information on the progress of nations upholding their intended national determined contributions (INDCs) will be critical in the coming decades. There may therefore be an opportunity for unofficial, but still credible, progress reports from academia, workshops, businesses, and governments. This will likely be the only way leaders will be able to meet the demands of the five-year review cycles outlined in the Paris Agreement.

Financial Pledges

Under the Paris Agreement, it was decided that developed nations would provide financial support to developing nations to help meet decarbonization goals: \$100 billion per year by 2020, from public and private sources. Current commitments amount to \$67 billion per year by 2020, underscoring the need for additional commitments. There is also the question of how best to track climate finance. The latest research finds that the current climate finance accounting system, while still in development, is still unable to provide accurate data and reporting (Xu et al. 2016).

Diplomatic and Geopolitical Considerations

The Paris Agreement established an ambitious timeline for targets, but no process for achieving them. Therefore, cap-and-trade markets, global stocktakes (five-year evaluations of countries' progress on their climate action plans), and other mitigation mechanisms will rely upon collaborative geopolitical cooperation and mutual accountability. The INDCs to date will enact moderate mitigation efforts by 2030, in comparison to the ambitious long-term goals stipulated in the Paris Agreement. Additional voluntary commitments on the part of national and subnational actors will be necessary, which may prove difficult in countries like the U.S. in the face of deep political polarization around the issue (Bang et al. 2016).

Progress in Action

Climate Vulnerable Forum

One of the most inspiring outcomes of the COP22 meeting in Marrakech occurred on the last day, when 48 of the world's poorest countries committed to supplying 100 percent of their domestic energy from renewable sources between 2030 and 2050 (CVF 2016). The group, part of the Climate Vulnerable Forum, called on a peaking of global emissions by 2020, and carbon neutrality by the 2050s. This movement recognizes that even under a 1.5°C scenario, disadvantaged populations will be dangerously vulnerable to climate change impacts. Their



commitment to promoting green economies was extended as additional encouragement to other nations to increase their INDCs. Edgar Gutierrez of Costa Rica proclaimed, "We don't know what countries are still waiting for to move towards net carbon neutrality and 100 percent renewable energy."

Academia

The academic community is also making strides to rise to the challenge of achieving the Paris Agreement's objectives. Much of the research in the lead up to COP21 in Paris was focused on a 2°C scenario, so additional research has been in demand on the more ambitious, preferred 1.5°C aspiration put forth in the Paris Agreement. Since then researchers have been coordinating to modify the focus of the research agenda of the 2018 IPCC Special Report on a 1.5°C target instead. While many within the academic community have questions about the achievability of such a goal, they have nevertheless rallied around a sense of responsibility to provide usable science to answer decision-makers' questions (Editorial 2016). As the imperative for climate mitigation intensifies, the academic community is exploring opportunities to provide more, and better, leadership (Bateman and Mann 2016).

Private Industry

While not accountable directly under the Paris Agreement, businesses are increasingly emerging as leaders in combatting climate change. One example of the progress made by the private sector is the aviation industry, which has announced its intentions to increase efficiency, decrease reliance on carbon-intensive fuels, and even adopt carbon pricing. In Marrakech, the Lima-Paris Action Agenda (LPAA) formally recognized the voluntary business actions addressing climate change. This gesture was scrutinized by some, however, questioning if the LPAA program was overreaching its mandate. Likewise, the presence of businesses at COP proceedings was also called into question by some, citing the potential for conflicts of interest. While some question the appropriate level of participation by businesses in COP22 meetings, there is no doubt that private industry measures to combat climate change contribute significantly to the rising groundswell of mitigation.

Subnational Actors

In the face of questionable U.S. federal support for climate action, subnational actors are forging ahead with their momentum from recent years. California continues to be an international leader in renewables adoption, tackling technological considerations in the effort to meet large-scale integration of wind and solar at a level of 33 percent by 2020 (Shaker et al. 2016). In a speech at the 2016 American Geophysical Union (AGU) Fall Meeting in San Francisco, California's Governor Jerry Brown strongly confirmed his state's commitment to its ambitious trajectory to decarbonize, regardless of federal administration priorities. Likewise, Hawaii is committed to supplying 100 percent of its electricity from renewables by 2045. The state is pursuing this ambitious goal through policy and tax incentives, smart grid development, as well as investment in solar, offshore wind, bioenergy, and marine hydrokinetic energy (EESI 2016). Governors in New England and on the west coast are likewise exploring additional climate and



clean energy opportunities, entering into agreements on carbon pricing (Bateman and Mann 2016).

Obstacles Ahead

United States Leadership

On the second day of the COP 22 meeting, Donald Trump prevailed as the winner of the U.S. presidential election. Many world leaders were under the assumption that Hillary Clinton, and her supportive platform of climate policy, would be the future of U.S. leadership on climate change. By contrast Donald Trump, whose stance on climate change is at best questionable, was a shock to the system at Marrakech. Nevertheless, UN leaders held firm that regardless of this new unknown, progress launched at COP21 would not be derailed. This was underscored by the Chinese delegation, which insisted that climate change would remain a critical focus for China, “whatever the circumstances.” Through these words, and additional displays of leadership, China is signaling that they are prepared to emerge as the international leader on climate mitigation (Hilton and Kerr 2016).



Within the United States, the future of federal support of climate action is much less certain. The INDCs put forth by the United States in the Paris Agreement were already ambitious – with models showing achievement of those targets in only the most aggressive scenarios (Greenblatt and Wei 2016). The Environmental Protection Agency’s current administrator, Gina McCarthy, acknowledges that the agency has experienced a lot of anxiety since the election. However, she is hopeful that mitigation efforts will persist on many levels, regardless of the official stance of the administration (Showstack 2016). As she said in a speech in late November, “We have been successful over five decades in avoiding partisan politics as much as possible. It really doesn’t matter if you are a Republican or a Democrat: You still want your kids to be healthy and the future to be sound.”

Integration Higher Levels of Renewables

Subnational actors ambitions to integrate renewable energy at scale mean they must answer questions about how they can achieve their long-term targets. The main issue is variability. Because wind and solar only produce the power that weather will yield, grid managers used to turning on power plants as needed are adjusting to a new paradigm. As renewable energy continues to be added to the grid at an exponential rate, storage and other updates to the grid will be necessary to account for higher amounts of renewables (Stram 2016). Historically, utilities have resisted increasing the penetration of renewables to more than 10-15 percent, feeling that higher rates threaten reliability – but increasingly, jurisdictions are adopting rates of 20 percent or more while maintaining reliability and keeping costs low (Martinot 2016).

While the cost declines of wind and solar mean they will likely form the backbone of the electricity system through the renewables transition, other renewables serve as important complements that reduce the intermittency problem. Other countries like Austria, Costa Rica, New Zealand, Norway, and Uganda have particularly plentiful hydroelectric and geothermal resources, allowing them to reach 60-90 percent renewable penetration and bypass the variability challenge (Martinot 2016).

California, the world's 6th largest economy by some measures, in particular has pushed the boundaries of renewable integration and will continue down that path with its goal to reach 50 percent renewables by 2030. California's Low Carbon Grid Study by Brinkman et al (2016) has identified four keys to ensuring the booming wind and solar market keeps costs low and does not threaten reliability: 1) relying on a diverse portfolio of renewables (including geothermal and hydro) *and* energy efficiency, 2) encouraging electricity use when solar and wind are plentiful (and discouraging it when they are not), 3) cooperation throughout the Intermountain West, and 4) finding ways for wind and solar plants to mimic dispatchable gas plants.

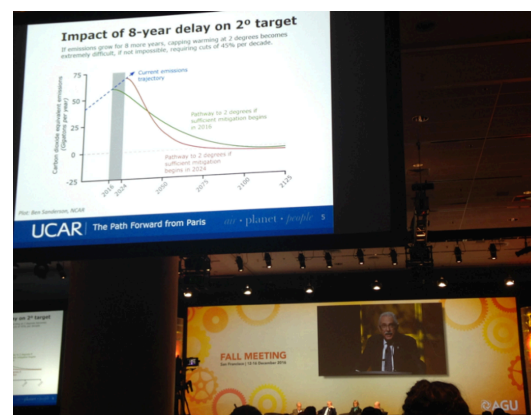
Looking Forward

The majority of the global process in the wake of the Paris Agreement has been focused on 2018, the deadline decided by countries to have firmer adaptation and mitigation commitments, plans, and progress underway. Likewise, the special IPCC Report on impacts of and pathways to a 1.5°C scenario will be completed by this time. These next couple of years will be a time for countries to conduct research and develop country-specific plans to meet their INDCs. This was reflected in the general tone and tenor of Marrakech.

While this planning process is indeed invaluable, so too is maintaining a sense of imperative. At the AGU Fall Meeting, a Union session convened a panel on "The Path Forward from Paris, One Year Later."

During this session, panelist Carlos Nobre of the National Institute of Science and Technology of Climate Change echoed a similar message to that stated by Edgar Gutierrez at COP22: "Why does the system not respond to the risk? Why doesn't that translate into more action? Why are leaders so slow-moving?... It took more than twenty years between the Kyoto Protocol and the Paris Agreement. We don't have that kind of time... We need a disruptive transformation of the political system."

Whether that disruption comes from private innovation, or subnational actors, or a groundswell has yet to be determined.



Works Cited

- Bang, G., J. Hovi, and T. Skodvin. 2016. The Paris Agreement: Short-Term and Long-Term Effectiveness. *Politics and Governance*. 4(3)209-218.
- Bateman, T and M. Mann. 2016. The supply of climate leaders must grow. *Nature Climate Change*. 6 (November 2016) 1052-1054.
- Brinkman, G., J. Caldwell, A. Ehlen, J. Jorgenson. 2016. Low Carbon Grid Study: Analysis of a 50% Emission Reduction in California. NREL Publication. Available http://lowcarbongrid2030.org/wp-content/uploads/2016/01/1601_Low-Carbon-Grid-Study-Analysis-of-a-50-Emission-Reduction-in-CA.pdf.
- CVF. 2016. The Climate Vulnerable Forum Vision. Outcome Documentation: CVF2016/1 | Marrakech High Level Meeting – 18 November 2016. Accessed 10 Dec 2016. <http://www.thecvf.org/marrakech-vision/>
- Editorial. 2016. Researching 1.5°C. *Nature Climate Change*. 6 (November 2016). 975.
- Greenblatt, J.B and M. Wei. 2016. Assessment of the climate commitments and additional mitigation policies of the United States. *Nature Climate Change*. 6 (2016) 1090-1093.
- Hilton, I, O. Kerr. 2017. The Paris Agreement: China's 'New Normal' role in international climate negotiations. *Climate Policy*. 17(1) 48-58.
- Martinot, E. 2016. Grid Integration of Renewable Energy: Flexibility, Innovation, and Experience. *Annual Review of Environment and Resources*. 41 (1).
- Shaker, H. H. Zareipour, and D. Wood. 2016. Impacts of Large-scale Wind and Solar Power Integration on California's Net Electrical Load. *Renewable and Sustainable Energy Reviews*. 58 (May 2016)761-774.
- Showstack, R. 2016. EPA head calls climate change biggest threat to U.S. progress, *Eos*, 97, doi:10.1029/2016EO063439. Published on 22 November 2016.
- Smith, T. 2016. The Path to 100% Renewable Energy in Hawaii. Published by the Environmental and Energy Study Institute.
- Stram, B.N. 2016. Key Challenges to Expanding Renewable Energy. *Energy Policy*. 96 (September 2016): 728-734.
- Xu, Y., Z. Dong & Y. Wang. 2016. Establishing a measurement, reporting, and verification system for climate finance in post-Paris agreement period, *Chinese Journal of Population Resources and Environment*, 1-10. DOI:10.1080/10042857.2016.1258802