IEEJ Energy Journal Special Issue December 2018

Seven Things Everyone should Know about Climate Policy

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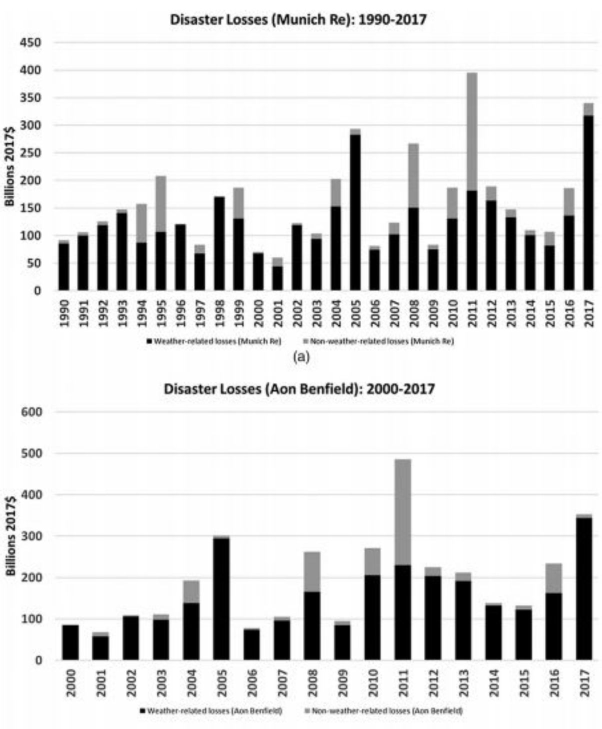
The recent release of the Intergovernmental panel on Climate Change report on meeting a temperature target of 1.5 degrees C has focused attention on the magnitude of the climate challenge and the lack of progress to date (IPCC, 2018). This paper summarizes seven things that everyone should know about climate policy, but in my experience are often underappreciated. It is only with a better understanding of the challenge that effective policy options might be developed and implemented.

1. Economic Damage from Weather Disasters as a Proportion of Global Gross Domestic Product has Decreased since 1990.

A common approach to motivating political action on climate change has been to point to recent disasters as evidence of the consequences of increasing greenhouse gases in the atmosphere, accompanied by an implication that such disasters might be lessened in the future if action is taken. There is a significant literature on the lack of efficacy of such strategies (see, e.g., O'Neill et al. 2009). Here I point to another obstacle to such strategies: in recent decades as the economic toll of weather disasters has increased, such losses have also decreased as a proportion of the global economy. In economic terms, disasters are less significant than they used to be.



The figure to the left shows that (inflation-adjusted) total global losses and those related to weather and climate, as tracked by Munich Reinsurance (for 1990 to 2017) and Aon (for 2000 to 2017) have increased.[1] However, once the losses are considered as a proportion of global GDP there is a downward trend over the period 1990 to 2017. Of course, any such trend is highly sensitive to start

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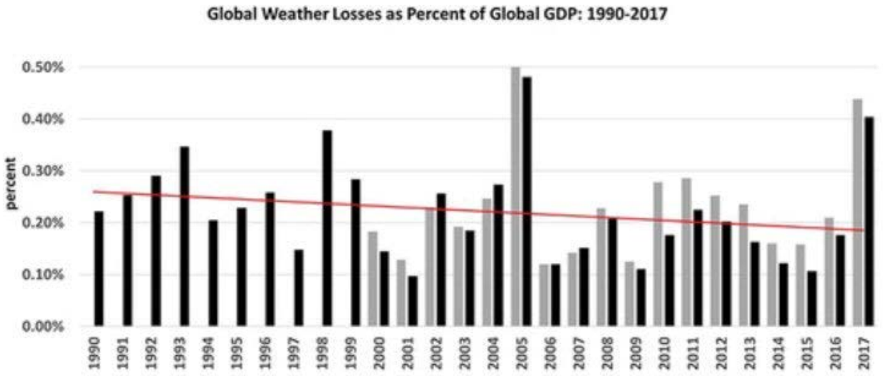
1 For a description of data and methods see Pielke (2019).

and end date.



There is of course no guarantee that this trend continues into the future, but it does help to explain why appeals to recent disasters may have trouble finding traction in the climate debate beyond those who already are focused on the issue. The world has been getting richer faster than the increasing toll weather and climate disaster, and this is good news indeed. Of course, if one wishes to understand trends in weather and climate extreme, one should look at climatological data, not economic losses. Such data is consistent with what is observed in losses (IPCC, 2018).

2. Climate Impact Studies Favour an Implausible Scenario for 21st Century Emissions

Climate impact studies – those that project the future consequences of increasing greenhouse gases in the atmosphere – display a heavy reliance on one emission scenario, called RCP (Representative Concentration Pathway) 8.5, in climate impact studies. The RCP 8.5 scenario is based on an assumption of the dramatic expansion of coal energy around the world over the 21st century which results in extremely high carbon dioxide emissions (Ritchie and Dowlatabadi, 2017). Despite its outlier status, RCP 8.5 is the most commonly used scenario in climate impact studies, appearing in thousands of academic papers.[2] Climate impact studies generally use physical climate models to project how the climate system might change in the future, with particular attention to phenomena like heat waves, floods, drought and hurricanes. The use of an extreme emissions scenario yields larger and more significant changes to climate in the future. The characterization of an extreme scenario as "business as usual" implies that it is a baseline scenario, a vision of what is likely to happen in the absence of climate policies.

However, RCP 8.5 has been criticized for its unrealism. Ritchie and Dowlatabadi (2017) conclude that "evidence indicates that RCP 8.5 does not provide a physically consistent worst case BAU trajectory that warrants continued emphasis in scientific research, it does not provide a useful benchmark in policy studies." In early 2017 the team of researchers responsible for producing the

2 https://www.bloomberg.com/news/articles/2017-05-24/misleading-coal-estimates-may-have-skewed-climate-projections

scenarios that will underpin the Sixth IPCC assessment observed that emissions consistent with RCP 8.5 “can only emerge under a relatively narrow range of circumstances.” Yet, RCP 8.5 remains a scenario favored by most climate impacts researchers publishing in the academic literature. One reason for this is obvious: because the scenario generates very high carbon dioxide emissions, the associated climate impacts projected in climate models can also be very large, which are media-friendly and thus help to lend continued urgency to calls for emissions reductions. Large future impacts provide support in economic models that show positive benefit-cost ratios for costly climate policies. However, to the extent that RCP 8.5 is an outlier, heavy reliance on it in climate impact scenarios runs the risk of being perceived as overstating concerns about future impacts and biasing benefit-cost analyses.

3. Success in Meeting the Goals of Reducing Emissions Consistent with a 1.5 or 2 Degree C Temperature Target Depend on the Wide Deployment of Technologies that Do not Exist

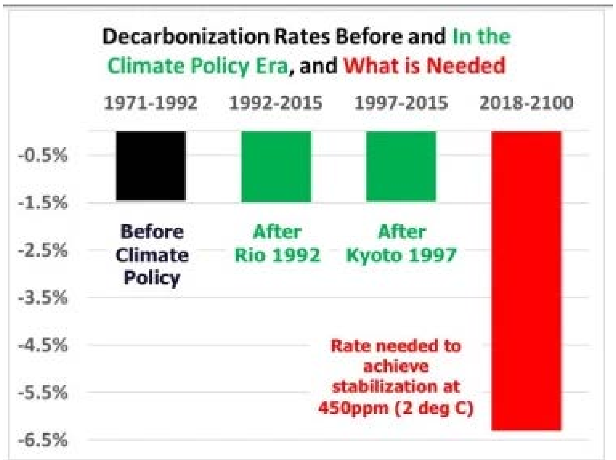
With the release of the latest IPCC report on the 1.5 C degree temperature target this issue of “negative emissions” has begun to receive wider attention (IPCC, 2018). Climate policy scenarios that result in dramatically reduced emissions by mid-century and later rely on the widespread deployment of bio-energy with carbon capture and storage, called BECCS, a technology that combines biomass energy production with the storage of carbon dioxide. BECCS allows for “negative emissions” — the removal of carbon dioxide from the atmosphere through the large-scale growing of plants, which are then combusted to create energy, with the carbon dioxide emissions from the combustion then captured and stored, presumably in deep geological formations. BECCS technologies thus serve two important functions in scenarios of the future: they serve as a source of carbon-free energy supply needed to replace fossil fuels, and as a sink for carbon dioxide in the atmosphere. BECCS technologies do not yet exist.

BECCS technologies are fundamental to the family of IPCC scenarios designed to take climate policy discussion into the 2020s. Fuss et al. (2014) observe that some extreme scenarios foresee BECCS accounting for more than 1,000 gigatonnes of carbon dioxide over the 21st century, with a median removal across scenarios of 12 gigatonnes per year. For comparison, in 2017 carbon dioxide emissions from fossil fuels emissions worldwide totalled about 37 gigatonnes. The Paris Agreement on climate change does not mention BECCS technologies, yet is fully dependent upon them. Geden (2016) argues that scenarios thus hide policy failure: “By establishing the idea of negative emissions, climate researchers have helped, unintentionally, to mask the lack of effective political mitigation action.”

4. There is Little Evidence that Climate Policy since 1992 has Influenced Global Decarbonization Rates

A very simple but powerful framework for understanding the levers available to influence carbon dioxide emissions was proposed in the 1980s by a Japanese scientist, Yoichi Kaya, as a tool for creating scenarios of future emissions that would be used as inputs to climate models. Kaya explained that future carbon dioxide emissions would be the product of four factors: population, economic activity, how we obtain our energy and how we use that energy.

From a policy perspective, these four factors can be used to describe in totality the means available to reduce future carbon dioxide emissions. In short, our levers available to reduce emissions are population, income, energy intensity of the economy and the carbon intensity of energy Decarbonization of the economy refers to the latter two terms and is expressed in terms of a ration of carbon dioxide emissions to economic activity. The figure below shows trends in the reduction in the ratio of emissions to GDP over different periods. To achieve stabilization of carbon dioxide concentrations in the atmosphere at a level consistent with a 2 degrees C temperature target would require an annual rate of decarbonization 6% or higher.[3]

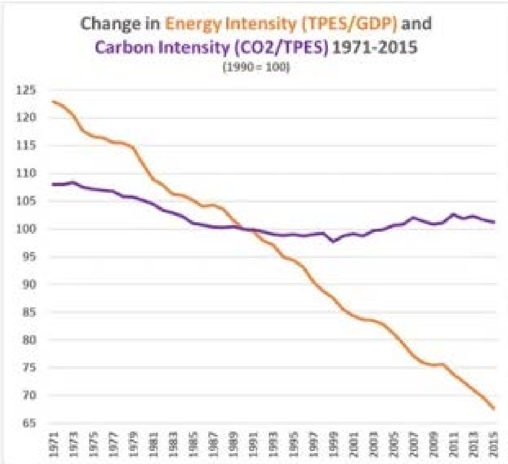


Before the 1992 Rio Earth Summit the world averaged a decarbonization rate of about 1.5% per year (data from the International Energy Agency). From 1992 to 2015, the post-Rio era or 1997 to 2015 the post-Kyoto Protocol era the world has also averaged decarbonization rates of about 1.5% per year. The data show that from a global perspective, climate policies to data have collectively not discernibly influenced rates of decarbonization. For all the achievements of international climate diplomacy, accelerating decarbonization has not yet resulted.

[3] https://www.pwc.co.uk/sustainability-climate-change/assets/pdf/low-carbon-economy-index-2018-final.pdf

5. The Most Important Policy Level for Deep Decarbonization is via Influencing Carbon Intensity

The Kaya Identity identifies four levers that might be used to reduced carbon dioxide emissions: population, per capita wealth, energy intensity of the economy and carbon intensity of energy. Obviously, no policy is going to be focused upon culling population or wilfully making people poorer. So action on climate, if it is to be successful, necessitates accelerating rates of improvements on energy use in the economy and emissions from the combustion of fossil fuels. Simple math tells us that the overwhelming majority of this effort must come from improvements in carbon intensity.



To put this another way, no matter what is done in terms of energy efficiency the world will need to source more than 90% of its energy consumption from carbon-free sources to stabilize carbon dioxide concentrations in the atmosphere at a low level. At present the world sources about 16% of its energy consumption from carbon-free sources, as shown below. The IPCC (2018) suggests that the world must reach 90%+ carbon-free by 2050 to hit a 1.5 C degree temperature target. The figure to the left shows global trends in energy intensity and carbon intensity since 1971 (based on data from the IEA), with 1990 set to equal 100. The data show little if any change in the rate of improvement in energy intensity over the period, including during the post-1992 era of international climate diplomacy. The data also show that global carbon intensity in 2015 was quite similar to what it had been in 1985, 30 years earlier.

6. United States Climate Policy is Subject to Dramatic Shift because Action has Occurred through Executive Actions rather than Congressional Legislation

Under Presidents Obama and Trump action on climate policy has focused on "executive orders" which are policy directives issued to federal agencies from the White House. Executive Orders do not have the same legal standing as Congressional legislation – for instance, an executive order can be over-turned or cancelled by a succeeding president. These are exactly the dynamics observed over the past decade. President Obama entered the U.S. into the Paris Agreement and domestically put forward what was called the "Clean Power Plan," which was inevitably going to face challenges in court. However, before those challenges could be resolved, as is well known, the Trump administration changed course on both domestic and international climate policy.

Such instability in U.S. climate policy should be expected to continue unless and until policies are proposed that can gain the support of enough Republicans and Democrats in the U.S. Congress to enact legislation which is then signed by the president. The lesson here is that one-party climate policy in the U.S. will be largely ineffective at achieving climate policy goals and hence will be more likely to serve purely political or symbolic functions.

7. The Intergovernmental Panel on Climate Change does not Serve as an "Honest Broker of Policy Alternatives"

Perhaps the most notable characteristic of the recent IPCC (2018) report is that it does not offer policy options. The IPCC first assessment report did discuss policy options, but since that time the organization has eschewed formal discussion of adaption or mitigation policy options. This has led to concerns that the IPCC may be favouring some technologies over others. For instance, several climate scientists have argued that the IPCC disfavors nuclear power.[4] The lack of explicit discussion of policy options means that the IPCC is well positioned to present the case for a policy problem to decision makers, but offers little in terms of what those decision makers might do in response. Not surprisingly, much of the public discussion focuses on empty exhortations ("something must be done") rather than debate over specific action alternatives that might, in particular, accelerate improvements in carbon intensity.

The IPCC, or another authoritative body, could convene discussions of and a cataloguing of alternative possible courses of action that might be readily implementable by decision makers. Similarly, such a policy-focused body could evaluate the vast array of climate-related energy and adaptation policies put into place around the world to assess what works, what does not and reasons for success or failure. In such a manner a group focused on climate policy alternatives could facilitate policy learning and diffusion. As policies implemented to date have had little impact on energy and climate intensity rates of improvement, it seems clear that a focus on understanding and perhaps even expanding the scope of policy choice (the "honest brokering of policy alternatives," see Pielke 2018) would offer opportunities for climate policy to get on course.

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[4] https://www.forbes.com/sites/michaelshellenberger/2018/10/29/top-climate-scientists-warn-governments-of-blatant-anti-nuclear-bias-in-latest-ipcc-climate-report/#602af0533973

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Writer's Profile

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He served as Director of the Center for Science and Technology Policy Research at the University of Colorado Boulder from 2001 to 2007 and from 2013 to 2016. He was a visiting scholar at Oxford University's Saïd Business School in the 2007-2008 academic year. His interests include understanding the politicization of science; decision making under uncertainty; policy education for scientists in areas such as climate change, disaster mitigation, and world trade; and professional sports.