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Why researchers should resolve to engage in 2017

January 4, 2017

"Liberal elites tell us that 'the science is settled', and that people must have faith in their predictions. But science is never settled."

"The EPA [Environmental Protection Agency] could overturn its own endangerment finding, which, according to the Supreme Court, compels the agency to regulate carbon dioxide. The EPA has just been handed a loaded gun to accomplish just that. … The paper 'The art and science of climate model tuning' is written by Frederic Hourdin and 15 co-authors. It details the phenomenal amount of adjustment that has been applied to the GCMs [global climate models] in order to get them to simulate the 20th Century or just the present climate."

The first quote is from a *Washington Examiner* article reposted by the American Enterprise Institute, and the second is from the Cato Institute — both US think tanks that support free markets and reduced government. The generalization in the first will be heard even more this year than in the last, and from leading US political figures. The second relates to genuine issues in science that need open discussion, and which can be seized upon to question the robustness of climate understanding — in good faith and in bad.

How should researchers engage with such opinions? Some would respond with 'don't bother' — picking holes in science is just a 'denialist' tactic, and correcting such people will have no influence given the imminent new political shape of Washington DC. On the contrary, *Nature* persists in the belief that researchers who take action by engaging with people beyond their peers in support of the evidence can make a positive difference.

Scientists can seek understanding of the dynamics of the debate — for example, by looking at previous eras in US politics to see what tactics were used by protagonists in equivalent situations (seeA. M. McCright and R. E. Dunlap *Theory Cult. Soc.* **27**(2–3), 100–133; 2010). They can also investigate what the psychological literature says about one's opponents — rather than dismiss them, one should instead tackle the issues while recognizing their values and their motivations for change (see, for example, go.nature.com/2pkjha8).

Rules of engagement

From both of these perspectives, one can conclude that a key avenue of engagement in the United States relates to promoting its international competitiveness — such as by keeping an eye on China's growth in low-carbon industries and carbon-capture technologies, and the adoption of such innovations worldwide.

Another approach is to engage in debate on social media and elsewhere on the state of knowledge. Some organizations that are opposed to government regulation show at least partial respect for the scientific literature, and many citizens — including journalists and policymakers

— simply want to see what the science is saying. In this case, a groundswell of scientists who engage using social media might productively influence the public discourse in 2017, whether in relation to the science or to topics such as the social cost of carbon — a key policy issue. An equally important form of engagement is for US researchers to write to their political representatives.

For those who are less familiar with online debates about the science, some websites are instructive either as examples to follow or in highlighting key arguments. RealClimate is by a group of mainstream climate scientists; Climate Etc. is a more critical take; and Skeptical Science reflects the views of an international group of technically minded individuals who look critically at climate-change scepticism. Climate Outreach provides tools to assist communication. More generically, there isadvice on alerting social media to fake news, and on getting your postings noticed on web searches (go.nature.com/2wzkmrg and google.com/adwords). In such engagements, researchers need to be as clear as possible about their motives as experts or advocates.

“Researchers need to be as clear as possible about their motives as experts.”

Another key area of engagement in 2017 will be genome editing. Its societal framing still needs to be established, especially where human inheritance of modifications would be involved. Values concerning the ethical status of embryos and of human suffering in disease remain in consistent opposition. The views of people with disabilities or diseases (see, for example, *Nature* **530,** 402–405; 2016), the interests of future generations, and ways of challenging social inequities all need to find expression. Moreover, the ethical issues can be critically dependent on the science, for example in understanding where the boundaries between non-heritable and heritable genome modifications might lie.

Invited panels of experts have been convened — see, for example, go.nature.com/2j34ntk andgo.nature.com/2yzphk7 — and many discussions are ongoing worldwide, but there is no single forum that can hand down a solution. Regulation will happen at a regional or national level, and again the voices of researchers outside the inner circles of policy need to be expressed. The science is moving rapidly. All the more need, therefore, for researchers to engage, and for those who see results being misrepresented to respond publicly, whether or not they choose to discuss research regulation and potential applications. As with climate-change politics, such engagement will be productive only if researchers try to understand the values of others.

Such public discussions may take many researchers outside their comfort zone. But as regulators seek clarification of the issues in genome editing, and as society at large wrestles with climate change and the many voices around it, outside that zone is where researchers surely need to venture. How they can be supported to do so is no easy question, and the need for new incentives in academic recognition is clear. All credit, therefore, to the sheer commitment of those researchers who engage despite the great time and effort required.