En-ROADS: Energy – Rapid Overview And Decision Support

Interactive Experimentation with a Global Energy and Climate Simulator for Policy Makers and Educators

The climate and energy infrastructure are coupled complex dynamical systems driven by multiple feedback processes, accumulations, time delays, and nonlinearities. However, research shows poor understanding of these processes is widespread, even among highly educated people with technical backgrounds (Booth-Sweeney and Sterman, 2007, Sterman 2008, Sterman 2011).

Effective risk communication in such complex settings must catalyze learning at a level deep enough to change entrenched mental models, attitudes, and behaviors. Mere transmission of information in reports and presentations is not sufficient (Weber and Stern 2011, Sterman 2011).

There is no learning without feedback, without knowledge of the results of our actions. Scientists usually generate that feedback through controlled experimentation. When experiments are impossible, however, as in the climate-energy system, scientists rely on models and simulations, which enable controlled experimentation in virtual worlds (Sterman 1994, Edwards 2010).

Learning arises in the process of interacting with the models, hypothesizing how the system might respond to policies, testing these with new simulations and data from the real world. Paradoxically, however, scientists, having deepened their understanding through an iterative, interactive learning process, often present the results to policymakers and the public through reports and briefings, then express surprise when these groups—unable to assess the evidence on their own and presented with claims that conflict with deeply held beliefs—resist the message and challenge the authority of the experts.

When experimentation is impossible, when the consequences of our decisions unfold over decades and centuries, that is, for the energy-climate system and many other complex challenges, simulation becomes the main—perhaps the only—way people can discover for

themselves how complex systems work and what the impact of different policies might be, and thus integrate science into decision making.

En-ROADS is a transparent, intuitive policy simulation model that provides policymakers, educators, businesses, the media, and the public with the ability to explore, for themselves, the likely consequences of energy, GDP, land use, and GHG emissions policies and uncertainties, with the goal of improving their understanding. The simulation, developed by Climate Interactive, Ventana Systems, and MIT Sloan, runs on an ordinary laptop in a fraction of a second, is available online, offers an intuitive interface, has been carefully grounded in the best available science, and has been calibrated against a wide range of existing integrated assessment, climate and energy models.

En-ROADS extends a multi-region climate simulator, C-ROADS, that is being used by officials and policymakers in key UNFCCC parties, including the United States, China and the United Nations. (Sterman et al. 2013)

References

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