

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy
Christine Sturm

Will defend her prospectus

Germany's Energy Transition Experiment
A case Study about Guiding Decisions and Governing Change in
Large Socio-Technical Systems

Abstract

Germany's energy system is changing at an incredible pace. Its renewable energy share increased exponentially over the past two decades accounting in 2013 for more than a quarter of Germany's gross electricity consumption (25.4%). This unprecedented achievement was only possible because Germany responded to the calls to action against anthropogenic climate change and rising greenhouse gas emissions with an integrated energy and climate policy, also known as the German *Energiewende*. However, the efforts to rapidly transform this large sociotechnical system are generating unpredictable dynamics and new complexity. These changes in turn make it not only harder to understand the system itself, but also increasingly difficult to guide reasonable decisions for its transition towards a more sustainable future state. Moreover, decisions to change the socio-technical energy system impact not only carbon emissions, but human well-being in all of its dimensions, with complex political and moral consequences related to energy justice and intergenerational equity, thus multiplying the complexity of the question "what ought we do with our energy systems?" even more.

In my research, I set out to critically explore the German *Energiewende* and to use this German case study with the overarching goal of finding out whether or not it is possible to govern change in large socio-technological systems. Beyond this overarching goal, I seek to generate descriptive-analytical, normative, and instructional knowledge about governing large socio-technical systems, at different spatial and temporal scales. I hypothesize that changing simultaneously too many variables in large and complex systems, with the intention of governing their transition from a less desirable state towards a more desirable one, can generate system dynamics that put at risk both the management efforts and the policy makers' best intentions. I will use the complex regulatory and policy framework that underpins Germany's *Energiewende* as framework for this research inquiry. To achieve my

research targets I will primarily employ mixed qualitative research methods such as grounded theory, participant observation, document analysis, and in-depth interviews. I will apply institutional analysis, to capture the organizational settings and the power dynamics that triggered their historical evolution. I will furthermore follow the evolution of Germany's energy discourse from the environmental movements that marked its beginning, to the institutionalization of this vision and its current proof-of-concept. I will build up my narrative in a novel way, as a continuous dialogue between theories, real-life experiences, explanations and insights. I will furthermore backup some of these examples with simple dynamic models to visualize and quantify consequences of rapid transitions and enhance understanding for potential governance barriers. Finally, I will synthesize my research findings into lessons that can be learned from the German energy transition experiment, and conclude my work with recommendations for future energy-political decisions.

Wednesday, December 3, 2014

2:00 p.m.

WGHL 401

Faculty, students, and the general public are invited.

Supervisory Committee:

Dr. Daniel Sarewitz – Chair

Dr. Clark Miller – Member

Dr. John Anderies – Member

Dr. Paul Hirt - Member