Understanding Map Design for Energy Policy, Planning, and Technology Implementation

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The development of a fully renewable and sustainable energy system is a spatial problem. Renewable energy systems are acutely sensitive to local geographical nuances. Further, intensive renewable energy development requires significant local changes to land-use and infrastructure. Despite these community impacts, development companies and government agencies often fail to include the public in planning and siting decisions for these new technologies. This failure often creates tensions that lead to project delays and, in some cases, project abandonment (Pasqualetti 2002). Maps, and especially online interactive maps, are one medium through which government and industry can better assess and communicate the local opportunities for, and potential impacts of, renewable energy development and implementation. Indeed, there is a growing body of literature in energy mapping and a steadily increasing number of maps depicting renewable energy potential across multiple geographic scales (Calvert *et al.* 2013; Resch et al., 2014). As most energy map products have been developed by engineers and planners, the purpose of this research is to bring a cartographic perspective to understanding energy map design and communication.

This research examines renewable energy map products that are available in the public domain, building on systematic map evaluation methods previously used in both the static and interactive map domains (e.g., Kessler and Slocum 2011, Aggett and McColl 2006). In this study, we first compile a large set of online maps pertaining to solar and wind energy, and categorize them according to geographic scale. Second, we apply quantitative content analysis (see Muehlenhaus 2011) in order to evaluate and characterize cartographic design and content of all map products. Third, we evaluate all interactive maps based on adherence to usability heuristics (Nielsen, 1993). Finally, we rate each of these maps based on their cartographic design and usability to better understand the extent to which these maps have the potential to explain renewable energy policies, potential, and technologies.

The anticipated results of this research will give us a better understanding of: 1) current renewable energy map products and 2) the intended role of these maps in strategic, planning and operational decisions across geographic scales in terms of facilitating the integration of renewable energy into energy planning and technology implementation decisions. This knowledge will be used to identify best practices and common issues in the design of such maps, and in turn help to support more effective synthesis between energy sciences, community energy planning, and cartography.

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BOOK CHAPTERS

2015 Brewer, C.A. and **Fish, C.** (in press) "GIS as a tool for mapmaking" In: (Monmonier) *The History of Cartography Project*, Volume 6". University of Chicago Press; Chicago, Illinois.

PEER REVIEWED PUBLICATIONS

2013 Schaetzl, R. J., Enander, H., Luehmann, M.D., Lusch, D.P., **Fish, C.**, Bigsby, M., Steigmeyer, M., Guasco, J., Forgacs, C., and Pollyea, A. (2013) Mapping the physiography of Michigan with GIS. *Physical Geography* 34(1): 2-39.

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