REIs: Renewable Energy Infrastructures

Principal Investigator: Chris Ford, Architecture
http://architecture.unl.edu/people/bios/ford_chris.shtml

Abstract

Designers have historically played a role as technological innovators. Like scientists, designers address problems outside of themselves and therefore are engaged in applied research. As such, our team is looking to apply our design thinking skills to a problem that involves energy production, energy transmission, and urban living. We believe a Renewable Energy Infrastructure (REI) will solve this problem.

An REI generates renewable energy megawatts (MW) at an industrial scale through the simultaneous harnessing of wind, solar, and geothermal resources within an integrated, holistic, and free-standing facility positioned in an urban environment. An REI is *not* a retrofit of a pre-existing architectural condition, but rather is conceived as a new typology to be owned and operated by an electrical utility for purposes of servicing users in high-population areas. We are in an advantageous position to consider this design problem and would first assess the full design requirements involved in such a proposal. We shall assess pre-existing and emerging industrial-scale power technologies and generate multiple plausible design options for hybridizing these solar, wind, geotechnical and (if applicable) hydrological technologies into a single, holistic, infrastructural entity. Our project deliverables yielded require working with the State of Nebraska's various public power districts in the design of (3) site-specific, technically-plausible REI solutions of escalating scale in Columbus NE (population 21,595), Lincoln NE (population 251,624) and Omaha NE (population 438,646). We are finding our preliminary design from March 2009 to have the technological potential of generating 124 MW of renewable energy.

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While renewable energy technologies of industrial scale (such as wind farms and solar arrays) are currently located in rural areas, their service to urban areas is compromised due to measurable degradation rates along electrical transmission lines and loss during electrical load step-down at transformers. We recognize that certain economic, political and social forces position these renewable energy technologies in rural areas, and we further recognize that our idea will meet resistance by existing zoning ordinances and prevailing "not-in-my-backyard" sensibilities. However, just as society has accepted water towers and cell phone towers on our landscapes because of their performative benefit, then so too does an REI (Renewable Energy Infrastructure) need to establish credibility through physical performance to best circumvent restrictive urban zoning policies, provoke NIMBY attitudes and provoke market transformation.

We are in an advantageous position to consider this design problem and would first assess the full design requirements involved in such a proposal. We shall assess existing zoning codes. We shall catalog pre-existing and emerging industrial-scale power technologies. We shall consult external partners with demonstrated expertise and knowledge in disciplines other than our own. As designers then, our role is to pull together diverse realms of expertise and generate multiple plausible design options for hybridizing these solar, wind, geotechnical and (if applicable) hydrological technologies into a single, holistic, infrastructural entity. Our project deliverables would require working with the State of Nebraska's various public power districts in the design of (3) site-specific, technically-plausible REI solutions of escalating scale in Columbus NE (population 21,595), Lincoln NE (population 251,624) and Omaha NE (population 438,646).