Power Struggles: Improving Energy Infrastructure Project Siting Outcomes in the Los Angeles Region

Executive Summary—The Los Angeles region's landscape is undergoing a transformation unlike anything since the highway construction boom of the 1950s and 1960s. The queue to connect new electricity generation facilities to transmission and distribution stations contains 79 projects in Los Angeles, San Bernardino, and Riverside counties alone. Nearly all of these new generation facilities will also require new transmission projects to deliver the electricity to urban areas. In addition, if extraction of natural gas in the Monterey Shale increases, there will be additional need for natural gas pipelines and gas processing facilities in the region. Clearly, land use conflicts related to energy infrastructure siting are, and will continue to be, a major economic, social and political problem in the greater Los Angeles (LA) area. The solution-driven *Power Struggles* research enterprise consists of a suite of two integrated research domains to help optimize regional economic, environmental, and social sustainability outcomes for the region:

This research develops a map of new and proposed energy infrastructure projects for the LA region using data from state agencies and energy industry trade publications. This action element provides a website with geographical information system (GIS) maps of all the proposed projects for the LA region. The GIS data will act as a spatial decision-making tool for municipal, county, and utility planners, as well as local communities to use to improve siting outcomes. Increasing community information can potentially optimize siting outcomes by speeding up the facility permitting times and can reduce socio-political conflict by including community preferences in the energy project design phase. The project includes outreach to local governments, local media outlets, as well as the use of social media to increase awareness of the project's data resource. The outcomes from website usage will be evaluated through stakeholder surveys and webpage traffic tagging.

The *Power Struggles* project provides solution-driven, cutting edge social science research to help the region build the energy infrastructure it requires for the region's continuing prosperity, and beyond that, helps inform local policies to ensure that infrastructure will be located and designed in a way that is acceptable to impacted communities.

Introduction and Motivation

The primary motivation for our work is to find ways to mitigate the negative effects of the "social dilemma". In this case, energy infrastructure projects that provide public goods such as economic development and reliable oil, gas, and electricity supplies also exhibit private "bads" such as health and safety risks, property value impacts, viewshed impairment, and environmental externalities to the communities near the infrastructure facilities. As a result, energy infrastructure projects are politically contested which results in delays, higher energy prices, litigation, and social protest that can pit communities against each other, and against regulators and energy suppliers.

Timely examples can be found right here in Los Angeles. Increasing the use of renewable energy is a major policy goal for the state of California. The Tehachapi Renewable Transmission Project (TRTP) is a project sponsored by Southern California Edison to connect wind power facilities in Kern County with customers in LA and San Bernardino Counties. However, after winning approval for all segments of the 250-mile, $2.1 billion power line in 2009, a protracted legal and political campaign compelled the California Public Utilities Commission (CPUC) to order a construction halt in November of 2011 for a five-mile section that runs through the City of Chino Hills. Figure 1 shows a picture of a partially completed tower looming over a house that is adjacent to the extremely narrow project right-of-way (Hope for the Hills, 2013). In addition to the social costs imposed on Chino Hills residents, the City of Chino Hills alone has spent about $3 million in taxpayer revenue to fight the power line. Furthermore, the line is behind schedule for completion. The CPUC has authorized Edison incur to costs to study placing the segment underground (Tasci, 2013), which will further delay getting the wind energy into LA. Aside from this local example, academic research has shown that citizen opposition is the largest barrier to siting new energy infrastructure (Vajhala, 2007).

Figure 1 Chino Hills Transmission Tower

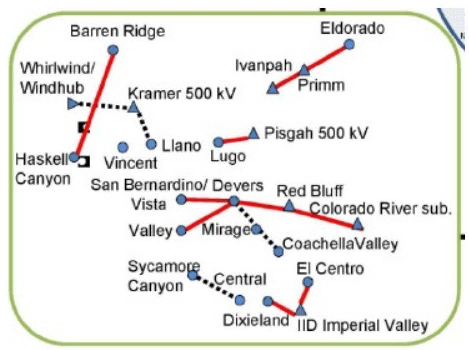
This issue is even more important because of the huge number of energy infrastructure projects that are transforming the landscape of the LA region. The anticipated land use changes include pipelines, electricity transmission lines, natural gas extraction and processing plants, as well as electricity generation facilities, each of which can transform local landscapes. Taken together, the proposed energy infrastructure projects are likely to alter portions of Southern California landscape by increasing the number of highly visible infrastructure facilities.

Landscape changes due to the electricity sector projects are being driven by California legislation; including policies to increase the amount of renewable electricity sold in the state (SBX1-2), as well as programs to reduce the emissions of greenhouse gases (AB32). Consider for a moment only proposed new electricity generation stations. The current California Independent System Operator queue to connect new generation facilities to transmission and distribution stations contains 79 projects in LA, San Bernardino, and Riverside counties alone (California ISO, 2013). The new generation projects include:

- 11 natural gas plants
- 5 large wind farms
- 57 new solar projects for over 10,000 megawatts of generation capacity equivalent to about 10 large coal or gas plants.

From a landscape perspective, wind and solar projects have a much larger land use footprint than fossil generation plants, because they require much more land area to generate electricity. In addition, utility-scale wind and solar projects are typically sited in rural and natural appearing areas, where they have the potential to change the landscape's relatively undeveloped character. While not all of these projects may be constructed, the interconnection queue is large enough to anticipate dramatic changes to the character of Southern California's landscape from new energy infrastructure.

Figure 2: New Power Lines in Southern California



Given this electricity generation data, consider that nearly all of these new facilities will require new transmission projects to deliver the electricity to urban areas. In addition to the recently constructed TRTP project mentioned above (and the Sunrise Powerlink in San Diego), Figure 2 shows that there are at least 6 new high voltage transmission lines (HVTLs) planned, approved, or under construction, for LA, San Bernardino, and Riverside counties to transmit renewable electricity and improve grid reliability (CTPG, 2012). Those under construction in Figure 2 include Eldorado-Ivanpah, Devers-Palo Verde, and Devers-Valley.

The planned projects for the electricity sector alone are intimidating enough even before considering the planned expansions to natural gas and petroleum infrastructure due to forecasted increases in California's energy demand from population and economic growth. Furthermore, the boom in shale gas that is underway nationally could result in more natural gas use in California for electric generation and as a transportation fuel. In addition, if extraction of the natural gas in the Monterey Shale ramps up, there will be additional need for natural gas pipelines and gas processing facilities in the LA region. Clearly, land use change and conflicts related to energy infrastructure are, and will continue to be, a major economic, social and political problem in the greater LA area.

Contributions from the Project

What, if anything, should be done to move beyond the gridlock created by contentious siting of infrastructure facilities to assure that Southern California will be able to build the energy infrastructure it requires for the region's continuing prosperity, and beyond that, to assure it will be located and designed in a way that is acceptable to the communities in which it is located? One could argue that nothing should be done, as California is rightfully considered a world leader in its energy and environmental policies. Perhaps existing regulatory processes will result in socially optimal outcomes. However, given the nature of the social dilemma described above, even social optimality will result in sustained socio-political conflict as communities oppose these public goods projects with local "bads". There is considerable evidence that paying off impacted communities is not a long term solution (Aldred, 2006, Mansfield et al, 2002). Our previous research, sponsored by Southern California Edison, indicates that there are strategies and tools that can be used to improve social outcomes and reduce siting conflict (Abdollahian, Yang & Nelson, 2013).

New energy policies are bound to have unintended consequences in this complex sector where outcomes are so interdependent. One result from complexity is information asymmetry. Communities usually do not know about a planned project until its proponent has completed the project assessment document which typically presents the project route or location alternatives as a *fait accompli* (Hendry, 2004), rather than communities being able to help specify the project at the design phase. Better community involvement increases perceptions of procedural fairness that can increase support and reduce siting conflict (Gross, 2007). Information asymmetries come from at least two sources. First, citizens and local governments have few spare resources to monitor looming fights over infrastructure siting. San Bernardino County attempted to integrate utility planning in its 1980's Joint Utility Management Project (JUMP), but nothing substantive emerged in cross-sectoral planning. Second, energy project information is distributed across multiple public and private organizations including Federal resource agencies, the CPUC, the California Energy Commission, the California Independent System Operator, the California Environmental Protection Agency and others. There is no "one-stop-shop" for infrastructure siting information.

Our project integrates the proposed infrastructure projects with data from a range of agencies and provides a website with geographical information system (GIS) maps of all the proposed projects for the LA region. The database that forms the foundation of the map will include links to project documents that includes project design and route, as well as the sponsor contact information so that communities can reach out to the relevant parties. As explained below, by reducing information asymmetries, the GIS map can potentially optimize siting outcomes by speeding up the facility permitting times and can reduce socio-political conflict by including community preferences in the energy project design phase.

The GIS data will be available for municipal, county, and utility planners, as well as local communities to develop land uses policies that can improve siting outcomes. With an integrated information platform, planners and housing developers can better design future communities so that they are better integrated into the utility right-of-ways (ROWs). As examples, future development can integrate open space in the ROWs as well as keep homes away from transmission towers. The contribution from this research domain is to provide information that can improve successful siting processes by producing stakeholder consensus and strategies for the physical siting of large energy projects that increase community acceptance.

Project Objectives

The goal for this research enterprise is to better understand energy facility siting in the LA region, and to provide information and tools to enable less conflictual, more socially sustainable energy solutions in the future. Taken together, the two research objectives comprise an integrated understanding of how the landscape of Southern California might evolve.

The objective of this Research is the development of an ArcGIS Online map that archives all of the new and proposed energy infrastructure project for the region. The map will be searchable by county and zip code and will have layers for each energy technology (solar, wind, natural gas generation, transmission lines, etc) that can be turned on or off by the user. The energy infrastructure project map will provide communities' critical information on project proposals in their "backyard". By reaching out to the project sponsors early in the project design phase, communities have a better likelihood of having their concerns integrated into the project's development. Most energy projects' design documents have project alternatives, which can be different routes in the case of pipelines and transmission lines, different technologies (wind and solar), or different project scales (megawatts) that can be manipulated to meet regulatory requirements and social demands.

While we heartily support the conclusions of research finding public participation improves environmental planning decisions (ie Beierly and Cayford, 2002), we maintain that more public participation is not necessarily better as it can be inefficient (Newig & Fritsch, 2009). However, we can unequivocally state that public participation *earlier* in the planning process is desirable as it can avoid the disastrous Decide, Announce, Defend approach by project proponents who do all the project planning behind closed doors and then present the project as a *fait accompli* to impacted communities (Hendry, 2004).
The map can serve as the foundation for participatory spatial decision-making. The project map follows a long tradition of use "by grassroots groups and community-based organizations (CBOs) that use GIS as a tool for capacity building and social change" (Seiber, 2006, p. 491).

Research Design and Methods

Mapping Proposed Energy Infrastructure Projects
The GIS map will consist of the following new energy infrastructure project types: natural gas and petroleum infrastructure (extraction, processing, pipelines), natural gas and renewable electricity generation facilities, and high voltage transmission lines. This data will provide the information for the Google Map or ArcGIS Online map which will be searchable by users. Initial priority will be given to project in the counties of Los Angeles, San Bernardino, Riverside, Ventura and Orange. Depending on how much time is required to generate the maps for projects in these counties, we might extend the spatial coverage to other counties in California. Second priority counties are Imperial, San Diego, and Kern counties as these have the largest renewable energy potentials. San Luis Obispo and Santa Barbara counties are also if interest potentially.

The project data will be coded and placed into an excel spreadsheet. The fields are listed in a separate spreadsheet 8_Oct_2013_Energy_Sector_Database

Energy infrastructure project proposals will be identified from three categories of data sources.

- The first are media sources and energy industry trade journals that report on energy project developments in California such as Renewable Energy World and Oil and Gas Journal. Local and regional newspapers are another potential source of data on project proposals (Scott).
    - Replicable methodologies for searching these electronic resources need to be developed. The methodology needs to define the search terms and date ranges that are used so that the data can be regularly updated.
- The second data category are state agency planning documents from the CPUC, the California Energy Commission, the most recent California Independent System Operator interconnection queue[1], the California Environmental Protection Agency, and other sources (Koropey).
    - We need to develop a list of questions for state agency personnel to identify potential sources of project information that are available prior to the Environmental Impact Review process. We also need to develop an email list of relevant stakeholders for the website outreach efforts.
- Finally, we will reach out to environmental non-governmental organizations (NGOs) that monitor energy projects. These NGOs include Basin and Range Watch, the National Resources Defense Council, Sierra Club and others (Scott).
    - We need to develop a list of questions for NGOs to identify other organizations that might have project information (a snowball sampling methodology). We also need to develop an email list of relevant stakeholders for the website outreach efforts.

Project locations' latitude and longitude will be geocoded for mapping in either Google Maps or ArcGIS online. The latitude and longitude of pipelines and power lines are not publicly available due to national security concerns. For these projects, we will digitize the approximate project route from existing project maps. Our geocoding will be accurate enough for community mobilization purposes but not precise enough to trigger national security concerns.

Website Outreach

In order to build capacity and affect social change we will reach out to the Southern California Area Governments (SCAG) GIS data required for the project, and for dissemination of the results to SCAG municipal members. We will also perform outreach with local media sources such as community newspapers and television stations to increase awareness of the data resource for local communities. We will also engage social media resources such as Facebook and Twitter to increase awareness of the website. The map will be hosted by the Advanced GIS Lab at Claremont Graduate University and we will communicate with SCAG about them mirroring our project website, as well as advertising our research in their communications with SCAG municipal members.

[1] http://www.caiso.com/planning/Pages/GeneratorInterconnection/Default.aspx

Figure 4 shows a Gantt chart of the tasks associated with the two solution-driven research domains. The dependencies between the tasks can also be reviewed as each task builds on the completion of the task above it.

Figure 4: Project Timeline for the Research Domain

	Quarter Since Funding							
Project Element	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4
Interview and hiring of graduate research assistants								
Domain #1: New/proposed energy project geocoding								
Domain #1: Digitizing powerline and pipeline projects								
Domain #1: Website development								
Domain #1: Project stakeholder outreach								
Domain #1: Project evaluation								

The Evaluation of *Power Struggles* Project Objectives

Usage of the energy infrastructure website will be assessed in three ways. First, we will send short follow up surveys to users of the web tool who provide their email when using the tool. This survey will inquire about what types of data that users were interested in as well as their assessment of the usefulness of the GIS tool. We will solicit feedback on how, if at all, the information impacted their outreach efforts to other energy infrastructure project stakeholders. Second, we will use web page tagging analytics to evaluate project website usage. Tagging analytics track the visitors to the site, as well as the pages they access and the types of information that they viewed. Our goal is to have a user-friendly, well trafficked website that provides action-oriented information to siting stakeholders. Finally, we will track the number of links to the project website by SCAG and other project stakeholders.

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