

## **PUBLIC OPPOSITION TO LARGE SCALE SOFT TECHNOLOGY IN VERMONT: FOUR CASE STUDIES**

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### **ABSTRACT**

In response to rising costs and an uncertain public opinion and regulatory climate for conventional expansion of electric power supply, investor-owned and municipal utilities as well as private entrepreneurs have begun to experiment with grid-linked soft technology as an alternative for electric supply. We examine public opposition to four such projects in Vermont in an effort to find whether public opposition is based on issues similar to that of conventional, and especially nuclear, power projects. Our findings show that opposition to these projects is based on local economic and aesthetic issues as well as more broadly drawn and challenging economic and social concerns.

During the past twenty years, there has been rising public opposition to large-scale power generation and nuclear technology has drawn special concern. Since nuclear technology has proliferated; over 10,000 groups in the United States and Europe have formed a loose network which has many concerns including:

- the generic safety of nuclear power generation;
- the evaluation of long-term catastrophic and low-level risk;
- the role of the scientist as advocate and adversary; and
- the relationship between power generation and economic growth.

Contrast these with the following issues raised in connection with non-nuclear power:

- local air pollution impacts;
- changes in recreational opportunities;
- the distribution of development costs; and
- the direct environmental impact on contiguous property owners.

In efforts to diversify power generation sources, decrease the reliance on high-risk-capital-intensive projects in a time of inflation and high interest rates, and seek the public relations benefits associated with soft technologies, a small number of electric utilities have begun experimenting with large-scale, central-grid-linked soft technology, i.e., solar, wind, biomass, and hydro generation. This is particularly true in northern New England with a history of soft technology use, an abundance of wood, a large number of available formerly used dam sites, and a reliance on expensive imported oil.

The development of utility-sponsored soft technology linked to the supply grid, presents an opportunity to focus on public opposition. In this article we attempt to take an initial look at whether there is significant public opposition to such projects. Several types of literature which assess political values underlying this opposition are reviewed including:

- local energy reports by government agencies and consultants assessing the technical and economic feasibility of different energy options;
- the local newspapers in our study site, Vermont, the *Burlington Free Press* and the *Rutland Herald*, to gauge the local information and attitude environment; and
- newsletters published by local opposition and environmental groups.

The local information has been incorporated directly into the case studies. Following a brief literature review, we suggest a matrix by which the focus of opposition can be analyzed. Then we report on four case studies. Our results are summarized in the final part of the article and we conclude with suggestions for further research.

## LITERATURE REVIEW

### Opposition to Non-Nuclear Energy

Since 1970, social scientists have been closely examining several aspects of the antinuclear movement. Case studies have often been made to deepen understanding of:

- intergovernmental relationships [1, 2];
- the nature of public opposition [3, 4]; and
- the ethical role of scientists and the media in public policy [5, 6].

Political scientists have studied plant siting decision-making. Messing, et al. are among researchers who have carefully used case study examples to show how the centralization of electrical energy production has affected local, state, regional, and federal intergovernmental relations [1].

Nelkin and Pollack, sociologists, show the role that citizens can play in delaying and increasing the costs of a nuclear power plant in the United States and Europe [3].

They also show that opposition to nuclear power is the focus of a number of otherwise diverging political values. In Germany, this opposition has focused on land claims for specific reactor sites. In France, opposition has been more ideological with a focus on centralized decision-making and regional autonomy. Also an anti-technology anti-industry centralization view is growing which is heightened by the sense that nuclear power development depends on a foreign, U. S. dominated technology.

Price argues that the antinuclear movement in the United States is now a bonafide social movement [4]. The movement has unified formerly opposing political groups such as labor and environmental groups.

Philosophers have also looked closely at the ethics involved in centralized nuclear power public policy decision-making. Shrader-Frechette persuasively argues that the policy makers are happy to incorporate scientific findings concerning the nuclear power but only when the results conclusively indicate small risks [6]. She shows that often safety studies for the government are completed by pro-nuclear scientists and that "disamenities" or externalities are systematically ignored or unrecognized.

Less work has been done which examines opposition to nuclear energy with opposition to nonconventional energy production than has been done in opposition to conventional power. Generally speaking, opposition to conventional energy projects is even more diffuse than nuclear opposition.

Most opposition to nonconventional projects is at a local scale. Our Vermont case studies aim to illuminate more about opposition to nonconventional energy projects particularly hydropower, wind, and wood chips. Limited work on these topics has been completed on New England by Burger [7-11].

## THEORETICAL FRAMEWORK

Building on the previous literature review and the development of the political movement against nuclear power, we postulate a six region matrix overlaying scale and issue dimensions (Table 1). The scale dimension distinguishes between micro and macro issues. Micro issues are site-specific while macro issues are more broadly challenging, not only to the particular project, but to the entire economic or technological context within which the project is proposed. The issue dimension distinguishes between economic, aesthetic, and technological areas of concern.

Table 1. The Scale and Issue Matrix

<i>Technologic</i>	<i>Aesthetic</i>	<i>Economic</i>
<b>MICRO</b>		
Is the core protected from earthquake?	TV reception	What are the development costs? How many local employees are there?
Do cooling towers affect aquatic life?	Ugly towers	What is the impact on rate structures?
<b>MACRO</b>		
What are impacts of level radiation?	?	Should shareholders benefit at ratepayer expense?
How safe is safe enough?		What is the geographic distribution of costs and benefits?

The matrix is helpful in charting the changing focus of opposition to nuclear power as well as hypothesizing about the development of opposition to grid-linked soft technology. Initially, the antinuclear movement focused on microtechnological issues, i.e., does the cooling system adequately shield the hydro environment, is the reactor containment vessel adequately protected from earthquakes? As the emphasis has shifted to link nuclear power with nuclear weapons and with more centralized power, opposition has shifted toward both macro technical and economic issues. Concerns raised in this context include the assessment and acceptability of risk and the relationship between utility shareholders and customers.

### Hypothesis

We postulate that opposition to grid linked soft technology will be micro in nature. People who are affected will raise issues which are site specific and impact directly on their homes, livelihood, or property.

### CASE STUDIES

We have chosen Vermont to study opposition to grid linked soft technology for the following reasons:

- our familiarity with both grid linked and household scale soft technology;
- relative simplicity of the political system; and
- importance of aesthetics to state tourism.

Vermont with an average per capita income of \$7933 ranks fortieth out of fifty states, harsh winters and a dependence on foreign oil has been at the forefront for using renewable technology. Prior to World War II, the largest commercial wind generator was located on Grandpa's Knob in the Green Mountains. Ninety-four low-head hydro-electric projects are under initial consideration or advanced review. At the household scale, more than 50 percent of the homes utilized locally cut wood to supplement central heating systems. In this context, opposition to soft technology would be highlighted.

In terms of both size and levels of government, Vermont has a relatively simple political system. The 250 towns are highly autonomous and there are few regional layers of government between the town and state.

Finally, due to the small population size, Vermont's political actors, including the State's governor, senators, and representatives, are highly visible and accessible. This access and simplicity would facilitate fuller documentation of opposition to soft technology.

Finally, based on an agricultural and tourism economy, the State has a long standing tradition for valuing the aesthetics of the environment. This, too, would dramatize objections.

Within the Vermont setting, we have chosen four cases which span the urban-rural continuum and focus on hydro, wind, and rubbish burning technologies (Figure 1). These include:

- the Chace Mill Hydro Project between Winooski and Burlington;
- the Black River Hydro Project;
- the Lincoln Ridge Wind Turbine; and
- the Burlington Rubbish Fired Power Project.

### **Chace Mill**

Chace Mill, the urban site for the proposed 13 MW hydro electric project, borders both Burlington and Winooski. The proposal, made as a joint effort by a municipal utility, Burlington Electric Department (BED) and an investor-owned utility, Green Mountain Power Company (GMP), would generate power by connecting two generating units to a penstock tunnel. The effective head would be fifty-five feet. Many of the dams already exist in various stages of disrepair. The proposed storage reservoir would flood an additional eleven acres of undeveloped land. Unfortunately for both GMP and BED, diversion of the river would bypass downtown Winooski and the commercial and residential urban redevelopment which focuses on the river as a scenic resource.

Opposition to the project is localized in the town of Winooski and originates from the merchants located in a new upscale urban shopping complex, Champlain Mill. By mobilizing the town government and legal council, these merchants have raised a number of sophisticated points to halt or significantly change the scope and design of the Chace Mill project. These issues include the

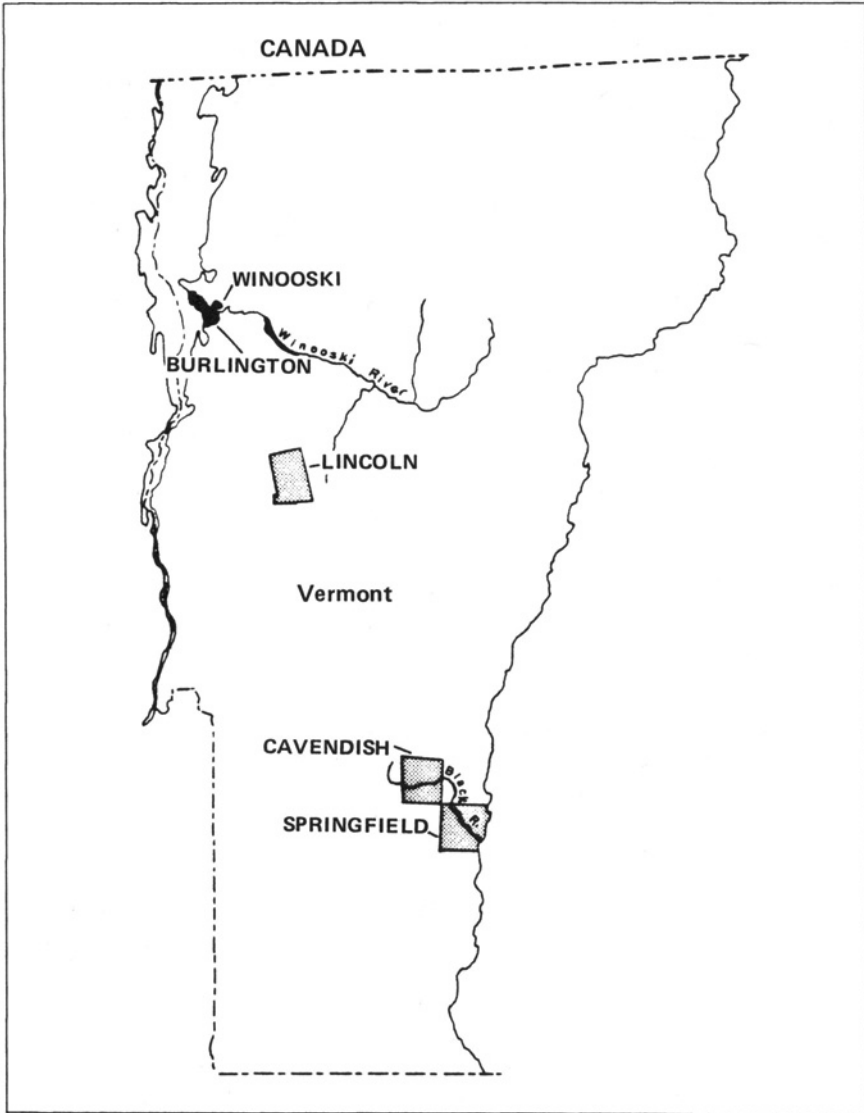


Figure 1. The case study sites.

impact on water quality, competing uses such as salmon spawning and jurisdictional issues between the Vermont Public Service Board (VTPSB) and the Federal Energy Regulatory Commission (FERC). Clearly, however, opposition to the project centers on aesthetic issues based on micro economic concerns. The Champlain Mill uses the Winooski River as a visual focus. Without the river, it would be little more than yet another moderate scale, urban shopping plaza.

As the Director of Community Development in Winooski put it,

This is an extremely lucrative site and a very developable one from a hydro point of view . . . . Green Mountain owns the water, but we feel these are limited rights . . . . They (Green Mountain Power) made it seem that either you loved their project or you were a dreamer, a nineteenth century fool. They couldn't see the difference in impact between Winooski and Burlington . . . . Our whole downtown is focused on that river. We gave them a reason to look elsewhere or build a smaller project [12].

### **The Black River Project**

As a tributary of the Connecticut, the Black River winds through villages and towns in eastern Vermont. Springfield was once a major source of energy to the region's farming communities as well as the sawmills, textile mills, and machine tool industries. While Central Vermont Public Service (CVPS) continues to operate several small hydro projects on the river, the utility purchases much of its power from plants fueled by imported oil. As a response to a number of substantial rate increases by CVPS, the town of Springfield proposed, in January 1975, to operate its own municipal utility. The Springfield utility would purchase transmission and distribution facilities from CVPS and use the Black River as a site for hydro generation. The Black River project called for the renovation of four existing dams and the building of two new facilities, the largest of which, the Hawks Mountain Dam, would be 155 feet high and confine a 500 to 800 acre reservoir. The total project was rated at 30 MW with the Hawks Mountain Dam accounting for half the power production.

While a landmark project in terms of the creation of a new municipal utility, the scope and location of electric generation, made the project one of high visibility and risk. In order to assure preference in the FERC licensing procedure and to avoid a CVPS counter proposal, the actors in Springfield worked largely in secret. Citizens were asked to vote on a bond to finance planning and development in the March town meeting, three months after the initial plan was announced. This left town officials open to charges of acting without public approval, consultation, or mandate. While benefiting Springfield, the Hawks Mountain generating facility and its reservoir was within the town of Cavendish, and this is a second source of conflict. Cavendish residents who were to lose their homes claimed that Springfield was "not treating the town as equals" and that Cavendish and other smaller towns along the Black River would be forced to bear the environmental costs and derive none of the benefits.

Opposition developed quickly. Both CVPS and Cavendish residents capitalize on the lack of public mandate and environmental cost issues. One of the affected Cavendish residents stated that a general sympathy to soft energy technologies and hydropower was overshadowed by the immediate impact on his home and business. He said,

I want to make it clear that I'm not against solar or wind or even hydro or any other new technology . . . but I'm dead against this dam . . . . (If it was built) where you're standing would be ten feet below water.

### **Lincoln Ridge Wind Machine Idea**

Using the wind for grid linked power production is not a new concept in Vermont. In 1941, GMP built a 1.25 MW wind powered generation station on Grandpa's Knob in the Green Mountains. This produced power until 1945 when, due to a lack of parts and maintenance problems during World War II, it ceased to operate.

As a return to this technology, GMP proposed to locate a large wind turbine on Lincoln Ridge in central Vermont. The wind machine would mount 150 foot blades on a 200 foot tower and be capable of producing up to 3 MW of power. Most of the 710 residents in Lincoln, located at the base of the ridge opposed the wind turbine. A 1981 study of the visual preferences of Vermonters showed that if a wind machine is used, certain arrangements and locations are preferred. In the Lincoln Ridge case, local residents do not receive power from GMP. Therefore, the residents objected to the wind machines in large part because they would have to look at the machine and not receive reduced energy costs or in any other way benefit in return. Gent compared visual preferences of Lincoln residents with those in Canaan, Vermont, a town where wind energy would be feasible in the future but are not currently proposed [9]. Gent found that the scale and form of the wind machines in relation to the surrounding landscape affect perception. Local control and perceived local benefits are recommended as important requisites in improving public acceptance of wind machines. In terms of our matrix, the focus of opposition was on micro economic concerns.

### **Burlington Rubbish Plant**

The final case, that of the BED's wood and rubbish fired power plants, has focused national attention on the possibilities for the integration of new soft technologies into the central power grid. Capitalizing on the widespread use of wood as a supplementary home heating fuel, BED, in 1977, initially proposed to build a 50 MW wood chip fired generation plant. Even before its completion, BED proposed to build a complementary rubbish fired cogeneration plant. The adjoining plants, located on the border of a natural wetland, the Intervale, are designed to generate one-half of Burlington's projected demand in 1986 [13].

Opposition to the proposed rubbish plant originates from a small group, Citizens for Safe Energy (CSE). While focusing on micro environmental concerns of protecting the Interval, when asked to articulate the relationship of these plants to other environmental issues, it was clear that opposition to this project is only one case in a larger ideological and political argument. In terms of the wood chip plant, one member of CSE said "It's much more efficient to



Table 2. Summary of Opposition

	<i>Economic</i>	<i>Aesthetic</i>	<i>Technologic</i>
MICRO	Hawkes Mountain Chace Mill		
MACRO		Lincoln Ridge Burlington	

burn wood in stoves” and that “the plant should be put where the wood is.” While another noted, “Cogeneration isn’t such a bad idea, but we could recycle most of the garbage.” More generally, there seemed to be consensus among group members that development has a tendency to “reverse biological evolution” and “turn everything into concrete.” When asked to compare the municipally owned BED to investor-owned utilities (IOU’s), one group member said, BED is “not quite as bad as an IOU, but there is a mind set which goes beyond making profit from a particular project. Their’s is a non-ecological view.”

## DISCUSSION AND QUESTIONS FOR FUTURE RESEARCH

Returning to our original scale-issue matrix, we can compare the basis of opposition in the four cases (Table 2). In the Hawkes Mountain and the Chace Mill hydro cases, opposition focuses on micro economic issues. In both cases, opposition was developed by those who would bear the most significant negative economic impacts. In the Lincoln Ridge study, opposition was based on micro aesthetic and macro aesthetic and economic issues. While our hypothesis, that micro issues would dominate opposition to soft technology was only partially supported, this does raise interesting questions for further research.

The research reported on here has a distinctly local focus which calls for further, expanded work. It would be interesting to compare the opposition to soft technology with the opposition to nuclear power. Our research, however, does suggest that those opposed to grid linked soft technology may not share the macro-concerns of antinuclear advocates. This distinction may mirror the differences between the technologies or the inability of antinuclear advocates to translate the macro question into another technological context. It will be worthwhile to examine whether this translation occurs as grid linked soft technology expands.

Second, our research indicates that soft technology can inspire considerable opposition. Environmental impacts may be small but they are of consequence

to those local residents impacted. When these residents bear these costs and receive few benefits they can successfully block or stall even small scale grid linked soft technology projects. Also, a chart of the most successful strategies of environmental mediation in terms of participation patterns and the spatial distribution of costs and benefits.

Finally and most basically, it will be important to chart successful applications of grid linked soft technologies; successful not only in meeting a portion of energy demand, but in enlisting the support and enthusiasm of the local population.

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