

Analyzing the Socioeconomic Impacts of Nuclear Power Plant Closure

Introduction

The nuclear power industry as a whole is declining, as it faces competition from natural gas and renewable energy. Market competition, maintenance costs, and licensing complications contribute to the hardships that utilities with nuclear reactors face. The declining economic feasibility of nuclear power plants is leading to their closure. Many more will close in the future as licenses for operation are expiring. Similar to the loss of other industries, the effects of closure can be felt far away from any facility, factory, or mine. The decline of nuclear power production raises concern considering there are 60 commercially operating nuclear power plants with 100 nuclear reactors in 30 states in the United States.

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Crystal River Nuclear Power Plant

Image from Tampa Bay Times, 2013

Background

For 86 communities, having a nuclear power plant in their backyard has become a significant part of their identity. Nuclear power plants contribute to local economies that become attractive to people looking for new opportunity, similar to other large industries. For example, the semiconductor industry in Silicon Valley quadrupled the population in just 30 years. People were attracted to the community because of the employment opportunities, which in turn bring a wealth of restaurants, improved schools, and more revenue for the towns to spend on community affairs. Nuclear power plants help provide these types of amenities for communities through their tax contributions and employing high-paid workers. Learning the full story of several sites and documenting the most wide scale socioeconomic impacts and discovering the best mitigation techniques will provide insight for the 60 communities that will face nuclear power plant decommissioning in the future.

The Goal

The goal of this project was to help communities and utility companies improve planning for nuclear power plant closure by identifying potential socioeconomic impacts and exploring mitigation opportunities. We achieved this goal by completing three research objectives.

Objectives

1. Identify socioeconomic impacts on host communities caused by closure
2. Document and characterize factors that contribute to socioeconomic impacts on host communities
3. Document mitigation efforts to help inform best practices for future decommissioning projects

Methodology

We selected four nuclear power plant sites to focus on in this project.

Maine Yankee	Wiscasset, ME
Crystal River 3	Crystal River, FL
Zion	Zion, IL
Kewaunee	Kewaunee, WI

The three main methods of data collection that our team utilized were

1. Content analysis of newspaper articles
2. Interviews with local government officials and staff of the four communities
3. Consultations of government databases such as the U.S. Census and Federal Reserve of Economic Data.

We analyzed 35 articles from the communities of the four sites in order to identify impacts and potential factors. The nine individuals we interviewed had influence in the decommissioning process with their respective communities.

Findings

There are many Common Socioeconomic Impacts among the Host Communities.

We used an open coding process in order to reflect the qualitative data of the articles and interviews. The socioeconomic impacts that we identified include: job loss of the utility workers, decrease in the tax contribution paid to the host community from the plant, increased town financial burden, raised residential taxes, lowered citizen expenditure, funding adjustments for schools leading to decrease in education quality, land reuse, and changes to the town's economic outlook and morale.

Host Communities Experience a Large Loss of Tax Contribution Following a Closure

At the four locations that we investigated, host communities experienced a large loss of tax contributions following the closure. The communities in which the power plants were located negotiated their own agreement to reduce tax contribution over the multiple years following closure. The loss of a major tax contributor can affect a community's budget in many ways. For example, the Town of Wiscasset had to begin charging residents for trash pickup, a municipal service that used to be free for residents. In Crystal River, approximately 100 government workers were laid off. In Zion, the property tax rate has increased from 8.72% (1997) to 21.46% (2016) to offset the loss of the Zion

Generating Station tax contributions. In Kewaunee the municipal bond ratings were adjusted to account for the loss of Kewaunee Power Station.

Mitigation Efforts

We found the most effective mitigation efforts have created opportunities for learning and transparency among the stakeholders involved. Community Advisory Groups have helped to promote stakeholder involvement and communication in order to increase knowledge about impacts. With more knowledge in the community, stakeholders can better understand what is going to happen and how they could be affected. Duke Energy at Crystal River provided frequent information on certain events in the closure process. This allowed them to plan better for the socioeconomic impacts that will occur with each step of decommissioning.

Table shows the loss of tax payments that follow a closure

Site Location:	Crystal River	Kewaunee	Maine Yankee	Zion
Payment to community year prior to closure	2012: \$169,392,384	2012: \$449,705	1996: \$12,785,826	1997: \$19,511,994
Payment to community four years after	2016: \$24,588,470	2016: \$338,012	2000: \$1,908,000	2001: \$8,140,751
% Decrease	85.48%	24.83%	85.01%	58.28%

Closure Before Expected Lifespan Affects Impacts

Communities often do not expect the plant that has operated for many years to abruptly shut its doors. Without knowledge of closure far enough in advance, communities are unable to effectively prepare for the impacts that follow. In Crystal River, FL, the nuclear power plant closed suddenly. The nearby City of Ocala was expecting to have inexpensive power for the next 20 years, but was forced to find a replacement. Duke Energy settled with the city of Ocala to help offset the losses.

Recommendations

1. Conduct a pre-closure socioeconomic impact study.

Knowledge about potential impacts of nuclear power plant closure is often times lacking in a host community. By conducting a socioeconomic impact study, new and current planning for closure can

better anticipate potential socioeconomic impacts. By incorporating potential socioeconomic impacts into planning, communities have a better ability to form mitigation efforts to address those impacts.

2. “Phase-out” Tax Contributions Over a Set Period of Time

Our findings showed that tax contributions made to the community from the utility company not only were reduced across the four sites, but also factored into further socioeconomic impacts. Therefore, we recommend that the tax contributions get reduced over a set time frame. “Phase-out” payments were used in three of our observed sites, and it helps to lessen the immediate impacts.

3. Continue Building and Centralizing Lessons Learned and Implications

In addition to continuing the investigations, we recommend compiling findings in a central location in order to build a database. There currently is an accessible database for information regarding the lessons learned from commercial nuclear power plant closures. This information is not only essential for future studies but it can serve as a tool used for stakeholder education. Our team made an initial effort to fill this void by creating an interactive matrix with information about impacts and mitigation efforts.



Maine Yankee Community Advisory Panel

Conclusion

Host communities are often ill-prepared to understand or plan for the impacts that can occur when a nuclear power plant closes. The overall economy will be facing a time of hardship, which has potential to affect educational institutions, local businesses, and the whole community. Communities with nuclear power plants in the process of being decommissioned need to stay active about addressing the socioeconomic impacts that stem from a closure. Our project served as an initial effort to identify the range of socioeconomic impacts that can emerge. By studying several closed nuclear power plants in the United States we gained insight to the underlying issues of closure. Each closure will differ in its own way however, understanding lessons learned from other places can help new communities improve mitigation techniques and create mitigation strategies.

References

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