



Does proximity matter? Plant location, public awareness, and support for nuclear energy



Tabitha Cale^a, Mileah Kromer^{b,*}

^a Everglades Policy Associate Audubon Society, 4500 Biscayne Blvd., Ste 205, Miami, 33137, FL, USA

^b Department of Political Science and International Relations, Goucher College, Julia Rogers Building, G32 1021 Dulaney Valley Rd Towson, 21204, MD, USA

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ABSTRACT

Does geographic proximity to nuclear power plants influence public attitudes toward nuclear energy? Utilizing a statewide survey of North Carolina residents, this research considers whether proximity to a nuclear facility – measured by residence in a 10 or 50 mile Emergency Planning Zone – influences citizen awareness, support, and perceptions of safety concerning nuclear energy. The results suggest that while geographic proximity to generating sites does lead to increased levels of awareness, it does not appear to impact overall attitudes toward the use and perceived safety of nuclear energy.

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1. Introduction

In the past decade, faded memories of Chernobyl and salient concerns of climate change had heartened industry leaders, politicians, and some environmentalists to argue that a “nuclear renaissance” would be necessary to meet energy demand while mitigating carbon emissions (Smith, 2013). The 2011 Fukushima Daiichi disaster changed that in an instant, rekindling discussion concerning the safety and use of nuclear energy. There has been a global decrease in the number of nuclear reactors and the percentage of total power generated from nuclear sources post Fukushima, with countries across Europe and Asia voting to phase out or scale back plans for further development in response to awakened public outcry (Kottasova, 2014).

Given increased concern toward the use of nuclear energy in other countries, have perceptions of nuclear power changed in the U.S? What factors shape citizen

opinion toward the use and safety of nuclear energy? Do citizens residing in close proximity to nuclear facilities – the citizens most impacted by an accident – worry more about the use and safety of nuclear energy? Do their opinions differ significantly from those living at a safer distance? Using a statewide survey of North Carolina residents collected in the immediate aftermath of the Fukushima disaster, this study explores citizen-level perceptions of nuclear power and public awareness of the potential dangers of nuclear energy. Results suggest that while residents in close proximity to nuclear facilities do demonstrate heightened awareness of nuclear energy production, those living in the shadows of nuclear facilities do not differ in their opinions about the use and safety of nuclear energy.

2. Nuclear power in the USA and North Carolina

The USA pioneered the use of nuclear energy to create electricity, developing the first experimental nuclear reactor on December 20, 1951, at a USA Atomic Energy Commission experimental nuclear reactor in Idaho. Shortly after, the first commercial nuclear reactor to

* Corresponding author. Tel.: +14103373296.

E-mail address: mileah.kromer@goucher.edu (M. Kromer).

generate electricity was built in the USA and was fully operational by 1957. Today, according to the USA Energy Information Administration (EIA), there are 104 nuclear reactors operating in 65 different plants around the United States. These reactors generate about 20 percent of total domestically produced electricity. Thirty one states in the USA have nuclear reactors. In 2011, Illinois lead the USA in the generation of nuclear power with six nuclear power plants producing 95,823,196 MWh of electricity.

In 2011, North Carolina ranked 5th in the country in the generation of nuclear power, with a total of 40,526,834 MWh of electricity. About one-third of the total electricity produced by the state was generated from nuclear power (USA Energy Information Administration, 2012). There are three nuclear power plants operating in North Carolina under Duke Energy Progress: Brunswick, Shearon Harris, and McGuire. The Brunswick Nuclear Facility is located in Brunswick County, near the coast, south of Wilmington, North Carolina. The Brunswick facility has two boiling water reactors in operation. The Shearon Harris Nuclear Power Plant is located in Wake County, southwest of Raleigh, and has a single pressurized light water reactor. The McGuire Nuclear Station is located in Mecklenburg County, east of Charlotte, and has two pressurized light water reactors. Additionally, while not located within the North Carolina border but operated by Duke Energy Progress, the Catawba Nuclear Station is located in adjacent York County, South Carolina about 40 miles outside of Charlotte, North Carolina. The Catawba Nuclear Station utilizes two pressurized water reactors.

3. Risk, safety, and proximity to nuclear facilities

The International Atomic Energy Agency establishes safety standards for nuclear power facilities as well as emergency preparedness and response in the case of nuclear accidents. Details of emergency preparedness and response plans are developed by the countries that generate nuclear power based on the IAEA's general guidelines (International Atomic Energy Agency, 2014). In the USA, emergency preparedness and response plans are developed by government agencies, state and local officials, nuclear plant owners, and other stakeholders. Two federal agencies share responsibility for federal oversight of these emergency plans—the Nuclear Regulatory Commission and the Federal Emergency Management Agency. These agencies have developed two emergency planning zones (EPZ) around each nuclear power plant in the USA. The “plume exposure pathway” extends about 10 miles (6.2 km) in radius around the plant and the “ingestion pathway” extends about 50 miles (80.4 km) in radius around the plant (USA Nuclear Regulatory Commission, 2014). While the dangers associated with a nuclear accident are conditioned by factors such as the levels of radioactivity in the plume, its path, and weather conditions on the day the accident occurs, the 10 mile radius is considered the area where it is most possible that residents could be harmed by direct radiation exposure. Further, if an incident does occur, the federal government mandates resident evacuation within the 10 mile plant radius. In the broader 50 mile

radius, water supplies, food crops, and livestock can be contaminated by radioactive materials.

Previous research suggests that living and working in proximity to nuclear facilities can condition individual opinion toward nuclear power. Due to various factors such as familiarity with a local nuclear facility, knowing individuals who work at the facility, and perceptions of the economic benefits of nuclear energy, individuals living in close proximity to nuclear facilities are less likely to express negative attitudes or concerns about nuclear energy (Baxter & Lee, 2004; Burningham & Thrush, 2004; Blowers & Leroy, 1994; Freudenberg & Davidson, 2007; Greenberg, 2009; Hecht, 1998; Parkhill, Pidgeon, Henwood, Simmons, & Venables, 2010). Further, a study of nuclear power plant employees conducted by Sjoberg and Drottz-Sjoberg (1991) finds that employee knowledge about radiation is negatively associated with risk perception; those who know the most, express diminished perceived risk concerning exposure to radiation. Recent work by De Groot, Steg, and Poortinga (2013) finds that the more an individual believes in the benefits of nuclear energy, the more accepting they are of its use. However, proposals of new nuclear facilities generate more resident concern, negative attitudes, and suggest a “not in my backyard” (NIMBY) effect (Lima, 2004; Lima & Marques, 2005; Vorkinn & Riese, 2001). Rosa (2001) finds that most individuals living in areas without nuclear facilities are unlikely to support the construction of them in their community. Rosa (2001) argues this is related to perceived risks related to the safety of reactors, spent fuel storage, and low levels of trust in the authorities who operate and regulate nuclear plants. De Boer and Catsburg (1988) find that the opposition to building a nuclear facility within 5 miles of one's home has increased steadily.

Perceptions of nuclear safety are also influenced by operations and issues surrounding nuclear energy. Highly publicized nuclear accidents from the past, especially those at Chernobyl and Three Mile Island, only appear to have a temporary effect on attitudes toward nuclear power. For example, De Boer and Catsburg (1988) find that long term trends in public opinion are against the use of nuclear energy, but the largest negative shifts in opinion coinciding with major nuclear accidents fade within a year. This pattern of a temporary change in opinion toward nuclear energy in the aftermath of Three Mile Island and Chernobyl occurred before the rise of the internet and 24-hour cable news coverage. Thus, it is possible that media coverage of the accident at Fukushima was fundamentally different than coverage of past nuclear incidents. Friedman (2011) finds that “although heavy print and broadcast coverage also followed the Three Mile Island and Chernobyl accidents in 1979 and 1986, respectively, coverage did not grow as quickly or become as vast as what occurred for Fukushima,” (55) and that this was largely due to the speed and reach of information available on websites and social media. Other work by Koerner (2014) finds that a large majority of newspaper headlines present nuclear energy and power in a negative light and that USA newspapers contain more headlines concerning nuclear energy than their foreign counterparts. Therefore, the disaster in Japan

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