

Socioeconomic Impacts from Nuclear Power Plant Closure and Decommissioning

**HOST COMMUNITY EXPERIENCES,
BEST PRACTICES AND RECOMMENDATIONS**



Socioeconomic Impacts from Nuclear Power Plant Closure and Decommissioning: Host Community Experiences, Best Practices and Recommendations

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ABOUT THE NUCLEAR DECOMMISSIONING COLLABORATIVE

We are the nation's nuclear decommissioning clearinghouse. As a nonprofit corporation, we bring together people and resources to provide guidance and strategy as you move through your decommissioning journey. We take the mystery out of the decommissioning of nuclear power plants to produce better, and more equitable outcomes, for all stakeholders.

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Preface

In 2005, the Electric Power Research Institute (EPRI) published a report documenting the lessons learned in the decommissioning of the Maine Yankee nuclear power station.¹ As part of the introduction, the authors observed that while the report's original focus was to be on “nuts and bolts” issues, another layer of considerations, so called “soft areas” emerged as being significant and which influenced, “. . .the effective conduct of the overall decommissioning project.”

These “soft areas” included issues such as stakeholder engagement and local/state regulatory interaction: issues that may have originally been viewed as tangentially related to the decommissioning process as defined by the U.S. Nuclear Regulatory Commission (NRC).

Our efforts build upon EPRI's work as we delve further into these “soft areas.” In particular, we focus on the often-overlooked socioeconomic impacts of closure and decommissioning and explore ways in which host communities have responded to job loss and a corresponding reduction in tax revenues. We also examine more deeply how stakeholders (at the local, state and federal levels) view the process of nuclear plant closure and decommissioning, and how this evolving understanding is shaping their ability and desire to improve project outcomes by playing a more constructive role in the decommissioning process.

1 Electric Power Research Institute, (2005). *The Maine Yankee Decommissioning Experience Report—Detailed Experiences 1997–2004*.



THE FOLLOWING CONTENT IS
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Executive Summary

The operation of a typical nuclear plant annually contributes at least \$400M of economic impact to the plant's host region as well as being a key source of economic livelihood for over one thousand plant employees and contractors. In addition, the presence of nuclear plant employees and their families strengthens host community capacity through their participation in a wide range of civic, cultural and volunteer opportunities.

Over the next several decades, all nuclear power plants that currently operate will close and be decommissioned under the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC) with the cost to complete this decommissioning effort estimated to be approximately \$100B.

Despite the large sums of money involved in decommissioning, the socioeconomic impacts to host communities resulting from plant closure are swift, severe and lasting. Many highly skilled workers and their families relocate, procurement of local goods and services is significantly reduced, tax payments to local towns plummet and housing values erode. These impacts occur at every nuclear power plant, but the effects are felt more deeply in rural communities where most plants are located.

For more than 20 years, plant host communities across the country have repeated these dynamics. In response to this resulting uncertainty and the associated socioeconomic hardships, host communities have undertaken various attempts at recovery. However, a series of factors continue to hamper these recovery efforts including:

- **Limited resources for economic development**
 - Economic recovery planning can be a resource intensive effort requiring considerable investments of time, funding and local capacity. All three of these elements are in short supply once plant closure takes place.
- **Steep learning curve**
 - Nuclear power plant closure and decommissioning is particularly complex and is often referred to as a “once in a lifetime experience.” Roles and responsibilities of local and state stakeholders are unclear, opportunities for meaningful community engagement are generally limited and there are few resources to support peer-to-peer learning and collaboration at a national level.
- **Socioeconomic impacts of operating plants are not well understood**
 - At the host community level as well as from a national perspective, the socioeconomic impacts of plant operation vs. closure are not well articulated. A centralized information database would improve policymaking.
- **The long-term presence of spent nuclear fuel hinders economic development**
 - The presence of spent nuclear fuel at decommissioned power plants represents a significant and ongoing barrier to economic recovery.
- **The lack of a coordinated federal framework with limited focus on socioeconomic impacts**
 - Mitigating socioeconomic impacts from nuclear power plant closure is largely outside the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC), the primary federal entity that regulates decommissioning. While recent federal appropriations encourage increased coordination between the Department of Commerce and the Department of Energy, the federal response to these host communities would benefit from increased interagency collaboration.

As more nuclear power plants come off-line, the socioeconomic impacts from plant closure will continue to mount on host communities. With this realization, the plight of nuclear closure communities has begun to receive increased attention. At the national level, modest amounts of federal funding have been recently appropriated to support economic development planning; states have begun to increase their role in the closure and decommissioning process; and, host communities are seeking opportunities to have greater control over their economic future in the wake of plant closure.

As more nuclear power plants come off-line, the socioeconomic impacts from plant closure will continue to mount on host communities. With this realization, the plight of nuclear closure communities has begun to receive increased attention.

These emerging efforts (at the local, state and federal levels) would, however, benefit from increased alignment and coordination towards the goal of implementing decommissioning projects that produce outcomes that are of greater benefit to the host community. With that goal in mind, this report examined the socioeconomic aspects of closure and decommissioning with a focus on the host community experience. Through a combination of stakeholder interviews and research, we developed a more complete picture of what it means to close and decommission a nuclear power plant. With this more robust definition in hand, we then highlighted lessons learned and provided recommendations to improve project outcomes.

We group observations and recommendations into three perspectives from the local, state and national level. Key findings include:

- **Local perspective**
 - Early planning for post-closure economic recovery at the community, county and regional level neither accelerates nor precipitates the decision to close the plant. The economic recovery process is long, challenging and heavily dependent upon the host community to galvanize and sustain action. Identification of economic development barriers (e.g., presence of spent nuclear fuel, lack of planning resources) and the design of economic recovery plans,

well before a plant is scheduled to close, is a reasonable and prudent community investment.

- **State perspective**
 - In concert with local entities developing economic mitigation plans prior to plant closure, states have a similar incentive to anticipate closure and develop their own policies. Areas of influence that a state may have on decommissioning range from final radiological cleanup levels and the provision of economic impact mitigation funds to defining the role of host communities and advisory boards in the decommissioning process. Without prior action in advance of plant closure, the role of states is generally limited.
- **National perspective**
 - The \$100B required to decommission the current nuclear fleet was (and will be) derived largely from ratepayers. In this context and to ensure that those same ratepayers may realize maximum benefit from decommissioning, the improved coordination of federal agencies focusing on additional research, efficient deployment of resources and the provision of planning assistance would be a demonstrable benefit to host communities. The establishment of a national network of nuclear closure communities, modeled after similar coordinating entities in the DOE (the Energy Communities Alliance) and the DOD (the Office of Economic Adjustment), would also improve the effectiveness of the federal response.

In addition to these above recommendations, opportunities for additional research and knowledge development exist in the following areas: (i) improving our understanding of the socioeconomic relationship between the plant and the host community; (ii) creation of a more robust (longitudinal) understanding of the efficacy of various economic development efforts; (iii) increased appreciation of the local opportunity costs associated with stranded assets due to the presence of spent nuclear fuel; (iv) improvements to the practice of community engagement; and, (v) exploration of property stewardship models (possibly through a land trust) to facilitate repositioning of decommissioned sites to their highest and best use.

CHAPTER ONE

Background and Context Setting

Introduction

As the socioeconomic impacts of nuclear power plant closure have begun to gain greater visibility, the United States Congress directed the Economic Development Administration (EDA) to engage on this matter more fully. Pursuant to the Explanatory Statement accompanying the Consolidated Appropriations Act, 2018 (P.L. 115-141), EDA prepared a summary report addressing their work to help identify and develop best practices to assist communities affected by loss of tax revenue and job loss due to nuclear power plant closures. This report is found in Appendix A.

In 2019, pursuant to Senate Report 115-275, which accompanied the Consolidated Appropriations Act, 2019 (P.L. 116-6), and working in coordination with the Department of Energy, EDA prepared and submitted a subsequent report describing existing resources and funding opportunities for which affected communities may be eligible. This report is found in Appendix B.

In conjunction with the preparation of the 2019 report, EDA entered into a Cooperative Agreement with The Nuclear Decommissioning Collaborative to support communities impacted by nuclear power plant closures. Key deliverables associated with this cooperative agreement included: (i) education and awareness building; (ii) the provision of technical assistance to nuclear closure communities; and, (iii) additional research accompanied by stakeholder interviews. This report is the final deliverable from the Cooperative Agreement and highlights lessons learned and best practices so as to better support host communities through their nuclear plant closure and decommissioning process.

With respect to the research and stakeholder interview process, the authors of this report conducted three forms of inquiry: a review of published literature and media reports exploring energy plant closures in general and nuclear power plant closures in particular; attendance at a series of meetings in 2019 that were sponsored by the NRC regarding community engagement in decommissioning;² and, telephone interviews with stakeholders from nuclear power plant host communities.³

Interviews with 27 decommissioning stakeholders took place from December of 2019 through April of 2020. Interviewees consisted of community leaders, economic development professionals, industry representatives and local elected officials. Interviewees were chosen from the nine nuclear power plant host communities listed below representing decommissioned, decommissioning and operational reactors across the country.

TABLE 1
Nuclear Communities Interviewed

Host Community	Nuclear Power Plant	Operational Status
Wiscasset, ME	Maine Yankee	Decommissioned (2005)
Oak Harbor, OH	Davis-Besse	Operational (since 1978)
Plymouth, MA	Pilgrim	Decommissioning (closed 2019)
San Luis Obispo, CA	Diablo Canyon 1 & 2	Operational (since 1985 & 1986)
Covert Township, MI	Palisades	Operational (since 1971)
Haddam Neck, CT	Connecticut Yankee	Decommissioned (2007)
Zion, IL	Zion	Decommissioning (closed 1998)
Mineral, VA	North Anna 1 & 2	Operational (since 1978 & 1980)
Crystal River, FL	Crystal River	Decommissioning (closed 2013)

List of host communities and their associated nuclear power plants that participated in stakeholder interviews.

² A list of NRC meetings is found in Appendix C.

³ Interviewees were asked a series of exploratory questions to allow each interviewee to describe their decommissioning experience in their own terms. Responses were then synthesized and incorporated into report findings.

It is clear that the closure and decommissioning landscape is complex and that each host community has its own distinct experience. In this context, the authors of this report fully recognize that it is not possible to capture all the various nuances with a limited sample size. We also recognize that not every nuclear closure community was represented. Nevertheless, common themes emerged from the interviews with sufficient regularity and consistency that general observations and conclusions were developed and are included herein.

It is clear that the closure and decommissioning landscape is complex and that each host community has its own distinct experience. Nevertheless, common themes emerged from the interviews with sufficient regularity and consistency that general observations and conclusions were developed and are included herein.

Report Overview

Following this introduction, **Chapter 2—Plant Operation, Closure and Decommissioning** presents an overview of the history of nuclear power plant operation and closure over the past 20 years. This chapter also reviews key aspects and issues associated with the decommissioning process and the applicable NRC regulations.

Chapter 3—Socioeconomic Impacts of Closure and Decommissioning, utilizes the results of the project research and stakeholder interviews to illustrate the various socioeconomic impacts to host communities arising from plant closure and decommissioning.

Having established a common understanding of the closure and decommissioning process and the associated socioeconomic ramifications,

Chapter 4—Closure and Decommissioning: Impact and Responses then examines how various communities have responded to these challenges and opportunities. Again, using research results and observations from stakeholder interviews, community actions are mapped against a common framework.

Chapter 5—Recommendations synthesizes community responses, highlights lessons learned and develops a series of recommendations. This chapter is then followed by **Chapter 6—Suggestions for Future Work**.

This document summarizes general observations and findings regarding the socioeconomic impacts resulting from the closure and decommissioning of nuclear power plants across the country over the past 20 years. To that end, this single report does not intend to reflect all stakeholder experiences or community responses. Nor does it attempt to address issues such as fuel storage, radiological remediation or other technical aspects of decommissioning.

CHAPTER TWO

Nuclear Plant Operation, Closure and Decommissioning

Nuclear Plant Operation

The first commercial nuclear power plant in the United States, the Shippingport Atomic Power Station in Shippingport, Pennsylvania, came online in 1958. Since then, nearly 100 commercial reactors have entered operations under the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC), producing approximately 20% of the nation's electricity needs. As a result, the United States is currently home to the world's largest fleet of commercial nuclear power generating stations. The nation's newest nuclear power plants, Vogtle Electric Generating Units 3 and 4 in Wayne County, Georgia, are scheduled to commence operations in the early 2020s.

The operation of a nuclear power plant provides a significant and ongoing economic stimulus to the host community and the surrounding region. First, the construction of a nuclear plant is typically a multi-year, multi-billion-dollar effort resulting in the creation of thousands of construction and engineering jobs along with significant secondary and tertiary economic impacts to nearby towns and regions.

Second, as the operation of a nuclear power plant provides ongoing baseline energy to the electrical grid, so too does the plant provide ongoing baseline employment and economic opportunity. A typical nuclear plant annually contributes at least \$400M of gross regional product (GRP) and accounts for the direct employment of up to 2,000 workers (employees and contractors).⁴

As nuclear power plants are often located in rural areas, this concentrated and sizeable number of jobs tends to magnify the plant's local economic development contribution. In addition, nuclear



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The Shippingport Atomic Power Station was the nation's first commercial nuclear power plant.

plant workers are highly skilled with commensurate wages that often outpace regional pay scales. For instance, employees at the Pilgrim Nuclear Power Station (Pilgrim) earned an average salary of \$100,000 per year: 50% higher than the average annual salary for the host state of Massachusetts.⁵ In parallel, host communities often report that nuclear power plant operations account for a critical portion of local tax revenues. The operation of Zion Nuclear Power Station (Zion) provided the City of Zion, Illinois with approximately 50% of its tax base. Similarly, the Maine Yankee nuclear power plant (Maine Yankee) provided over 90% of the tax base for its host community of Wiscasset, Maine.

The ongoing operation of a nuclear power plant helps support a symbiotic socioeconomic relationship between the plant operator and the host community. Accordingly, over the operational lifespan of a typical power plant,

4 Brattle Group, (2018). *Impacts of Announced Nuclear Retirements in Ohio and Pennsylvania*; D. Murphy and M. Berkman.

5 Cooper, J.C., (2014). *The Pilgrim Nuclear Power Station Study A Socio-Economic Analysis and Closure Transition Guide Book*, University of Massachusetts Amherst.

both parties tend to settle into a period of mutually beneficial stability.

Nuclear Plant Closure

In 1989, Colorado's Fort Saint Vrain nuclear reactor was the first commercial nuclear power plant to close, after 10 years of operation. Since then, more than 20 additional plants have ceased operation and entered the decommissioning process as governed by the NRC.⁶ The average operational life span of these plants has been 26 years. Barring new construction or government subsidies, the U.S. nuclear fleet will continue to shrink, with this rate of contraction governed by two forces: the term of the plant's operating license and underlying electricity market conditions.

Barring new construction or government subsidies, the U.S. nuclear fleet will continue to shrink, with this rate of contraction governed by two forces: the term of the plant's operating license and underlying electricity market conditions.

First, as each plant's operating license expires, the license holder (or licensee) has the option to renew the plant's NRC license for an additional 20 years. This license renewal process is a complex, costly and multi-year investment. Some licensees may choose the renewal path thus extending the lifespan beyond the initial 20-year license period. Examples of plants that have received one or more license renewals include the Kewaunee Power Station (Kewaunee) in Wisconsin and New Jersey's Oyster Creek Generating Station (Oyster Creek).

Second, continued plant operation calls for the plant to provide a reasonable return on investment, or to put it simply, the plant needs to make money. Of late, and for the foreseeable future, the profitability of certain nuclear power plants is under mounting pressure due to the combination of relatively high operating costs (which increase as the plant continues to age) combined with the availability of lower cost options for generating electricity. The presence of these competitive

forces has caused the premature closure (in advance of NRC license expiration) of several nuclear power plants across the country. Examples of these premature plant closures include Indian Point Nuclear Generating Units 2 and 3 (Indian Point), New York; and, Pilgrim in Massachusetts.⁷

As a result of ongoing economic pressures combined with scheduled license expiration, it may be reasonably expected that the U.S. nuclear fleet may experience upwards of 20 plant closures through 2050.⁸ For instance, S&P Global Platts recently reported that upcoming rule changes to the Federal Energy Regulatory Commission capacity market auction could result in 13 units joining the list of nuclear power plants that are at a "high-risk" of early shut-down.⁹ These plants include:

- **Exelon—Illinois**
 - Braidwood-1 and -2
 - Byron-1 and -2
 - Dresden-2 and -3
 - LaSalle-1 and -2
- **PSEG—New Jersey**
 - Salem
 - Hope Creek-1 and -2
- **Energy Harbor (former FirstEnergy Solutions)—Ohio**
 - Perry
 - Davis-Besse

While the future rate of nuclear power plant closures is unpredictable, what is certain is that all nuclear power plants will eventually close and all will enter the NRC's decommissioning process.

Nuclear Plant Decommissioning Regulatory Setting

Federal Regulations

The term "decommissioning" describes a multi-step process governed by the NRC. While it is a complex undertaking, the goal of decommissioning is straightforward and defined as, ". . .the safe removal of a facility from service and reduction of residual radioactivity to a level that permits termination of the NRC license."¹⁰

In 2014, after recognizing that the current decommissioning process may benefit from updated regulations, the NRC initiated a rulemaking effort

6 NRC Regulations, 10 C.F.R., Part 20 Subpart E, and Parts 50.75, 50.82, 51.53, and 51.95.

7 When announcing the closure of the Pilgrim Nuclear Power Station, plant owners cited three factors supporting their decision, "poor market conditions, reduced revenues and increased operational costs." Mand, F. (2015, October 4), *Entergy to close Pilgrim Nuclear Power Station by 2019*, *The Patriot Ledger*.

8 Cooper, M., (2013). *Renaissance in Reverse: Competition Pushes Aging U.S. Nuclear Reactors to the Brink of Economic Abandonment*. Vermont Law School.

9 S&P Global Platts, (2020, March 5). Growth in U.S. decommissioning market depends on federal, state policies. *Nucleonics Week*, Volume 61/Number 10/page 8.

10 10 C.F.R. § 50.2.

to take a fresh look at the emerging decommissioning landscape and revise regulations accordingly. Preliminary indications are that this rulemaking will generally focus on emergency preparedness, security and administrative matters. Socioeconomic impacts associated with closure and decommissioning do not appear to be included in the rulemaking effort. This rulemaking was to be complete by December 2019. As of June 2020, this rulemaking remains a work in progress.

In managing the decommissioning process, NRC is supported by other agencies including the Department of Homeland Security, Federal Emergency Management Agency (FEMA). In particular, FEMA is to “. . . take the Federal lead role in off-site emergency planning and preparedness activities and to review and assess offsite emergency plans and preparedness for adequacy.”¹¹

State and Local Decommissioning Regulations

The role of the state is generally influenced by the regulatory setting under which the plant generated electricity (i.e., a regulated or non-regulated utility). For those states with a regulated utility marketplace, the public utilities commission (or equivalent) exerts a degree of influence over certain plant permits and approvals. For instance, Vermont provides an example of a state with a degree of regulatory authority over decommissioning. In particular, Entergy, the licensee for the Vermont Yankee Nuclear Power Station (Vermont Yankee) was required to obtain a Certificate of Public Good (CPG) from the state’s Public Utility Commission to enable the transfer of its NRC operating license to the decommissioning contractor (NorthStar). The public CPG process allowed the state to exert a modest degree of influence and enforcement over the performance of the decommissioning project. Other states, for instance Massachusetts, have little regulatory oversight of the decommissioning process.

States have, however, played a role in developing radiological cleanup standards. In the mid-1990s, the NRC established the radiological cleanup standards for the release of a decommissioned site through what was called an “enhanced participatory rulemaking” where state governments and other interests collaborated with the NRC on standard development. The State role in the cleanup standards is limited to providing

comments and advice to the NRC through the NRC rulemaking process.

Although the NRC regulations for radiological cleanup standards preempt any state cleanup standards, a state does have the authority to set cleanup standards for the period of time after the NRC Part 50 license is terminated and the plant is decommissioned. For example, Massachusetts has established a 10 mrem¹² standard that must be met after the NRC Part 50 license has been terminated.

With respect to the involvement of local regulatory authorities, these actions are generally limited to traditional issues such as the issuance of building permits and other administrative functions.

The Decommissioning Process

NRC regulations state that decommissioning (i.e. termination of the NRC license) must be completed within 60 years from the permanent cessation of operations.¹³ Completion of license termination is driven by two inter-related elements: the availability of funds to support decommissioning; and, the selection of a decommissioning option.

Decommissioning a commercial nuclear power plant is a capital-intensive effort. Estimated total project costs to complete decommissioning can exceed \$3B in the case of larger plants and \$1B project costs are common for smaller plants.

Decommissioning Funding

Decommissioning a commercial nuclear power plant is a capital-intensive effort. Estimated total project costs to complete decommissioning can exceed \$3B in the case of larger plants, such as California’s Diablo Canyon Power Plant (Diablo Canyon), and \$1B project costs are common for smaller plants. In 2018, the total cost for decommissioning the remaining U.S. nuclear power fleet was estimated to be approximately \$96B.¹⁴

NRC regulations govern how the licensee develops the necessary financial assurance (10 C.F.R. § 50.75) to support decommissioning. According to the Callan Institute, there are two

11 *Memorandum of Understanding* Between the Department of Homeland Security/Federal Emergency Management Agency, and Nuclear Regulatory Commission Regarding Radiological Emergency Response, Planning, and Preparedness, 2015.

12 A millirem (mrem) is one thousandth of a rem and defines absorbed radiation dose. As a rem is a large dose of radiation, mrem is often used for dosages commonly experienced, such as the amount of radiation received from medical x-rays and natural background sources.

13 10 CFR 50.82(a)(3).

14 Callan Institute, (2019). *2019 Nuclear Decommissioning Funding Study*.



Holtec, International

Steel canisters that will be used to temporarily store spent nuclear fuel above ground.

approaches to securing financial assurance. The largest category of licensees (accounting for approximately 70% of plant owners) are traditional regulated utilities that are authorized by the NRC to collect money from their customers during the life of the plant and place those funds in a nuclear decommissioning trust (NDT). The remaining 30% of the licensees are required to provide financial assurance through prepaid decommissioning fund and/or another form of guarantee.¹⁵ However, regardless of the manner in which the NDT is created, the NDT is essentially the only source of funds available to decommission a plant.

Through 10 C.F.R. § 50.82, the NRC also governs how NDT funds are spent in the decommissioning process and specifically allows withdrawals that are for “. . . expenses for legitimate decommissioning activities consistent with the definition of decommissioning in §50.2.” However, NRC regulations do not specifically define “legitimate decommissioning activities.” In general, activities associated with spent fuel management, site restoration and non-hazardous waste management outside of NRC license termination activities may not be deemed legitimate. Should a licensee seek a more refined definition of a “legitimate decommissioning activity,” the NRC provides for an exemption process. Such a

process was utilized in 2018 at Vermont Yankee when the decommissioning contractor and licensee, NorthStar was granted permission to use \$20M of NDT funds for spent fuel management.¹⁶ In 2019, a similar exemption was granted to Holtec Decommissioning International permitting the use of approximately \$470M in NDT funds for spent fuel management and site restoration at Pilgrim.¹⁷

Decommissioning Options

To achieve decommissioning objectives, the licensee generally has two options:

- **DECON:** A method of decommissioning, in which structures, systems, and components that contain radioactive contamination are removed from a site and safely disposed at a commercially operated low-level waste disposal facility, or decontaminated to a level that permits the site to be released for unrestricted use shortly after it ceases operation.¹⁸ The Zion Nuclear Power Station in Illinois is an example of a plant undergoing DECON.
- **SAFSTOR:** A method of decommissioning in which a nuclear facility is placed and maintained in a condition that allows the facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use.¹⁹ NRC

¹⁵ Ibid.

¹⁶ Vermont Yankee Nuclear Power Station—*Issuance of Exemption From 10 CFR 50.82(A)(8)(1)(A) (L-2018-LIe-0007)*, 2018.

¹⁷ Nuclear Regulatory Commission No. 50-293, *Holtec Decommissioning International, LLC Pilgrim Nuclear Power Station Exemption*, 2019.

¹⁸ NRC, *DECON*.

¹⁹ NRC, *SAFSTOR*.

regulations allow for a maximum 50 years of SAFSTOR. The Kewaunee Power Station in Wisconsin is an example of a plant currently employing the SAFSTOR approach.

In general, if there are sufficient funds available in the NDT to support a decommissioning program, the licensee tends to select the DECON option. However, if NDT funds are insufficient to support near-term decommissioning efforts, SAFSTOR is employed with the expectation that the NDT balance will grow over time to allow DECON to be implemented.

Whether the DECON or SAFSTOR option is selected, NRC regulations require decommissioning to be complete within 60 years of plant closure. This allows for a maximum of 50 years for SAFSTOR followed by a 10-year DECON effort. It is generally assumed that 10 years is sufficient to accomplish DECON because after the expiration of the 50-year SAFSTOR period the radiation hazards at the plant would have reduced through natural processes allowing for a relatively expedited DECON process.

Whether SAFSTOR or DECON are employed, the main steps and regulatory filings associated with decommissioning are briefly summarized below.²⁰

Transition from Operation to Decommissioning

Once a licensee has closed a nuclear power plant, the licensee submits a series of written notices to the NRC concerning permanent closure, removal of nuclear fuel from the reactor vessel and other transitional changes. Within two years after submitting the certification of permanent closure, the licensee must also submit a Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC. This report provides a description of the planned decommissioning activities, a schedule for their completion, and an estimate of the expected project costs. In concert with report submittals, the NRC typically holds at least one public meeting to review the licensee's decommissioning plans but does not approve the PSDAR. Rather, the NRC requests public comment and may provide comments back to the licensee on the PSDAR.

Major Decommissioning Activities

Ninety days following NRC's receipt of the PSDAR, the licensee may begin major decommissioning activities (e.g., permanent removal of major reactor components and mechanical systems) without

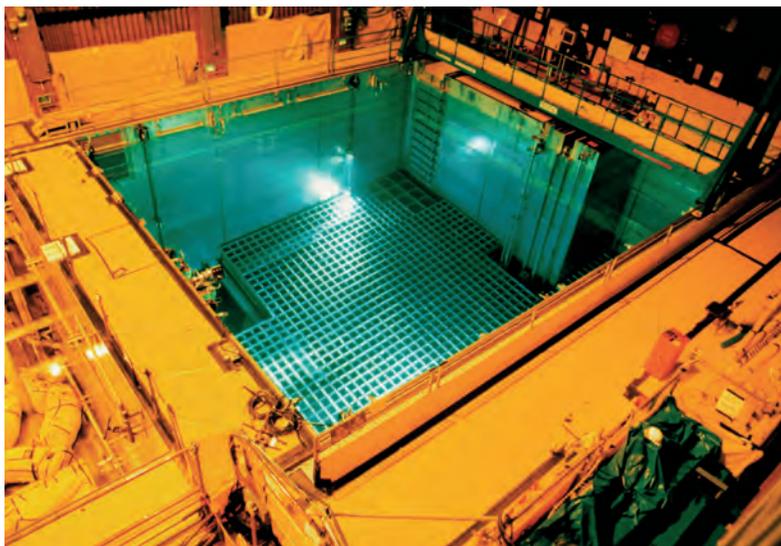
specific NRC approval. If any of these activities results in a material change to environmental or financial requirements, then the licensee is required to submit a license amendment request, which would provide an opportunity for an NRC adjudicatory hearing before the NRC's Atomic Safety and Licensing Board Panel (ASLBP).

License Termination Activities

Within two years of the expected request for license termination, the owner is required to submit a license termination plan (LTP) which addresses a variety of environmental, end-use, dismantlement and financial matters associated with decommissioning. Most LTPs envision releasing the site to the public for unrestricted use, meaning any residual radiation would be below NRC's limits of 25 mrem annual exposure and there would be no further regulatory controls by the NRC. Submittal and review of the LTP is subject to public comment but also to a possible adjudicatory hearing before the ASLBP.

Decommissioning and Spent Nuclear Fuel

One byproduct of nuclear power plant operation is the creation of nuclear waste. With respect to the management of this waste, the Department of Energy is singularly responsible for the ultimate disposition of spent nuclear fuel (SNF) from the operation of commercial reactors. In 1987, Congress amended the Nuclear Waste Policy Act (NWPA) of 1982 to designate a site in Nevada (Yucca Mountain) as the only site to be characterized as a permanent repository for the nation's SNF.



Spent nuclear fuel stored in a water-filled fuel pool at a reactor facility.

Creative Commons/U.S. NRC

20 Paraphrased from NRC, *Backgrounder on Decommissioning Nuclear Power Plants*.

TABLE 2

Spent Nuclear Fuel Stored at Nuclear Reactors

Plant Name	Spent Nuclear Fuel Stored on Site (MTU)	
	Spent Fuel Pool	Dry Cask ISFSI
Big Rock Point (MI)	—	58
Connecticut Yankee (CT)	—	414
Crystal River—3 (FL)	—	582
Diablo Canyon—1 & 2 (CA)	669	799
Dresden—1 (IL)	—	91
Duane Arnold (IA)	372	221
Fort Calhoun (NE)	—	465
Fort St. Vrain (CO)	—	15
Humboldt Bay (CA)	—	29
Indian Point—1, 2 & 3 (NY)	992	569
Kewaunee (WI)	—	519
La Crosse (WI)	—	38
Maine Yankee (ME)	—	542
Millstone - 1 (CT)	526	—
Oyster Creek (NJ)	436	367
Palisades (MI)	208	512
Pilgrim (MA)	422	205
Rancho Seco (CA)	—	228
San Onofre—1, 2 and 3 (CA)	674	935
Three Mile Island—1 (PA)	703	—
Trojan (OR)	—	359
Vermont Yankee (VT)	—	704
Yankee Rowe (MA)	—	127
Zion—1 and 2 (IL)	—	1,019
Totals	5,002	8,798

Spent nuclear fuel presently stored adjacent to nuclear reactors that have entered, or are scheduled to enter, the decommissioning process.

In the 30-plus years since the 1987 NWSA amendments, the United States has not implemented a functioning nuclear waste management program. No commercial SNF has been disposed of at Yucca Mountain or at any other site. As a result, SNF from commercial nuclear power plants remains adjacent to the reactor from which it was generated. This fuel is temporarily stored in either spent fuel pools and/or in what are known as Independent Fuel Storage Installations (ISFSI) within dry casks as shown below.

At total of 80,000 MTU²¹ of SNF is stored in pools or in dry casks at ISFSIs across the country,

of which approximately 14,000 MTU is stored at plants that have entered, or are scheduled to enter, the decommissioning process. The distribution of this SNF is shown on the following table.²²

National political dynamics call into question the viability of the Yucca Mountain site for the permanent disposal of SNF. This indicates that SNF from commercial nuclear reactors will likely remain at its current location (adjacent to its reactor site) for several decades.

There are, however, two license applications for separate consolidated interim storage facilities currently being reviewed by the NRC. One of these facilities would be located in southeastern New Mexico with the other situated western Texas. If either, or both, of these facilities receives an NRC license and becomes operational, they could begin receiving SNF in the mid- to late-2020s. The sequence in which this waste is transported to either of these storage facilities (i.e., from which operating and/or decommissioned plants) remains to be resolved along with the issue of ultimate disposal.

Decommissioning Business Models

In the 1990s, during the initial phase of nuclear power plant decommissioning and prior to the deregulation of energy markets, the decommissioning process was generally undertaken by the utility that owned and operated the plant. This was the case for plants such as the Yankee Rowe Nuclear Power Station (Yankee Rowe) and the Connecticut Yankee Nuclear Power Plant (Connecticut Yankee). In these instances, work scopes and regulatory filings were generally developed in-house, and while certain segments of the physical decommissioning were subcontracted out to specialized firms, the decommissioning effort was managed and directed by plant ownership utilizing in-house staff.

This approach continued until Zion began its decommissioning program in 2010. For this plant, a new business model emerged involving the transfer of the NRC facility license from the plant owner (Exelon Generation) to a decommissioning contractor (Zion Solutions). Specifically, for the purposes of decommissioning, the NRC license, the NDT and all improvements (except the switchyard) were transferred to Zion Solutions along with a lease of the site's real property. Following completion of field activities, the real property lease will be terminated (site control reverts back to Exelon)

21 MTU = metric tons of uranium.

22 Department of Energy, (2019). *Spent Nuclear Fuel and High-Level Radioactive Waste Inventory Report, FCRD-NFST-2013-000263, Rev. 6*. Note: Quantities do not reflect ongoing SNF transfers.

and the NRC license will be transferred back to Exelon along with possession of the ISFSI and SNF.

Building from the Zion Solutions model, a new decommissioning contractual arrangement has recently emerged whereby all plant assets (site property, physical plant, the NDT and SNF) are transferred, in their entirety, to a third-party decommissioning contractor. Under this model, the original plant owner divests all interests and obligations while the decommissioning contractor assumes all responsibility for completing the decommissioning process (i.e., termination of the NRC license) as well as responsibility for, and control of, the NDT. This approach is underway at multiple sites including the former Vermont Yankee site (where NorthStar is the decommissioning contractor) and the former Oyster Creek site (being decommissioned by Holtec Decommissioning International).

Public Engagement in Decommissioning

Given the socioeconomic and radiological dimensions of the decommissioning process, these projects are of increasing interest to residents of the nearby host community and region. As such, decommissioning projects see a continued desire, especially on behalf of host communities, for increased public engagement.

While not mandated by NRC, most licensees have instituted a forum for stakeholder dialogue commonly referred to as a Community Advisory Board (CAB). These CABs generally consist of multiple stakeholders who meet on a regular basis in a public setting. CABs tend not to have decision-making authority and generally serve as sounding boards and opportunities for stakeholders to hear reports as to progress and to engage with regulators and the licensee regarding decommissioning

progress.²³ However, some CABs, such as Vermont Yankee's Nuclear Decommissioning Advisory Panel, are legislatively enabled, have a specific mandate and a limited degree of authority.

In addition to CAB engagement efforts, the NRC often holds public hearings and comment periods regarding key decommissioning report submittals and project milestones.

Given the socioeconomic and radiological dimensions of the decommissioning process, these projects are of increasing interest to residents of the nearby host community and region. As such, decommissioning projects see a continued desire, especially on behalf of host communities, for increased public engagement.

Chapter Summary

This chapter reviewed the general lifecycle of a nuclear power plant from operation through to closure and decommissioning. With regard to decommissioning, we discussed the role of the NRC, the process by which plants decommission and the evolving business models being developed to accomplish this task. This chapter also reviewed the issue of spent nuclear fuel and its long-term presence on former plant sites as well as the matter of community engagement. With the development of this baseline understanding, this report now takes a closer look at some of the "soft areas" originally highlighted in the 2005 EPRI report with an emphasis on the socioeconomic impacts brought about by plant closure and decommissioning.

23 For a comprehensive resource on community engagement in decommissioning, see Black Diamond Consultants, Inc., (2005). *The Maine Yankee Decommissioning Advisory Panel, A Model for Public Participation in Nuclear Projects*. A Report by The Maine Yankee Community Advisory Panel on Decommissioning.

CHAPTER THREE

Socioeconomic Impacts of Closure and Decommissioning

Socioeconomic Impacts of Plant Closure

As described previously, the operation of a nuclear power plant provides substantial socioeconomic value to a host community and surrounding region with annual economic impacts measured in the hundreds of millions of dollars. In parallel, the closure of a nuclear power plant presents a similarly significant blow to local and regional economics. These negative impacts are illustrated below:

Direct and Indirect Job Loss

An operating nuclear power plant directly employs hundreds of highly skilled and well-paid workers and often a similar number of contractors. Once closure has occurred, staffing reductions typically follow a predictable pattern as the intensity of plant operations declines in phases as discussed on the table below and illustrated on the associated graph on the next page.²⁴

With these staffing reductions, impacts to host communities are soon to follow. For example, the closure of Kewaunee has meant the loss of approximately 650 jobs representing a direct annual impact to labor income of over \$70M. When indirect business-to-business activity is included along with the effect that these lost wages have on the regional economy, the total annual economic impact of plant closure is estimated to be over \$630M to the surrounding region.²⁵ Similar economic impact figures have been developed for other plants with a 2019 report by UC Berkeley estimating the annual economic loss from the closure of Diablo Canyon at \$800M.²⁶

Reduction of Tax or Municipal Payments

In addition to the loss of direct and indirect jobs, plant closure has a significant impact on municipal operating budgets through reductions in tax payments as discussed below.

TABLE 3
Employee Reduction Phases in Nuclear Plant Closure

Announcement	Closure	Hot Fuel	Cool Fuel	ISFSI Onwards
Normal operational employment at the power plant.	Operational total as the plant goes offline. Reductions represent employee retirement or relocation after announcement.	Workforce reductions after plant ceases to produce electricity. Plant operations limited to managing spent fuel including “hot fuel” recently removed from reactor.	Workforce after all hot fuel has sufficiently cooled for dry storage with the remainder in pool storage.	Workforce after all fuel has been prepared for dry cask storage in on-site ISFSIs.

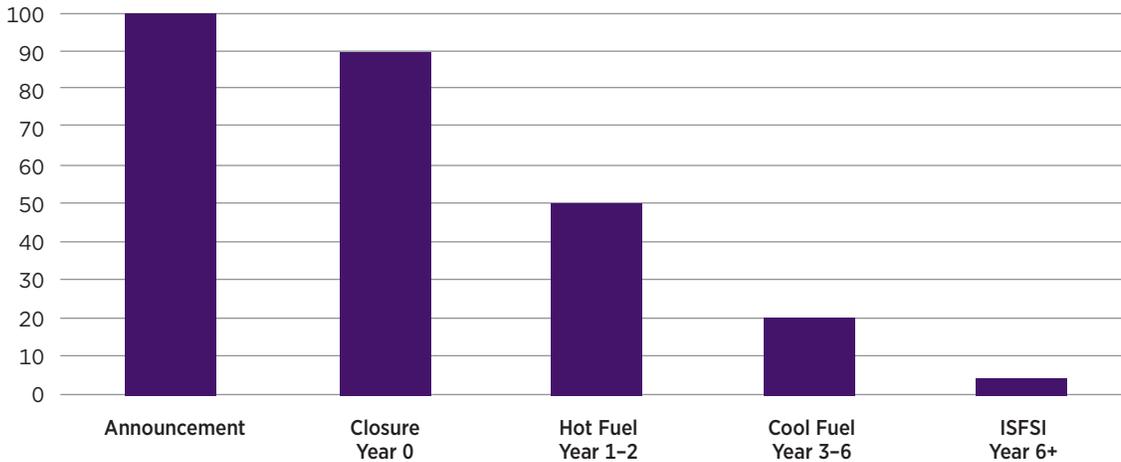
24 Cooper, (2014).

25 Kewaunee County Economic Development, (2013). *Views of the Future Kewaunee, Manitowoc and Brown Counties Wisconsin, USA.*

26 Roland-Host, D.W., et al, (2019). *Prospective Closure of the Diablo Canyon Nuclear Power Plant—Economic Impact Assessment*, University of California Berkeley.

FIGURE 1

Typical Employee Reduction Patterns Over Time Expressed as a Percentage



This graph illustrates typical employment reductions associated with plant closure.

Example Case—Wiscasset, Maine

Maine Yankee operated in Wiscasset, Maine for 25 years until its closure in 1997. During its operation, the plant employed over 500 workers most of whom lived within 20 miles of the plant. At the time of its closing, the plant contributed \$12 million annually in local taxes, covering 90% of the Wiscasset’s municipal budget for schools, fire protection, and other public services.

Example Case—Indian Point Energy Center, New York

Entergy’s Indian Point Energy Center (IPEC), is a nuclear power facility that hosts two reactors: Indian Point 2 (IP2) and Indian Point 3 (IP3). During full operation, approximately 950 full-time workers were employed at the site. Entergy has separate payment-in-lieu-of-taxes (PILOT) agreements with various entities adjacent to the plant including the Town of Cortlandt, the Village of Buchanan, the Hendrick Hudson Central School District (HHSCD) and Westchester County. Total annual PILOT payments to these entities were approximately \$33M in Tax Year 2015–2016 accounting for significant proportions of local operating budgets. For example, PILOT funds accounted for 31% of the HHSCD’s annual budget and 42% of revenues for the Village of Buchanan. As a result of plant closure, reduction in PILOT payments (for each unit) were negotiated between Entergy and New York State reducing payments by approximately 90% through 2024 as shown on the following table.²⁷

TABLE 4
Entergy PILOT Agreements with Taxing Jurisdictions

Fiscal Year Ending In	Unit 2 PILOT Payments—Percentage Reduction	Unit 3 PILOT Payments—Percentage Reduction
2020	0	0
2021	30	0
2022	60	30
2023	90	60
2024	90	90

Reduction in PILOT payments over time in conjunction with Indian Point unit closures.

Implications of Tax and Municipal Payment Reductions

Facing a reduction in tax revenues from a closed plant, host communities typically revert to increasing the local tax rate as a means to offset revenue shortfalls. Upon closure, Wiscasset’s state valuation dropped approximately 35% and other towns within the County saw their county tax increase 56% to cover increased costs of county government and the loss of Maine Yankee from Wiscasset’s tax base.²⁸ With respect to IPEC, the Village of Buchanan recently announced tax increases of 40%.

27 Indian Point Closure Task Force, (2018). *Annual Report*.

28 PA Strategies, (2001), *Economic and Property Tax Impact Analysis: A Report Analyzing the Economic Impact of the Maine Yankee Decommissioning and Future Economic Projections with Site Development*.

An increase in the local tax rate carries its own set of negative consequences. Take for example the City of Zion, Illinois. As a result of the closure of the Zion plant, the City saw a marked decrease in tax revenues similar to that to Wiscasset, Maine and the communities surrounding IPEC. Accordingly, the City increased local taxes to offset a portion of this revenue shortfall. This increased local tax rate, however, continues to hinder Zion's ability to attract new businesses.

Reduction in Emergency Management Payments

For the purposes of emergency management planning, the NRC defines a Plume Exposure Emergency Planning Zones (EPZ) as an area within a 10-mile radius of the plant. Predetermined protective action plans are in place for this EPZ and are designed to avoid or reduce dose from the potential exposure of radioactive materials.²⁹ During plant operation, plant operators typically support emergency-related activities within this EPZ through cash contributions, equipment supply, first responder training and infrastructure maintenance. In conjunction with plant shut-down, licensees have successfully argued to the NRC that the corresponding reduction in risk (resulting from a decrease in the performance of certain plant operations) warrants a reduction in the size of EPZ. Accordingly, the decrease in the size of EPZ results in a parallel decrease in local funding to the first-responder community. This reduction in funding has caused a series of disagreements between decommissioning representatives and the local first responder community at multiple plants.

Outmigration of Workforce and Reduction in Local Community Capacity

The domestic nuclear industry faces a long-term shortage in the supply of a qualified workforce. Accordingly, there is healthy market for those specialized workers whose jobs have been made redundant as a result of plant closure. This leads to a strong demand for highly skilled and well-paid workers to relocate but as discussed below, there are other factors to consider when examining workforce reduction from plant closure.

One way to understand the change that occurs to this workforce upon plant closure is to consider workers in three basic categories. First, there are those workers with generalized skills: (e.g.,

accounting, electricians, and security). These are workers who may be likely to seek local re-employment as they possess transferrable skills and experience. Second, there are the workers who are specialized to the nuclear industry and in high demand. As has been seen across the country, recent plant closure announcements are followed by reports of hiring incentives to nuclear workers to other facilities. In parallel, owners of the soon-to-be-closed plant offer incentives to retain sufficient staffing to ensure safe plant operation through closure. This dynamic is supported by a notable spike in wages using data from the Bureau of Labor Statistics' Quarterly Census of Employment and Wages for closing plants in the year leading up to closure.³⁰

The final workforce category relates to worker retirements. The U.S. nuclear fleet is aging, and its workforce has been aging in parallel. With few new plants built in the past three decades, and the closure rate increasing, increased numbers of the nuclear workforce are tracking towards retirement. Accordingly, there is a subset of workers who do not relocate to a new opportunity and choose retirement or semi-retirement.

The main employment dynamic associated with closure is, therefore, the loss of both jobs and workers from the labor force, not a massive uptick in long-term unemployment. As the rate of closure increases across the country, it will be important to pay attention to changes in these dynamics as they are highly determined by local employment opportunities, the nature of the nuclear workforce, and opportunities for those workers nationwide. New conditions, such as a widespread rise in unemployment or major changes in the energy sector, may alter these dynamics.

The exodus of many workers from the location of the closing plant also includes the removal of these individuals and their families from local civic life. Many nuclear plants are sited in rural locations where social capital and volunteerism are critical to the survival of volunteer fire departments, anti-poverty programs, youth sports, and small towns that rely heavily upon volunteers. The loss of nuclear households often means the loss of a highly educated working spouse—a school principal, class parent, small business owner. Therefore, the talent drain from nuclear plant closure extends beyond those individual exiting workers.

29 NRC, *Emergency Planning Zones*.

30 See U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages*.

Depressed Housing Valuations

Worker outmigration may place downward pressure on real estate values as discussed below.

Reduced Housing Demand

The outmigration of employees upon plant closure can release a large number of housing units into the market over a relatively short period of time. Whether there is sufficient uptake of this inventory is dependent upon two main factors, the first of which is baseline demand for housing in that region. Where there is population loss and low wages such as rural sites, homes may languish on the market. Second, as employees tend to draw from a wide region, the housing stock released into the market is spread across many sub-markets with local variables that make it difficult to identify major overall impacts. However, within individual sub-markets, these impacts may be significant.

Increase in Vacancy Rates

With a short-term release of homes into the housing market, there may be a rise in vacancy rates. Vacancies may persist if there is a lack of demand from high-wage households, which can occur in a region that lacks sufficient job opportunities to offset the loss of hundreds of highly paid professional and skilled positions at the plant. High vacancy rates will typically depress home values over time. In the post-closure era, when tax revenues are already dropping, decreasing sale prices will depress assessments. This dynamic will promote a long-term downward spiral in local revenues.

Potential Increase in Valuation Due to Reduced Stigma

Opponents of nuclear power point to an improvement in the perception of communities as a result of plant closure, due to a reduction in nuclear-related stigma. This dynamic is assumed to confer additional value upon communities and properties but may be offset by the perception of lower economic vitality. As with any change to real estate values, understanding this potential effect would require research that controls for other variables, explicitly examines consumer choice drivers, and utilizes a timeframe sufficient to assess valuation changes before and after closure.

Burdens to Community Morale

The combination of reduced revenues, the outmigration of nuclear households and a depressed housing market presents a significant challenge to town officials, economic development planners and the wider community. In the face of these forces, feelings of denial, despair and resignation are not uncommon amongst members of nuclear closure communities. Furthermore, the negative impact of this dynamic is accentuated due to the fact that there is a pressing need for economic planning and action at precisely the same time that local coffers and capacities are being depleted.

The combination of reduced revenues, the outmigration of nuclear households and a depressed housing market presents a significant challenge to town officials, economic development planners and the wider community.

NRC's Consideration of Socioeconomic Impacts from Plant Closure

This chapter has, up to this point, reviewed the generalized socioeconomic impacts stemming from the closure of a commercial nuclear power plant. The emphasis on the term “closure” in this discussion is purposefully distinct from “decommissioning.” Recall that decommissioning is defined by the NRC as, “. . . the safe removal of a facility from service and reduction of residual radioactivity to a level that permits termination of the NRC license.”³¹ With respect to these regulations, the socioeconomic impacts of plant closure are not of significant concern.

This distinction is illustrated in the 2002 Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1 (GEIS). The GEIS is the foundational document that defines what impacts are to be formally considered by the NRC and the licensee in the pursuit of decommissioning.³² The GEIS does acknowledge impacts of *closure*, specifically mentioning, “*...impacts to the following public services occur as a result of plant closure: transportation, public safety, social services, public utilities, and tourism and recreation.*” However, *the GEIS closes the door on consideration of*

31 Domestic Licensing of Production and Utilization Facilities, 10 C.F.R. § 50.2.

32 NRC, (2002). *NUREG-0586, Supplement 1 Volume 1, Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors, Main Report, Appendices A through M Final Report.*

these impacts: “Impacts related to the decision to permanently cease operations are outside the scope of this Supplement.” As noted previously, the GEIS was last revised in 2002, several years before this recent upsurge in the level of decommissioning activity.

The objectives of the National Environmental Policy Act are not only to inform the NRC decision-making process but also to inform the public of what types of environmental impacts might result from an NRC action.

Socioeconomic Impacts of Plant Decommissioning

In contrast to the socioeconomic impacts of plant closure, this section reviews similar impacts as they pertain to plant decommissioning.

NRC’s Consideration of Socioeconomic Impacts from Plant Decommissioning

There are two primary elements to the NRC’s authority. One is the authority to protect public health and safety under the Atomic Energy Act.³³ There is, however, another element in the NRC’s regulatory structure for decommissioning: the requirements based on the National Environmental Policy Act (NEPA) to consider the environmental impacts from decommissioning, including socioeconomic impacts. These requirements have been codified in the NRC regulations in 10 CFR Part 52 and apply to the NRC, as well as to a licensee or license applicant. The trigger for implementing these requirements is the preparation by the NRC of an environmental impact statement (EIS) or an Environmental Assessment (EA).

The objectives of NEPA are not only to inform the NRC decision-making process but also to inform the public of what types of environmental impacts might result from an NRC action. Note that, unlike the NRC public health and safety requirements, which establish substantive requirements to be complied with, NEPA is a “process” statute (i.e., as long as the required environmental information is developed and presented in what has been termed a “hard look” at environmental impacts, the requirements of NEPA have been met). The NRC also must identify mitigating strategies for the environmental impacts but has no obligation to require a licensee

to implement those mitigating strategies unless these impacts relate to a public health and safety issue.

The NRC’s approach to implementation of NEPA in the decommissioning arena has been to issue a generic EIS. The GEIS, although developed long before much of the pertinent decommissioning activity has taken place, attempts to identify the typical environmental impacts (including socioeconomic impacts) that may result from decommissioning. If the particular impact is found to be sufficiently generic, then it does not require consideration through a site-specific decommissioning EIS or EA.

Additional Dimensions of Socioeconomic Impacts

As discussed, socioeconomic impacts of decommissioning have been considered by the NRC as referenced in the GEIS. Typically, these generic findings when applied to an actual site result in the conclusion that socioeconomic impacts of decommissioning are insignificant.

However, a recent study UC Berkeley concluded that the economic stimulus provided by the planned decommissioning of Diablo Canyon was material. Specifically, “Previous studies have only considered the negative shocks, whereas we take account of how decommissioning expenditures will substantially offset economic losses attributable to plant closure.” The degree to how substantial the offset may be is subject to debate, but as stated above, a revision of the GEIS may prove beneficial to better incorporate current realities as well as new research and experiences. In any event, while the performance of a large-scale decommissioning project carries with it substantial economic aspects, evaluating the socioeconomic impacts of decommissioning warrants additional consideration of the following issues.

Temporary Nature of the Decommissioning Workforce

- Nuclear plant employees live and work in the host region. However, decommissioning contractors tend to employ their own labor, often bringing them into a project on a limited basis. These worker living situations are temporary, as opposed to permanent, and a portion of wages may be transferred back to their permanent residence thereby reducing positive impacts to the local economic economy.

Potential Changes to Local Procurement Practices

- During operation, many plants dedicated a portion of their procurement to local goods and services. This was viewed as good business practice as the operating utility had a long-term presence in the community. For example, during the operation of Yankee Rowe, the utility procured goods and services from 125 small businesses in 12 communities in the host county.³⁴ Due to its specialized business nature however, decommissioning generally involves a greater proportion of non-local business expenditures and contractors. Without the ability for local or state entities to enforce local hire and procurement provisions, NDT funds may be spent in a way that has less relative benefit to the region than those expenditures during plant operation.

Chapter Summary

This chapter reviewed the socioeconomic impacts of closure and decommissioning. The range of impacts include job loss, worker migration, decrease in tax payments, depressed housing markets and challenges to a community's morale. This chapter also discussed the difference between impacts from closure as compared to decommissioning and reviewed NRC jurisdiction over these matters. In general, closure impacts were found to be widespread but fell outside

Regardless as to whether impacts arise from closure or decommissioning, the body of knowledge surrounding the socioeconomic dimensions of a nuclear power plant's final phases is incomplete. There is a significant and burgeoning need for the planning, economic development and research community to strengthen our understanding of these complex issues.

the purview of the NRC while decommissioning impacts are more limited and within NRC jurisdiction.

Regardless as to whether these impacts arise from closure or decommissioning, the body of knowledge surrounding the socioeconomic dimensions of a nuclear power plant's final phases is incomplete. To that end, there is a significant and burgeoning need for the planning, economic development and research community to strengthen our understanding of these complex issues. In that context, this need is partially met in the next chapter as we take a closer look at closure-related impacts and the associated community responses.

³⁴ Mullin, John R. and Kotval, Zenia, *The Closing of the Yankee Rowe Nuclear Power Plant: The Impact on a New England Community* (1997). Journal of the American Planning Association. 25.

CHAPTER FOUR

Closure and Decommissioning— Impacts and Responses

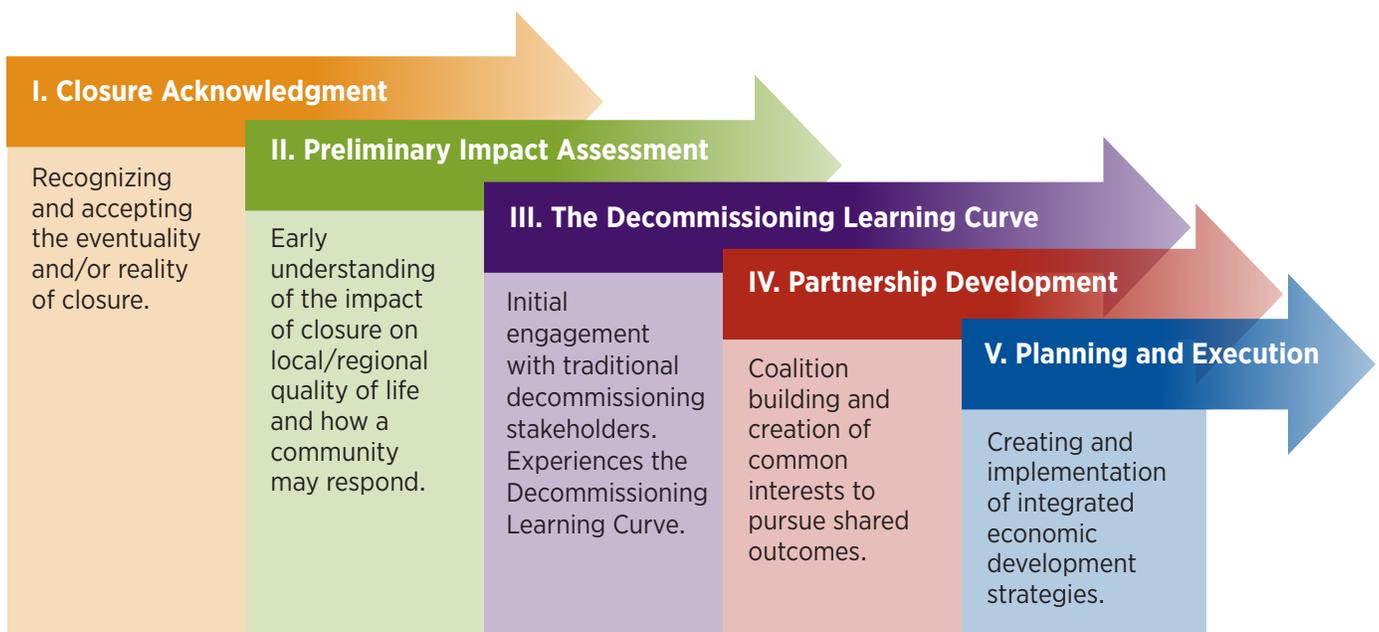
Introduction

A host community’s response to the closure of a nuclear power plant is similar to that of communities that experience the closure of a coal plant or manufacturing facility: the economic impact is realized, a community becomes organized and plans are made to mitigate the fiscal loss. Building on that basic model by including experiences from nuclear closure communities across the country, we have developed a similar

process to illustrate the phased journey that a typical nuclear host community may experience as it seeks to recover from the socioeconomic impacts stemming from plant closure. This five-phased process is illustrated below.

With this planning model as a general guide, and drawing from stakeholder interviews and project research, this chapter explores host community responses to nuclear power plant closure.

FIGURE 2
Nuclear Host Community Economic Recovery Process



This graphic is a conceptual depiction of the process that communities generally follow as they respond to the closure of a nuclear power plant. While the phases are displayed in a linear fashion, each community designs its own response based on its unique experiences and circumstances—theirs is a context-sensitive process that mirrors individual needs and aspirations.

Phase I—Closure Acknowledgement

Discussion

The closure of a nuclear power plant generally results from a business decision made by the operating utility. In some instances, public discourse surrounding potential plant closure may precede by years the final closure decision. Subsequent to that closure decision, actual plant closure may occur months or years later. Such was the case for Indian Point which was the focus of years of public discourse regarding its operational future when in January 2017, it was announced that closure for Unit 2 would take place in 2020 and in 2021 for Unit 3. This dynamic remains relevant today as nuclear power plants in Pennsylvania, Illinois, Ohio and elsewhere are the subject of ongoing public dialogue and policy discussions surrounding plant closure.

In other instances, the announcement of plant closure may be relatively unexpected as was the case of Kewaunee in Wisconsin. Prior to closure, the plant was experiencing a period of strong reliability and performance, but its profitability was being eroded due to market conditions. As a result, on October 22, 2012, Dominion Power, which had purchased the plant five years before, announced a closure date of May 2013 providing employees and community stakeholders with seven months of advance notice. This example of a short timeline illustrates how unpredictable closure can be.

While the nature of the host community's response to a pending or potential closure varies, one common reaction displayed is that of avoidance: specifically, an initial reluctance to acknowledge the inevitability of closure and the associated economic impacts. In some instances, this reluctance results in the ongoing unwillingness of community members and elected officials to publicly discuss the possibility of closure, as if verbalizing the potential end of a plant's operating life will accelerate the pace, or increase the likelihood, of closure.

This reluctance to acknowledge the inevitability of closure is understandable. The plant likely operated for approximately 30 years in the community, provided an ongoing level of high economic security, and the plant's workforce was fully integrated into local civic, social and cultural identities. The idea that this period of stability may soon end is, therefore, resisted. Discussion of plant closure is sometimes further complicated by political divisions

over nuclear power which has polarized some communities, consuming limited internal capacity as the community enters its closure phase.

Not until the hurdle of denial is overcome can a community move forward. This is illustrated by the following examples of several host communities who early on acknowledged that plant closure was a reality and took strategic measures to mitigate potential impacts.

While there are a variety of host community responses to a pending or potential closure, one common reaction is that of avoidance: specifically, an initial reluctance to acknowledge the inevitability of closure and the associated economic impacts.

Example Case—Closure Acknowledgement Southwest Michigan Planning Commission

The Palisades Power Plant (Palisades) has operated on the shores of Lake Michigan since 1971 and its current operating license is scheduled to expire in 2031. In 2017, the plant owners announced plans for a premature closure scheduled for 2022.

The plant is located in an Economic Development District (EDD) in which the Southwest Michigan Planning Commission (SWMPC) is the managing entity. An EDD is a multi-jurisdictional entity, commonly composed of multiple counties and in certain cases even cross-state borders. EDDs help lead the locally based, regionally driven economic development planning process that leverages the involvement of the public, private and non-profit sectors to establish a strategic blueprint (i.e., an economic development roadmap) for regional collaboration.³⁵

In response to this impending closure, local agencies in the surrounding region launched a series of initiatives to lay the foundation for economic development planning. In particular, the SWMPC is spearheading the Palisades Economic Recovery Action Plan to, “. . . implement a comprehensive economic recovery strategy for the benefit of southwest Michigan in the wake of the upcoming closure of the Palisades Nuclear Power Station.”³⁶

Central to the Action Plan's effectiveness is its commitment to “deep and persistent public engagement...[to] create a central hub for reliable

35 For more information see EDA, *Economic Development Districts*.

36 Southwest Michigan Planning Commission, (2020). *Palisades Economic Recovery Action Plan*.

information on all the formal events surrounding the plant closure and the economic recovery strategy.” Key constituents targeted by the Action Plan include:

- School districts
- Philanthropic organizations
- Events and organizations who rely on volunteers
- Local government service recipients
- Local businesses
- Residents and visitors

For those communities that currently host a nuclear power plant, many have yet to develop a sufficiently detailed understanding as to the integrated nature of the nuclear power plant’s contribution to the local economy.

By serving as trusted source of information and by building awareness across a broad stakeholder base, SWMPC is a good example of a local entity taking the early leadership role to build the alliances and networks necessary for effective economic and community development planning.

Phase II—Preliminary Impact Assessment

Discussion—Understanding the Plant’s Economic Role in the Host Community

Once there is a general understanding that a nuclear power plant will close, the next phase communities enter into is a period of assessment. Given the relatively large fiscal and socioeconomic contribution that most nuclear power plants have on their host community, it may be reasonable to assume that the nature and extent of this fiscal impact is already well understood. However, research indicates that the opposite is generally true: namely, that for those communities that currently host a nuclear power plant, many have yet to develop a sufficiently detailed understanding as to the integrated nature of the nuclear power plant’s contribution to the local economy.

One of the complications in assembling this knowledge base is that the “Host Community” remains difficult to define. The municipal host is usually not the only beneficiary of economic gains. As the following examples illustrate, stakeholders come from a diverse range of geographic

units because the jobs base, tax revenues, philanthropic reach and community engagement of the nuclear power plant extend across a broad region. At the same time, there may be one principal unit most at risk due to closure because of their reliance upon the plant revenues (e.g., an individual town, a school district, a library).

Example Cases

The Indian Point Task Force

In 2017, three years before the first of two units at IPEC were to close, the governor of New York announced the formation of the Indian Point Task Force (Task Force) to provide insights into socioeconomic dimensions of the facility closure and subsequent decommissioning. The Task Force was convened by the New York State Department of Public Service with a broad and inclusive membership consisting of representatives from the Governor’s office, state elected officials, local and county representatives, labor and various state agencies.

Early work of the Task Force focused on issues pertaining to local taxes, employment, energy reliability as well as decommissioning and site reuse. The Task Force also researched various legislative options to mitigate socioeconomic impacts and produced a thorough inventory of state programs that may be of assistance. In parallel, the economic relationship between IPEC and the surrounding region became well-defined thus forming the basis for a range of remedial measures and policies. These measures included phased reduction in PILOT allocations over four years for each reactor and the creation of the \$30M Electricity Generation Facility Cessation Mitigation Program.³⁷

The Southeast Vermont Economic Development Strategy Planning Group

Vermont Yankee was the focus of significant public discourse and litigation in the years leading up to the 2013 announcement that the plant would close in 2014. During that pre-announcement window, the Southeast Vermont Economic Development Strategies grassroots planning group (SeVEDS) formed the multi-stakeholder Post-Vermont Yankee Task Force to examine the plant’s role in the local and regional economy. Their 2012 report identified the following expected impacts of plant closure:

37 For more information see: New York State, *Electricity Generation Facility Cessation Mitigation Program*.

1. **Job losses:** Over 1,000 direct and indirect jobs would be permanently lost.
2. **Significant GDP decline:** Major impacts on local retailers as a result of a decrease in discretionary spending on local goods and services.
3. **Major declines in real estate value:** The report estimated a valuation reduction between 5% and 10% from pre-closure levels.
4. **Major declines in human capital:** As high-capacity workers left the region, the quality of health care and education, and the viability of non-profit organizations, would be jeopardized.
5. **Major declines in state and local tax revenue:** As Vermont Yankee and its employees paid property taxes, sales and income taxes, significant reductions in those revenue streams to state and local governments were forecasted.³⁸

The advanced development (several years before closure was announced) of this fiscal knowledge base provided the local community and the state with greater understanding as to the relationship between Vermont Yankee and the local/regional economies. As with the case of Indian Point, the report provided elected officials with the baseline information necessary to develop policies and requirements regarding state oversight of eventual decommissioning. The report and advocacy by regional stakeholders informed negotiations between Vermont and Entergy, leading to one of the nation's largest nuclear power plant economic mitigation funds.

San Luis Obispo County, California

In the fall of 2016, California Senate Bill 968 (Monning) was enacted which called for an economic assessment of the “adverse and beneficial economic impacts, and the net economic effects, for the County of San Luis Obispo and the surrounding regions, that could occur if the [Diablo Canyon Nuclear Power Plant] were to temporarily or permanently shut down...”⁴⁰ This legislation, enacted two years prior to closure announcement and eight years before closure of the first unit, was undertaken at the urging of local advocates who engaged elected officials and statewide legislators to work together to address socioeconomic issues.

Phase III—The Decommissioning Learning Curve

Once a host community recognizes the impending closure of a nuclear power station and combines this realization with an understanding of the potential socioeconomic impacts associated with closure, they embark upon what we refer to as the Decommissioning Learning Curve. For most community members as well as local and state officials, the decommissioning of a nuclear power plant is a once-in-a-lifetime undertaking; to that end, the Learning Curve is steep. In that context, this section highlights the following six key observations typically experienced by stakeholders along their Learning Curve journey:

1. The Scope of Decommissioning is Narrowly Defined
2. Lack of Sufficient Resources to Support Socioeconomic Planning
3. A Singular Focus on Site Redevelopment in Spite of the Presence of SNF
4. Limited Opportunities for Public Engagement
5. Realization of the Broader Disconnection Between Host Community Needs and the Current Regulatory Framework
6. The Need for Improved Coordination Between Federal Agencies to Support Decommissioning Host Communities

For most community members as well as local and state officials, the decommissioning of a nuclear power plant is a once-in-a-lifetime undertaking; to that end, the Learning Curve is steep.

The Decommissioning Scope is Narrowly Defined

Recall that the goal of decommissioning, as defined by the NRC, is limited to actions intended to accomplish license termination. Using this definition, the socioeconomic issues, dynamics and impacts associated with plant closure have little substantive requirements requiring action by the NRC or the licensee. In parallel, the licensee (plant owner or decommissioning contractor) follows the same set of federal regulations and is also reluctant (some would say statutorily discouraged) from materially addressing issues that do not contribute to license termination (e.g., socioeconomic matters).

³⁸ Post—Vermont Yankee Task Force of the Southeast Vermont Economic Development Strategy Planning Group, (2012). *Windham County Post-Vermont Yankee Economic Mitigation and Growth*.

³⁹ *Senate Bill 968*, 2015–2016, Ch. 674, 2016 Cal. Stat.

The fact that closure-related socioeconomic impacts, measured in the hundreds of millions of dollars, are not considered relevant under current NRC regulations is an important realization for current host communities.

Lack of Sufficient Resources to Support Socioeconomic Planning

Stakeholder interviews indicate that, in the wake of plant closure, a lack of resources is the overwhelming obstacle preventing communities from moving forward in economic planning and recovery. There are two key dimensions to these resource needs: human capital and fiscal resources.

Human Capital

For several reasons, host communities often face early difficulties in the creation of economic development responses to the closure and decommissioning of a nuclear power plant. First, the closure decision is generally made without considering local interests and planning needs. Second, the closure and decommissioning process is an entirely new and unfamiliar phenomenon. As such, there are few resources available to regional or state economic development entities to become skilled in nuclear power plant closure, its implications and the development of response strategies. Third, the long-term presence of the nuclear power plant, and its benefits to local budgets, has in some cases obviated the need for the host community to participate in coordinated regional economic development efforts.

There are few resources available to regional or state economic development entities to become skilled in nuclear power plant closure, its implications and the development of response strategies.

Fiscal Resources

NRC's definition of decommissioning also governs how nuclear decommissioning trust (NDT) funds may be spent. While current NRC regulations allow for up to 3% of NDT funds to support "planning" purposes, the definition of those planning purposes is limited to activities that advance license termination.⁴⁰ NRC does not presently support the use of NDT funds for the purposes of socioeconomic mitigation planning.

Local Responses

Local entities have sought to mitigate economic losses by applying a tax to the "value" of the SNF stored at the site. Taxing the value of a shut-down plant is also a potential option for a host community but this is generally prone to differing perspectives between the plant owners and the host community. For instance, during its operation Kewaunee was valued at approximately \$460M. Following closure, the host community (the Town of Carlton) attempted to continue taxing the plant at this rate but the plant owners rejected this valuation. A settlement was reached that set the market value of the plant at zero and the fair market value of "personal property" at the site of approximately \$1M.⁴¹

State Responses

Some states have also risen to the challenge to assist host communities with funding that addresses the broad, long-term economic impacts. For example, regarding California's Diablo Canyon, the state passed Senate Bill 1090 in 2018. The bill directed the California Public Utilities Commission to approve the \$85M settlement negotiated between the plant operator (Pacific Gas and Electric or PG&E) and seven local cities who argued that PG&E's initial mitigation plans were inadequate. Of the \$85M settlement, \$75M is planned to offset property tax losses by the San Luis Obispo School District, the county and 69 other special districts. The remaining \$10M would be used for economic development efforts in the county and surrounding cities.

Also, as mentioned previously, New York created the \$30M Electricity Generation Facility Cessation Mitigation Program. In parallel, Vermont secured \$10M from Entergy to establish the Windham County Economic Development Program that over five years has invested to create or retain over 700 jobs, with \$42M of positive economic impact to date.⁴²

The Federal Response

One of the Federal Government's resources is EDA who has, for several years, worked with communities suffering from economic loss due to the closure of a nuclear power plant. Areas of support include the provision of technical assistance along with grants to support a wide range of economic development activities. While EDA's mandate is

40 10 C.F.R. § 50.82(a)(8)(ii).

41 Schneider, D., (2017, January 20). *Kewaunee nuke plant is due \$12M in tax refunds*, *Green Bay Press Gazette*.

42 State of Vermont, *Windham County Economic Development Program*.



The aerial photograph shows the site of the former Connecticut Yankee nuclear power plant. The independent spent fuel storage installation (ISFSI) is the rectangular shape on the bottom right of the photo.

quite broad when it comes to assisting economically distressed communities, and its resources dedicated to these communities is limited (\$15M in FY2020), EDA can be an important partner to host communities.

A Singular Focus on Site Redevelopment and the Presence of SNF

For those stakeholders who are associated with a decommissioned or soon-to-be-decommissioned plant, a majority express a strong belief that redevelopment of the former plant site is a fruitful pathway to economic recovery. On the surface, this is a reasonable expectation as the plant site has been the source of considerable economic value for decades. In addition, nuclear power plants have existing electricity transmission infrastructure and are adjacent to water (used for plant cooling during operation) all of which makes them appear desirable from a commercial or industrial redevelopment perspective. At present however, near-term site redevelopment tends not to be the most promising source of economic development for the following reasons.

The Presence of Spent Nuclear Fuel

SNF from a commercial nuclear reactor will remain hazardous to human health and the environment for approximately 300,000 years. Also recall that SNF is likely to remain at its current location for decades. While the current above-ground storage of SNF in dry casks has a demonstrated safety record, the ongoing presence of SNF carries with it a certain degree of negative stigma along with liability and regulatory considerations that discourage redevelopment. Put simply, “precedent indicates that spent fuel storage on the site of the dismantled plant will preclude redevelopment.”⁴³ In this context, it is worth noting that the only reason that Maine Yankee, Connecticut Yankee and Yankee Rowe remain in business (as operators of ISFSIs) is the continued presence of SNF at these sites. Had the federal government met its obligation to remove SNF beginning in 1998, the sites would have been available for repurposing.

43 Wyndham Regional Commission, et al, (2016). *When People and Money Leave (and the Plant Stays)—Lessons Learned from the Closure of the Vermont Yankee Power Station: A Tri-Region Experience.*

Lack of Redevelopment Incentive or Site Control

The presence of SNF notwithstanding, site redevelopment is further hobbled by the fact that redevelopment is not part of decommissioning contractor's business model or skillset. As such, the potential for site redevelopment appears to be an afterthought. The same may be said for utilities that have retained title to decommissioned plant sites: they are in the business of generating electricity and site redevelopment is not a core competency. Rather, redevelopment of a site adjacent to stored SNF is generally seen as an unnecessary business risk.

The utilities themselves are not in the business of redevelopment, which is why the long-term site ownership becomes problematic in terms of future economic activity. Take for example the former Connecticut Yankee site. The utility owns and manages the site per NRC regulations until such time that the SNF is removed offsite for disposal, thereby allowing for NRC license termination. The total site area is 525 acres of which approximately five acres is dedicated to SNF storage. According to a local official, while there is some interest in utilizing the remaining property for commercial purposes (a solar power installation) there has not been sufficient interest to move this plan forward.

Lengthy Decommissioning Timeframes and Schedule Uncertainty

Current NRC regulations require that decommissioning be complete within 60 years from the cessation of operations. While those responsible for project execution may work to complete decommissioning on an accelerated timeframe (in some instances perhaps as soon as 10 years from start of project activities), the 60-year schedule for completion remains a possibility. This degree of schedule uncertainty makes redevelopment planning problematic.

Conservation as a Site Reuse Option

Discussion of site reuse options would be incomplete without mention of the option of non-commercial land uses, in particular, the potential for conservation or passive recreation. To that end, three brief examples are discussed.

Maine Yankee

Maine Yankee closed in 1997 after 25 years of operation on the shores of Maine's Back River. The operational portion of the plant site encompassed less than 10% of the plant's 820 acres. Decommissioning was substantially completed in 2005. In conjunction with decommissioning, 200 acres of

the original property were released from the plant's operating license and donated to a local nonprofit conservation organization (the Chewonki Foundation), and 400 acres was sold to the Town of Wiscasset which subsequently transferred this property to a private developer.

Diablo Canyon

PG&E's Diablo Canyon is situated on California's central coast with San Luis Obispo County. The plant's operating license encompasses over 900 acres of property while the power-producing portion of the plant is approximately 12 acres in size. PG&E's total land holdings associated with the Diablo Canyon facility total over 12,000 acres the majority of which are deeded as conservation land. The site's two reactors are scheduled for premature closure in 2024 and 2025 and community-based organizations (including The Hourglass Project) are actively working with PG&E and the California Public Utility Commission to develop comprehensive land conservation measures in support of closure and decommissioning.

A Focus on Redevelopment Distracts from More Promising Near-Term Efforts

In its most optimistic context, site redevelopment could begin no sooner than within 10 years once decommissioning efforts have begun. The implication of this is that even the most ambitious site redevelopment will occur after a period of local economic uncertainty or decline. In addition, the ongoing presence of SNF in this scenario is a virtual certainty. Combined with the fact that the host community does not own the site and has little control over its ultimate fate, site redevelopment and associated economic gain remains an unlikely proposition.

In the meantime, as discussed in Section 4.6 and quite distinct from site redevelopment, host communities have a range of other opportunities under their direct control that may more expeditiously spur local and regional economic growth.

Limited Opportunities for Public Engagement

As host communities continue along the Decommissioning Learning Curve, there is an ongoing desire to engage with stakeholders to more fully explore opportunities, resources and collective actions. Recall the point made previously that Community Advisory Boards (CABs) are often the standard vehicle for community engagement, and that Maine Yankee's Community Advisory Panel (CAP) provided a good example of the licensee and host community working together in the

pursuit of common objectives. Specifically, key elements of the Maine Yankee CAP included:⁴⁴

- The CAP was politically very diverse and represented a broad cross-section of the community including elected officials;
- Funding was made available to help the CAP navigate through the process;
- CAP members worked to develop and maintain mutual trust from the outset;
- The CAP always had dinner together before the meetings as that connection “made it hard to demonize the other.” This commitment to collaboration set the tone for how the CAP functioned; and,
- The CAP welcomed community involvement. The feeling was that there was value in concerns and fears being manifest early with the motto “embrace it—don’t run from it” being a constant theme.

Research of current CAB practices indicates that in some instances, CABs are viewed as separate from the local community or town infrastructure. In some cases, the CAB was derided as having the appearance of a “tool” of the federal decommissioning process with little impact or communication with county government, planning, economic development or other local entities. In these cases, the CABs were not seen as effective and created friction within the communities.

Not all decommissioning projects have decided to implement a CAB. In particular, Duke Energy’s Crystal River Nuclear Power Plant (Crystal River),

which was shut down in 2009 and retired in 2013, is currently in the decommissioning process. In considering its engagement options at Crystal River, Duke Energy has chosen to create an informal stakeholder group rather than a formal CAB. In a statement to the press, a Duke spokeswoman said that, “Based on statistically valid data and input from our community, forming a formal advisory board was not necessary for us and was not the best avenue to meet the needs of our community.”⁴⁵

When it comes to socioeconomic issues, CABs closely align their role with the current regulatory framework, which means that socioeconomic issues tend to remain unaddressed in these engagement opportunities.

In response to increased attention to the importance of meaningful public engagement in decommissioning, the Nuclear Energy Innovation and Modernization Act (NEIMA) was enacted in 2019.⁴⁶ Specifically, Section 108 of NEIMA called for the NRC to identify best practices for “establishing and operating local community advisory boards to foster communication and information exchange between a decommissioning licensee and the local community.” To satisfy its NEIMA obligations, the NRC held a series of 10 public meetings and two webinars in 2019 to solicit



Creative Commons/U.S. NRC

44 Maine Yankee Community Advisory Panel on Decommissioning, (2005).

45 Bates, M., (2019, October 8). *Decommissioning Meeting Set for Thursday*, *Citrus County Chronicle*.

46 Nuclear Energy Innovation and Modernization Act of 2019, S.512—115th Congress (2017–2018), Public Law No: 115-439 (2019).

public input on the matter of community advisory boards. The findings of NRC’s engagement on the matter of CABs were published in July of 2020.⁴⁷

A review of public comments submitted to the NRC as part of the NEIMA process indicates that many stakeholders view current CABs as having departed significantly from the spirit and form of Maine Yankee’s successful CAP. Specifically, many commenters view current CABs as industry-sponsored communication vehicles, with little opportunity for meaningful two-way dialogue. Additional comments include a desire for greater community influence in the design and function of CABs, along with access to resources to enable third-party validation of key decommissioning efforts. In parallel, many comments call for additional opportunities to broaden the conversation to include socioeconomic impact mitigation and other issues that are outside of the NRC’s current definition of decommissioning.

The challenge to maintain ongoing communication is sometimes further complicated when the nuclear power plant is sold and/or decommissioning rights are contracted to another entity. In some of these cases, while ongoing communication with the utility was positive prior to license transfer, once the transaction took place,

communication with the decommissioning contractor was reduced in both frequency and quality.

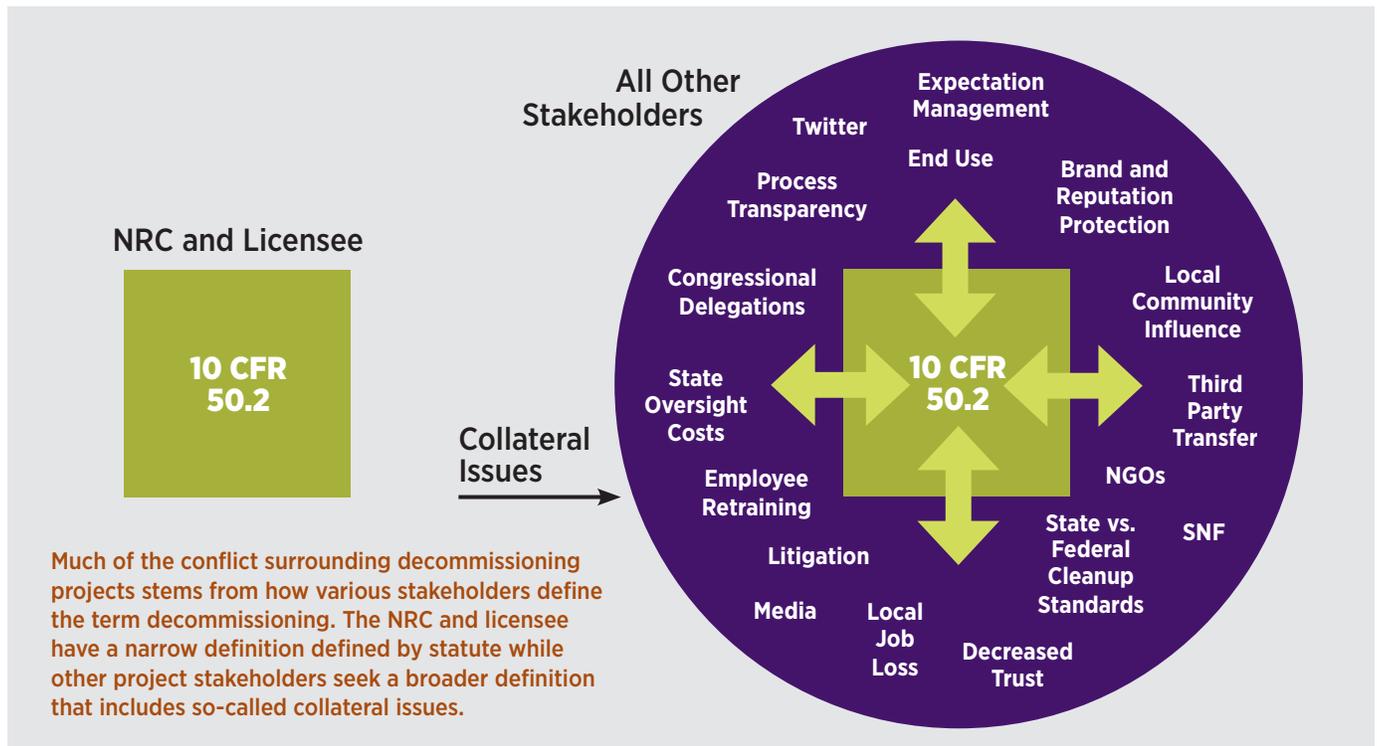
Given the variation from site to site, it is not the purpose of this report to prescribe the composition of engagement processes that will work everywhere. However, when it comes to socioeconomic issues, CABs closely align their role with the current regulatory framework, which means that socioeconomic issues tend to remain unaddressed in these engagement opportunities.

In any event, certain decommissioning contractors and project stakeholders are independently seeking ways to foster more meaningful engagement and communication methods as a means of improving project outcomes, but this is not currently the norm.

Realization of the Broader Disconnection Between Host Community Needs and the Current Regulatory Framework

Towards the end of The Decommissioning Learning Curve, host community stakeholders begin to realize that there is a fundamental conflict between their needs and desires (both process and resource-related) and the confines of the current federal regulatory framework. This discord is best illustrated in the following diagram.

FIGURE 3
Decommissioning Perspectives



47 NRC, (2020). *Best Practices for Establishment and Operation of Local Community Advisory Boards Associated With Decommissioning Activities at Nuclear Power Plants: A Report for The Senate Committee on Environment and Public Works and The House Committee on Energy and Commerce.*

On the left, the green box illustrates how decommissioning is viewed by the NRC and the licensee as described in 10 C.F.R. § 50.2.

The image on the right depicts how decommissioning is viewed by the rest of the stakeholder community. It is in this disparity where the inherent and ongoing conflict resides. Put simply, two stakeholders (the NRC and the licensee) are confined by regulation to manage the decommissioning process under the narrowly defined terms. In contrast, the stakeholder community seeks a broader conversation to address what are known as collateral issues (i.e., socioeconomic impact mitigation, access to resources and process transparency). This conflict is a common feature at any number of decommissioning-related meetings.

One feature of the right-hand side diagram is illustrated by the box's dashed border and the arrows of influence. These indicate that Collateral Issues have a direct influence on the pursuit of decommissioning outcomes. This influence can be negative: if Collateral Issues are poorly managed, there is the increased risk of litigation, reputational damage and the distraction of senior executives away from their day-to-day decommissioning obligations. The influence may also be positive: if Collateral Issues are adequately addressed, decommissioning stakeholders may seek to work collaboratively with the licensee thus decreasing overall project risk. In this setting, the degree to which certain Collateral Issues are, or are not, addressed by the licensee, becomes a business decision.

Decades of experience in other industrial sectors (extractives, petrochemical and non-nuclear energy generation) suggests strongly that the strategic management of Collateral Issues is a best practice and results in harmonized efforts between the project proponent and host community with positive impacts to project cost and schedule. The degree to which these lessons may be adopted by the nuclear decommissioning industry remains to be seen.

The Opportunity for Improved Coordination Between Federal Agencies to Support Host Communities

As host communities approach the end of the Decommissioning Learning Curve, they have experienced a variety of realizations including:

- There is no common understanding amongst the general stakeholder community of the process for closure and decommissioning and key steps along the way;

- There is no clear understanding of how the community may meaningfully engage with the licensee regarding decommissioning objectives;
- The role of state governments in the decommissioning process is highly variable and to that end, the understanding as to “Who is in charge” differs by topic area and from state-to-state; and,
- There are insufficient resources available to assist host communities through the decommissioning process.

In this context, host communities often turn to the federal government for assistance and guidance. As we have discussed, socioeconomic impact mitigation is outside of NRC's jurisdiction. And while the presence of spent nuclear fuel remains and impediment to economic development, federal action on this matter is slow to develop. Other federal agencies may be able to provide specific support depending on the location of the plant (for instance, the U.S. Department of Agriculture has programs that may be suitable for plants in rural settings). In addition, U.S. Economic Development Administration, the Department of Housing and Urban Development and the Department of Labor have programs that may also be applicable to nuclear closure communities.⁴⁸

In this context, there is an opportunity to coordinate access to federal resources so as to efficiently provide support to host communities and such efforts are in their initial stages. Nevertheless, access to these federal resources will rely almost entirely on local stakeholders to leverage skills and experience. This need to strategically invest in partnerships and collaboration is discussed more thoroughly in the following section.

Phase IV—Partnership Development

With the realizations described in the previous section, host communities soon understand that they face a significant resource deficit to allow for effective participation in closure and decommissioning processes. This resource deficit has two components: financial and capacity. To that end, some host communities have attempted to overcome this deficit by investing in the formation of coalitions and partnerships. Such is the case of the community surrounding Diablo Canyon located in San Luis Obispo, California.

48 See Appendix B for a description of applicable federal programs.

Case Examples

The Hourglass Project— Diablo Canyon, California

Diablo Canyon is owned and operated by PG&E and employs over 1,200 workers. In 2016, the plant owners announced that the plant's two reactors would be closing in 2024 and 2025 when the two licenses were due to expire.

As one of the largest employers in the region, the closure of Diablo Canyon represents the potential for a significant negative impact to the county of San Luis Obispo. In addition, PG&E's holdings associated with the Diablo Canyon property total over 12,000 acres of California's central coast. As such, the fate of this natural resource is also of considerable regional interest. In response to closure of Diablo Canyon and other regional economic changes, a coalition of business and civic leaders came together to form a region-wide economic development "action-tank" named the Hourglass Project.

The Hourglass Project engaged with hundreds of stakeholders around a variety of issues and options regarding the Diablo Canyon facility. They have worked at multiple scales, bringing together municipal, county and state officials, private sector leadership, research universities, and regional economic development organizations.

Beginning in 2018 and building on its focus as a champion of regional economic development, the Hourglass Project engaged with hundreds of stakeholders around a variety of issues and options regarding the Diablo Canyon facility. They have worked at multiple scales, bringing together municipal, county and state officials, private sector leadership, research universities, and regional economic development organizations. The Hourglass Project has managed to raise over \$1M in both public and philanthropic funding to support their efforts and are positioned to play an active role in the eventual decommissioning of the Diablo Canyon facility. In particular, the broad stakeholder support for the Hourglass Project generates significant political capital thereby allowing them to serve as a leading community-based organization to enter into negotiations with PG&E regarding land-use, economic development goals and other decommissioning issues.⁴⁹

49 For more information visit the Hourglass Project's [website](#).

50 Post—Vermont Yankee Task Force, (2012).

51 EDA, *Comprehensive Economic Development Strategy*.

Vermont Yankee Local Impacts Working Group

Another example of partnership development is the Vermont Yankee Local Impacts Working Group which was formed in conjunction with the 2012 SeVEDS Post-Vermont Yankee task force report discussed previously.⁵⁰ The Working Group led to additional research, planning, and mitigation projects carried forward by SeVEDS, regional economic development and planning organizations from the three affected counties in Vermont, New Hampshire and Massachusetts. These efforts were supported by academic institutions in Vermont and Massachusetts. One of Vermont's early successes was increasing issue visibility regarding the potential closure of Vermont Yankee and related impacts. In particular, regional partners held a one-day conference in 2014 at Landmark College with a cross section of over 50 public and private stakeholders, including Entergy and key federal representatives. This unique event focused on understanding closure-based socioeconomic issues and opportunities.

As with the Hourglass Project, the Vermont Yankee tri-state collaboration resulted in the development of baseline information combined with increased visibility and political capital that paved the way for legislative action regarding the role of the state in decommissioning projects, as well as regional economic development projects.

Phase V—Planning and Execution

The final phase in the community-based process is that of planning and execution. As an integrator of federal economic development resources, EDA can support nuclear host communities as they transition through the closure and decommissioning process. This support is in the form of direct grants and the provision of technical assistance and guidance as discussed below.

Comprehensive Economic Development Strategy

A key component of planning is reflected in a Comprehensive Economic Development Strategy (CEDS): a strategy-driven plan for regional economic development. Such plans are designed to build capacity and guide the economic prosperity and resiliency of an area or region and are produced as part of a regionally-owned planning process.⁵¹ CEDS are also instrumental documents that facilitate a community's access to federal funding opportunities through EDA.



Old Colony Planning Council/Bruce Hughes

A REDS is an EDA-supported event that is a valuable tool to coalesce local, state and federal agencies and spur economic development.

An important element in the development of the CEDS is the SWOT Analysis, which invites participants to consider the region's Strengths, Weaknesses, Opportunities, and Threats in the years to come. In those instances where a host community to a nuclear power plant is not yet included in a CEDS, this is a valuable chance to bring the plant into the public dialogue as one of several items for consideration. Where host communities are already served by a CEDS, the CEDS steering committee can use the existing annual reporting mechanism to bring the host community's relationship to the power plant into focus if it has not done so already.

Regional Economic Diversification Summits⁵²

Another example of federal resources are Regional Economic Diversification Summits (REDS) which provide the opportunity for EDA to respond directly to locally identified economic development strategies and priorities. Through the REDS process, EDA's Economic Development Representatives, Specialists, Integrators and other key personnel can leverage their collective expertise and network relationships to help distressed communities implement priority projects and achieve critical economic development objectives. The eventual investments resulting from the REDS process are intended to complement each other in such a way as to maximize the overall benefit to, and the economic potential of, the community or region where they are made.

REDS are designed to catalyze project implementation. The common objectives for each REDS include:

1. **Strengthen Relationships Among Federal, State, Regional, Local Stakeholders:** Engage inter-governmental and cross-sector stakeholders and potential funders in a focused, action-oriented dialogue about the resources necessary to implement priority projects.
2. **Remove Obstacles and Expand Access to Resources for Economic Diversification:** Identify effective steps that both Federal agencies and program applicants can take to reduce or eliminate the obstacles that make it difficult for applicants to secure the necessary resources for project implementation.
3. **Achieve Optimal Resource Alignment:** Work with community and regional stakeholders to coordinate project resources, align various program requirements, and otherwise leverage Federal and other investments for maximum benefit.
4. **Project Action Plans and Outcome Evaluation Metrics:** Establish agreement among inter-governmental and cross-sector partners to continue collaborating in support of implementing REDS priority projects. Establish Implementation Plans and identify Next Steps for specific project teams and actions that align with the REDS objectives.

⁵² REDS discussion borrows from the internal EDA report: Regional Integration Events Planning and Implementation Guide (REV. July 2019).

Case Examples

Plymouth, Massachusetts

In 2014, Moody's Investors Service released a report entitled, "U.S. Nuclear and Coal-Fired Power Plant Retirements to Jolt Some Local Governments."⁵³ The purpose of the report was to identify the 10 local governments across the country with the highest levels of credit exposure in the event of a power plant closure or downsizing. In the Town of Plymouth, which was identified as one of the at-risk communities despite holding a General Obligation Bond rating of Aa2 (high quality and very low credit risk), the report generated some concern and raised a number of questions.

Later that year, the Town's Department of Planning & Development, with support from the Old Colony Planning Council (OCPC), the regional planning agency serving Plymouth, engaged the University of Massachusetts Amherst's Center for Economic Development and the Institute for Nuclear Host Communities (INHC) to assess the socioeconomic impact of Pilgrim. The result of that effort, "The Pilgrim Nuclear Power Station Study: a Socio-Economic Analysis and Closure Transition Guide Book" was developed in early 2015, six months before the plant announced its intent to close in 2019.⁵⁴ By January 2016, the town had formed a Working Group to coordinate engagement and a Nuclear Matters Committee was formed to provide operational advice to the Town's Select Board.⁵⁵

A well-organized REDS establishes an action/outcome-oriented agenda identifying the appropriate individuals who can take some measure of responsibility for overseeing the ongoing progress of individual project teams after the summit concludes.

In October 2016, a second phase of the project with the INHC produced a Community Guidebook for Closure Response to enable town officials to become "local experts," providing a base of knowledge and recommendations in key areas.⁵⁶ In 2017, the Town secured the services of RKG Associates to develop an economic development

strategy to prepare for the economic and fiscal consequences of the plant's shutdown. The final report, issued in June 2018, "provides an economic base and market conditions analysis, fiscal impact modeling, and related services for a new economic development strategy for the Town."⁵⁷ The report includes 11 goals for the Town's post-nuclear era, as well as an implementation framework to bring those goals to bear with respect to recruitment, retention, marketing, and asset development.

The implementation of early pre-planning and knowledge development programs facilitated a REDS in the fall of 2019. Specifically, the REDS was sponsored by the OCPC and focused on three core areas: Water and Wastewater Expansion, Traffic and Transit Solutions; and, Advancing Workforce Development. Participants in the REDS event were drawn from a wide variety of entities including:

Local

- Greater Brockton Workforce Board
- Town of Kingston
- Old Colony Planning Council
- Town of Plymouth
- The Plymouth Foundation
- South Shore Workforce Board

State

- Institute for Policy Analysis and Regional Engagement at Bridgewater State University
- University of Massachusetts at Dartmouth's Economic Development
- Massachusetts Department of Career Services
- Massachusetts Development Finance Agency
- Massachusetts Department of Transportation

Federal

- Department of Transportation
- Economic Development Administration
- Small Business Association

This REDS is a good example of a local initiative establishing an action/outcome-oriented agenda identifying the appropriate individuals who can take some measure of responsibility for overseeing the ongoing progress of individual project teams after the summit concludes.

53 Moody's, (2014, June 18). *US nuclear and coal-fired power plant retirements to jolt some local governments*.

54 Cooper, (2014).

55 Plymouth Board of Selectmen, (2016). *Entergy Task Force Update*.

56 Institute for Nuclear Host Communities, (2016). *Pilgrim Station Phase II: Community Guidebook for Closure Response Prepared for the Town of Plymouth and Old Colony Regional Planning Commission*.

57 RKG Associates, Inc., (2018). *Economic Development Strategy Plymouth County, Massachusetts*.

San Luis Obispo County, California

In June 2016, PG&E submitted a proposal to the California Public Utilities Commission for its approval of PG&E's intent to retire Diablo Canyon's two reactors in 2024 and 2025.⁵⁸ County officials, municipal officials, and business and economic development advocacy groups began to discuss possible ways forward. The consortium coalesced around the need for an ambitious regional economic planning process and worked toward securing a blend of funding from municipal, federal, charitable, and business resources to support the work.

In July 2018, six months after the CPUC approved PG&E's timeline for shutting down Diablo Canyon, the EDA announced a \$200,000 grant through its Economic Adjustment Assistance program "to fund a feasibility study to determine the economic impact of recent severe storms and flooding and the closure of a nuclear power plant."⁵⁹ This grant was awarded to the Economic Vitality Corporation of San Luis Obispo County, the county's economic development and business resource services provider.

As the scope of the project emerged, however, the extent of the plant's impacts on neighboring counties came into view. With communities fifty miles to the north and south of San Luis Obispo within the plant's sphere of socioeconomic influence, the parties agreed to shift the project to the newly formed Hourglass Project. This broader geography, reaching from Camp Roberts in southern Monterey County down to Vandenburg Air Force Base in central Santa Barbara County, also necessitated a shift in focus.

With additional funding from the State of California, as well as San Luis Obispo County, the Hourglass Project has subsequently embarked on the Central Coast Jobs Roadmap and Action Plan.⁶⁰ The project, which began in April 2019, has yielded its first deliverable: an extensive public opinion survey that provides a portrait of the Central Coast's workforce. One of the key findings is that labor shortages across the Central Coast could easily worsen in the next few years, further constraining the local economy. The Hourglass Project is now putting the finishing touches on its action plan for regional job creation and expects to release the plan at the upcoming REACH 2030 Summit.⁶¹

In the meantime, California State University at San Luis Obispo (Cal Poly SLO), the region's major public university, has leveraged the EDA's resources effectively to complement the Hourglass Project's ongoing work. In September 2017, Cal Poly SLO received a \$500,000 award through the Regional Innovation Strategies' i6 Challenge competition.⁶² The award accounted for slightly less than half the total investment required "to fund the Coast Innovation Lab & Accelerator program, which will create a regional entrepre-

By expanding entrepreneurial infrastructure . . . the region hopes to counter the impending effects of the closure of the nuclear power plant.

neurial ecosystem in the County of San Luis Obispo, a predominately rural area in central coast of California." In announcing the award, the EDA noted that "by expanding entrepreneurial infrastructure and promoting commercialization of products and concurrent development of potential new companies, the region hopes to counter the impending effects of the closure of a nuclear power plant."

Most recently, Cal Poly SLO was awarded \$6,745,200 from EDA to support the expansion of the Cal Poly Technology Park.⁶³ The Disaster Supplemental Funding will cover approximately 60 percent of the project cost, which will "construct a 30,000-square-foot building and install supporting infrastructure to help fill the critical need for capacity in the area, which will lead to the creation of new industries and jobs throughout the region and help contribute to the economic resilience in the face of future natural disasters." It is expected that this investment will help create 150 jobs and leverage \$20M in private investment.

Chapter Summary

In this chapter, we illustrated the phases of learning and action that a host community experiences as they realize, encounter and respond to the socioeconomic impacts of a nuclear power plant closure.

58 *Joint Proposal of Pacific Gas and Electric Company, et al To Retire Diablo Canyon Nuclear Power Plant at Expiration of the Current Operating Licenses and Replace it with a Portfolio of GHG Free Resources*, 2016.

59 EDA, *2018 Grants*.

60 Hourglass Project, (2020). *Losing Hope, Struggling to Get By and Likely to Leave—A Portrait of the Central Coast Workforce*.

61 SLO Chamber of Commerce, (2020). *What's next for the Hourglass Project?*

62 EDA, *2017 Grants*.

63 EDA, *Grants*.

In **Phase I—Closure Acknowledgement**, we described the dynamic whereby host communities may first resist the notion of plant closure, preferring instead to hold on to the belief that the plant will continue to operate and continue to provide local and regional economic opportunity. Even when faced with the stark inevitability of closure, local officials are often slow to acknowledge the impending economic disruption. Only after they overcome the hurdle of denial may productive assessment and planning begin. The work of the Southwest Michigan Planning Commission offers a strong example of a local community entity taking early action to develop awareness and forming the needed partnerships to begin to address the need for economic revitalization.

Many host communities soon realize that they suffer from two key deficits: lack of planning resources and a parallel deficit in internal capacity to launch economic recovery efforts.

Awareness building creates the foundation for **Phase II—Impact Assessment**, where host communities may begin to develop a deeper understanding of the socioeconomic relationship between the plant's operation and the surrounding region. Such efforts involve the combined efforts of multiple stakeholders from local, regional and state jurisdictions, some of whom may realize for the first time the degree of influence that an operating plant has on the surrounding economy. Impact assessments in New York (Indian Point), Vermont Yankee (Vermont) and Diablo Canyon (California) were conducted at the urging of local stakeholders. These reports provided foundational data from which state economic development policies were then created.

During **Phase III—The Decommissioning Learning Curve**, project stakeholders begin to appreciate the depth and breadth of the decommissioning process and soon understand that the learning curve is both steep and long. Key realizations along the Learning Curve include: (i) the degree to which economic impacts are, and are not, considered in decommissioning; (ii) the lack of planning resources available to host communities; (iii) the difficulties associated with site redevelopment due to the presence of nuclear waste; (iv) the challenges associated with public

engagement and the limited degree of public influence on decommissioning activities; (vi) the fundamental disconnect between how the nuclear industry and its regulator view decommissioning as compared to the common perspective of local, state and regional stakeholders; and, (vi) the opportunity for improved federal agency coordination to assist host communities mitigate socioeconomic impacts. In addition to the experiences of plant host communities already mentioned, this section also included a detailed discussion of Maine Yankee's CAB process to further illustrate item (iv) above.

With a more thorough understanding of the decommissioning process developed through the previous three phases, many host communities soon realize that they suffer from two key deficits: lack of planning resources and a parallel deficit in internal capacity to launch economic recovery efforts. In response, host communities then enter **Phase IV—Partnership Development**, where the critical mass of networks and relationships is cultivated to overcome both deficits. The work of the Hourglass Project in San Luis Obispo County and the Vermont Yankee Local Impacts Working Group both offer instructive examples of local organizations coalescing diverse stakeholder groups to focus on the economic recovery needed in the wake of plant closure.

The final step in the community-based planning process, **Phase V—Planning and Execution**, is focused on the targeted implementation of economic development strategies in conjunction with nuclear power plant closure. Host communities in this phase may take advantage of various programs and resources offered by the federal government, including those from EDA. First, a CEDS or a CEDS-like report is an important component in a host community's ability to access federal funds through EDA. Second, a REDS event creates the opportunity for local, state and federal agencies to collaborate on closure-related economic development initiatives. This chapter highlighted the experiences of California's Hourglass Project as well as those stakeholders associated with Pilgrim in Plymouth, Massachusetts. In particular, the work of officials local to the Pilgrim plant was discussed relative to a REDS that was held in 2019, the result of which saw increasing collaboration between a wide variety of local, state and federal agencies.

CHAPTER FIVE

Best Practices and Recommendations

At the beginning of this report, we make mention of the fact that nuclear power plant closure and decommissioning has been underway in this country for over 20 years and that each plant closure brings with it a unique set of circumstances and experiences. We also state that in this context it would be unwise to expect that a series of generalized findings would find universal applicability. Nevertheless, and with these expectations and limitations in mind, this section offers a series of observations, best practices and recommendations based on the documented experiences of a range of closure and decommissioning projects.

The following discussion is divided into three categories: local/regional, state and national. Absent are recommendations focused specifically on the decommissioning industry itself (i.e., nuclear power utilities and/or decommissioning contractors) as the scope of this report was designed to address community and public sector issues. Having said that, the central role of the nuclear power utility and decommissioning contractor cannot be overstated, and it would be advantageous for all stakeholders to utilize the findings herein and opportunities for greater collaboration towards common objectives.

The Host Community Experience Develop the Knowledge Base

Navigating through the poorly understood process of decommissioning is difficult for any set of stakeholders, and this is made all the more difficult in the absence of a firm understanding of the plant's socioeconomic relationship to the host community. Experience has demonstrated that those host communities who develop this knowledge base, in advance of closure, are in a better position to weather the inevitable

socioeconomic storm. Examples from New York (Indian Point) and Vermont (Vermont Yankee) help illustrate these points.

Realize That Chronic Resource Constraints are a Given

A community that faces a plant closure quickly realizes a wide range of deficits, whether they be financial, or a lack of familiarity with the fundamentals of the closure and decommissioning process. Given the complexity of the situation and the significant economic toll of plant closure, operating in a form of deficit-mode is characterized by host communities as “the new normal.” There is no need to single out a community that has uniquely experienced this phenomenon: it is universal across the nuclear power plant closure landscape.

Appreciate Strength in Numbers (of People)

Planning for economic recovery requires new partnerships and coalitions. It takes time to bring these stakeholders together, particularly given the need to operate at multiple scales and across many disciplines and perspectives. Furthermore, the definition of a host community may include not only the municipal location of the plant itself, but the region from which its employees are drawn, and the communities which benefit from plant-related taxes or other payments. In addition, planning networks often grow to include state and federal officials who, at the outset, may not fully appreciate their relationship to the closure and decommissioning of a nuclear power plant. Communities in Michigan (Palisades) and New York (Indian Point) provide good examples of coalition building.

Undertake Recovery as a Self-Directed Outcome

Closure-related socioeconomic impacts generally fall outside of NRC jurisdiction. This reality combined with the absence of a coordinated and integrated federal response places the recovery burden squarely on the host community and surrounding region. While recent efforts have resulted in modest federal funding to support host communities experiencing this transition, navigating the application process and securing funding remains a local responsibility. Chapter 4 used examples from Massachusetts (Pilgrim) and again from California (Diablo Canyon) to demonstrate this reality.

Approach Site-Reuse as Component of a Larger Strategy

The potential redevelopment of a former nuclear power plant, while tantalizing, is fundamentally constrained by multiple liability, regulatory and practical considerations that will take at least a decade (and most probably longer) to resolve. While not abandoning the potential opportunities of site redevelopment, host communities are well-advised to invest in more near-term economic development strategies which can be initiated at any time, such as:

- Redevelopment of a different, high-value or high-capacity property
- Regional business growth and job creation to replace layoffs at the plant
- Talent attraction and workforce development
- Sector diversification strategies
- Marketing and recruitment

Continue to Highlight the Presence of Economic Development Barriers

Increase Access to Funding Resources

The lack of funds to facilitate economic development planning is a major obstacle to community revitalization. Recall from the previous discussion that NEPA is a “process statute” and that this process focus does not diminish the usefulness of, for example, identifying the economic impacts on a community from decommissioning, as well as ways to mitigate those impacts. In addition, NRC’s regulations pertaining to the preparation of a draft EIS allow for “...consideration of the economic, technical, and other benefits and costs of the proposed action and alternatives.”⁶⁴ [emphasis added] As there is potential for an update to the 2002 GEIS, these economic considerations may see additional attention.

On a related front, there is increased attention being paid to the potential for a portion of NDTs to be used for economic development purposes. As the majority of NDTs were funded by ratepayers, these same ratepayers view NDTs as a justifiable source of funds for economic development planning, in much the same way as the licensee uses 3% of the NDT for decommissioning planning. Local access to NDT funds, perhaps capped at 1%–2% of the total value of the NDT, could be provided to a qualifying community-based not-for-profit entity or state authority. Such funds could be made available starting five years before scheduled license termination or on the date that the licensee has notified the NRC of its intent to permanently cease operations.

Reinvigoration of a Federal Spent Nuclear Fuel Management Program

The presence of SNF at former plants is due to the absence of a federal program for the disposal of this waste. This results in ongoing hardship to every community that seeks to redevelop this property and spur local economic development. A functioning federal spent fuel management program will be of demonstrable value in assisting local communities implementing restorative economic development.

Realize All Plants Will Close and All Communities Will Experience Loss

Except for the newly constructed plants at the Vogtle site, most of the currently operating commercial nuclear power plants are forecast to come off-line on the next 20 to 30 years. These plant closures represent an annual loss measured in the billions of dollars to regional economies throughout the country. Given current market conditions, the rate of closure (and associated economic impacts) may well increase.

The journey along The Decommissioning Learning Curve takes several years. Only after its completion may community stakeholders coalesce and begin to develop positive traction to affect the needed change. Planning for this eventuality is best undertaken today to allow host communities to develop the knowledge base, form partnerships and create economic resiliency strategies so that the effects of plant closure can be mitigated. Planning neither accelerates nor precipitates plant closure and the information gleaned during the information gathering process is of high value in developing forward-thinking strategies and policies. The

benefits of this “plan early” dynamic are illustrated below.

The Host State Experience

The role of state government in the closure and decommissioning of a nuclear power plant is generally not at the forefront of legislative agendas. When it is, the focus is typically safety and energy supply. Nevertheless, once a plant announces closure, states undergo a learning curve not dissimilar to that of a host community. To be able to respond in a timely fashion to constituent demands stemming from nuclear power plant closure, the following state actions are recommended:

Clarify State Roles, Responsibilities and Expectations

States across the country have chosen a variety of approaches regarding engagement in the closure and decommissioning process. In this discernment process, some states have had ample opportunity to deliberate and choose an optimal course of action whereas others have had to behave in a more reactionary mode due to schedule pressures. For those states that host a nuclear power plant that has yet to close, learning from peers as to the risks and rewards of various engagement strategies is a task best undertaken in the near term so as to allow for the development of appropriate policies. Areas of policy development may include radiological cleanup standards, level of interaction with the NRC,

oversight of NDT funds and leveraging decommissioning efforts to spur local and regional economic development.

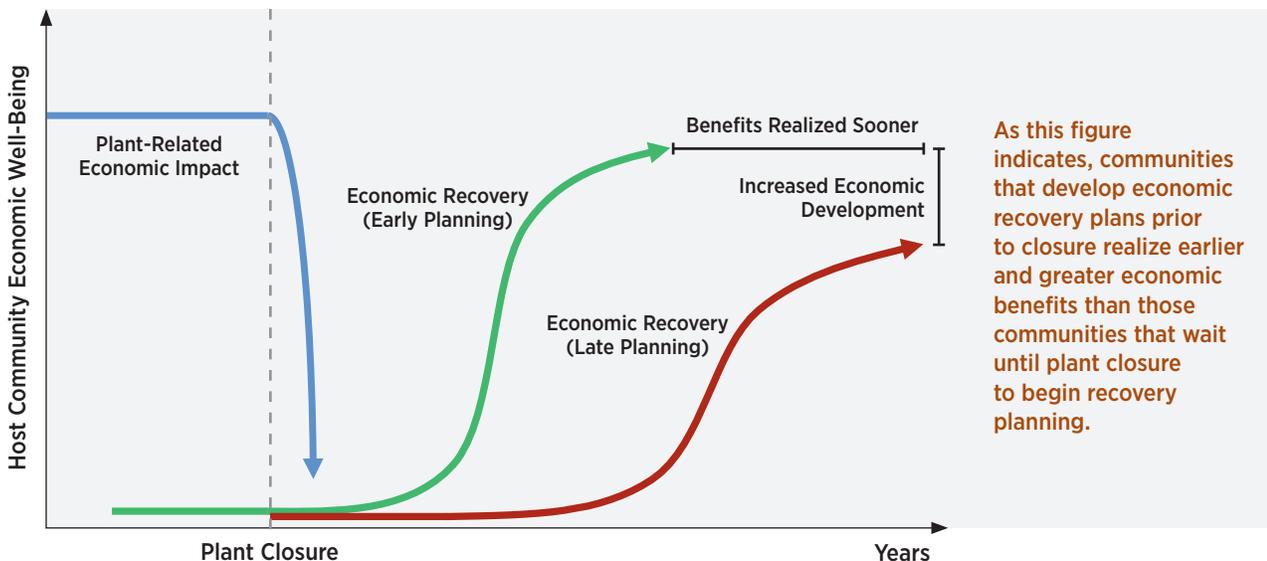
For those states that host a nuclear power plant that has yet to close, learning from peers as to the risks and rewards of various engagement strategies is a task best undertaken in the near term so as to allow for the development of appropriate policies.

There is currently no structured opportunity for this learning to occur. Nor is there a standard method for state agencies and officials who will be involved in plant closure to become informed about the socioeconomic impacts and how their decisions may negatively or positively shape opportunities for host communities to fully recover.

Nonetheless, it is important that state officials understand how nuclear closure and decommissioning differ from processes with which they are familiar, such as the redevelopment of brown-fields sites. It is equally important to understand the event not just in terms of state-level impacts like energy supply or state tax losses, but in terms of outmigration of households or decreases to the local tax base. The state can play a critical role in supporting communities through a strategic planning and implementation process that will have positive economic outcomes at state, regional and local levels.

FIGURE 4

Economic Recovery Scenarios



Explore State-Driven Economic Development Programs

Closure creates a moment of clarity about coming change, but that moment passes. Understanding that local and regional officials may suffer from a lack of capacity, it behooves states to consider their responsibility for both supporting (with funding and expertise) and even requiring some of the best practices, from economic analysis to strategic plan creation.

Up to and including the point of closure, there is a potential window to negotiate mutual benefits between the plant operator and state in a manner that can also benefit the host communities. This negotiation often occurs under time pressure, but with the deeper understanding of the host communities' needs and goals in hand, there is an opportunity to leverage closure negotiations into an expansion of the local recovery toolkit.

Build Closure-Specific Fluency via EDA University Centers and other Higher Education Programs

With a learning curve as steep as that for nuclear power plant decommissioning, states should consider utilizing the resources of higher education and, where available, EDA University Centers. Research institutes, academic programs, and departmental affiliates can provide a variety of technical assistance services to build knowledge and capacity at local, regional, and state levels. Borrowing from EDA's website:⁶⁵

EDA's University Center Economic Development Program makes the resources of universities available to the economic development community. Institutions of higher education have extensive resources, including specialized research, outreach, technology transfer, and commercialization capabilities, as well as recognized faculty expertise and sophisticated laboratories. The EDA-supported University Center (UC) program is specifically designed to marshal the resources located within colleges and universities to support regional economic development strategies in regions of chronic and acute economic distress. The UCs, which EDA considers long-term partners in economic development, are required to devote the majority of their funding to respond to technical assistance requests originating from organizations located in the economically distressed portions of their service regions.

In Massachusetts, for example, undergraduate and graduate students, as well as faculty and university-affiliated research staff, have been engaged in economic and community development research on nuclear power plant closure and decommissioning for several years. Engagements with Clark University, the Center for Economic Development at the University of Massachusetts Amherst, the University of Massachusetts Donahue Institute, the Conway School, and Worcester Polytechnic Institute have produced literature reviews, impact assessments, input-output analyses, feasibility studies, and community-scale closure resources of benefit to a variety of stakeholders in New England.

Establish practices around Community Advisory Boards while plants remain operational

To date, nearly all nuclear plant closure announcements have led to the convening of some sort of CAB to serve as an outlet for information-sharing about the plant's decommissioning plans from the plant operator, to solicit input from the public, and augment the existing public input requirements of the NRC. CABs are often the primary way for relevant local and state entities to regularly meet with one another and with the public.

Answers to questions such as, "Who convenes these panels?" "What is in their charter?" and, "Which organizations/communities are represented?" vary from one state to the next. States may wish to consider working with plant operators to establish practices and/or funding mechanisms around CABs during the operational life of the plant to establish precedent and shorten the decommissioning learning curve. It is also worth considering the establishment of neutral funding mechanisms for these engagements so that CABs with a diverse stakeholder group do not "belong" to any one entity on the panel.

This approach can take advantage of 10 CFR 50.75 (f)(3), which requires each power reactor licensee to submit to the NRC preliminary decommissioning cost estimates at or about five years before a projected end of operations. Although these cost estimates are very preliminary, they will provide CAP members an opportunity to familiarize themselves and the public with the size and scale of that process, and the parallel economic development scenarios.

65 EDA, *University Centers*.

The National Perspective

Nuclear power plants are scattered across states, varied in size, ownership structure, and design. In fact, nuclear power plants and the contexts in which they operate can feel so disparate that the question is often raised as to whether there is truly a shared experience that unites nuclear host communities.

Yet once a plant announces closure, similarities become clear. Nuclear power plants do not resemble regular plant closures, possessing as they do highly specialized and highly paid workforces. As highlighted in earlier chapters, a lack of research, planning and recovery frameworks makes responding to nuclear power plant closure more difficult when compared to potentially similar brownfields projects which benefit from a cadre of experienced professionals and robust federal programs. Special conditions in nuclear power plant decommissioning because of NRC regulations and DOE fuel-management responsibilities create unique circumstances requiring a set of planning tools, the development of which is still in its infancy.

Using the lessons and observations from this report, host communities and states can improve socioeconomic outcomes in conjunction with plant closure. However, this requires a considerable degree of ground-up organizing and multi-level collaboration. In order to ensure every community can respond to nuclear power plant closure in a timely and strategic manner, federal agencies may wish to consider fostering a supportive framework that ensures all stakeholders have ready access to knowledge, resources, networks and expertise.

Establish a National Network of Nuclear Closure Communities

Those stakeholders that are currently experiencing decommissioning are developing a rich knowledge base that is of high value to those stakeholders who will follow in their footsteps. At present, there is no systematic approach to capturing and retaining this knowledge and as such, its long-term utility is limited. Cataloging emerging knowledge and codifying it in a manner that will be useful to stakeholders in future decommissioning projects will improve efficiencies of future projects and result in improved outcomes. To that end, a national network of nuclear closure communities would serve to coordinate and align the various federal resources that may be brought

to bear to support nuclear closure communities and would be modeled after the Energy Communities Alliance⁶⁶ or the Office of Economic Adjustment that supported the BRAC process.⁶⁷

Key components of the network would be:

- Facilitation of peer networking and peer learning
- Offering stakeholder training (e.g., Decommissioning Boot Camp)
- Uniting a broad base of local, regional, state and national stakeholders
- Provision of technical assistance to Nuclear Closure Communities
- Education and Outreach
- Building the Knowledge Base through research and conferences
- Development and Support of a Community of Practice (including consulting resources)

Using the lessons and observations from this report, host communities and states can improve socioeconomic outcomes in conjunction with plant closure. However, this requires a considerable degree of ground-up organizing and multi-level collaboration.

Prioritize knowledge building

Nuclear closure communities require assistance accessing resources, from basic education about the socioeconomic impacts of closure to targeted capacity building, to reliable help with economic studies and access to planning resources. In addition to the creation of the nuclear closure community network outlined above, there is a need to invest in knowledge-building through government and university partnerships to improve expertise in this area. Examples include university knowledge centers and national research partners such as the International Economic Development Council and the National Association of Development Organizations.

Identify resources to pursue scenario-based planning for sites

Site restoration and site reuse discussions must be guided by scenarios built from the ground up and according to the community's vision. Embracing a goal of full economic recovery for every host community would require a conversation about what long term resources, planning

66 For more information on the Energy Communities Alliance, visit their [website](#).

67 For more information on the BRAC process and the role of the Office of Economic Adjustment, visit their [website](#).

and regulatory change would be adequate to support complete site restoration (using the BRAC model as a guide). Unfortunately, in most areas, the skillset and frameworks to pursue projects of such regulatory complexity, on a multi-decade timeline, is not embedded in local or regional agencies. For this same reason, brownfields, EPA Superfund⁶⁸ and BRAC projects have long benefited from federal leadership.

Early planning for post-closure economic recovery at the community, county and regional level neither accelerates nor precipitates the decision to close the plant. The economic recovery process is long, challenging and heavily dependent upon the host community to galvanize and sustain action.

Sustained and Integrated Multi-Agency Support to Nuclear Closure Communities

The recovery timeline for a typical host community responding to the closure of a nuclear power plant is measured in decades with annual regional economic losses of at least \$400M. Many of these closure communities have been experiencing these severe economic losses for years.

While much can be accomplished through local, regional and state partnerships supported by federal agencies and their integrators, the very nature of the nuclear closure process involves a timeframe that is poorly matched with the political life cycles of local officials. To better leverage two major assets—lead time to closure and the current revenues from an operating plant—communities would benefit from more integrated intervention and sustained commitment over several years. The combination of a coordinated multi-agency response effort in conjunction with nuclear closure-specific resources will yield positive dividends in this regard.

COVID-19 Considerations

This report was written during the COVID-19 pandemic and during a time of significant economic turmoil. In conjunction with the widespread economic disruption related to the pandemic, these nuclear host communities have experienced, and will continue to suffer from, closure-related impacts to their long-term well-being. The combination of these two forces increases the need for federal support and focused relief efforts.

Chapter Summary

Recognizing the highly individualized nature of the decommissioning experience, this chapter nevertheless attempted to coalesce and synthesize the experiences of a number of host communities into a series of best practices and recommendations. In doing so, this discussion touched on the local, state and federal dimensions of nuclear plant closure and decommissioning.

On the local front, early planning for post-closure economic recovery at the community, county and regional level neither accelerates nor precipitates the decision to close the plant. The economic recovery process is long, challenging and heavily dependent upon the host community to galvanize and sustain action. Identification of economic development barriers (e.g., presence of spent nuclear fuel, lack of planning resources) and the design of economic recovery plans, well before a plant is scheduled to close, is a reasonable and prudent community investment.

At the state level, states have an incentive to anticipate closure and develop their own policies. Areas of influence that a state may have on decommissioning range from final radiological cleanup levels and the provision of economic impact mitigation funds to defining the role of host communities and advisory boards in the decommissioning process. Without prior action in advance of plant closure, the role of states is generally limited.

The \$100B required to decommission the current nuclear fleet was (and will be) derived largely from ratepayers. In this context and to ensure that those same ratepayers may derive maximum benefit from decommissioning, the improved coordination of federal agencies focusing on additional research, efficient deployment of resources and the provision of planning assistance would be a demonstrable benefit to host communities. The establishment of a national network of nuclear closure communities, modeled after similar coordinating entities in the DOE (the Energy Communities Alliance) and the DOD (the Office of Economic Adjustment), would also improve the effectiveness of the federal response.

Implementation of these recommendations will advance the practice of nuclear plant decommissioning and serve to strengthen host communities. There remains, however, the need for additional data and information to more fully inform the process. These opportunities for additional research are discussed in the following chapter.

68 EPA, *Superfund*.

CHAPTER SIX

Opportunities for Additional Learning

The closure and decommissioning of nuclear power plants represents a \$100B undertaking that will span the next several decades. Given the long timeframes and significant expenditures of funds, most of which are derived from ratepayers, it would appear both reasonable and prudent to increase our collective understanding of the closure and decommissioning process so as to improve policies and promote positive outcomes that serve to strengthen the economic standing of host communities. The authors of this report recognize that this document is but a small first step on the path towards increasing our understanding of the socioeconomic impacts of nuclear power plant closure and decommissioning. To that end, the decommissioning ecosystem would benefit from the following areas of research and knowledge development.

The Plant—Community Relationship

The socioeconomic relationship between an operating nuclear power plant and its host community is highly variable. It is also incomplete. This inadequate data set undermines the ability to develop effective state and national policies. Additional research is needed to objectively define this socioeconomic relationship.

Longitudinal Examination of Economic Development Efforts

This report discussed the experiences of a limited number of host communities during a snapshot in time. What is absent are in-depth analyses of these experiences across timeframes (multiple years) to allow for more the development of more robust findings. In this context, longitudinal and statistically significant surveys are recommended to create a more complete data set.

The Opportunity Costs of Stranded Assets

All decommissioned nuclear power plants currently house spent nuclear fuel and the presence of this waste hinders site redevelopment. The opportunity cost

associated with a host community's inability to derive economic benefit from the decommissioned plant site has not been calculated on a systematic basis. Nationally, this opportunity cost is estimated to be in the hundreds of millions of dollars. Additional research is recommended to collect develop accurate data from which more effective policies may be developed.

Community Engagement Models

A recurring theme from research and stakeholder interviews was a general dissatisfaction, on behalf of community members, with community engagement as it pertains to decommissioning. While this finding is common to many complex energy infrastructure projects, the associated research into improving the stakeholder experience is lacking. Given that decommissioning will occur over the next several decades, investment in the development of more constructive engagement models may pave the way for more efficient completion of decommissioning projects along with more equitable outcomes.

Property Stewardship Models

The nation's nuclear utilities control approximately 50,000 acres of property associated with plant operation, the majority of which is undeveloped open space. At the same time, due to liability and regulatory considerations, the presence of SNF hinders site repurposing. Given the long timeframes in question combined with the large amount of property to be surplus during the decommissioning process, there may be an opportunity for a land trust to facilitate site repositioning. Such a trust may bundle various decommissioned sites, and through economies of scale, secure cost-effective liability and risk mitigation measures so as to allow these sites to be returned to their highest and best uses (from natural resource conservation to commercial or industrial development). *The RACER Trust* is an example of a land trust that has been successful in repositioning former industrial sites and their experience, and that of other land trusts, warrants additional investigation and analysis.

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U.S. Bureau of Labor Statistics, *Quarterly Census of Employment and Wages.*

State Legislation and Programs

New York State, *Electricity Generation Facility Cessation Mitigation Program.*

Senate Bill 968, 2015–2016. Ch. 674, 2016 Cal. Stat.

State of Vermont, *Wyndham County Economic Development Program.*

Regulatory Actions and Submittals

Joint Proposal of Pacific Gas and Electric Company, et al To Retire Diablo Canyon Nuclear Power Plant at Expiration of the Current Operating Licenses and Replace it with a Portfolio of GHG Free Resources, 2016.

Memorandum of Understanding Between the Department of Homeland Security/Federal Emergency Management Agency, and Nuclear Regulatory Commission Regarding Radiological Emergency Response, Planning, And Preparedness, 2015.

Nuclear Regulatory Commission No. 50-293 *Holtec Decommissioning International, LLC Pilgrim Nuclear Power Station Exemption*, 2019.

Vermont Yankee Nuclear Power Station—*Issuance of Exemption From 10 CFR 50.82(A)(8)(I)(A) (L-2018-Lle-0007)*, 2018.

APPENDIX A

EDA Summary Report

PURSUANT TO THE EXPLANATORY STATEMENT ACCOMPANYING
THE CONSOLIDATED APPROPRIATIONS ACT, 2018 (P.L. 115-141)



UNITED STATES DEPARTMENT OF COMMERCE
Chief Financial Officer
Assistant Secretary for Administration
Washington, D.C. 20230

JUN 25 2018

The Honorable Jeanne Shaheen
Ranking Member
Subcommittee on Commerce, Justice,
Science, and Related Agencies
Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Senator Shaheen:

Enclosed is the Economic Development Administration's (EDA) Report on job losses from nuclear power plant closures, pursuant to the Explanatory Statement accompanying the Consolidated Appropriations Act, 2018 (P.L. 115-141). This report addresses EDA's work to help identify and develop best practices to assist communities affected by loss of tax revenue and job loss due to nuclear power plant closures.

If you have any questions or need additional information, please call me at (202) 482-4951. Thank you for your continued support of the Department of Commerce and its programs.

Sincerely,

A handwritten signature in blue ink that reads "Lisa Casias".

Lisa Casias
Acting Chief Financial Officer/Assistant Secretary
for Administration, and Deputy Assistant Secretary
for Administration

Enclosures

REPORT ON JOB LOSSES FROM NUCLEAR POWER PLANT CLOSURES

Economic Development Administration

Reference: Page 2, Explanatory Statement Accompanying P.L. 115-141:

Job Losses from Nuclear Power Plant Closures. - As noted in Senate Report 114-239, recent closures of nuclear power plants throughout the United States have had a negative impact on the economic foundations of surrounding communities, and there is potential for additional plant closures in the coming years. EDA can serve an integral role in assisting communities as nuclear plant closures affect the economic landscape of surrounding areas. To that end, EDA is directed to report to the Committees within 90 days of enactment of this Act on its work to help identify and develop best practices to assist communities affected by loss of tax revenue and job loss due to nuclear power plant closures.

As the Committee notes, this topic area is germane to Economic Development Administration (EDA) and many of its programs. EDA has a long-standing commitment to helping communities that face challenges caused by changing economic conditions to adjust to new realities and thrive. Communities facing a loss of tax revenue and jobs associated with a nuclear power plant closure are encouraged to seek EDA assistance. Currently, four of EDA's six regional offices are working with communities on addressing this issue; those communities and activities are listed in the report below. EDA also monitors the Nuclear Regulatory Commission's public list of plant closures and decommissioning actions in order to proactively identify communities which may likely face these challenges in the future.

1. EDA's relevant programs.

Many of EDA's programs can be used to help communities and regions affected by the closure and decommissioning of nuclear plants. Depending upon certain program eligibility criteria such as anticipated and actual job losses within a set time frame, these communities could apply for an EDA Economic Adjustment Assistance (EAA) grant. The EDA Public Works (PW) program is an appropriate funding mechanism for recovery activities specific to infrastructure enhancements. While eligibility for the Short-Term Planning (STP), Local Technical Assistance (LTA) and Partnership Planning¹ programs is not specific to sudden and severe job losses, each competitive program could be leveraged to establish economic growth and diversification strategies in response to the closure and decommissioning of local and regional nuclear power plants. A complete list of EDA's programs is available at www.eda.gov/programs/eda-programs/.

Beginning in FY15, EDA has targeted program support to communities severely impacted by the declining use of coal through the Assistance to Coal Communities (ACC) program², a subset of EAA. While the assistance that nuclear power plant-impacted communities require is not identical to an approach for supporting coal-impacted communities, ACC, along with EDA's prior support for projects and strategies under the Military Base Realignment and Closure (BRAC) process, could inform strategies and approaches in the future.

¹ To help with the development of Comprehensive Economic Development Strategies (CEDs), other plans, planning documents or strategies.

² Assistance to Coal Communities: <https://www.eda.gov/coal/2017/>.

2. Communities facing this challenge and EDA's efforts to help them.

The following examples describe communities that experienced closures related to nuclear power and EDA's efforts to help them, organized by EDA Regional Office.

Atlanta Regional Office

Savannah River Site (Nuclear Reservation³) – Aiken County, SC.

- Groups EDA is working with – Lower Savannah Council of Governments; Aiken Tech; South Carolina Regional Development Alliance; and Midlands Tech College.
- Past Activities – Funding of workforce development facilities transitioning workers to and from nuclear related jobs into other industries.
- Current/Planned Activities – Monitoring needs as they arise.

Chicago Regional Office

Palisades Nuclear Power Plant – Van Buren County, MI – Scheduled Year of Closure: 2021.

- Groups EDA is working with – Southwest Michigan Regional Planning Commission (RPC), an Economic Development District (EDD)⁴; and Kinexus, a local Economic Development Organization (EDO)⁵.
- Past Activities – General outreach with the local EDD and EDOs.
- Current/Planned Activities –
 1. Working with Kinexus to submit an Economic Recovery Impact Analysis and recovery plan.
 2. Implementation of the Recovery plan with a possible economic recovery coordinator.

Kewaunee Power Station – Kewaunee, WI – Closed in 2013.

- Groups EDA is working with – Bay Lake Regional Planning Commission (RPC), an EDD; Economic Development Corporation of Manitowoc County; and Kewaunee County Economic Development Corporation.
- Past Activities – \$81,000 EAA Investment in 2014 (Award #06-79-05948) to complete a supply chain analysis and develop an interactive on-line platform to assist the regional economy in recovering from mass layoffs in manufacturing companies.
- Current/Planned Activities – The EDD has been contacted about EDA's potential assistance for nuclear power plant impacted communities. The Counties of Manitowoc and Kewaunee fail to meet EDA's standard distress eligibility which makes project development difficult. The closure was five years ago and the area is outside the timeframe for addressing a special need. The regional office will continue outreach.
- Links to studies or materials funded by EDA-
<https://progresslakeshore.org/manufacturing/>.

Zion Nuclear Power Plant – Zion, IL – Decommissioned in 1998.

- Groups EDA is working with – City of Zion, IL.
- Past Activities – No previous EDA activities.
- Current/Planned Activities –
 1. Working with City of Zion officials to identify potential projects for EDA assistance or to match with other applicable/appropriate federal programs.
 2. Further consultation with City of Zion to identify appropriate recovery projects.

³ This is not a nuclear power plant, but is a nuclear reservation which has undergone closure and remediation.

⁴ EDD – funded via EDA's Partnership Planning program.

⁵ EDO – generally not directly funded via EDA resources

Philadelphia Regional Office

Pilgrim Nuclear Plant – Entergy Corporation, Plymouth, MA – Closure: June 2019.

- Groups EDA is working with – Old Colony Planning Council, an EDD.
- Past Activities –
 1. Completed impact study addressing far-reaching economic impacts for community, region(s) and Commonwealth.
 2. Convened Regional Planning Group comprised of representatives from state and local government, economic and business development organizations, education, labor and private business including Entergy Corp. (owner of Pilgrim Nuclear Plant).
- Current/Planned Activities –
 1. Economic Development Representative (EDR)⁶ working directly with EDD Executive Director Pasquale (Pat) Ciaramella, concerning ongoing planning and meetings taking place within the community between the Town of Plymouth Officials, Entergy Corporation Officials and other community and EDOs.
 2. Work is ongoing in the development and implementation of strategic steps outlined within Local Socioeconomic Impact Study completed by UMass Amherst in 2015, including identification of funding sources for implementation of strategic tasks identified in the study (<http://www.plymouthbusiness.org/wp-content/uploads/2017/06/Pilgrim-Station-Phase-II-Community-Guidebook-for-Closure-Response-2016.pdf>).
 3. EDR meeting with EDD within the next 60 days as well as local, state and other representatives to discuss next steps. EDR will attend many local meetings and seminars either in person or by conference call to assist in providing guidance and technical assistance on plans and next steps regarding federal funding agencies and opportunities. Will coordinate with other federal agencies and Economic Development Integrator (EDI)⁷.
- Link(s) to studies or materials funded by EDA: The closure of this facility and EDD activity is recognized in the Old Colony Planning Council Comprehensive Economic Development Strategy (CEDs) (Pages II-24 and VI-7)⁸. See also, http://www.ocpcrpa.org/docs/comprehensive/Pilgrim_Nuclear_Power_Station_Study.pdf

Oyster Creek Nuclear Generating Station – Lacey Township, Ocean County, NJ – Scheduled Date of Closure: October 2018⁹.

- Groups EDA is working with – To be determined, outreach is underway.
- Past Activities – Teleconference with Triad Associates Consulting Firm.
- Current/Planned Activities – Triad Associates is working with representatives of Lacey Township to help address the economic impacts of the loss of 500 jobs as a result of the closure.

⁶ EDR – EDA’s State specific professionals helping communities develop projects. A list of EDRs and EDA POCs is available here: <https://www.eda.gov/contact/>.

⁷ EDI – EDA regional professional focusing on integrating federal resources.

⁸ Note: Entergy Corp. owns a total of 1500 acres in Plymouth that were initially purchased for the construction of two additional Nuclear Power Facilities. The Town of Plymouth has been given first position in purchasing a portion of the 1500 acres which currently is being considered by the Town for development of an industrial park as well as training facilities for displaced workers in Plymouth (200 jobs) and the region (600 jobs). Entergy is also working with the state Department of Labor to identify training and other ways to prepare people for life after closure.

⁹ This plant is not included on NRC website, further investigation shows that Exelon Generation has cited costs and other issues as the reason for the October 2018 planned shut down <https://www.usatoday.com/story/news/nation-now/2018/02/02/nations-oldest-nuke-plant-close-ahead-schedule/303251002/>.

Indian Point – Unit 1 – Buchanan (Village)/Town of Cortlandt, Westchester County, NY –
Scheduled Date of Closure: October 1, 2026.

- Groups EDA is working with – The Village of Buchanan
- Past Activities –
 1. Village of Buchanan, NY – A group organized by Mayor Knickerbocker and Jennifer Becker-Pollet, Legislative Counsel, Congresswoman Nita M. Lowey (NY-17), sought help to address the economic impacts of the closure.
 2. Jennifer Becker-Pollet organized two conference calls to learn about potential EDA assistance. EDR advised them that an application would be too far in advance of the 24-month period prior to closure, as required by the current Notice of Funding Opportunity (NOFO)¹⁰.
- Current/Planned Activities – EDR conducted a site visit on April 30, 2018 with an eye toward future development of a project to address the economic impacts of the closure and a strategic plan forward for the communities.

Peach Bottom – Unit 1 – Delta, PA – Scheduled Year of Closure: 2034.

- Groups EDA is working with – Delaware Valley Regional Planning Commission (DVRPC) has included this matter as part of their 20-year plan discussions.

Three Mile Island – Unit 2 – Middletown, PA – Scheduled Year of Closure: 2036.

- Groups EDA is working with – There is no EDD for this region. Still too far out for in-depth discussions.

Beaver Valley – Unit 2 – Shipping Port, PA – Scheduled Year of Closure: 2021.

- Groups EDA is working with – Southwest PA Commission, an EDD.
- Current/Planned Activities – Started discussions with Lew Villotti, Director of the EDD, to reach out to his counties for job loss mitigation projects.

Vermont (VT) Yankee Nuclear Power Facility – Town of Vernon, Windham County, VT –
Permanent shutdown occurred: December 29, 2014.

- Groups EDA is working with – Since August of 2011 EDA has been actively engaged with Vermont’s Windham Regional Commission, the Brattleboro Development Credit Corporation and a small range of individuals within the region. EDA’s knowledge and awareness on the matter became heightened during EDA deployment with FEMA in Vermont as a result of Tropical Storm Irene.
- Past Activities –
 1. \$75,000 FY12 STP Investment (Award #01-87-14181) for CEDS development on “decommissioning a nuclear facility”. The CEDS that was developed, known as the Southeastern Vermont Economic Development Strategy (SeVEDS), was recognized by IEDC for “Excellence in Economic Development” in 2016 and it was an early adopter of the SMART strategic planning framework (Specific, Measurable, Attainable, Realistic and Time Bound).
 2. EDA participated in the April 2, 2014 Conference on the Socioeconomic Impacts of Nuclear Power Plant Closure at Landmark College (Putney, VT) hosted by the Institute for Nuclear Host Communities.
 3. The demonstrated work and community cohesion of the SeVEDS prompted the Vermont Legislature in 2015 to create/study the Southern Vermont Economic

¹⁰ NOFO – The relevant EDA NOFO is the Economic Development Assistance Program (EDAP) NOFO. The current one can be found here: <https://www.grants.gov/web/grants/view-opportunity.html?oppId=294771>.

Development Zone¹¹.

4. \$265,650 FY15 EAA Investment (Award #01-79-14660) to conduct Green Building Cluster activities. Utilized job documented losses from the Vermont Yankee Nuclear Power Station as the Special Need eligibility. Match funds were from the State-administered VT Yankee Nuclear Power Station settlement fund which provides for a range of community economic development projects in Windham County. Scope of work included coordination with regional planning commissions in neighboring Massachusetts and New Hampshire. The region also benefited from a FY12 Disaster Relief award; the award benefits are functionally relational but not direct from a programmatic sense for this report.
- Current/Planned Activities –
 1. \$150,000 FY16 EAA Investment (Award #01-79-14733) for Windham Grows, an Agricultural Business Accelerator Program that is part of the mission of the nationally recognized non-governmental organization, “Strolling of the Heifers” – a social enterprise that aims to connect people with healthy local food, encourage and facilitate innovation and entrepreneurship in the farm/food sector, and supports the development of stronger local food systems and healthy, sharing, connected and resilient communities. The EDA scope of work provides structured technical assistance to farm and agricultural businesses and includes the support of two entrepreneurs in residence, one of which is from Vermont’s most noted venture capital organization, “Fresh Tracks Capital” on behalf of Mr. Carin Cross. The next iteration of Windham Grows will rely exclusively on private funding.
 2. \$70,000 FY17 STP Investment (Award #ED17PHI3020009) for Windham and Bennington County combined CEDS.
 3. Working on a small scale Regional Economic Development Summit (REDS)¹² on May 29, 2018 with the Department of Labor – Employment & Training Administration, Department of Education, and U.S. Department of Agriculture – Rural Development to engage with SeVEDS Board Members and Workforce Development Practitioners.
 4. Potential \$1M EAA application for water and wastewater capacity at industrial park.
 - Links to studies and materials funded by EDA –
 1. SeVEDS: <http://seveds.com/wp-content/uploads/2012/08/FINALCEDSReport.2013.pdf>.
 2. Economic Impact Report funded by the Massachusetts based, Franklin Regional Council of Governments EDD: <http://www.donahue.umassp.edu/our-publications/economic-impacts-of-vermont-yankee-closure>.
 3. White Paper: <https://brattleborodevelopment.com/wp-content/uploads/2016/10/White-Paper-Final.pdf>.
 4. Ecovation Hub: <https://brattleborodevelopment.com/ecovationhub/>.

Seattle Regional Office

Diablo Canyon – Avila Beach, San Luis Obispo County, CA – Scheduled Year of Closure: 2024-2025.

- Groups EDA is working with – Economic Vitality Corporation (EVC), a non-profit organization established in 1994 to provide economic development services and business resources throughout San Luis Obispo County. Their role in a project related to the

¹¹<https://legislature.vermont.gov/assets/Documents/2016/WorkGroups/House%20Commerce/Reports%20and%20Resources/W~Southern%20Vermont%20Economic%20Development%20Zone~Southern%20Vermont%20Economic%20Development%20Zone%20Committee%20Report-1-26-2016.pdf>.

¹² REDS – done in coordination with the Economic Development Integration Framework across multiple state, local and federal funders and stakeholder groups.

Diablo closure is to be lead applicant and administrator of a consultant team to assess the impacts of the Diablo closure and develop an economic strategic plan.

- Past Activity – EVC previously submitted an application on December 19, 2016 for a plant closure study and an economic strategy/implementation plan. However, the project is more than 5 years in advance from closure, making it not currently fundable under the rules of that NOFO.
 - Current/Planned Activities –
 1. The applicant has submitted another application to prepare an economic strategic plan addressing the impact of plant closure. Some additional information will need to be clarified by the applicant to determine appropriate funding eligibility.
 2. Once the reactors are decommissioned they are estimating a 10-year process to dismantle. Potential mitigation strategies for the impacts of an estimated job loss of 1,500 will be studied. Diablo Canyon has lot of infrastructure, including office space, a marina and other assets that could be used for other businesses and go toward diversifying the economy. Environmental and energy impact, including potential higher utility costs, are other factors to be studied.
 - Links to studies and materials – A report was done (not EDA funded) by Pacific Gas & Electric (PGE) and Cal Poly-San Luis Obispo in 2013 on the Economic Benefits of the Diablo Canyon Power Plant. The report discusses jobs lost and economic impact with respect to licensing and commissioning the nuclear reactor. PGE owns the plant: https://www.pge.com/includes/docs/pdfs/shared/edusafety/systemworks/dcpp/PGE_Economic_Impact_Report_Final.pdf.
- 3. Actions that EDA is taking or plans to take in response to the timely attention to this issue.**
- Continued engagement with constituent post-closure communities and communities facing nuclear plant closures to recommend resources available within EDA’s portfolio of economic development grant programs. EDA will also recommend other federal agency resources potentially available to such communities through EDA’s Economic Development Integration role (www.eda.gov/edi).
 - EDA anticipates hosting informational materials on its website that EDA has already used to help other communities facing nuclear power plant closures. By aggregating relevant resources, including case-studies and reports which EDA has already funded, EDA will help communities understand what products and resources might be available to help them effectively respond to this challenge.
 - EDA may pursue and consider other projects to help communities prepare for and adjust to nuclear plant closures and the economic impacts thereof.

APPENDIX B

EDA Summary Report

**PURSUANT TO SENATE REPORT 115-275, WHICH ACCOMPANIED
THE CONSOLIDATED APPROPRIATIONS ACT, 2019 (P.L. 116-6)**



UNITED STATES DEPARTMENT OF COMMERCE
Chief Financial Officer
Assistant Secretary for Administration
Washington, D.C. 20230

AUG 09 2019

The Honorable Jerry Moran
Chairman
Subcommittee on Commerce, Justice,
Science, and Related Agencies
Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Enclosed is the Economic Development Administration's (EDA) report on Nuclear Plant Closures pursuant to Senate Report 115-275, which accompanied the Consolidated Appropriations Act, 2019 (P.L. 116-6). The report describes existing resources and funding opportunities for which affected communities may be eligible. The report also includes what opportunities exist for these affected communities to consider alternative uses for these sites upon completion of the decommissioning process and what Federal programs may assist in these efforts.

If you have any questions or need additional information, please call me at (202) 482-4951. Thank you for your continued support of the Department of Commerce and its programs.

Sincerely,

A handwritten signature in black ink, appearing to read "Tom Gilman", written over a light blue horizontal line.

Thomas Gilman
Chief Financial Officer and
Assistant Secretary for Administration

Enclosure

**REPORT ON BEST PRACTICES TO ASSIST COMMUNITIES AFFECTED BY LOSS OF TAX
REVENUE AND JOB LOSS DUE TO NUCLEAR POWER PLANT CLOSURES**
U.S. Department of Commerce
Economic Development Administration

Reference: Page 14, Senate Report 115-275:

Nuclear Plant Closures.—As part of the Explanatory Statement accompanying Public Law 115–141, the Committee directed EDA to report on its work to help identify and develop best practices to assist communities affected by loss of tax revenue and job loss due to nuclear power plant closures in recognition of the reality that communities that have a nuclear power plant that will undergo decommissioning, is currently undergoing decommissioning, or has completed decommissioning have become de facto high-level radioactive waste storage sites. The Committee further directs the Secretary of Commerce, in coordination with the Secretary of Energy, to build on EDA’s efforts by working across the executive branch and report to the Committee, not later than 90 days after the date of enactment of this act, on existing resources and funding opportunities for which affected communities may be eligible. The report shall also include what opportunities exist for these affected communities to consider alternative uses for these sites upon completion of the decommissioning process and what Federal programs may assist in these efforts.”

1. Executive Summary

Several federal agencies provide a range of technical and financial resources that may be useful to communities that suffer socioeconomic impacts from a nuclear power plant (NPP) closure, though none of the programs are specifically targeted at such closures. A majority of these programs require matching funds and a degree of institutional capacity that are generally beyond the capabilities of communities facing power plant closure. As such, it may be, that most of the programs described in this report are beyond the reach of the target communities. Furthermore, these programs are typically intended to support the implementation of back-end economic development projects as opposed to early-stage, front-end strategic planning activities. These early planning resources are what NPP host communities need most.

It should be noted that potential redevelopment options could be restricted by the presence of spent nuclear fuel, which will remain in place until such time that a permanent disposal solution for this waste is developed.

In this context and as described in this report, EDA is responding in part to Committee direction by implementing a cooperative agreement with the non-profit Nuclear Decommissioning Collaborative. Additionally, it is engaging with multiple stakeholders across the NPP spectrum; raising awareness of the economic development consequences of NPP closure, identifying resources available to address the related issues through on-site meetings, webinars and a dedicated website; increasing collaboration between stakeholders; and developing best practices to strengthen host community capacity and improve outcomes.

Given the 90-day duration of this reporting requirement, this document serves primarily as an update to the Committee on the activities taken thus far. It also serves as a primer for further engagement with economic development stakeholders going through the NPP closure and decommissioning process.

2. Introduction and Background

Since the construction of the first nuclear plants in the United States, 25 nuclear plants have closed, or are scheduled to close prior to 2020, in the following 16 states: California, Colorado, Connecticut, Florida, Iowa, Maine, Massachusetts, Michigan, Nebraska, New Jersey, New York, Ohio, Oregon, Pennsylvania, Vermont and Wisconsin. Each of these closures, many of which are located in rural communities, represents the direct loss of approximately 1,000 well-paying jobs and direct and indirect collateral economic impacts that range from hundreds of millions to billions of dollars, according to the Nuclear Energy Institute, the policy organization of the nuclear technologies industry.¹

As the Committee notes, the issue of NPP closure aligns closely with EDA's mission to help communities facing economic distress take control of their own economic future. In particular, and as outlined in this report, EDA is well positioned to work across the executive branch to coordinate the investment of multiple federal resources and to develop best practices to assist those communities facing NPP closure.

With respect to the requirements of this report and its development with input from the Department of Energy, specific EDA efforts included:

- i. Hosted an all-day federal executive branch roundtable on April 10, 2019, to discuss federal government resources that can potentially be used to support communities experiencing the loss of both jobs and property tax revenue due to NPP closures; and to better inform the discussion of the role of the federal government in the response to these plant closures. Attendees included representatives from: Department of Agriculture, Department of Commerce, Department of Energy, Department of Housing and Urban Development, Nuclear Regulatory Commission and the Environmental Protection Agency (EPA).
- ii. Collaborated with EPA to identify a range of programs that address the issue of redeveloping contaminated lands using EPA's 2017 Brownfields Federal Programs Guide.²
- iii. With respect to Committee's direction regarding exploration of, "...*alternative uses for these sites upon completion of the decommissioning process,*" this matter is influenced by the presence of spent nuclear fuel at these sites (left over from plant operations) and the complexities associated with liability considerations. EDA will continue to explore possibilities as part of the ongoing work through the cooperative agreement with the Nuclear Decommissioning Collaborative and on-going discussions with the other federal partners (particularly the Department of Energy).
- iv. As described in Section 13 of this report, the Nuclear Decommissioning Collaborative³ is a part of EDA's work assisting communities facing NPP closures. EDA will also leverage this partnership to evaluate additional opportunities to improve local NPP community outcomes, as described in more detail in Section 14 of this report.

¹ For additional information on the economic impacts of plant closure, see <https://nei.org/resources/reports-briefs>.

²https://www.epa.gov/sites/production/files/2017-06/documents/final_2017_bf_fed_guide_5-8-17.pdf

³<https://decommissioningcollaborative.org/>

Federal Programs – Existing Resources and Funding Opportunities

3. Economic Development Administration

Economic Development Integration – EDA’s Economic Development Integration (EDI) team collaborates with federal peers to identify opportunities to facilitate the coordinated and effective investment of multiple federal economic development resources in support of high-impact projects and activities by implementing policies and methods that:

- **Increase Access:** Ensuring that local and regional applicants can easily identify and apply for the federal economic development resources that can best support their local priorities and objectives.
- **Enhance Collaboration:** Facilitating coordination among multiple partners and stakeholders (federal and non-federal, public and private) to promote multiple, strategic investments in support of local priorities that can contribute to sustainable economic growth, especially for distressed communities.
- **Reduce Administrative Burdens:** Working with federal interagency partners on guidance tools to help applicants navigate, and possibly consolidate different administrative requirements that are triggered by each individual award of federal assistance (e.g., strategic planning, reporting).

In addition to three EDI staff at EDA Headquarters, Regional Integrators work in each of EDA’s 6 regional offices (Atlanta, GA, Austin, TX, Chicago, IL, Denver, CO, Philadelphia, PA, and Seattle, WA) to further enhance EDA’s capacity to support local and regional economic development projects. Additional information about Economic Development Integration is available online: www.eda.gov/edi. The tools developed by and connections made through EDI are particularly important to NPP communities as they often face a host of cross-cutting issues where multiple federal agencies may be able to assist.

Economic Adjustment Assistance Program – EDA’s Economic Adjustment Assistance (EAA) funding can be awarded to support the design and implementation of strategies (e.g., strategy development, infrastructure construction, Revolving Loan Fund capitalization/recapitalization) to assist communities or regions that have experienced or are under serious threat of experiencing damage to their underlying economic base. EAA investments provide resources that help communities experiencing or anticipating economic dislocations plan and implement specific solutions that leverage their existing regional economic advantages to support economic development and job creation. Grants generally require a 50% local cost share. This is EDA’s primary tool for assisting NPP closure communities.

Planning Program – The Planning Program grants help regional organizations (Economic Development Districts, Indian tribes, and other eligible recipients) fund short- and long-term planning activities to guide the eventual creation and retention of high-quality jobs, particularly for the unemployed and underemployed in economically distressed regions. As part of the program, EDA provides Partnership Planning grants to facilitate the development, implementation, revision, or replacement of Comprehensive Economic Development Strategies (CEDs). A CEDs is a strategy-driven plan for regional economic development, a result of a “regionally-owned” planning process designed to guide the economic prosperity and resiliency

of an area or region. An EDA-approved CEDS is a prerequisite for requesting an EDA-funded Public Works or EAA investment. Grants generally require a 50% local cost share. Including NPP closure response and recovery actions in a local CEDS is an important component of sustained and effective economic recovery.

Local Technical Assistance Program – The Local Technical Assistance program strengthens the capacity of local, regional or state organizations and institutions to undertake and promote effective economic development programs through projects such as feasibility studies, impact analyses, disaster resiliency plans, and project planning. Grants generally require a 50% local cost share. Total Technical Assistance can provide important foundational information for NPP closure communities so they can identify assets and develop plans to smoothly transition the local economy away from dependence on the NPP.

4. Department of Agriculture (USDA)

USDA programs that could benefit an eligible community experiencing a NPP closure, include:

Business and Industry Guaranteed Loan Program – The Business and Industry Guaranteed Loan Program bolsters the existing private credit structure through the guarantee of a lender’s loans to rural businesses. The program is administered at the local level through the Business Programs staff at USDA state offices.

Intermediary Relending Program – The purpose of the Intermediary Relending Program (IRP) is to alleviate poverty and increase economic activity and employment in rural communities through loans made to intermediaries that establish revolving loan programs. The IRP capitalizes locally managed revolving loan funds for small businesses unable to secure adequate bank financing on their own.

The Rural Business Development Grant Program – The Rural Business Development Grants (RBDG) program is a competitive grant program that supports targeted technical assistance and training for the development or expansion of small and emerging private businesses in rural areas.

The Rural Economic Development Loan and Grant Program – The Rural Economic Development Loan and Grant (REDLG) program provides funding to rural projects through local utility organizations. The grant program provides grant funds to local utilities to establish revolving loan funds for use in making loans for the creation and retention of viable jobs in rural areas.

Rural Economic Development Innovation (REDI) – REDI aims to strengthen the capacity of rural communities (50,000 people or less in the United States plus Tribes and territories) in implementing strategic community and economic development plans.

Strategic Economic and Community Development (SECD) – SECD is a Farm Bill provision that allows USDA to give priority through existing underlying programs for projects that support the implementation of regional economic development plans.

Additional information regarding other USDA’s programs, including housing, community facilities and infrastructure program, may be found at: <https://www.rd.usda.gov/programs-services>.

5. Department of Defense (DOD)

While the DOD does not provide support to communities facing NPP closure, DOD's Office of Economic Adjustment, as it relates to the Department's Base Realignment and Closure Program, provides useful planning guidance and reference information. For further information please see: <http://www.oea.gov/>.

6. Department of Energy (DOE)

As the primary means of promoting local economic development, DOE is developing technical and policy solutions that can help industry avoid NPP closures. For those communities that are, or will be, experiencing closure of a NPP, DOE has general technical assistance abilities that could potentially be applied to this matter if communities requested assistance.⁴

The report language required that the Secretary of Energy and the Secretary of Commerce (via EDA) coordinate on this report. EDA and the Office of Nuclear Energy at DOE have developed a strong partnership and plan to work together to help address these issues jointly.

7. Department of Housing and Urban Development (HUD)

Community Development Block Grant Program – The Community Development Block Grant (CDBG) program provides communities with resources and broad discretion in selecting activities to address a wide range of unique community development needs and may be of use to communities experiencing a NPP closure. Each activity funded through the program must meet one of the following statutory national objectives: benefit low- and moderate-income persons, prevent or eliminate slums or blight, or address community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community for which other funding is not available. For further information please see:

https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs.

8. Department of Labor (DOL)

Job Training – DOL's Employment Training and Administration (ETA) administers programs that provided training and employment assistance to over thirteen million adult workers and youth in Program Year 2015 through American Job Centers. Many of these centers provide job seekers with job vacancies and labor market information, job search and placement assistance, assessment and career counseling, and access to training. DOL supports apprenticeship programs for employers and employees that explains what apprenticeship programs are, how employers can establish apprenticeship programs, and how individuals can apply to become apprentices. This may be especially relevant as it pertains to training the decommissioning project workforce. For further information please see: <https://www.doleta.gov/>.

9. Department of Transportation (DOT)

Transportation Planning – The Federal Transit Administration (FTA) and Federal Highway Administration (FHWA) jointly administer programs related to transportation planning for local, rural, metropolitan, state, tribal, federal, and citizen partners. These programs may apply to NPP facility reuse planning. For further information please see:

⁴ State, Local and Tribal officials can request technical assistance on a variety of programs and topics via: <https://www.energy.gov/ta/state-local-and-tribal-technical-assistance-gateway>

<https://www.transit.dot.gov/regulations-and-guidance/transportation-planning/training-technical-assistance>.

10. Environmental Protection Agency (EPA)

The following EPA programs and funding mechanisms assist with the assessment and potential redevelopment of brownfield sites. They do not relate specifically to NPP closure and redevelopment; however, the programs and means for financial assistance may help communities catalyze strategic planning and economic development in conjunction with parallel efforts surrounding reuse and redevelopment of former NPP sites.

Assessment Grants – Assessment Grants provide funding for a grant recipient to inventory, characterize, assess, conduct a range of planning activities, develop site-specific cleanup plans, and conduct community involvement related to brownfield sites.

Cleanup Grants – Cleanup Grants provide funding for a grant recipient to carry out cleanup activities at brownfield sites. An applicant must own the site for which it is requesting funding and a 20% cost-share is required, although Tribes, nonprofit organizations, and government entities may request EPA to waive the 20% cost-share due to hardship.

Environmental Workforce Development and Job Training (EWDJT) Grants: EWDJT Grants provide funding for a grant recipient to recruit, train, and place unemployed and under-employed residents of areas affected by the presence of brownfields.

Technical Assistance to Brownfields Communities Program – Under the Technical Assistance to Brownfields Communities program, EPA awards grants to organizations that provide geographically based technical assistance and training on brownfields issues to communities and other stakeholders. The goal is to increase community understanding and involvement in brownfields cleanup and redevelopment.

Brownfields Research, Training and Technical Assistance Grants – EPA awards grants that support research and technical assistance on specific issues that challenge brownfield communities. The following organizations are actively providing technical assistance to brownfields communities across the country: Council of Development Finance Agencies; Groundwork USA; Hazardous Materials Training and Research Institute; the University of Louisville; and Kansas State University.

Additional information regarding EPA’s programs may be found at: <https://www.epa.gov/brownfields/types-brownfields-grant-funding>.

11. Nuclear Regulatory Commission (NRC)

As an independent safety regulator, the NRC’s focus is on ensuring safe decommissioning of the commercial NPP and terminating the NRC license to allow other beneficial uses of the property after it meets NRC safety radiological criteria. The NRC does not provide resources or funding opportunities to assist host communities in planning for beneficial reuse.

12. Small Business Administration (SBA)

Basic 7(a) Loan Program -- The 7(a) loan program is SBA’s primary program to help startup and existing small businesses obtain financing, with financing guaranteed for a variety of general business purposes. SBA does not make loans itself, but rather guarantees loans made by participating lending institutions. The 7(a) loans are the most basic and most used types of SBA

loans. For further information please see: <https://www.sba.gov/partners/lenders/7a-loan-program/types-7a-loans>.

13. Actions that EDA is Taking or Plans to Take in Response to this Issue

Building on the information in this report, EDA is continuing its efforts to assist NPP host communities through a cooperative agreement with the Nuclear Decommissioning Collaborative (<https://decommissioningcollaborative.org/>): a non-profit specializing in improving NPP decommissioning outcomes for host communities. Completion of this work scope will advance the following objectives:

- Increase cohesiveness between and among NPP stakeholders;
- Enhance interagency understanding of NPP stakeholder issues; and
- Improve coordination and effectiveness of DOE, NRC, EDA and other federal programs to address the needs of NPP stakeholders.

Key elements of the scope of work under this cooperative agreement include:

- i. Federal Government Roundtable & Working Group
 - Objective: Assist EDA in working across the executive branch to identify areas of common purpose leading to the development of coordinated strategies and mutually reinforcing objectives to assist affected communities.
- ii. Intake and Outreach with Affected NPP Stakeholders
 - Objective: Build awareness and develop preliminary insights from key stakeholders across the country who are or have been engaged in NPP decommissioning processes.
- iii. National NPP Stakeholder Webinar
 - Objective: Disseminate the findings and recommendations included in this report to the NPP stakeholder community.
- iv. Feedback from NPP Stakeholders
 - Objective: After the national webinar, allow for stakeholders to provide voluntary feedback surrounding the socioeconomic dynamics of NPP closure.
- v. Regional Economic Diversity Summit(s)
 - Objective: Building on the model of EDA's Regional Economic Diversification Summits, host summits in up to three EDA Regions specific to NPP closure.
- vi. Prepare and Deliver Final Report
 - Objective: Prepare and submit final report with recommendations to EDA.
- vii. Project Time-Line
 - The project scope of work will be completed by 4/30/2020.

14. Other Matters for Potential Consideration.

Looking ahead, there are several additional issues that, if and when addressed, will serve to further strengthen host community capacity and improve closure and decommissioning outcomes. These include:

- implementation of a functioning disposal solution for commercial spent nuclear fuel;
- increased access to grant programs and other resources to allow communities to undertake pre-closure planning/visioning activities;
- possible development of a standard, accepted environmental impact statement to facilitate inter-agency resource delivery; and
- exploration of models to manage liability associated with NPP closures and promote site redevelopment.

APPENDIX C

NRC NEIMA Meetings

NRC NEIMA Meetings⁶⁹

Meeting Date	Location	Web Link to Meeting Summary
August 8, 2019	Webinar*	View Meeting Summary
August 21, 2019	Palisades*	View Meeting Summary
August 26, 2019	Humboldt Bay	View Meeting Summary
August 27, 2019	Diablo Canyon	View Meeting Summary
August 29, 2019	San Onofre	View Meeting Summary
September 10, 2019	Vermont Yankee*	View Meeting Summary
September 11, 2019	Pilgrim*	View Meeting Summary
September 24, 2019	Kewaunee	View Meeting Summary
September 26, 2019	Zion	View Meeting Summary
October 2, 2019	Indian Point*	View Meeting Summary
October 3, 2019	Oyster Creek	View Meeting Summary
October 10, 2019	Crystal River	View Meeting Summary
November 19, 2019	Webinar*	View Webinar Slides

* Denotes meeting attended by Collaborative staff.

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Socioeconomic Impacts from Nuclear Power Plant Closure and Decommissioning

HOST COMMUNITY EXPERIENCES, BEST PRACTICES AND RECOMMENDATIONS

The operation of a typical nuclear plant annually contributes at least \$400M of economic impact to the plant's host region as well as being a key source of economic livelihood for over one thousand plant employees and contractors. In addition, the presence of nuclear plant employees and their families strengthens host community capacity through their participation in a wide range of civic, cultural and volunteer opportunities.

The socioeconomic impacts of plant closure are severe and swift. Many highly skilled workers and their families relocate, procurement of local goods and services is significantly reduced, tax payments to local towns plummet and housing values erode. These impacts occur at every nuclear power plant, but the effects are felt more deeply in rural communities where most plants are located.

A series of factors continue to hamper host community recovery efforts including:

- limited resources available to host communities for economic development planning;
- the decommissioning process is complex and is accompanied by a steep learning curve;
- the long-term presence of spent nuclear fuel hinders economic development; and,
- the lack of a coordinated federal framework to facilitate host community economic recovery.

Over the next several decades, all currently operating nuclear power plants will close, representing a total annual reduction in gross regional product of approximately \$25B. Given the scale of this impact, there is both the need and opportunity to strengthen policy, process and performance to improve economic outcomes of host communities recovering from plant closure.

This report is offered with that goal in mind. Through a combination of stakeholder interviews and research, we have developed a more complete picture of what it means to close and decommission a nuclear power plant with a focus on the host community experience. By doing so, we provide all project stakeholders with additional tools and information to improve project outcomes and catalyze economic recovery.