

# Upfront Planning for Power Plant Retirement Projects

Low natural gas prices, environmental regulations and the growth of renewable energy have accelerated retirements of fossil fuel-fired power plants. As utilities decommission and demolish such plants, they must understand permitting requirements, costs and options available.



Identifying the right options for the decommissioning and demolition (D&D) of a power plant requires extensive upfront planning and coordination. Special permits are likely needed for everything from demolition and waste disposal to asbestos abatement and stack lighting. Utilities and other energy sources may need to be isolated. The project scope will need to be clearly defined to minimize changes so that activities stay within permit requirements and budget. Through it all, expectations will need to be managed as utilities coordinate with a range of operations, safety, security, environmental and management stakeholders.

D&D projects typically follow a three-phase process. Critical components of this process include assembling a team to carry out the decommissioning project from start to finish, as well as identifying common challenges utilities can expect to face — and work to avoid — along the way. Utilities must also understand the processes essential to bidding and implementing the project safely and within budget.

## Phase One: Plan Development

### Assemble A Project Team

A power plant D&D project team typically includes representatives of the utility's own in-house project team, the

specialty engineering team and those involved in stakeholder engagement. The utility's own in-house project team is responsible for determining the project scope and defining the end-state conditions for the site when decommissioning is complete. This may include engineering, operations, energy delivery, security, safety, telecommunications, environmental, real estate and legal services. The specialty engineering team uses the retirement scope to define the permitting and technical requirements that will be used to develop bid documents. Those involved in stakeholder engagement are responsible for presenting the D&D team's conceptual approach to outside stakeholders, including government and environmental agencies, and obtaining feedback prior to implementation.

### Select a Retirement Model

One of the D&D team's most consequential decisions is its choice of a retirement model for the project. A variety of economic factors drive power plant retirements. Long-term cost, safety and environmental considerations typically influence a utility's decision on whether to demolish the decommissioned plant or retire it in place until demolition can occur at a future date.

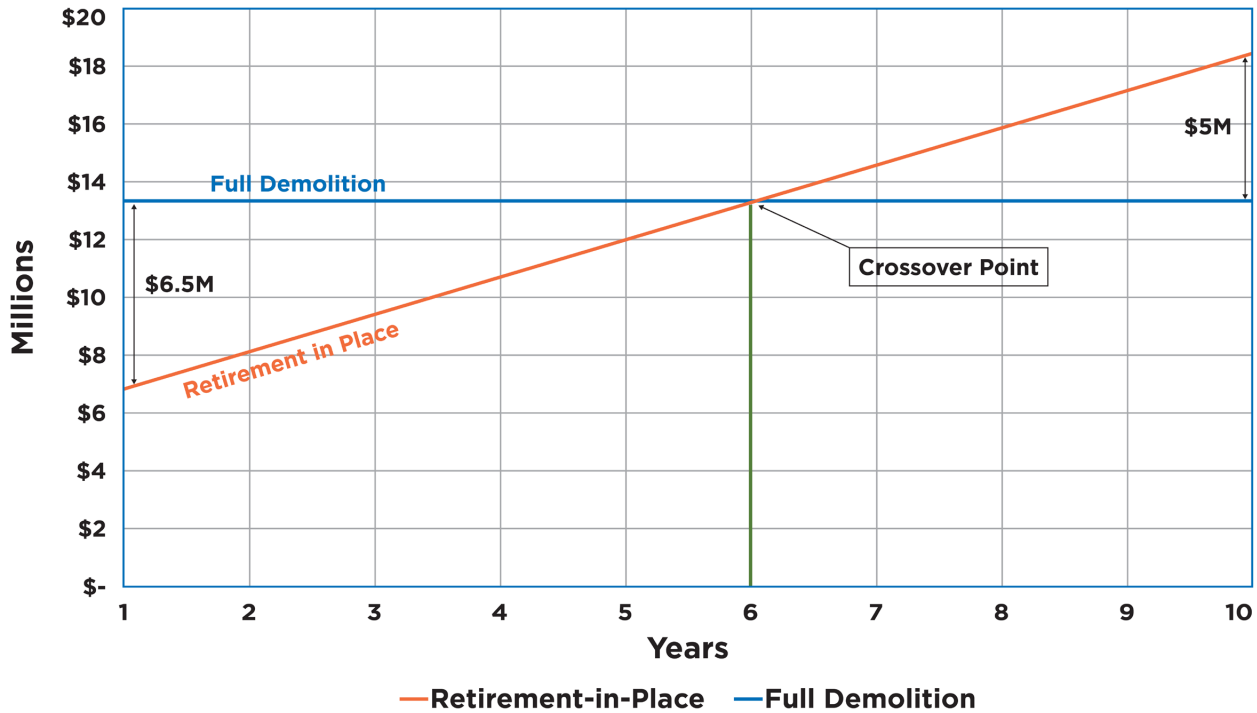


Figure 1: Retirement in place versus full demolition cost estimate

When a utility chooses to retire a plant in place, it retains ownership of the property and facilities. While lower in upfront costs than demolition, a retire-in-place plant accrues security, maintenance and other expenses over time. This option is generally preferred by utilities with multiple units at a plant, each on a different retirement timeline due to the cost of isolating and removing individual units.

With a full demolition approach, all plant assets are demolished and removed from the site. The approach offers the benefit of fixed, upfront capital costs, while also making it possible to sell the site and assets, such as scrap metal. It also opens the door to potential redevelopment or new power generation at the site.

**Conduct a Regulated Materials Assessment**

Before selecting a retirement model, it is important to conduct a thorough assessment of regulated materials at the plant. Asbestos, mercury, PCBs, chemicals, toxic gases, fuel, refrigerants, and lead-based paint are among the regulated materials that are often found inside and outside these facilities. Mercury can be found in fluorescent lamps, some switches and thermostats, heating and cooling equipment, gas ranges, and barometers. The quantity and location of asbestos and other materials can significantly impact plant retirement costs.

**Retrieve Critical Facility Information**

This is an appropriate time to collect facility construction drawings, environmental reports, permits and lists of

construction materials — all of which will be valuable when project development begins. Information gathering will likely also include interviews with on-site operators and maintenance staff to obtain institutional knowledge of historical site conditions and changes, as well as other information not shown on construction or as-built drawings. Interviews can help identify the locations of spills, underground tanks or other environmental concerns not included in reports. Staff may also be able to offer insight on the alloys used in retrofitted boiler and condenser tubes that may bring greater scrap value.

**Determine Permit Requirements**

D&D projects require multiple permits, including those for asbestos abatement, demolition, stormwater management, Federal Aviation Administration (FAA) lighting on stacks, and intake/discharge closure on rivers or lakes, among others. Both the budget and schedule can be impacted by these requirements. It is imperative to understand both the technical requirements that may be imposed by a permit as well as the expected timeline to issue the permit.

**Develop a Cost Estimate**

Prior to moving to the next phase of retirement, a planning level cost estimate should be developed to understand the costs of the planned activities. It can also be used to determine which approach will be used. All of the information obtained during this phase is central to the development of a detailed cost evaluation comparing retirement options over

a specific time frame. Figure 1 shows an example plant cost estimate for a retire-in-place approach that would save the utility approximately \$6.5 million in the first year, compared to demolition. By year six, the cost for retirement would be equal to initial demolition. By year 10, however, the utility will have paid \$5 million more for retirement in place than it would have paid had it demolished the plant at the start, principally due to ongoing costs for maintenance, security, insurance and taxes.

## Phase Two: Scope Development

### Define the Scope of Retirement Model

The scope of work for a D&D project can vary dramatically, depending on the retirement model chosen. The scope of retire-in-place projects will depend on the results of an evaluation of utility interties among the units or facilities that will remain on-site, among other factors. An assessment must also determine if remaining fire protection, sanitary and stormwater sewers, communications systems and other utilities should be isolated when not needed, and if new utilities are needed to support ongoing site activities. The scope must also account for the relocation or rerouting of utilities that pass through retired units.

Retire-in-place projects require baseline and periodic inspections of stacks/chimneys. These inspections are essential for maintaining long-term safety and regulatory compliance. The results of baseline inspections, in fact, may prompt renewed consideration of at least partial demolition, if not the full demolition alternative.

Ongoing site security requirements should also be assessed, including the need to secure doors, perimeter fencing, security cameras, a security force and other solutions to prevent unauthorized access and protect the public and environment from potential hazards.

### Define the Scope for Demolition

Demolition projects involve removing all assets and structures from the site and remediating and restoring the site for potential reuse. The utility must first determine how the site will be left following demolition; for example, if foundations will remain in place or be removed and be replaced with a gravel or vegetated surface.

Because the property may be repurposed or sold after demolition, project development should consider current property assets. Rail access or spurs to a main line may be beneficial for shipping when redeveloping the site. Highway access may signal a site's potential as an intermodal facility. If the site offers waterway access to a river system, it may be able to be leased or repurposed by a new owner for barge loading and unloading. Site location could be a valuable

benefit since it can be difficult to obtain permits for new facilities. Similarly, if a utility has water rights, it should assess its water intake/discharge structures and permits.

Access to transmission lines is another important asset that creates the potential to repower the site with combined-cycle, simple-cycle, reciprocating engine or other type of power generation that could be used to power new generation facilities at the site. However, repowering can be limited if natural gas is not available within a reasonable distance.

Owners undertaking facility demolition must also identify any utility interties with units or facilities that will remain at the site, determining whether utilities are no longer needed and if they need to be isolated. Projects should identify if any new utilities are needed to support ongoing site activities, as well as whether utilities running through-units slated for demolition should be relocated or rerouted.

Potential environmental liabilities also must undergo evaluation. Coal piles may require removal of residuals and capping. Landfills may need to be consolidated and capped, and coal ash ponds may need to be closed in place or removed.

An overall grading plan will be needed for final site restoration. The plan should be designed to promote drainage without producing point source discharges.

### Research Local Ordinances and Permit Requirements

Regardless of the retirement approach, it is important to identify and communicate information regarding local ordinances and permit requirements that could impact how bidders complete the work. This includes demolition requirements and permits needed to perform demolition or to work on or near bodies of water. Special permits may also be required for stack lighting or temporary lighting during demolition. Utility abandonment requirements and stormwater pollution prevention plans should also be communicated.

### Develop Bid Documents

Comprehensive D&D bid documents should make it easy to evaluate and compare bidders and reduce the potential for change orders. These documents can also be used as the project plan for successful implementation. High-quality bid documents include all site and facility information and a clearly defined scope of work that minimizes ambiguity and enables a true comparison among bid responses.

The clearer the scope definition, the fewer contingencies that result. That is why bid documents should also include optional scope items or unit pricing for activities that may arise during the project. For example, projects should seek

unit prices for asbestos abatement in stacks, boiler refractory and underground piping. Unit prices for soil removal and other items may also be helpful, as will costs for alternate items, such as additional building removal, that may be added later. Labor and equipment costs need to be included during the competitive bid process so that these rates can be used as a basis for evaluation of change orders during implementation.

Upfront knowledge of these costs allows the owner to control costs and mitigate potential change orders using the competitive bid process, rather than after the project begins.

## Phase Three: Project Implementation

### Prequalify Contractors

Prior to determining which contractors receive requests for proposals (RFPs), it is imperative to prequalify potential bidders to identify contractors qualified to conduct the work. Prequalified contractors include those that have experience with projects of similar size and scope, as well as a good safety record for the three previous years as demonstrated by their experience modification rate (EMR), total recordable incident rate (TRIR) and days away, and restricted or transferred ratings (DART). The experience of the contractor staff assigned to the project also matters, as does the availability of the experienced project teams and equipment.

### Identify Key Contractor Personnel

Owners should include a full-time, on-site safety manager and superintendent among the key personnel required by the RFP. Any safety manager candidate should be a Certified Safety Professional (CSP) or Associate Safety Professional (ASP) with a minimum of five years of experience on similar projects and no other responsibilities at the site. Likewise, the superintendent's sole focus should be on directing and conducting the work safely and effectively. Candidates should have experience with similar projects and be able to oversee both abatement and demolition activities.

### Develop a Preliminary Execution Plan

Bids are most meaningful and helpful when they arrive with preliminary execution plans that include a proposed methodology and the types of equipment to be used for activities such as abatement and demolition. These plans should describe the sequence of activities to be performed for abatement and demolition, as well as identify any zones that will be excluded from demolition activities. Information like this enables the D&D project team to determine if the contractor has prepared a site-specific bid and has a clear understanding of the expectations described in the bid documents.

### Evaluate Bids

Bids should undergo both technical and financial evaluations. The technical evaluation should assess each bidder's project understanding, as addressed in its execution plan. The past three years of safety performance for subcontractors proposed for the project, along with subcontractor and project team experience on similar projects and the proposed schedule, should also be scrutinized. The financial evaluation should involve not only the base bid, but also scrap credits, unit prices and alternates, with the goal of identifying overall project costs.

### Prepare Specific Execution Plans for Major Activities

Before major activities get underway, the contractor should be expected to provide execution plans for specific activities, including the demolition of boilers, coal bins, turbine halls, precipitators and other large structures. Pick plans are also needed for lifting equipment or structures, as are building or stack implosion plans. These plans should provide the sequence of activities, safety plans and procedures, any work exclusion zones, removal methodologies and contingency plans.

A licensed structural engineer should either develop or review proposed major activity plans to confirm that the proposed approaches can be accomplished safely. Prior to the start of a major activity, the utility, contractor and engineer should meet on-site to review the plan and set expectations for the results.

### Isolate Utilities

Utilities must be safely isolated prior to any demolition activities. The lockout/tagout method of isolation is not appropriate for these projects. Instead, owners should insist on a permanent "air gap" method because it provides visual evidence that isolation is completed. This method allows the contractor to confirm that both electrical and mechanical systems are no longer energized or pressurized prior to beginning demolition work.

The contractor should be expected to verify that all systems are de-energized by the owner prior to demolition. Written documentation of the isolation and verification should be signed off on by both the owner and the contractor.

### Structure Removal Methods

There are multiple ways to clear structures from a site. They can be pulled over, tripped by their legs, mechanically sheared or imploded. High-reach shears, backhoes and other equipment can be used to support removal. Whatever methods are employed, safety plans must provide protocols that address the potential for materials to drop on equipment and operators as well as adjacent structures.

In cases where all or parts of structures are to be imploded, adjacent structures will require protection. A safe buffer area will need to be established and adjacent property owners will need to be notified. Coordination with those who could be impacted, as well as local police, fire and other emergency staff, is essential. Traffic control plans must be in place for before, during and after the implosion to prevent bystanders or others from entering into a blast zone. A dust control plan is also needed for the large amounts of dust generated by the implosion process.

### **Establish On-Site Field Representation**

Success D&D project implementation requires full-time on-site representation either by the owner or engineering firm. Throughout the process, an on-site field representative should be expected to provide the owner with independent verification and documentation of contractor activities. The person holding this position is responsible for reviewing contractor invoices, tracking and confirming proper waste disposal and verifying that contractor staff have secured any required certifications, such as those for asbestos abatement.

The on-site field representative's responsibilities also include participating in daily safety meetings and notifying the contractor and owner of any unsafe situations or safety plan nonconformance. The representative is tasked with observing on-site demolition activities for conformance with the execution plans and developing a final report that assembles all documents, manifests and results in one place.

## **Summary**

Developing a high-quality power plant retirement plan requires the cooperation and coordination of any parties. Most importantly, it requires:

- A plan development phase where a project team is organized, the property's end use is determined, regulated materials are assessed and a cost analysis of retirement options is developed.
- A scope development phase when property assets are inventoried, permit requirements are identified, utilities are isolated and comprehensive bid documents are developed.
- A project implementation phase when contractors and subcontractors are prequalified, plans for major activities are prepared and utility isolation and on-site field representation are executed.

## **About Burns & McDonnell**



Burns & McDonnell is a family of companies bringing together an unmatched team of engineers, construction and craft professionals, architects, and more to design and build our critical infrastructure. With an integrated construction and design mindset, we offer full-service capabilities. Founded in 1898 and working from dozens of offices globally, Burns & McDonnell is 100% employee-owned. For more information, visit [burnsmcd.com](https://burnsmcd.com).