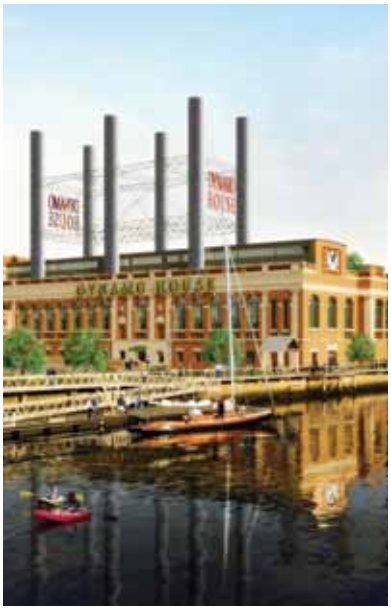
AMERICAN CLEAN SKIES FOUNDATION

REPURPOSING LEGACY POWER PLANTS

LESSONS FOR THE FUTURE





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The American Clean Skies Foundation was founded in 2007 to advance America's energy independence and a cleaner, low-carbon environment through expanded use of natural gas, renewables and efficiency. The Foundation is a not-for-profit organization exempt from federal income taxes under Section 501(c)(3) of the Internal Revenue Code.

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Industry analysts predict that environmental and economic factors will lead to the retirement of dozens of aging coal-fired power plants in the coming decade. Many old generating plants occupy strategic locations in urban areas, often with access to valuable waterfront. These sites present tremendous opportunities for new civic and private uses such as riverfront housing, shops and offices – as well as museums, parks and other community amenities.

This report profiles eight power plant repurposing projects that have been completed or begun. These projects highlight the compelling case for remediating and redeveloping these sites. They also offer points of reference for business leaders, policy makers, and community stakeholders who wish to prepare for the coming wave of power plant retirements in their localities.

In many cases, retired generating plants have been left abandoned for years or decades. For local communities, these sites create blight and represent a forgone opportunity – but this need not be the case. Experience with past redevelopments suggests the need to plan early for site reuse and adopt a collaborative approach that assures the involvement of all stakeholders, including incumbent utilities and power companies. Clarity of vision is crucial, but it is equally important to develop a realistic business plan with feasible financing mechanisms that can cover the considerable costs of site cleanup and redevelopment.

Repurposing old generating stations presents special challenges but also creates opportunities to build stronger communities and foster economic growth. Capitalizing on these opportunities can help communities create a healthier environment, foster new business activity and job development, and bring retired power plant properties back onto the tax rolls.

The case studies described embody an ambitious vision for the future. They wow with scale and revitalize whole neighborhoods and regions. They harness history for education and tell the remarkable story of how America was electrified. Each project design also reflects community goals, civic pride, and future aspirations.

Early redevelopments have frequently capitalized on preserving plant structures with significant historic and architectural value. However, the coming wave of coal plant retirements will include some power stations that lack a distinctive architectural legacy and might best be demolished. Whether the goal is to preserve significant buildings or to level undistinguished facilities and build anew, insights can be gleaned from analyzing what has been done before.

02 Background: The Opportunity Ahead

There has never been a better time to discuss the redevelopment of old power plant sites in the United States. In the coming decade, communities across the country are likely to see coal plant retirements. One of these is likely to involve the 60 year-old Potomac River Generating Station in Alexandria, Virginia. An affiliate of the American Clean Skies Foundation, Potomac River Green LLC, is currently developing a collaborative plan for the successful redevelopment of this site.

New federal regulations to protect public health are expected to spur the closure of well over 150 power plants nationwide. Most of these plants lack adequate pollution controls and retrofitting them to meet new environmental requirements —even when feasible—will be too costly. At the same time, increased price competition from cleaner burning natural gas-fired generators has given many plants a further impetus for closure.

Estimates for total retirements vary, but it is generally projected that between 30 and 50 gigawatts (GW) of generating capacity—equivalent to approximately 10-15 percent of the nation's coal-fired power plant fleet—are likely to be retired between 2012 and 2020. The major drivers of these retirements are age, high costs, competition from alternative fuels and (perhaps most important) new federal pollution control regulations.Ð Specifically, the U.S. Environmental Protection Agency (EPA) is implementing new provisions under the Clean Air Transport Rule for emissions of nitrous oxide (NOx) and sulfur dioxide (SO2) (in 2012 and 2014, respectively); a new Air Toxics Rule (in 2014); a tightened ozone standard (2014–2016); and new power plant water discharge rules under the Clean Water Act (2014–2017). In addition, EPA is strengthening National Ambient Air Quality Standards for ozone and ozone precursors (2014–2017).Ð To protect the public from harmful emissions, these rules may require older, dirtier coal-fired plants to convert from "once-through" to "closed-loop" cooling systems; install activated carbon injection units to control mercury emissions; mount "scrubbers" and selective catalytic reduction (SCR) systems to limit the release of acid gases and other pollutants; and install fabric filters to reduce airborne emissions of toxic metal particulates.

In June 2010, the EPA also proposed new rules to regulate the disposal of coal ash (likely effective in two to five years or more). These rules will regulate the removal of solid waste from units that burn coal.[3] Taken together, these regulations will subject highly polluting coal plants to further costs in order to protect public health and will cause many poorly performing generators to close.

Approximately one-third of the U.S. coal-fired power plant fleet currently lacks critical emissions control technology. Many older plants, in particular, emit significant amounts of mercury and other metals, acid gases, and dangerous particles. These emissions have been shown to cause premature death, cancer, neurological damage, heart conditions, and chronic respiratory diseases such as asthma.Ð Almost 120 million Americans still live in areas that fail to meet national ambient air quality standards for ozone and other pollutants.Ð

A confluence of market forces poses further challenges to coal plants. Many of these plants face increasingly stiff competition from cleaner natural

1] Freese B. et al., "Coal – A Risky Proposition: the Financial Hazards of New Investments in Coal Plants," Union of Concerned Scientists, March 2011, available at http://www.ucsusa.org/assets/documents/clean_energy/a-risky-proposition_report.pdf; Celebi M. et al., "Potential Coal Plant Retirements Under Emerging Environmental Regulations," Brattle Group, 8 Dec. 2010, available at http://www.brattle.com/_documents/uploadlibrary/upload898.pdf; Eggers D. et al., "Growth from Subtraction: Impact of EPA Rules on Power Markets," Credit Suisse, 23 Sept. 2010, available at http://op.bna.com/env.nsf/id/jstn-8actja/$File/suisse.pdf.

2] Staple G. and Carr C., "Growing the Market for Clean Power: The EPA's New Power Plant Regulations and What They Mean for Utilities and Public Health," American Clean Skies Foundation, 16 Dec. 2010, available at http://www.cleanskies.org/pdf/12-20AG_MEF.pdf.

3] See EPA proposed rule, "Disposal of Coal Combustion Residuals from Electric Utilities," 75 FR 35128, 35147, 21 June 2010, available at http://edocket.access.gpo.gov/2010/2010-12286.htm.

4] U.S. Environmental Protection Agency, "Reducing Air Pollution from Power Plants," 26 Apr. 2011, available at http://www.epa.gov/airquality/powerplants/.

5] U.S. Environmental Protection Agency, "Key EPA Power Sector Rulemakings," supra, p. 3.

gas, as well as from renewable energy sources. Estimates of the domestic natural gas resource base have increased by 39 percent since 2009.[6] Compared to coal-fired electrical generation, using natural gas as a fuel produces less than one-half the amount of CO2 emissions per kilowatt-hour of output, approximately one-tenth the amount of nitrogen oxide emissions, and negligible amounts of mercury, sulfur dioxide, and particulates.[7]

State Renewable Energy Standards (RES) are also likely to increase coal plant retirements. To date, 29 states and the District of Columbia have adopted mandatory standards that require a portion of the electricity sold by their utilities to come from renewable sources like wind, solar, biogas, and geothermal energy. Many RES policies require utilities to progressively increase the share

Table 1: Examples of Sites for Possible Redevelopment

Plant Name	Metro Area	Total Plant Capacity (MW)	Fuel Type
A B Peterson Electric Generating Plant	New Orleans, LA	123	Oil/Gas
Cane Run Generating Station	Louisville, KY	577	Coal
Cecil Lynch Generating Station	Little Rock, AR	170	Oil/Gas
Cromby Generating Station	Philadelphia, PA	345	Coal
Dubuque Generating Station	Dubuque, IA	76	Coal
Eagle Mountain Power Plant	Forth Worth, TX	665	Oil/Gas
Glenwood Power Station	New York, NY	337	Oil/Gas
H. Wilson Sundt Generating Station	Tuscon, AZ	472	Coal/Oil/Gas
Hamilton Municipal Power Plant	Cincinatti, OH	131	Coal
Monroe Electric Generating Plant	Monroe, LA	126	Oil/Gas
Morro Bay Power Plant	San Luis Obispo, CA	999	Oil/Gas
NRG Norwalk Harbor	Norwalk, CT	342	Oil
Oswego Steam Station	Oswego, NY	1,700	Oil/Gas
Potomac River Generating Station	Washington, D.C.	482	Coal
Salem Harbor Station	Boston, MA	744	Coal
Sixth Street Generating Station	Cedar Rapids, IA	77	N/A
Somerset Power Generating Station	Providence, RI	127	N/A
State Line Generating Plant	Chicago, IL	795	Coal
Tanners Creek Generating Station	Cincinatti, OH	990	Coal
Trenton Channel Power Plant	Trenton, NJ	730	Coal
		Total 9,910	

*identified plants include unites that are projected by EPA to retire in response to the proposed utility boiler mact rule
Source: EPA

6] Freese B. et al., "Coal – A Risky Proposition: the Financial Hazards of New Investments in Coal Plants," Union of Concerned Scientists, March 2011, available at http://www.ucsusa.org/assets/documents/clean_energy/a-risky-proposition_report.pdf.

7] Ibid.

of electricity that comes from renewable sources throughout the coming decade, increasing the pressure on coal plants to retire. Ð

Many renewable energy resources like wind and solar energy are intermittent and require back-up generation for periods when the wind is not blowing or the sun is not shining. Natural gas-fired plants can ramp up and down more efficiently than legacy coal-fired plants.Ð This will further reduce the economic value of coal plants as the grid begins to accommodate more renewable energy sources.

The expected wave of coal plant retirements is already beginning to arrive. Recent analyses show that announced retirements now total more than 20 GW of generating capacity. States in the Midwest, the Northeast, and Texas currently project the largest number of retirements. Table 1 (page 07) and Figure 1 identify the name and location of select plants that are likely to be retired.

A number of cases stand out as useful examples for redeveloping early 20th century power plant sites. These include an impressive large-scale redevelopment of the Seaholm Power Plant in Austin, Texas, and the grand vision for redeveloping Station B in Sacramento, California. Also instructive is the powerful fusion of mission and design that was achieved at the Homan Square Power House in Chicago, Illinois. The redeveloped Pennsylvania Railroad Powerhouse in Queens, New York, and the Station L Power Plant in Portland, Oregon, exemplify a high degree of acumen, while pragmatism is on display in the reconstruction of the Chester Power Station near Philadelphia, Pennsylvania. Experience with the South Street Power Station in Providence, Rhode Island, provides a cautionary tale, while the Ultimo Power Station in Sydney, Australia, stands out as a compelling success. Further information on current and projected power plant redevelopment projects can be found in an appendix to this report.

Table 2: Sites That Have Been Redeveloped or With Anticipated Redevelopment

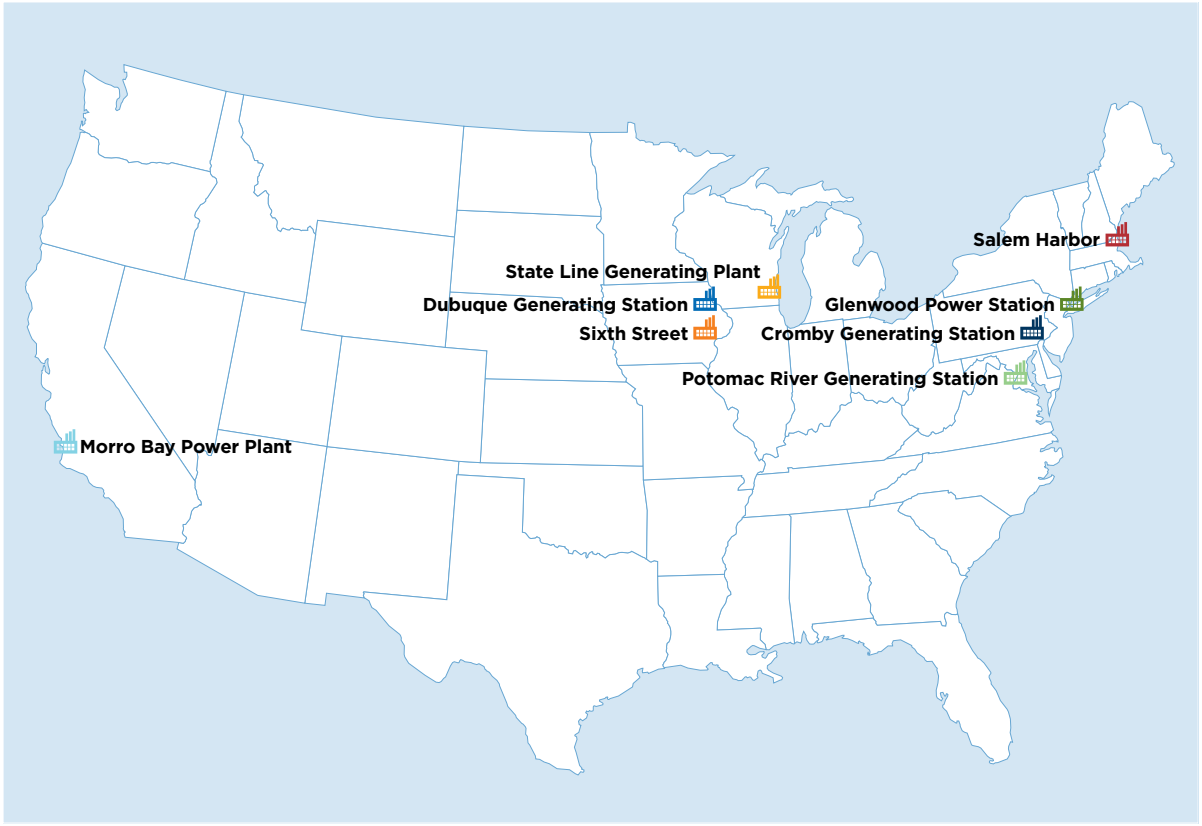
Plant Name	Location
Battersea Power Station	London, United Kingdom
Power House Power Plant	St. Louis, Missouri
Comal Power Plant	New Braunfels, Texas
Power Plant Contemporary, Art Gallery	Toronto, Canada
IP Power Plant	New Delhi, India
Pratt Street Power Plant	Baltimore, Maryland
IRT Powerhouse	New York City, New York
Salem Harbor Power Station	Salem, Massachusetts
Lucky Strike Power Plant	Richmond, Virginia
Seattle Gas Company Plant	Seattle, Washington
Mission Road Power Plant	San Antonio, Texas
Station B Power Plant	San Diego, California
Ottawa Street Power Station	Lansing, Michigan
Tejo Power Station	Lisbon, Portugal

8] Slavin, M., "Where the Wind Blows and Sun Shines: A Comparative Analysis of State Renewable Energy Standards," Renewable Energy World North America, June-July 2010, available at http://www.renewableenergyworld.com/rea/news/article/2010/05/where-the-wind-blows-and-sun-shines.

9] Swisher, J. "The Business Case For Integrating Clean Energy Resources to Replace Coal," American Clean Skies Foundation, June 2011, available at http://www.cleanskies.org/wp-content/uploads/2011/06/staple_swisher.pdf.

Figure 1: Select Metropolitan Area Power Plants with Potential for Redevelopment

Plant Name	Metro Area	Current Owner	Year First Online
Cromby Generating Station	Philadelphia, PA	Exelon Corporation	1954
Dubuque Generating Station	Dubuque, IA	Alliant Energy	1929
Glenwood Power Station	New York, NY	National Gird	1952
Morro Bay Power Plant	San Luis Obispo, CA	NRG Energy	1955
Potomac River Generating Station	Washington, D.C.	GenOn Energy	1949
Salem Harbor Station	Boston, MA	Dominion	1951
Sixth Street	Cedar Rapids, IA	Alliant Energy	1888
State Line Generating Plant	Chicago, IL	Dominion	1929



*Sources: EIA, EPA, Ventyx

03 Precedents for Redevelopment

A. Homan Square Power House: Charter School and Community Center

Building Characteristics:

The Homan Square Power House in the west side of Chicago, Illinois, was built in 1905 and designated a National Historic Landmark in 1978. The complex provided electricity and heat to the world headquarters of Sears, Roebuck and Co. Its four buildings had an area of 30,000 sq. ft., including a three-story turbine room and a smaller boiler room that turned water into steam.

Redevelopment Plan:

The coal power plant was redesigned between 2007 and 2009 as the Shaw Technology and Learning Center in order to revitalize an under-served area. The center serves as a community meeting space for low- and moderate-income residents, but its primary occupant is the chartered Henry Ford Academy, or Power House High. The school's original curriculum incorporates themes of green technology and environmental sustainability. The facility also hosts technology and education fairs to connect students, schools, and employers.

The results of this redevelopment echo London's Tate Modern museum and are especially striking in the high-ceilinged turbine room (right). The room hosts a cafeteria, gym classes, school assemblies, and community events. Throughout the complex large pieces of equipment were left in place, including sections of the original coal conveyor system, coal hoppers, and a diesel generator. Inside the turbine room the architects conserved a big blue chilling machine, a 40-ton gantry crane, and the rail system. The room also retained its glazed brick walls and terra cotta floor tiles. The boiler room was converted to classrooms and meeting rooms through the installation of new floors, walls, stairs, and corridors amid historic features. The coal ash conveyor belt is featured behind glass and windows in some classrooms show the power plant's chimney. The plant's brick exterior retained decorations such as bolts of electricity and lines from old lean-to buildings.

Project Costs:

The project cost $40 million, not counting an additional $17 million in federal tax credits.

Lessons

Reuse and Tap Green Design to Advance Project Mission:

Power House High not only reclaims a chunk of Chicago's history, it also prepares students for careers in engineering, architecture, and related fields. To start, the building's layout included non-traditional table configurations to promote a less hierarchical teaching style and more teacher-student interaction. The complex is also LEED Platinum certified by the U.S. Green Building Council. Coupled with the building's history as a place for generating power, its green energy systems offer a multitude of educational opportunities. The heating and air-conditioning (HVAC) system leverages a geothermal well field with technologies for better temperature control and energy efficiency. Historic windows on the west and north facades are retrofitted with insulated glass, and skylights in the turbine room feature an energy-efficient natural daylighting system. Mechanical systems use heat recovery and demand-based ventilation.

Sources

"Power Play: Architects Help Turn Old Sears Power Plant in Chicago into New Charter School," Chicago Tribune, 1 Sept. 2009, available at http://featuresblogs.chicagotribune.com/theskyline/2009/09/power-play-architects-help-turn-old-sears-power-plant-in-chicago-to-new-charter-school-.html.

"About the Power House" and "About Power House High," Homan Square, available at http://education.homansquare.org, accessed 27 Feb. 2010.

Bruni C., "Adaptive Reuse! A Long Overdue Post on the Sears Power House Restoration and Renovation," Green Preservationist, 9 July 2010, available at http://preservegreen.wordpress.com/2010/07/09/adaptive-reuse-a-long-overdue-post-on-the-sears-powerhouse-restoration-and-renovation/.

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Gerfen K., "Charles H. Shaw Technology and Learning Center," Architect, 16 Feb. 2010, available at http://www.architectmagazine.com/articles/adaptive-reuse/charles-h-shaw-technology-and-learning-center.aspx?playlist=playlist_____20_304214&plitem=1.

B. Station L Power Plant: The Oregon Museum of Science and Industry

Building Characteristics

Portland General Electric's Station L Power Plant was completed in 1908. This sawdust- and wood chip-fired steam generating plant was built on an 18.5-acre site along the Willamette River, across from downtown Portland, Oregon. The plant produced electricity until high operating costs forced it to shut down in 1975.

Redevelopment Plan

Groundbreaking on the redevelopment project got underway in 1990 and the Oregon Museum of Science and Industry (OMSI) opened in 1992. Architects incorporated the plant's single smokestack and turbine buildings, now known as the museum's Turbine Hall. With 219,000 sq. ft., OMSI became the fifth largest science and industry museum in the U.S. It includes a 305-seat, five-story OMNIMAX Dome Theater and a 200-seat planetarium. OMSI's multimillion dollar facility also has five exhibit halls, eight science labs, a retired U.S. Navy submarine open for tours, a high-speed motion simulator ride, a 25,000 sq. ft. exhibit-building shop, a science store, and a café. OMSI educates and entertains its visitors through interactive displays, science classes, hands-on activities, and outdoor camps; it also serves as a hub for local science clubs. The museum is known internationally for its innovative exhibits and educational programs.

Project Costs

The vision for OMSI took an important step toward becoming reality when Portland General Electric donated Station L in 1989. The total cost to build the museum was about $40 million; the OMNIMAX Dome Theater alone cost $6 million. The project was supported by public bonds and $32 million in donations obtained over a period of five years from businesses, foundations, and individuals.

Lessons

Secure Corporate Funding with Innovative Design:
The Oregon Science and Industry Museum showcases historic machinery along with cutting-edge technology. Supported by SANYO North America Corporation, InSpec Group, and Portland General Electric, the museum's parking lot now features North America's first solar charging station. The canopy station serves electric cars, e-bikes, and personal electronic devices. The installation is large enough to cover three standard-sized parking spaces for automobiles and features weatherproof lockers. Two of the lockers serve "eneloop bikes"—three pedal-assisted hybrid electric bicycles donated by SANYO. The charging station and eneloop bikes increase the use of alternative transportation and educate the public about renewable energy.

Sources

Pelinka D., "Oregon Museum of Science and Industry," Oregon Encyclopedia, available at http://www.oregonencyclopedia.org/entry/view/oregon_museum_of_science_industry_omsi_/, accessed 22 Mar. 2011.

"OMSI's History" and "OMSI Facts," available at http://www.omsi.edu, accessed 22 Mar. 2011.

Funding Universe, "Portland General Corporation," available at http://www.fundinguniverse.com/company-histories/PORTLAND-GENERAL-CORPORATION-Company-History.html, accessed 22 Mar. 2011.

Image Credits
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Lower Willamette Group, "Portland Harbor RI/FS Draft Remedial Investigation," 27 Oct. 2009, available at http://lwgportlandharbor.org/library/documents/RI/ChemicalAnalysisinAdjacentAreasText.pdf, accessed 22 Mar. 2011.

"OMSI Unveils Solar Charging Station in Portland," The Portlander, 30 July 2010, available at http://theportlander.com/2010/07/30/omsi-unveils-solar-charging-station-in-portland/.

C. PG&E Power Station B: The Powerhouse Science Center

Building Characteristics

Pacific Gas & Electric Station B stands by the Sacramento River, in the developing Riverfront District near downtown Sacramento. The plant is over 100 years old, with a stucco and plaster exterior. It had a three-story turbine room, two-story boiler room, and four 220-ft. smokestacks. Station B ceased operating in 1954 and was listed on the National Register of Historic Properties and the California Register of Historic Resources in 1984. In 2008, the Discovery Museum Science & Space Center signed a long-term lease with the City of Sacramento to create the larger Powerhouse Science Center.

Redevelopment Plan

In 2013, Station B will re-open as the Powerhouse Science Center, a high-tech educational facility for students and families. The aim of the center is to model a 21st century hands-on approach to education in science, math, technology, engineering, and space exploration. The facility also aims to highlight the area's scientific achievements, latest developments in medical science and technology, and fundamentals of resource conservation.

Developers will preserve Station B's original structure and architectural features while creating a 42,881 sq. ft. space over the original foundation, two additional floors, and the mezzanine. The nearby newly constructed 11,954 sq. ft. Earth and Space Sciences Center will focus on the natural environment. It will feature a 150-seat, 55-ft. full-dome planetarium for movies and programs replicating the night sky. The Challenger Learning Center—developed with NASA—will let students use their computer game skills in hands-on science and space exploration scenarios. The facility will host two floors of exhibit space, science laboratories and classrooms, a robotics exhibit and lab, a conference center, a bookstore, and a gift shop.

The City of Sacramento views the project as part of an effort to become a national leader in the green economy. The museum's interactive computer games and exhibits will enable students to explore water, technology, and alternative energy sources. The Center itself will be a model green building with an array of alternative energy systems: a hydrogen fuel cell, urban wind towers, photovoltaic "trees," and photovoltaic roofs over parking areas. A "living machine" will recycle the building's liquid waste into water for landscaping. The Center's transparent design is intended to help interpret these elements for visitors inside the building.

Project Costs

The Powerhouse Science Center is estimated to cost $50 million. The project was funded through a partnership between the Center, PG&E, the City of Sacramento, and 28 other partners. PG&E volunteered to remove the towers and wires, which will save about $860,000 in project costs.

Sources

Powerhouse Science Center, "The Project, the Vision," available at http://powerhousesciencecenter.org, accessed 22 Mar. 2011.

"Powerhouse Science Center Historic Preservation," Presentation to the City of Sacramento on 7 April 2010, available at http://www.cityofsacramento.org/dsd/meetings/commissions/preservation/2010/documents/PSC-Historic-Preservation_4-7-10.pdf.

Lessons

Secure Funding with a Critical Mission, Ambitious Vision:
The Powerhouse project's regional scale and a highly germane educational mission helped it secure significant donations from businesses, foundations, educational institutions, and individuals. The Sacramento region plans to diversify its technology sector and the Center's focus on STEM (Science, Technology, Engineering, and Math) is viewed as critical for the area. The Center will be a field trip destination for pre-kindergarten to 12th-grade students from throughout the region. Efforts are already underway to work with First 5 Sacramento to develop a program for young children. There are also plans to develop additional after-school and summer programming for youth from the Sacramento area, with a special focus on serving the low-to-moderate income community.

Make Use of the Waterfront for Visibility, Reclaimed Public Value:
PG&E's Power Station B was the first-choice location for the Powerhouse Science Center in large part because the plant's position on the riverfront is highly visible and creates a feeling of greater awareness for the imaginative science facility. The Center's design incorporates outdoor exhibits, a stage and multimedia screen, and interpretive signage. The complex will include a restaurant with riverfront views; in addition, an exterior terrace about 1,300 sq. ft. in size at the Earth and Space Sciences Center will feature a café with outdoor seating.

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Dreyfuss & Blackford Architects
Dreyfuss & Blackford Architects

Dreyfuss & Blackford Architects, Page & Turnbull.

"Former Sacramento PG&E Power Plant Will Become Cutting Edge Educational Facility," Sacramento Scoop, 10 Oct. 2010, available at http://sacramentoscoop.com/2010/10/04/former-sacramento-pge-power-plant-will-become-cutting-edge-educational-facility/.

D. Pennsylvania Railroad Powerhouse: A Luxury Condo Complex

Building Characteristics

This seven-story power plant in Queens, New York, was designed with four 275-ft. chimneys circa 1906. Historically, it supplied steam to electrify the Long Island and Pennsylvania railroads. The building had been vacant since the late 1990s and was used as a plumbing warehouse.

Redevelopment Plan

As apartment prices increased and real estate grew scarcer in Brooklyn and Manhattan, developers looked to Queens. Reconstruction began in 2006 and this power plant building re-opened as the PowerHouse Condominium in late 2008. When the remaining two construction phases are finished (by 2013), the site will have 447 units and 180,000 sq. ft. of galleries, restaurants, and offices. The first complex of 177 units advertises spectacular views, high-class layouts, and amenities that rival Manhattan's. Prices for the condo units range from $570,000 for a one-bedroom unit to $1.3 million for a three-bedroom unit – about half the price of comparable units in Manhattan.

The redevelopment of the old stone and brick power house added four levels and corner windows to the base of the building but conserved its original arched windows. New floors were set back and covered with copper-colored aluminum panels and glass. The designer removed the chimneys for structural reasons but incorporated in their stead some similar, but shorter, round glass towers for living areas. In the common areas, designers exposed the original brick and steel columns.

Project Costs

Developers purchased this plant and the adjacent Schwartz Chemical Plant on a smaller site for roughly $24 million. The redevelopment, which will cost approximately $170 million, includes two additional buildings with housing and 100,000 sq. ft. of retail, a courtyard, and a 150-car garage. In this case working with an older structure was tougher, costlier, and more time-consuming than projected. The original proposal was to raze the power plant entirely, which would have saved $40 million.

Lessons

Plan Ahead to Reduce Costs, Balance Conflicting Aims:
Architects originally decided to build a glass tower between the chimneys because it would be less expensive than demolishing them. However, the plan required a ruling that would prolong the process. Because there was no guarantee of approval, the team had to eliminate the chimneys. Many wanted both the chimneys and the power house demolished for aesthetic reasons, but others wanted to save these historic features. When the smokestacks could not be retained, the architects fought hard to add new round shapes that resembled the power plant's original features.

Leverage Spectacular Design in a Tough Market:
Instead of offering regular condominium amenities, the design team sought to distinguish the facility with a two-story lounge and a catwalk viewing perch, extensive water features, a courtyard garden, spa, fitness center, media center, children's playroom, and rooftop deck with private cabanas and public zones.

Sources

Ballinger, B., "Powering Forward: A Turn-Of-the-Century Steam Plant Now Houses Upscale Condos in an Up-And-Coming Queens, N.Y., Neighborhood," Multifamily Executive, 10 Dec. 2009, available at http://www.multifamilyexecutive.com/adaptive-reuse/powering-forward.aspx.

Image Credits
CGS Developers
The PowerHouse Condominiums
The PowerHouse Condominiums

Hughes, C. J., "Powerhouses to the People," New York Times, 9 Mar. 2008, available at http://www.nytimes.com/2008/03/09/realestate/09post.html?_r=1&ref=realestate.

E. Seaholm Power Plant: Ambitious Redevelopment

Building Characteristics

The Seaholm Power Plant in Austin, Texas, was finished in 1958 in a simplified Art Deco Modern style. The 130,000 sq. ft. power plant complex sits on a 7.8-acre property. The plant had five gas/oil generation units and consists of three buildings: the Turbine Generator Building (main building), the Water Intake Structure on the bank of Town Lake, and the Pump Room/Fuel Oil Building. All buildings are eligible for listing in the National Historic Register. The largest of them contains over 110,000 sq. ft. of floor space on three levels, including a 235 by 110 ft. third-story hall with clerestory windows and a 65-ft. ceiling.

Redevelopment Plan

The Seaholm Power Plant once supplied the whole city, but it has not produced electricity since 1989, when a local citizens' group prevailed in a campaign to decommission the plant. Because of the plant's historic and architectural importance, the City of Austin decided in 1996 to reuse it as a major civic venue for concerts and special events.

The mixed-use redevelopment plan will preserve the buildings' architectural style. The plant itself will house an 8,000 sq. ft. center for concerts and special events on the upper level; office space, retail shops, and restaurants will fill the bottom two levels. Existing underground utilities will be relocated to maximize the site's relatively small acreage. A one-acre green roof plaza will link the plant with two additional buildings, including a boutique six-story, 160-room hotel with 275,000 sq. ft. of condominium-penthouse space above it and an office building (for a total of 100,000 sq. ft. of office space).

The 22-story hotel/condominium structure will sit atop an elevated parking garage that will house the hotel lobby and some retail space on the ground level. Amenities will include valet service, pool, spa, bar, conference center, restaurant, and café. The new office building will host underground parking and some first-level retail shops, which will complete a total of 60,000 sq. ft. allotted for retail and restaurant space. The redevelopment's new buildings will feature elements of the power plant's Art Deco style. The site will be adjacent to a commuter rail station and a bus drop-off, a new library, and a reused water treatment plant. The Seaholm Power project is expected to revitalize a hidden corner of downtown Austin while also supporting more than 200 jobs and generating over $2 million in yearly tax revenues.

Project Costs

The $150 million–$180 million redevelopment project is LEED Silver designated and required $15 million in initial financing for an eight-year-long pre-construction phase that included equipment removal, new roof installation, and remediation/abatement for PCBs, asbestos, lead paint, mercury, and oil/sludge. Remediation alone cost $13 million. The City of Austin contributed $18.6 million to cover the cost of related street and utility projects, public parks, and an underground parking garage.

Sources

Scadden et al., "Facility Decommissioning and Adaptive Re-Use," NDIA 27th Environmental Symposium and Exhibition, 26 Apr. 2001, available at http://www.westonsolutions.com/about/news_pubs/tech_papers/ScaddenNDIA01.pdf.

Collins M., "Planned Seaholm Development Puts Retired Power Plant to Different Use," Community Impact, 10 Apr. 2009, available at http://impactnews.com/central-austin/news/3909-planned-seaholm-development-puts-retired-power-plant-to-different-use .

"The Adaptive Re-Use of Seaholm Power Plant," accessed 27 Feb. 2011, available at http://friendsofseaholm.com.

Lessons

Determine the Site's Purpose Before Decommissioning:
The lack of a vision on future reuse created conflicts and uncertainty during the Seaholm project's earlier decommissioning and remediation process. Proponents of using the building as a science and technology center argued for retaining significant portions of the plant's equipment onsite for display purposes. Other groups wanted the equipment completely removed. Some parties searched for an alternative approach to addressing the issue of asbestos and metals-based paint contamination while preserving the boilers. In the meantime, the electric utility wished to eliminate issues of potential future liability.

Reevaluate the Site's Urban Context:
Prior to soliciting proposals, the City of Austin commissioned an urban design and redevelopment plan for the whole surrounding district. The master plan would accommodate the Seaholm complex as a major public attraction, with all decisions reinforcing this goal. The plan would include recommendations for the types and locations of visitor parking at Seaholm, a possible intermodal transportation network with light rail and intercity rail connections, and the best way to integrate the adjacent downtown business district and a 1,000-acre park.

Image Credits
Southwest Strategies Group, Inc.
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"Seaholm Power Plant Redevelopment," HS&A, accessed 27 Feb. 2011, available at http://www.hsatx.com/market/seaholm.html.

Allen M., "Day 2 - Seaholm Power LLC - Austin Adaptive Reuse," 20 May 2010, available at http://mallentxtour.blogspot.com/2010/05/day-2-seaholm-power-llc-austin-adaptive.html.

Geiser A., "Repurposing a Downtown Icon: Firm to Buy Defunct Historical Seaholm Power Plant Amid Criticism," The Daily Texan, 5 May 2010, available at http://www.dailytexanonline.com/content/repurposing-downtown-icon; Seaholm Power, LLC., available at: http://www.seaholm.info, accessed 10 May 2011.

F. Ultimo Power Station: The Powerhouse Museum

Building Characteristics

The Ultimo Power Station in Sydney's Darling Harbor was built between 1899 and 1902. The station generated power for the city's electric tram system, but stopped operating in 1961. In 1979, the New South Wales government decided to house the flagship portion of the local Museum of Applied Arts and Sciences at the site.

Redevelopment Plan

The Powerhouse Museum opened in 1988 and is now Australia's largest and most popular museum. Its collection spans history, science, technology, design, industry, decorative arts, music, transportation, and space exploration. Developers created the Powerhouse Museum from the plant's old shell and an additional new building. The add-on was inspired by 19th century's exhibition halls and grand railway stations. It synchronizes with the plant's original style while incorporating modern elements. The old tram depot next to the station re-opened in 1981 with offices, workshops, laboratories, and storage space. In total, the exhibitions cover over 175,000 sq. ft. Among other amenities, the museum offers classrooms, theater space, and dining facilities. The New South Wales Migration Heritage Centre is also located at the museum and manages community partnerships to record the history and legacy of migrant communities.

Lessons

Fit Purpose to Situation:
The developer of the Powerhouse Museum reused equipment from the old Ultimo Power Station. The station's engine hall from 1905 is now part of the Museum's "Steaming" exhibition.

Sources

Powerhouse Museum, "History of the Museum" and "Paradise, Purgatory and Hellhole: a History of Pyrmont and Ultimo" and "The Steam Revolution," available at http://www.powerhousemuseum.com, accessed 22 Mar. 2011.

Image Credits
Andrew Frolows/Powerhouse Museum
M.O. Stevens

G. The Chester Power Station: An Office and Retail Complex

Building Characteristics

The former Chester Power Station is located on 396,000 sq. ft. of waterfront along the Delaware River outside Philadelphia, Pennsylvania. This five-turbine, 14-boiler, electricity-generating coal and oil plant was constructed in the late 1910s. It features Gothic architecture supported by Tuscan columns and cornices. The complex included three buildings: the Switch House, Turbine Hall, and Boiler House (with respective base areas of 9,000, 30,000, and 45,000 sq. ft.) Turbine Hall has a vaulted 85-ft. high ceiling. The plant supplied power until 1982, but had stood abandoned for years.

Redevelopment Plan

The complex was renovated for office use between 2002 and 2004 and opened as The Wharf at Rivertown in 2004. Turbine Hall's four stories now house office space and a multi-purpose meeting room, along with concert and party areas. The renovated spaces display extensive detail in Classic Revival style. The Boiler House (original structure gutted) is now a six-story office constructed from the original four-story frame with an additional two stories on top. On-site amenities include a 6,000 sq. ft. basement food court, a 1,500 sq. ft. fitness center, and a river walk. The complex offers five parking spaces per 1,000 sq. ft., including 80 spaces of covered parking.

Project Costs

The entire power station rehabilitation cost $80 million. State and federal governments, along with the Delaware River Port Authority, added more than $11 million for environmental clean-up, new roads, and other improvements in the area. Remediation costs were significant—in fact, Philadelphia Electric Co. was willing to sell the plant for just $1 provided the buyer, Preferred Real Estate Investments, would be responsible for the environmental cleanup. It took six months to complete remediation, with oil pollution and asbestos presenting immediate issues. In fact, the plant's interior was so contaminated that inspectors had to don protective clothing and masks. Ultimately, however, the project was 80 percent leased while still months from completion.

Lessons

Utilize Existing Equipment:
The power plant's crane was not removed and later proved to be instrumental throughout construction – both for demolition and renovation. The project involved hanging a truss theatrical lighting system above the Turbine Hall's vaulted 85-ft. ceiling. The crew erected the scaffolding on top of the crane, which was outfitted with pulleys and winches to lift the truss system close to the ceiling. When the lighting system was completed, the crew permanently fixed the crane in place as a piece of historic sculpture.

Sources

Holcomb H., "A New Electricity at Chester Site," Philadelphia Inquirer, 15 May 2004, available at http://www.linderman.net/newelectricity.htm.

Swedberg C., "Repurposing a Power House: Robert Ford Electric Brings Historic Structure to the Present," Electrical Contractor, May 2007, available at http://www.ecmag.com/?fa=article&articleID=7576.

Image Credits
The Warf at Rivertown

"The Wharf at Rivertown," the Buccini/Pollin Group, 2 Mar. 2011, available at http://www.bpgroup.net/wharf-rivertown.htm.

H. The South Street Power Station: A Mixed-Use Vision

Building Characteristics

The South Street Power Station—also known as the Narragansett Electric Lighting Company Power Station—occupies 350,000 sq. ft. along the Providence River in Providence, Rhode Island. The joined three-building complex is nearly a century old and was built with brick in the Classical Revival style. The 100-ft.-high plant originally had nine stacks but lost some of them in a hurricane; the rest were stripped in the late 1980s. The power plant itself was decommissioned in the 1990s.

Redevelopment Plan

The South Street Power Station was eventually redesigned as the "Dynamo House Project"—a nickname bestowed on the plant in 1903. The plant was abandoned for so long that Narragansett Electric initially planned to demolish it, but instead ended up donating the complex to the Heritage Harbor Museum in 1999. The seven-story redevelopment plan eventually included a restaurant on the ground level, 55,000 sq. ft. for a two-floor museum, about 150,000 sq. ft. of leased office space on three levels, and a 171-room luxury brand hotel on the top two floors (which were added to the original structure). The Heritage Harbor Museum will feature a soaring atrium entryway leading to a permanent collection of artifacts on Rhode Island's history, along with 10,000 sq. ft. for traveling exhibits on loan from the Smithsonian. The latter arrangement is unique in Rhode Island and is expected to help make the museum a statewide attraction.

Project Costs

The project's total cost is projected to be over $150 million.

Lessons

Beware of Potential Financing Challenges: The South Street Power Plant redevelopment faced several financial setbacks. Narragansett Electric had donated the plant to the Heritage Harbor Museum, which originally planned to occupy the plant in its entirety. However, the museum was unable to fund the project after state voters rejected a $25-million general obligation bond. When a major for-profit developer bought the asset, the new plan reduced the size of the museum to 55,000 sq. ft., which the new owner, Struever Bros. Eccles & Rouse, allowed to operate rent-free. At that point, the completion was scheduled for the end of 2009. In practice, the Struever Bros. in turn faced financial difficulties. (Part of the problem was that revisions to Rhode Island's tax-credit program for historic preservation had cost the Struever Bros. almost $8 million in projected financing.) When the Harbor East Development Group, LLC took over in late 2010, the project had still not secured a large tenant for its office space and faced serious difficulties in bridging the financing gap. A host of creditors are now attempting to recover payment for work already performed and a slew of secured grant money, state bonds, and historical preservation credits are in limbo.

Sources

Barbarisi D., "A Bright Beginning: Project to Restore Symbols of City's Past," The Providence Journal, 3 Dec. 2006, available at http://www.heritageharbor.org/?id=6&uudis=14.

Image Credits
Studio AMD
Studio AMD

Marcelo P., "The Transformation of South Street Station," The Providence Journal, 18 Jan. 2009, available at http://www.projo.com/ri/providence/content/DYNAMO_HOUSE_01-18-09_K3CVEB4_v72.3aca12b.html.

Nickerson J., "What's Going on With the Dynamo House?" Greater City: Providence, 9 Nov. 2010, available at http://www.gcpvd.org/2010/11/09/whats-going-on-with-the-dynamo-house.

04 Building Anew

In many cases, retired power plants have also been demolished. With newer, less architecturally and historically significant buildings, developers have opted for complete redesign. For instance, developers recently chose to demolish the 1940s-era Frank R. Phillips Power Station in South Heights, Pennsylvania. This 54-acre property will be redeveloped for commercial and industrial use.

While new construction has yet to commence at most sites, the projects listed below highlight the importance of meeting community needs. Many retired power plants have witnessed a number of years—or decades—between decommissioning and demolition. Ideally, early planning for redevelopment will help to avoid similar periods of blight and foregone opportunity for plants that are closed in the future.

- Mad River Power Plant - Springfield, Ohio: built in 1927, abandoned since 1981, dismantled in 2011
- 284 West Power House - Hanford, Connecticut: built in 1943, abandoned since 1992, demolished in 2011
- Westport Power Plant - Baltimore, Maryland: operated since 1906, abandoned in 1993, demolished in 2007
- Hookers Point Power Plant - Tampa, Florida: operated since 1940, abandoned since 2002, demolished in 2009
- Mohave Generating Station - Laughlin, Nevada: operated since 1971, abandoned since 2005, dismantled in 2011
- Lovett Power Plant - Tomkins Cove, New York: built in the 1950s, abandoned since 2007, dismantled in 2008
- Coal Brook Breaker Power Station - Carbondale, Pennsylvania: abandoned since the 1970s, demolished in 2006

10] Bauder B., "Power Station Owner Developing Crescent Site for Commercial Use," Pittsburgh Tribune-Review, 3 Feb. 2011, available at http://www.pittsburghlive.com/x/pittsburghtrib/business/s_721066.html#ixzz1OnRIJVlU.

Lessons for the Future 05

Given the considerable numbers of coal plant retirements on the horizon, an overview of past practice and recent developments can help create a springboard for discussion in individual communities on how to repurpose retiring coal-fired stations. The process of redeveloping these plant sites is complex and varies from case to case. Nevertheless, some parallels can be drawn from successful developments in recent years.

A. Costs, Timeframes, and Financing

Developing the sites of old coal plants frequently takes several years. Though typical zoning rules apply, site cleanup, working with old buildings, meeting requirements for historic preservation, and special financing challenges add to the time required for redevelopment. Environmental remediation alone can take several years. Nevertheless, successful projects have shown redevelopment to be worth the potential challenges.

Costs for the redevelopment of old power plants can range from under $10 million for smaller projects to $40 million–$80 million for mid-size developments, to around $150 million–$180 million for larger plans. Examples of smaller projects include an office development at the former Lucky Strike plant in Richmond, Virginia; new offices for Cannon Design in St. Louis; and commercial/residential development of the Mission Road Power Plant site in San Antonio, Texas. For mid-size projects, representative cases include the Charles H. Shaw Technology and Learning Center in Chicago; the Powerhouse Science Center in Sacramento; the Oregon Museum of Science and Industry in Portland; and the Chester Power Station in Chester, Pennsylvania. On the other end of the spectrum are large projects like the Accident Fund's offices at the Ottawa Street Station in Lansing, Michigan; the luxury PowerHouse Condominium complex in Queens, New York; and the mixed-use redevelopments of the Seaholm Power House in Austin, Texas, the South Street Power Station in Providence, Rhode Island, and the IP Power Plant in New Delhi, India.

Decommissioning and retirement costs make up a significant portion of project expenses. These costs can vary considerably from plant to plant, but may be between $30 million and $50 million for a plant of about 500 MW. Economies of scale generally reduce the cost of demolition. The cost of environmental cleanup alone can be significant. For instance, environmental remediation for the heavily contaminated 170 MW PG&E Hunter's Point Power Plant in San FranciscoÐÐ was estimated to cost over $25 million in 2003.ÐÐ Smaller projects can require lesser, but nonetheless significant investments. For the 18,500 sq. ft. Lucky Strike power plant building in Richmond, Virginia, the redevelopment contract for hazardous material handling alone came to more than $1 million—almost 20 percent of the total redevelopment budget.ÐÐ For a residential project on the 28-acre site of the 60 MW Comal Power Plant in New Braunfels, Texas, total remediation costs amounted to about $11.3 million over a period of three years. The clean-up followed the framework requirements of the Texas Commission on Environmental Quality's

11] Bay Area Air Quality Management District, "PG&E Hunters Point Power Plant Officially Closes," 15 May 2006, available at http://www.baaqmd.gov/~/media/Files/Communications%20and%20Outreach/Publications/News%20Releases/2006/pge_060515.ashx.

12] Public Utilities Commission of the State of California, "Opinion Adopting Estimate for Hunters Point Power Plant Site Remediation," 27 Mar. 2003, available at http://www.cpuc.ca.gov/word_pdfAGENDA_DECISION/30027.doc.

13] NBC12 News, "Turning Lucky Strike Power Plant into Commercial Hub," 26 Jan. 2006, available at http://www.richmondcitywatch.com/forum3/viewtopic.php?f=14&t=1201.

Voluntary Cleanup Program. This process entailed removing asbestos, PCBs, landfills, above-ground fuel storage tanks, an old transmission substation, and lead-based paint, along with repairing the Comal Dam, which helps control the level of the nearby lake.ÐÐ In general, the costs of remediation will be lower for newer coal plants. The newer the plant, the less likely it is that presently banned toxic materials and chemicals were used in its construction and operation.

Among the several challenges in brownfield redevelopment is upfront costs. Because end use (residential, commercial, industrial, or recreational) decides the extent of required remediation, early planning can be helpful in minimizing expenditures. Local, state, and federal assistance programs aimed at promoting sustainability through site reuse are often available to reduce project costs. These programs may provide for direct grants and forgivable/performance loans, as well as loan guarantees and companion loans that reduce lender risk. For borrowers, public financing opportunities include interest-rate reductions and due diligence assistance, as well as repayment grace periods, tax abatements, and training/technical assistance.ÐÐ

Among public financing options, the most important programs are offered by the U.S. Environmental Protection Agency (e.g. assessment, clean-up, capitalization and grants issued by the Revolving Loan Fund program); the Economic Development Administration's economic development funds; the Department of Housing and Urban Development (Community Development Block Grants); and the Department of Agriculture (rural development grants and community facility/business grants and loans). Project developers can also take advantage of tax code incentives like low-income housing tax credits, energy efficiency incentives, and new markets tax credits.ÐÐ

EPA's Revolving Loan Fund (RLF) grants are available to local, state, and tribal governments and to any entities that they may form, sanction, or direct (nonprofit organizations are not eligible for these grants). RLF grant recipients must generally cover a share of costs amounting to 20 percent of total funds awarded.ÐÐ The Economic Development Administration (EDA) offers economic development funding to district organizations, states, municipalities, and tribal governments and their nonprofit partners. EDA evaluates grant applications on a competitive basis using a set of core criteria. These criteria include assisting economically distressed or underserved communities and addressing national strategic priorities such as technology-led development, global competitiveness and innovation, and environmentally sustainable development. EDA grant recipients generally bear 50 percent of project costs.ÐÐ The Department of Housing and Urban Development extends various block grants to local governments whose projects use at least 70 percent of the funding to benefit low- and moderate-income individuals.ÐÐ

Additional information on brownfields grants and other redevelopment assistance available from the EPA, the Department of Housing and Urban Development, and the Economic Development Administration may be found at:

- http://epa.gov/brownfields/grant_info/index.htm
- http://www.eda.gov/InvestmentsGrants/FFON.xml
- http://www.hud.gov/offices/cpd/communitydevelopment/programs/

14] LCRA, "Recycling a Power Plant," 26 Feb. 2007, available at http://www.lcra.org/featurestory/2007/comal_dedication.html.

15] Bartsch C., "Green Building on Brownfields – Obstacles and Opportunities," ICF International Webinar, 6 May 2008.

16] Ibid.

17] U.S. Environmental Protection Agency, "FY11 Guidelines for Brownfields Revolving Loan Fund (RLF) Grants," accessed 6 June 2011, available at http://www.epa.gov/oswer/docs/grants/epa-oswer-oblr-10-10-rev.pdf.

18] U.S. Economic Development Administration, "Federal Funding Opportunities and Other Notices," accessed 6 June 2011, available at http://www.eda.gov/InvestmentsGrants/FFON.xml.

19] U.S. Department of Housing and Urban Development, "Community Development Block Grant Program – CDBG," accessed 6 June 2011, available at http://www.hud.gov/offices/cpd/communitydevelopment/programs/.

Credits for historic preservation are managed by state historic preservation offices and the National Park Service, which oversee the National Register of Historic Places. For the former Lucky Strike power plant in Richmond, Virginia, historic renovations included repairs to the obsolete smokestack, coal silo, and water tower. Developers cleaned the brick walls, retained the window sashes and staircase, rebuilt a skylight, and reused as a wall the original levered door.[20] Complying with regulations for historic preservation so as to be eligible for tax credits can impose additional costs, but can also provide access to grants and tax incentives that are very helpful for securing project financing.

Depending on individual circumstances, historic and brownfields credits can cover a considerable percentage of project costs. In St. Louis, Missouri, Cannon Design took advantage of the state's generous tax credits for the adaptive reuse of historic and brownfield sites. These credits can be worth as much as 45 cents for every dollar spent on redevelopment.[21] Renovation of the 1920s-era, 19,000-square foot Power House plant resulted in 32,000 sq. ft. of LEED Gold certified office and conference space, along with 3,500 sq. ft. of urban garden space.[22]

For smaller projects, tax credits can be critical to viability. In the case of the Lucky Strike power plant, the cost to buy and transform the 1910 five-story, 18,500 sq. ft. building exceeded $4 million; the costs to purchase the property alone totaled $1.15 million, equivalent to about $32 per sq. ft.ĐĐ These costs were offset by the city tax abatement program, as well as state and federal tax credits. Without tax credits, developers could not have financed this project.

Tax incentives can also be important in attracting developers for large-scale projects. In Lansing, Michigan, the $182 million, 334,000 sq. ft. redevelopment of the 1940s Art Deco Ottawa Power Plant benefited from a comprehensive package of federal, state, and local tax incentives. The package included approximately $10 million

20] Hazard C., "Renovation Completed at Tobacco Row's Lucky Strike Power Plant Building," Richmond Times-Dispatch, 8 Feb. 2009, available at http://www2.timesdispatch.com/business/2009/feb/08/luck08_20090206-214012-ar-82662/.

21] Azure Magazine, "Power House," Sam Fox School at the Washington University in St. Louis news, June 2009, available at http://sfac.wustl.edu/news/2075.

22] Cannon Design, "Regional Offices, Power House Restoration, Renovation & Adaptive Reuse," accessed 4 May 2011, available at http://www.cannondesign.com/#%2Fexpertise%2Fproject_catalog%2F621%23description.

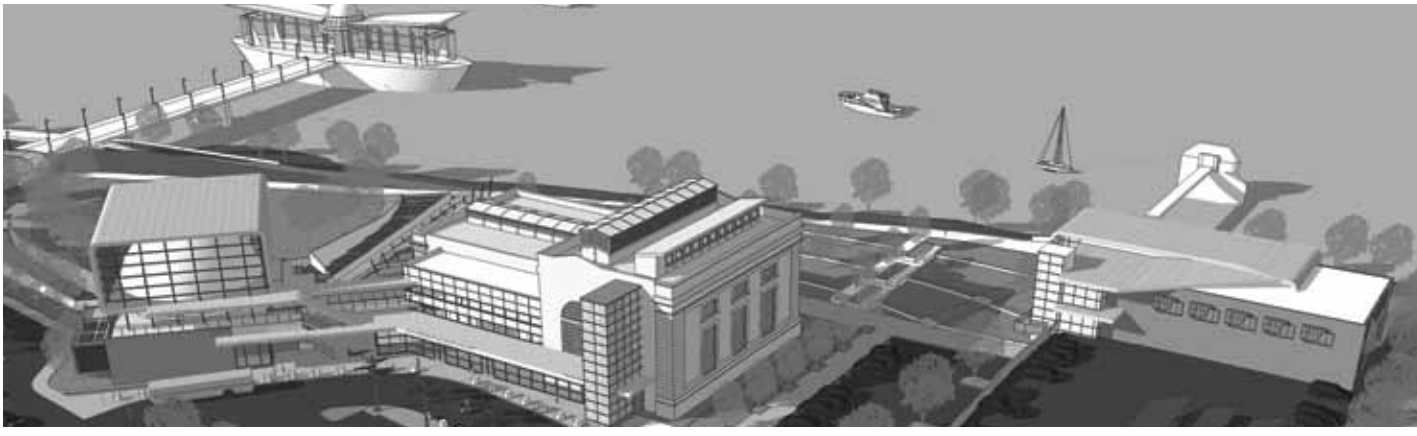
23] LaPointe M., "Former Lucky Strike Power Plant Sells for $1.1M," CoStar Group, 14 Nov. 2007, available at http://www.costar.com/News/Article/Former-Lucky-Strike-Power-Plant-Sells-for-$11M/95412.

in state business tax credits, over $33 million in state and local property tax incentives, and the establishment of a Renaissance Zone that exempts the facility from paying most state and local taxes for 15 years, resulting in a savings of $45 million in business and property taxes.ÐÐ In addition, state tax credits for historic preservation provided a one-time tax savings of 5 percent of the project's costs.ÐÐ The former Ottawa coal plant will serve as headquarters for Accident Fund Holdings Inc. and its main business, Accident Fund Insurance Co. of America. Renovations undertaken at the plant included the construction of new floors, the addition of a 105,000 sq. ft. office, and a new 1,005-space parking ramp. The project aimed to preserve historical features and achieve a LEED Silver certification.ÐÐ

Beyond the public financing options, creative vision and execution can help to bridge the cost gap. Like the Powerhouse Science Center in Sacramento, developers of projects with a compelling public purpose are often able to raise significant corporate donations. Project developers can also take advantage of smaller opportunities to reduce costs. Where a project includes a museum, power plant equipment not sold for scrap metal can be reused for exhibits. In fact, every detail is fair game: as part of the Lucky Strike redevelopment, Odell Associates reused as a wall an original door; during the building phase at Chester Power Station, creative construction teams reused cranes and the existing switchgear.

B. Community Involvement and Implications

In many communities, aging coal-fired generating stations have been part and parcel of local history and development. These plants have played a role in the surrounding economy and projects to redevelop and repurpose them should support community goals by delivering civic value, increasing local government revenues, and fostering job growth. For example, developers of the Comal Power Plant complex estimated that the project would deliver positive economic benefits on the order of $12 million per year for the city of



24] Domsic M., "Accident Fund Prepares to Open Headquarters in Renovated Ottawa Power Station," Lansing State Journal, 30 Mar. 2011, available at http://mdh.miracledreamhomes.com/ottawa-construction-news/accident-fund-prepares-to-open-headquarters-in-renovated-ottawa-power-station/.

25] Steele J., "Accident Fund Tax Aid Gets OK; State Senate Approves Credits for Historic Site, Renaissance Zone," Lansing State Journal, 14 Dec. 2007, available at http://blogpublic.lib.msu.edu/index.php/senate_expands_state_historic_tax_credit?blog=5.

26] Domsic M., "Accident Fund Prepares to Open Headquarters in Renovated Ottawa Power Station," Lansing State Journal, 30 Mar. 2011, available at http://mdh.miracledreamhomes.com/ottawa-construction-news/accident-fund-prepares-to-open-headquarters-in-renovated-ottawa-power-station/.

27] Dupuy R. et al., "Turning a Liability into an Asset! The Story of an Old Power Plant," UHP Projects, Inc., accessed 6 May 2011, available at http://www.uhpprojects.com/services/comal2.htm.

New Braunfels, Texas.ĐĐ At the renovated Ottawa Power Station, Accident Fund plans to add 500 jobs in the next 10 years. ĐĐ

The fate of retired power plants can also determine the future of neighborhoods; for this reason the public is often heavily involved in redevelopment plans. For instance, the driving force for redeveloping the Seaholm plant site in Austin, Texas, originally came from a dedicated group of local citizens—"Friends of Seaholm." This group saw that the plant's architectural style, scale, location, and ownership by the City of Austin Electric Utility as an opportunity for adapting it for new public uses. Eventually, the Friends of Seaholm prevailed in a campaign to get the city council to direct the city-owned utility to decommission the plant.ĐĐ

In many cases, retired coal plants have been left abandoned for years or decades. Ideally, early planning for ways to reuse power plant sites in the future will avoid delays in municipal economic development and revitalization, expand the number of redevelopment projects that can be implemented in a timely way, and lower the costs of remediation. The Salem Harbor Power Station in Massachusetts, for instance, is among the city's top 15 employers. Its owner, Dominion Power, pays $3 million per year in property taxes and a $1.75 million host fee. As Salem's largest taxpayer, the plant will impact city finances when it shuts down. Without a redevelopment plan, the city would need to substantially increase its property taxes, limit services, or combine the two to make up for the lost revenue.ĐĐ Because the plant will close in 2014, the city of Salem has been working to examine alternatives for the site's economic development, taking into account environmental conditions, redevelopment costs, and the reuse of other power plant sites around the country.ĐĐ

In cases where efforts to reuse the power plant site have been led by private developers or utilities, developers have collaborated with municipal agencies, the city, and the general public to meet community needs. For instance, developers of the Cannon Street Station in Bedford, Massachusetts, have considered community needs in moving away from the concept of an "island" casino. As such, the Cannon Street casino will not have a theater and its restaurants will be intentionally undersized in an effort to encourage the use of Bedford's existing performance sites, restaurants, and shops.ĐĐ For the Mission Road project in San Antonio, Texas, the site developer CPS Energy created a community involvement plan. As part of the plan, CPS Energy met with neighbors and community leaders to discuss a feasibility study for possible future uses; it also conducted a survey on community preferences and released the results publicly.ĐĐ

C. Design and Reuse

Old coal plant sites present tremendous redevelopment opportunities. The examples discussed in this report embody an ambitious vision for the future. Their scale is impressive and can help revitalize whole neighborhoods and regions. Many of them provide a unique environment and unique amenities to their tenants and visitors, and many of their designs seek to harmonize with both existing buildings and their surroundings.

The redevelopment vision for many sites includes variations on providing public access to the waterfront. For the site of the old Ottawa Street Station, architects envisioned extending the city's

28] Domsic M., "Region's Insurance Companies Look to Hire," Lansing State Journal, 31 Jan. 2011, available at http://michiganinsurancecoalition.com/2011/01/31/regions-insurance-companies-look-to-hire/.

29] Scadden et al., "Facility Decommissioning and Adaptive Re-Use," NDIA 27th Environmental Symposium and Exhibition, 26 Apr. 2001, available at http://www.westonsolutions.com/about/news_pubs/tech_papers/ScaddenNDIA01.pdf.

30] Jay Lindsay J., "Feelings Mixed as Power Plant Nears End: Salem Station is Dirty, but It Is a Big Taxpayer in City," Associated Press, 29 Nov. 2010, available at http://articles.boston.com/2010-11-29/news/29287429_1_merchant-plant-filthy-five-low-sulfur-coal.

31] Dalton T., "Reuse Consultant Wanted for Study at Power Plant," The Salem News, 2 Jun. 2010, available at http://www.salemnews.com/local/x1996910308/Reuse-consultant-wanted-for-study-at-power-plant.

32] Sparer J., "Up from the Ashes," Casino Design, 17 July 2010, available at http://casinodesignmagazine.com/issue/casino-design-2010-issue/article/up-from-the-ashes.

33] Mondo M., "CPS Seeks Ideas for Building," San Antonio Express-News, 21 Mar. 2007, available at http://www.cpsenergy.com/files/MRPP_ENarticle_032107.pdf.

34] Steele J., "Redevelopment Proposal Would Retain Look of Ottawa Power Station," Lansing State Journal, 2 Jul. 2008, available at http://forum.skyscraperpage.com/showthread.php?t=153733.

river trail system and a riverside patio area.ĐĐ At the iconic Tate Modern museum in London, a two-story glass penthouse above the original roof includes a café-restaurant with views of the city and the Thames River; the building's terraces offer further London overlooks for the public.ĐĐ

Developers of many power plant sites have embraced clean energy and green building practices. In nearly all U.S. projects, the benchmark for building certification is the U.S. Green Building Council's LEED designation (LEED stands for Leadership in Energy and Environmental Design). LEED buildings exemplify sustainable site development and materials selection; they also maximize energy efficiency, water savings, and improved indoor environmental quality. One example among many is the design for the Mission Road Power Plant, which includes a helical wind turbine, green roofs, and solar panels.ĐĐAt the Tate Modern, an adjoining electric substation is currently undergoing renovation. Heat emitted by the substation's electricity transformers will be captured with a pioneering heat recovery system to make hot water and heat for the gallery's new space of more than 3,280 sq. ft.ĐĐ The IP Power Plant in New Delhi, India, will include green building features such as solar panels, rooftop heliostats, circulation light wells, a rooftop garden, and green cover. Innovative daylighting techniques will include west facade shading and an induced stack effect in the building's atriums, which will also contribute toward reducing the complex's carbon footprint. ĐĐ

At former power plant sites, the more traditional aspects of design are unique as well. For the loft and apartment tenants of the Comal Power Plant, 16-foot ceilings, cast iron bathtubs, and built-in wine racks were part of the sales appeal. The new building also included a fitness club, sauna, massage room, and turbine room clubhouse where the ambiance was enhanced by the presence of a 100-ton crane.[39] In the Cannon Design project, the move into a former power plant site presented unique opportunities for market visibility and a chance to showcase the highly collaborative, team-oriented work approach increasingly being adopted by the design profession. With staff and business units spread over several floors, the firm looked to the turbine hall's cohesive space to facilitate communication.[40] Not only was this goal achieved, but Cannon Design now also occupies a landmark street-level building to facilitate client access.[41]

Redevelopment provides an opportunity to both affirm the presence of old coal plants and blend newer structures with historical features and surroundings. One of the more innovative elements of the Tate Modern is a colored light cap on the chimney by the artist Michael Craig-Martin. At night, the penthouse light beam and this "Swiss Light" mark the presence of the Tate Modern for many miles.[42] At the Ottawa Power Station, the addition of a whole new building makes a different, but harmonious statement with existing power plant features.

Developing an existing building is frequently more challenging than building anew. Historic preservation tax credits may play a large role in making the adaptive reuse of an existing facility attractive. For instance, the team in Lansing spent months discussing plans for an addition to the Ottawa Power Station. Matching new building elements to old ones sounds logical, but historic preservation involves delineating between time periods and treating additions as parts of the

35] Tate Modern, "The Building," accessed 4 May 2011, available at http://www.tate.org.uk/modern/building/.

36] Michael Imbibio, Inc. "Transforming Our Past into Beacons for the Future: Mission Road Power Plant," 2009, available at http://www.michaelimbimbo.com/mi-images/Michael%20Imbimbo%20Inc.%20-%20Adaptive%20Reuse.pdf.

37 Utility Week, "Electrical Refurbishment Gives Tate Modern More Space," 1 Mar. 2011, available at http://www.utilityweek.co.uk/news/news_story.asp?id=195120&title=Electrical+refurbishment+gives+Tate+Modern+more+space.

38] Burke J., "Delhi Plans Tate Modern-Style Gallery in Old Power Station," The Guardian, 28 Dec. 2010, available at http://www.guardian.co.uk/world/2010/dec/28/india-delhi-power-plant-project.

39] LCRA, "Recycling a Power Plant," 26 Feb. 2007, available at http://www.lcra.org/featurestory/2007/comal_dedication.html.

40] Cannon Design, "Power Play: a Disused Steam Power Plant in Downtown St. Louis is Transformed into a Gem of a Modern Office," 29 Oct. 2010, available at http://www.cannondesign.com/FILES/original/2010/10/29/4b192e84135c45effa99bbaa2f819d6afaa09084.pdf.

41] Azure magazine, "Power House," Sam Fox School at the Washington University in St. Louis news, June 2009, available at C:\Users\Sustaingrup\Downloads\available at http:\samfoxschool.wustl.edu\news\2075.

42] Tate Modern, "The Building," accessed 4 May 2011, available at http://www.tate.org.uk/modern/building/.

evolving city. Architects for the Ottawa Power station created a glassy, modern annex that makes its own quiet statement while paying homage to the historical building. "Viewed from the north, the annex blends with the reddish lower layer of the plant. From other sides, it hovers like a transparent ghost, ceding the spotlight to its towering neighbor. Six catwalks floating in a glassy membrane connect the two buildings, enhancing the impression that the annex is a fresh spirit, or perhaps a second thought, issuing from the re-animated plant." [43]

For the Ottawa Power Station, adding space to the existing building was only one piece of the challenge of qualifying for historic preservation tax credits. The building's old windows were very inefficient in terms of adding to summer cooling loads. Tinted windows would disrupt the plant's historic look, but without them the upper floors would need significant air conditioning. To reconcile the desire for historic preservation with green design, architects installed recently perfected high performance glass that appears clear but absorbs light. Another difficulty was retaining the turbine hall's look while using the space productively. As a solution, designers suspended the third floor from the fourth, leaving a dramatic space between the edge of the floor and the exterior wall. Inside, the floors feel like a contiguous space; outside, viewers are presented with unbroken window lines.ÐÐ

From close-up, a multitude of design touches link the Ottawa Power Station's history with the present. At the base of the annex, dark masonry echoes the vivid pattern of the old power plant. Dark paving stones at the entrance enhance this effect. Inside the added building, turnbuckles (metal support rods) were left exposed to link the new building with the old. Inside, the building's historic industrial fabric marks every floor—from beams and bolts to the huge crane that once serviced the turbines, to the hand window cranks. The Accident Fund predicts that when employees move in, "meet me under the big red ingot" will be a common coffee break invitation. The company is confident that the building's panache and stunning views will be a strong recruitment and retention tool.

43] Cosentino L., "From Power to People: How Designers Made Planet Machine Habitable by Humans," City Pulse, 30 Mar. 2011, available at http://www.lansingcitypulse.com/lansing/article-5650-from-power-to-people.html.

44] Ibid.

Importantly, the best design for a given redevelopment project will vary significantly depending on circumstances. A number of the projects described in this report involved old power plants with historic and architectural value. As a consequence, architects preserved the buildings' distinctive structural and decorative features. Newer coal power plants typically have a more functional exterior and may lend themselves better to a complete redesign that preserves only some elements of the original building, or to using new designs that mimic some parts of the earlier structure.

Conclusion

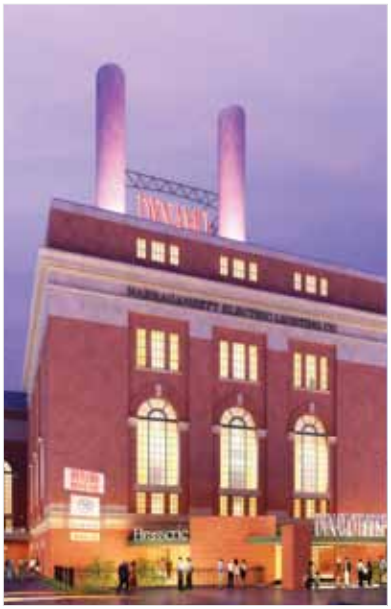
The successful redevelopment of a number of closed electric generating plants is instructive. Astute and creative developers plan early, engage the community, and meet its needs with a compelling vision. They also take full advantage of opportunities to minimize their costs. However, plans and processes for redeveloping power plant sites have varied significantly from case to case—and have involved different levels of cost, time, remediation, and reuse. Regardless of circumstances, results are typically transformative. The most critical common aspect of these projects is their focus on positive development and sustainability in America's cities. Repurposing these sites is about people and places: often the effect is to change a polluting coal-fired plant into a powerhouse for social, economic, and environmental revitalization. These places are unique for their ability to foster an appreciation of history, an understanding of the present, and a vision for the future.

45] Cosentino L., "From Power to People: How Designers Made Planet Machine Habitable by Humans," City Pulse, 30 Mar. 2011, available at http://www.lansingcitypulse.com/lansing/article-5650-from-power-to-people.html.

Additional Resources

1. Bankside Power Station - London, United Kingdom: http://www.tate.org.uk/modern/building
2. Battersea Power Station - London, United Kingdom: http://www.batterseapowerstation.com
3. Chester Power Station - Chester, Pennsylvania: http://www.ecmag.com/?fa=article&articleID=7576
4. Comal Power Plant - New Braunfels, Texas: http://landmarklofts.com
5. Homan Square Power House - Chicago, Illinois: http://www.homansquare.org/index.php
6. IP Power Plant - New Delhi, India: http://www.guardian.co.uk/world/2010/dec/28/india-delhi-power-plant-project
7. IRT Powerhouse - New York City, New York: http://www.huffingtonpost.com/marta-hallowell/mayor-bloomberg-powers-up_b_529272.html
8. Lucky Strike Power Plant - Richmond, Virginia: http://www2.timesdispatch.com/business/2009/feb/08/luck08_20090206-214012-ar-82662/
9. Mission Road Power Plant - San Antonio, Texas: http://www.cpsenergy.com/Developers_Builders/New_Infrastructure/Mission_Road_Power_Plant/
10. Oregon Museum of Science and Industry-Portland, Oregon: http://www.omsi.edu/history
11. Ottawa Street Power Station - Lansing, Michigan: http://www.lansingcitypulse.com/lansing/article-5646-first-life-of-a-landmark.html
12. Pennsylvania Railroad Powerhouse - Queens, New York: http://www.multifamilyexecutive.com/adaptive-reuse/powering-forward.aspx
13. Power House Power Plant - St. Louis, Missouri: http://www.cannondesign.com/FILES/original/2010/10/29/4b192e84135c45effa99bbaa2f819d6afaa09084.pdf
14. Power Plant Contemporary Art Gallery - Toronto, Canada: http://www.thepowerplant.org/AboutUs/History.aspx
15. Powerhouse Science Center - Sacramento, California: http://powerhousesciencecenter.org/
16. Pratt Street Power Plant - Baltimore, Maryland: http://www.sourcewatch.org/index.php?title=Pratt_Street_Power_Plant
17. Salem Harbor Power Station - Salem, Massachusetts: http://articles.boston.com/2010-11-29/news/29287429_1_merchant-plant-filthy-five-low-sulfur-coal
18. Seaholm Power Plant - Austin, Texas: http://www.seaholm.info
19. Seattle Gas Company Plant - Seattle, Washington: http://www.seattle.gov/tour/union.htm
20. South Street Power Station - Providence, Rhode Island: http://www.projo.com/ri/providence/content/DYNAMO_HOUSE_01-18-09_K3CVEB4_v72.3aca12b.html
21. Station B Power Plant - San Diego, California: www.youtube.com/watch?v=wL-astDcFCE
22. Sydney Powerhouse Museum - Sydney, Australia: http://www.powerhousemuseum.com/about/aboutMuseum.php
23. Tejo Power Station - Lisbon, Portugal: http://en.wikipedia.org/wiki/Electricity_Museum_Lisbon





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