

Statewide Transmission and Energy Redevelopment Analysis for the Commonwealth of Pennsylvania PART A – Preliminary Assessment of Potential Opportunities



KEYLOGIC
a System One company

PREPARED BY KEYLOGIC IN COORDINATION WITH TEAM PA AND
THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

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Credits

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Glossary of Acronyms and Abbreviations

Acronym/Abbreviation	Definition
\$B	Billion dollars
\$M	Million dollars
AI	Artificial intelligence
ATT	Advanced transmission technologies
BEA	Bureau of Economic Analysis
BESS	Battery energy storage systems
CapEx	Capital expenditures
CCS	Carbon capture and storage
CIR	Capacity Interconnection Right
DCED	Department of Community & Economic Development
DEP	Department of Environmental Protection
DOE	Department of Energy
DUQ	Duquesne Light Company
EIA	Energy Information Administration
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
EV	Electric vehicle
FE-ASTI	First Energy-ASTI
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
ft ²	Square foot
GDP	Gross domestic product
GET	Grid-enhancing technologies
GIS	Geographic information system
GW	Gigawatt
HiLS	High-level screening
hr	Hour
IT	Information technology
ITU	International Telecommunication Union
kV	Kilovolt
kW	Kilowatt
LMP	Locational marginal price
METED	Metropolitan Edison Company
MVA	Megavolt-ampere
MW, MWe	Megawatt electric

Acronym/Abbreviation	Definition
MWh	Megawatt-hour
N/A	Not available/applicable
NETL	National Energy Technology Laboratory
NGCC	Natural gas combined cycle
NGCT	Natural gas simple cycle
NGFC	Natural gas fuel cell
OpEx	Operating expenditures
PA	Pennsylvania
PATER	Pennsylvania Accelerated Transmission and Energy Redevelopment
PECO	PECO Energy Company
PENELEC	Pennsylvania Electric
PJM	PJM Interconnection
PNNL	Pacific Northwest National Laboratory
PPL	PPL Electric Utilities
PUC	Public Utility Commission
PV	Photovoltaic
RTEP	Regional Transmission Expansion Plan
SMR	Small modular nuclear reactor
TBD	To be determined
US, U.S.	United States
yr	Year



Executive Summary

Executive Summary

Pennsylvania stands at a decisive inflection point. Aging energy infrastructure and accelerating large-load growth along with a rapidly shifting generation mix have created both urgent reliability challenges and an unprecedented prospect for statewide economic revitalization. Specifically, rejuvenation of brownfield sites supported by readily re-developable infrastructure ecosystems presents a compelling near-term opportunity. However, maximizing the potential of these brownfield sites requires a coordinated, statewide strategy that considers both supply and demand pathways within a portfolio framework. The Commonwealth of Pennsylvania (PA) needs a decision-ready framework that identifies three critical factors: 1) where infrastructure enables or constrains growth, 2) which sites offer the highest redevelopment value, and 3) which investments best balance reliability, cost, and economic impact. The Pennsylvania Accelerated Transmission and Energy Redevelopment (PATER) initiative is designed to deliver these insights in a form that supports action by the Commonwealth and the PJM Interconnection (PJM).

The PATER study is divided into two phases: 1) Part A (delineated in the current report) delivers the foundational analysis required to identify, compare, and prepare a portfolio of candidate deactivated sites and 2) Part B submits Part A's portfolio to deeper evaluation. These sites—primarily retired fossil power plants—represent significant embedded infrastructure value, including existing transmission interconnections, brownfield acreage, water access, rail and highway proximity, and community workforce assets. Redeveloping the sites can accelerate power deployment, support large loads, and catalyze economic growth in regions facing industrial transition. Part B will apply a transparent, data-driven multi-criteria decision analysis framework informed by stakeholder input and public-outreach to narrow the Part A candidate list to 5–7 deactivated sites that are opportune for redevelopment. While specific redevelopment configurations will be investigated as a means to explore and illustrate viability of the sites, both Part A and Part B reports are not intended to be prescriptive of the end use for each site.

System Context and Drivers

PA remains one of PJM's most critical energy states, exporting nearly 89 million MWh in 2025—more than any other state—while experiencing a 46% rise in retail electricity prices since 2018. The generation fleet is shifting rapidly; coal retirements, increased natural gas reliance, and emerging technologies are reshaping supply. Meanwhile, PJM's latest capacity auction cleared short, prompting federal and state action, including the proposed Reliability Backstop Auction to procure 6,831 MW of new capacity. Load growth is accelerating faster than traditional planning processes can accommodate. Transmission constraints vary widely across the state, creating pockets of headroom and bottlenecks. Developers increasingly pursue co-located generation and load, complicating visibility into system needs.

Part A Core Deliverables

Part A integrates geospatial analysis, transmission modeling, site-level evaluation, and preliminary redevelopment assessment to identify candidate deactivated sites and produce a comprehensive, comparable dataset for each candidate site. A wide-ranging set of over 60 attributes was identified including property characteristics, environmental risks, regulatory readiness, energy infrastructure, transportation accessibility, transmission and natural gas constraints, projected load and generation growth, redevelopment configuration, regional economic and workforce conditions, costs and schedule, and broader economic impacts.

Key components include the following:

- **Identification of suitable deactivated sites** using geographic information system (GIS) visualization, infrastructure overlays, and screening criteria.

- **Assessment of electricity, natural gas, water, broadband, and transportation infrastructure** surrounding each site.
- **Transmission hosting capacity analysis** aligned with PJM methodologies including headroom estimates.
- **Evaluation of redevelopment configurations, costs, and schedules**, including
 - New power generation
 - Large loads
 - Hybrid or co-located configurations
- **Cost and schedule estimates** for redevelopment options.
- **Economic impacts**, including job creation and investment potential for the different options and sites.
- **A transparent comparison framework** to support prioritization in Part B.

Key Findings from Part A

The analysis identified 21 candidate deactivated energy sites (shown in Figure 1) across PA to identify high-value redevelopment opportunities and to compare potential redevelopment pathways. The sites comprised retired coal, natural gas, and peaker plants amounting to 4.8 GW of total retired capacity.

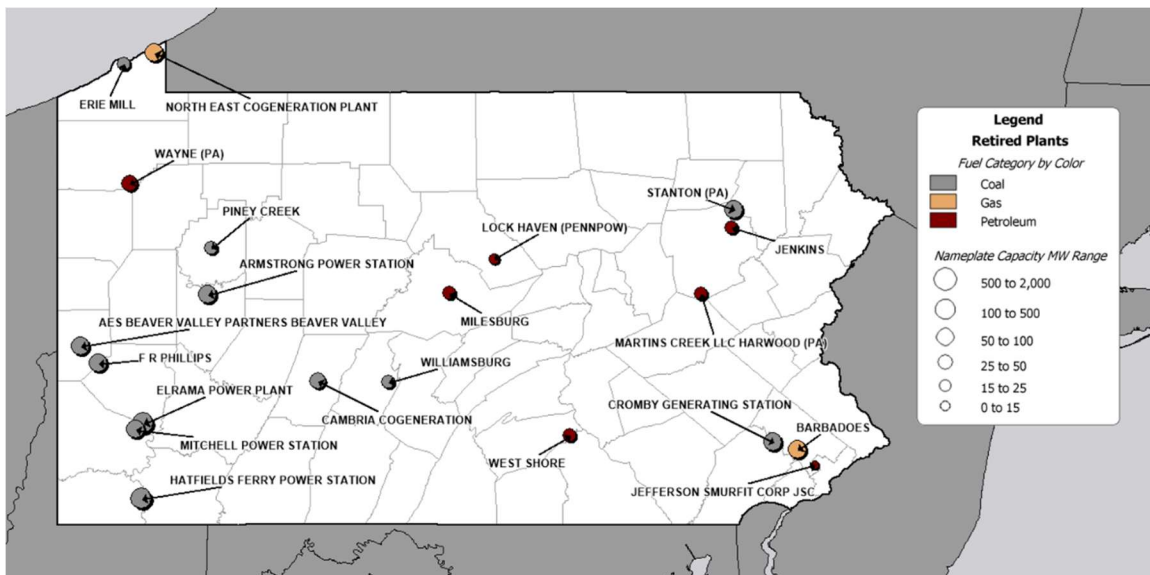


Figure 1 Map of the 21 candidate deactivated sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Key findings of preliminary analyses of site attributes included the following:

- **Embedded infrastructure readiness.** Most candidate sites are physically ready for redevelopment; nearly all lie adjacent to or within ~1 mile of transmission lines/substations, about half are within 1.4 miles of natural gas pipelines, and many are within 3.8 miles of major fiber networks—conditions that can materially reduce redevelopment costs and schedule.
- **Land and zoning advantages.** Coal-fired sites generally offer the largest developable parcels (average ~200 acres for coal sites), while gas and oil sites tend to be much smaller; nine sites have >100 acres available and several (e.g., Stanton, Mitchell) offer very large footprints suitable for major projects.

- **Decommissioning/readiness.** Most sites are largely cleared and decommissioned, making them physically ready for redevelopment; a few exceptions remain that need additional site clearance.
- **Meaningful but finite transmission capacity.** A statewide hosting capacity screen indicates ~9 GW of practical capability for either generation injections or load withdrawals under representative assumptions, signaling substantial near-term potential but also the need for site-specific validation. The transmission hosting capacity assessment indicates that PA's existing transmission network retains meaningful capability to support both new generation and new load development at the candidate deactivated sites.

Primary Risks

- **Remediation and environmental liabilities:** These include groundwater contamination, flooding, and geo-technical exposure—raising costs and extending schedules.
- **Transmission and queue dynamics:** Available hosting capacity is location-specific and may be consumed quickly by emerging demand; PJM interconnection outcomes will materially affect site prospects. Transmission hosting capacity represents only one dimension of system reliability. Continued analysis of additional scenarios, generation availability, operational performance, and evolving system conditions will be necessary to confirm that future redevelopment can be accommodated while maintaining reliable and secure grid operations over the planning horizon.
- **Regulatory complexity:** This exists across permits for air, water, waste, and land use.
- **Community acceptance and social license:** Local opposition can arise (e.g., proposed reuse of Homer City), so stakeholder engagement and social license are critical.

The Opportunity Ahead

Part A positions PA to make informed, strategic decisions in Part B, where the 21 sites will be narrowed to **5–7 priority redevelopment locations** through refinement of the site-specific analyses supplemented by public, industrial, and state government engagements along with site visits. These sites will represent the highest-value opportunities to

- Accelerate deployment of new generation needed for PJM reliability.
- Support large loads on compressed timelines.
- Revitalize communities with legacy industrial assets.
- Optimize transmission investments for maximum economic impact.
- Create durable, long-term economic growth across PA.



1. Introduction

1. Introduction

Pennsylvania stands at a defining moment in its energy future—the convergence of aging infrastructure and unprecedented demand growth presents a generational opportunity to create economic prosperity by rejuvenating brownfield sites, turning legacy liabilities into engines of investment, job creation, and economic growth. Capturing this opportunity requires targeted investment, and maximizing return demands disciplined, data-driven decision-making. The confluence of acute demand growth and aging infrastructure presents a significant opportunity to rejuvenate brownfield sites. When siting new facilities, brownfield sites offer advantages but are not always aligned with existing transmission capacity, complicating their redevelopment as either producers or consumers of energy. While these sites retain significant embedded infrastructure value, maximizing their potential requires a coordinated, statewide strategy that considers both supply and demand pathways within a portfolio framework.

The Commonwealth of Pennsylvania (PA) needs a decision-ready framework that identifies three critical factors: 1) where infrastructure enables or constrains growth, 2) which sites offer the highest redevelopment value, and 3) which investments best balance reliability, cost, and economic impact. The Pennsylvania Accelerated Transmission and Energy Redevelopment (PATER) initiative is designed to deliver these insights in a form that supports action by the Commonwealth and the PJM Interconnection (PJM).

1.1 PATER Objectives

The PATER initiative asks a fundamentally different question than a conventional transmission planning study or redevelopment assessment. It requires PA to evaluate its transmission system, deactivated generation fleet, and emerging load growth as a single, integrated portfolio and to produce prioritized, investable recommendations. The initiative is organized around three elements: the context, the challenge, and the opportunity.

The Context: The U.S. Energy Information Administration (EIA) (2025a) issued a Research Brief showing that PA’s generation mix for 2025 was about 59% natural gas, 7% coal, 30% nuclear, and 4% other. In 2025, PA exported an estimated 89 million MWh of electricity, nearly double the second highest export state and a 69.8% increase since 2018. Average prices for PA residents increased by 46.1% from 2018 to 2025, compared to 40% for Ohio, 39% for Virginia, and 41% for other PJM states—despite the fact that 18% of net generation in PJM came from PA.

PA’s power generation landscape is quickly evolving due to three dynamics. First, the generation mix is shifting as large thermal units retire and are replaced by a more gas-weighted fleet and emerging technologies. Second, the transmission system is unevenly constrained, with some corridors retaining headroom while others are approaching limits due to concentrated load growth and aging infrastructure. Third, demand is accelerating from large loads often on compressed timelines. PJM capacity market cleared short in the latest auctions and energy market costs have been increasing in recent years.

On January 16, 2026, the White House National Energy Dominance Council signed a Statement of Principles with the governors of all 13 PJM states. The document urged PJM to take specific actions to reform its capacity market, protect consumers, and accelerate new generation including a proposed Reliability Backstop Auction for the procurement of additional capacity resources needed to serve new large load growth. In response, after a Critical Issue Fast Path process, on July 31, 2026, PJM filed a *Section 205(d) Rate Filing: Reliability Backstop Procurement to Address Resource Adequacy and Large Loads to be effective 9/29/2026* at Federal Energy Regulatory Commission (FERC) Docket No. ER26-3380. PJM proposes a Reliability Backstop Procurement (a/k/a Reliability Backstop Auction), to be initiated on September 30, 2026, that aims to procure the most recently identified shortfall of ~6,831 MW of capacity less any quantities of qualifying credits (e.g., bilateral contracts) or other adjustments as specified in the filing.

Recent studies also show that transmission expansion can improve affordability, lower system costs, and enhance reliability, particularly when investments are coordinated across regions (CERA Consulting, 2026). These findings underscore the importance of expanding both generation and transmission infrastructure to support sustained economic growth and grid resilience.

The Challenge: PA must align variables that have historically been evaluated separately: the generation queue, transmission capacity, redevelopment opportunities, and emerging load growth. The generation queue represents a pipeline of potential supply subject to interconnection timelines and upgrade requirements. Transmission capacity must be understood in terms of current constraints and expansion potential. Redevelopment opportunities must account for the embedded value of deactivated sites. Emerging load growth must be evaluated based on where demand is forming and how it intersects with infrastructure, including redevelopment and growth corridors such as Western PA energy communities with concentrated retired coal assets, industrial redevelopment zones, and areas adjacent to PJM transmission corridors experiencing increasing data-center and advanced manufacturing load. Given the complexity, many developers are exploring co-location strategies that introduce opacity into the broader system, as project-level decisions and private infrastructure investments are not always visible within traditional planning processes. Combined with fragmented data across utilities, PJM, and state stakeholders, this limits the ability to develop a clear system-wide view of capacity and opportunity, resulting in misaligned or overlooked investments.

The Opportunity: This study delivers three core capabilities: statewide visibility across transmission, generation, and enabling infrastructure; grid-aware modeling to evaluate constraints and opportunities using PJM-informed approaches for ensuring system reliability; and a transparent prioritization framework co-developed with stakeholders. The state of PA—supported in part by brownfield redevelopment—is well-poised to pursue a balanced strategy that expands regional power supply while enabling local growth in energy-intensive industries. This approach can spur regional job creation, reduce pressure on PJM market costs, and ultimately lower costs for consumers. PA has the opportunity to unlock near-term economic growth by leveraging existing assets, including repurposing deactivated sites, utilizing available transmission capacity, expanding transmission capacity optimally, and enabling co-located or hybrid configurations. From this foundation, targeted investments can build on existing strengths to deliver compounding benefits, enabling high-impact outcomes while balancing cost, regional economic development, system reliability, and long-term electricity affordability.

1.2 Approach

The technical approach (an overview of which is shown in Figure 2) was developed to support the PATER objectives in charting a practical roadmap leveraging existing infrastructure to expedite power generation to support large loads to spur both near- and long-term investment, both public and private, that are critical to the economic development of PA.

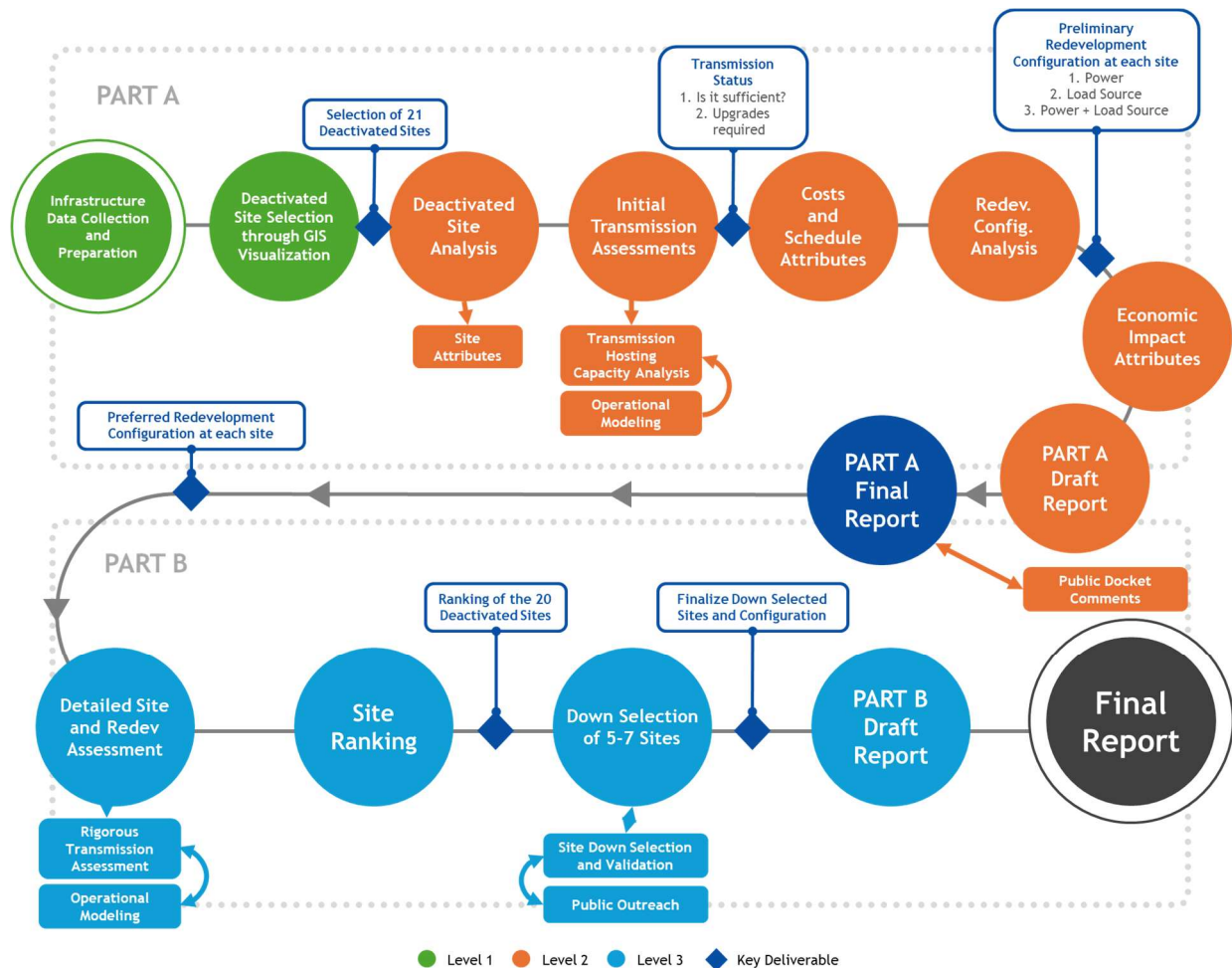


Figure 2 Technical approach flow chart.

The technical approach starts with a comprehensive collection of relevant infrastructure data followed by in-depth analyses of deactivated sites coupled with rigorous transmission assessments to culminate in a detailed report that lays a solid foundation for the decision phase in Part B. Multi-criteria decision analysis frameworks boosted by state-of-the art optimization techniques along with inputs from stakeholders will be leveraged in Part B to narrow the Part A candidate list to 5–7 deactivated sites that are opportune for redevelopment.

The approach is designed to progressively increase the level of detail and analytical rigor as the study narrows from a broad statewide perspective to the portfolio of deactivated sites, and finally the priority sites (see Table 1). Rather than applying the same level of effort across all levels, a tiered framework is used that begins with high-level screening (HiLS) to identify patterns and opportunity zones, advances to consistent comparative analysis across a defined set of candidate sites and culminates in detailed validation and investment ready insights for the highest priority locations. This structured progression ensures that effort is focused on where it adds the most value, while maintaining consistency across key evaluation dimensions including energy, infrastructure, site feasibility, market conditions, and development readiness. The result is a disciplined, efficient approach that supports both comprehensive understanding and actionable decision making.

Table 1 Progressively detailed approach across key dimensions.

	Level 1: Statewide Assessment (Screening Level)	Level 2: Deactivated Sites (~20 Sites)	Level 3: Priority Sites (5–7 Sites, Validation Level)
	Identify opportunity zones and constraints	Assess the portfolio of sites across key dimensions	Evaluate and prioritize sites for redevelopment
Energy & Grid	- Bulk transmission network (100 kV+) - Regional capacity and congestion patterns - High level generation mix and queue activity	- Transmission headroom (available vs consumed) - Capacity Interconnection Rights position - Estimated upgrade requirements and timelines	- Capacity validation - Refined upgrade pathways and cost ranges
Supporting Infrastructure	- Fiber corridors, gas pipelines, water availability (macro level) - Transportation networks (rail, highways, ports)	- Distance to fiber, gas, water - Capacity and accessibility of each - Proximity to substations and interconnections	- Confirmed access to gas, fiber, water - Constraints and expansion requirements - Infrastructure investment needs
Site & Land	- Locations of deactivated assets - General land availability and zoning indicators	- Acreage, layout constraints - Environmental conditions (screening level) - Compatibility with generation or load	- Site walkthrough validation - Layout feasibility - Identification of physical constraints
Market & Economic	- Regional demand trends (emerging large loads) - Energy community designations	- Proximity to demand centers - Redevelopment cost ranges - Economic impact potential	- Refined cost estimates - Economic development impact (jobs, investment)
Regulatory	- Broad permitting landscape - Policy incentives and constraints	- Permitting complexity (relative) - Known constraints or sensitivities	- Other permitting complexities - Key risks and mitigation strategies
Community	- Workforce availability (regional) - Economic transition indicators	- Workforce proximity - Local stakeholder environment	- Stakeholder input from site visits - Local support or opposition signals
Development Readiness	- High level screening of viable regions - Identification of opportunity clusters	5-year feasibility assessment - Potential for co-location or hybrid configurations - Classification: as is vs requires investment	- Realistic deployment timelines - Potential capital sequencing considerations - Final prioritization inputs

A variety of stakeholder engagements are strategically planned throughout the project to elicit feedback and consider different perspectives, on-ground realities, and previous experiences to supplement the technical approach in arriving at a well-informed selection of the 5–7 deactivated sites. Apart from the public-facing PATER Study Review Meetings to be hosted by the PA Public Utility Commission (PUC) after Part A and Part B, regular touchpoints include discussions with regional industry experts and engagements with PA Energy Horizons Cross-Sector Collaborative, which includes a diverse group of stakeholders coming together to shape PA’s energy futures. These engagements shed light on the

technical, environmental, economic, practical, and region-specific factors that need to be considered for a complete and robust analysis. While specific redevelopment configurations will be investigated as a means to explore and illustrate viability of the sites, both Part A and Part B reports are not intended to be prescriptive of the end use for each site.

1.3 Scope of Part A

Part A integrates infrastructure, transmission, and site-level analysis using PJM informed methods to assess feasibility and constraints. The approach leverages proven, robust data mining and analytical techniques using the most up-to-date datasets, combined with a rigorous transmission and power system assessment aligned with PJM practices. This Part A report includes a comprehensive analysis of brownfield sites in the ensuing chapters:

- Chapter 2 describes the identification of a set of 21 brownfield sites, referred to in this report as “candidate deactivated sites,” that are promising from a redevelopment perspective.
- Chapter 3 presents a geospatial assessment and visualization of the candidate deactivated sites relative to the existing electricity, natural gas, water, and broadband infrastructure in PA. The maps also include contexts of demographics and economic parameters.
- Chapter 4 comprehensively delineates the attributes of the candidate deactivated sites leveraging the geospatial maps developed in Chapter 3 among other relevant sources.
- Chapter 5 provides a treatise on the transmission hosting capacity analysis along with qualitative considerations of implications of advanced transmission technologies.
- Chapter 6 explores potential redevelopment configurations (power generation, large loads, etc.) at each of the candidate deactivated sites along with compilation of associated costs and schedule implications.
- Chapter 7 lays the foundation for evaluating economic impacts of different redevelopment configurations at a given deactivated site.
- Chapter 8 summarizes the findings from this Part A analysis, discusses some key risks, and provides a brief description of the transition to Part B work.
- The Appendix provides a glimpse of the dashboard template that has been developed for each of the candidate deactivated sites. This template was designed to serve as a potential starting point for ranking the sites in Part B.

Part A culminates in an identification of 21 promising sites with a detailed set of attributes for each of candidate sites, electrical transmission constraints, and potential redevelopment options along with the economic impact implications. This provides the data required for detailed investigation under Part B to rank and down select the final 5–7 sites. While specific redevelopment configurations will be investigated as a means to explore and illustrate viability of the sites, both Part A and Part B reports are not intended to be prescriptive of the end use for each site.



2. Candidate Deactivated Sites

2. Candidate Deactivated Sites

The viability of candidate deactivated sites for Part A was assessed using a multidimensional evaluation framework that considered site-specific conditions, property characteristics, environmental risks, regulatory readiness, energy infrastructure and utility availability, transportation accessibility, transmission and natural gas constraints, projected load and generation growth, redevelopment configuration, regional economic and workforce conditions, costs and schedule, and broader economic impacts. A comprehensive set of over 60 attributes was identified through a combination of literature review, prior study assessments, and consultations with industry experts. Key references include the National Energy Technology Laboratory (NETL) study *With uncertainty comes opportunity: Repurposing coal assets to create new beginnings in the U.S.* (Pena Cabra, Izar-Tenorio, Sharma, Clahane, & Iyengar, 2024), the *Coal-Fired Power Plant Redevelopment Playbooks* prepared for the PA Department of Community and Economic Development (DCED) (2023), and the Pacific Northwest National Laboratory (PNNL) report *Assessing Energy-Related Redevelopment Options for Pennsylvania's Retired Coal Power Plants* (2024a). These resources informed the development of the evaluation criteria used to assess the redevelopment opportunities across the deactivated sites. Table 2 summarizes the attributes identified and applied in the assessment.

Table 2 Summary of attributes identified for the assessment of candidate deactivated sites.

Category	Attribute
Directory	Site Name
	Address
	City
	County
	Ownership
	Latitude and Longitude
	Fuel Type
Site-Specific Status	Retired Capacity
	Decommissioning Status
	Remediation Status
	Remediation Flags
Property Characteristics	Ownership Type
	Parcel Acreage
	Parcel Building Footprint
	Nearby Parcel Acreage
	Land Use/Cover
	Waterfront Access
	Developable Land Area
	Ruggedness
Environmental Risks	Groundwater Quality
	Brownfields (proximity and/or designation)
	On-Site Contamination
	Nearby Contamination Sources
	Flood Risk
	Natural Hazards Risk
	Geotechnical Risk (Mine Subsidence)
Regulatory Readiness	Zoning
	Permitting
Energy Infrastructure and Utility Access	Interconnection Rights
	Distance to Nearest Electric Power Transmission Lines
	Distance to Nearest Electric Substations
	Distance to Nearest Natural Gas Pipelines
	Distance to Nearest Broadband Infrastructure
	Distance to Nearest Power Plant
	Distance to Nearest Marcellus Shale

Category	Attribute
	Distance to Nearest Wastewater Treatment Plant
	Distance to Nearest Brownfield or Superfund
	Electricity Supply Access
	Cooling Water Access
Transportation Accessibility	Distance to Nearest Railroad
	Distance to Nearest Major Road
	Distance to Nearest Waterway
Transmission and Natural Gas Constraints	Transmission Hosting Capacity
	Natural Gas Supply Constraints
Projected Load and Generation Growth	Load Forecast (2030)
	Retirement and Planned Power Generation
	PJM Cycle 1 Proposals
Redevelopment Configuration	Power Generation
	Large Load
	Power Generation + Large Load
	Energy Storage
Economic and Workforce Factors	Regional Economic Activity
	Workforce Availability
	Population Proximity
	Public Funding and Incentives
Costs and Schedule	Decommissioning Costs
	Remediation Costs
	Redevelopment Configuration
	Associated Infrastructure
	Permitting
Economic Impacts	Community Acceptance
	Regional Impacts
	Statewide Impacts

2.1 Data Collection and Sources

Data for this study were sourced from a combination of proprietary and publicly available sources for 1) deactivated sites across PA with potential viability to be redeveloped, and 2) cost and schedules of select redevelopment options for project implementation (see Table 3).

Table 3 Data collection and sources for candidate deactivated sites.

Attribute	Source
Deactivated Site Name	(Hitachi Energy, 2026)
Deactivated Site Retired Capacity	
Deactivated Site Retirement Year	
Deactivated Site Fuel	
Deactivated Site Ownership	
Deactivated Site Address and Geographic Coordinates	(Hitachi Energy, 2026; U.S. EIA, 2025b; Regrid, 2026; GEM, 2026)
Proximity to Electric Power Transmission Lines	(Hitachi Energy, 2026)
Proximity to Electric Substations	
Proximity to Natural Gas Pipelines	
Proximity to Active Power Plants	
Proximity to Marcellus Shale Resources	
Proximity to Wastewater Treatment Plants	
Proximity to Railroads	
Proximity to Major Roadways	
Proximity to Major Rivers	(ITU, 2026)
Proximity to Broadband Infrastructure	
Proximity to Brownfields and Superfunds	
Population within 30-mile radius	(U.S. EPA, 2022)
	(U.S. Census Bureau, 2025)

Attribute	Source
Deactivated Site Parcel Acreage	(Regrid, 2026)
Deactivated Site Parcel Building Footprint	
Deactivated Site Parcel Terrain Ruggedness	
Deactivated Site Parcel Natural Hazards Risk	
Deactivated Site Parcel Flood Hazard	
Deactivated Site Parcel Zoning	
Deactivated Site Water Frontage	
Deactivated Site Parcel Ownership ¹	
Deactivated Site Brownfield Designation	Determined using assumptions based on fuel type
Deactivated Site Parcel Mine Subsidence Potential	(PA DEP, 2024)
Deactivated Site Onsite and Groundwater Contamination ²	(Ashtracker, 2024; Earthjustice, 2025; U.S. EPA, 2017)
Deactivated Site County Workforce Availability	(Commonwealth of Pennsylvania, 2025)

¹ Historical parcel ownership completed and/or validated through review of specific county property records

² Data gaps completed using assumptions based on publicly available information

Site-specific data, including deactivated site names, retired generating capacity, retirement year, plant fuel, addresses, geographic coordinates, and ownership information were extracted from Velocity Suite (Hitachi Energy, 2026). Site locations were verified for accuracy by cross-referencing addresses and coordinate data with Form EIA-860 published by the U.S. Energy Information Administration (EIA) (2025b), facility records maintained by the Global Energy Monitor (GEM, 2026), and satellite imagery and parcel boundary data available through the Regrid Property App (Regrid, 2026).

The verified coordinates were subsequently used to estimate the proximity to key energy and industrial infrastructure assets and transportation accessibility. Distances were estimated to the nearest power transmission lines, electric substations, natural gas pipelines, active power plants, Marcellus Shale formation, wastewater treatment plants, railroads, major roadways, and major rivers using data from Velocity Suite (Hitachi Energy, 2026). Distances to broadband infrastructure were derived from International Telecommunication Union (ITU) datasets (2026), while proximity to brownfields and superfunds was assessed using Environmental Protection Agency (EPA) data (2022). These same coordinates were used to estimate the population residing within a 30-mile radius using data from the U.S. Census Bureau data (2025) and assess the underground mine subsidence potential through PA's Department of Environmental Protection (DEP) Mine Subsidence Insurance Risk Map (2024).

Property characteristics such as parcel acreage, parcel building footprint, and nearby potential acreage under common ownership, were evaluated using Regrid. Because lot acreage information was unavailable for certain older sites, historical satellite imagery was analyzed to estimate available acreage using parcel boundaries identified through Regrid. Consequently, the nearby potential acreage assessment was limited to parcels sharing ownership with the primary parcel associated with the deactivated site. For parcels with ownership changes reported after the site's retirement year, historical ownership was validated through a review of county property records corresponding to the parcel boundaries identified in Regrid.

Regrid also provided information related to environmental risks and regulatory readiness, including terrain ruggedness, Federal Emergency Management Agency (FEMA) Natural Risk Index scores for natural hazards,¹ FEMA flood zone and flood hazard designations, and parcel zoning classifications. Because comprehensive data regarding on-site and groundwater contamination were not available from a single source, contamination information was compiled through site-specific reviews of publicly available resources, including Ashtracker (2024), Earthjustice (2025), or EPA (2017), among others.

¹ FEMA's National Risk Index for Natural Hazards evaluates risks for 18 natural hazards across the United States. These include avalanche, coastal flooding, cold waves, droughts, earthquakes, hail, heat waves, hurricanes, ice storms, inland flooding, landslides, lightning, strong winds, tornadoes, tsunamis, volcanic activity, wildfires, and winter weather (FEMA, 2025).

For the purposes of this study, sites were screened for potential brownfield conditions based on historical fuel type. Coal-fired generating units are considered to present the highest likelihood of brownfield-related concerns due to the potential presence of contamination associated with coal combustion residuals. Facilities fueled by distillate fuel oil and natural gas are considered to have a comparatively lower risk because they typically generate smaller volumes of solid waste and fewer contamination sources. This screening approach is intended as a preliminary indicator of potential redevelopment constraints, noting that fuel type alone is insufficient to determine whether a site qualifies as a brownfield.

Workforce availability was estimated using occupational employment data obtained from the PA Department of Labor and Industry (Commonwealth of Pennsylvania, 2025). Occupations commonly associated with the construction and operation of the redevelopment options evaluated in this study were identified and grouped into technology-specific workforce categories, including power generation facilities, data centers, and manufacturing redevelopments. County-level workforce availability was then estimated by aggregating annual employment figures for the occupations included within each category.

2.2 Identification of Candidate Deactivated Sites

The initial phase of this analysis consisted of identifying retired power generation facilities in PA that had been in operation since 1971. The screening process identified 76 retired generating facilities from Velocity Suite (Hitachi Energy, 2026) with a combined retired capacity of nearly 10 GW. Retired coal-fired facilities accounted for 75% of the total retired capacity, while petroleum-fired facilities represented 18% (excluding natural gas-fired generation). The distribution of retired capacity by generation technology is presented in Figure 3 along with existing transmission network (>100 kV). The total capacity by fuel category is listed in Table 4.

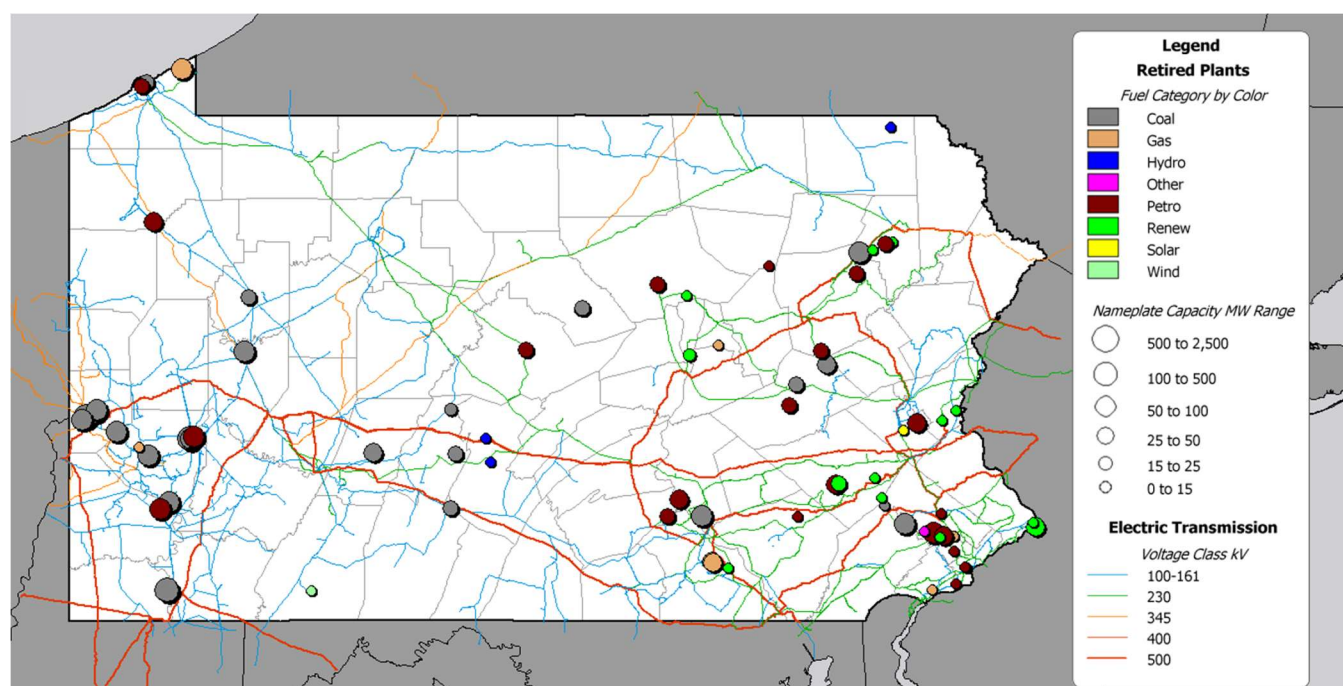


Figure 3 Map of retired power generation facilities in PA (n=76) between 1971 and June 2026, categorized by generation technology and associated transmission (>100 kV) infrastructure (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Table 4 Retired capacity by fuel category (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Fuel Category	Total Capacity (MW)
Coal	7,682
Gas	323
Hydro	16.5
Petroleum	1,774
Renewable	152
Solar	1.9
Wind	10.4
Grand Total	9,959

The initial list of retired generating facilities was further screened to include only sites with retired capacities greater than 12 MW,² reducing the candidate pool from 76 to 43 sites. A subsequent screening criterion excluded facilities with partial retirements, defined as sites where one or more generating units remain in active operation, resulting in a total of 36 sites. These plants were subsequently screened to determine if their circumstances allowed for likely redevelopment and reduced to 21 sites. Figure 4 shows the site selection methodology under Part A along with the subsequent Part B process.

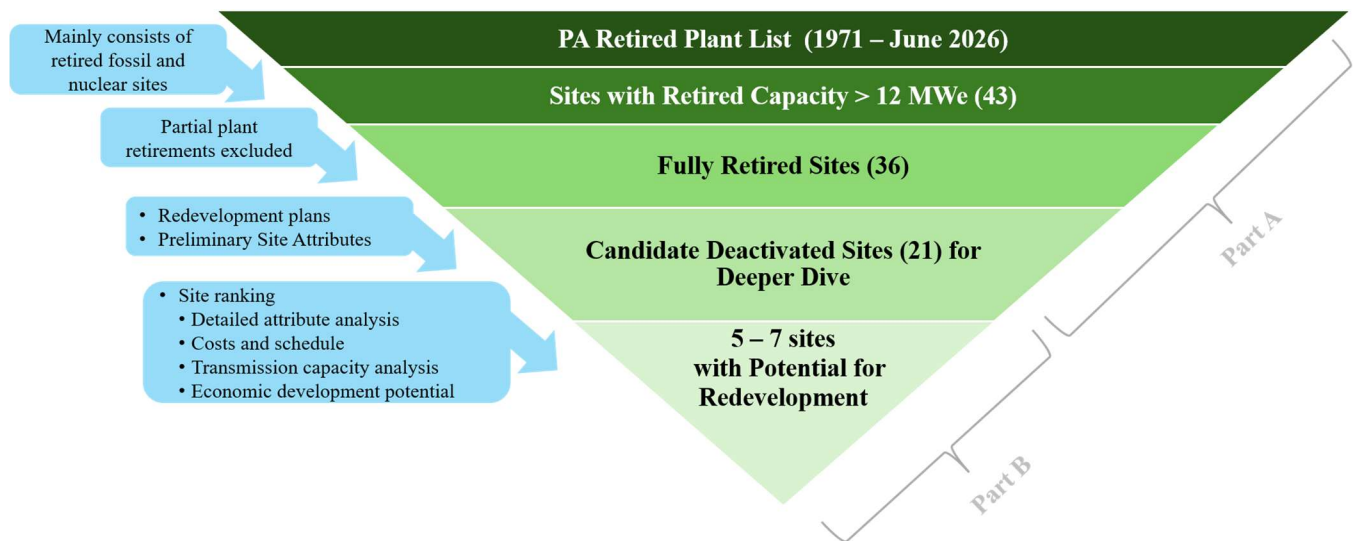


Figure 4 Screening steps to identify candidate deactivated sites for Part A (this report) and Part B (next steps).

The assessment to reduce the sites to 21 included individual checks by photograph and by internet search to see if any redevelopment had already occurred; in the case of redevelopment or heavy reuse, the plant was dropped from consideration. Next, each site was researched to identify any publicly announced plans for redevelopment; plants already spoken for were dropped from the list.

The sites were then ranked as being good for redevelopment, likely to be good for redevelopment, and likely not suited for redevelopment. Categories factored into consideration included the site having been cleared of buildings; having no or only light reuse; having useable land with favorable zoning owned by the same entity or entities amenable to negotiation; and being proximate to assets, features, or accessible facilities. Sites thought likely not suited for redevelopment were excluded from further consideration. The locations and technology classifications of the resulting candidate deactivated sites are shown in Figure 5.

The 21 candidate deactivated sites identified include retired coal plants, natural gas plants, and peaker plants across PA. Together, they amount to ~4,758 MW of retired capacity. The 12 coal plants contribute to ~4,122 MW of retired capacity while the 2 natural gas and 7 fuel oil peaker plants accounted for ~405 MW and ~230 MW of deactivated capacity. The average date of plant retirement within this set rounded

² The plants with retired capacity <12 MW were generally small renewable and hydro plants with low acreages that were deemed to be less suited for redevelopment.

to the nearest year is 2008, but the capacity weighted average retirement date rounded to the nearest year—that is, the average retirement age of the capacity and not the plants themselves—is 2010. Table 5 shows the county, fuel type, and retired capacity of the 21 candidate deactivated sites.

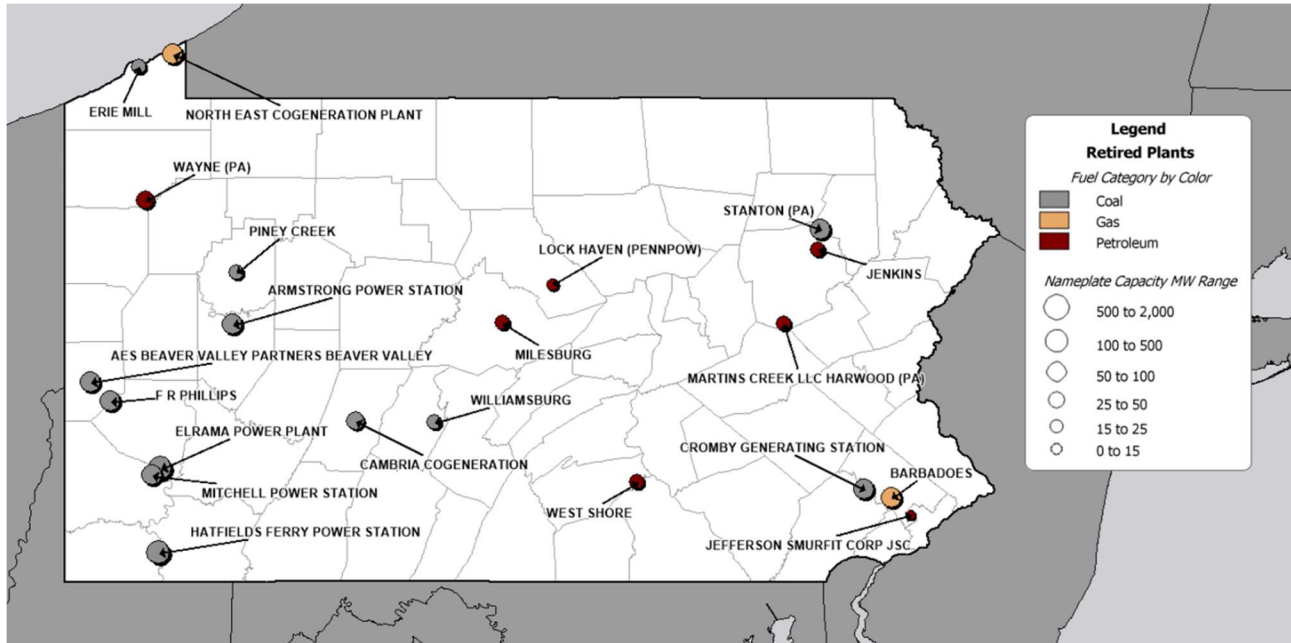


Figure 5 Map of the 21 candidate deactivated sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Table 5 Summary of county, fuel, and retired capacity for the 21 candidate deactivated sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Site Name	County	Fuel Type	Retired Capacity (MW)
AES Beaver Valley Partners Beaver Valley	Beaver	Coal	149
Armstrong Power Station	Armstrong	Bituminous Coal	326.4
Barbadoes	Montgomery	Natural Gas	248.1
Cambria Cogeneration	Cambria	Waste Coal	98
Cromby Generating Station	Chester	Bituminous Coal	420.2
Elrama Power Plant	Washington	Coal	510
Erie Mill	Erie	Bituminous Coal	44.5
F R Phillips	Beaver	Bituminous Coal	410
Hatfield's Ferry Power Station	Greene	Bituminous Coal	1,728
Jefferson Smurfit Corp JSC	Philadelphia	Distillate Fuel Oil	12
Jenkins	Luzerne	Distillate Fuel Oil	32
Lock Haven (PENNPOW)	Clinton	Distillate Fuel Oil	18.5
Martins Creek LLC Harwood (PA)	Luzerne	Distillate Fuel Oil	32
Milesburg	Centre	Distillate Fuel Oil	46
Mitchell Power Station	Washington	Bituminous Coal	448.6
North East Cogeneration Plant	Erie	Natural Gas	157.8
Piney Creek	Clarion	Waste Coal	36.2
Stanton (PA)	Luzerne	Coal	140
Wayne (PA)	Crawford	Distillate Fuel Oil	53
West Shore	Cumberland	Distillate Fuel Oil	37
Williamsburg	Blair	Bituminous Coal	43.3

2.3 Limitations and Assumptions

This analysis incorporates several assumptions and limitations that should be considered when interpreting the results. The quality and accuracy of the findings depend on the underlying data sources used in the analysis. Because the values for the attributes presented in Table 3 were compiled from a variety of publicly available and proprietary sources, reported values may differ from those found in other references and should, therefore, be interpreted with appropriate caution. Additionally, the geospatial datasets used to characterize infrastructure represent conditions at a specific point in time (e.g., year) rather than current or future developments. As a result, some infrastructure assets may have been modified, expanded, retired, or newly constructed since the data were collected, potentially affecting the attribute values assigned to individual sites. The form which the geospatial data took should also be considered: distance to features is not from the parcel boarder or from the main site entrance; rather, each feature was recorded as a precise coordinate location somewhere on the site, a depthless line in the case of pipelines and rivers, or a field in the case of geologic formations. Between each point or closest part of a line or field, a distance was measured, and all distance measurements must be considered general. Furthermore, the analysis is intended to provide HiLS assessment and should not be considered a substitute for site-specific due diligence, engineering evaluations, or detailed feasibility studies.

One of the primary assumptions was the application of a 12-MW retired generation capacity threshold during the initial screening process. This threshold was selected to reduce the candidate sites from 76 to 43 by excluding facilities with relatively small generating capacities, which were generally assumed to occupy smaller parcels and provide more limited redevelopment opportunities. A subsequent screening criterion excluded sites with parcel areas smaller than 15 acres. This acreage threshold assumed that smaller parcels would be less capable of supporting large-scale redevelopment projects.

Retirement year was also used as a screening consideration. More recently retired facilities were generally prioritized over sites that had been inactive for more than 25 years, unless there was evidence of ongoing redevelopment activity, completed equipment removal, or other indicators demonstrating site readiness for reuse. More recently retired sites were assumed to have a greater likelihood of retaining reusable electrical and plant infrastructure, whereas infrastructure at long-retired facilities was considered more likely to have deteriorated, been removed, or require substantial replacement prior to redevelopment. This assumption reflects the practical challenges associated with maintaining idle infrastructure over extended periods and the increased uncertainty surrounding the condition and redevelopment readiness of long-retired sites.

Although not directly relevant to the facilities evaluated in this study, recently deactivated generating facilities in PJM may have additional redevelopment opportunities through provisions that can facilitate the transfer or replacement of existing Capacity Interconnection Rights (CIRs) under certain conditions, potentially reducing interconnection-related development barriers for successor projects. Under current PJM rules, a deactivating facility may retain its CIRs for one year following retirement (PJM). However, it remains unclear whether these provisions apply retroactively to facilities that retired before the rule's implementation or only to facilities retiring thereafter. Consequently, CIR transfer opportunities were not considered a factor in the evaluation of candidate sites in Part A of this study but may be examined further as part of the Part B assessment (PJM, 2026).

Additional limitations are associated with the evaluation of brownfield conditions and environmental contamination. Because comprehensive site-specific environmental investigations were not available for all candidate sites, brownfield status was assessed using a screening-level approach based primarily on historical generating fuel type. Coal-fired generating facilities were generally assumed to have a higher likelihood of brownfield-related concerns because of the potential presence of coal combustion residuals, ash disposal areas, and other legacy contamination sources. In contrast, natural gas- and distillate fuel oil-fired facilities were assumed to present comparatively lower environmental risk due to the typically

smaller quantities of solid waste generated and fewer potential sources of contamination. As a result, sites were assigned preliminary qualitative classifications, such as *presumptive brownfield* or *not presumptive brownfield*, based primarily on fuel type and facility history. These classifications are intended as screening-level indicators and do not replace the need for site-specific environmental assessments and due diligence.

A similar methodology was applied to the *on-site contamination* and *groundwater contamination* attributes. In the absence of documented evidence confirming the presence or absence of contamination, sites were assigned screening-level classifications based on the potential contamination risks associated with historical facility operations and generating fuel types. Coal-fired facilities were generally assumed to have greater potential for contamination than natural gas- or oil-fired facilities due to the potential presence of coal combustion residuals, ash management areas, and other contamination sources. Sites with documented contamination that had subsequently undergone remediation and closure in accordance with regulatory requirements were classified as *none known* for the purposes of this assessment. Consequently, these environmental attributes should be considered preliminary indicators rather than definitive determinations of site conditions. Site-specific environmental investigations and due diligence would be required to confirm actual site conditions and identify any remaining environmental liabilities.



3. Candidate Sites and Infrastructure Assessment

3. Candidate Sites and Infrastructure Assessment

This analysis utilizes the infrastructure data sets compiled to support the evaluation of the 21 deactivated candidate sites to provide geospatial assessments relative to infrastructure and economic factors. Geospatial data were collected to characterize regional electrical infrastructure such as transmission lines and substations, as well as average locational marginal prices (LMPs). Additional datasets were assembled to characterize natural gas infrastructure, including pipelines, compressor stations, storage facilities, and the extent of the Marcellus Shale formation. Environmental datasets, including rivers and wastewater resources, and transportation infrastructure datasets, including railroads and major highways, were also collected to assess site accessibility and resource availability. The final geospatial layers included broadband infrastructure and demographic data to provide additional context for redevelopment potential.

3.1 Electricity Infrastructure

Transmission and Substations

Transmission lines and substations were mapped relative to the 21 deactivated sites selected for further evaluation to illustrate site proximity to existing grid assets, as shown in Figure 6. This assessment provides insight into the availability of electrical infrastructure and may help identify potential opportunities or constraints associated with future site redevelopment. The results indicate that most deactivated sites are located in close proximity to transmission lines and substations, suggesting that existing grid infrastructure could support future redevelopment activities and reduce the need for major new electrical infrastructure.

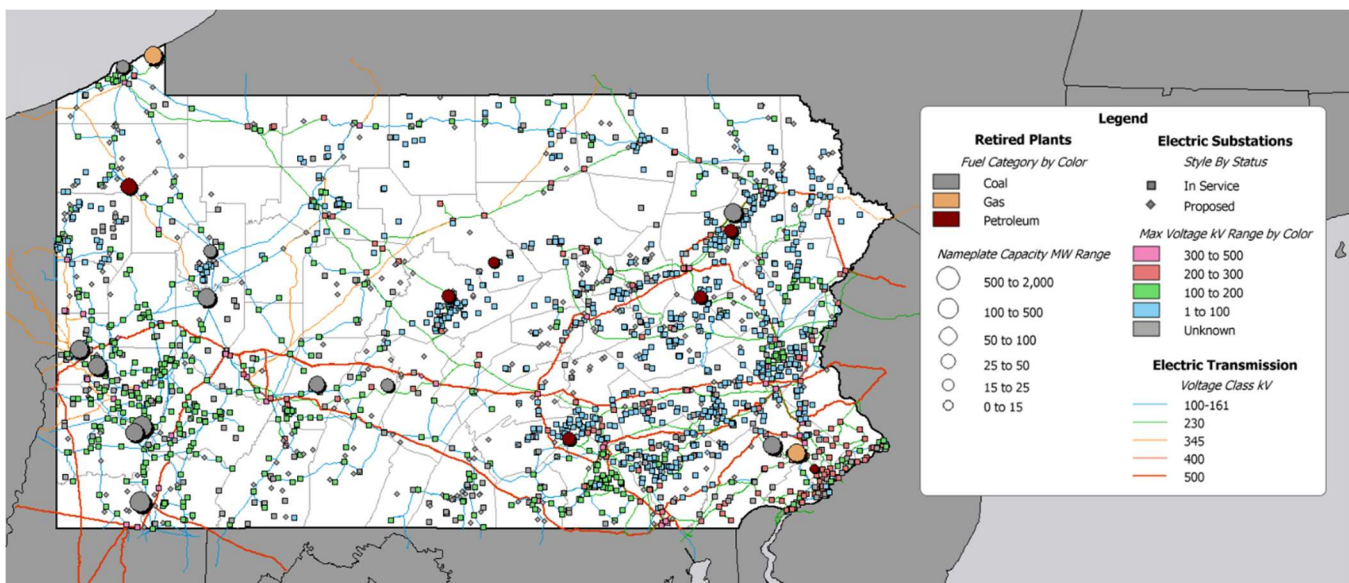


Figure 6 Map showing the proximity of the 21 deactivated sites selected for further evaluation to existing electrical infrastructure, including transmission lines and substations (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Prices

Figure 7 shows that most deactivated sites were near nodes with 2025 annual average LMPs ranging \$40–50/MWh. Three sites in northeastern PA were associated with lower annual average LMPs of \$20–40/MWh, whereas the 2025 statewide annual average LMP was ~\$42/MWh.

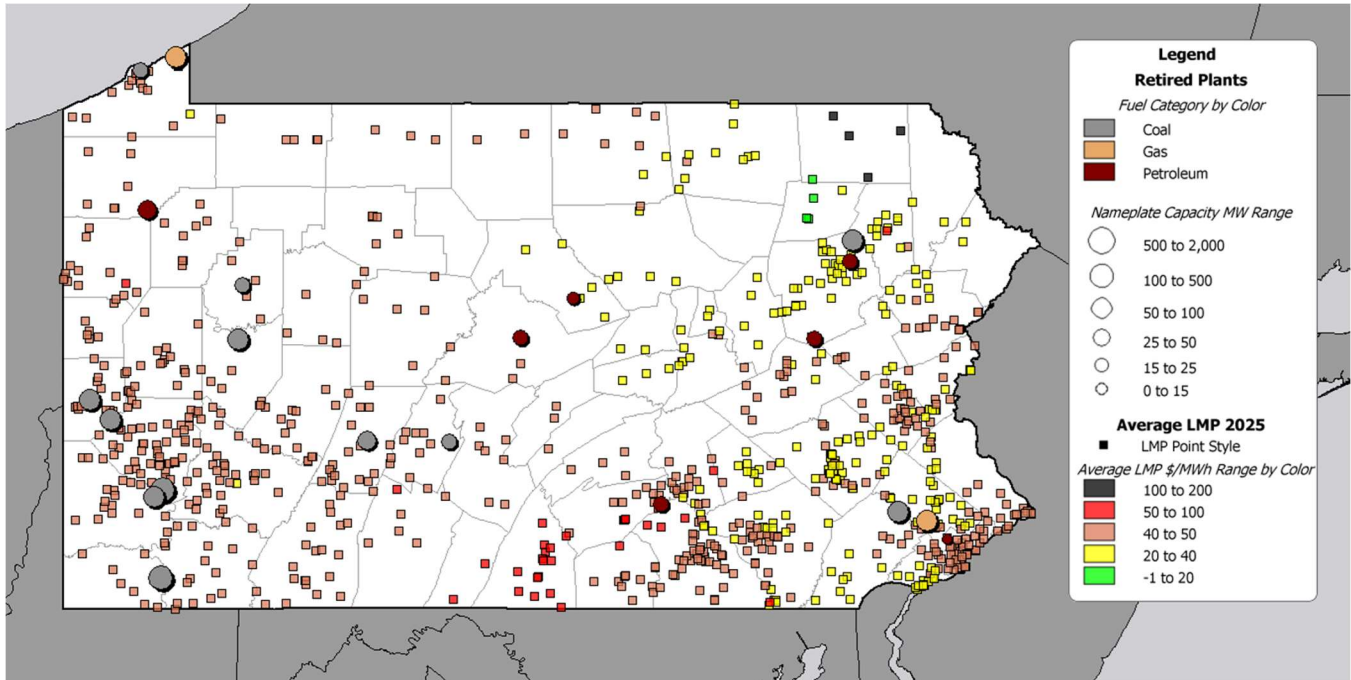


Figure 7 Average LMPs per node for 2025 across PA relative to the 21 deactivated sites selected for further evaluation (Hitachi Energy, 2026).

3.2 Natural Gas Infrastructure

Natural gas infrastructure was mapped relative to the 21 deactivated sites selected for further evaluation. As shown in Figure 8, the analysis includes natural gas pipelines of varying diameters as well as key natural gas assets, including supply, compression, and storage flow points. The results indicate that redevelopment of certain sites as natural gas-fired generating facilities may require the construction of new (short-run) pipeline interconnections or other gas delivery infrastructure. Figure 8 also illustrates the extent of the Marcellus Shale formation within PA providing additional context regarding natural gas resource availability and infrastructure accessibility.

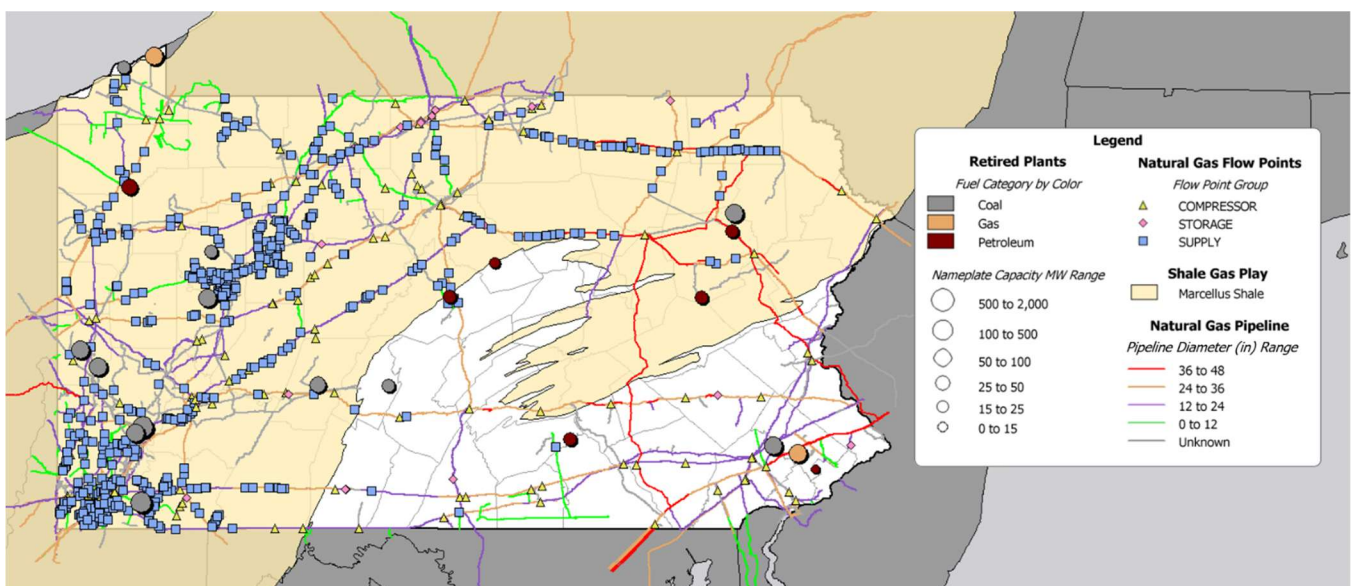


Figure 8 Map of natural gas infrastructure relative to the 21 deactivated sites selected for further evaluation (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

3.3 Waterways

Figure 9 shows that most deactivated sites are located in close proximity to rivers, streams, and wastewater facilities, potentially providing access to existing water resources for cooling and other industrial uses. Additionally, the presence of nearby waterways may offer transportation advantages for certain redevelopment scenarios by supporting barge or other water-based transportation access.

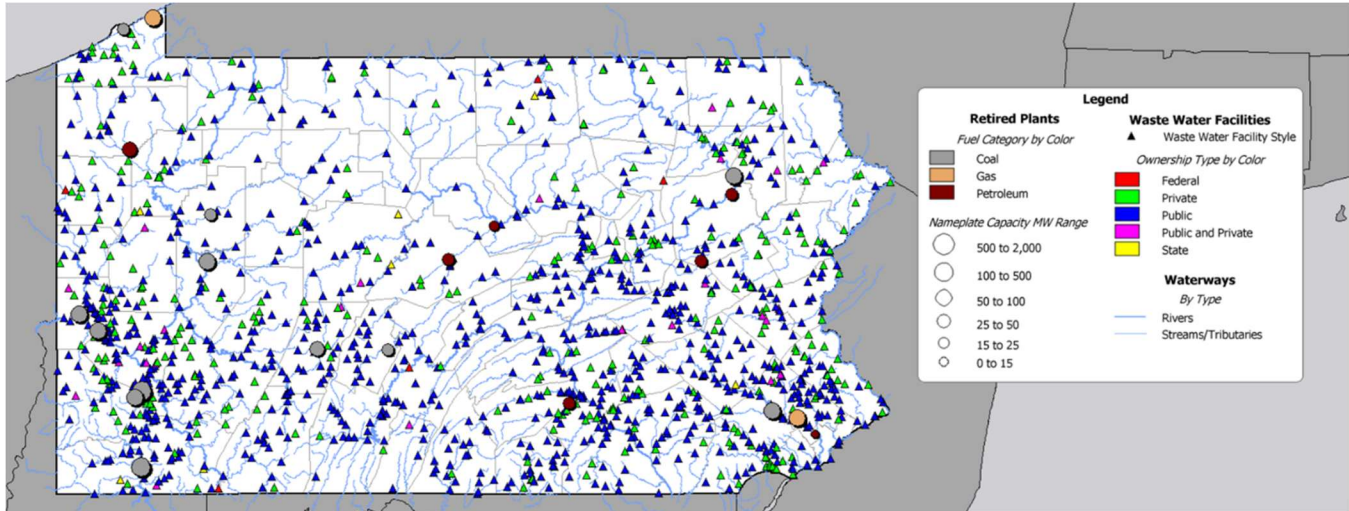


Figure 9 Map of river streams and wastewater facilities relative to the 21 deactivated sites selected for further evaluation (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

3.4 Land Accessibility

Figure 10 shows that all but three deactivated sites are located within ~1 mile of an active railroad. This proximity to usable rail infrastructure may facilitate the transportation of heavy equipment, bulk materials, and construction supplies, potentially reducing logistics costs and improving access to various markets. Rail access may represent a significant advantage for certain redevelopment scenarios, particularly those involving large-scale industrial or energy-related facilities.

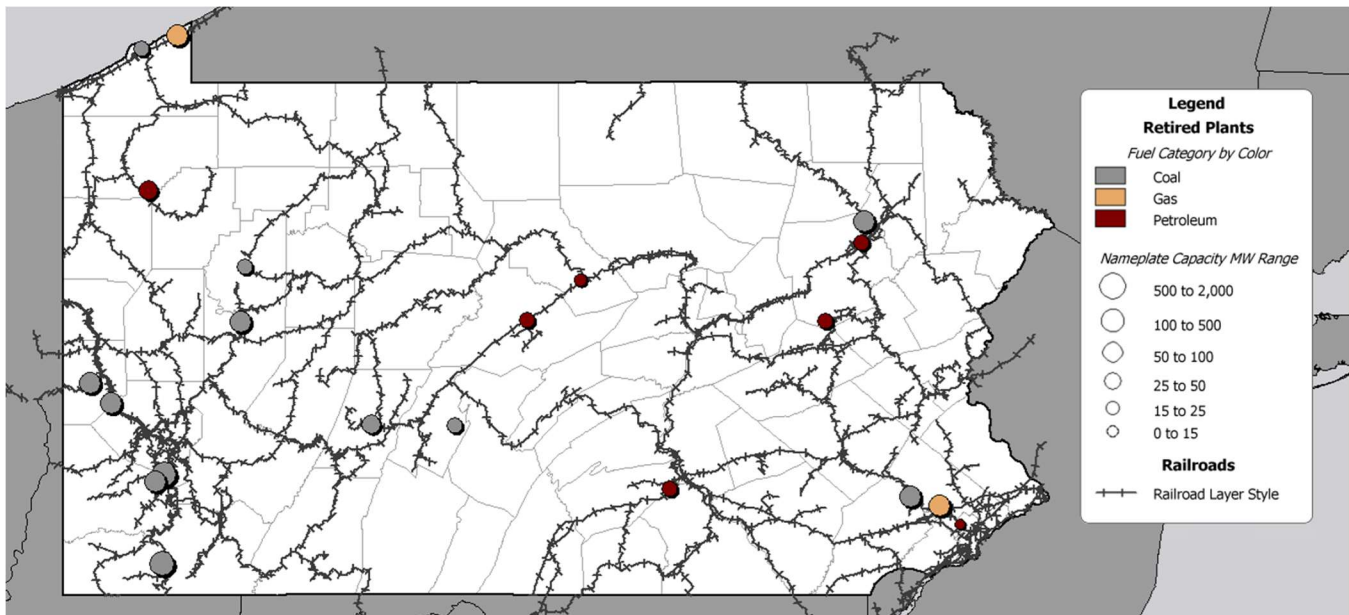


Figure 10 Map of railroads relative to the 21 deactivated sites selected for further evaluation (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

Figure 11 shows that all but two deactivated sites are located within ~1 mile of a major highway. This proximity to major highway infrastructure is important because it may provide efficient movement of goods, personnel, equipment, and construction materials. Access to major highway transportation networks can also enhance connectivity to suppliers, customers, and labor markets, potentially reducing transportation costs and supporting a broad range of redevelopment opportunities.

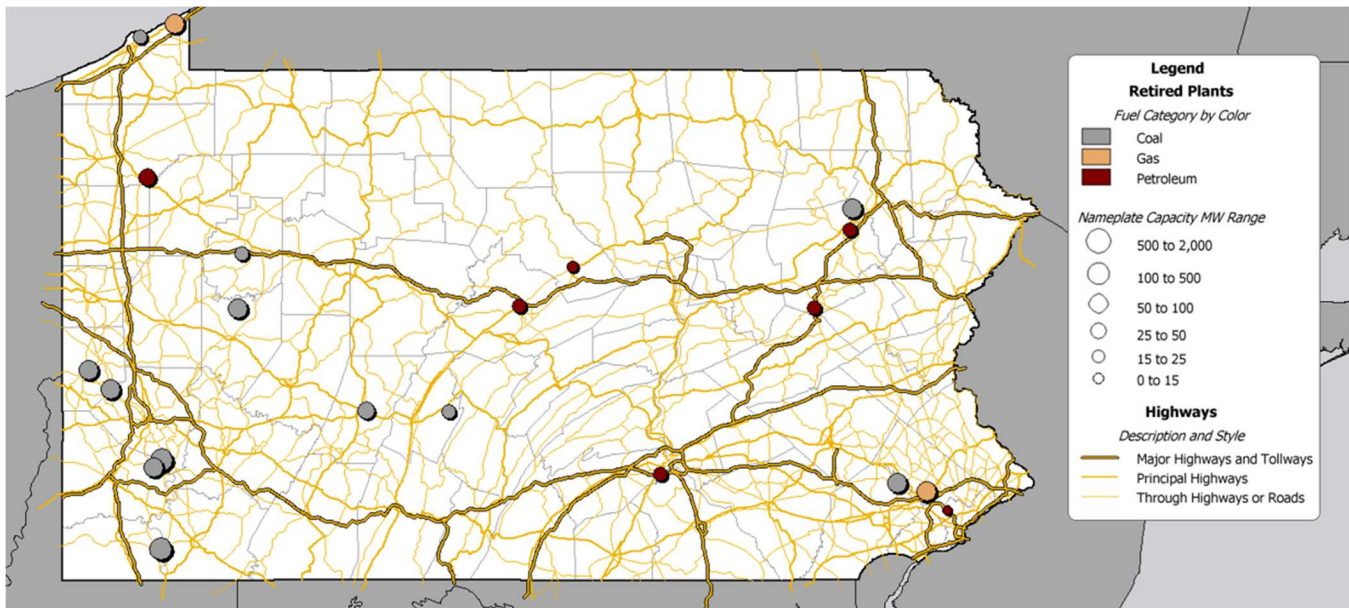


Figure 11 Map of major highways relative to the 21 deactivated sites selected for further evaluation (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b).

3.5 Broadband Infrastructure

Figure 12 shows that all 21 deactivated sites are located in close proximity to fiber broadband infrastructure, suggesting that telecommunications connectivity is unlikely to be a significant constraint for redevelopment. For additional context, the map also displays the distribution of existing and proposed data centers across PA. Comparison of these facilities with the deactivated sites indicates that the candidate sites generally have access to fiber broadband infrastructure that is comparable to, and in some cases closer than, that of existing and planned data centers, a potentially emerging large load in PA.

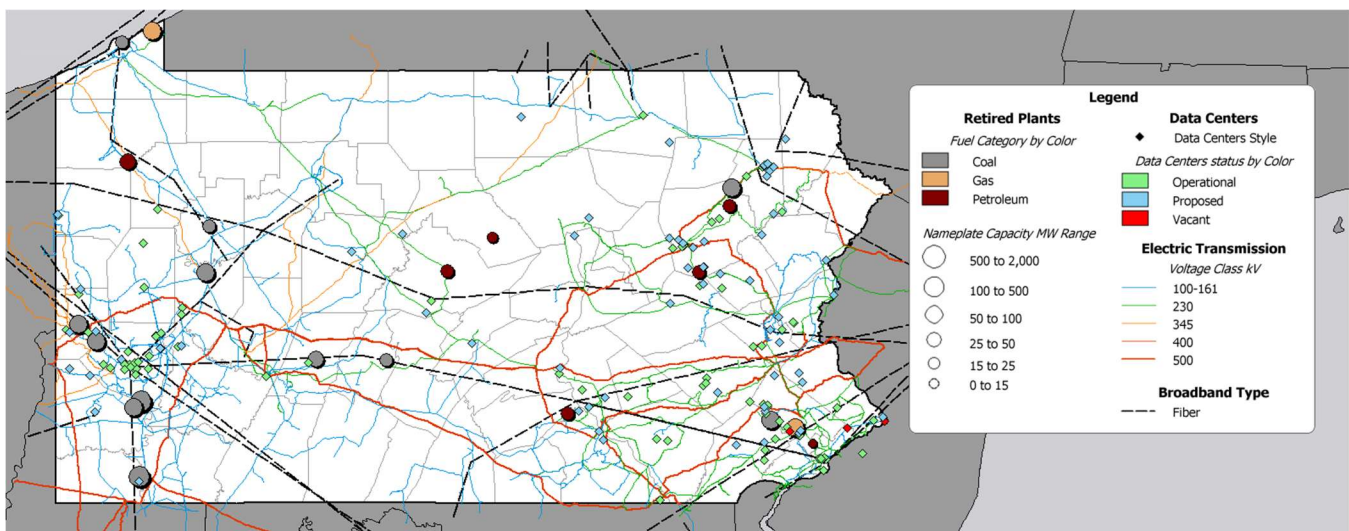


Figure 12 Map showing the locations of fiber broadband infrastructure, electric transmission lines, and data centers relative to the 21 deactivated sites selected for further evaluation (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b; ITU, 2026).

3.6 Demographics

Figure 13 shows that approximately half of the 21 deactivated sites are located in counties with populations exceeding 250,000. Access to larger population centers may offer several redevelopment advantages, including a broader labor pool, greater demand for goods and services, more developed infrastructure networks, and improved transportation connectivity. These attributes can enhance workforce availability, support supply chain efficiency, and improve the overall attractiveness of sites for future redevelopment.

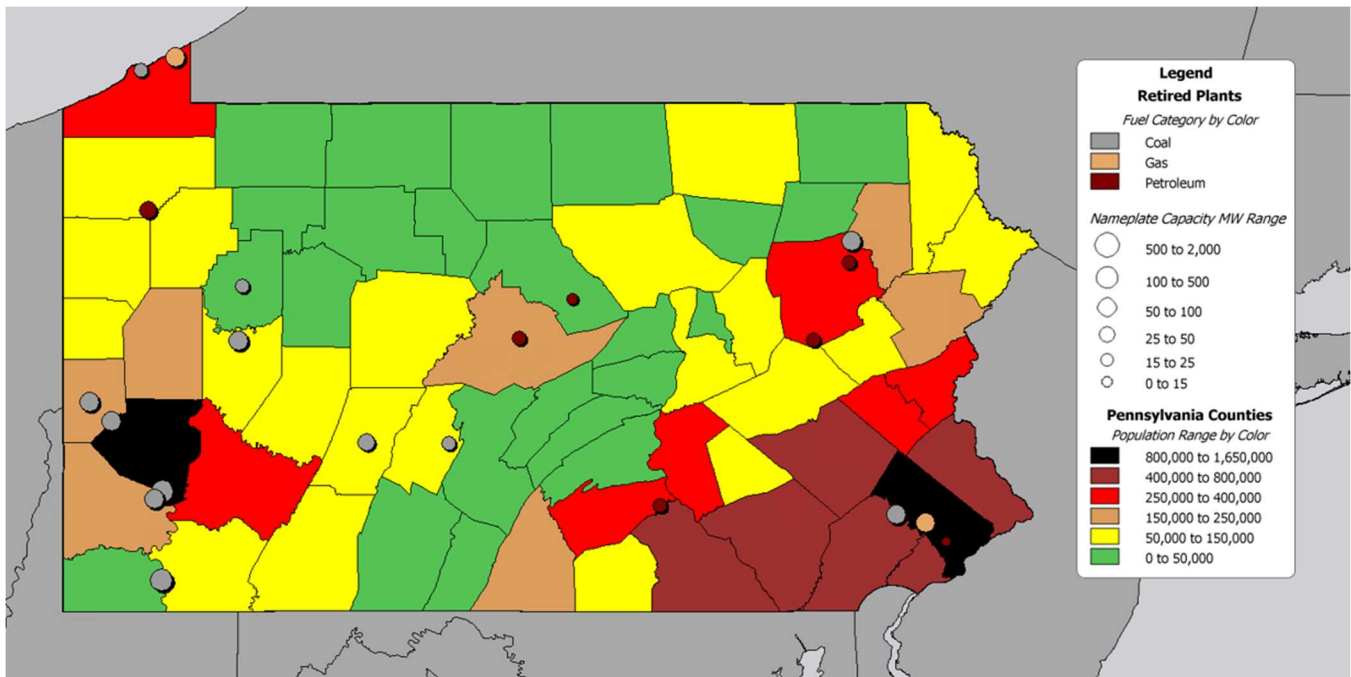


Figure 13 Map of population per county and 21 deactivated candidate sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b; U.S. Census Bureau, 2025).

Figure 14 shows that all but three of the 21 deactivated sites are located in counties with labor forces exceeding 100,000 workers. Access to larger labor pools may provide a significant advantage for redevelopment projects that require a large number of workers, including manufacturing, warehousing, distribution, and logistics facilities. Larger labor markets can also improve workforce availability, expand the pool of qualified candidates, and reduce the need to recruit employees from outside the region, thereby increasing the feasibility and competitiveness of future redevelopment opportunities.

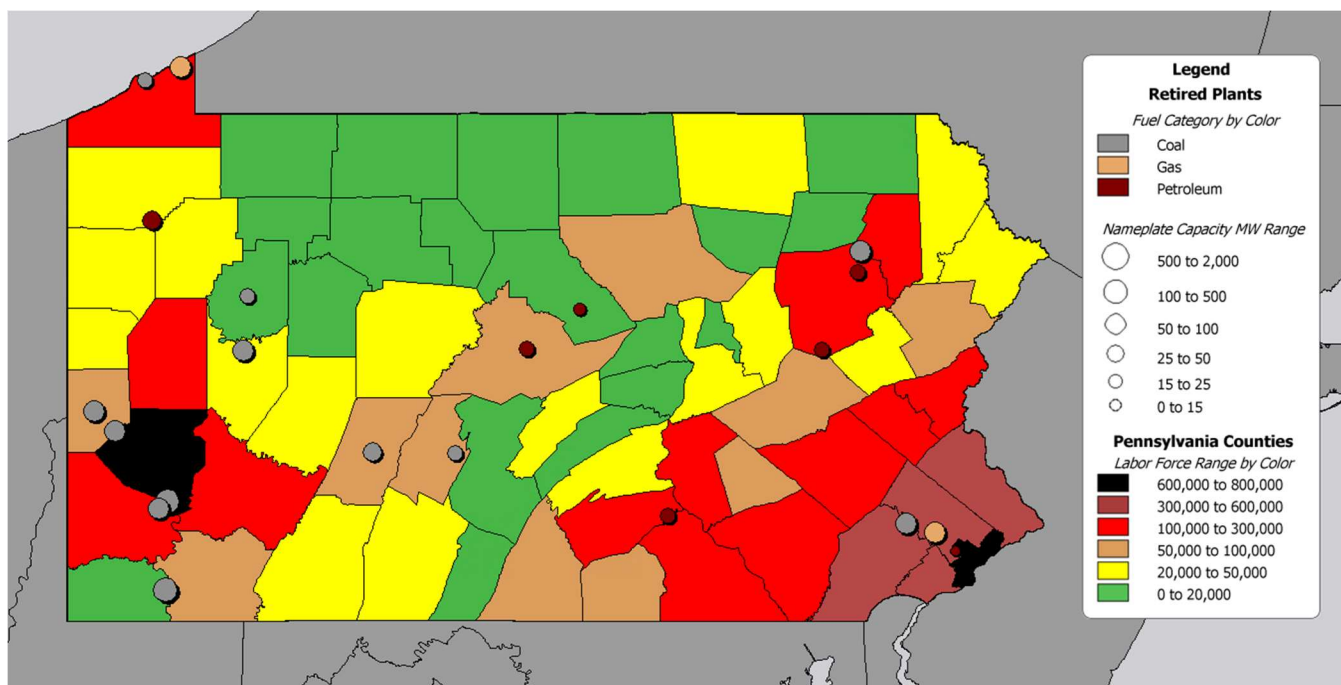


Figure 14 Map of labor force per county and 21 deactivated candidate sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b; U.S. BLS, 2025).

Figure 15 shows that 13 of the 21 deactivated sites are located in counties with median individual annual income exceeding \$35,000. Median income was included as a socioeconomic indicator to characterize the communities surrounding candidate sites and provide context for regional economic conditions. In general, redevelopment of deactivated sites can provide relatively high incomes that could raise median wages in surrounding counties. However, higher-income regions can also be associated with increased land values, labor costs, taxes, and development costs, which may influence the economic feasibility of certain redevelopment options.

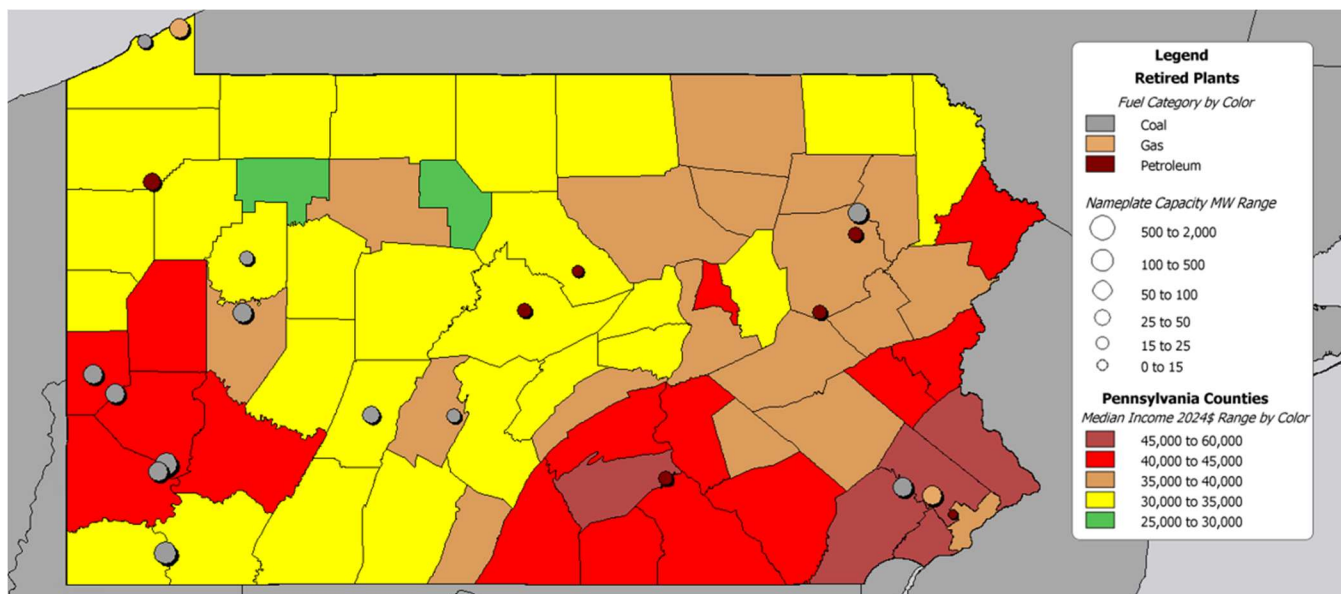


Figure 15 Map of median individual income per county and 21 deactivated candidate sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b; U.S. Census Bureau, 2025).

Figure 16 shows that 12 of the 21 deactivated candidate sites are located in counties with gross domestic product (GDP) exceeding \$15B, while an additional 4 sites are located in counties with GDP of \$6–15B. County-level GDP provides a measure of regional economic output and context for evaluating the potential economic benefits of redevelopment. Redevelopment of deactivated sites can increase county economic output through capital investment, business expansion, and job creation, supporting broader county and regional economic growth.

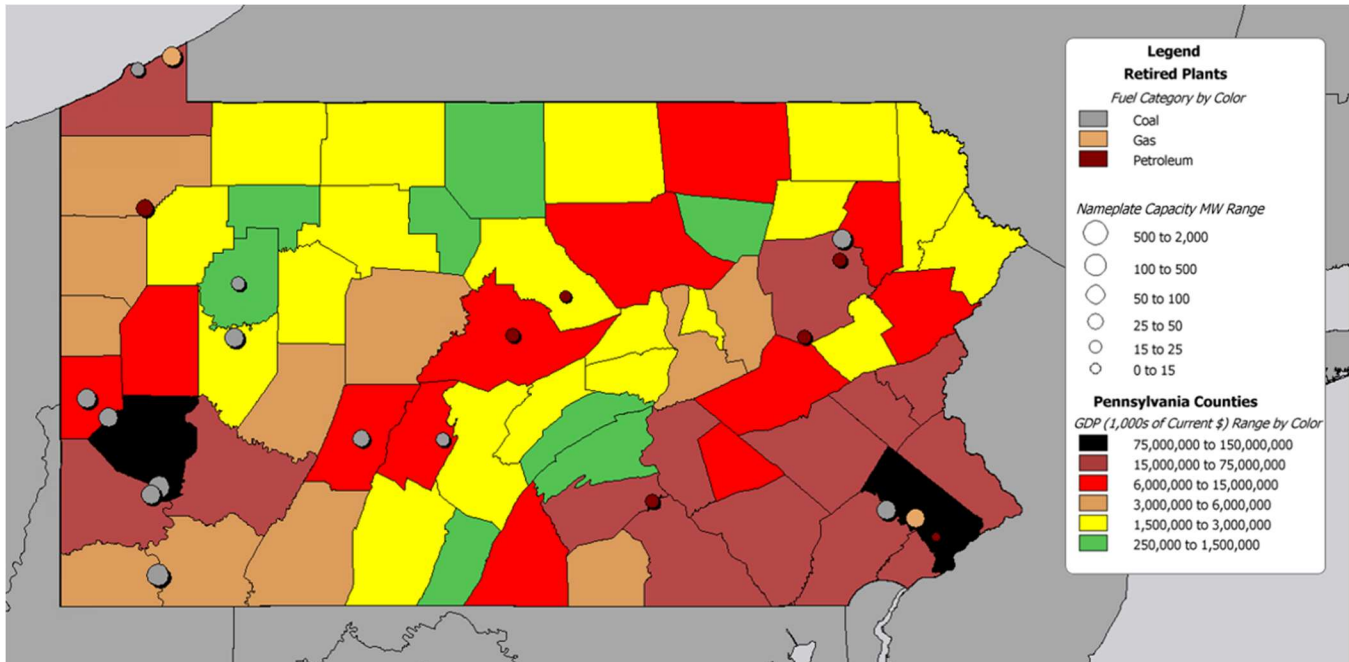


Figure 16 Map of GDP per county and 21 deactivated candidate sites (Hitachi Energy, 2026; GEM, 2026; U.S. EIA, 2025b; BEA, 2024).



4. Attributes of Candidate Deactivated Sites

4. Attributes of Candidate Deactivated Sites

Attributes for each of the candidate deactivated sites are expounded in this chapter. These attributes are derived based on the data sources listed in Chapter 3.

4.1 AES Beaver Valley Partners Beaver Valley

Located at 400 Frankfort Rd, Monaca, PA 15061 (coordinates 40°40'03.0"N 80°21'12.5"W), and also known as the Beaver Valley Generation Plant, this 196-acre former coal plant on the Ohio River and Raccoon Creek retired in 2015 and has a retired capacity of 149 MW (see Figure 17 and Table 6). The facility occupied leased land within a 196-acre parcel owned by Nova Chemicals. The lease was terminated in 2015 following an early buyout of the power purchase agreement by West Penn Power, the plant's primary customer (Utility Dive, 2015). Ownership of the parcel transferred to Styropek (i.e., BVPV Styrenics, LLC) in 2020 (The Allegheny Front, 2023). Styropek ceased operations in 2026, and county property records show that the site was acquired by Beaver County Redevelopment Co. LLC, a redevelopment entity, in April 2026. It is zoned for industrial use and has 54.9 adjacent acreage possibly open for further redevelopment space, though the terrain is rated as highly rugged. The site is treated as a presumptive brownfield with soil and groundwater contamination to be determined (TBD). FEMA designates the site as having a very low natural hazard risk with minimal flood hazard. The parcel and nearby parcels are designated as having possible mine subsidence potential, as they are located within or adjacent to a known coal mining area; however, no publicly accessible PA DEP records were identified to confirm that mining activities occurred on the site. The site has immediate access to the road network, the rail network, and a river. Transmission lines, a substation, and a natural gas pipeline are all available within 1 mile; Broadband, the closest generation plant, the Marcellus shale formation, and a wastewater treatment facility are all available within 5 miles. The nearest brownfield site is ~6 miles away. There are ~1,421,408 people within 30 miles of the site.



Figure 17 Satellite imagery of AES Beaver Valley original site (NASA Earthdata Search, n.d.).

Table 6 AES Beaver Valley Partners Beaver Valley details

AES Beaver Valley Partners Beaver Valley			
400 Frankfort Rd, Monaca, PA 15061			
40°40'03.0"N 80°21'12.5"W			
Plant Retirement Year	2015	Approximate Distance (miles) to	
Parcel Acreage (acre)	196	Major Road	0.08
Retired Capacity (MW)	149	Rail Network	0.12
Zoning Classification	Industrial	Major River	1.16
Nearby Potential Acreage (acre)	54.94	Transmission Line	0.70
Ruggedness Rating	5 = Highly rugged	Substation	0.13
Brownfield Designation	Presumptive	Natural Gas Pipeline	0.72
On-Site Contamination	TBD	Broadband	1.10
Groundwater Contamination	TBD	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	2.04
FEMA Flood Hazard	Minimal	Brownfield Site	5.89
Population Within 30 Miles	~1,421,408		

4.2 Armstrong Power Station

Located at 108 Power Plant Rd, Adrian, PA 16210 (coordinates 40°55'45.0"N 79°27'58.5"W), this 32-acre former coal plant on the Allegheny River retired in 2012 and has a retired capacity of 326.4 MW (see Figure 18 and Table 7). The parcel retains the plant infrastructure and is still owned by FirstEnergy via Allegheny Energy Supply Company, LLC. Decommissioning remains in the planning stages, and remediation is in progress. It is currently not zoned for any particular use and has ~460 acres of adjacent available land, but the terrain is rated as highly rugged. The site is treated as a presumptive brownfield, has confirmed on-site soil contamination, and TBD groundwater contamination. FEMA designates the site as having a very low natural hazard risk but sitting within the floodway. The parcel is not located within a known coal mining area and is, therefore, considered to have minimal mine subsidence potential; however, nearby parcels fall within a documented mineable coal area with potential mine subsidence risk. The site has immediate access to rail and the river, and a major highway runs within 5 miles of the site. Transmission lines and a substation are present within 1 mile, and a natural gas pipeline exists ~3 miles away. The site is located on the Marcellus shale formation. Broadband is installed ~4.5 miles away, and the nearest wastewater treatment site is just over 6 miles away. The nearest generator is ~20 miles away, and the nearest brownfield site is ~15 miles away. There are ~369,926 people living within 30 miles of the site.

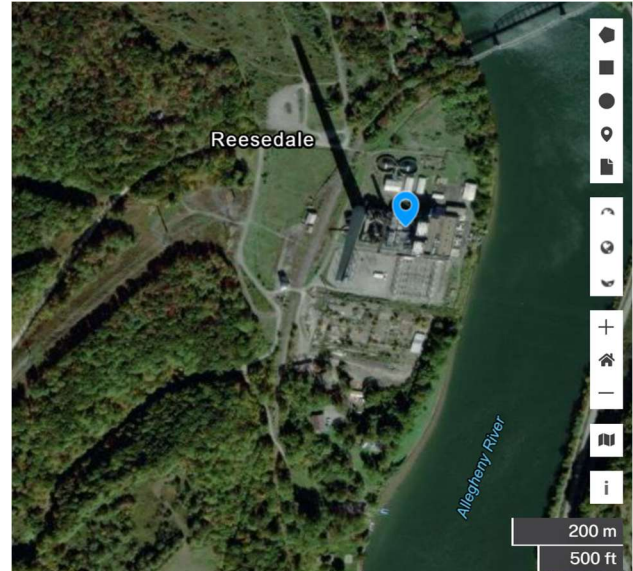


Figure 18 Satellite imagery of Armstrong Power Station original site (NASA Earthdata Search, n.d.).

Table 7 Armstrong Power Station details

Armstrong Power Station			
108 Power Plant Rd, Adrian, PA 16210			
40°55'45.0"N 79°27'58.5"W			
Plant Retirement Year	2012	Approximate Distance (miles) to	
Parcel Acreage (acre)	32.045	Major Road	4.39
Retired Capacity (MW)	326.4	Rail Network	0.07
Zoning Classification	Special	Major River	0.33
Nearby Potential Acreage (acre)	460.13	Transmission Line	0.00
Ruggedness Rating	5 = Highly rugged	Substation	0.07
Brownfield Designation	Presumptive	Natural Gas Pipeline	3.01
On-Site Contamination	Confirmed	Broadband	4.51
Groundwater Contamination	TBD	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	6.11
FEMA Flood Hazard	Floodway	Brownfield Site	14.81
Population Within 30 Miles	~369,926		

4.3 Barbadoes

Located at 1 Haws Ave, King of Prussia, PA 19406 (coordinates 40°06'48.5"N 75°21'18.8"W), this 65.4-acre former natural gas plant situated on the Barbadoes Island in the Schuylkill River retired in 1990 and has a retired capacity of 248.1 MW (see Figure 19 and Table 8). There appears to be two substations on the plot, but otherwise the land is cleared and free to be developed. The site has been decommissioned, and its remediation status is unknown. It is zoned for industrial use and has 18.9 acres of adjacent available land rated as slightly rugged. The site is not classified as a presumptive brownfield; however, confirmed groundwater contamination has been reported. FEMA designates the site as having a very low natural hazard risk but sitting within the floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. The site has immediate access to major roads, the rail network, and the river. The site has immediate access to transmission lines, a substation, a natural gas pipeline, and broadband installed. The nearest generating station is ~14 miles away. The site is ~50 miles from the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is adjacent to the site. There are ~4,236,300 people within 30 miles of the site.

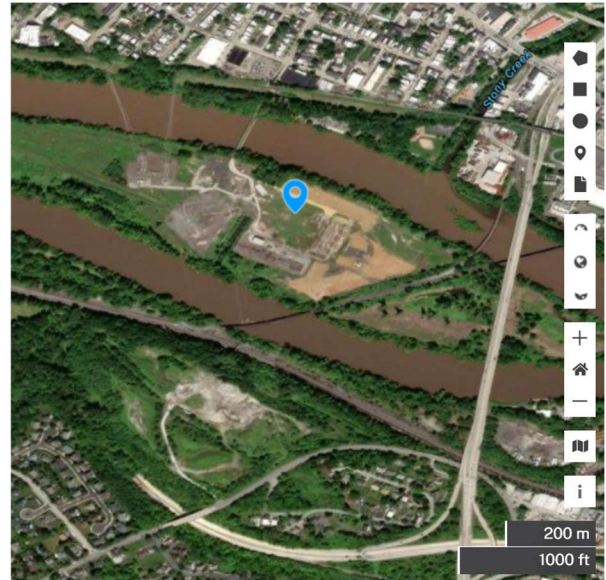


Figure 19 Satellite imagery of Barbadoes original site (NASA Earthdata Search, n.d.).

Table 8 Barbadoes details

Barbadoes			
1 Haws Ave, King of Prussia, PA 19406			
40°06'48.5"N 75°21'18.8"W			
Plant Retirement Year	1990	Approximate Distance (miles) to	
Parcel Acreage (acre)	65.35	Major Road	4.39
Retired Capacity (MW)	248.1	Rail Network	0.07
Zoning Classification	Industrial	Major River	0.33
Nearby Potential Acreage (acre)	18.88	Transmission Line	0.00
Ruggedness Rating	2 = Slightly rugged	Substation	0.07
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	3.01
On-Site Contamination	TBD	Broadband	4.51
Groundwater Contamination	Confirmed	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	6.11
FEMA Flood Hazard	Floodway	Brownfield Site	14.81
Population Within 30 Miles	~4,236,300		

4.4 Cambria Cogeneration

Located at 243 Rubisch Rd, Ebensburg, PA 15931 (coordinates 40°28'28.2"N 78°42'04.7"W), this 46.3-acre former coal plant retired in 2019 and has a retired capacity of 98 MW (see Figure 20 and Table 9). Most of the buildings have been demolished, and a waste management company has built a parking lot and started operating on the site. The site has been decommissioned, but the remediation status is unknown. The site is south of US-22 and just north of Bethlehem Mine 33. It is zoned for industrial use and has 55.6 acres of potentially developable adjacent land rated as moderately rugged. The site is considered a presumptive brownfield and there is no known groundwater contamination. FEMA designates the site as having a relatively low natural hazard risk and as a minimal flooding risk. The parcel and nearby parcels are located within or adjacent to a confirmed underground mining area and are, therefore, considered to have elevated mine subsidence potential. The site has immediate access to major highways, and rail access is ~1 mile away; however, the closest major river is ~10 miles away. The site has close access to transmission lines, a substation, and a natural gas pipeline, and the nearest installed broadband is ~1 mile away. The nearest generating station is ~7 miles away. The site is located on the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is ~2 miles away. There are ~389,131 people within 30 miles of the site.



Figure 20 Satellite imagery of Cambria Cogeneration original site (NASA Earthdata Search, n.d.).

Table 9 Cambria Cogeneration details

Cambria Cogeneration			
243 Rubisch Rd, Ebensburg, PA 15931			
40°28'28.2"N 78°42'04.7"W			
Plant Retirement Year	2019	Approximate Distance (miles) to	
Parcel Acreage (acre)	46.33	Major Road	0.27
Retired Capacity (MW)	98	Rail Network	1.03
Zoning Classification	Industrial	Major River	9.47
Nearby Potential Acreage (acre)	55.59	Transmission Line	0.00
Ruggedness Rating	4 = Moderately rugged	Substation	0.07
Brownfield Designation	Presumptive	Natural Gas Pipeline	0.13
On-Site Contamination	TBD	Broadband	1.25
Groundwater Contamination	None Known	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Relatively low	Wastewater Treatment Facility	1.01
FEMA Flood Hazard	Minimal	Brownfield Site	2.20
Population Within 30 Miles	~389,131		

4.5 Cromby Generating Station

Located at 100 Cromby Rd, Phoenixville, PA 19460 (coordinates 40°09'07.5"N 75°31'47.5"W), this 56.8-acre former coal plant sitting on the west bank of the Schuylkill River retired in 2011 and has a retired capacity of 420.2 MW (see Figure 21 and Table 10). Many of the plant's buildings have been demolished. The site has been decommissioned, and remediation is in progress. It is zoned for utility use and 53.5 acres of adjacent available land rated as moderately rugged. The site is treated as a presumptive brownfield, with soil and groundwater contamination TBD. FEMA designates the site as having a very low natural hazard risk but sitting in a floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. The site has immediate access to the river and the rail system, and major freeways are ~1 mile away. Transmission lines, a substation, and a natural gas pipeline are all adjacent to the site. The nearest installed broadband is ~8 miles away. The closest generator is ~6 miles away. The site is ~42 miles from the Marcellus shale formation. The nearest wastewater treatment plant is ~1.5 miles away, and the nearest brownfield is ~2 miles away. There are ~4,399,235 people within 30 miles of the plant.

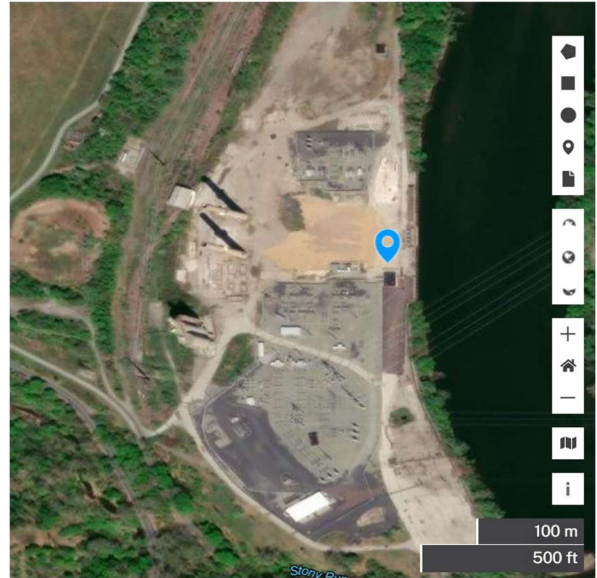


Figure 21 Satellite imagery of Cromby Generating Station original site (NASA Earthdata Search, n.d.).

Table 10 Cromby Generating Station details

Cromby Generating Station			
100 Cromby Rd, Phoenixville, PA 19460			
40°09'07.5"N 75°31'47.5"W			
Plant Retirement Year	2011	Approximate Distance (miles) to	
Parcel Acreage (acre)	56.75	Major Road	1.09
Retired Capacity (MW)	420.2	Rail Network	0.16
Zoning Classification	Utility	Major River	0.49
Nearby Potential Acreage (acre)	53.48	Transmission Line	0.00
Ruggedness Rating	4 = Moderately rugged	Substation	0.10
Brownfield Designation	Presumptive	Natural Gas Pipeline	0.15
On-Site Contamination	TBD	Broadband	7.62
Groundwater Contamination	TBD	Marcellus Shale Formation	41.94
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	1.51
FEMA Flood Hazard	Floodway	Brownfield Site	1.89
Population Within 30 Miles	~4,399,235		

4.6 Elrama Power Plant

Located at 30 Duquesne Light Dr, Elrama, PA 15038 (coordinates 40°15'08.1"N 79°55'04.1"W), this 18.7-acre former coal plant sitting on the Monongahela River retired in 2014 and has a retired capacity of 510 MW (see Figure 22 and Table 11). The buildings have been cleared from the site, and it remains free for development. The site has been decommissioned, and remediation is in progress. The site is east of Elrama on the west bank of the river. It is zoned for industrial use, and the land and 32.6 acres of adjacent available land are rated as intermediately rugged. The site is treated as a presumptive brownfield with confirmed soil contamination and contaminated groundwater. FEMA designates the site as having a very low natural hazard risk but sitting in a floodway. The parcel is not located within or adjacent to a documented coal mining area and is, therefore, considered to have minimal mine subsidence potential; however, nearby parcels fall within a documented mineable coal area with confirmed underground mining activity and are, therefore, considered to have elevated mine subsidence risk. The site has easy access to major highways, the rail system, and the river. Transmission lines, a substation, and a natural gas pipeline are all adjacent to the site. The nearest installed broadband is ~4 miles away. The closest generator is ~12 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is ~0.5 mile away. There are ~1,930,750 people within 30 miles of the site.

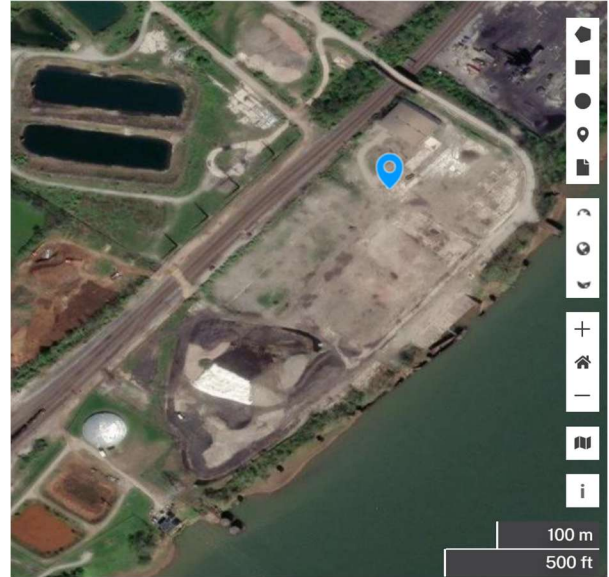


Figure 22 Satellite imagery of Elrama Power Plant original site (NASA Earthdata Search, n.d.).

Table 11 Elrama Power Plant details

Elrama Power Plant			
30 Duquesne Light Dr, Elrama, PA 15038			
40°15'08.1"N 79°55'04.1"W			
Plant Retirement Year	2014	Approximate Distance (miles) to	
Parcel Acreage (acre)	18.66	Major Road	0.45
Retired Capacity (MW)	510	Rail Network	0.05
Zoning Classification	Industrial	Major River	0.44
Nearby Potential Acreage (acre)	32.62	Transmission Line	0.00
Ruggedness Rating	3 = Intermediately rugged	Substation	0.05
Brownfield Designation	Presumptive	Natural Gas Pipeline	0.10
On-Site Contamination	Confirmed	Broadband	4.03
Groundwater Contamination	Confirmed	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	1.25
FEMA Flood Hazard	Floodway	Brownfield Site	0.49
Population Within 30 Miles	~1,930,750		

4.7 Erie Mill

Located at 1540 E Lake Rd, Erie, PA 16511 (coordinates 42°08'34.8"N 80°03'10.8"W), this 73.1-acre former paper mill and coal-fired power plant site is situated along the shores of Lake Erie (see Figure 23 and Table 12). The generating facility retired in 2002 with a capacity of 44.5 MW. The property, owned by SB3 LLC, has been largely cleared except, with three smokestacks remaining from the former Hammermill/International Paper complex. A portion of the site has been redeveloped as the SB3 Industrial Park, which includes office space available for lease (Erie Times-News, 2025). An adjacent 73.6-acre parcel under common ownership remains available for redevelopment. Together, the nearly 150 acres are zoned for industrial use with its terrain classified as slightly rugged. The site is treated as a presumptive brownfield, but there is no known soil or groundwater contamination. FEMA designates the site as having a very low natural hazard risk and minimal flooding risk. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. The site has easy access to major highways, the rail system, and the water. Transmission lines and a substation are adjacent to the site, and a natural gas pipeline lies ~3 miles away. Broadband is installed close to the site. The closest generator is ~40 miles away. The site sits ~1 mile from the Marcellus shale formation. The nearest wastewater facility and brownfield site both are ~1 mile away. There are ~288,666 people within 30 miles of the site.

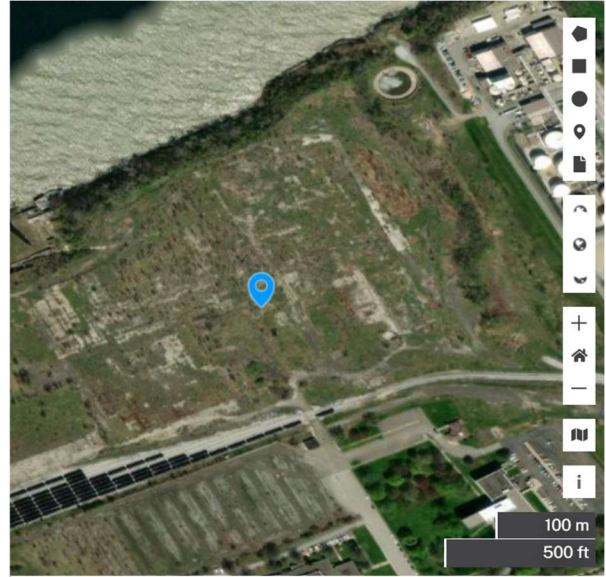


Figure 23 Satellite imagery of Erie Mill original site (NASA Earthdata Search, n.d.).

Table 12 Erie Mill details

Erie Mill			
1540 E Lake Rd, Erie, PA 16511			
42°08'34.8"N 80°03'10.8"W			
Plant Retirement Year	2002	Approximate Distance (miles) to	
Parcel Acreage (acre)	73.1	Major Road	0.10
Retired Capacity (MW)	44.5	Rail Network	0.10
Zoning Classification	Industrial	Major River	0.30
Nearby Potential Acreage (acre)	73.62	Transmission Line	0.73
Ruggedness Rating	2 = Slightly rugged	Substation	0.25
Brownfield Designation	Presumptive	Natural Gas Pipeline	3.13
On-Site Contamination	None known	Broadband	0.42
Groundwater Contamination	None known	Marcellus Shale Formation	1.14
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	0.98
FEMA Flood Hazard	Minimal	Brownfield Site	1.25
Population Within 30 Miles	~288,666		

4.8 F R Phillips

Located at 200 McGovern Blvd, Glenwillard, PA 15046 (coordinates 40°34'08.7"N 80°13'44.0"W), this 15.9-acre former coal plant on the east bank of the Ohio river retired in 2000 and has a retired capacity of 410 MW (see Figure 24 and Table 13). A scrap metal dealer operates on part of the site, and the rest of the lot seems available. The site has been decommissioned, and its remediation status is unknown. The site is northwest of Pittsburgh and directly adjacent to Crescent Township. It and an available adjacent 10.4 acres under common ownership are zoned for industrial use; the area is rated as being moderately rugged. The site is treated as a presumptive brownfield, and there is confirmed soil and groundwater contamination on the site. FEMA designates the site as having a very low natural hazard risk but sitting in a floodway. The parcel is not located within a known coal mining area and is, therefore, considered to have minimal mine subsidence potential; however, nearby parcels fall within a documented mineable coal area with potential mine subsidence risk. The site has easy access to major highways, the rail system, and the river. Transmission lines and a substation are adjacent to the site, and a natural gas pipeline runs ~1.5 miles away. The nearest broadband installation is ~1 mile away. The nearest generator is 7 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is ~1.5 miles away. There are ~1,817,337 people within 30 miles of the site.



Figure 24 Satellite imagery of F R Phillips original site (NASA Earthdata Search, n.d.).

Table 13 F R Phillips details

F R Phillips			
200 McGovern Blvd, Glenwillard, PA 15046			
40°34'08.7"N 80°13'44.0"W			
Plant Retirement Year	2000	Approximate Distance (miles) to	
Parcel Acreage (acre)	15.87	Major Road	0.26
Retired Capacity (MW)	410	Rail Network	0.05
Zoning Classification	Industrial	Major River	0.03
Nearby Potential Acreage (acre)	10.44	Transmission Line	0.23
Ruggedness Rating	4 = Moderately rugged	Substation	0.00
Brownfield Designation	Presumptive	Natural Gas Pipeline	1.49
On-Site Contamination	Confirmed	Broadband	1.24
Groundwater Contamination	Confirmed	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	0.90
FEMA Flood Hazard	Floodway	Brownfield Site	1.40
Population Within 30 Miles	~1,817,337		

4.9 Hatfield's Ferry Power Station

Located at 2907 E Roy Furman Hwy, Carmichaels, PA 15320 (coordinates 39°51'20.4"N 79°55'39.5"W), this former coal plant near the Monongahela River retired in 2013 and has a retired capacity of 1728 MW (see Figure 25 and Table 14). The prior buildings have been demolished leaving the site empty; there are no current plans for redevelopment. The site has been decommissioned, and remediation is in planning stages. The 176-acre site is across the river from Masontown. It and 96.1 acres of adjacent land are not zoned and are rated as moderately rugged. The site is treated as a presumptive brownfield, and there is confirmed soil and groundwater contamination. FEMA designates the site as having a relatively low natural hazard risk but having a 0.2% chance of annual flooding. The parcel and nearby parcels are located within or adjacent to a confirmed underground mining area and are, therefore, considered to have elevated mine subsidence potential. The site has adjacent access to major roads, the rail system, and the river. Transmission lines, a substation, and natural gas pipeline all run by the site. Broadband is installed ~2.5 miles away. The nearest generator is ~0.5 miles away. The site is located on the Marcellus shale formation. The nearest wastewater treatment plant is adjacent to the site, but the nearest brownfield is ~14 miles away. There are ~353,425 people within 30 miles of the site.



Figure 25 Satellite imagery of Hatfield's Ferry Power Station original site (NASA Earthdata Search, n.d.).

Table 14 Hatfield's Ferry Power Station details

Hatfield's Ferry Power Station			
2907 E Roy Furman Hwy, Carmichaels, PA 15320			
39°51'20.4"N 79°55'39.5"W			
Plant Retirement Year	2013	Approximate Distance (miles) to	
Parcel Acreage (acre)	176	Major Road	0.18
Retired Capacity (MW)	1728	Rail Network	0.24
Zoning Classification	Special	Major River	0.16
Nearby Potential Acreage (acre)	96.05	Transmission Line	0.00
Ruggedness Rating	4 = Moderately rugged	Substation	0.35
Brownfield Designation	Presumptive	Natural Gas Pipeline	0.10
On-Site Contamination	Confirmed	Broadband	2.59
Groundwater Contamination	Confirmed	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Relatively low	Wastewater Treatment Facility	0.23
FEMA Flood Hazard	0.2% Annual chance	Brownfield Site	14.10
Population Within 30 Miles	~353,425		

4.10 Jefferson Smurfit Corp JSC

Located at 5000 E Flat Rock Rd, Philadelphia, PA 19127 (coordinates 40°01'59.4"N 75°14'11.4"W), this former fuel oil peaker plant located on Venice Island in the Schuylkill River retired in 2004 and has a retired capacity of 12 MW (see Figure 26 and Table 15). The site was acquired in 2021 by a redevelopment entity (MontCo Today, 2021) and legacy buildings and equipment have been cleared. The site has been decommissioned, but its remediation status is unknown. The 27.9-acre site is on Venice Island on the outskirts of Philadelphia. It and an additional 2.5 acres of adjacent land are zoned for industrial use and rated as slightly rugged. The site is not classified as a presumptive brownfield, and there is no known soil or groundwater contamination. FEMA designates the site as having a relatively low natural hazard risk but being in a floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. The site has access to the river and to the rail system, and major roads are ~1 mile away. The site has access to transmission lines and a substation, and a natural gas pipeline runs ~4 miles away. The nearest broadband installation is ~4.5 miles away. The nearest generator is 6.5 miles away. The site is 57 miles away from the Marcellus shale formation. A wastewater treatment plant is ~4 miles away, but the nearest brownfield is ~1 mile away. There are ~4,061,232 people within 30 miles of the site.



Figure 26 Satellite imagery of Jefferson Smurfit Corp JSC original site (NASA Earthdata Search, n.d.).

Table 15 Jefferson Smurfit Corp JSC details

Jefferson Smurfit Corp JSC			
5000 E Flat Rock Rd, Philadelphia, PA 19127			
40°01'59.4"N 75°14'11.4"W			
Plant Retirement Year	2004	Approximate Distance (miles) to	
Parcel Acreage (acre)	27.94	Major Road	0.58
Retired Capacity (MW)	12	Rail Network	0.01
Zoning Classification	Industrial	Major River	0.14
Nearby Potential Acreage (acre)	2.53	Transmission Line	0.08
Ruggedness Rating	2 = Slightly rugged	Substation	0.00
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	4.15
On-Site Contamination	None known	Broadband	4.41
Groundwater Contamination	None known	Marcellus Shale Formation	57.18
FEMA Natural Hazards Risk	Relatively low	Wastewater Treatment Facility	4.04
FEMA Flood Hazard	Floodway	Brownfield Site	0.95
Population Within 30 Miles	~4,061,232		

4.11 Jenkins

Located at no specific address but at coordinates 41°16'56.6"N 75°48'59.2"W, this former fuel oil peaker plant located next to Laflin retired in 2022 and has a retired capacity of 32 MW (see Figure 27 and Table 16). The site is cleared and ready for redevelopment. The 34.2-acre site is located between Laflin and Hudson, PA. The site has been decommissioned, but its remediation status is unknown. It and an additional 5.5 acres of adjacent land are zoned for industrial use and rated as intermediately rugged. The site is not classified as a potential brownfield, but there is no known soil or groundwater contamination. FEMA designates the site as having a relatively moderate natural hazard risk but minimal flood risk. The parcel and nearby parcels are located within or adjacent to a confirmed underground mining area and are, therefore, considered to have elevated mine subsidence potential. Rail access is ~0.5 miles away; a major road is ~1 mile away, and river access is ~1.5 miles away. The site is close to transmission lines, a substation, and a natural gas pipeline. The nearest broadband installation is ~14.5 miles away. The nearest generator is ~14 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~5 miles away, and the nearest brownfield is ~2 miles away. There are ~707,864 people within 30 miles of the plant.



Figure 27 Satellite imagery of Jenkins original site (NASA Earthdata Search, n.d.).

Table 16 Jenkins details

Jenkins			
No Address			
41°16'56.6"N 75°48'59.2"W			
Plant Retirement Year	2022	Approximate Distance (miles) to	
Parcel Acreage (acre)	34.15	Major Road	1.06
Retired Capacity (MW)	32	Rail Network	0.31
Zoning Classification	Industrial	Major River	1.56
Nearby Potential Acreage (acre)	5.48	Transmission Line	0.00
Ruggedness Rating	3 = Intermediately rugged	Substation	0.08
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	0.55
On-Site Contamination	None known	Broadband	14.55
Groundwater Contamination	None known	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Relatively moderate	Wastewater Treatment Facility	4.94
FEMA Flood Hazard	Minimal	Brownfield Site	2.23
Population Within 30 Miles	~707,864		

4.12 Lock Haven (PENNPOW)

Located at no specific address but at coordinates 41°07'08.0"N 77°28'15.7"W, this former fuel oil peaker plant located across Bald Eagle Creek from Flemington PA retired in 2022 and has a retired capacity of 18.5 MW (see Figure 28 and Table 17). Pennsylvania Power and Light Co. has plans to rebuild the lock haven substation and Sunbury–Lock Haven 69-kV line here. The 34-acre site is located between Flemington and Mill Hall. The site is decommissioned, but its remediation status is unknown. It is zoned for commercial use and rated as nearly level. The site is not classified as a presumptive brownfield, and there is no known soil or groundwater contamination. FEMA designates the site as having a relatively low natural hazard risk but sitting in a floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. The site has easy major road and rail access, and river access is ~2.5 miles away. The site has immediate access to transmission lines and a substation, but a natural gas pipeline is ~11 miles away. The nearest broadband installation is ~20 miles away. The nearest generator is ~33 miles away. The site sits ~1 mile from the Marcellus shale formation. The nearest wastewater treatment plant and brownfield are ~2 miles away. There are ~239,464 people within 30 miles of the site.

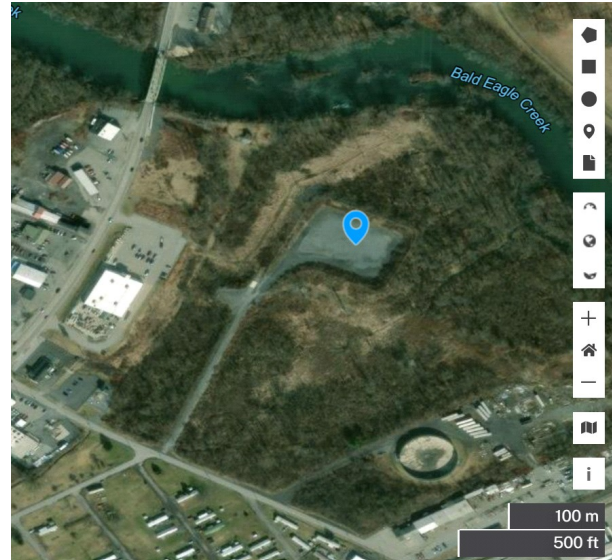


Figure 28 Satellite imagery of Lock Haven (PENNPOW) original site (NASA Earthdata Search, n.d.).

Table 17 Lock Haven (PENNPOW) details

Lock Haven (PENNPOW)			
No Address			
41°07'08.0"N 77°28'15.7"W			
Plant Retirement Year	2022	Approximate Distance (miles) to	
Parcel Acreage (acre)	33.97	Major Road	0.25
Retired Capacity (MW)	18.5	Rail Network	0.23
Zoning Classification	Commercial	Major River	2.42
Nearby Potential Acreage (acre)	0	Transmission Line	0.00
Ruggedness Rating	1 = Nearly level	Substation	0.00
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	11.34
On-Site Contamination	None known	Broadband	20.32
Groundwater Contamination	None known	Marcellus Shale Formation	0.88
FEMA Natural Hazards Risk	Relatively low	Wastewater Treatment Facility	2.22
FEMA Flood Hazard	Floodway	Brownfield Site	2.12
Population Within 30 Miles	~239,464		

4.13 Martins Creek LLC Harwood (PA)

Located at no specific address but at coordinates 40°56'07.0"N 76°01'42.4"W, this former fuel oil peaker plant located southwest of Hazelton, PA, retired in 2022 and has a retired capacity of 32 MW (see Figure 29 and Table 18). The cleared land looks to have been purchased by a private company and is being used by a truck and repair service, but the adjacent parcel contains a PPL substation and has available land. The site has been decommissioned, but its remediation status is unknown. The 27-acre site is located along Interstate 81. It and 12.7 adjacent acres are zoned for commercial activity and rated as intermediately rugged. The site is not classified as a potential brownfield, and there is no known soil or groundwater contamination. FEMA designates the site as having a relatively low natural hazard risk and minimal flooding risk. The parcel and nearby parcels are located within or adjacent to a confirmed underground mining area and are, therefore, considered to have elevated mine subsidence potential. Rail access is ~1 mile away; it sits by a major road, and it is ~11 miles from river access. Transmission lines, a substation, and a natural gas pipeline are all within 1 mile of the site. The nearest broadband installation is ~10 miles away. The nearest generator is ~1 mile away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~2.5 miles away, and the nearest brownfield is ~2 miles away. There are ~678,147 people within 30 miles of the site.

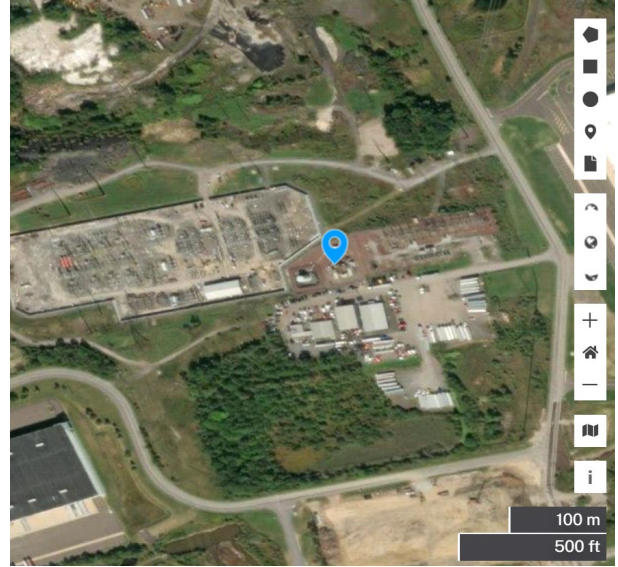


Figure 29 Satellite imagery of Martins Creek LLC Harwood (PA) original site (NASA Earthdata Search, n.d.).

Table 18 Martins Creek LLC Harwood (PA) details

Martins Creek LLC Harwood (PA)		
No Address		
40°56'07.0"N 76°01'42.4"W		
Plant Retirement Year	2022	Approximate Distance (miles) to
Parcel Acreage (acre)	26.95	Major Road 0.23
Retired Capacity (MW)	32	Rail Network 1.15
Zoning Classification	Commercial	Major River 11.09
Nearby Potential Acreage (acre)	12.68	Transmission Line 0.00
Ruggedness Rating	3 = Intermediately rugged	Substation 0.12
Brownfield Designation	Not Presumptive	Natural Gas Pipeline 0.87
On-Site Contamination	None known	Broadband 10.00
Groundwater Contamination	None known	Marcellus Shale Formation 0.00
FEMA Natural Hazards Risk	Relatively low	Wastewater Treatment Facility 2.46
FEMA Flood Hazard	Minimal	Brownfield Site 1.86
Population Within 30 Miles	~678,147	

4.14 Milesburg

Located at 285 Commercial St, Milesburg, PA 16853 (coordinates 40°56'26.4"N 77°47'21.4"W), this former fuel oil peaker plant retired in 1984 and has a retired capacity of 46 MW (see Figure 30 and Table 19). The land is cleared and has no plans for redevelopment currently. The 9.7-acre site is located near the intersection of Interstate 80 and Interstate 99. The site has been decommissioned, but its remediation status is unknown. It and 15.3 acres of adjacent available land is zoned for industrial use and rated as level ground. The site is not classified as a presumptive brownfield, but it has been confirmed to have soil contamination while groundwater contamination has not been determined. FEMA designates the site as having a relatively low natural hazard risk but sitting in a floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. Rail access and major roads are easily accessible at the site, but the nearest major river access is ~18.5 miles away. The site has easily accessible transmission lines and a substation, but the nearest natural gas pipeline is ~1.5 miles away. The nearest broadband installation is 9.5 miles away. The nearest generator is ~27 miles away. The site is ~1 mile from the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is ~5 miles away. There are ~267,976 people within 30 miles of the site.

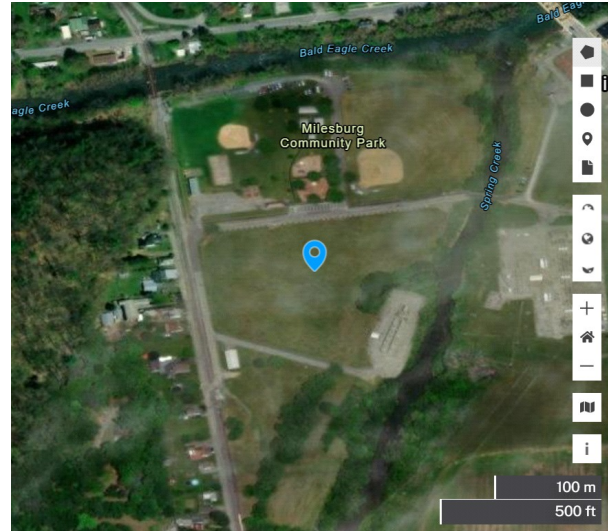


Figure 30 Satellite imagery of Milesburg original site (NASA Earthdata Search, n.d.).

Table 19 Milesburg details

Milesburg			
285 Commercial St, Milesburg, PA 16853			
40°56'26.4"N 77°47'21.4"W			
Plant Retirement Year	1984	Approximate Distance (miles) to	
Parcel Acreage (acre)	9.66	Major Road	0.02
Retired Capacity (MW)	46	Rail Network	0.18
Zoning Classification	Industrial	Major River	18.69
Nearby Potential Acreage (acre)	15.28	Transmission Line	0.00
Ruggedness Rating	0 = Level	Substation	0.01
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	1.31
On-Site Contamination	Confirmed	Broadband	9.51
Groundwater Contamination	TBD	Marcellus Shale Formation	0.94
FEMA Natural Hazards Risk	Relatively low	Wastewater Treatment Facility	1.20
FEMA Flood Hazard	Floodway	Brownfield Site	4.87
Population Within 30 Miles	~267,976		

4.15 Mitchell Power Station

Located at 50 Electric Way, New Eagle, PA 15067 (coordinates 40°13'16.6"N 79°58'07.9"W), this former coal plant by Courtney, PA, on the banks of the Monongahela River retired in 2013 and has a retired capacity of 448.6 MW (see Figure 31 and Table 20). The land is partially cleared, but some of the plant structures remain on the site. The 26.6-acre site is located north of the intersection between Interstate 70 and State Highway 43. Decommissioning has not started, and its remediation has not yet begun. It and 278.7 acres of nearby undeveloped land under common ownership are zoned for industrial use and rated as moderately rugged land. According to the PA DCED decommissioning and redevelopment playbook, the broader Mitchell Power Station and adjacent Canestrone properties comprise ~856 acres in cohesive ownership available for redevelopment (PA DCED, 2018). The site is treated as a presumptive brownfield with confirmed contaminated soil and contaminated groundwater. FEMA designates the site as having a very low natural hazard risk but sitting in a floodway. The parcel is not located within or adjacent to a documented coal mining area and is, therefore, considered to have minimal mine subsidence potential; however, nearby parcels fall within a documented mineable coal area with confirmed underground mining activity and are, therefore, considered to have elevated mine subsidence risk. Rail access, major roads, and water access are all easily accessible from the site. The site has access to transmission lines and a substation, and a natural gas pipeline runs ~0.5 miles away. The nearest broadband installation is ~1.5 miles away. The nearest generator is ~14.5 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~1.5 miles away, and the nearest brownfield is 3.5 miles away. There are ~1,869,316 people within 30 miles of the site.



Figure 31 Satellite imagery of Mitchell Power Station original site (NASA Earthdata Search, n.d.).

Table 20 Mitchell Power Station details

Mitchell Power Station			
50 Electric Way, New Eagle, PA 15067			
40°13'16.6"N 79°58'07.9"W			
Plant Retirement Year	2013	Approximate Distance (miles) to	
Parcel Acreage (acre)	26.63	Major Road	0.18
Retired Capacity (MW)	448.6	Rail Network	0.04
Zoning Classification	Industrial	Major River	0.22
Nearby Potential Acreage (acre)	278.74	Transmission Line	0.00
Ruggedness Rating	4 = Moderately rugged	Substation	0.03
Brownfield Designation	Presumptive	Natural Gas Pipeline	0.47
On-Site Contamination	Confirmed	Broadband	1.26
Groundwater Contamination	Confirmed	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	1.38
FEMA Flood Hazard	Floodway	Brownfield Site	3.36
Population Within 30 Miles	~1,869,316		

4.16 North East Cogeneration Plant

Located at 10915 Ackerman Ln, North East, PA 16428 (coordinates 42°12'07.5"N 79°50'33.1"W), this former natural gas plant near Lake Erie retired in 2010 and has a retired capacity of 157.8 MW (see Figure 32 and Table 21). The buildings on site, which also houses a non-operating Welch's Food plant, have not altered since the plant retired. The 15.4-acre site is located north of the intersection of Interstate 90 and State Highway 89. Site decommissioning has not started, and its remediation status is unknown. It and 55 acres of nearby land are zoned for industrial use and are rated as slightly rugged. FEMA designates the site as having a very low natural hazard and minimal flooding risk. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. Rail access and major roads are easily accessible from the site, but major water access is ~2 miles away.



Figure 32 Satellite imagery of North East Cogeneration Plant original site (NASA Earthdata Search, n.d.).

The site has easy access to transmission lines, a substation, and natural gas pipelines. The nearest broadband installation is ~7.5 miles away. The nearest generator is ~29 miles away. The site sits ~1 mile from the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is ~16 miles away. There are ~269,868 people within 30 miles of the site.

Table 21 North East Cogeneration Plant details

North East Cogeneration Plant			
10915 Ackerman Ln, North East, PA 16428			
42°12'07.5"N 79°50'33.1"W			
Plant Retirement Year	2010	Approximate Distance (miles) to	
Parcel Acreage (acre)	15.35	Major Road	0.16
Retired Capacity (MW)	157.8	Rail Network	0.35
Zoning Classification	Industrial	Major River	1.80
Nearby Potential Acreage (acre)	54.96	Transmission Line	0.00
Ruggedness Rating	2 = Slightly rugged	Substation	0.03
Brownfield Designation	Not presumptive	Natural Gas Pipeline	0.06
On-Site Contamination	None known	Broadband	7.46
Groundwater Contamination	None known	Marcellus Shale Formation	0.91
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	1.21
FEMA Flood Hazard	Minimal	Brownfield Site	16.05
Population Within 30 Miles	~269,868		

4.17 Piney Creek

Located at 336 Power Ln, Clarion, PA 16214 (coordinates 41°10'40.8"N 79°26'32.0"W), this former coal plant near Williamsburg, PA, retired in 2013 and has a retired capacity of 36.2 MW (see Figure 33 and Table 22). The structures have been largely cleared, and there are no current plans for redevelopment. The 87.8-acre site is located southwest of the intersection of Interstate 80 and State Highway 68. The site is decommissioned, but its remediation status is unknown. It and 112.7 acres of nearby land are not zoned and rated as moderately rugged land. The site is treated as a presumptive brownfield, while soil and groundwater contamination are TBD. FEMA designates the site as having a very low natural hazard risk and minimal flooding risk. The parcel is designated as having possible mine subsidence potential, as it is located within or adjacent to a known coal mining area without confirmed historical mining activities; however, nearby parcels fall within a documented mineable coal area with confirmed underground mining activity and are, therefore, considered to have elevated mine subsidence risk. Rail access is ~2.5 miles away, and major roads are ~1.5 miles away. Major river access is ~12.5 miles away. Transmission lines and a substation are easily accessible on site, and a natural gas pipeline runs ~4 miles away. The nearest broadband installation is ~2 miles away. The nearest generator is ~20.5 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~2.5 miles away, but the nearest brownfield is ~19 miles away. There are ~186,781 people within 30 miles of the site.

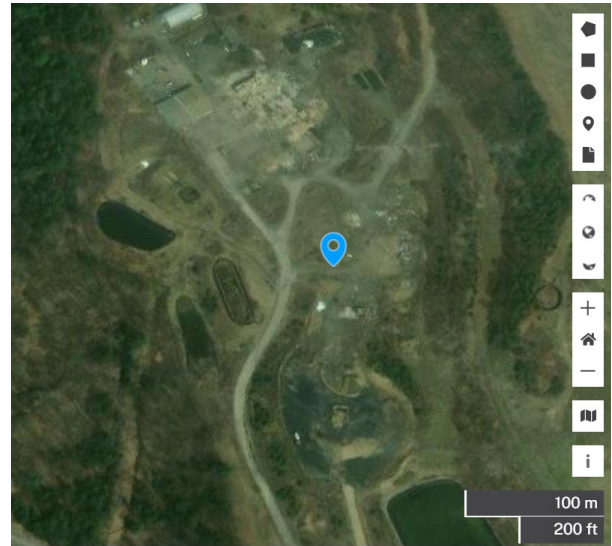


Figure 33 Satellite imagery of Piney Creek original site (NASA Earthdata Search, n.d.).

Table 22 Piney Creek details

Piney Creek			
336 Power Ln, Clarion, PA 16214			
41°10'40.8"N 79°26'32.0"W			
Plant Retirement Year	2013	Approximate Distance (miles) to	
Parcel Acreage (acre)	87.81	Major Road	1.05
Retired Capacity (MW)	36.2	Rail Network	2.48
Zoning Classification	Special	Major River	12.41
Nearby Potential Acreage (acre)	112.74	Transmission Line	0.00
Ruggedness Rating	4 = Moderately rugged	Substation	0.00
Brownfield Designation	Presumptive	Natural Gas Pipeline	3.97
On-Site Contamination	TBD	Broadband	1.71
Groundwater Contamination	TBD	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	2.51
FEMA Flood Hazard	Minimal	Brownfield Site	18.76
Population Within 30 Miles	~186,781		

4.18 Stanton (PA)

Located at 1733 PA-92, Harding, PA 18643 (coordinates 41°22'32.3"N 75°47'50.7"W), this former coal plant near Pittston, PA, retired in 1990 and has a retired capacity of 140 MW (see Figure 34 and Table 23). Since retirement, a portion of the site was redeveloped; the remaining land is available and needs to be cleared for redevelopment. The 152-acre site is located north of Pittston along State Highway 92 along the banks of the Susquehanna River. The site has been decommissioned and remediated. It and 365.5 acres of adjacent land are zoned for industrial use and rated as intermediately rugged. The site is classified as a presumptive brownfield; it has been confirmed as having been remediated after soil contamination, while groundwater contamination is TBD. FEMA designates the site as having a very low natural hazard risk but sitting in a floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. Rail access, major road access, and river access are all easily accessible from the site. Transmission lines and a substation are accessible from the site. The nearest natural gas pipeline runs ~5 miles away. The nearest broadband installation is ~10.5 miles away. The nearest generator is ~27 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~2 miles away, and the nearest brownfield is ~3 miles away. There are ~622,373 people within 30 miles of the site.



Figure 34 Satellite imagery of Stanton (PA) original site (NASA Earthdata Search, n.d.).

Table 23 Stanton (PA) details

Stanton (PA)			
1733 PA-92, Harding, PA 18643			
41°22'32.3"N 75°47'50.7"W			
Plant Retirement Year	1990	Approximate Distance (miles) to	
Parcel Acreage (acre)	152	Major Road	0.61
Retired Capacity (MW)	140	Rail Network	0.20
Zoning Classification	Industrial	Major River	0.48
Nearby Potential Acreage (acre)	365.45	Transmission Line	0.00
Ruggedness Rating	3 = Intermediately rugged	Substation	0.13
Brownfield Designation	Presumptive	Natural Gas Pipeline	5.20
On-Site Contamination	Confirmed - remediated	Broadband	10.60
Groundwater Contamination	TBD	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	2.08
FEMA Flood Hazard	Floodway	Brownfield Site	2.93
Population Within 30 Miles	~622,373		

4.19 Wayne (PA)

Located at 3590 Franklin Pike, Cochran, PA 16314 (coordinates 41°30'53.1"N 80°00'37.1"W), this former fuel oil peaker plant retired in 2004 and has a retired capacity of 53 MW (see Figure 35 and Table 24). Since retirement, the site has been cleared while keeping a substation on the property. The 53-acre site is located near the intersection of State Highway 173 and US-322. The site is decommissioned, but its remediation status is unknown. It and 0.8 acres of adjacent land are not zoned and rated as slightly rugged. The site is not classified as a presumptive brownfield, and there is no known soil or groundwater contamination. FEMA designates the site as having a relatively moderate natural hazard risk and minimal flooding risk. The parcel and nearby parcels are designated as having possible mine subsidence potential, as they are located within or adjacent to a known coal mining area; however, no publicly accessible PA DEP records were identified to confirm that mining activities occurred on the site. Rail and water access all fall within 2 miles of the site; a major roadway is within 1 mile. Transmission lines and a substation are accessible on site; a natural gas line runs ~2 miles away. The nearest broadband installation is ~3.5 miles away. The closest generator is ~19 miles away. The site sits on the Marcellus shale formation. The nearest wastewater treatment plant is ~4 miles away, and the nearest brownfield is ~16 miles away. There are ~236,732 people within 30 miles of the site.



Figure 35 Satellite imagery of Wayne (PA) original site (NASA Earthdata Search, n.d.).

Table 24 Wayne (PA) details

Wayne (PA)			
3590 Franklin Pike, Cochran, PA 16314			
41°30'53.1"N 80°00'37.1"W			
Plant Retirement Year	2004	Approximate Distance (miles) to	
Parcel Acreage (acre)	53.02	Major Road	0.78
Retired Capacity (MW)	53	Rail Network	1.58
Zoning Classification	Special	Major River	1.74
Nearby Potential Acreage (acre)	0.83	Transmission Line	0.00
Ruggedness Rating	2 = Slightly rugged	Substation	0.09
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	2.23
On-Site Contamination	None known	Broadband	3.55
Groundwater Contamination	None known	Marcellus Shale Formation	0.00
FEMA Natural Hazards Risk	Relatively moderate	Wastewater Treatment Facility	3.67
FEMA Flood Hazard	Minimal	Brownfield Site	15.73
Population Within 30 Miles	~236,732		

4.20 West Shore

Located at 1421 Arcona Rd, Mechanicsburg, PA 17055 (coordinates 40°11'26.8"N 76°56'45.8"W), this former fuel oil peaker plant retired in 2022 and has a retired capacity of 37 MW (see Figure 36 and Table 25). Since retirement, the site has been cleared, and no plans have been made regarding its use. The 19.3-acre site is located south of Interstate 76 east of its intersection with US-15 south of Harrisburg. The site is decommissioned, but the remediation status is unknown. It is zoned for single family rural residential use, but 25.1 available acres adjacent to it are zoned for neighborhood commercial use; they are rated as nearly level. The site is not classified as a presumptive brownfield, and there is no known soil or groundwater contamination. FEMA designates the site as having a very low natural hazard risk and minimal flooding risk. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. The site has easy access to rail and major roadways, but river access is ~5 miles away. Transmission lines and a substation are present on site. A natural gas pipeline is ~5.5 miles away. The nearest broadband installation is ~3 miles away. The nearest generator is ~15 miles away. The site is ~10 miles from the Marcellus shale formation. A wastewater treatment plant is ~2 miles away, and a brownfield is ~4.5 miles away. There are ~1,258,133 people within 30 miles of the site.



Figure 36 Satellite imagery of West Shore original site (NASA Earthdata Search, n.d.).

Table 25 West Shore details

West Shore			
1421 Arcona Rd, Mechanicsburg, PA 17055			
40°11'26.8"N 76°56'45.8"W			
Plant Retirement Year	2022	Approximate Distance (miles) to	
Parcel Acreage (acre)	19.25	Major Road	0.47
Retired Capacity (MW)	37	Rail Network	0.14
Zoning Classification	Residential	Major River	5.30
Nearby Potential Acreage (acre)	25.07	Transmission Line	0.01
Ruggedness Rating	1 = Nearly level	Substation	0.01
Brownfield Designation	Not Presumptive	Natural Gas Pipeline	5.63
On-Site Contamination	None known	Broadband	2.89
Groundwater Contamination	None known	Marcellus Shale Formation	9.63
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	2.22
FEMA Flood Hazard	Minimal	Brownfield Site	4.57
Population Within 30 Miles	~1,258,133		

4.21 Williamsburg

Located at 774 Juniata River Rd, Williamsburg, PA 16693 (coordinates 40°28'13.7"N 78°12'27.8"W), this former coal plant retired in 1990 and has a retired capacity of 43.3 MW (see Figure 37 and Table 26). The site is owned by the Williamsburg Borough and needs to be cleared for development aside from a substation. The 37.9-acre site is located north of Williamsburg, which is just off US-22. It and an adjacent 4.3-acre site is not zoned and rated as moderately rugged. It is treated as a presumptive brownfield with confirmed soil contamination and groundwater contamination TBD. FEMA designates the site as having a very low natural hazard risk but in a floodway. The parcel and nearby parcels are not located within or adjacent to a documented coal mining area and are, therefore, considered to have minimal mine subsidence potential. Access to the rail system is ~8 miles away; major roads are ~2.5 miles away, and river access is ~6 miles away. The nearest transmission lines are ~2.5 miles away, and the nearest substation is ~6 miles away. The nearest natural gas lines are ~10 miles away. The nearest broadband installation is adjacent to the site. The nearest generator is ~20 miles away. The site is ~10 miles away from the Marcellus shale formation. The nearest wastewater treatment plant is ~1 mile away, and the nearest brownfield is ~12 miles away. There are ~347,184 people within 30 miles of the site.

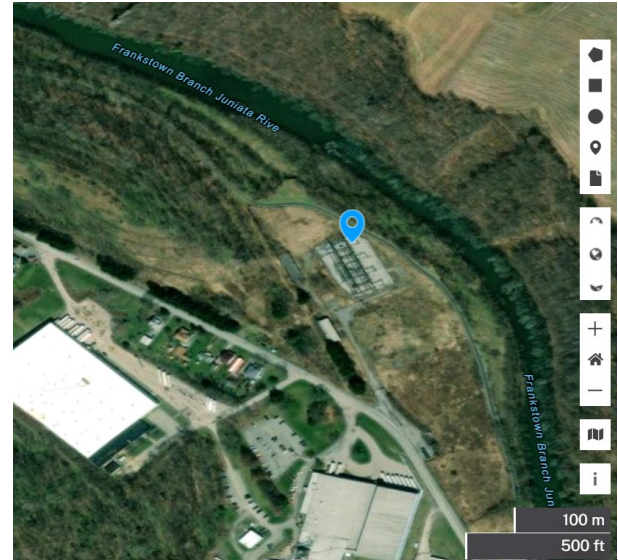


Figure 37 Satellite imagery of Williamsburg original site (NASA Earthdata Search, n.d.).

Table 26 Williamsburg details

Williamsburg			
774 Juniata River Rd, Williamsburg, PA 16693			
40°28'13.7"N 78°12'27.8"W			
Plant Retirement Year	1990	Approximate Distance (miles) to	
Parcel Acreage (acre)	37.93	Major Road	2.39
Retired Capacity (MW)	43.3	Rail Network	7.99
Zoning Classification	None Listed	Major River	6.11
Nearby Potential Acreage (acre)	4.29	Transmission Line	2.31
Ruggedness Rating	4 = Moderately rugged	Substation	6.22
Brownfield Designation	Presumptive	Natural Gas Pipeline	10.21
On-Site Contamination	Confirmed	Broadband	0.18
Groundwater Contamination	TBD	Marcellus Shale Formation	10.08
FEMA Natural Hazards Risk	Very low	Wastewater Treatment Facility	0.80
FEMA Flood Hazard	Floodway	Brownfield Site	12.19
Population Within 30 Miles	~347,184		



5. System and Transmission Assessment

5. System and Transmission Assessment

The objective of the system and transmission assessment is to evaluate the capability of the existing transmission network to support redevelopment of the selected decommissioned generation sites and to identify transmission limitations that may influence future development opportunities. The assessment combines transmission hosting capacity analysis with targeted scenario selection methodologies to evaluate how the bulk electric system responds to new generation injections and large load additions under a representative range of operating conditions. The PJM Regional Transmission Expansion Plan (RTEP) cases serve as the analytical foundation for the study, providing established transmission system configurations, generation dispatch assumptions, forecast demand levels, and planned network expansions that represent the conditions under which transmission adequacy is traditionally evaluated. These deterministic power flow cases provide a critical baseline for understanding expected system performance and identifying the transmission infrastructure available to support future redevelopment.

However, the redevelopment pathways considered in this study, including new generation resources, large industrial facilities, data centers, and pharmaceuticals, are not explicitly represented in the baseline planning cases and may significantly alter local and regional power flow patterns. To evaluate these impacts, a transmission hosting capacity framework is used to estimate the maximum amount of generation or load that can be accommodated while maintaining acceptable transmission system performance. The analysis accounts for the interactions among multiple candidate sites, transmission constraints, contingency conditions, and generation redispatch assumptions, recognizing that transmission capability is a shared network resource. While deterministic RTEP cases remain the primary basis for evaluation, supplemental scenario selection techniques are applied to identify additional operating conditions that may be important from a transmission perspective. Rather than performing a fully probabilistic assessment, these methods use statistical analysis of system operating conditions to identify representative and potentially critical scenarios that complement the deterministic planning framework. Together, the deterministic planning cases and supplemental scenarios provide a balanced foundation for evaluating transmission adequacy and redevelopment potential across the candidate sites.

The outcome of this analysis will be aggregate injections or withdrawals of power at transmission substations in PA across the studied scenarios. The upper and lower bounds of the aggregate injections and withdrawals will be used to characterize the transmission hosting capacity at the deactivated generation sites identified in Chapter 2 of this report. Given the confidential nature of transmission system information and data (network data is classified as Critical Energy Infrastructure Information), this chapter intends to present an overview of the methodology used to determine the optimal hosting capacity and the system conditions (i.e., generation and load levels) under which the assessments were completed. Results will be related back to the deactivated sites and used as an additional attribute in the final site prioritization process.

5.1 Adequacy of Transmission Infrastructure

Historically, transmission planning has focused on ensuring that the electric grid can reliably serve forecast demand while maintaining compliance with applicable reliability and planning criteria under a defined set of operating conditions and contingency events. Transmission expansion decisions were typically driven by a combination of reliability requirements, anticipated load growth, and the need to interconnect large generation facilities. While these objectives remain fundamental, the pace and nature of system development are evolving rapidly. Increasing levels of renewable generation development, accelerated electrification, large industrial facilities, data centers, hydrogen production, and other energy-intensive economic development initiatives are creating unprecedented demand for access to the transmission system. At the same time, transmission expansion timelines often lag the pace of new

generation and load development, creating increasing pressure on existing infrastructure and highlighting the need to better understand the available capability of the transmission network.

These trends have elevated transmission adequacy from a traditional reliability consideration to a broader planning challenge focused on determining how much additional development can realistically be supported by existing infrastructure. In this context, transmission adequacy refers to the capability of the transmission network to accommodate additional injections or withdrawals of power while maintaining acceptable system performance and satisfying applicable planning criteria. While transmission adequacy alone does not determine the feasibility of a specific project, it provides an important indication of whether available transmission capability is likely to support or limit future development opportunities.

The concept of transmission hosting capacity has emerged as a practical means of quantifying transmission adequacy under these evolving system conditions. Whereas traditional studies often focus on a single proposed point of interconnection, hosting capacity analysis evaluates the capability of the transmission system itself and seeks to determine how much new generation or load can be accommodated before operational limits become binding. This provides a planning-oriented perspective that is particularly valuable when evaluating multiple potential development opportunities across a region rather than assessing a single project in isolation.

An important aspect of transmission adequacy is the recognition that transmission capability is fundamentally a shared network resource. Additional power injections or withdrawals at one location can affect flows throughout the interconnected system, often utilizing the same transmission corridors and reactive power resources as developments located elsewhere. As a result, evaluating locations independently can overstate the amount of capacity that may ultimately be available across a broader area. Assessments that consider multiple locations simultaneously provide a more representative understanding of how available transmission capability is distributed across competing development opportunities and how transmission constraints emerge as development levels increase.

This consideration is particularly relevant for the PATER assessment, which evaluates a portfolio of decommissioned generation sites that may support a variety of redevelopment pathways. Many of these sites possess existing electrical infrastructure and historical transmission interconnection characteristics that make them attractive candidates for future development. However, the suitability of a site cannot be determined solely based on the transmission facilities located within the site boundary. The capability of the surrounding transmission network, the prevailing power flow conditions, and the availability of transfer capability throughout the broader system all influence the amount and type of development that may be accommodated. Consequently, a robust assessment of transmission adequacy requires explicit evaluation of network behavior under representative operating conditions rather than reliance on infrastructure proximity alone.

To address this need, the assessment applies an optimization-based transmission hosting capacity methodology to quantify the capability of the existing transmission network to support future redevelopment. The analysis considers both generation hosting capacity and load hosting capacity, recognizing that future redevelopment could involve new generation resources, large industrial loads, data centers, hydrogen production facilities, or hybrid configurations that combine multiple uses. The methodology evaluates the interaction between candidate redevelopment locations, transmission system constraints, contingency conditions, and generator redispatch assumptions to determine the maximum additional capacity that can be accommodated while maintaining acceptable transmission system performance.

Rather than simply identifying whether transmission constraints exist, the assessment seeks to quantify available capability and characterize the conditions under which constraints become limiting. This provides insight into the relative robustness of different redevelopment locations, the transmission facilities most likely to limit future growth, and the extent to which redevelopment potential is sensitive

to changing system conditions. The resulting hosting capacity estimates can then be considered alongside site attributes such as available acreage, transportation access, water availability, fuel access, and other redevelopment factors to provide a more comprehensive evaluation of future redevelopment potential.

Finally, the transmission adequacy assessment provides an important planning perspective beyond site screening alone. By identifying the facilities and operating conditions that constrain redevelopment opportunities, the analysis provides insight into where future transmission reinforcements, operational changes, or advanced transmission technologies could increase the capability of the network and expand redevelopment potential. In this manner, transmission adequacy serves not only as a measure of current system capability, but also as a means of informing future infrastructure investment and economic development strategies.

5.2 Selecting Representative Scenarios

As discussed in Chapter 5.1, transmission hosting capacity assessments increasingly require evaluation of system performance across a broader range of operating conditions than can be represented by a limited set of traditional planning snapshots. Growth in renewable generation, energy storage, electrification, large load additions, and weather-dependent resource variability has expanded the range of operating conditions that may influence transmission utilization and network performance. While chronological production cost and resource adequacy simulations can capture this diversity, they often produce thousands or millions of potential operating states, making comprehensive power flow evaluation impractical. The challenge, therefore, becomes identifying a manageable set of scenarios that adequately represent system behavior while preserving the conditions most relevant to transmission planning.

HiLS methodology addresses this challenge through a structured scenario reduction process that uses statistical analysis, machine learning, and clustering techniques to identify representative operating conditions from large simulation datasets. Rather than relying solely on traditional snapshot selection based on predefined criteria such as peak demand or minimum load, HiLS evaluates the broader population of operating states and groups conditions exhibiting similar system characteristics, including load distribution, generation dispatch patterns, renewable production levels, storage operation, and regional power transfers. Representative scenarios are then selected from each cluster to capture the dominant operating behaviors of the larger dataset while substantially reducing the number of cases requiring detailed engineering analysis. A conceptual representation of the scenario reduction approach used by HiLS is seen in Figure 38.

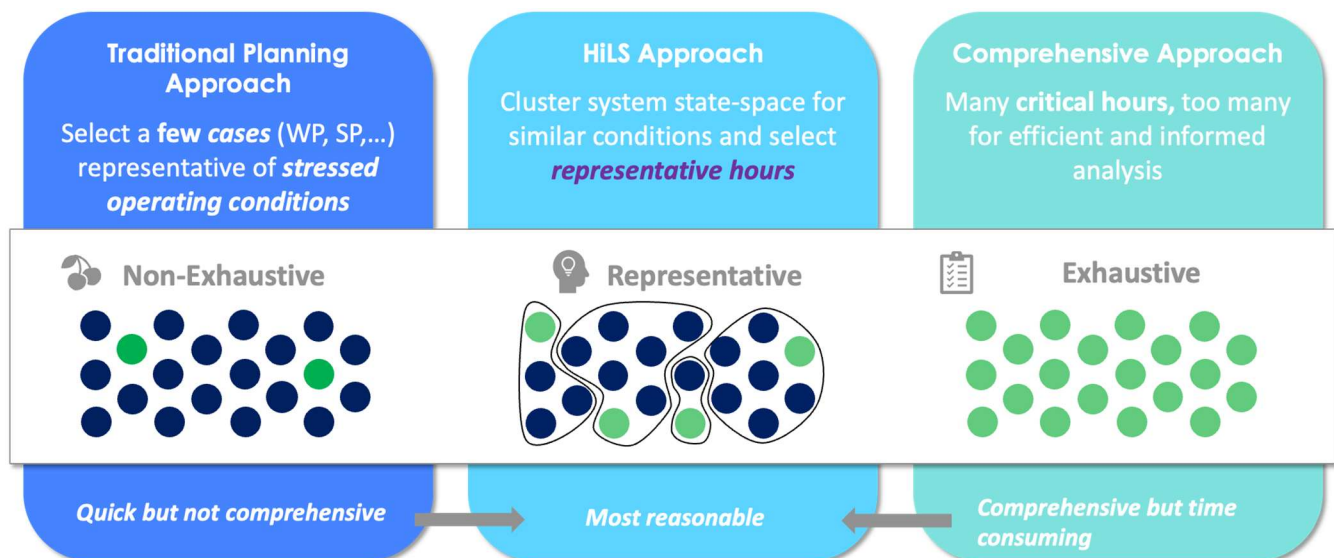


Figure 38 A HiLS approach compared to traditional and comprehensive scenario assessments.

For transmission hosting capacity assessments, HiLS serves as a decision-support framework that supplements deterministic planning cases, i.e., the RTEP seasonal peak power flows, by identifying additional operating conditions that may influence hosting capacity results. Transmission limitations associated with new generation injections or large load additions do not necessarily occur during conventional planning extremes and may instead emerge under conditions characterized by unique combinations of power transfers, renewable output, dispatch patterns, or localized load concentrations. By selecting representative scenarios from across the full range of modeled system conditions, HiLS enables a broader and more defensible evaluation of hosting capacity while maintaining manageable computational requirements. The resulting scenarios can be incorporated alongside traditional planning cases to provide a more comprehensive assessment of transmission adequacy and redevelopment potential. The results of this assessment will be made available in the Part B report.

5.3 Hosting Capacity Summary

The transmission hosting capacity assessment was performed to quantify the amount of new generation and load that could be accommodated at the candidate redevelopment sites under the system conditions identified through the deterministic and representative scenario assessment process. The methodology evaluates transmission network performance by incrementally introducing new injections or withdrawals at candidate locations while maintaining power balance through generator redispatch and monitoring network performance under applicable operating and contingency conditions. For each modeled scenario, the assessment seeks to identify the maximum level of development that can be accommodated before transmission system limitations become binding. The resulting hosting capacity values, therefore, represent a planning-level estimate of the transfer capability available to support redevelopment at each site under the assumptions reflected in the study cases.

The methodology is designed to evaluate multiple candidate redevelopment locations collectively rather than as independent studies. Because the transmission system operates as an interconnected network, the capacity available at one location is often influenced by development occurring elsewhere on the system. Evaluating sites individually can, therefore, overstate the total amount of development that may ultimately be accommodated. The optimization-based framework addresses this challenge by simultaneously evaluating candidate points of interconnection and determining how available transmission capability should be allocated across those locations to maximize overall system utilization while satisfying modeled transmission constraints. This approach allows the assessment to identify not only the hosting capacity of individual sites, but also the combinations of sites that produce the greatest overall utilization of the existing transmission network.

An important consideration in the development of the hosting capacity framework is assessing generation and load hosting separately. From a power-system perspective, generation injections and load withdrawals have fundamentally opposing impacts on power balance. If both generation and load were allowed to vary simultaneously with unrestricted degrees of freedom, the optimization could continuously offset new generation against new load, producing a large number of feasible solutions that satisfy the same transmission constraints. In such a formulation, incremental generation additions could be balanced by incremental load additions, obscuring the true limiting capability of the transmission network and making it difficult to determine whether the resulting hosting capacity was attributable to transmission capability, generation flexibility, or the simultaneous introduction of offsetting resources.

Consequently, a simultaneous optimization of unconstrained generation and load hosting would not provide a meaningful measure of either generation-hosting capacity or load hosting capacity. Instead, it would identify a potentially infinite set of combinations of injections and withdrawals capable of satisfying system balance and transmission constraints. For planning purposes, the objective of a hosting capacity assessment is to quantify the maximum capability of the transmission system to support a specific type of development. Generation and load hosting capacity were, therefore, evaluated independently. This

approach isolates the factors limiting each development pathway, allows transmission and resource adequacy constraints to be interpreted more clearly, and produces results that can be directly related to future redevelopment opportunities at the candidate sites.

Input Data and Setup

The hosting capacity assessment was conducted using the PJM 2025 Summer Peak RTEP planning case and focused on redevelopment opportunities within the five transmission planning areas that comprise PA in the PJM planning models: Allegheny Power (APS), Duquesne Light (DUQ), Pennsylvania Electric (PENELEC), PPL Electric Utilities (PPL), and PECO Energy Company (PECO). Candidate redevelopment sites were mapped to substations represented within the transmission planning models, with interconnections evaluated at both the high-voltage and low-voltage buses where applicable. A contingency screening process was applied to the original set of 2,548 contingencies, resulting in a reduced set of 131 critical contingencies for use in the hosting capacity assessments. This approach retained the transmission conditions most likely to influence redevelopment opportunities while reducing computational complexity.

The site selection process described in Chapter 3 provided 21 candidate locations at the deactivated generation sites. These sites were provided to PJM and were mapped to the nearest substation from the power flow model allowing candidate redevelopment locations to be represented consistently across both economic and transmission planning models. Because many substations contain multiple voltage levels, candidate interconnection points were identified at both lower-voltage and higher-voltage buses, providing a basis for evaluating how the location of an injection or withdrawal within the substation influences hosting capability (see Figure 39).

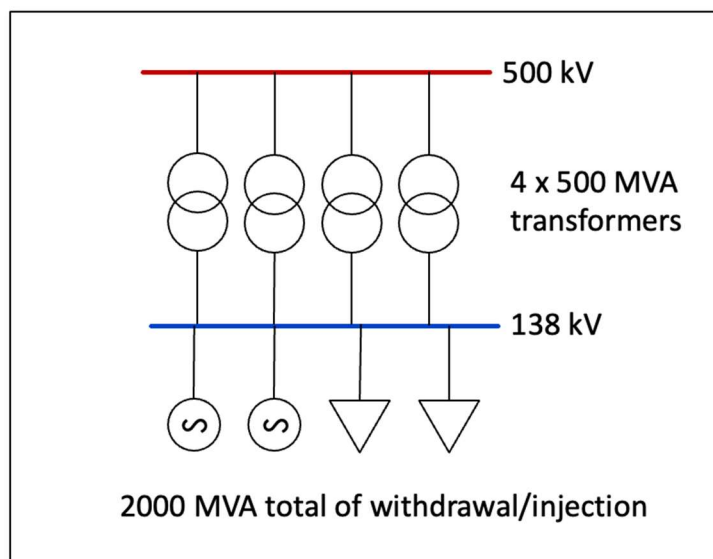


Figure 39 Example substation configuration.

The hosting capacity assessment evaluates both generation injection and load withdrawal by introducing new resources at these candidate interconnection points and assessing the resulting impacts on transmission system performance. In most cases, the lower-voltage bus represents the typical interconnection location because it reflects how generation and load are commonly connected to existing station infrastructure. However, hosting capability at the lower-voltage bus may be constrained by transformers and internal station facilities connecting the lower-voltage system to the bulk transmission network, meaning that the limiting factor may be local infrastructure rather than the broader transmission system.

To capture these differences, the assessment evaluates interconnections at both low-voltage and high-voltage buses. Connecting directly to the high-voltage network can provide access to a larger portion of the transmission system and may enable greater injections or withdrawals, but the resulting hosting capacity becomes more dependent on transmission network constraints and regional power flow conditions. By evaluating both high-voltage and lower-voltage interconnection configurations, the analysis provides a more comprehensive understanding of how existing substation infrastructure and bulk transmission limitations influence redevelopment potential at each candidate site.

Generation Hosting Capacity Analysis and Results

Optimization Objective

Two optimization objectives were evaluated throughout the generation hosting capacity assessment. The first objective focused on site utilization, which seeks to maximize the amount of generation capacity that can be allocated across the portfolio of redevelopment sites. This objective generally promotes a broader distribution of development opportunities throughout PA and is, therefore, most closely aligned with the redevelopment goals of the study.

The second objective focused on transmission network utilization, which seeks to maximize the amount of generation that can be injected into the transmission system regardless of how that capacity is distributed among redevelopment sites. Under this formulation, capacity may become concentrated at a smaller number of locations if doing so allows the transmission system to accommodate additional generation. The distinction between these objectives provides insight into the tradeoff between maximizing redevelopment opportunities across sites and maximizing utilization of the existing transmission network.

Both objectives are evaluated using the same transmission planning cases, contingency assessments, reliability criteria, and generator redispatch assumptions. The distinction between the two approaches lies solely in how the optimization allocates available hosting capacity across the candidate sites. Consequently, the comparison provides insight into the tradeoff between maximizing redevelopment opportunities across a broad portfolio of locations and maximizing the total amount of generation that can be accommodated by the existing transmission network.

In both optimization approaches, generation injections are constrained by transmission system limits under both normal and contingency conditions, as well as by the availability of generation redispatch required to maintain system balance. Limits are driven by how active power flow manifests as a result of the injections or withdrawals. Multiple combinations of generation allocations across the candidate sites can satisfy the optimization objectives. The hosting capacity values reported in this chapter represent the system-wide limit identified by the optimization and should, therefore, be interpreted as portfolio-level transmission hosting capacity rather than the maximum capability of any individual site. Additionally, site-specific factors such as acreage, environmental conditions, permitting requirements, or redevelopment costs are not considered in this hosting capacity assessment and are evaluated separately in Chapter 6.

Methodology

The generation hosting capacity assessment was developed using a progressive series of increasingly constrained evaluations intended to move from a theoretical transmission capability limit toward a representation of realistic system operations. A fundamental consideration in generation hosting studies is that new generation cannot be added to the system without reducing generation elsewhere to maintain load-generation balance. Power flow across the system must remain in balance; more specifically, in this scenario system, loading remains unchanged as new generation injections are introduced to the system. As such, existing generation across the system must be dispatched down to maintain power flow balance across the system. Consequently, hosting capacity is highly dependent upon assumptions regarding

generator redispatch and the amount of operational flexibility available within the existing generation fleet.

The initial assessment represented a theoretical upper bound in which all generators within PA were allowed to participate in redispatch. This unconstrained formulation effectively assumes unlimited flexibility and allows the optimization to identify the maximum amount of generation that could be accommodated if all resources were available to adjust output. Under these assumptions, more than 37 GW of generation hosting capability was identified, demonstrating that the aggregate capability of the transmission network significantly exceeds the operational flexibility available within the existing generation fleet. The resulting value of more than 37 GW should not be interpreted as a practical redevelopment opportunity within PA. Instead, it represents a theoretical upper bound that quantifies the amount of generation that could be accommodated if generation redispatch flexibility were effectively unlimited. In this formulation, any generator within PA can adjust its output to maintain system balance, allowing the optimization to isolate the transmission system response from operational limitations imposed by the generation fleet. The significance of this result is not the magnitude of the hosting capacity itself, but rather the insight that transmission infrastructure is not the primary limiting factor under these assumptions. Instead, the practical ability to absorb new generation becomes dependent on the availability of resources capable of reducing output elsewhere on the system.

The second assessment introduced additional operational constraints by fixing PA generation and allowing the PJM slack bus to serve as the balancing resource. In this formulation, generation outside the PA footprint absorbs the incremental injections, allowing the optimization to evaluate the transmission-limited hosting capability of the system. This case isolates the capability of the transmission network from generation adequacy considerations and quantifies the amount of generation that could theoretically be accommodated based solely on transmission constraints.

The final assessment incorporated engineering judgment regarding likely system operations and market behavior. Redispatch was restricted to flexible fossil-fueled resources located within PA, including combined-cycle units, combustion turbines, diesel generators, and qualifying fossil steam units. Large baseload resources, including nuclear generation, renewable resources, hydroelectric facilities, storage resources, and pumped-storage units, were excluded from redispatch participation. This progression from unconstrained flexibility to realistic dispatch assumptions allowed the assessment to incrementally introduce operational constraints while preserving the ability to understand the factors limiting redevelopment potential.

The available operational flexibility represented in this final case was quantified using the unused dispatch capability available among eligible generating units. Approximately 10.1 GW of downward redispatch capability was identified among the qualifying fossil fleet, with the majority derived from combined-cycle generation. This available headroom establishes the practical operational flexibility used to accommodate new generation injections and ultimately constrains the amount of additional generation that can realistically be interconnected within PA.

Generation Hosting Capacity Results

The results demonstrate that generation hosting capacity is strongly influenced by assumptions regarding generator flexibility and redispatch participation. Under the unconstrained redispatch formulation, more than 37 GW of generation hosting capability was identified. This result represents a theoretical transmission hosting limit rather than a realistic development outcome, as it assumes that all generators within PA can freely adjust output to accommodate new injections. The primary conclusion from this assessment is that the transmission network itself possesses significantly more capability than can realistically be utilized under expected operating conditions. Consequently, operational factors associated with generator redispatch, rather than transmission infrastructure alone, emerge as the dominant limiting factor as progressively more realistic system assumptions are introduced.

When the assessment was limited to transmission considerations and balanced through the PJM slack bus, hosting capacity ranged from ~12.9 GW under the site-utilization objective to ~15.8 GW under the transmission-utilization objective. These values represent the transmission-limited hosting capacity present in the planning case and provide an estimate of the aggregate transfer capability available within the network. The hosting distribution across the identified sites can be seen in Figure 40.

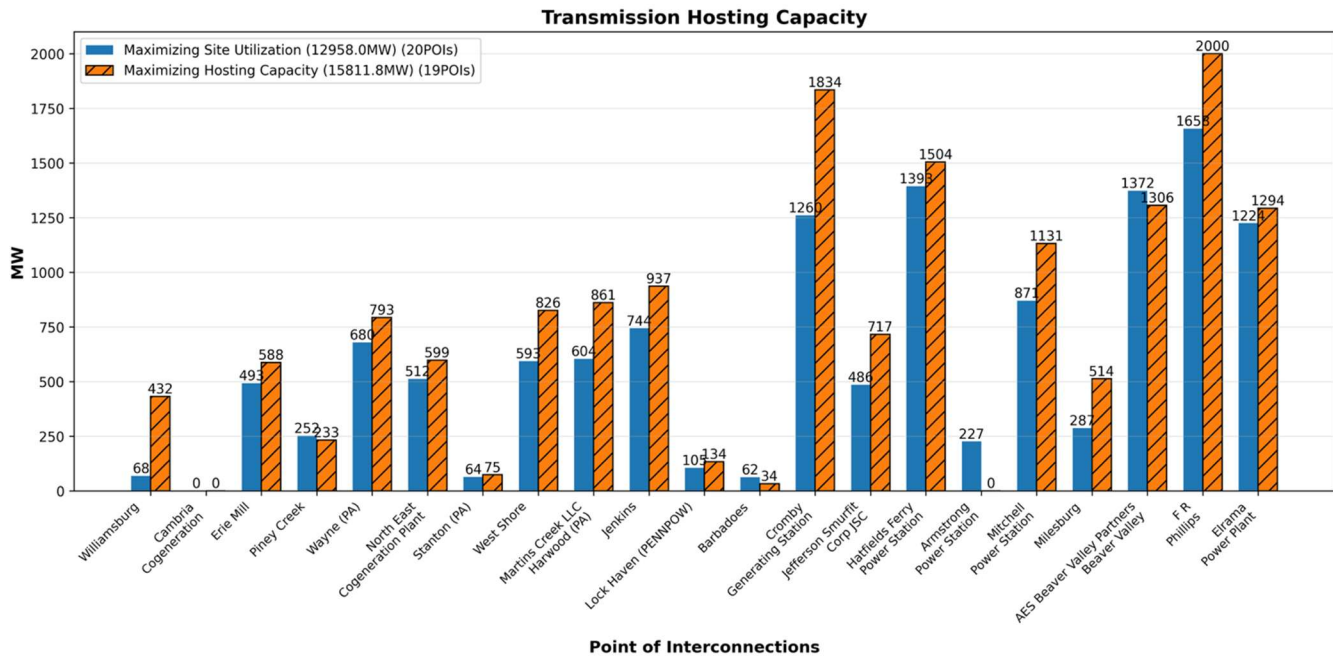


Figure 40 Generation hosting capacity under current network conditions.

This assessment captures the limits bounded by the available transmission capacity in the system. Additionally, the hosting distribution seen in Figure 40 is a function of the network optimization. As sites are prioritized further in the overall process, the combination of sites selected to host load and/or generation could result in new optimal distributions. From a planning perspective, these results indicate that the physical transmission network is capable of accommodating a significant amount of additional generation under the modeled system conditions. The relatively small difference between the site-utilization and transmission-utilization objectives suggests that multiple redevelopment pathways exist that can leverage existing transmission infrastructure. In practical terms, the transmission system itself does not emerge as the primary limiting factor at this stage of the analysis. Instead, the results indicate that sufficient transfer capability exists to support multiple redevelopment opportunities across the candidate sites before transmission constraints become broadly restrictive.

When more realistic operating assumptions are introduced, the practical generation hosting capability decreases to ~10 GW. Specifically, generation hosting capacity decreased to ~9.8 GW when maximizing site utilization and ~10.1 GW when maximizing transmission utilization. The distribution of hosting capacity is seen in Figure 41. This reduction does not reflect a lack of transmission infrastructure, but rather the operational limitations associated with maintaining system balance. While the transmission network appears capable of supporting more generation, only a portion of that capability can be practically utilized under expected operating conditions because existing generators must have sufficient flexibility to reduce output as new generation is added. As a result, the practical hosting capability identified in this study is governed by both transmission infrastructure and the operational characteristics of the generation fleet. It should be noted that this allocation of capacity is unique to the optimization that is targeted. As site attributes beyond transmission capability begin to factor into the prioritization process, a new combination of optimal hosting capacity for generation can be determined.

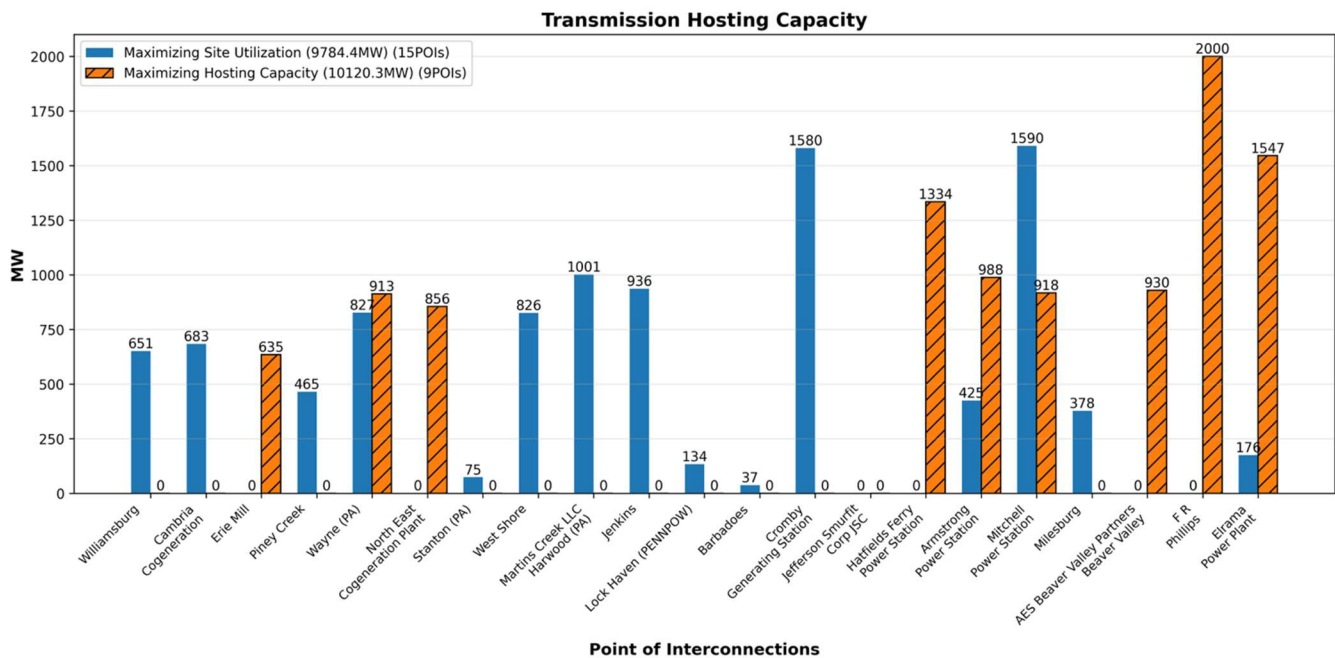


Figure 41 Generation hosting capacity distribution under assumed economic system performance.

The two optimization objectives should be viewed as alternative allocation strategies rather than independent scenarios. Both assessments evaluate the same transmission system under the same operating assumptions and constraints. The difference lies in whether available hosting capacity is distributed broadly across the portfolio of candidate sites or concentrated at a smaller number of locations to maximize overall system utilization. The relatively small difference in the resulting hosting capacities indicates that both strategies lead to similar system-wide outcomes, suggesting that the redevelopment opportunities identified in this study are reasonably robust to the specific optimization objective selected.

Load Hosting Capacity Analysis and Results

Optimization Objective

While the generation hosting capacity assessment evaluated both site utilization and transmission utilization objectives, the load hosting capacity assessment was developed with a different planning objective. For generation hosting, the distribution of generation across redevelopment sites influences both redevelopment opportunities and transmission system utilization, creating a meaningful distinction between maximizing site utilization and maximizing aggregate network utilization.

For large load interconnections, this distinction is less relevant. The objective of the load hosting assessment is not to maximize utilization across individual redevelopment sites but rather to determine the maximum amount of additional load that can be supported by the existing transmission system under a progressively broader set of generation supply assumptions. In the generation hosting assessment, the location of new injections is a primary driver of the resulting transmission limitations because injections redistribute active power flows throughout the network. As a result, different allocations of generation across the candidate redevelopment sites can lead to different transmission constraints and hosting capacity outcomes. This creates a meaningful distinction between objectives that prioritize broad utilization of redevelopment sites and those that prioritize maximum utilization of the transmission network.

For the load-hosting assessment, generation resources across the broader system are available to serve incremental load additions. Consequently, the primary planning question becomes how much aggregate

load can be accommodated before transmission or resource adequacy limitations become binding. While multiple allocations of load across the candidate sites may satisfy the optimization, the distinction between site utilization and transmission utilization is less pronounced because the objective is not to maximize utilization of individual locations, but rather to quantify the maximum demand that can be supported by the existing system. In this formulation, transmission constraints are driven primarily by systemic limitations associated with serving additional load while maintaining reliable system operation.

Consequently, the assessment focuses on identifying the network hosting limit associated with each set of resource adequacy assumptions rather than evaluating alternative distributions of load across candidate sites. The resulting hosting capacity values, therefore, represent the maximum amount of additional load that can be accommodated by the transmission network under each assessment scenario while maintaining acceptable system performance and reliability criteria.

Methodology

The load hosting capacity assessment employed the same progressive assessment philosophy used for the generation hosting analysis. However, whereas generation hosting capacity is constrained by the ability to reduce generation output elsewhere on the system, load hosting capacity is fundamentally constrained by the availability of generation capable of serving additional demand. The methodology was, therefore, developed by progressively introducing additional generation resources capable of supporting new load while evaluating the resulting ability of the transmission system to accommodate increased demand. Four separate assessments were completed:

1. The first assessment represents the most restrictive operating condition and considered only the available dispatch headroom of flexible generating resources currently operating within PA. This case assumes that existing dispatchable fossil-fueled generators, specifically units with rated power outputs less than 400 MW, provide the sole source of additional energy available to support new load interconnections; 400 MW was selected as a reasonable limit that distinguishes between inflexible baseload units such as coal and nuclear that would likely be unavailable to dispatch down in an operational scenario. As a result, the hosting limit is constrained directly by the unused dispatch capability available within the existing PA generation fleet.
2. The second assessment relaxed this limitation by introducing additional flexibility from renewable generation resources. Under this approach, the output of existing renewable resources was allowed to increase above base-case operating levels through an increase in renewable capacity utilization. This assumption represents conditions under which additional renewable production can contribute to serving incremental demand and, therefore, expands the amount of generation available within PA.
3. The third assessment further increased available generation support by incorporating fossil-fueled generating facilities identified by PJM as expected to enter service by 2030. These resources are represented within the planning model but are not committed in the base operating condition. Allowing these resources to participate in serving additional load provides a representation of how anticipated resource additions could increase the capability of the PA system to support future economic development and electrification.
4. The final assessment removed generation adequacy limitations altogether by allowing the PJM slack bus to serve as the balancing resource. In this formulation, generation located outside PA is permitted to support additional demand within PA. No specific external region is assumed to provide the generation; instead, the slack bus serves solely as a balancing mechanism within the optimization. This final case effectively isolates transmission constraints from generation adequacy considerations and identifies the maximum amount of load that can be accommodated by the network based solely on the thermal transmission limitations represented in the planning case.

This progressive expansion of available generation support allows the assessment to distinguish between limitations driven by in-state generation availability and limitations driven by the transmission network itself. The resulting framework provides a structured understanding of how resource adequacy and transmission capability collectively influence future load interconnection opportunities.

Load Hosting Capacity Results

The results demonstrate that generation adequacy is a significant limiting factor for accommodating new large loads within PA. Under the most restrictive assessment, where only the unused dispatch capability of currently operating flexible generators was considered, ~744 MW of additional load could be accommodated (see Figure 42). This value represents the practical hosting limit under existing operating conditions and reflects the relatively limited amount of available upward dispatch capability within the current generation fleet.

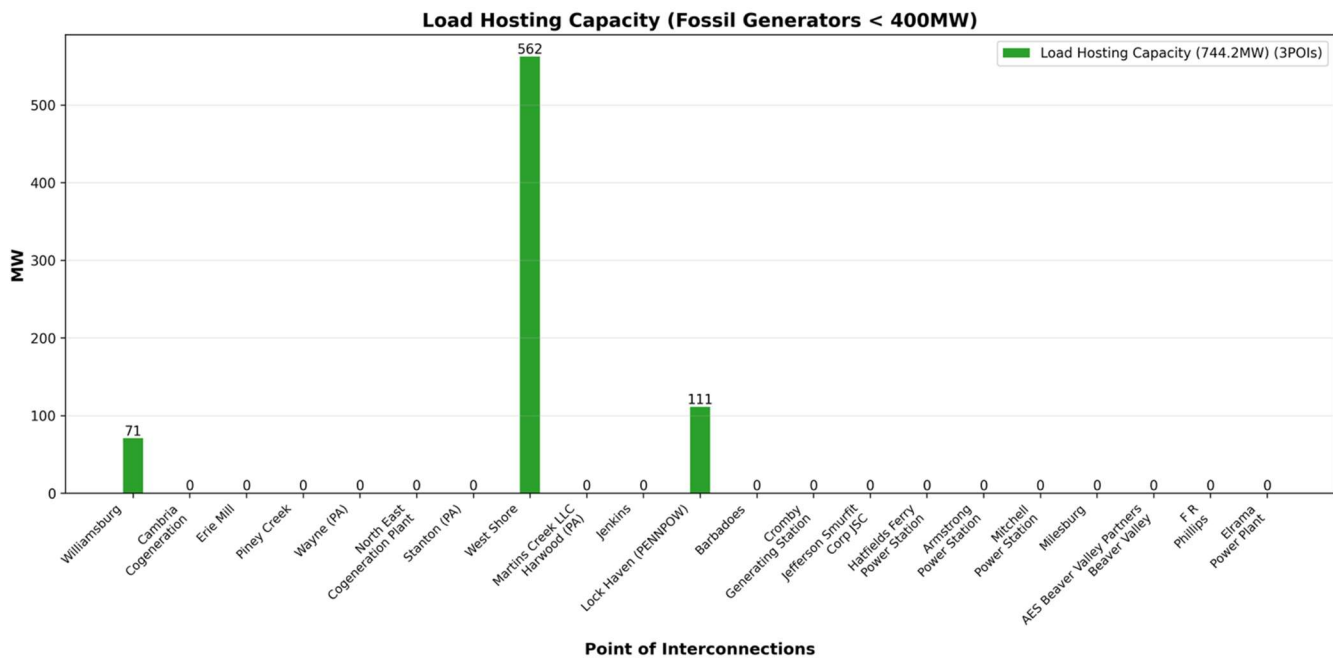


Figure 42 Load hosting capacity under the current capability of dispatchable fossil fuel generation (rated power output less than 400 MW) in PA.

Allowing additional renewable production substantially increased the amount of load that could be supported by the system. By increasing the utilization of existing renewable resources, the hosting limit increased to ~2.2 GW (see Figure 43). The increase in hosting capacity is attributable primarily to the additional generation availability created by the higher renewable output assumptions rather than a change in the capability of the transmission network itself. Transmission constraints continue to influence where load can be accommodated and how power flows are redistributed across the system; however, under this assessment, the availability of generation remains the dominant limiting factor. The results, therefore, indicate that additional renewable production can materially increase the ability of PA to support future load growth, although generation availability continues to become restrictive before the transmission limits of the system are fully utilized.

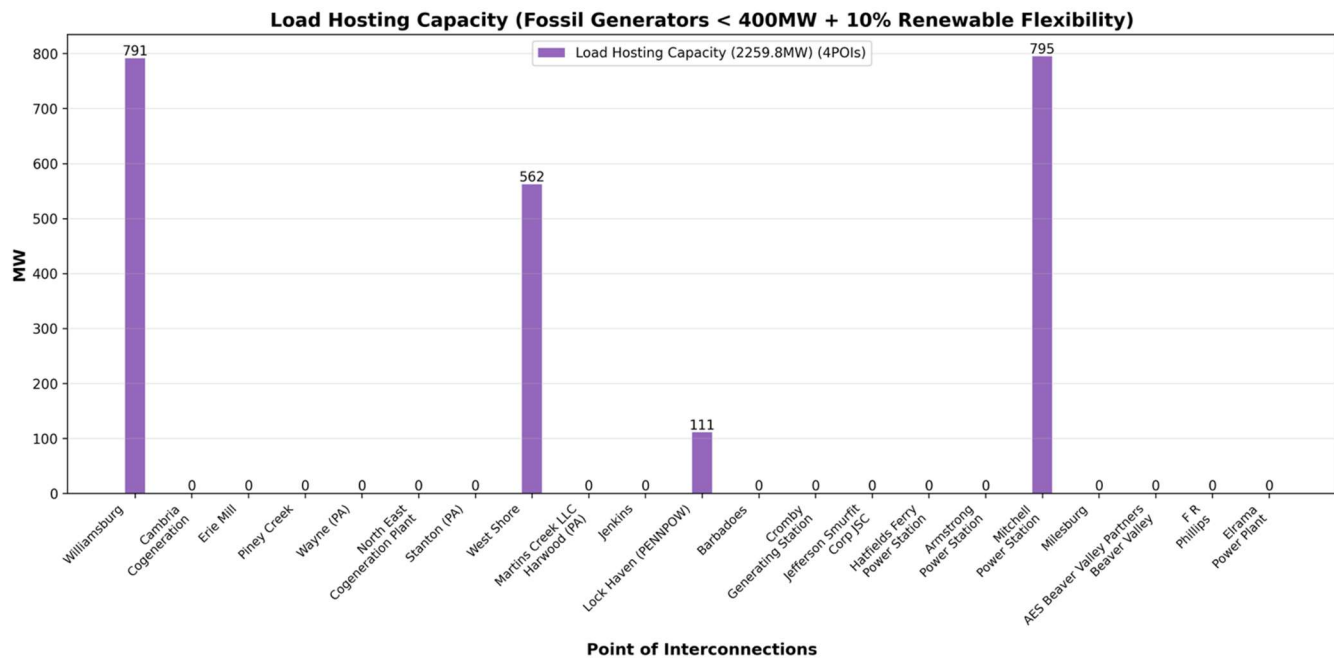


Figure 43 Load hosting capacity under the current capability of dispatchable fossil fuel generation and a 10% increase in the renewable generation capacity factor.

Additional improvement was observed when the planned fossil-fueled generation resources identified within the PJM planning models were allowed to participate. Incorporation of these future resources increased load hosting capacity to ~4.2 GW (see Figure 44), demonstrating the importance of expected generation additions in supporting future economic development and electrification initiatives throughout PA.

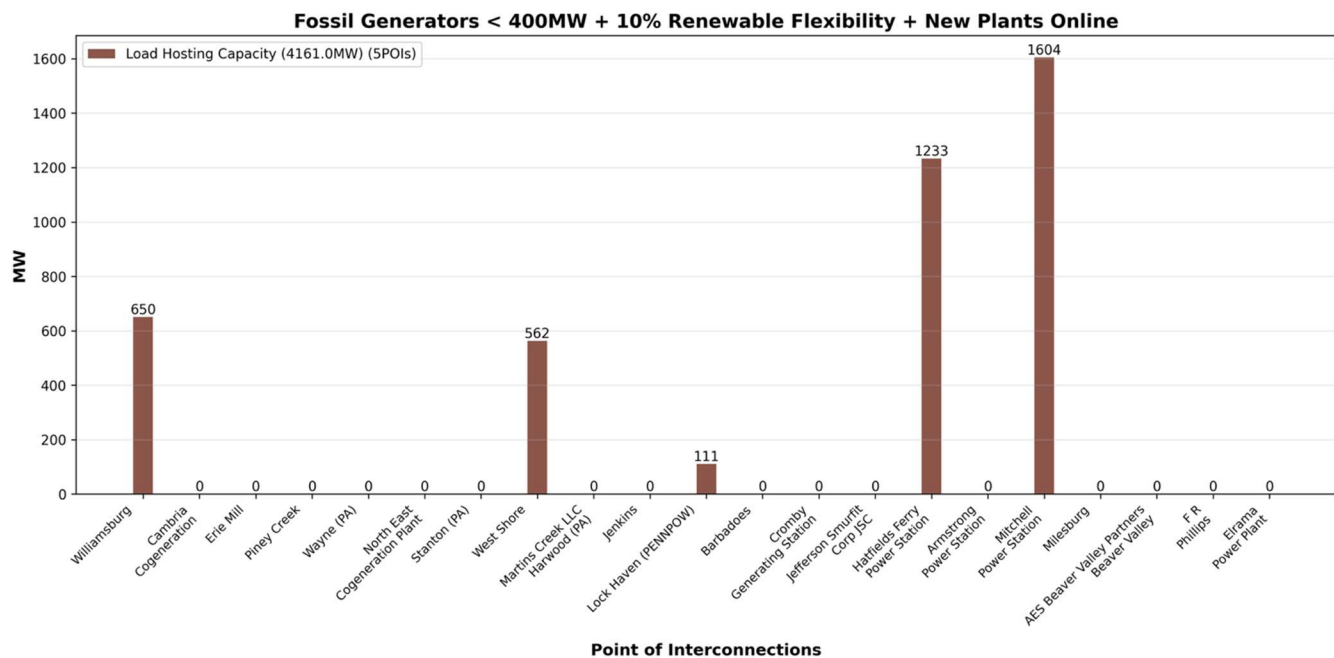


Figure 44 Load hosting capacity under previous assumption + new fossil plants scheduled to be online in 2030.

The final assessment represents the transmission-limited hosting capability of the network. By removing constraints associated with generation adequacy and allowing external generation resources to balance system demand, the assessment identified ~9.2 GW of load hosting capability (see Figure 45). Because this case considers only the thermal transmission limitations represented in the power flow model, it

provides an estimate of the maximum amount of large load that could theoretically be interconnected if sufficient generation resources were available to support it.

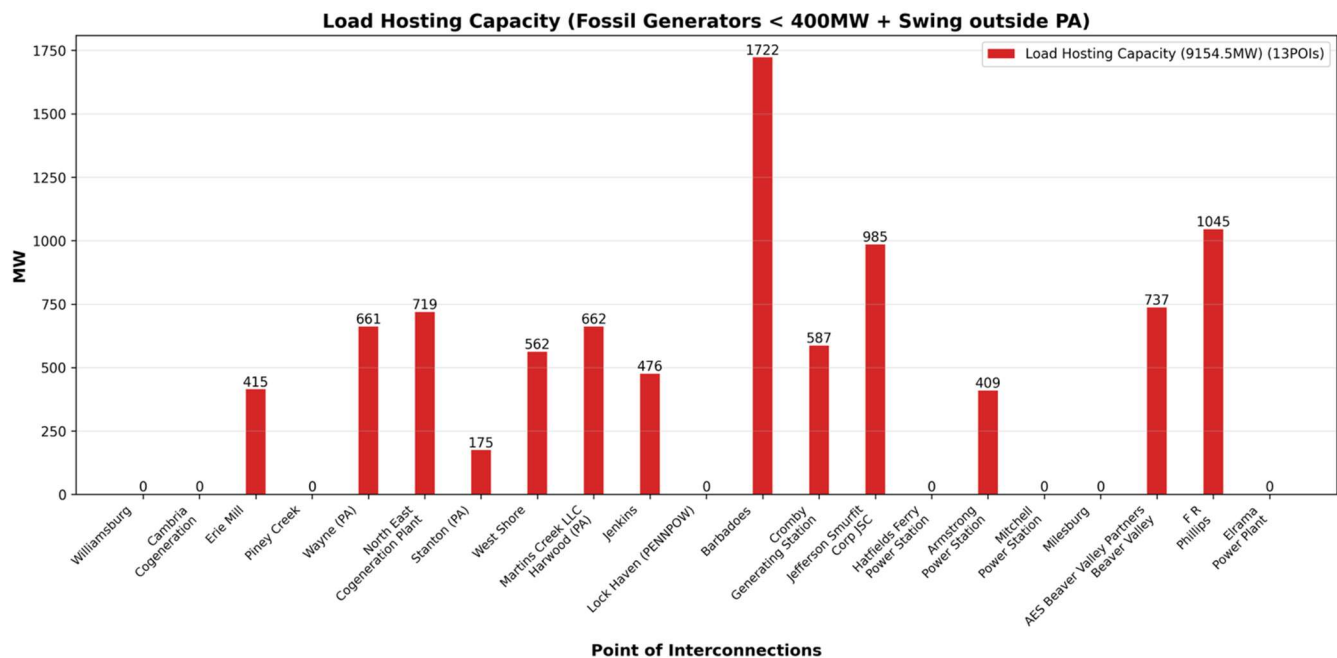


Figure 45 Load hosting capacity considering generation availability across the PJM system.

Collectively, these results provide important insight into the factors limiting future load development opportunities. While the transmission system is capable of accommodating more than 9 GW of additional demand under the modeled network conditions, the amount of load that can be practically supported using resources available within PA is substantially lower. The progression of results, therefore, indicates that generation adequacy constraints emerge well before transmission constraints become binding. This finding suggests that future large-load interconnections, including data centers, electrification initiatives, and industrial development projects, may depend as much on the availability of generation resources as on the capability of the transmission network itself.

5.4 Production Cost Modeling

Product cost modeling illustrates the performance of both individual generators (e.g., dispatch behavior) and the broader electrical system (e.g., prices, reliability). In this study, the production cost modeling was completed using Hitachi PROMOD software. PROMOD is a security-constrained economic dispatch model. It captures system characteristics like generating unit operations (including fuel costs, maintenance, and outages), future demand, and transmission constraints. PROMOD can produce outputs including hourly LMPs, hourly unit generation and cost, fuel consumption, and emissions. It is widely used in the electric grid modeling industry, including by PJM.

As input data, scenarios files were provided directly by PJM (specifically from 2024/25 Long-Term Market Efficiency Window 1, which is built for modeling 2029 and 2032). These are the same scenario files used by PJM to conduct their own market efficiency economic planning studies and represent PJMs best understanding of the current and projected state of the generation fleet and network topology throughout their territory. The scenarios were updated with the most recent load projections, also provided by PJM. These data are at the transmission zone level, with most zones seeing an increase in load relative to the base model, and some seeing a decrease.

The model is run simultaneously for all of PJM. The interconnected nature of electrical systems necessitates this kind of approach even when only local results are of interest. The scenario files provided

by PJM are specific to a single modeling year. Running other years (for example, 2030) requires reusing transmission network topology from another year (in the example, 2029). As a base case, 2030 was run using the 2029 network topology.

Base Case Results

The base case PROMOD results (i.e., with projected changes to load and generation but without any candidate site redevelopment) provide an expectation of future system conditions. Whereas evaluating each site in more detail in Part B will involve highly granular generator and system-level model outputs, the base case results serve as a high-level point of comparison. The results indicate that, without site redevelopment, PPL is expected to see the highest LMPs in 2030 (see Figure 46). This is consistent with PPL having the most dramatic increase in forecasted load growth among the PA PJM transmission zones. While this modeling was not used to inform the preliminary site redevelopment configurations (discussed in Chapter 6.1), it also supports the notion that sites in PPL could be particularly suited for redevelopment as power generation.

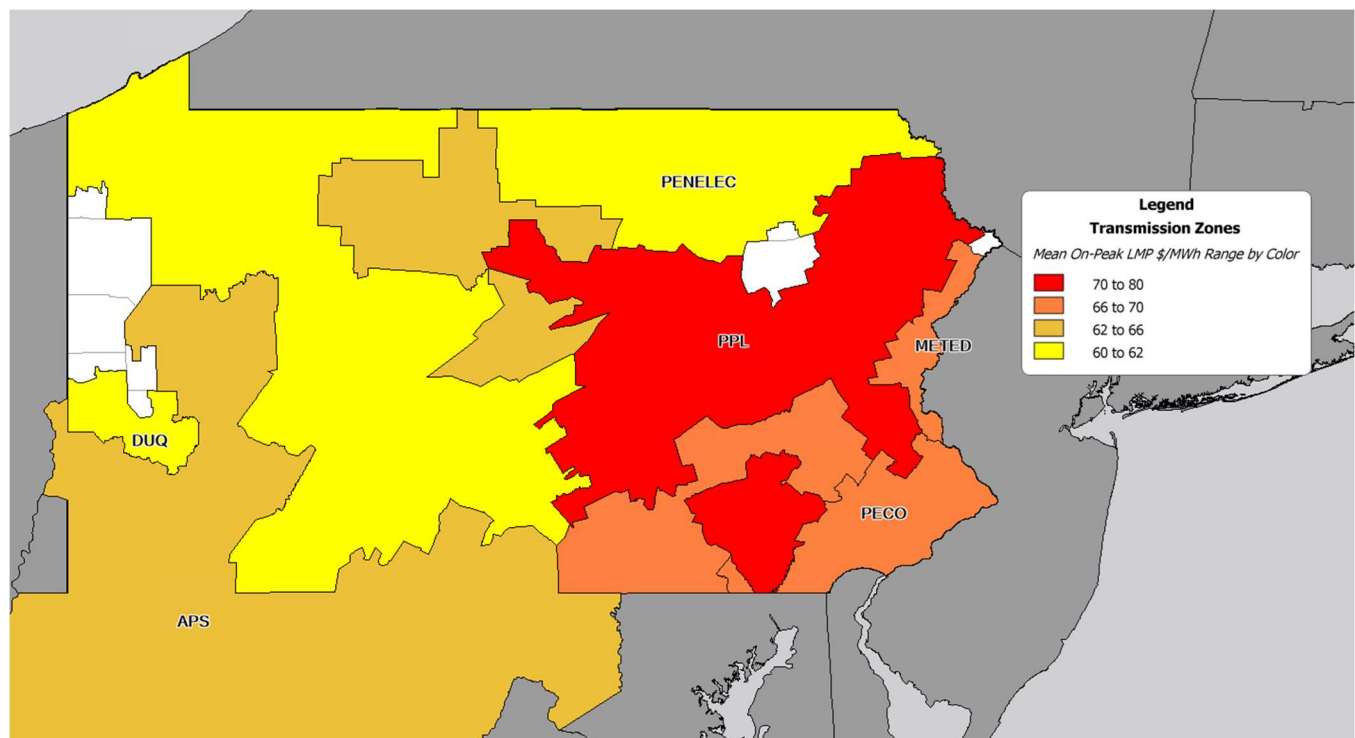


Figure 46 Average, on peak LMPs in 2030 across PJM transmission zones.

5.5 Advanced Transmission Technologies

Assessment of Duquesne Light Company and Pennsylvania Power & Light's ATT Pilot Projects

The growing need to accommodate new generation resources, large industrial loads, and emerging economic development opportunities has increased interest in technologies capable of extracting additional value from existing transmission infrastructure. While long-term transmission expansion remains essential to supporting future growth, transmission reinforcements often require extended development timelines due to siting, permitting, environmental review, and construction requirements. Consequently, utilities and system operators are increasingly evaluating advanced transmission technologies (ATTs) and grid enhancing technologies (GETs) as complementary solutions that can improve utilization of existing infrastructure, relieve congestion, and create additional transfer capability while maintaining reliability standards. This industry trend has been further reinforced by FERC Order

No. 2023, which requires transmission providers to evaluate ATTs during the interconnection study process and consider their potential as alternatives to conventional network upgrades.

PA has emerged as an early adopter of several ATT and GET applications, providing practical demonstrations of how these technologies can address real transmission constraints. PPL has deployed dynamic line rating systems to provide enhanced visibility into actual transmission line capability under prevailing environmental conditions. By replacing conservative static ratings with ratings that reflect real-time weather and conductor conditions, dynamic line rating systems can increase available transfer capability while maintaining safe operating limits. Publicly reported results from the PPL deployment indicate that the technology has produced measurable congestion relief and improved utilization of existing transmission assets, illustrating the potential for transmission operators to unlock additional capacity without constructing new facilities.

Additional demonstrations within the PJM region have focused on advanced power flow control technologies that actively redirect power away from congested transmission facilities. These devices modify the electrical characteristics of transmission paths to balance flows across parallel circuits and improve utilization of existing network infrastructure. The technologies have been evaluated as alternatives to traditional network upgrades within the PJM process, demonstrating that transmission constraints can sometimes be addressed more rapidly and at substantially lower cost than conventional line rebuilds or new construction projects. Similar efforts by PA utilities, including Duquesne Light Company and others participating in regional modernization initiatives, reflect increasing industry recognition that advanced transmission technologies can play an important role in supporting reliability, integrating new resources, and accelerating economic development while longer-term transmission expansion plans are developed.

5.6 New Transmission Capacity Buildout Implications

PA and the broader PJM region are facing significant challenges in meeting rapidly increasing electricity demand, from advanced manufacturing, defense-related infrastructure, AI data centers, and broader economic growth. A recent study by CERA Consulting (2026) found that transmission expansion is the most cost-effective strategy for accommodating this demand growth, with PJM realizing the greatest economic benefits among the regions evaluated. The study further concluded that coordinated interregional transmission buildouts provide substantially greater benefits than region-specific transmission investments, generating customer savings of up to three times those achieved under scenarios without enhanced interregional connectivity. These findings underscore the role of transmission expansion in reducing the need for new local generation capacity by enabling access to lower-cost electricity resources across a wider geographic area. In addition, increased transmission capacity can enhance grid reliability and resilience by providing greater operational flexibility, alleviating congestion, and increasing access to backup resources during extreme weather events.

These conclusions are consistent with findings from other recent studies. Ham, Kay, and Hausman (2026) found that transmission buildout can reduce electricity generation costs by enabling lower-cost electricity resources to flow to regions with higher demand, regardless of geographic boundaries. Similarly, DOE concluded that interregional and cross-interconnection transmission linkages can relieve transmission congestion, improve resource adequacy, and strengthen overall grid performance (2026). Collectively, these studies highlight the potential implications of new transmission capacity buildout, including reduced electricity system costs, enhanced reliability and resilience, improved resource adequacy, and greater operational flexibility while supporting continued growth in electricity demand. The results of the transmission hosting capacity analyses align with the findings described in the cited studies. While there is potential to better utilize the existing transmission network, it is limited in terms of the projected load growth and the scale of the expected load interconnections. The analysis presented in this chapter section indicates that the potential for load and generation interconnections given the current capabilities of the

system sits at ~9 GW in either direction. While this is likely to support short-term project development, the system can become quickly constrained. Economically driven transmission expansion provides the best outcome to deliver value to the system and residents of PA.

5.7 Next Steps

The assessments discussed in this chapter have identified the expected limits of the transmission system in terms of both generation hosting and load hosting at the deactivated sites. It should be noted that the limits identified are a function of an optimization-based assessment. The combination of sites selected and the level of power injection or withdrawal are subject to the optimization objective and the reliability performance of the system; however, this approach has allowed for the identification of the system bounds. The next stage of transmission analysis will begin to factor in the proximal site characteristics that are the subject of discussion in Chapter 6 of this report. These characteristics will allow the methodology to create weighted functions that prioritize the suitability of one site compared to another. By completing this analysis over 1) a broader set of scenarios that will identify additional system limits and 2) prioritized sites for load or generation, the assessment will refine the hosting capacity limits that have been identified in this report to ensure that the system can perform reliably and securely over the planning horizon.



6. Preliminary Site Redevelopment Assessment

6. Preliminary Site Redevelopment Assessment

An important consequence of the various site attributes is the type of redevelopment that can be supported. This study evaluates three redevelopment configurations with transmission system implications for the candidate deactivated sites:

- a. Power generation (including batteries) only
- b. Large load source only
- c. Co-located power generation and large load source

The power generation technologies evaluated include natural gas simple-cycle (NGCT) and combined-cycle (NGCC) plants, natural gas fuel cells (NGFCs), small modular nuclear reactors (SMRs), onshore wind, solar photovoltaic (PV) systems, and battery energy storage systems (BESS). Large load sources considered include manufacturing facilities and data centers. Manufacturing sectors evaluated included semiconductor fabrication plants, electric vehicle (EV) battery gigafactories, pharmaceutical and biotechnology facilities, automotive plants, and food and beverage processing facilities. Data center typologies included enterprise, colocation, hyperscale, and AI-optimized facilities.

Preferred redevelopment configurations were determined using a consistent set of site, infrastructure, and implementation considerations along with the PJM load forecasts for the corresponding transmission zone. The considerations included compatibility with available acreage and terrain; proximity to transmission, substations, natural gas, water, transportation, and broadband infrastructure; potential reuse of existing assets; environmental and permitting constraints; estimated capital requirements; and the time required to achieve commercial operation.

The preliminary site potentials are intended to identify technically plausible configurations for each candidate site rather than establish a final development recommendation. Estimates are presented as ranges suitable for comparing redevelopment configurations across candidate sites. The estimates should be interpreted as order-of-magnitude rather than firm indicators. Actual outcomes will depend on site-specific demolition and remediation requirements, equipment selection, labor and material availability, permitting, interconnection studies, grid conditions, and market conditions at the time of development. Configurations that require substantial off-site upgrades, extensive remediation, or uncertain interconnection pathways remain feasible only if those constraints can be addressed during subsequent engineering and due-diligence activities.

A qualitative discussion of potential redevelopment configurations at the candidate deactivated sites follows. Next, potential costs for the different redevelopment configurations are included along with the construction duration. The estimates provide a common comparative basis for Part B prioritization and should be refined through site-specific engineering, stakeholder engagement, and commercial due diligence.

6.1 Potential Redevelopment Configuration Evaluation Methodology

The process of arriving at potential configurations is shown in Figure 47. The assessment starts with the PJM transmission zones in which each site is located (see Figure 48). For each transmission zone in PA (APS, DUQ, First Energy-ASTI [FE-ASTI], Jersey Central Power and Light [JCPL], Metropolitan Edison Company [METED], PECO, PENELEC, PPL, and UGI Corporation) the prospects for load growth and generation additions were evaluated.³ Sites were first categorized based on the transmission zone status: expected surplus of generation or load. Then, sites were classified into more specific potential redevelopment configurations based on their local characteristics. For example, a strong candidate for natural gas power generation would be very near to existing gas pipelines and sit in a zone expected to

³ There were no potential sites in UGI Corporation, FE-ASTI or JCPL, so they do not appear in the analysis that follows.

add more load than generation. Conversely, a site far from broadband in a zone expected to add more generation than load would be a candidate for a large load (e.g., pharmaceutical plant).

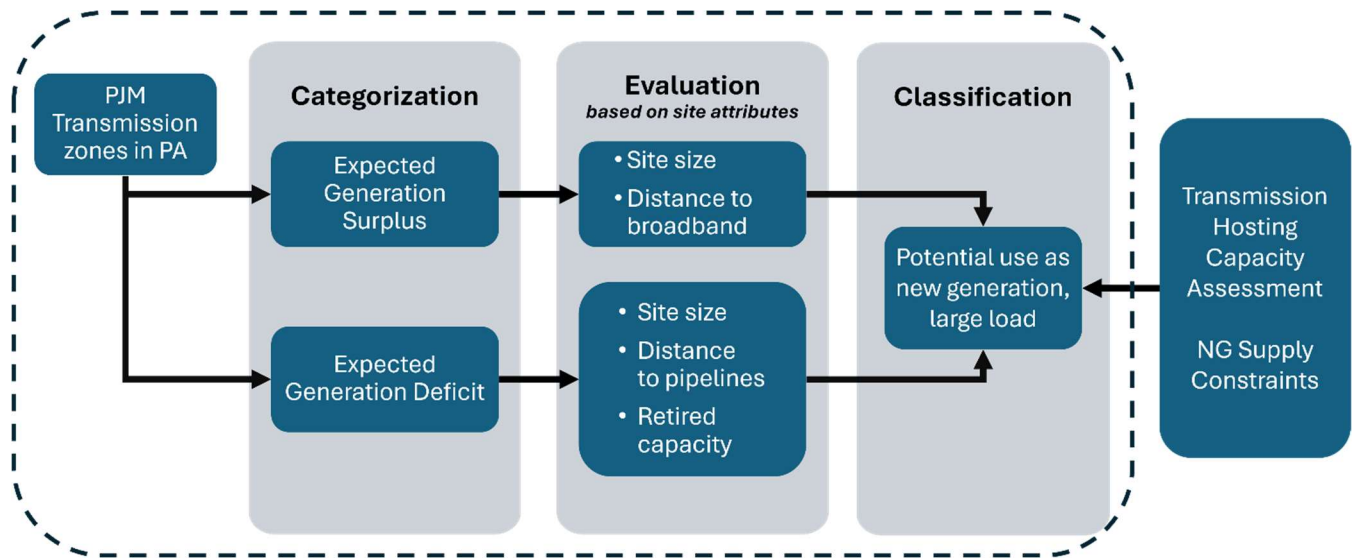


Figure 47 Preferred redevelopment configuration workflow.

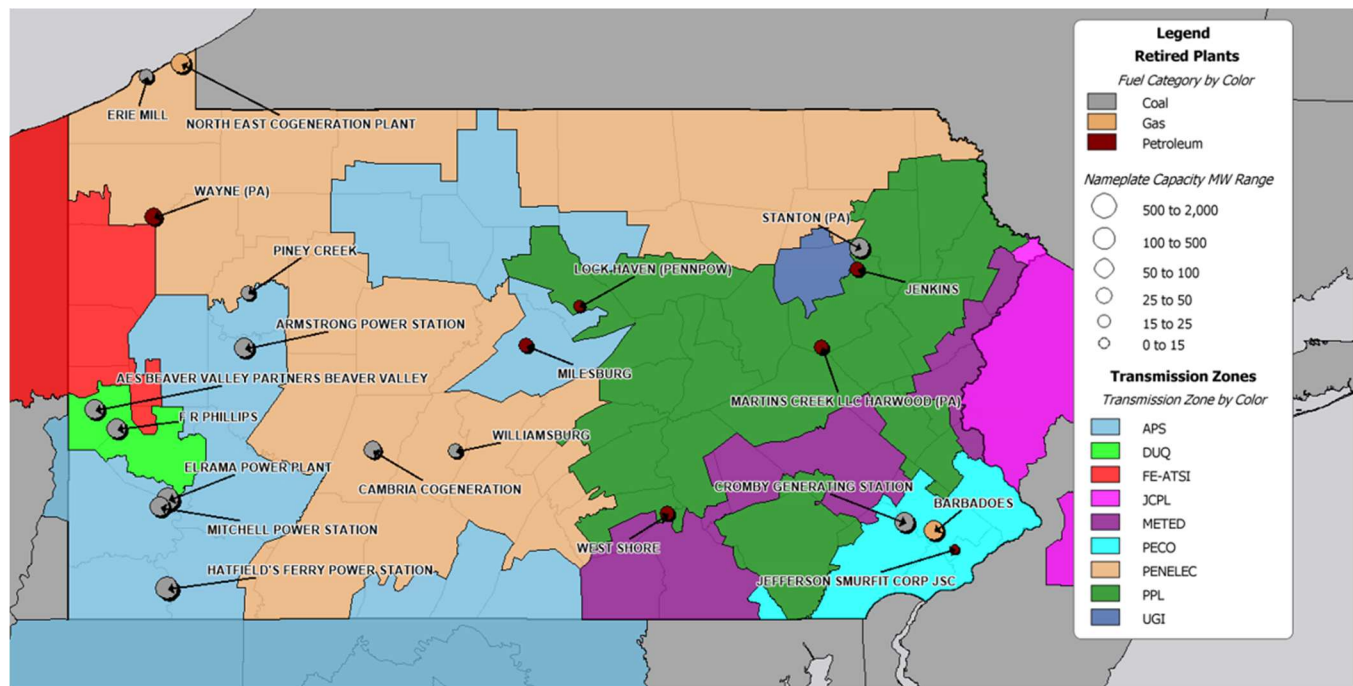


Figure 48 Site locations and PJM transmission zones.

Load growth projections are published by PJM annually, with the most recent data from February 2026 (see Figure 49). The forecasts include load profiles as well as peak load and annual energy. PJM uses a combination of data from EIA, private vendors, and internal modeling to characterize behind the meter solar/battery, electric vehicles (EV), and appliance saturation rates, efficiency and intensity. Net generation additions are based on Hitachi Velocity Suite data. These data include unit retirements and additions with a published online date. Notably, this does not include conceptual projects whose validity, size, and timeline are subject to significant uncertainties.

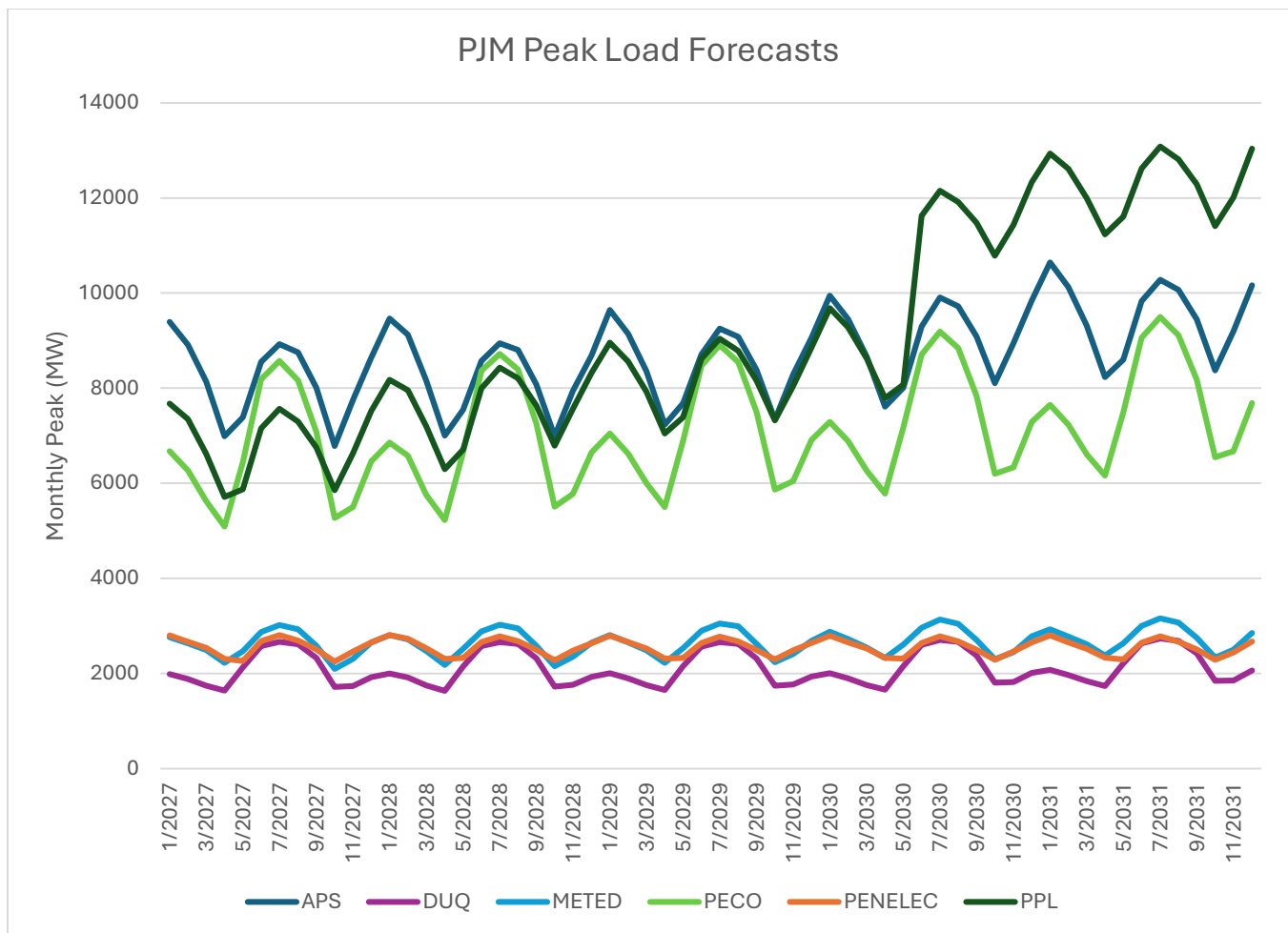


Figure 49 PJM load forecasts for relevant transmission zones in PA.

To classify sites, zones were assessed on both an energy and a power basis. The changes to installed capacity and peak demand (see Figure 50) provide one gauge of expected changes to supply and demand with the limitations that the peak load is only a snapshot in time and actual capacity differs from installed capacity across time and generation types. As a second gauge, zones were also compared based on changes to the annual energy consumption and production. Energy consumption values were provided directly by PJM. For retiring units, historical capacity factors were used to estimate energy production; the capacity factors of new units were estimated based on similar generators (by fuel and geography). Zones where expected changes to generation exceed expected load are more suitable for large loads. On the other hand, zones where expected load exceeds expected generation are more suitable for generation additions.

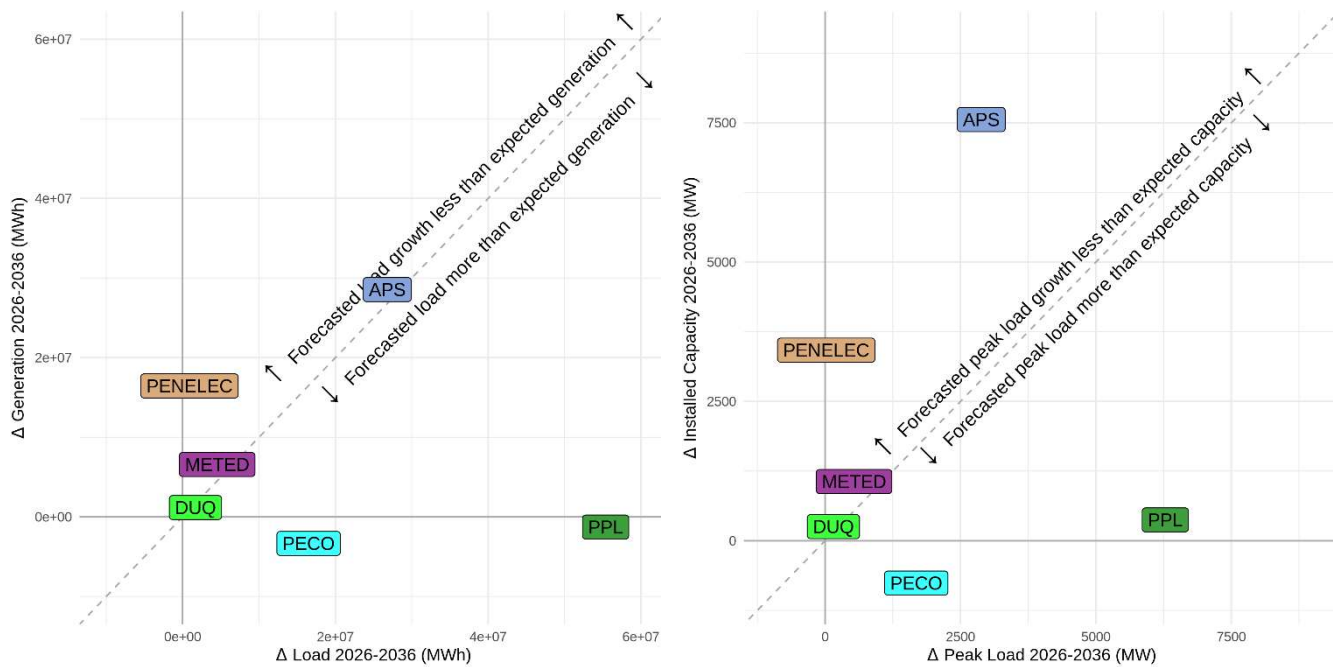


Figure 50 Projected load and generation growth across PA PJM transmission zones.

After being classified based on transmission zones, sites were assessed for their potential to host specific load and generation technologies. Based on the forecasts for each transmission zone, sites located in PECO, PPL, DUQ, METED, and APS were evaluated for generation additions (see Figure 51). Sites closer to gas pipelines are more favorable for gas-powered redevelopment, although all the sites in the selected zones were closer than 6 miles to the nearest pipeline (in PA, the furthest existing gas plant is 9.6 miles from the nearest pipeline). Sites with more land area can obviously host more generating capacity, but each generator type also has different land requirements (see Table 27). Batteries are the densest among the technologies considered (taking ~0.07 acres/MW) while solar is the most land intensive (7 acres/MW). For smaller sites, this limits which generating types are feasible for a utility-scale installation.

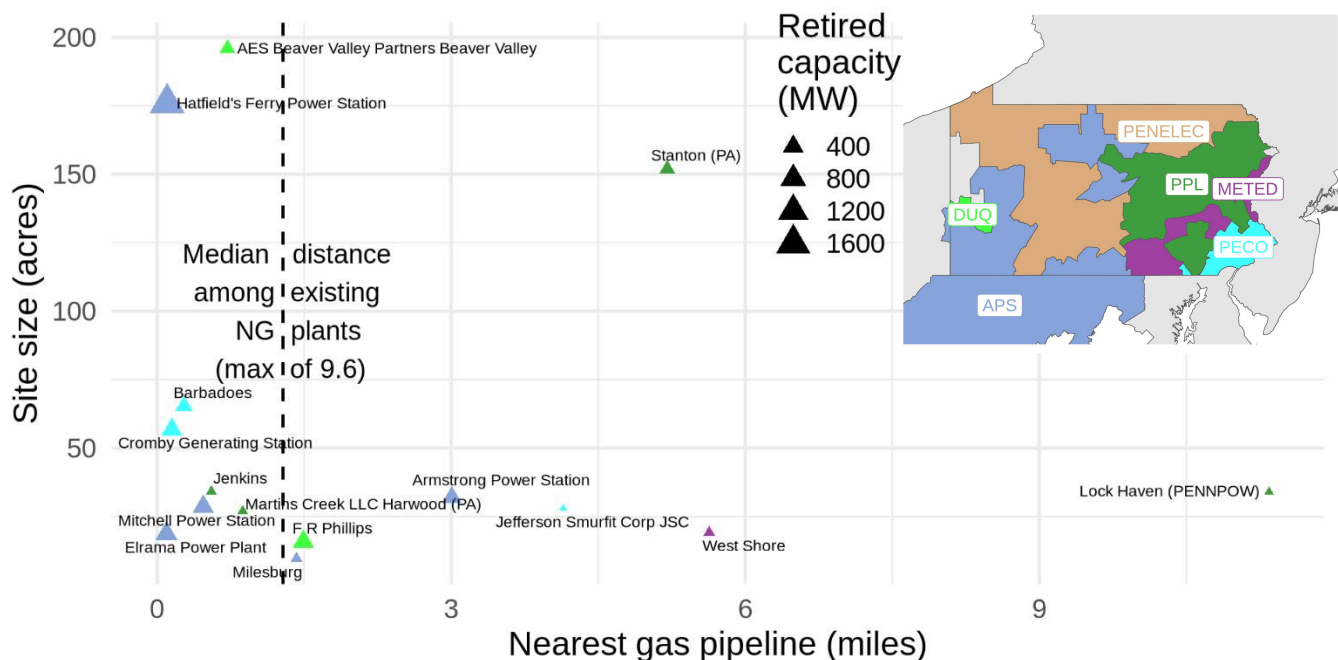


Figure 51 Sites in transmission zones suited to generation additions. To capture the potential for future capacity additions, site acreage (y-axis) and retired capacity (size) are both shown.

Table 27 Land intensity of generation technologies (Thunder Said Energy, n.d.).⁴

Technology	Land Use
Batteries	0.07 acres/MW
Natural Gas	0.2 acres/MW
Conventional Nuclear	0.6 acres/MW
SMRs	0.8–1.5 acres/MW
Solar PV	7 acres/MW
Onshore Wind	70 acres/MW

Estimates for the maximum installed capacity were produced based solely on the available land area and approximate land intensities of various generating technologies. Several sites have surrounding acreage with the same ownership. Estimates with this extended acreage were also produced (see Table 28 and Figure 52). While established technologies (e.g., natural gas, solar PV) have well-understood land intensities, emerging technologies do not. Data on SMRs are particularly limited, published estimates come from the original equipment manufacturers themselves and there are very few in commercial operation. Estimates published by original equipment manufacturers are often related to the reactor itself, while the greater plant needs much of the same infrastructure (roads, maintenance facilities, steam turbine and enclosure, switchyard) as a combined cycle plant. Fuel cells are another possible generation solution, with land use intensity similar to battery storage.

Table 28 Installed power generation capacity potential based on site acreage. Extended acreage includes adjacent land parcels with the same ownership as the parcel corresponding to the retired site. Estimates are approximate as they are based on parcel acreage (which may differ from developable land acreage) and single land use intensity values per technology.

Site	Parcel Acreage [Extended]	Installed Capacity (MW) Potential Based on Acreage [Extended]			
		Gas	Conv Nuclear	Battery	Solar
AES Beaver Valley Partners Beaver Valley	196 [251]	980 [1,255]	327 [418]	2800 [3,585]	28 [36]
Armstrong Power Station	32 [317]	160 [1,587]	53 [529]	458 [4,533]	5 [45]
Barbadoes	65 [84]	327 [421]	109 [140]	934 [1,203]	9 [12]
Cromby Generating Station	57 [110]	284 [551]	95 [184]	811 [1,575]	8 [16]
Elrama Power Plant	19 [51]	93 [256]	31 [85]	267 [733]	3 [7]
F R Phillips	16 [31]	79 [154]	26 [51]	227 [440]	2 [4]
Hatfield's Ferry Power Station	176 [240]	880 [1,201]	293 [400]	2514 [3,433]	25 [34]
Jefferson Smurfit Corp JSC	28 [30]	140 [152]	47 [51]	399 [435]	4 [4]
Jenkins	34 [40]	171 [198]	57 [66]	488 [566]	5 [6]
Lock Haven (PENNPOW)	34 [34]	170 [170]	57 [57]	485 [485]	5 [5]
Martins Creek LLC Harwood (PA)	27 [40]	135 [198]	45 [66]	385 [566]	4 [6]
Milesburg	10 [25]	48 [125]	16 [42]	138 [356]	1 [4]
Mitchell Power Station	29 [163]	143 [814]	48 [271]	408 [2,327]	4 [23]

⁴ While included here for reference, onshore wind was not included in subsequent analysis based on the acreage of the candidate sites.

Site	Parcel Acreage [Extended]	Installed Capacity (MW) Potential Based on Acreage [Extended]			
		Gas	Conv Nuclear	Battery	Solar
Stanton (PA)	152 [517]	760 [2,587]	253 [862]	2171 [7,392]	22 [74]
West Shore	19 [44]	96 [222]	32 [74]	275 [633]	3 [6]

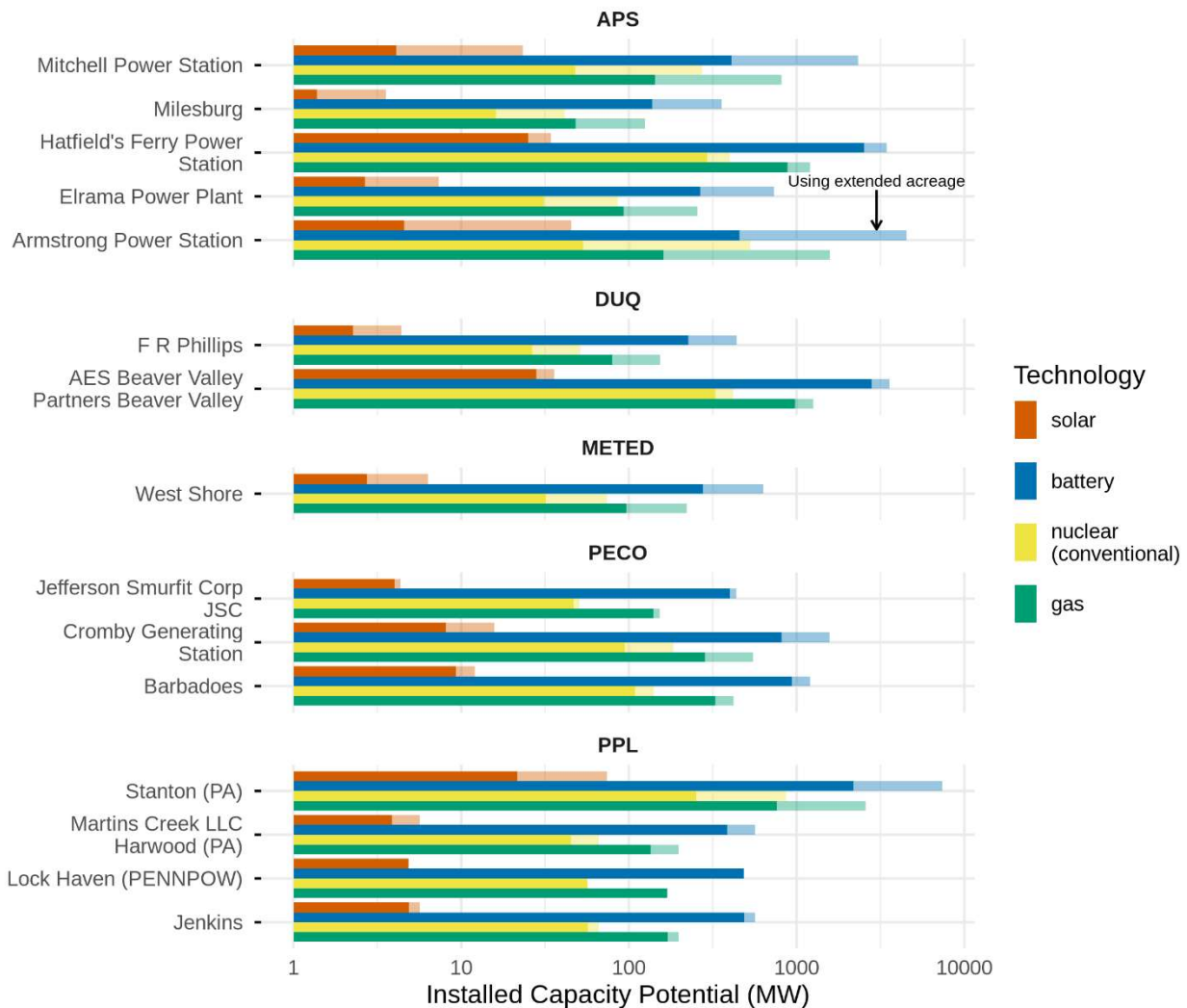


Figure 52 Installed capacity potential for sites in zones where load is expected to exceed generation. Installed capacity is based solely on available land area and translates to different load carrying capabilities for different generation types. Shaded areas use the extended site acreage.

Sites in PENELEC, DUQ, METED, and APS were evaluated for potential to host new large loads. Note that sites in DUQ, METED, and APS were evaluated for both new generation and load since the differences identified in the first phase of the analysis were marginal. Data centers are one type of large load evaluated in this study. Data centers tend to be closer to broadband fiber. Proximity to broadband maybe an advantage for sites pursuing similar developments, though all sites were closer than 10 miles to the nearest broadband (in PA, the furthest existing data center is 25 miles from the nearest broadband) (see Figure 53). Other large loads have different land requirements and may place higher value on proximity to other infrastructure (e.g., waterways) as opposed to broadband.

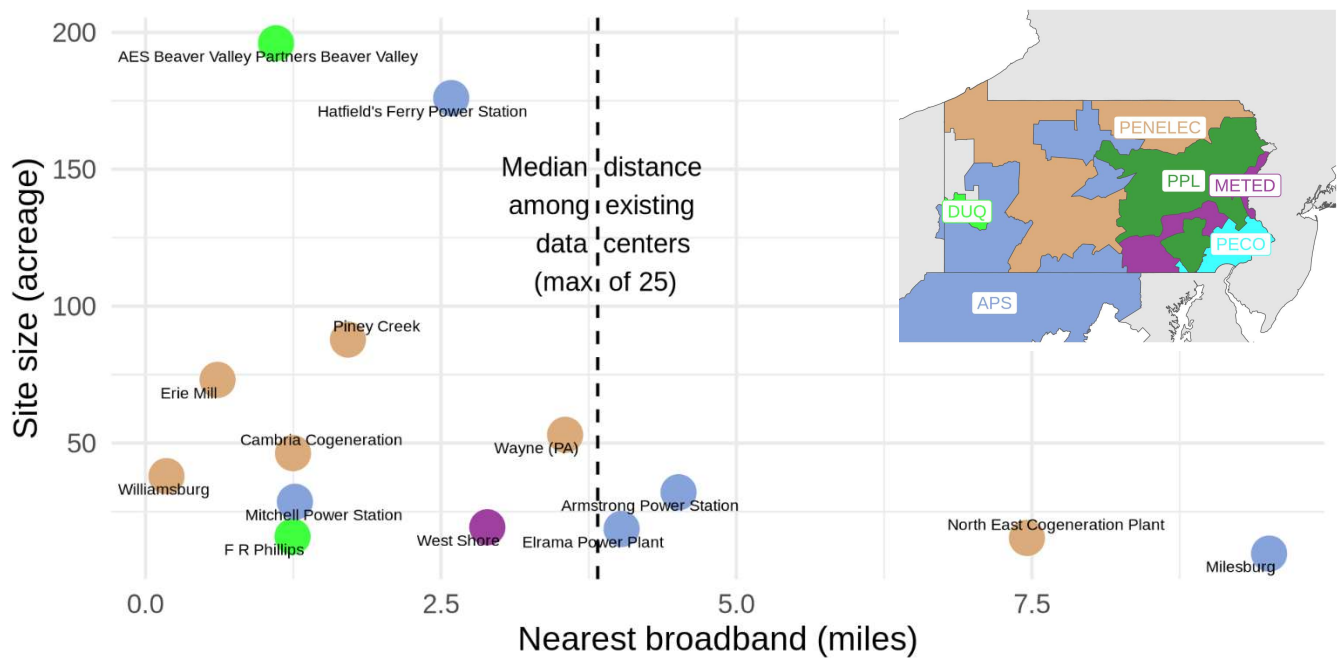


Figure 53 Site proximity to broadband in selected transmission zones.

There is significant variation in the acreage of requirements of different large loads, even of the same technology, which Chapter 6.3 covers in more detail. The ranges span orders of magnitude, for example, collocated data centers can range from just 37 acres to 2,000 acres. To get a sense of the potential of sites to host various manufacturing and commercial installations, the lower end of the acreage range was compared to the site acreage (and extended site acreage). Using maximum acreage would change allocations, in some cases significantly.

Semiconductor manufacturing is not feasible at any of the candidate sites, even when including extended acreage. Only the extended Armstrong Power Station site is large enough to be suitable for automotive manufacturing or a battery gigafactory. Most sites are not large enough to host technologies other than collocated (i.e., a shared multi-tenant data center) or smaller data centers (see Figure 54). Only two sites (Hatsfield's Ferry Power Station and AES Beaver Valley) have sufficient acreage to accommodate a larger data center or pharmaceutical plant on the retired plant land parcel. Considering extended site acreage increases the list of eligible sites, adding Armstrong Power Station, Mitchell Power Station, and Piney Creek. The extended areas of Hatsfield's Ferry Power Station, AES Beaver Valley, Armstrong Power Station, Mitchell Power Station, Piney Creek, and Erie Mill are each large enough to host an AI-optimized or co-located data center. AES Beaver Valley and Armstrong Power Station are the only sites large enough to host a hyperscale data center.

Site acreage, local characteristics, and transmission zones are one set of consideration for site redevelopment configurations. Hosting capacity is another critical indicator—the maximum capacity that can be developed on a site may be developed by transmission constraints instead of site acreage. There is also interplay between elements. For example, data center development with onsite power can be less constrained by transmission bottlenecks but inherently requires more land than smaller enterprise data centers. Consideration of industrial zoned lands in proximity to the site amenable to supplement the site acreage is beyond the scope of the current analysis, but could significantly increase the potential for co-located options.

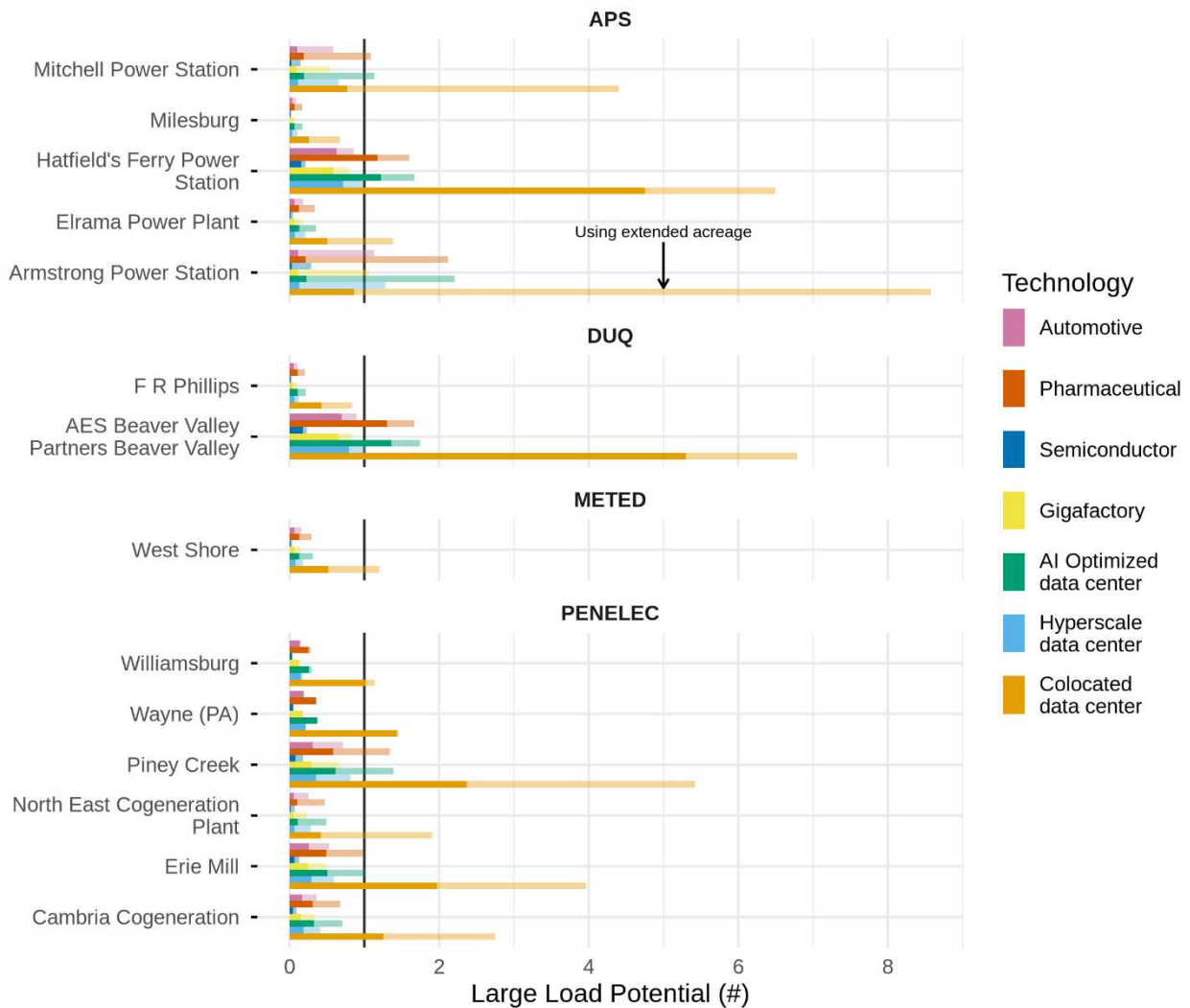


Figure 54 Site potential, represented by the number of minimum-sized large loads the acreage could accommodate. Vertical line corresponds to sufficient acreage for 1 such installation. Shaded areas use the extended site acreage.

6.2 Natural Gas Supply Constraints

The PA natural gas system was evaluated to identify possible fuel supply constraints at candidate sites. At the state level, all PA flow points available in Hitachi Velocity Suite were mapped for the peak natural gas demand day for the state since 2025 (identified as January 29, 2026). Simultaneously, at the local level, the network of points connected to each site were identified and the flow data for the maximum demand day were collected. Networked flow points with a utilization at or above 80% were flagged as potential choke points and followed up with a more in-depth evaluation of the site network (see Figure 55). The site-by-site analysis did not reveal any major pipeline constraints for any of the sites. Either the sites had no capacity constrained flow points in their local networks, or the points that were constrained would not limit deliveries to the site. For example, in the gas pipelines of Martins Creek LLC Harwood (PA), the constrained points are a residential delivery node and compressor stations on adjacent lines. Most sites are connected to the broader gas pipeline network through multiple pathways. Once preliminary site configurations have been established (in particular, plant power output), pipeline capacity headroom can again be verified to be able to support potential redevelopment.

Potential Constraint Point Name	Primary Point Type	Flow Direction	Sum Operating Capacity (dekatherm)	Sum Scheduled Quantity (dekatherm)	Sum Operationally Available Quantity (dekatherm)	Capacity Utilization (%)
UGI Corporation	Residential	Delivery	355,756	355,756	0	100
Compressor Station 515 MP 81.71	Compressor	Segment	2,564,733	2,564,733	0	100
Central Penn Line South N to S TSB MP 1	Segment	Segment	2,265,904	2,265,904	0	100

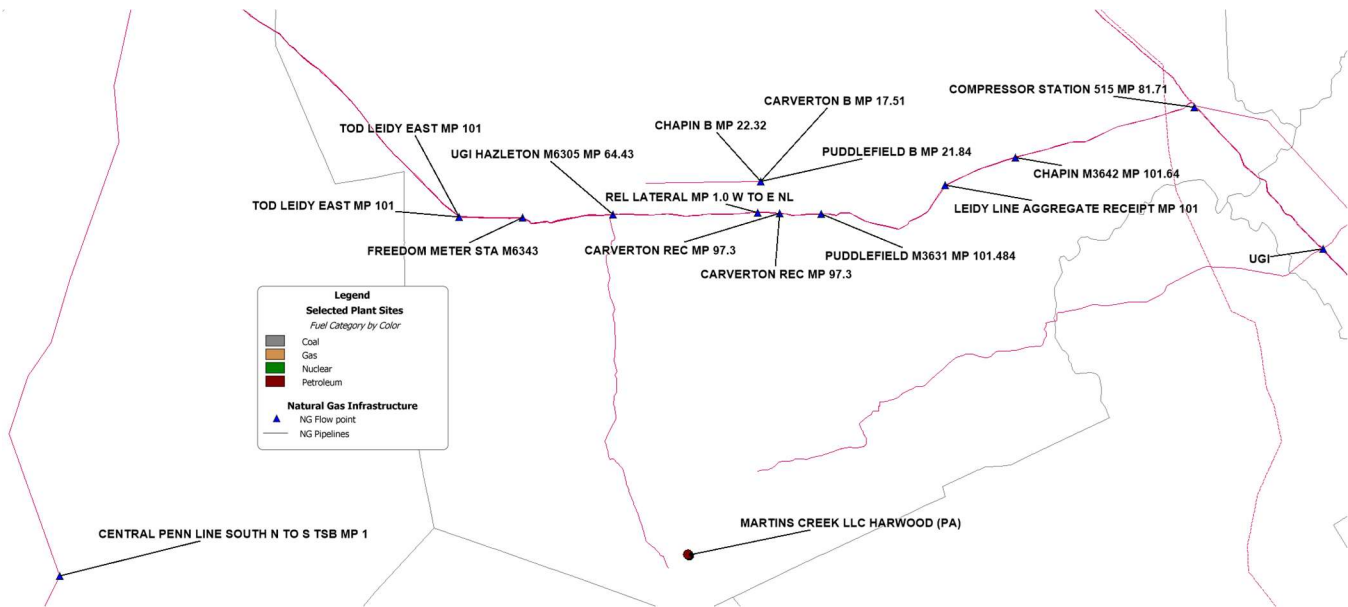


Figure 55 Local natural gas network for Martins Creek LLC Harwood (PA) site.

6.3 Potential Redevelopment Costs

Data Collection and Sources

Capital expenditures (CapEx), operating expenditures (OpEx), and implementation timelines for representative redevelopment projects were compiled from publicly available sources (see Table 29). The assessment considered data centers, manufacturing facilities, and electric power generation assets. Data center typologies included enterprise, colocation, hyperscale, and AI-optimized facilities. Manufacturing sectors evaluated included semiconductor fabrication plants, EV battery gigafactories, pharmaceutical and biotechnology facilities, automotive plants, and food and beverage processing facilities. Power generation technologies reviewed included NGCT, NGCC, NGFCs, SMRs, onshore wind, solar PV, and BESS. All costs are reported in constant 2024 dollars using the U.S. Bureau of Labor Statistics inflation calculator for conversion (2026).

Table 29 Data collection and sources for cost and project timelines of select redevelopment options.

Redevelopment Option	Data Type	Sources
Representative Data Center	Cost	(Vila, 2025; Cushman & Wakefield, 2025; iRecruit.co, 2026a; Laniakea Research, 2026; SRC EvalMetrics, 2025; ITK Research, 2026; Barroso, Hölzle, & Ranganathan, 2026; WUC Technologies, 2026; Epoch AI, 2026)
	Development timeline	(Deloitte, 2024; JLL, 2026; McKinsey, 2025; iRecruit.co, 2026b; Cortex Construct, 2026)
Project-Specific Data Center	Cost	(CoreWeave, 2025; QTS, 2026; PA Data Center Partners, 2026; Amazon Innovation in PA, 2026a; Microsoft, 2026; Compute Atlas, 2026)
Representative Manufacturing Sectors	Cost and development timelines	(iFactory AI, 2026).
	Cost	(iRecruit.co, 2026c; Oxmaint AI, 2026).
	Development timeline	(BLS & Co., 2020)
Representative Semiconductor Manufacturing	Cost, acreage	(iRecruit.co, 2026c)

Redevelopment Option	Data Type	Sources
Project-Specific Semiconductor Manufacturing	Cost, acreage, under roof square footage	(Intel, 2025; CNBC, 2024; ENR, 2022; Korea JoongAnn Daily, 2025; BCG, 2020; BCG, 2023)
Project-Specific EV Battery Manufacturing		(Kearney, 2025; ENR, 2024; Barton Malow, 2026; LG Energy Solution, 2022; Panasonic Energy, 2025)
Project-Specific Pharmaceutical Manufacturing		(Eli Lilly, 2022; Pharma Phorum, 2025; Pharma Phorum, 2026; Corbin, McNulty, Macharoen, McDonald, & Nandi, 2020; Sampat, et al., 2022; Nandi, et al., 2016; da Gama, Misailidis, & Petries, 2022)
Project-Specific Automotive Manufacturing		(Stellantis, 2025; CPE, 2025; GM Authority, 2017)
Representative Electric Power Generation Technologies (All)	Cost, development timeline	(U.S. EIA, 2024)
Representative Natural Gas-Fired Generation	Cost	(NETL, 2025)
Representative Natural Gas-Fired Fuel Cell		(NETL, 2022; Perez, 2025)
Representative SMR		(NLR, 2025)
Project-Specific Onshore Wind		(LBL, 2025a)
Project-Specific Solar PV		(LBL, 2025b)
Representative BESS		(PNNL, 2024b)

Cost ranges for representative data center typologies were compiled from industry and market sources (Vila, 2025; Cushman & Wakefield, 2025; iRecruit.co, 2026a; Laniakea Research, 2026; SRC EvalMetrics, 2025; ITK Research, 2026; Barroso, Hölzle, & Ranganathan, 2026; WUC Technologies, 2026; Epoch AI, 2026). Meanwhile, implementation schedules were derived from industry analyses and market research (Deloitte, 2024; JLL, 2026; McKinsey, 2025; iRecruit.co, 2026b; Cortex Construct, 2026). Project-specific information on costs, capacity, and development information was obtained from developer announcements, corporate publications, and other publicly available project documentation (CoreWeave, 2025; QTS, 2026; PA Data Center Partners, 2026; Amazon Innovation in PA, 2026a; Microsoft, 2026; Compute Atlas, 2026).

For manufacturing facility types, cost estimates and implementation schedules were developed using market and industry sources (iFactory AI, 2026; iRecruit.co, 2026c; Oxmaint AI, 2026; BLS & Co., 2020). Industry-specific cost and development data were supplemented with information from trade publications, market analyses (Kearney, 2025; ENR, 2024; CPE, 2025; GM Authority, 2017; Pharma Phorum, 2025; Pharma Phorum, 2026; CNBC, 2024; ENR, 2022; Korea JoongAnn Daily, 2025; BCG, 2023), and developer announcements (Barton Malow, 2026; LG Energy Solution, 2022; Panasonic Energy, 2025; Stellantis, 2025; Eli Lilly, 2022; Intel, 2025).

For electric power generating technologies, typical costs and project timelines were obtained primarily from the U.S. EIA (2024). Additional CapEx and OpEx data were collected for natural gas-based technologies (NETL, 2025), NGFCs (NETL, 2022; Perez, 2025), SMR (NLR, 2025), onshore wind (LBL, 2025a), solar PV (LBL, 2025b), and BESS (PNNL, 2024b).

Estimated Costs

The estimated costs and construction schedules for the three redevelopment categories, namely electric power generation technologies, manufacturing facilities, and data centers are summarized in Table 30, Table 31, and Table 32, respectively.

Table 30 and Figure 56 indicate that natural gas generation is the least capital-intensive technology evaluated, with estimated capital costs ranging ~\$860–1,650/kW. Onshore wind, solar PV, and BESS have the shortest construction timelines, typically requiring up to one year for completion. These three technologies also incur minimal or no variable operating costs, which may enhance their economic attractiveness. As a result, while natural gas generation may offer lower upfront capital requirements,

technologies such as wind, solar PV, and BESS may provide cost advantages over the project lifetime through lower operating and maintenance expenses. SMR, on the other hand, is by far the costliest technology of all evaluated.

Table 30 Costs and construction timeline for electric power generation and storage technologies.

	CapEx (2024\$/kW)			Fixed OpEx (2024\$/kW-year)			Variable OpEx (2024\$/MWh)			Typical Construction /Build (months)
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	
NGCT	\$ 861	\$ 1,258	\$ 1,654	\$ 7	\$ 8	\$ 10	\$ 1	\$ 4	\$ 6	22
NGCC	\$ 894	\$ 1,103	\$ 1,321	\$ 12	\$ 26	\$ 36	\$ 2	\$ 3	\$ 4	23
NGFC	\$ 955	\$ 1,742	\$ 4,712	\$ 28	\$ 67	\$ 265	\$ 5	\$ 6	\$ 8	TBD
SMR	\$ 6,860	\$ 9,705	\$ 13,221	\$ 122	\$ 152	\$ 222	\$ 2	\$ 3	\$ 3	48
Onshore Wind	\$ 1,477	\$ 1,857	\$ 2,194	\$ 21	\$ 25	\$ 29	\$ -	\$ -	\$ -	9
Solar PV	\$ 1,547	\$ 1,752	\$ 1,950	\$ 11	\$ 18	\$ 40	\$ -	\$ -	\$ -	12
BESS Li-ion (4 hr)	\$ 1,382	\$ 1,620	\$ 1,874	\$ 4	\$ 5	\$ 5	\$ -	\$ -	\$ -	12

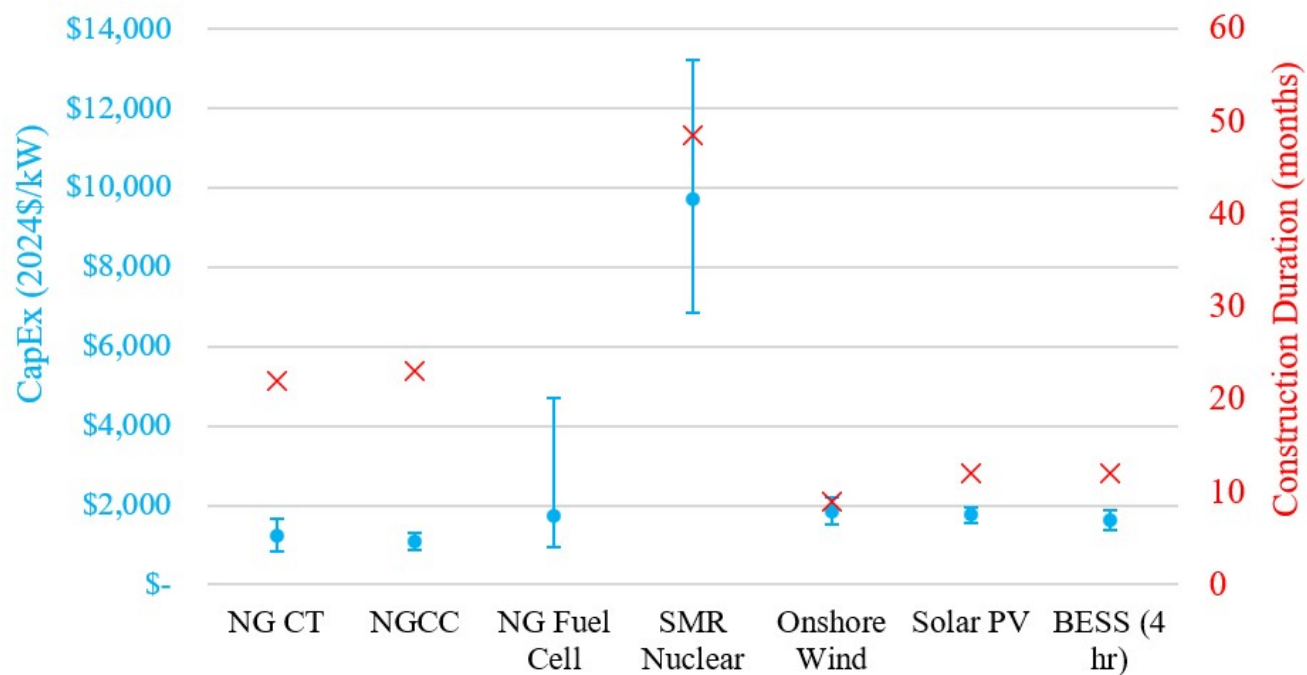


Figure 56 Typical capital costs and construction duration for electric power generation technologies.

Manufacturing facility costs were evaluated for five representative industry sectors: semiconductor fabrication, EV battery gigafactories, pharmaceutical manufacturing, automotive manufacturing, and food and beverage processing. The assessment indicates that semiconductor fabrication facilities are, by far, the most capital-intensive facilities, whereas automotive manufacturing and food and beverage facilities are the least costly. Semiconductor fabrication and pharmaceutical manufacturing facilities exhibit the longest development schedules, with project timelines extending up to five years from project initiation to full operation. Estimated CapEx, OpEx, development timelines, and acreage requirements for each facility type are shown in Table 31 and shown in Figure 57

Table 31 Costs, construction timeline, and acreage for manufacturing facilities.

	CapEx (2024 \$/ft ²)			OpEx (2024 \$/ft ² /yr)			Typical Construction/Build (months)			Building Under Roof (acre)	Site Acreage
	Low	Mid	High	Low	Mid	High	Low	Mid	High	Range	Range
Semiconductor Fabrication	\$4,444	\$9,080	\$20,000	\$178	\$647	\$3,200	36	48	60	24–161	~1,100
EV Battery Gigafactory	\$725	\$959	\$1,333	\$145	\$360	\$667	24	36	48	64–184	300–3,600
Pharmaceutical	\$800	\$4,392	\$6,500	\$120	\$1,166	\$2,410	36	48	60	16–21	150–400
Automotive	\$110	\$309	\$800	\$11	\$39	\$120	24	36	48	84–367	280–2,900
Food & Beverage	\$120	\$260	\$400	\$12	\$33	\$60	12	18	24	N/A	N/A

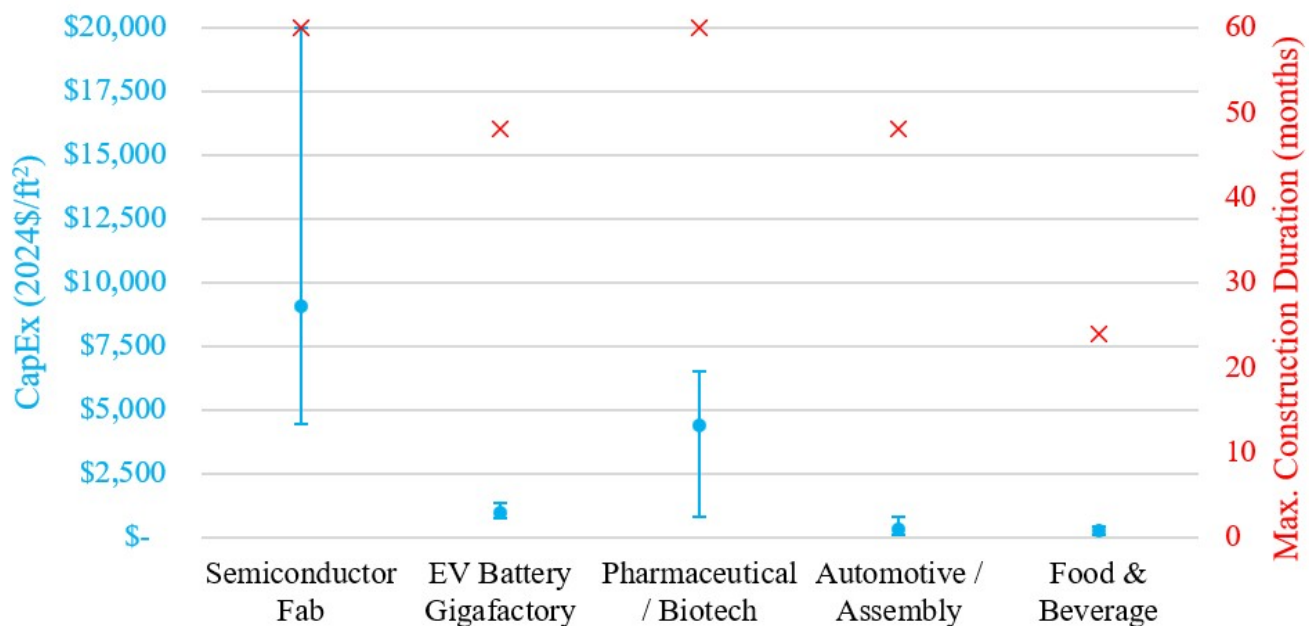


Figure 57 Typical capital costs and maximum construction duration for manufacturing industries.

Among the industries evaluated, automotive manufacturing facilities typically require the largest building footprints and overall site acreage, followed by EV battery gigafactories and semiconductor fabrication facilities. In contrast, pharmaceutical manufacturing facilities generally require less land to support integrated production operations. A notable finding is that pharmaceutical and food and beverage facilities are more commonly developed on greenfield sites, which generally present fewer environmental constraints than brownfield sites. As a result, redevelopment of contaminated brownfield sites for these industries may require additional remediation activities, permitting efforts, and associated costs, potentially affecting overall project feasibility. Although less common, examples of brownfield redevelopment for life sciences and biomanufacturing application do exist. For example, a former 31-acre brownfield site has been partially redeveloped into biomanufacturing space, demonstrating that such projects can be feasible under appropriate site conditions and redevelopment strategies (DIG Architecture, 2026).

Data center costs were evaluated for four primary facility types, including enterprise, colocation, hyperscale, and AI-optimized data centers. The assessment includes construction-related CapEx for each facility type, as well as a separate estimate for typical information technology (IT) equipment CapEx. Enterprise data centers are typically owned and operated by a single organization and are generally small to medium in scale. Colocation facilities are medium- to large-scale developments that provide leased data

center space and services to one or more tenants. Hyperscale data centers are very large facilities designed to support cloud computing, internet services, and major digital platforms. AI-optimized data centers are similarly large in scale but are specifically designed to support high-density graphics processing unit clusters and other AI workloads, resulting in substantially higher power and cooling requirements than traditional data centers. IT equipment CapEx was evaluated separately because servers, networking hardware, storage systems, and specialized computing equipment often represent the largest share of total project costs, particularly for hyperscale and AI-focused facilities (Vila, 2025).

Table 32 and Figure 58 indicate that AI-optimized data centers are the most capital-intensive of the facility types evaluated, with construction costs ranging ~\$15–20M/MW. In many cases, IT equipment represents an even larger capital investment, with estimated costs ranging ~\$20–40M/MW. Hyperscale and AI-optimized facilities also exhibit the longest development times, typically requiring up to three years for construction. In addition, procurement of long-lead equipment can require up to two years (iRecruit.co, 2026b), underscoring the importance of early equipment ordering to maintain project schedules and avoid construction delays.

Table 32 Costs, construction timeline, and acreage for data centers.

	CapEx (2024 \$M/MW)			OpEx (2024 \$M/MW/yr)			Typical Construction/Build (months)			Building Under Roof (acre)	Site Acreage
	Low	Mid	High	Low	Mid	High	Low	Mid	High	Range	Range
Enterprise/Tier II	\$8.0	\$9.0	\$10	\$1.4	\$2.0	\$2.5	12	15	18	N/A	N/A
Colocation/Tier III	\$6.2	\$8.3	\$12	\$0.8	\$1.4	\$2.0	12	15	18	14–165	37–2,000
Hyperscale/Tier IV	\$5.0	\$11.9	\$15	\$1.0	\$1.3	\$1.5	24	30	36	7–103	247–2,250
AI-Optimized/Tier IV	\$15	\$18.3	\$20	\$0.9	\$1.4	\$2.0	24	30	36	46	144
IT Equipment	\$20	\$32.5	\$40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

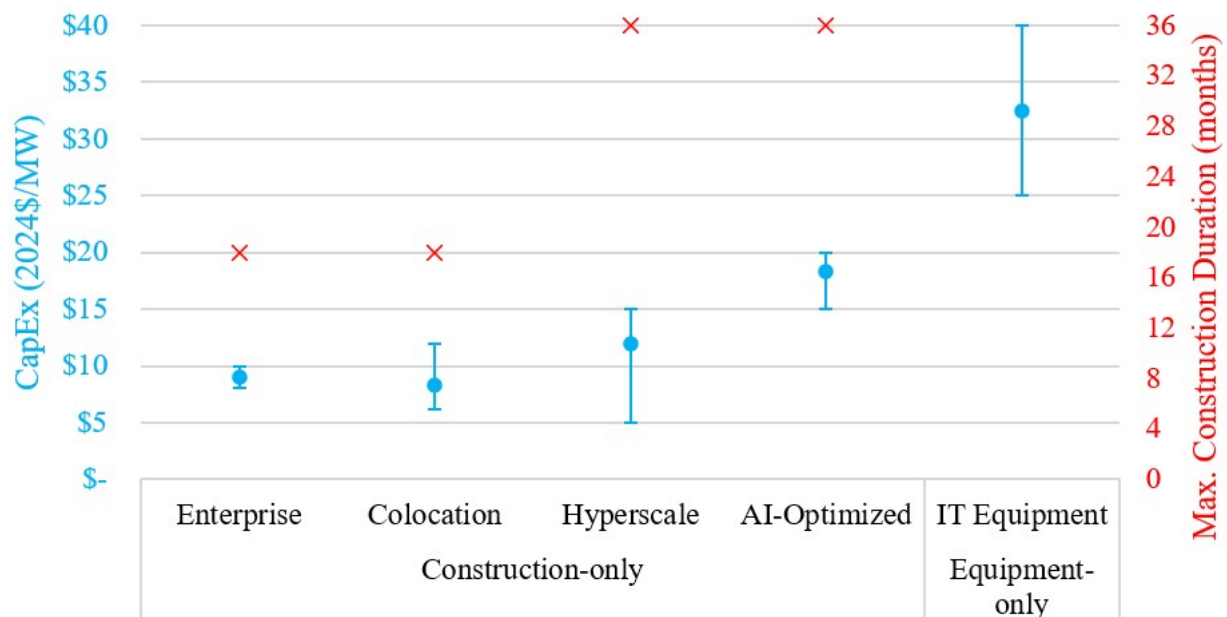


Figure 58 Typical capital costs for data centers and IT equipment, and maximum construction duration for data center facility types.

Based on the real-world projects reviewed, no clear relationship was identified between data center classification and building footprint. A notable finding is that most facilities occupy only a small fraction of the total site area available for development. In some cases, the building footprint accounted for as little as 0.6% of a 1,200-acre site, while the highest observed utilization was 38% of a 37-acre site. This

variation suggests that site design is influenced by factors beyond building areas alone, including setbacks, utility infrastructure, security buffers, parking areas, cooling systems, electrical equipment, retained natural areas, and provisions for future expansion. Facilities with similar building footprints were observed across sites with substantially different acreage, indicating that power capacity, equipment density, cooling requirements, redundancy requirements, and long-term growth plans are likely more significant drivers of land requirements than building footprint alone. Although many recent hyperscale and AI-oriented facilities are planned or have been constructed on sites with hundreds to thousands of acres, the findings indicate that large site acreage is not necessarily a prerequisite for data center development. Several real-world examples demonstrate that data centers can be successfully developed on sites consisting of a few dozen acres, especially when co-located with existing infrastructure or developed as part of a larger industrial or commercial complex.

6.4 Potential Redevelopment Configurations at the Candidate Sites

Based on the transmission zone, site characteristics, and analysis presented above, each site will be assigned a preliminary redevelopment configuration. These preliminary determinations will serve to inform future analysis rather than as recommendations. Site-specific demolition and construction; local workforce, politics, and permitting; and broader grid and market conditions at the time of development will all influence what technologies are most favorable and what outcomes are realized.

For the purpose of analysis and grading each site's desirability, it will be necessary to assume site configurations. Sites in zones expected to have more generation than load are classified into load technologies based on their proximity to infrastructure and acreage. Likewise, sites in zones expected to see more load growth than generation are classified according to suitable generation technologies. The actual, plausible size of installations will be informed by follow-on hosting capacity studies. The initial analysis (see Figure 59) shows the capacity each site can host based on a system-level analysis wherein the number of interconnection points and capacity were maximized. This analysis does not consider that some sites have higher potential based on available land area. For example, Stanton (PA) was assigned a near-zero hosting capacity despite the substantial land area available. This does not necessarily mean that the site is limited from a transmission perspective, but rather that capacity at other sites would need to be reduced to rebalance the system.

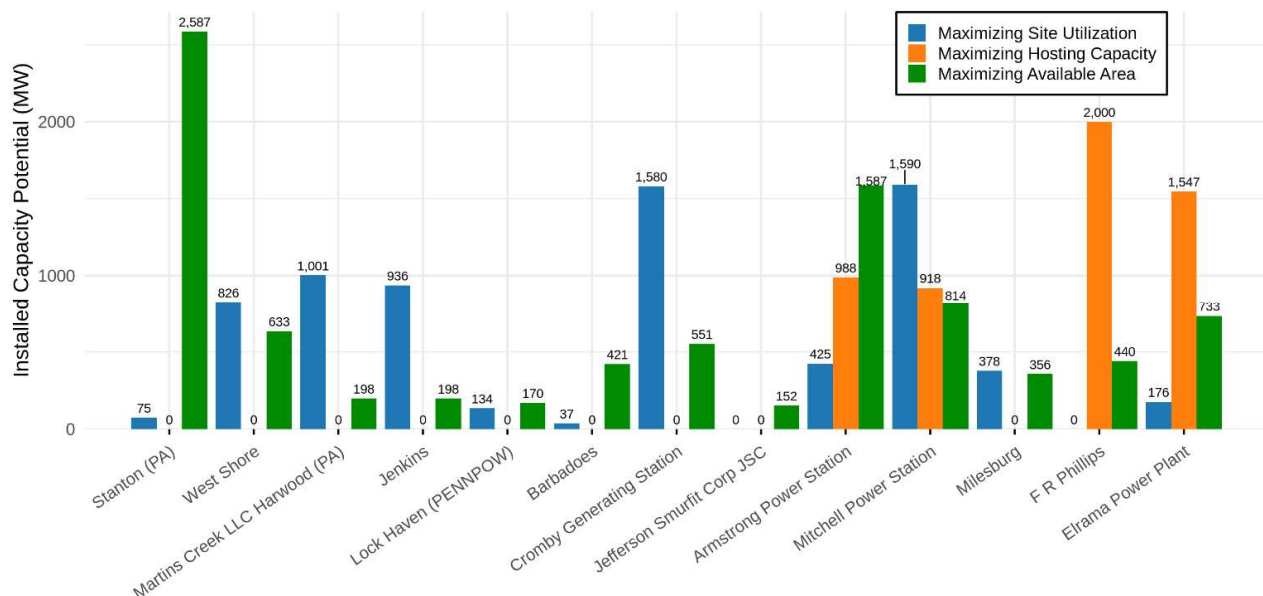


Figure 59 Installed capacity potential based on assumed economic system performance hosting capacity and acreage. The initial hosting capacity analysis maximizes the number of sites and capacity at a system level. Changing the subset of sites and their priority can change the capacity limits.

The configurations of load hosting sites are also preliminary. While the initial hosting capacity analysis assigned several sites zero capacity (notably Piney Creek), this was based on system-level optimization and is subject to change pending the prioritization of sites (see Figure 60). In addition, the initial analysis considered resource adequacy as a constraint in determining hosting capacity. The generation additions from other redevelopment projects will shift that constraint and influence future analyses. Sites with onsite generation are also less restricted with regards to resource adequacy constraints.

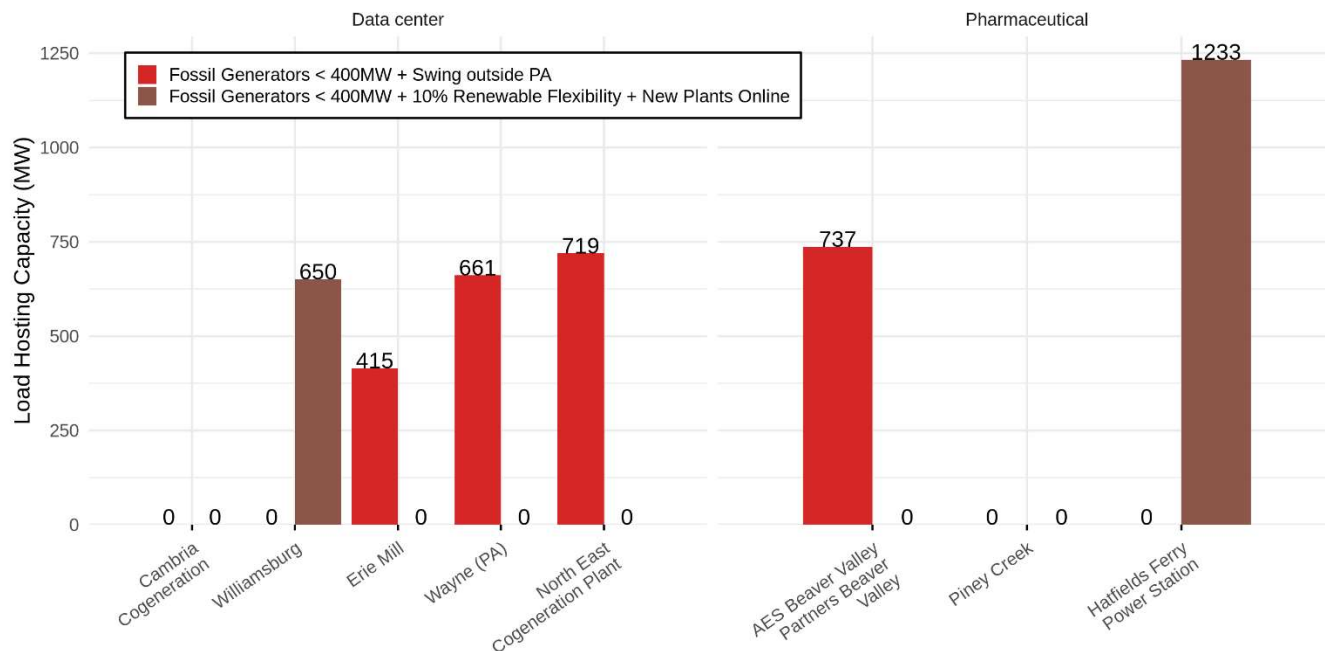


Figure 60 Load hosting capacity at potential sites. The initial hosting capacity analysis considered placing loads at all sites. Changing the subset of sites and their priority can change the capacity limits. The brown bars represent the generation-limited hosting capacity of the system, including fossil generators, renewable production, and planned additions while the red bars represent the transmission-limited hosting capacity.

6.5 Next Steps

The preliminary site redevelopment configurations will feed into more detailed analysis. Site-specific characteristics (e.g., remediation needs) and information from site owners will better inform estimates of the precise size of generation and load. Refined analysis of transmission and system constraints will provide other parameters constraining the preferred site configurations. Using only the subset of sites suitable for generation and load, secondary hosting capacity studies can better gauge generation and load-hosting capabilities, respectively. Since the hosting capacity is a system-level optimization, removing extra degrees of freedom will result in more precise results. Furthermore, certain sites (e.g., those with more available land area) can be given priority to better harmonize system needs with local resources. The refined configurations will in turn serve as inputs to PROMOD, which will illustrate the local (e.g., LMPs, congestion) and system (e.g., reliability) effects of site redevelopment.



7. Economic Development and Impacts

7. Economic Development and Impacts

This chapter examines the potential economic benefits of redeveloping the 21 sites identified in previous chapters as candidates for redevelopment. The analysis considers a number of technologies for site configuration, including power generators utilizing NGCC, solar, SMRs, and battery storage; as well as large load electricity users, such as auto manufacturing plants, battery manufacturing plants, and data centers.

Because of the large number of sites and potential site configuration technologies, this chapter is necessarily a high-level analysis of the economic impacts of these technologies. A multiplier-based estimates of jobs, economic output, labor income, and GDP is developed for each configuration at each candidate site. The analysis considers county-specific data as well as statewide data, which allows for a quick evaluation of impacts for ranking sites and configurations by their economic characteristics.

7.1 Methods and Data Sources

The economic impact analysis uses input-output modeling to assess the direct and total economic impacts of the redevelopment technologies. Input-output models characterize the economy as a series of transactions between different industries in a two-axis matrix of inputs and outputs (Leontief, 1951). These models are used primarily for economic benefits and/or cost analyses where there is a need to calculate a change in economic output due to a shock in the regional economy. Thus, input-output models capture the value of goods and services that flow between industries and households during production, which generate additional economic activity in the local economy, known as a multiplier effect.

For this analysis, IMPLAN (Demske, 2025) is used to assess the economic multipliers for each technology within the county economies surrounding each redevelopment site. IMPLAN is the most commonly used input-output model for assessing economic impacts, providing an assessment of both indirect effects (trade flows between the primary industry and its network of suppliers), and induced effects (impacts resulting from household spending of labor income).

The IMPLAN model assumes that trade relationships between industries are set in fixed proportions that do not change over time (Miller & Blair, 2022). Because of this assumption, the model contains no market price mechanism or economies of scale for production and, thus, is best used for impacts that are small relative to the comparison economy. Job impacts are also assumed to be located within the regional boundaries, with construction impacts constituting a one-time, temporary impact that accrue only during the construction period while operational impacts can be interpreted as annual, ongoing economic activity. Labor income is divided first into employee compensation and proprietor income, which includes self-employed people or owners and is distributed across nine household income groups to differentiate household spending patterns. These household spending patterns assume workers purchase distribution is similar those of typical residents in the region (IMPLAN Data Team, 2017).

7.2 Multipliers

Economic multipliers represent the amount of economic activity generated per \$1M in expenditure in a particular industry. These multipliers are greater than 1 because the dollars flow through multiple hands in the region and generate additional economic impact with each iteration of expenditure at supplier industries and from households spending labor income. The direct impact of \$1M is, thus, multiplied as it moves through the local economy. Figure 61 shows the process by which the multipliers for this study were developed.

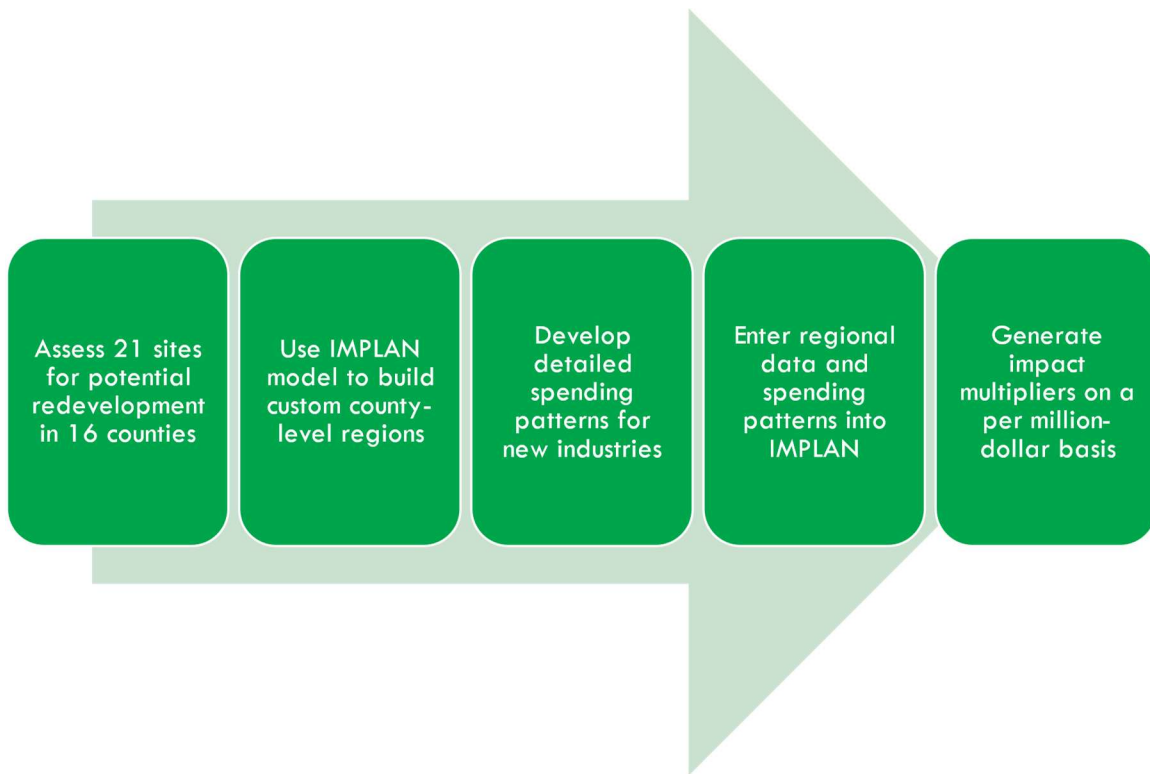


Figure 61 Process flow diagram to develop state and county-level multipliers per \$1M of economic impact.

As shown in Table 33, the 21 redevelopment sites detailed above are located in 16 individual counties within PA. Because the IMPLAN model is a county-based model, the multipliers were developed based on the county locations of each site. Thus, redevelopment sites in the same county will have identical economic multipliers for each of the configuration technologies.

Table 33 List of redevelopment project sites and their county locations.

Project	County
AES Beaver Valley Partners Beaver Valley	Beaver
Armstrong Power Station	Armstrong
Barbadoes	Montgomery
Cambria Cogeneration	Cambria
Cromby Generating Station	Chester
Elrama Power Plant	Washington
Erie Mill	Erie
F R Phillips	Beaver
Hatfields Ferry Power Station	Greene
Jefferson Smurfit Corp JSC	Philadelphia
Jenkins	Luzerne
Lock Haven (PENNPOW)	Clinton
Martins Creek LLC Harwood (PA)	Luzerne
Milesburg	Centre
Mitchell Power Station	Washington
North East Cogeneration Plant	Erie
Piney Creek	Clarion
Stanton (PA)	Luzerne
Wayne (PA)	Crawford
West Shore	Cumberland
Williamsburg	Blair
Statewide Multipliers	Pennsylvania

Custom County-Level Regions: Some of the configuration technologies do not currently exist in the redevelopment counties, either because the industry is not established in that county or because it is too new to have an existing presence there. If an industry does not currently exist in a county, IMPLAN recommends creating a custom county region (Lucas, 2019) to account for the economic impact if a new industry were built in the region. For this analysis, 16 custom county regions were created within the IMPLAN software for each of the redevelopment counties.

Detailed Spending Patterns: Newer industries such as data center construction and SMRs do not have well-established expenditure models within the IMPLAN system. For this analysis, detailed spending patterns were developed for the majority of the redevelopment technologies, which identify a distribution of expenditures across multiple commodities within the IMPLAN model.

Spending patterns for NGCC generating capacity were derived from Schmitt et al. (2023) and Schmitt et al. (2022) for newly built greenfield NGCC plants. Spending estimates for wind generation are sourced from the National Renewable Energy Laboratory Jobs and Economic Development Impacts model (2020), while solar and battery energy storage are drawn from the National Renewable Energy Laboratory's U.S. Solar Photovoltaic System and Energy Storage Cost Benchmarks (Ramasamy, et al., 2023). CapEx spending patterns for data center construction are sourced from Thunder Said Energy (2026).

Generation of Multipliers: Once the custom counties and spending patterns were completed, an IMPLAN model was run for each of the 21 projects and 17 technology spending patterns.⁵ Each model used a fixed \$1M in direct output in order to generate the economic multiplier per \$1M of expenditure. Multipliers were generated for output, employment, labor income, and GDP, for a total of nearly 1,500 separate multipliers.

Figure 62 to Figure 65 provide an example of the multiplier model showing how much economic impact is generated for each \$1M of expenditure, including both direct spending and indirect and induced impacts from the IMPLAN model. The example uses annual OpEx from a typical NGCC power plant and a battery manufacturing facility; however, multipliers were generated for the proposed resources. The statewide multiplier at the top of each chart indicates the impact of this sample project anywhere in PA, while project-specific multipliers are listed in the remainder of the chart. County multipliers are smaller than the state multiplier because less of the economic activity is contained within the county borders than within the state as a whole. Multipliers were generated for both CapEx and OpEx.

Figure 62 shows the annual number of jobs that would be created by a typical NGCC plant and a battery manufacturing plant for each \$1M of OpEx for each candidate deactivated site and also statewide. According to Turner et al. (2025), an average 741 MW NGCC generating plant has ~\$197M in annual OpEx. Using the statewide multiplier of 2.4 jobs per \$1M, this plant would generate ~475 jobs in the PA economy annually. Similarly, a typical giga-scale battery manufacturing plant with 10 GWh of annual capacity⁶ (OpenPR, 2026) would spend ~\$50.3/kWh annually (Küpper, Kuhlmann, Niese, Kim, & Nordemann, 2025) for a total OpEx of ~\$503 million. Using the statewide employment multiplier for battery manufacturing of ~4.1 jobs per \$1M in expenditure would indicate the typical factory would support more than 2,050 jobs in the PA economy.

⁵ Spending patterns were assigned for CapEx and OpEx for 8 technologies for a total of 16. Battery storage was assigned a spending pattern for CapEx but not OpEx, as literature sources indicate there is little additional OpEx beyond construction for storage systems (Ramasamy et al., 2023).

⁶ Tesla's Gigafactory in Nevada is designed to produce as much as 35 GWh annually, while some larger facilities under construction in China and Europe are designed for 50 GWh of annual production (Beck & Pollitzer, u.d.).

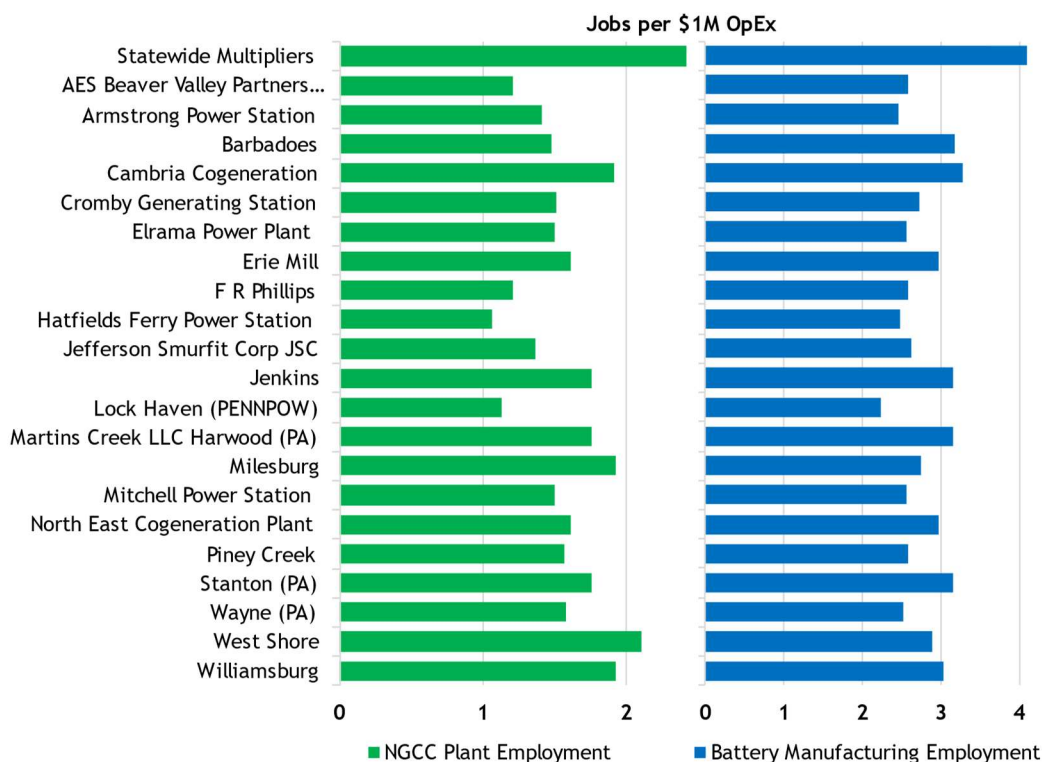


Figure 62 Statewide and county-level employment multipliers for \$1M of OpEx for selected example redevelopment projects.

A similar calculation can be made for economic output, labor income, and GDP multipliers presented in the remaining figures. Figure 63 shows that a typical NGCC plant would generate \$1.67M in annual economic output for each \$1M of annual expenditure, corresponding to a total of \$330M in annual economic impact in PA. The statewide multiplier for labor income, shown in Figure 64, is \$295,000 per \$1M in OpEx, for a total labor income of \$58M in the example plant. Finally, Figure 65 shows that \$1M in annual expenditures would generate \$888,000 in GDP impacts, for a total of \$173M in GDP gains in the state of PA. The corresponding figures for battery manufacturing are \$863M in output impact, \$189M in labor income impact, and \$313M in GDP impact.

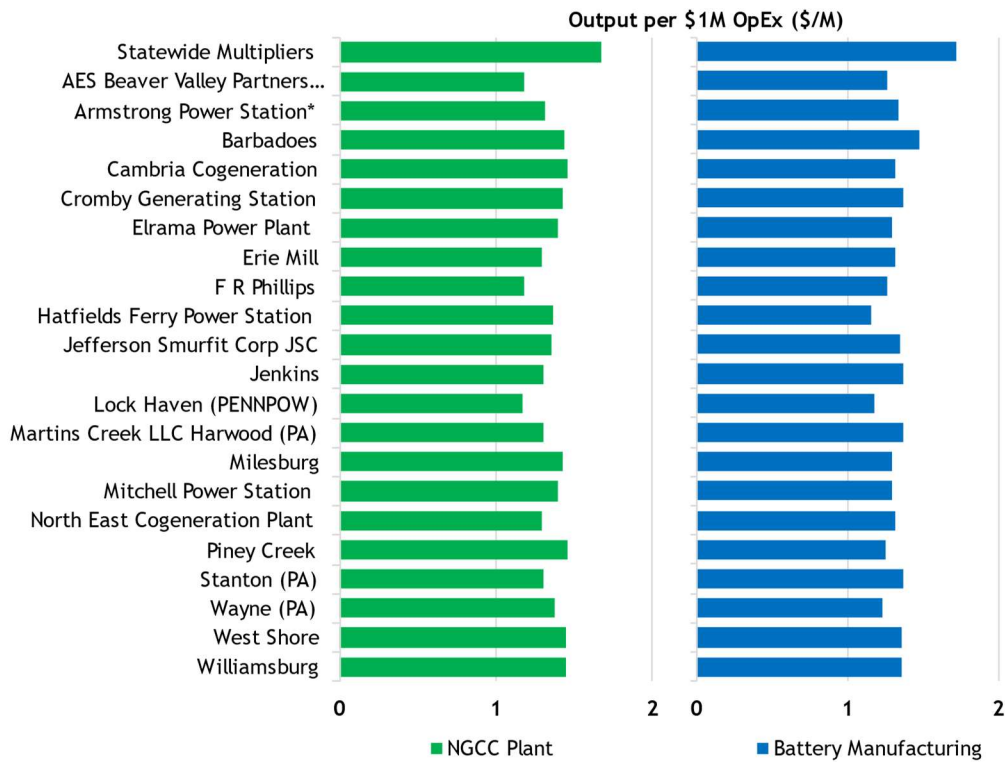
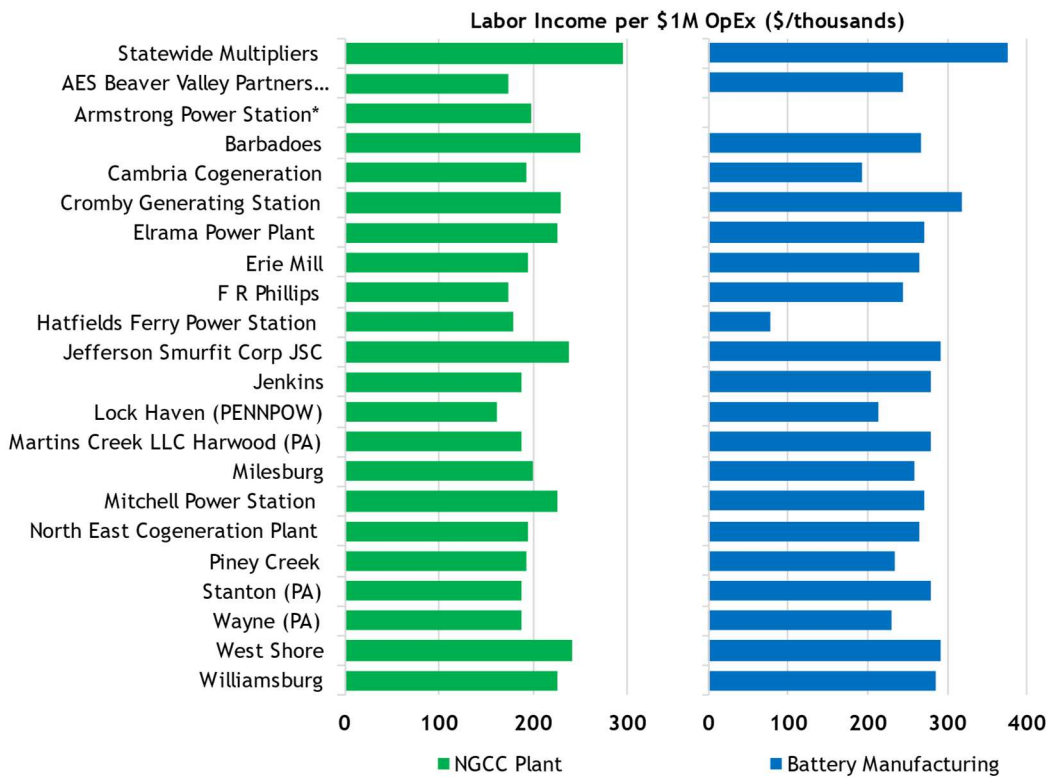
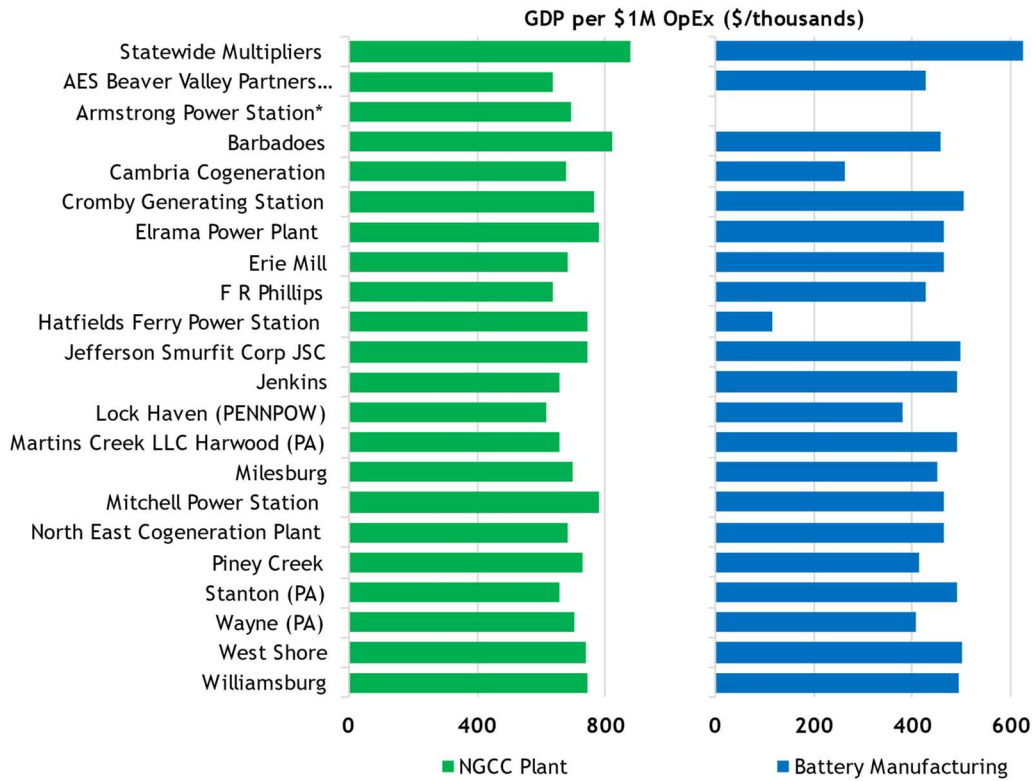


Figure 63 Statewide and county-level output multipliers for \$1M of OpEx for selected example redevelopment projects.



*Armstrong County was excluded because of an anomalous labor income multiplier in the battery manufacturing industry.

Figure 64 Statewide and county-level labor income multipliers for \$1M of OpEx for selected example redevelopment projects.



*Armstrong County was excluded because of an anomalous GDP multiplier in the battery manufacturing industry.

Figure 65 Statewide and county-level labor GDP multipliers for \$1M of OpEx for selected example redevelopment projects.

7.3 Economic Development Associated with New Transmission Capacity

One additional potential economic impact in the region would be the construction of new electric transmission capacity. Based on high-voltage projects (500 kV or greater) identified in PJM's Regional Transmission Expansion Plan (PJM, 2026), constructing new transmission lines would cost \$4–6M/mile. Economic impacts related to these transmission costs would be limited to the construction period. However, depending on the county where construction occurred, they would generate additional annual economic impacts of \$1.17–1.47M in economic activity per \$1M in expenditure, through the economic impact multiplier effect, as shown in Figure 66.

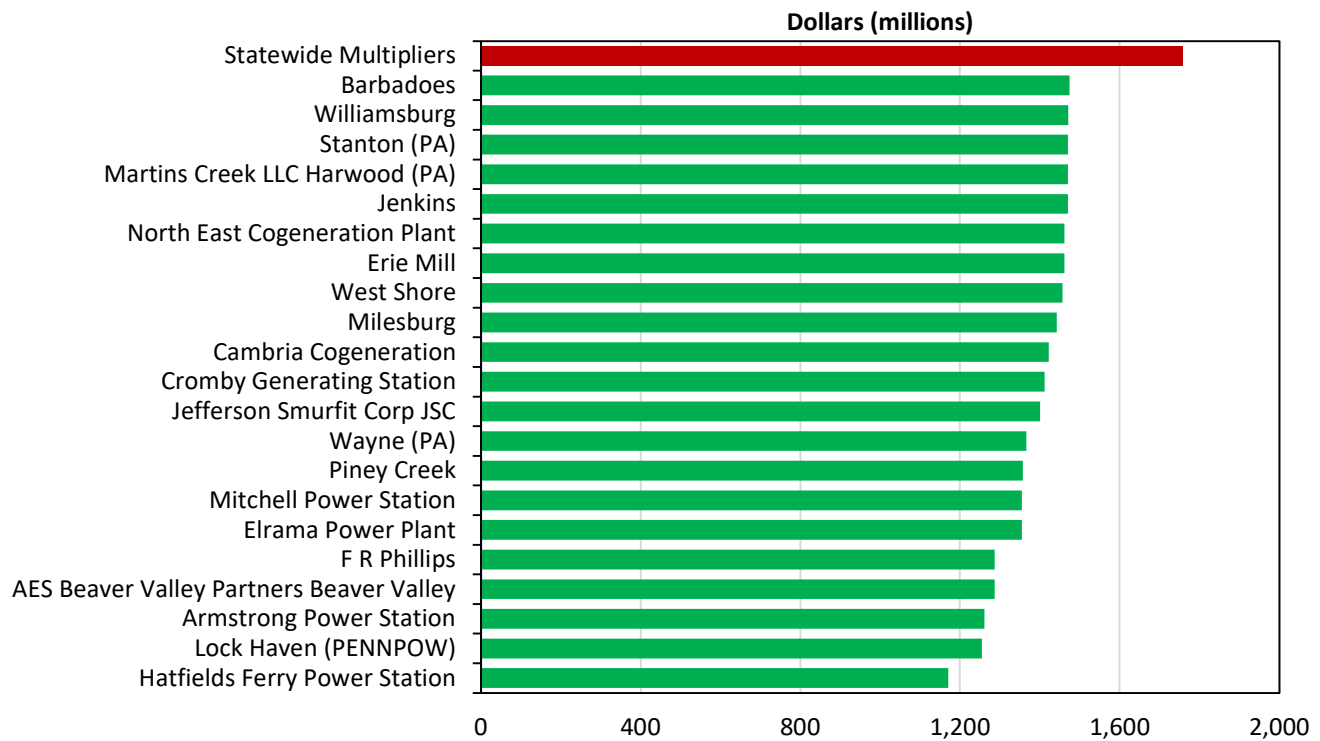


Figure 66 Statewide and county-level output multipliers for \$1M of electric transmission capacity construction expenditures per candidate deactivated site.

While the economic impacts of construction would be substantial, the primary economic benefit of additional capacity would be enabling additional economic activity through improved electricity transmission. Redevelopment of the potential sites identified above would benefit from additional capacity, either for transmission away from new generators, or to new electricity users. Broader economic value of new transmission will be defined by the long-term planning process that is established by PJM in response to FERC Order No. 1920-B. This new planning process will require justification of transmission across multiple economic and system performance metrics that demonstrate a positive cost-benefit ratio. Aligning new transmission projects with the long-term economic, reliability, energy affordability, and resilience needs of the system will be critical to ensuring continued value from these projects.



8. Key Findings

8. Key Findings

This chapter summarizes the findings of the analysis, beginning with an overview of the key attributes that support the viability of candidate deactivated sites viable for each of the four redevelopment configurations evaluated. It also includes a comparison of the capital and operating cost characteristics associated with these redevelopment pathways. The chapter then discusses the primary opportunities and risks identified through the preliminary screening process. Finally, it concludes by outlining key focus areas and consideration for further evaluation in Part B of the study.

8.1 Summary of Site Attributes and Redevelopment Costs

All the attributes compiled in this analysis are important for assessing the redevelopment viability of candidate deactivated sites. Overall, the findings indicate that physical site characteristics and access to energy infrastructure are among the most influential factors supporting successful redevelopment. Key considerations include land availability, zoning designation, decommissioning status, and proximity to critical infrastructure. Sites with larger amounts of developable acreage, appropriate industrial or commercial zoning, and completed decommissioning or site-clearing activities appear to be particularly attractive for redevelopment. The former Coffeen Power Station in Illinois and Cheswick Power Plant in PA provide examples of how these attributes can support redevelopment success. Both sites have at least 50 acres of developable land, have undergone substantial site clearance, and have reclaimed brownfield land for productive uses. Coffeen was redeveloped into a 46-MW solar and energy storage facility, while Cheswick is in plans for data center redevelopment (Dynamo DC, 2026; Renew Illinois Power, 2026).

Property Characteristics

Former coal-fired generation sites generally have larger amounts of potentially available land than natural gas- and distillate fuel oil-based generating facilities. The average extended acreage identified per fuel type is ~200 acres for the 12 coal-fired sites, 38 acres for the 7 distillate fuel oil plants, and 77 acres for the 2 natural gas plants. Among the coal-fired facilities, Elrama Power Plant, F R Phillips, and Williamsburg have the smallest extended acreages, at ~50 acres or less, despite retired capacities of 510, 410, and 43 MW, respectively. For Elrama Power Plant and F R Phillips, it is possible that the original generating station footprints were substantially larger than the primary parcel acreage identified in this analysis, suggesting that portions of the property may have been subdivided and transferred to new ownership over time.

Overall, 9 of the 21 candidate deactivated sites have more than 100 acres of extended land potentially available for redevelopment. In contrast, 8 of the remaining 12 have less than 50 acres of extended acreage. The former Stanton coal-fired power plant in Luzerne County has the largest potentially available land area, with more than 500 acres identified.

A general relationship was observed between fuel type and waterfront access. All but two of the combined natural gas- and distillate fuel oil-fired sites lack waterfront access, whereas all but three coal-fired facilities are located adjacent to a waterfront. Notably, the two facilities fueled by waste coal did not have waterfront access.

Satellite imagery review indicated that all sites, with the exception of Armstrong Power Station, Mitchell Power Station, and North East Cogeneration Plant, have been fully decommissioned and largely cleared, suggesting that the land is generally ready for redevelopment. With respect to zoning, West Shore is the only site not currently classified under industrial, commercial, or special use designations. Although the primary parcel is zoned for residential use, the site was retained for further consideration because an adjacent 25-acre parcel under common ownership is zoned for commercial use.

Proximity to Infrastructure

Existing infrastructure analysis indicates that all candidate sites except Williamsburg are located either adjacent to or within ~1 mile of the nearest electric transmission line and substation, suggesting strong access to existing grid infrastructure. Proximity to transmission assets may reduce the need for extensive interconnection upgrades and support redevelopment opportunities that require significant electrical capacity.

In terms of natural gas infrastructure, 12 of the 21 candidate sites are located within ~1.4 miles of the nearest natural gas pipeline. This distance corresponds to the median separation between existing natural gas-fired power plants in PA and their nearest natural gas pipeline, indicating that these sites have a level of gas infrastructure access comparable to current operating facilities in the state.

Similarly, 11 candidate sites are located within ~3.8 miles of the nearest major broadband fiber network. This distance is consistent with the median separation observed between existing PA data centers and broadband fiber infrastructure. Proximity to fiber networks may enhance the suitability of these sites for data center and other digitally intensive redevelopment opportunities by facilitating access to high-capacity telecommunications infrastructure.

Environmental Assessment

Environmental factors were also evaluated across the candidate sites. Based on FEMA's Natural Risk Index classification, only the Jenkins and Wayne power plants are located in areas with relatively moderate natural hazard risk, while all remaining sites are situated in areas classified as having very low or relatively low hazard risk. Flood risk assessments indicate that approximately half of the sites are located within FEMA-designated high flood risk areas associated with a 1% annual chance flood event, whereas the remaining sites are located within flood zones characterized by moderate or minimal flood risk.

Geotechnical conditions were assessed through a mine subsidence screening. Results showed that approximately two-thirds of the 21 candidate sites are located in areas without identified mine subsidence risk. Of the remaining sites, four are located in areas with confirmed underground coal mining activity, while three are situated above known underground coal mine workings where historic mining activity could not be confirmed.

Environmental site assessments identified documented evidence of either on-site contamination, groundwater contamination, or both at nine of the candidate sites, indicating that additional site-specific investigation and potential remediation may be required prior to redevelopment. Although no documented evidence was found confirming brownfield designation, a screening-level evaluation based on historical site use, fuel type, and available contamination records suggest that all candidate sites except Barbadoes and North East Cogeneration Plant may be considered *presumptive* brownfields. This means that redevelopment of these sites could involve environmental liabilities and remediation actions that may increase project costs and development timelines.

Transmission Hosting Capacity Summary

The transmission hosting capacity assessment indicates that PA's existing transmission network retains meaningful capability to support both new generation and new load development at the candidate deactivated sites. The analysis demonstrates that hosting capacity exists in both directions, with ~9 GW of practical capability identified for either generation injections or load withdrawals under representative operating assumptions. These results suggest that the existing transmission system can support significant near-term redevelopment opportunities while leveraging existing transmission infrastructure. However, hosting capacity is a shared network resource, and available capability varies across locations, operating conditions, and the combination of sites selected for redevelopment. Consequently, transmission infrastructure proximity alone is insufficient to determine redevelopment potential, and transmission

hosting capacity must be evaluated alongside site characteristics, infrastructure availability, and broader system considerations.

A key finding of the generation hosting assessment is that transmission infrastructure is not the primary limiting factor under current system conditions. While the transmission system demonstrated the theoretical capability to accommodate more than 37 GW of additional generation under unconstrained redispatch assumptions, practical hosting capacity decreased to ~10 GW when more realistic operational assumptions were applied. This reduction was driven primarily by the operational flexibility of the existing generation fleet and the ability of generators to redispatch while maintaining system balance. The results indicate that the practical integration of new generation depends not only on available transmission capability but also on the operational characteristics of the broader generation fleet.

Similarly, the load-hosting assessment found that generation adequacy constraints emerge well before transmission constraints become binding. Depending on assumptions regarding generation availability, load-hosting capability ranged from less than 1 GW under current operating conditions to more than 9 GW when generation adequacy constraints were removed and the analysis was bounded solely by transmission limitations. This progression demonstrates that the capability to serve future large-load development is influenced as much by the availability of generation resources as by the capability of the transmission network itself. Collectively, these results suggest that future economic development efforts should consider generation availability, operational flexibility, and transmission capability as interconnected components of system readiness.

While ~9 GW of load hosting capability is substantial relative to historical load growth patterns, the scale of emerging demand associated with large industrial facilities, data centers, manufacturing development, and electrification initiatives could consume this capability rapidly. The hosting capacity values identified in Part A should, therefore, be viewed as planning-level indicators of system capability rather than fixed development limits. In Part B, these results will be refined through broader scenario assessments, consideration of site-specific characteristics, prioritization of candidate sites, and additional power system analyses to ensure that redevelopment pathways can be accommodated while maintaining reliable and secure system operation over the planning horizon.

While the hosting capacity assessment demonstrates that PA's existing transmission system can support substantial near-term redevelopment and load growth, sustaining long-term economic development will likely require continued investment in both transmission and generation infrastructure. Recent studies indicate that transmission expansion can improve affordability, reduce overall system costs, and enhance reliability, particularly when investments are coordinated across regions (CERA Consulting, 2026), underscoring the importance of strategic infrastructure expansion to support future growth while maintaining reliable electric service.

Redevelopment Costs

Power plant redevelopments vary considerably by generation technology, with natural gas-fired facilities representing the least capital-intensive option. Estimated capital costs for natural gas technologies range ~\$860–1,650/kW. In comparison, onshore wind and solar PV projects generally require up to twice the investment, with estimated costs ranging \$1,520–2,200/kW and \$1,550–1,950/kW, respectively. A key advantage of renewable technologies is their shorter construction schedules. Typical project completion times are ~9 months for onshore wind and ~12 months for solar PV, compared to ~22 months for natural gas-fired generation. However, renewable technologies, particularly onshore wind, require substantially more land per unit of generating capacity. Typical land requirements are 70 acres/MW and 7 acres/MW for onshore wind and solar PV, respectively, compared to 0.2 acres/MW for natural gas facilities (Thunder Said Energy, n.d.).

Manufacturing redevelopment costs were evaluated on the basis of building square footage. From the five options evaluated, food and beverage processing and automotive facilities have the lowest capital costs,

ranging \$120–400/ft² and \$110–800/ft², respectively. While food and beverage facilities are among the least capital-intensive redevelopment options, their suitability for deactivated sites classified as presumptive brownfields may be limited due to potentially more stringent environmental due diligence, permitting, and food-safety requirement. As a result, environmental liabilities and remediation requirements could increase project costs and development timelines.

The next least capital-intensive redevelopment option is the EV battery gigafactory, with capital costs of \$725–1,333/ft². Both automotive and EV battery gigafactory facilities generally require large development sites. The real-world examples reviewed ranged ~280–2,900 acres for automotive manufacturing facilities and 300–3,600 acres for EV battery gigafactories. These large land requirements reflect the need for extensive manufacturing space, logistics infrastructure, parking areas, warehouses, and land for future expansion.

Pharmaceutical facilities, by comparison, typically require smaller site footprints, with real-world examples reviewed using as little as 20 acres of building area and up to 400 acres of total site land. However, these facilities are among the most capital-intensive manufacturing redevelopment options evaluated, with construction costs ranging ~\$800–6,500/ft². Pharmaceutical facilities may also require development timelines of up to 60 months due to complex facility designs, specialized process equipment, and stringent regulatory requirements. Similar to food and beverage facilities, pharmaceutical manufacturing operations are likely to face more rigorous environmental permitting and regulatory review processes, which may further affect project schedule and costs.

Data center redevelopment projects generally require substantially higher investments than power generation projects with total project costs, including equipment, ranging ~\$25–60M/MW. Facilities designed to support AI workloads generally occupy the upper end of this range because of their greater power density and computing requirements. In addition to capital costs, data centers require significant building space and land. Available studies suggest that each MW of IT load requires ~5,000–12,000 ft² of building area and 0.5–1.5 acres of land (Nichols, 2025). Actual site requirements depend on facility configuration and the extent to which existing infrastructure can be leveraged.

8.2 Major Opportunities

Redevelopment options present potential economic benefits that must be weighed against redevelopment costs and associated opportunity costs. Industrial redevelopment projects can generate employment, stimulate local economic activity, and expand local tax bases. These benefits may be particularly important in communities where the deactivated facility historically served as a major economic contributor, which is often the case for baseload power plants. Among the 21 candidate deactivated sites evaluated, 14 were formerly operated as baseload plants and 7 as peaking facilities. In addition to direct economic impacts, redevelopment can catalyze complementary development activity and broader community revitalization efforts. EPA notes that redevelopment of former industrial and power generation sites can support wider economic development and community reuse objectives (2016).

Redevelopment planning also provides opportunities to engage public agencies, local governments, utilities, and community stakeholders to identify strategic partnerships, align projects with local and regional priorities. Stakeholder engagement can also help developers identify grant programs, tax incentives, infrastructure investments, and other public or private funding sources that can improve project viability (PA DCED, 2023; PA DEP, 2017).

Former power plant sites may also offer significant redevelopment advantages through reuse of existing infrastructure and site assets. Potential cost savings can be realized by leveraging existing utility connections, transportation infrastructure, site grading, and other developed features. In some cases, redevelopment may benefit from existing electrical interconnection infrastructure, reducing the need for extensive upgrades or lengthy processes relative to greenfield redevelopment. Site-specific characteristics

may further enhance redevelopment potential. For instance, waterfront locations can provide access to commercial shipping and logistics networks, while proximity to densely populated areas may improve access to labor markets and end users. Existing energy assets, including transmission substations, natural gas pipelines, and/or interconnection rights, may increase the attractiveness of power generation or manufacturing redevelopments. Similarly, large parcels of developable land, access to reliable power and cooling resources, and broadband connectivity may improve the suitability of sites for data center developments. For example, the former Mitchell Power Station site illustrates many of these advantages. The site is located near broadband fiber networks and existing electrical infrastructure and contains more than 300 acres of available land, characteristics that support its potential for data center redevelopment.

8.3 Key Risks

Some of the key risks associated with the deactivated sites include environmental risk factors, community acceptance, dynamic risks, and regulatory risks.

Environmental risk factors include air quality, public health impacts, mine subsidence, on-site and groundwater contamination, flooding, natural hazards, and potential competition for water resources. For example, the Jenkins power plant is subject to multiple environmental risk factors, including *confirmed* underground mine activity and a *relatively moderate* FEMA natural hazards risk rating. Although no evidence of on-site or groundwater contamination was identified, the site is classified as a *potential* brownfield due to its historical use as a distillate fuel oil power plant. More broadly, redevelopment options may be constrained by the extent of contamination and could require an environmental assessment study to identify feasible reuse options. The presence of multiple environmental risk factors does not preclude redevelopment; rather, it indicates the need for additional due diligence, risk mitigation measures (e.g., insurance), and potentially higher redevelopment costs.

Environmental considerations beyond existing site conditions were not evaluated as part of this analysis. Because the study focuses on redevelopment viability rather than specific redevelopment pathways, potential environmental impacts associated with future end uses, such as air emissions, water use, wastewater generation, and other permitting considerations, were outside the scope of this assessment. Such impacts would need to be evaluated as part of project-specific planning and environmental review processes.

Community acceptance is also an important consideration when evaluating redevelopment pathways. Perceived environmental, public health, and economic impacts can influence public support and may affect project permitting, development timelines, and overall project feasibility. Certain redevelopment configurations may face greater challenges in obtaining community support than others. Plans to redevelop energy assets have encountered opposition from local residents and advocacy groups in the past. Concerns raised by community members have included potential air quality impacts, competitions for water resources between data centers and residents, uncertainty surrounding economic benefits and job creation, and other environmental considerations (Triblive, 2026).

Dynamic risks relate to the evolving nature of both generation and large loads in PJM and PA in particular. On August 3, 2026, PJM announced the latest round of new service requests that the independent system operator will begin analyzing in clusters. While project details, study reports, and agreements will become accessible as those analyses progress, current details are largely limited to project type, size, and requested in-service date. Four candidate sites are possibly overlapping with the proposed interconnection projects and a further three are considered most likely to be overlapping. However, the likelihood of each of the projects breaking ground is uncertain owing to both the prospective nature of some requests and the barrier of PJM approval. As it becomes clearer when and where new projects materialize, the updated grid conditions will affect the prospects of the candidate sites.

Regulatory risks include obtaining the permits, approvals, and rights required to implement a specific redevelopment option. These may include interconnection rights; environmental site assessments; cleanup planning and remediation approvals; stormwater, water withdrawal, and wastewater permits; air quality permits; waste management approvals; land use and zoning authorizations; standard building and construction permits; and generator air permits, among others (U.S. EPA, 2016; EPRI, 2019). Regulatory requirements can influence project schedules, increase capital and operating costs, and, in some cases, affect the overall feasibility of redevelopment at candidate deactivated sites.

Given the aim of leveraging deactivated sites, transmission system risks are primarily associated with the impacts of redevelopment. Generators and large loads that abide by the transmission limits the reliability impacts should be minimal. Dynamic impacts will still have to be addressed in order to identify impacts and mitigate any potential adverse consequences. Loads and generators that request to interconnect above the transmission limit will require transmission upgrades to ensure reliability and system security.

8.4 Focus Areas for Part B

The 21 deactivated sites characterized in detail as part of the present Part A report will be supplemented with further characterizations. These will include development of preferred redevelopment configuration at each site based on the physical attributes along with transmission hosting capacity. Based on the preferred redevelopment configuration, alternating current power flow simulations will be utilized to refine hosting capacity based on voltage and thermal limits. Production cost modeling will inform the economics of the preferred redevelopment configurations. These additional analyses will provide confirmation of the consistency of the redevelopment configurations with the existing electricity infrastructure without impacting the overall system reliability.

In tandem, a site ranking methodology will be developed to support a rigorous ranking of attributes and options and to ensure that the methodology is structured to incorporate all the criteria that arise through discussions with the PA PUC, Team PA, and other key stakeholders. The ranking procedure will take into considerations the physical attributes developed in this Part A report, refined transmission hosting capacity, operational economics, and economic impacts among other site-specific factors, both technical and general, to rank the deactivated sites in the order of redevelopment suitability. The suitability of the top 5–7 deactivated sites will be validated through site visits.

Part B will build upon the screening-level findings presented in this report through more detailed evaluation of site-specific characteristics, transmission and generation development opportunities, infrastructure requirements, environmental considerations, and economic impacts. Stakeholder feedback is an important component of this effort, particularly in identifying local redevelopment opportunities, validating site-specific conditions, and providing information that may improve assessment assumptions and future analyses. This additional work is intended to help refine redevelopment priorities and better understand the factors that may influence implementation feasibility across candidate sites.

The feedback from the public open comment period (as a PUC docket) during Part A, PATER Study Review Meetings in October and February, and continued engagement with local and regional public stakeholders, as well as industry experts, will be used to guide the Part B report and the study to completion with actionable recommendations.



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9. References

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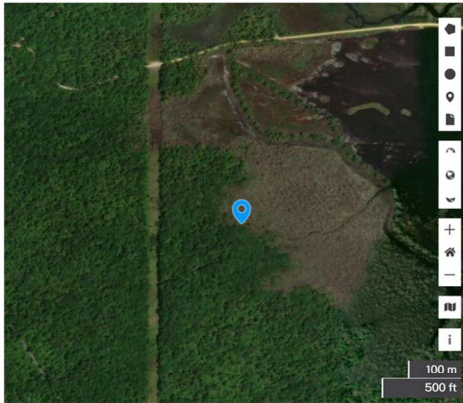
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10. Appendix

10. Appendix

Satellite View



Property Characteristics

🏠 Retired Capacity (MW)	102
⚡ Fuel Type	Coal
📐 Parcel Acreage	248.0
📍 Nearby Potential Acreage	98.0
👤 Ownership Type	Single
🌊 Direct Water Frontage	No
🏠 Zoning Classification	Industrial
📈 Terrain Ruggedness	3 - Intermediately Rugged

Site Readiness

🏠 Redevelopment Viability	Yes	✓
⏸ Decommissioning Status	Complete	✓
✓ Remediation Status	In Progress	!
⚡ Electricity Supply	Yes	✓
💧 Cooling Water Access	No	✗

Environmental Risks

🏠 Brownfield Classification	Presumptive	✗
💧 Groundwater Contamination	Confirmed	✗
🌊 FEMA Natural Hazards Risk	Very Low	✓
🌊 FEMA Flood Hazard	Minimal	✓

Nearest Infrastructure (mi)

⚡ Transmission Lines	0.55
🏠 Substation	0.05
🌊 Gas Pipeline	0.14
🌐 Broadband	1.23
🚂 Rail access	0.11
🛣 Major Roads	0.04
🏠 Power Generation Units	4.60
🌊 Marcellus Shale	0.00
🌊 Wastewater Treatment	3.60
🏠 Brownfield	6.90

Site Constraints

⚡ Max Transmission Hosting Capacity (MW)	52
🌊 Natural Gas Supply Limit (Bcf/d)	2.3

Financials

💰 Decommissioning Costs (\$M)	\$150
💰 Permitting Costs (\$M)	\$1.2
💰 Associated Infrastructure Costs (\$M)	\$350
💰 Redevelopment Costs (\$B)	\$3.5

Figure 67 Dashboard template example for displaying candidate deactivated site attributes.



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