

DECOMMISSIONING STUDY FOR LODI CT2 FACILITIES

DRAFT Capital Cost Estimate

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PREPARED FOR

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Executive Summary

Black & Veatch has evaluated the potential costs to decommission or demolish NCPA's Lodi CT2 facility¹ and has defined other associated issues. This study includes the following activities associated with retiring Lodi CT2:

- **Decommissioning** – Analyze Lodi CT2's systems to determine cost effective options for unit shutdown and demolition. The analysis includes consideration for the partial demolition of the Lodi CT2 facility.
- **Environmental** – Identify potential environmental hazards associated with Lodi CT2 facilities.
- **Capital Cost Estimate** – Develop cost estimates for demolition of plant equipment in today's dollars and, using Producer Price indexes, project future project capital costs.
- For the purpose of this study, retirement and decommissioning both refer to the formal process of removing an electric generating unit, and other associated equipment, from active service in a manner that it can no longer be used to generate electricity. Demolition is defined as the tearing down and removal of equipment, buildings, and structures (while potentially preserving valuable components and materials for reuse). Demolition does not refer to the process or actions taken to remove a piece of equipment for resale and reuse, which is more involved and typically requires skilled labor.

Black & Veatch has determined that the estimated capital cost to decommission and demolish Lodi CT2 is estimated at \$12,600,000.

¹ This retirement, decommissioning, and demolition study is not intended to be, and should not be construed as, advice concerning legal obligations or a recommendation concerning the timing, scope or necessity to conduct any related activity. Black & Veatch has assumed that the limited information, both verbal and written, provided by others is complete and correct; however, Black & Veatch does not guarantee the accuracy of the information, data, or opinions contained herein.

1.0 Introduction

1.1 FACILITY DESCRIPTION

The Lodi CT2 facility is located west of Lodi California outside the city proper within San Joaquin County and owned and operated by Northern California Power Agency (NCPA). This facility is part of a larger Lodi Energy Center (LEC) facility and consists of a 1x0 steam injected gas turbine. It utilizes a GE LM5000 and a Deltak three pressure HRSG for steam. Water is supplied by the city. The combustion turbine has pumps and a pipeline in the city Pollution Control Facility, as well as power and control cables. There is a 4,500 foot deep Class 1 injection well for process wastewater, as well as a pipe to the neighboring Pollution Control Facility. The facility owns a sewer pipe to move sewage waste to the city. The unit uses a lithium bromide chiller for inlet cooling and has a diesel fire pump for fire protection. Anhydrous ammonia is used for NO_x emission control. A three breaker ring bus was built to connect the facility to Pacific Gas & Electric (PG&E). PG&E also delivers gas through an on-site interconnection. The LEC was built next door to Lodi CT2, and as a result, there are numerous shared facilities.

2.0 Lodi CT2 Demolition Project Approach

Black & Veatch's project approach was split into several tasks. These include:

- Review of data provided by NCPA.
- Desktop review of demolition of Lodi CT2 facilities.
- Consider environmental hazards associated with the Lodi CT2 demolition process.

Black & Veatch's approach to estimate these costs was based on the use of a proprietary estimating spreadsheet developed for previous generating station decommissioning and demolition studies. Where possible, configuration data from Lodi CT2's drawings, and other technical resources provided by the NCPA was used to populate the spreadsheet. When site specific data was not available, typical data was supplemented from Black & Veatch in-house databases and information from previous projects. A general set of decommissioning assumptions was developed to guide the basis of the analysis based on the project kick-off conference call held on July 28, 2016. These discussions focused on safety and security requirements, potential hazardous materials that would be encountered during demolition, equipment to remain in service (if applicable), and final site condition requirements.

The retiring and disposing of a power plant can require close coordination with the regulatory agencies. There are several groups which administer regulations associated with air quality, surface water quality, ground water quality, solid waste management, hazardous waste, and petroleum storage tanks. There are no regulations which relate specifically to the dismantling of electric generating plants. The existing permits may contain limited closure guidelines or specific conditions. However, as more power generating facilities are retired these requirements could evolve in future years. Black & Veatch did not consult with or seek clarification from government agencies to confirm current or future anticipated decommissioning permitting requirements and processes. Therefore, during the next phase of the study, it is recommended that NCPA work closely with the various agencies during the planning stage to identify and negotiate specific closure requirements.

A decommissioning and demolition (D&D) plan, including a constructability analysis, was not completed as part of this estimate. It is recommended for the next phase of this project that a D&D plan is developed as it is a valuable roadmap to the deconstruction, final functionality (as applicable), and appearance of the facility and is recommended as part of any future project. This document can further define the project and enhance the accuracy of the cost estimate.

Based on discussions with NCPA, the Lodi CT2 facility equipment was broken down into seven groups which are reasonable depictions of facility systems for the purposes of this estimate. The systems for each group include the following and are illustrated in Appendix A:

- Group 1 includes Fire Water System including fire water tanks and fire water pump house.
- Group 2 includes natural gas metering station, gas compressor, combustion turbine, HRSG, electrical equipment room, main and aux transformers, circulating water tower, pumps and catalyst area and pipe rack.
- Group 3 includes admin building, control room, shop, and warehouse.
- Group 4 includes anhydrous ammonia system.
- Group 5 includes electrical switch building.

- Group 6 includes oil/water separator, waste water tank, waste water injection pump and waste water injection well.
- Group 7 includes water treatment building, warehouse, demineralizer water tank and reverse osmosis (RO) water tanks².

While LEC is not a facility currently being considered for decommissioning and demolition it affects the demolition of Lodi CT2. As such, two separate scenarios were considered for the Lodi CT2 facility. One scenario will be a complete demolition of all Lodi CT2 facilities and its equipment. The second scenario will be a surgical decommissioning and demolition, removing only the Lodi CT2 equipment that LEC is not using, leaving in place all the equipment that LEC is using. There are obviously combinations of equipment that could apply, but for the purposes of this scenario the equipment Groups 1, 3, 4, and 5 will remain in place. However, please note that as this equipment and their individual systems are integrated into the Lodi CT2 and LEC facilities additional consideration is needed when removing systems as to not adversely affect LEC operations. Therefore, for the purposes of this analysis demolition of the applicable Lodi CT2 facility took precedent and any of the connections (i.e., electrical, mechanical, etc.) to the following systems were included as being removed. No engineering was performed to identify conceptual or detailed reconfiguration designs. An allocation of money, based on Black & Veatch's experience and judgement, was included for each of the applicable systems reconnections to support LEC operations.

The following sections describe the assumptions and observations based on review of the available information and the site visit conducted on August 23, 2016 to support this cost estimate.

2.1 SCENARIO SPECIFIC ASSUMPTIONS

For purposes of the cost estimate, Black & Veatch's general assumptions for the full demolition of Lodi CT2 include the following:

- The cost estimate has an accuracy level equivalent to AACE Class 4.
- The availability of supporting information for the decommissioning study was limited. This includes quantities and weights of equipment and materials, Engineering Data Manuals, and construction contractor "close-out" manuals or reports. Wherever specific quantities were not readily available, Black & Veatch used estimates and typical quantities based on our experience and previous projects to populate the cost development spreadsheets.
- The Lodi CT2 equipment to be decommissioned and demolished will be modified and put into in a safe and secure condition by NCPA with no effort to preserve the equipment for later return to service or sale of equipment on the grey market.
- All equipment and materials are considered for scrap value only; no equipment salvage values were utilized. No resale or reuse of the plant components was included as part of the costs.
- Nonessential equipment and systems will be prepared by NCPA for permanent shutdown and removal.

² NCPA indicated within the RFP that the water treatment system was separate from water storage tanks. Based upon the system review, the water treatment system and water storage tanks are common or they depend on each other in the process aspect (RO product water from water treatment is sent to RO storage tanks and transferred to mixed beds in the water treatment building before sent to demineralize water storage tank).

- Black & Veatch understands that the operation of LEC is dependent upon several existing and common systems from Lodi CT2. However, as discussed with NCPA, the full demolition scenario does not include any additional costs for infrastructure needed to continue operation of LEC.
- A vibration analysis is recommended for the demolition scenario with specific focus on impacts to LEC equipment during surgical demolition of non-shared Lodi CT2 facilities.
- Where possible, nonhazardous (non-salvageable) materials from the decommissioning and demolition activities will be disposed off-site in a nearby landfill. Costs have been included to haul materials up to a distance of 50 miles.
- Based on discussions with NCPA personnel, it has been assumed that hazardous materials are not present at the facility and hazardous materials will not need disposal.
- Concrete and asphalt materials will not be used as on-site backfill material, but rather will be hauled to a landfill.
- The estimate assumes that all concrete and rebar will be taken off site by the demolition contractor and none will be pulverized and recycled on-site.
- As part of the demolition activities, existing asphalt roadbeds and parking areas around the Admin building will not be removed.
- All materials and equipment used to operate Lodi CT2's equipment will be removed by NCPA and associated costs or revenue are not included in the estimate. These include:
 - Plant operating fuels (i.e., fuel oil, gasoline, etc.).
 - Chemicals.
 - Fluids in tanks, pipes, barrels, storage areas, and other container and media.
 - Spare parts, tools, etc.
 - Any equipment that is not tied down by anchor to the foundation.
 - All mobile equipment and vehicles (as applicable).

Disposal of office furniture, office equipment, and spare parts inventory were not considered.
- The estimate assumes that all the identified plant systems for decommissioned equipment will be de-energized, drained and tagged-out of service by NCPA.
- Construction power and potable and non-potable water is assumed to be available at the station for decommissioning activities.
- For each group of equipment that NCPA may wish to keep intact and not demolish, an allocation for engineering, design, additional investigations and studies, light construction activities, and other activities supporting the decommissioning and demolition scenario including further identification and separation of common systems, has been included in the scenario's cost estimate toward this activity. This allocation is not an EPC cost or a cost developed specific to the activities to reconnect these systems.
- This study focuses on capital expenditures for the various decommissioning and demolition scenarios and does not consider impacts to existing O&M, personnel, or other associated plant costs.

- As LEC is a working facility, barriers will be installed as required to control access to the decommissioned area during demolition activities.
- Plant insurance, legal fees, permits, and property tax adjustments, other administrative fees, and other potential community engagement costs are not included.
- The duration of this decommissioning scenario is 16 months.

2.1.1 Civil/Structural Observations

2.1.1.1 Scenario Specific Assumptions

- All foundations will be completely removed.
- All gravel and asphalt located within the Lodi CT2 site area will be removed to native soil. New asphalt will be placed with a secondary option to use gravel instead of asphalt.
- The new asphalt/gravel will match the existing grade of the asphalt around Lodi CT2 in order to minimize drainage impacts.
- For the complete demolition option a cost will not be added for any new structures required for the continual operation of LEC.

2.1.1.2 Civil Structural Observations

The demolition of Lodi CT2 plant will consist of a complete removal of all buildings, foundations, and utilities and returning the site to natural conditions with either an asphalt or gravel surface. In addition to the complete removal of all CT2 equipment, an alternative scenario is considered to leave certain equipment and structures in place. All structures and foundations will be completely removed and backfilled with clean soil. The area will be surfaced with either asphalt or gravel.

To help facilitate the removal of the equipment NCPA should evaluate their options on where to locate a laydown area for waste material and staging. All demolition activities could not be contained within the NCPA lease area due to size constraints and additional staging area adjacent to the facility will be required.

During the partial demolition options of Lodi CT2 extra care and consideration should be taken when demolishing foundation around the anhydrous ammonia tank and natural gas metering station in order to insure the continued operation of LEC.

2.1.2 Mechanical Observations

2.1.2.1 Option 1 – Complete Demolition of Lodi CT2

Lodi CT2 is a semi combined cycle unit with very little complication for demolition regarding mechanical items. It is assumed that all piping from and to LEC will be terminated and capped right before underground at Lodi CT2 side.

The following Lodi CT2 major equipment will be removed during the demolition process:

- Combustion Turbine.
- Gas Compressor including Fuel Gas Receiver, Fuel Gas Filter.
- Fuel Gas Metering Station.
- HRSG including Deaerator.
- CEMS.

- Air Compressor System including Compressors, Dryers and Receivers.
- Cooling Tower including Circulating Water Pumps.
- Cooling Water Chemical System.
- Demineralizer Water Storage Tank and Transfer Pumps.
- Condensate System including Condensate Receiver, Condensate Pumps, Condensate Storage Tank, Condensate Transfer Pump.
- HP/IP Feedwater Pumps.
- LP Feedwater Pumps.
- RO Product Water Storage Tanks and Transfer Pumps.
- Chiller System.
- Closed Loop Heat Exchangers, Expansion Vessel and Pumps.
- Chilled Water Expansion Vessel and Pumps.
- Boiler Chemical System.
- Sample Panel.
- Blowdown Vessel.
- Steam Drain Vessel.
- Fire Water Storage Tanks including Diesel Storage Tank, Diesel Pump and Jockey Pump.
- Waste Water Tank and Transfer Pumps.
- Injection Well Water Skid.
- Water Treatment System including Tanks, Pumps, MM Filters, Ultra Filters, RO Unit, Degasifier.

2.1.2.2 Alternative Scenario – Selective Demolition of Lodi CT2

Some of Lodi CT2 systems, mainly anhydrous ammonia and fire water system are shared with LEC. These systems as well as others identified by NCPA as potential systems are listed below. Black & Veatch reviewed the individual system and identified considerations for LEC's continued functionality.

- **Anhydrous Ammonia Tank** – Anhydrous ammonia tank and vaporizer is shared with LEC. It is assumed that the piping to LEC will be kept and will be able to serve LEC as it is. All other equipment, piping and valves associated with Lodi CT2 will be demolished. It is assumed that nitrogen purge will be done manually by bringing nitrogen bottles and connecting to the pipe when needed. The new oil/water separator is required to drain collection from anhydrous ammonia containment. Power and control to operate anhydrous ammonia system is required (see Electrical Section).
- **Fire Tanks and Pump House** – Two fire tanks and the pump system serve fire water to both Lodi CT2 and LEC. Both tanks and the pump house including a diesel tank, a diesel pump and a jockey pump will stay for this option. It is assumed that the fire water piping to LEC will be kept and will be able to serve LEC as it is. In order to keep fire water system functional, new water source for fire water makeup water is required. Currently the fire water makeup water is from Lodi CT2 water treatment system (gray water downstream of

multi-media filters). It is assumed that the raw water from the City of Lodi White Slough Water Pollution Control Facility (WPCF) to the feedwater storage tank will be rerouted to the fire water storage tanks as fire water make up water. It is assumed that the raw water transfer pumps' size is adequate to supply water to the Fire Water Tanks. The new oil/water separator is required to drain collection from diesel containment. Power and control to operate the jockey pump is required (see Electrical Section).

- **Control Room / Shop / Warehouse / Office** – For this option, fuel gas line for heating and cooking needs to be supplied as well as potable water and sanitary drain lines. Power and cable to the buildings will be required (see Electrical Section).
- **Injection Well, Pumps, and Tank** – Currently, LEC can send their waste water to Lodi CT2 Waste Water Tank for disposal, but NCPA may want to keep it as backup. It is assumed that the piping from LEC to Lodi CT2 Waste Water Tank will stay and will operate properly without major modification. Sampling the waste water is required and it is assumed that the grab sample will be provided. Power and control to operate the injection well pump is required (see Electrical Section).
- **Water Plant and Water Storage Tanks** – Even though LEC has its own water treatment system, it can also receive demineralized water from Lodi, but NCPA may want to keep it as backup. All water treatment equipment including tanks, filters, RO units, degasifier and pumps for Lodi CT2 will stay as well as RO tanks and Demineralizer Water Tank and their transfer pumps. The ultra filter concentration and RO reject are currently transferred to the Waste Water Tank. A new small tank is assumed to be provided (cost not included) to collect the waste from the treatment system if the Waste Water Tank is demolished. The tank should be emptied periodically. Power and control to operate the pumps and blower is required (see Electrical Section).

2.1.3 Electrical Observations

Removal of the Lodi CT2 electrical generation and unit distribution systems is not expected to be difficult due to its isolation from the LEC electrical systems. There are some loads currently powered from Lodi CT2 that are common and will need to be repowered from LEC. Since the main Lodi CT2 GSU is being decommissioned, all power to the common equipment will be lost. Many of the cable feeds to these systems also run in raceway that is being decommissioned, therefore, it was determined that all electrical and controls equipment will be decommissioned and an allowance will be provided in the cost estimate to account for re-feeding the common areas from LEC. The removal includes all the associated cable, raceway and miscellaneous components connected to the equipment listed above. The Lodi CT2 plant lighting and grounding system has also been identified for removal.

Please note the following:

- All electrical equipment, including Switchgears, transformers, MCCs, panelboards, circuits and raceway associated with Lodi CT2 will be included in the decommissioning estimate.
- An allowance will be provided to re-feed the site area lighting from LEC, including installation of new cables and raceway to refeed lights.

2.1.3.1 Removal of Lodi CT2 Equipment

The following is a list of major electrical equipment that has been identified for removal at Lodi CT2:

- 4160 V switchgear 1200A Bus (4 vertical sections)
- 13.8kV Switchgear 3000A Bus
- (2) 480V Switchgear 3000A bus
- (4) Motor Control Centers 480VAC, 1200A, Vertical Sections
- Main Transformer, 13.8kV-230kV, 50/56/66.67/74.57 MVA
- Transformer, T-2, 13.8kV-4160V, 3.75/5.25MVA
- (2) Aux Transformers, 13.8kV-480, 2000/2576kVA
- T5, 15kV, 12kV-480V, 3 phase
- (3) Bypass Transformers, 25kVA, 1 phase, 60HZ, 480-120V
- Transformer, 45kVA, 480V-480/277V
- (3) Transformers, 45kVA, 480V-120/208V
- Transformer, 30kVA, 480V-480/277V
- Transformer, 30kVA, 480V-120/208V
- Transformer, 15kVA, 480V-120/208V
- (5) Relay Control Panels
- DC Panel
- UPS Panel
- (5) Distribution Panels
- (3) Power and Lighting Panels; 120/208VAC
- (2) Lighting Panels, 480/227V
- Heat Tracing Power Panel

2.1.3.2 For Partial Demolition for Lodi CT2

- Major electrical equipment, cable and raceway if installed under Lodi CT2 scope of work will be shown as decommissioned. An allowance was provided to re-feed these common systems from LEC, including installation of new cables and raceway to feed the equipment.
- The Switchyard building contains relay panels for breakers in the ring bus that currently feed LEC. An allowance was provided in the cost estimate to refeed the switchyard building from LEC.

2.1.3.3 Repowering Systems

Black & Veatch has grouped the systems identified by NCPA as common equipment and infrastructure required for LEC and briefly has described the electrical considerations as follows:

Group 1

- Fire Water Tanks
- Fire Water Pump House

This group requires running new power and control feeds, raceway, and grounding for the equipment from LEC to the Fire Water equipment.

Group 3

- Administration Building/Control Room/UPS

This group includes lighting and power to the admin building and control room and power to the UPS system, including power, control and UPS distribution panels. Raceway and grounding of the equipment and building is also required.

Group 4

- Anhydrous ammonia tank and vaporizer

This group would require power, controls, and grounding for this system.

Group 5

- Switchyard Building

The switchyard building houses the main relay panels for the switchyard ring bus, including the breakers feeding LEC. Assuming all the breakers and relaying need to stay in place for the ring bus, it would require power and control feeds from LEC to re-feed the panels, including raceway and grounding of the equipment in the building.

Group 7

- Water Treatment Building
- Warehouse
- Demin Water Tanks
- RO Water Tanks

The MCCs 3 and 4 are located in the Water Treatment Building and power all water treatment loads as well as loads for the Demin and RO tanks. The scenario includes providing power and controls to this building from LEC, including grounding, lighting and raceway to the building.

2.2 COST ESTIMATE

2.2.1 Estimate Description

The decommissioning and demolition costs provided in Table 2-1 were prepared based on the assumptions and observations defined in this report. The estimate is expressed as overnight costs and excludes any forward escalation. The estimates are considered to have an AACE Class 4 accuracy level.

2.2.2 General Cost Estimate Assumptions/Clarifications

- The cost estimate is primarily based on a dismantling method that utilizes torches, shears, and other heavy equipment rather than generally utilizing explosives.
- The plant does not have sufficient lay down areas for staging demolition equipment, contractors' trailers, and temporary storage and breakdown of demolished materials. Leased land is assumed to be available adjacent to the facility for the duration of the demolition activities.
- Credits for the resale of scrap metals is included for structural steel, tank metals, compressors, pumps, piping & valves, cable and conduit and electrical equipment.
- The estimate assumes that all scrap metal, such as: structural steel, miscellaneous steel, conduit, cable, piping, valves and equipment, will be cut to size on site for transporting in roll-off containers and 40' trailers for transporting to the nearest landfill and/or recycling centers (assumed within 50 miles of the plant). Costs for transportation are included in the scrap unit pricing in 2016 dollars.
- Scrap prices for materials can be estimated when detailed material quantities are available from historical data from previous demolition study estimates, vendor estimates, or industry internet sites like Iron Mike's Scrap Metal Services. Due to the limited detail material quantity information scrap value pricing was based on a combination of current internet pricing and 5 percent to 25 percent of the demolition costs were assumed for various equipment and materials. It should be noted that scrap values are subject to change based on daily market conditions. The combustion turbine equipment and HRSG scrap value is assumed to be approximately \$4.5 and \$3.5 Million, respectively.
- All costs are expressed in current day December 2016 U.S. dollars. Escalation is not included in this cost but is addressed in the next section.
- Wage rates are based on the state of California's Department of Industrial Relations labor rates³. A labor study was not performed.
- Direct costs include the costs associated with equipment rental, demolition and all contractor services.
- Demolition costs for the estimate include all contractor overhead, staff, indirect costs, and profit.
- The decommissioning cost estimates are based on an EPC contracting approach.

³ <http://www.dir.ca.gov/OPRL/2016-2/PWD/index.htm>

- Contingency of 15 percent is included as an allowance for site unknowns. Time constraints and limited plant-specific information are the primary drivers of this level of contingency. This added contingency value is independent of the project costs estimate, confidence level for estimate accuracy, and goes beyond the noted project assumptions. This value has been included to capture those unforeseen project costs not identified within the scope of the project.
- The estimates are based on limited information provided and supplemented with Black & Veatch estimate data for similar type and size units. Salvage value estimates are based on typical salable materials and estimate quantities. Decommissioning costs and salvage values are presented in 2016 dollars. Table 2-1 summarizes the estimated decommissioning and demolition costs for the Lodi CT2 full demolition project. Table 2-2 summarizes the estimated decommissioning and demolition costs for the partial demolition project—keeping common equipment note above in Groups 1, 3, 4, and 5.

2.2.3 Special Considerations

Several special considerations could alter these estimated decommissioning costs, including on-site investigation, identification of actual equipment and material weights, changes in environmental legislation, changes in economic considerations such as labor rates, demolition costs, or scrap values, changes disposal regulations/methods, costs for hazardous materials abatement (if found to be applicable), changes in contracting methodology, allocations for engineering and construction management, project contingency costs, changes to the location demolition materials are disposed, or a change in the future use of the site.

Table 2-1 Decommissioning and Demolition Capital Cost Estimate Summary - Complete

	LABOR COST	SUBCONTRACTOR COST	SALVAGE COST	TOTAL
Group 1	\$401,000	\$122,000	-\$23,000	\$500,000
Group 2	\$8,049,000	\$218,000	-\$9,083,000	-\$816,000
Group 3	\$899,000	\$439,000	-\$214,000	\$1,124,000
Group 4	\$132,000	\$18,000	-\$17,000	\$133,000
Group 5	\$265,000	\$33,000	-\$61,000	\$237,000
Group 6	\$140,000	\$8,000	-\$18,000	\$130,000
Group 7	\$1,328,000	\$460,000	-\$245,000	\$1,543,000
Demo Subtotal	\$11,214,000	\$1,298,000	-\$9,661,000	\$2,851,000
Construction Indirects	--	--	--	\$4,745,200
Construction Equipment	--	--	--	\$2,243,000
Engineering and Construction Management (10%)	--	--	--	\$1,121,000
Contingency (15%)	--	--	--	\$1,644,000
Demo Total	\$11,214,000	\$1,298,000	-\$9,661,000	\$12,604,000

Table 2-2 Decommissioning and Demolition Capital Cost Estimate Summary - Partial

	LABOR COST	SUBCONTRACTOR COST	SALVAGE COST	TOTAL
Group 1	\$0	\$100,000	\$0	\$100,000
Group 2	\$8,049,000	\$218,000	-\$9,083,000	-\$816,000
Group 3	\$0	\$500,000	\$0	\$500,000
Group 4	\$0	\$200,000	\$0	\$200,000
Group 5	\$0	\$200,000	\$0	\$200,000
Group 6	\$140,000	\$8,000	-\$18,000	\$130,000
Group 7	\$1,328,000	\$460,000	-\$245,000	\$1,543,000
Demo Subtotal	\$9,517,000	\$1,686,000	-\$9,346,000	\$1,857,000
Construction Indirects	--	--	--	\$4,144,000
Construction Equipment	--	--	--	\$1,903,000
Engineering and Construction Management (10%)	--	--	--	\$952,000
Contingency (15%)	--	--	--	\$1,328,000
Demo Total	\$9,517,000	\$1,686,000	-\$9,346,000	\$10,184,000

3.0 Cost Model Updating

3.1 INTRODUCTION

Black & Veatch understands that NCPA would like to utilize Black & Veatch's Cost Model at a future point in time without the need to fully re-perform the cost estimation exercise. Black & Veatch believes that the estimated amounts as shown in the Cost Model should remain materially accurate for a period of five to seven years, subject to adjustment for inflation. In order to allow the Cost Model to refresh the cost estimates as needed in the future, Black & Veatch has developed an escalation tool to estimate the future value of the cost estimates.

3.2 METHODOLOGY

Black & Veatch has built an escalation mechanism to adjust the 2016 Cost Model estimates to a desired future year using the U.S. Bureau of Labor Statistics (BLS) Producer Price Index (PPI). PPI measures the average change over time in the selling prices received by domestic producers for their output, and is reported on a monthly basis by the BLS for hundreds of categories of domestic producers. In order to allow for the update of the Cost Model, Black & Veatch has selected the four indices shown below in Table 3-1.

Table 3-1 Summary of PPI Assumptions

COST MODEL ITEM	PPI	SERIES ID
Indirect Costs	Engineering Services	PCU54133-5413
Direct Costs	Municipal utility and power generation and distribution engineering projects	PCU541330541330202
Construction Equipment	Construction equipment rental and leasing	PCU5324125324121
Scrap Value	Carbon Steel Scrap	PCU42993042993011

Black & Veatch has built two optional methods for updating the Cost Model using the above PPI, as summarized below:

- **Extrapolation:** The historical average annual percent change for an index (adjusted to exclude outlier years) is assumed to reasonably represent escalation for that cost category over the near term future, and the cost category is escalated at a fixed annual growth rate from the base year to the escalation year. The annual average was adjusted to omit any outlier years, defined as years in which the year-over-year growth fell outside of two standard deviations from the mean (excluding the 5 percent most extreme data).
- **Actual Value:** Because PPI is reported as an absolute index value and not a relative percentage growth rate, if a PPA values is known for both the base year and the escalation year, a cost category may be escalated proportional to the ratio of the escalation year's PPI value to the base year's PPI value. Black & Veatch has documented the latest September 2016 PPI value for each cost category, than may be compared to the actual future PPI value when the Cost Model is refreshed to reflect actual escalation.

The rationale for choosing each PPI, as well as the resulting fixed annual growth rate, is discussed in the following subsections.

3.2.1 Direct Costs

Black & Veatch has chosen the PPI “Municipal utility and power generation and distribution engineering projects” to represent escalation for estimated Direct Costs. Per the Cost Model methodology, Direct Costs are calculated as the value of contract or subcontracted labor and consumables to be utilized on the Project site. The chosen PPI reports the blended value of both services and goods typically required to construct utility or municipality scale power projects, which should utilize materially similar resources to the studied decommission scope.

The Municipal utility and power generation and distribution engineering projects index is a relatively new PPI, which has only been reported by the BLS since 2009. However, it has historically shown relatively consistent annual growth. A summary of this PPI, including actual annual percentage growth, average annual percentage growth, and adjusted annual average percentage growth is shown in Figure 3-1 below.

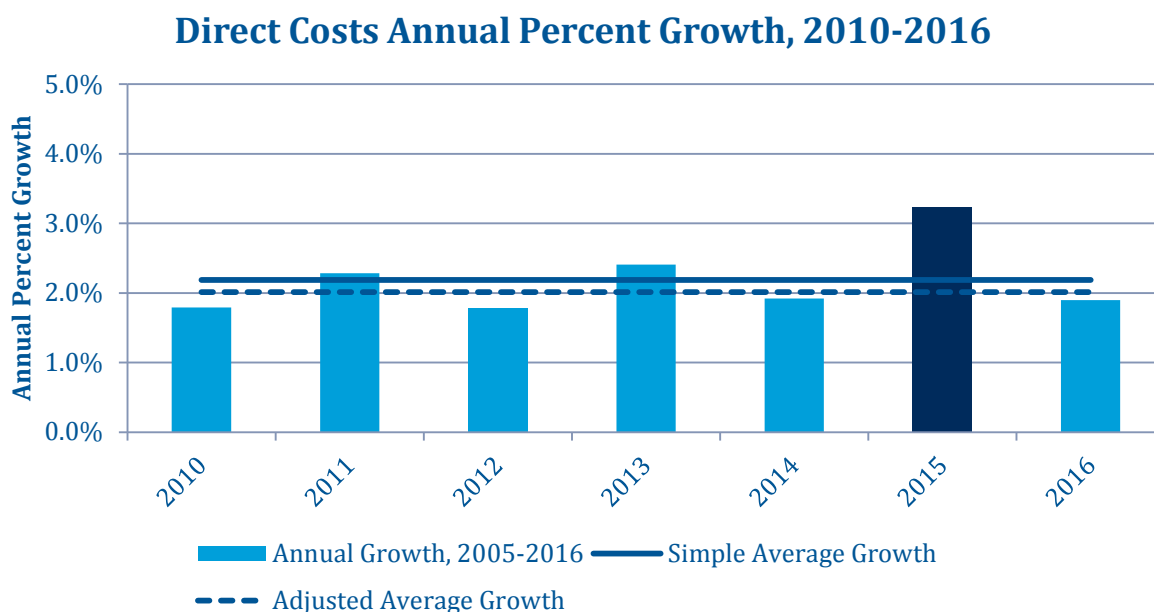


Figure 3-1 Direct Costs Annual Percent Growth, 2010-2016

As shown in Figure 3-1, Black & Veatch has calculated a simple historical average annual growth rate of 2.2 percent and an adjusted average annual growth rate of 2.0 percent when 2010 is omitted.

3.2.2 Indirect Costs

Black & Veatch has chosen the PPI “Engineering Services” to represent escalation for estimated Indirect Costs. Per the Cost Model methodology, Indirect Costs are calculated as the value of offsite labor, predominately engineering and project management. The chosen PPI reports the value of diversified engineering services.

The Engineering Services index has been reported by the BLS since 2004. A summary of this PPI, including actual annual percentage growth, average annual percentage growth, and adjusted annual average percentage growth is shown in Figure 3-2 below.

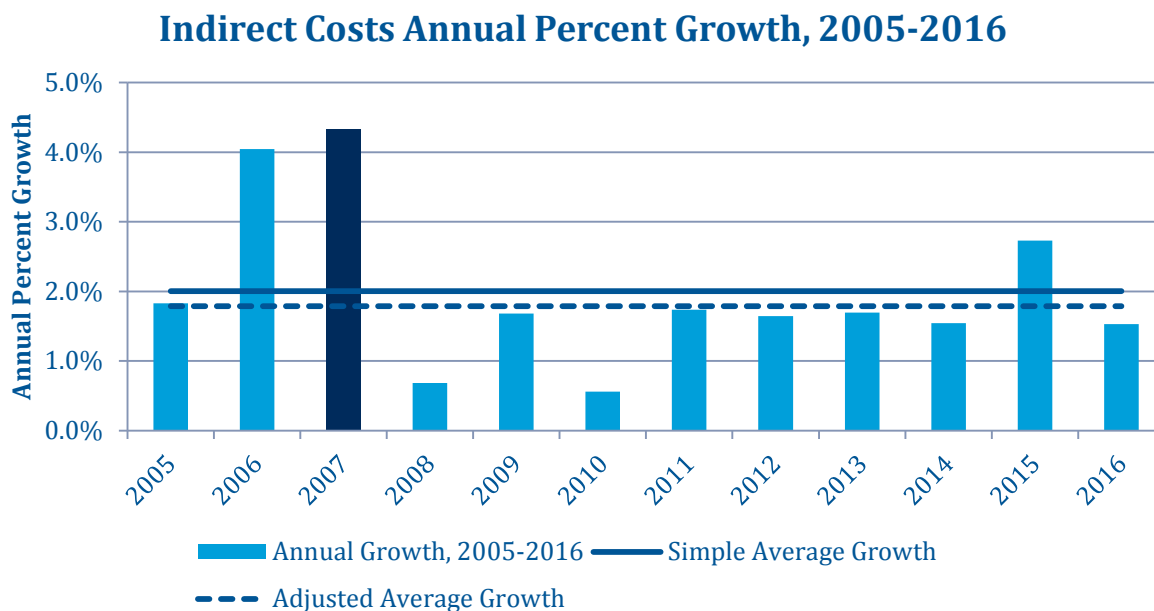


Figure 3-2 Indirect Costs Annual Percent Growth, 2005-2016

As shown in Figure 3-2, Black & Veatch has calculated a simple historical average annual growth rate of 2.0 percent and an adjusted average annual growth rate of 1.8 percent when 2007 is omitted.

3.2.3 Construction Equipment

Black & Veatch has chosen the PPI “Construction equipment rental and leasing” to represent escalation for estimated Construction Equipment Costs. Per the Cost Model methodology, Construction Equipment Costs are calculated as the value of the non-consumables equipment that is required to execute the demolition scope. The chosen PPI reports the value of construction equipment rental. Black & Veatch notes that the contractor performing the decommissioning work may choose to utilize owned equipment instead of rental; however, while the absolute value of renting versus owning equipment will vary, the overall market value trends should be linked and for relative annual growth assumptions the chosen PPI should be applicable to both scenarios.

The Construction equipment rental and leasing index has been reported by the BLS since 2004. A summary of this PPI, including actual annual percentage growth, average annual percentage growth, and adjusted annual average percentage growth is shown in Figure 3-3 below.

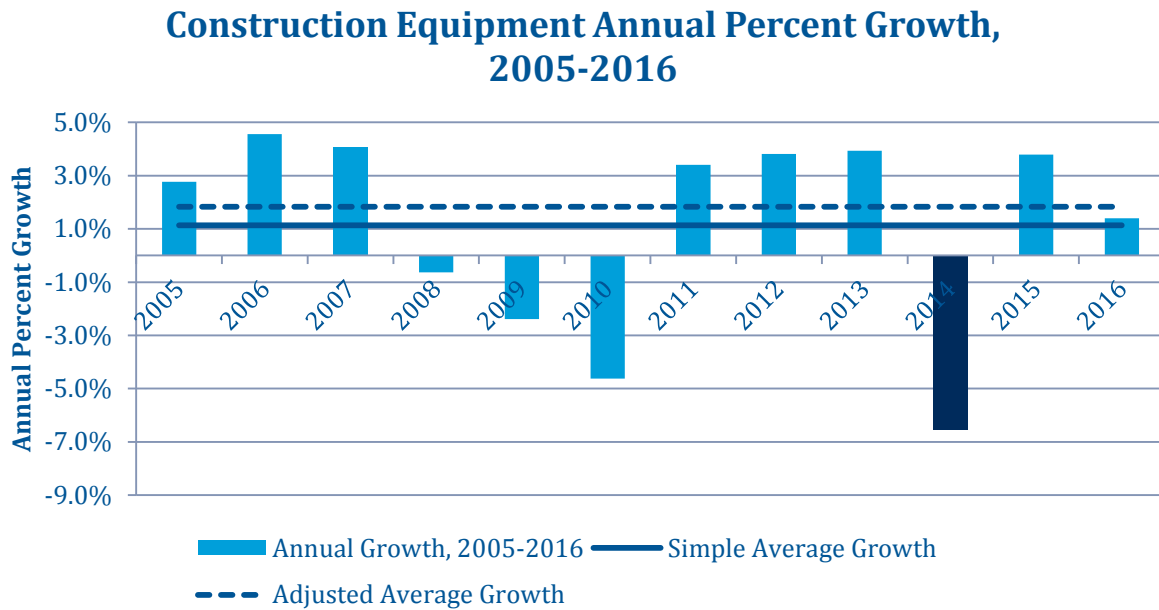


Figure 3-3 Construction Equipment Annual Percent Growth, 2005-2016

As shown in Figure 3-3, Black & Veatch has calculated a simple historical average annual growth rate of 1.1 percent and an adjusted average annual growth rate of 1.8 percent when 2014 is omitted.

3.2.4 Scrap Value

Black & Veatch has chosen the PPI “Carbon Steel Scrap” to represent escalation for estimated salvage value of materials recovered from the Project site. The chosen PPI reflects the value of high quality steel like that which is typically utilized in construction for the utility industry. Black & Veatch notes that other materials such as copper and precious metals will contribute to the actual salvage value of the Project, however steel should represent the largest portion of salvageable material by value, and has accordingly been chosen as the representative index.

The Carbon Scrap Steel index has been reported by the BLS since 1987. A summary of this PPI, including actual annual percentage growth, average annual percentage growth, and adjusted annual average percentage growth is shown in Figure 3-4 below.

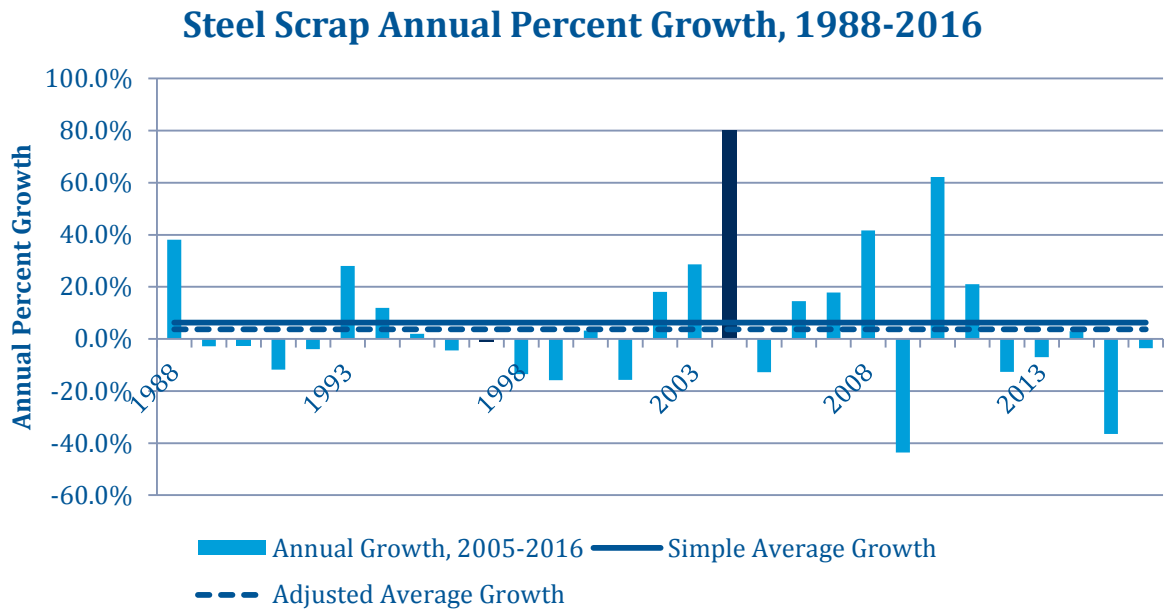


Figure 3-4 Steel Scrap Annual Percent Growth, 1988-2016

As shown in Figure 3-4, Black & Veatch has calculated a simple historical average annual growth rate of 6.3 percent and an adjusted average annual growth rate of 3.7 percent when 2004 is omitted.

Table 3-2 summarizes the estimated complete decommissioning and demolition costs for the project considering the future. For this example, the information in this table is based on 2016 as the Base Year, 2020 as the Escalation Year utilization of the Extrapolation Escalation Methodology. Table 3-3 summarizes the estimated partial decommissioning and demolition costs for the project considering the future.

Table 3-2 Decommissioning and Demolition Indexed Capital Cost Estimate Summary - Complete

COST ESTIMATE	2016 INDEX	2020 INDEX	2016 VALUE	2020 VALUE
Direct Costs	116.4	130.0	\$12,512,000	\$13,551,000
Less Salvage Value	297.5	300.0	-\$9,661,000	-\$11,166,000
Indirect Costs	128.7	130.0	\$4,745,200	\$5,094,000
Construction Equipment	115.4	130.0	\$2,242,800	\$2,411,000
Engineering & Construction Management	10% of Direct Labor		\$1,121,400	\$1,215,000
Contingency	15% of Subtotal		\$1,644,000	\$1,666,000
Total Cost	--		\$12,604,000	\$12,771,000
The information in this table is based on 2016 as the Base Year, 2020 as the Escalation Year using Extrapolation Escalation Methodology.				

Table 3-3 Decommissioning and Demolition Indexed Capital Cost Estimate Summary - Partial

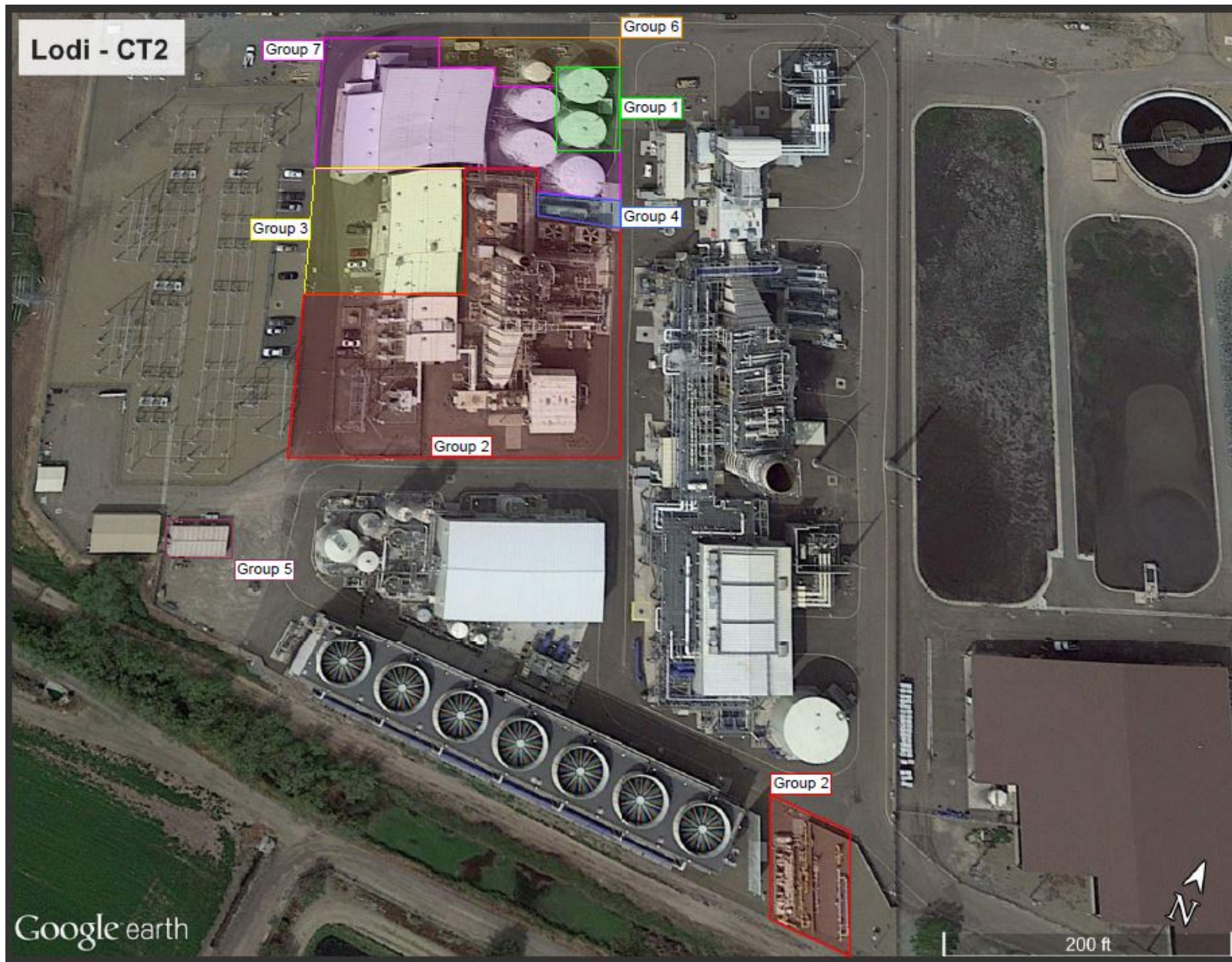
COST ESTIMATE	2016 INDEX	2020 INDEX	2016 VALUE	2020 VALUE
Direct Costs	116.4	130.0	\$11,203,000	\$12,133,000
Less Salvage Value	297.5	300.0	-\$9,346,000	-\$10,802,000
Indirect Costs	128.7	130.0	\$4,144,000	\$4,449,000
Construction Equipment	115.4	130.0	\$1,903,400	\$2,046,000
Engineering & Construction Management	10% of Direct Labor		\$952,000	\$1,031,000
Contingency	15% of Subtotal		\$1,328,000	\$1,329,000
Total Cost	--		\$10,184,000	\$10,186,000
The information in this table is based on 2016 as the Base Year, 2020 as the Escalation Year using Extrapolation Escalation Methodology.				

Appendix A. System Grouping

The following list highlights the structures at the Lodi CT2 facility shown on the following illustration:

1. Water Treatment Building
2. Administration Building
3. Battery and Electrical Building
4. Auxiliary Transformer
5. Transformer
6. T-line Dead End A-Frame
7. 500 KVA Transformer
8. Combustion Turbine
9. Heat Recovery Unit
10. Chiller, Pumps, and other Misc.
11. L.O. Cooling Tower Foundation
12. Ammonia Storage Tank, Vaporizer, and System Components
13. Condensate Storage Tank
14. Demin Tank
15. RO Tank
16. RO Tank
17. Firewater Tank
18. Firewater Tank
19. Wastewater Tank
20. Oil/Water Separator
21. Storage/Warehouse
22. Fire Pump System





Appendix B. Electrical Drawings

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