South Coast Air Quality Management District
Assembly Bill 617
South Los Angeles Dry Cleaning Equipment Replacement Project Plan

1. Project Identification and Background

Assembly Bill 617

Assembly Bill 617 (AB 617) was approved in 2017 and addresses the disproportionate impacts of air pollution in disadvantaged communities. The California Air Resources Board (CARB) has designated six (6) AB 617 communities within the jurisdiction of South Coast Air Quality Management District (South Coast AQMD) to develop both a Community Emission Reductions Plan (CERP) and a Community Air Monitoring Plan (CAMP). Each CERP and CAMP is developed under the guidance of a Community Steering Committee (CSC), which is a group of stakeholders comprised of active residents, representatives of community-based organizations, universities, government agencies, businesses, and/or others. As part of CERP development, each CSC identifies their community's top air quality priorities and helps develop objectives to address them.

Assembly Bill 617 South Los Angeles Community

In February 2021, South Los Angeles (SLA) was designated as an AB 617 community. The SLA CSC, composed of approximately 40 members in June 2022, collaborated with South Coast AQMD to develop the SLA CERP.[1] The South Coast AQMD Governing Board adopted the SLA CERP on June 3, 2022, and CARB approved the SLA CERP on August 26, 2022. The SLA CSC identified five (5) air quality priorities:

1) Mobile Sources,
2) Auto Body Shops,
3) General Industrial Facilities,
4) Metal Processing Facilities, and
5) Oil and Gas Industry

The SLA CERP includes objectives to address a number of these air quality priorities, including dry cleaners which are classified under General Industrial Facilities. One of the CERP objectives for the General Industrial air quality priority involves identifying incentive opportunities to transition dry cleaning equipment to community-identified alternatives, including zero-emission professional wet cleaning (PWC).[2]

Community Air Protection Incentives Program Funding

As part of the AB 617 Program, South Coast AQMD has been allocated Community Air Protection (CAP) Incentives Program funding to help implement CERP objectives. Some of the money provided for CAP Incentives funds is appropriated through California Climate Investments. California Climate Investments is a statewide initiative which distributes Cap-and-Trade auction proceeds from the Greenhouse Gas Reduction Fund to help address climate change and improve public health and the environment, particularly in disadvantaged communities. CAP Incentives funds can be applied towards mobile source, stationary source, and community-identified projects to reduce emissions and/or community air

[1] South Coast AQMD, *Assembly Bill 617 South Los Angeles Community Emissions Reduction Plan*, approved August 2022, https://www.aqmd.gov/docs/default-source/ab-617-ab-134/steering-committees/south-la/final-cerp.pdf?sfvrsn=7a5fa261_18

[2] See Footnote 2, *Assembly Bill 617 South Los Angeles Community Emissions Reduction Plan,* Chapter 5D, Table 5D-1, Goal C

pollution exposure. A community-identified project is a project developed to address one or more objectives in an approved CERP that have been prioritized by the CSC to receive CAP Incentives funding for implementation. The SLA community was allocated $11.2 million in Year 3 CAP Incentives funds.

Dry Cleaning Equipment Replacement Project

This document serves as the "Project Plan" for a community-identified zero-emission dry cleaning machine replacement project. This Project Plan was drafted in accordance with the 2025 CARB AB 617 Community Air Protection Incentives Program Guidelines, with particular attention to Chapter 6: Community-Identified Projects.[3] This Project Plan outlines the community-supported strategy, the requirements for entities seeking to participate, and the process for project funding. The Project Plan also describes project selection criteria and inspection and reporting requirements. These efforts are expected to benefit the community by improving air quality.

This Project Plan funds the replacement of regulated conventional dry cleaning equipment, including both solvent-based dry cleaning machines and associated natural gas boilers, with zero-emission technology. In 2015, CARB recognized both PWC and carbon dioxide (CO_2) dry cleaning as zero-emission technologies which commercial apparel cleaners can use to replace emissions-regulated dry cleaning machines.[4] That said, there are no longer any manufacturers of CO_2 dry cleaning machines. As such, this project focuses exclusively on PWC as the only commercially available zero-emission technology.

This Project Plan will replace dry cleaning equipment requiring a permit by South Coast AQMD with zero-emission PWC equipment. For each participating dry cleaning facility, emission reductions will be calculated by comparing the dry cleaning facility's South Coast AQMD permit and utility records against post-conversion data reflecting the replacement of solvent-based dry cleaning equipment to PWC equipment (see Section 7: Cost Benefit Analysis for more information).[5] Further, for each dry cleaning facility converted, a reduction in greenhouse gas emissions is anticipated based on the substantial reduction in natural gas use when dry cleaning facilities transition from natural gas boilers to electric boilers.

Dry cleaning facilities commonly use boilers to generate steam to operate finishing equipment. In many cases, these boilers are fueled by natural gas, which remains a prevalent choice due to cost effectiveness and reliability. The United States Environmental Protection Agency (U.S. EPA) recognizes that the combustion of natural gas, including in boilers, releases air pollutants such as nitrous oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM), and sulfur dioxide (SO_2), as well as greenhouse gases such as CO_2, methane (CH_4), and nitrous oxide (N_2O).[6] Therefore, this Project Plan includes CAP Incentives funds for participant dry cleaning facilities to switch their boiler system from natural gas to electric.[7]

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[3] California Air Resources Board, *Community Air Protection Incentives Program Guidelines*, revised May 30, 2025, https://ww2.arb.ca.gov/sites/default/files/2024-04/FINAL%20CAP%20Incentives%20Guidelines%20-%202024-04-04.pdf

[4] California Air Resources Board, *Alternative Solvents: Health and Environmental Impacts*, revised September 4, 2015, https://ww2.arb.ca.gov/sites/default/files/classic/toxics/dryclean/notice2015_alt_solvents.pdf

[5] Peter Sinsheimer, *Comparison of Electricity and Natural Gas Use of Five Garment Care* Technologies, revised February 19, 2009, https://etcc-ca.com/sites/default/files/OLD/images/stories/et_05_01_wet_cleaning_rpt.pdf

[6] Environmental Protection Agency, *AP-42: Compilation of Air Emissions Factors from Stationary Sources, Section 1.4 – Natural Gas Combustion*, 2020 https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf

[7] In order for participant cleaners to qualify for switching their boiler system from natural gas to electric, participant cleaners shall be in compliance with all South Coast AQMD rules and regulations, in particular South Coast AQMD Rule 1146.2 – Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters. Per CARB's 2025 CAP

As detailed in the 2014 CARB Professional Wet Cleaning Guidebook[8], to greater assure the success of dry cleaning facilities making this switch, the best practice is to contract with a qualified PWC service provider. Qualified PWC service providers are expected to have sufficient experience and expertise in the removal of regulated pollution-emitting dry cleaning equipment, facility redesign for new equipment, procurement and installation of qualified PWC equipment, PWC equipment maintenance, and comprehensive training to optimize the capabilities of these zero-emission technologies. Responsibilities of service providers will be defined as deliverables in executed contracts. Additional roles may be added as needed throughout the duration of the Project.

2. Community Support

Community co-lead Physicians for Social Responsibility – Los Angeles (PSR-LA) shared a presentation on the viability of PWC equipment as a zero-emission substitute to dry cleaning equipment at the February 2022 SLA CSC meeting.[9] This led to the CSC supporting the inclusion of an incentive objective focused on zero-emission dry cleaning equipment replacement into the CERP.

At the October 24, 2024, CSC meeting community co-lead PSR-LA reviewed key elements of this project, including providing up to 100% CAP Incentives funds covering eligible costs related to the successful conversion of dry cleaning equipment to PWC equipment. Additional eligible costs related to switching participant dry cleaning facilities from using natural gas boilers to electric boilers were reviewed. CSC members emphasized the importance of "bringing the right people to the table" to ensure the successful implementation of the SLA community-identified projects and unanimously voted to approve the Participatory Budgeting Funding Proposal, with $2.3 million in CAP Incentives funds allocated for this Project Plan.[10]

3. Eligibility and Requirements

(A) Applicant Eligibility

- Owner/operator of a dry cleaning facility within the SLA community boundary in possession of a valid South Coast AQMD Permit to Operate dry cleaning equipment and in compliance with all permit requirements.

(B) Replacement Equipment Requirements

1) Replacement PWC equipment must meet the equipment criteria listed in the 2014 CARB Professional Wet Cleaning Guidebook[11] and include the following:

- **a)** Professional wet clean washer,
- **b)** Professional wet clean dryer, and
- **c)** Professional wet clean grade tensioning presses

Incentives Guidelines, CAP Incentives funds may not be used to bring a participant cleaner into compliance. However, CAP Incentives funds may be used for early rule compliance and to support participant cleaners in meeting regulatory standards before regulatory deadlines.

[8] California Air Resources Board, *Professional Wet Cleaning Guidebook*, released October 14, 2017, https://ww2.arb.ca.gov/sites/default/files/classic//toxics/dryclean/wetcleaning_guidebook.pdf

[9] South Coast AQMD, *February 3, 2022, SLA CSC Meeting Archived Recording*, timestamp 41:20, https://www.facebook.com/watch/live/?ref=watch_permalink&v=1087541558671728

[10] South Coast AQMD, *October 24, 2024, SLA CSC Meeting Presentation*, https://www.aqmd.gov/docs/default-source/ab-617-ab-134/steering-committees/south-la/sla---presentation---10-24-2024.pdf?sfvrsn=633c8561_6

[11] See Footnote 9, Professional Wet Cleaning Guidebook, pages 23-25

2) Replacement PWC equipment must be comparable to the dry cleaning facility's existing dry cleaning equipment and sufficient to maintain the facility's current level of operations without significantly expanding operational capacity.
3) The replacement PWC equipment must be under a maintenance agreement for the duration of the Project Life as defined in Section 6 below.

(C) Process and Participant Requirements

4) Participants are required to submit a complete project application.
5) Participants are required to contract with a qualified PWC service provider, as defined in Section 3 (D) below, who will provide the following:
    - **a)** Procurement of PWC equipment meeting 2014 CARB Professional Wet Cleaning Guidebook Requirements,
    - **b)** Procurement of PWC detergents for the first year of operation,
    - **c)** Removal and proper disposal of existing dry cleaning equipment,
    - **d)** Modification of existing dry cleaning facility for installation of new PWC equipment,
    - **e)** Installation of PWC equipment,
    - **f)** Comprehensive training in the use of PWC equipment and changes in operations to optimize this zero-emission technology.
    - **g)** PWC service providers should also provide the following for the replacement of a natural-gas-fired steam boiler with an electric boiler system:
        - **i.** Procurement of an electric boiler system,
        - **ii.** Removal and proper disposal of the natural-gas-fired steam boiler, and
        - **iii.** Installation of an electric boiler system to provide sufficient steam for dry cleaning facility operations.
6) Participants are required to provide a quote from a qualified service provider including each element related to the conversion to PWC listed in Section 3 (B). Additionally, with the replacement of the natural-gas-fired steam boiler, each element of the conversion to an electric boiler system as listed in Section 3 (C) must be included in the quote. Along with the bid, the participant shall include the qualifications of the service provider as listed in Section 3 (D) below.
7) Provide a minimum cost-sharing contribution of 20% of the total project cost. Cost-sharing may include monetary contributions (e.g., replacement PWC equipment expenses) or in-kind support (e.g., dedicated employee time to complete related project and PWC equipment training). Applicants must indicate their committed cost-sharing percentage in the application. Cost-sharing contributions will be verified through invoices, proof of payment, training certification or other verifiable documentation as needed. Additional details on cost-sharing and project evaluation and ranking are provided in Section 5: Project Selection and Ranking.
8) Participants shall agree to remove all dry cleaning equipment, not add any additional dry cleaning equipment during the Project Life (see Section 6), not remove new PWC equipment during the Project Life, and maintain CAP Incentives funded PWC equipment during the Project Life.
9) Participants shall agree in writing, per contractual obligations, to use installed PWC equipment to process all customer apparel brought to the dry cleaning facility.
10) Participants shall agree to participate in ongoing data collection related to their conversion during the entire project life (see Section 6 below for the data to be collected).
11) Once the application has been approved, a contract will be offered to the participant.

12) Once the contract is signed, the participant shall coordinate with the PWC service provider on the removal of equipment to be replaced, modifications to the dry cleaning facility to enable proper use of the new PWC equipment, installation of the new PWC equipment, training, and maintenance.

13) The removed dry cleaning equipment shall be surrendered to an approved salvage yard[12] and rendered permanently inoperable. The surrendered dry cleaning equipment must include a hole in the equipment block with a diameter of at least three inches at the narrowest point. The hole must be irregularly shaped (i.e., no symmetrical squares or circles). All hazardous waste, including solvents and residue, shall be managed and disposed of in accordance with all applicable federal, state, and local regulations.

14) Once new PWC equipment is installed, post-inspection will be conducted by the project administrator to confirm that each piece of new PWC equipment installed meets the 2014 CARB Professional Wet Cleaning Guidebook criteria, proper operation of all equipment, and the participant has received proper training in the use of newly installed PWC equipment as well as training on modification of operations based on equipment characteristics.

15) After successful post-inspection is completed, the participant shall submit the invoice and W-9 tax form from the service provider to South Coast AQMD, including whether any down payment was provided to the service provider by the participant, as well as a completed W-9 tax form.

16) Once South Coast AQMD receives both the invoice and the completed W-9 tax form, South Coast AQMD shall issue a check for the amount of the invoice and mailed to the service provider and/or participant as detailed in the executed contract.

17) The participant may change during the course of the project, such as changing ownership of the dry cleaning facility, as long as the new participant signs a revised contract with South Coast AQMD and complies with all project requirements.

18) Failure to adhere to requirements may result in termination of participation in the program and/or ineligibility for future funding opportunities.

(D) Qualified Professional Wet Cleaning Service Provider

As discussed in the 2014 CARB Professional Wet Cleaning Guidebook, the success of dry cleaning facilities switching from dry cleaning equipment to PWC equipment improves substantially when a PWC equipment service provider coordinates the conversion process.[13] Integrating in the use of a qualified PWC equipment service provider further supports the request of the SLA CSC to "bring the right people to the table" to ensure successful project implementation and greater emission reductions by ensuring proper removal and disposal of dry cleaning equipment and proper installation, staff training, and maintenance of PWC equipment.

1) Qualified PWC service providers must demonstrate a minimum of five years of experience in converting dry cleaning equipment to dedicated PWC equipment. This includes the ability to:

- **a.** Procure and install qualified PWC equipment
- **b.** Arrange the removal and proper disposal of dry cleaning equipment as detailed in Section 3 (C) above
- **c.** Modify dry cleaning facility equipment layout prior to the installation of PWC equipment to optimize PWC equipment operations

[12] Approved salvage yard refers to licensed facilities authorized by regulatory agencies to dismantle or recycle equipment and handle any associated hazardous waste safely and lawfully.

[13] See Footnote 9, *Professional Wet Cleaning Guidebook,* page 29

d. Provide comprehensive technical training on PWC equipment use and optimizing dry cleaning facility operations using PWC equipment
e. Deliver ongoing PWC equipment maintenance and technical support
f. Provide five or more references from customers converted from dry cleaning equipment to PWC equipment[14]

4. Funding Amounts

This Project Plan will fund up to 80% of the eligible costs for equipment procurement and services related to the conversion to zero-emission PWC equipment and conversion to zero-emission electric boilers. Applicants are required to provide a minimum of 20% cost share as explained in Section 3 (C) above. Selected contractor(s) will be reimbursed for eligible costs in accordance with the payment terms outlined in the payment schedule, which will be based on the scheduled deliverables as detailed in the forthcoming procurement process.

Note that cost-sharing contributions will not be eligible for reimbursement under this program. While eligible costs (listed below) may be reimbursed using program funds, any portion of the project identified and committed as cost share will be considered the applicant's contribution and will not be reimbursed, either partially or in full. Please see Section 5: Project Selection and Ranking for proposals which include cost-sharing.

Eligible and Ineligible Costs

Eligible costs include:

- Purchase and installation of qualified zero-emission PWC equipment
- Purchase of PWC detergents for the first year of operation
- Purchase and installation of a zero-emission electric boiler system
- Removal of dry-cleaning machine(s)
- Removal of natural gas boiler
- Dry cleaning facility modification for installation of new equipment
- Delivery charges
- Comprehensive equipment training
- Sales tax
- Outreach and outreach materials
- Up to 12.5% of total project budget for management and administration[15]
- Up to 5% of the grant request may be budgeted for contingency costs (i.e., unforeseen costs such as price increases due to tariffs)

Costs not eligible to be funded:

- Overhead (e.g., office rent, utilities, office equipment and supplies)
- Extended warranties

5. Project Selection and Ranking

[14] See Footnote 9, *Professional Wet Cleaning Guidebook,* pages 28-29

[15] The SELA Green Spaces Project Plan included as an eligible costs "Up to 25% of the grant request may be budgeted for non-construction costs, including, but not limited to, design and project administration and management." Since dry cleaning facility design is already covered as an allowable cost in this Project Plan, total management and administrative costs was set at half this rate, or 12.5%.

Applications will be reviewed for completeness and the extent to which they meet the requirements in Section 3. Additionally, South Coast AQMD will prioritize eligible projects based on the following criteria which aims to ensure that program funds are directed towards the projects that have the potential to provide the greatest community benefit, demonstrate shared investment, and align with the SLA CERP's emission and exposure reductions goals:[16]

a) Projects located in AB 617 South Los Angeles community boundary[17]

b) Projects offering a higher percentage of cost-sharing contributions will be awarded additional points and ranked higher accordingly. Cost-sharing may include monetary contribution or in-kind support, and

c) Projects located in other geographic areas classified as disadvantaged communities within South Coast AQMD experiencing significant adverse emissions impacts as identified in the South Coast AQMD's Air Quality Management Plan (AQMP).

Once applications have been reviewed and scored, ranked eligible projects will be presented to the SLA CSC for additional feedback before finalizing applicant selection. South Coast AQMD will respond to applicants as soon as feasible considering the volume of applications received, not to exceed 90 days.

6. Project Implementation, Data Collection, and Project Life

All individual projects that receive funding under this Project Plan must comply with the reporting requirements described in Chapter 3 of the 2025 CAP Incentives Guidelines. In addition, participants must participate in project-specific data collection including, but not limited to, initial and annual reports. The initial report shall be completed after each participant is selected but before the dry cleaning facility is converted to document dry cleaning facility operations while operating dry cleaning equipment. Each annual report will be conducted after the initial conversion for the life of the project.

The initial report shall be compared to each annual report to determine permit-related emission reductions, any greenhouse gas emission reductions, and the cost-effectiveness (i.e., the project's cost relative to the amount of emissions reduced) of each participant dry cleaning facility and the project as a whole. The initial and annual reports shall include, but are not limited to, the following:

- Dry cleaning facility operating costs before and after conversion (e.g. electricity and natural gas, detergents, solvents, hazardous waste disposal, changes in labor time, equipment maintenance, regulatory compliance)
  Volume of garments cleaned before and after conversion

This list of data collection elements is not exhaustive. Additional details and requirements will be provided in the forthcoming procurement process and as part of the contract executed.

[16] The 2025 CAP Incentives Guidelines require that 70% of incentive funding be directed to disadvantaged communities, including both AB 617-designated areas and other low-income communities. This rank order increases the assurance that the maximum emission reductions in disadvantaged communities will be created through the implementation of this Project Plan as supported by the 2025 CAP Incentives Guidelines.

[17] South Coast AQMD, *South Los Angeles Community Boundary*, finalized May 2021: https://scaqmd-online.maps.arcgis.com/apps/webappviewer/index.html?id=cd4c08533c7e41dfbb6d7ca874239c87

The contract period will be based on two phases: Project Implementation and Project Life.

- Project Implementation is the period between contract execution and South Coast AQMD receipt of photo documentation of completed grant-funded PWC equipment installation. Project Implementation must follow the schedule included in the executed contract.
- Project Life is two (2) years from the date of South Coast AQMD receipt of initial report photo documentation prior to dry cleaning facility conversion. Regular maintenance of the grant-funded green PWC equipment installation throughout the Project Life to be conducted as needed. Annual photo documentation of the maintained grant-funded PWC equipment required.

At the conclusion of the project, South Coast AQMD staff will utilize project information to report the overall emissions reduction benefits and cost-effectiveness benefits of this project.[18] Permit-related emission reductions shall be based on the maximum permissible monthly dry cleaning equipment solvent consumption stated on each participant's South Coast AQMD Permit to Operate dry cleaning equipment.[19]

7. Cost Benefit Analysis

Overview of Benefits and Emission Reductions

The project plan will result in a reduction of greenhouse gas, NO_X, and VOC emissions. While VOCs are not criteria air pollutants, they contribute to the formation of ground-level ozone, which is a criteria air pollutant. By reducing VOC emissions, the project may help indirectly lower ozone levels. Emission reductions will be quantified using the dry cleaning facility's South Coast AQMD Permit to Operate and utility records. The following equipment categories detail how emission reductions will be realized and quantified:

Dry cleaning equipment: Replacing solvent-based dry cleaning equipment with PWC equipment will eliminate VOC emissions associated with cleaning solvents and reduce NO_X and greenhouse gas (GHG) emissions from associated equipment. A baseline will be established using each dry cleaning facility's South Coast AQMD dry cleaning equipment permit and supplemented as needed by utility billing data. Emission reductions will be quantified by comparing each dry cleaning facility's baseline with post-conversion data to be collected during Project Life.

Boilers: Replacing natural-gas-fired steam boilers with electric boilers will result in NO_X, GHG, and VOC emission reductions. A baseline for natural-gas-fired steam boiler emissions will be established based on each dry cleaning facility's utility records to reflect actual use. Emission reductions will be quantified by comparing the baseline with post-conversion electricity use.

Cost-effectiveness quantification shall be based on 2025 CAP Incentives Guidelines specified in Chapter 6: Community-Identified Projects, U.S. EPA and South Coast AQMD established methodologies, and data collected at participant facilities through the Project Life. In addition, operating costs data collected at participant dry cleaning facilities shall be used to quantify facility-specific cost-effectiveness and

[18] The information listed here is needed for the following reporting requirements: permit-related emission reductions, greenhouse gas emissions reduction, and cost-effectiveness.

[19] Dry cleaning facilities are required to obtain a South Coast AQMD "Permit to Operate" prior to operating dry cleaning equipment. This South Coast AQMD document details the equipment location, equipment description, and conditions for use, including the maximum permissible solvent consumption for dry cleaning equipment.

compiled at the end of the Project Life.[20]

Calculating Emission Reductions

Dry cleaning facilities typically operate with solvent-based dry cleaning machines and natural gas boilers. These systems contribute to local air pollution through both VOC emissions from petroleum-based solvent use (e.g., hydrocarbon solvents) and criteria pollutants (e.g., NO_X and SO_2) from natural gas combustion. The following provides calculations for annual emissions from petroleum-based solvent use and natural gas combustion to establish a baseline of current dry cleaning facility operations. Due to dry cleaning facilities varying in size and operations, example scenarios will also be used to illustrate emissions across different scenarios.

Solvent Emissions

South Coast AQMD Permits to Operate for dry cleaning facilities include limits on the total quantity of solvents to be used in permitted equipment to ensure VOC emissions stay below certain thresholds.[21] South Coast AQMD used a default VOC emission factor of 1.17 pounds per gallon (lbs/gal) for petroleum-based solvent used by dry cleaning operations.[22] It is approximated that dry cleaning facilities use 1 to 20 gallons of petroleum-based solvent per month, which equates to 12 to 240 gallons per year (gal/yr). The annual VOC emissions in pounds per year (lbs/yr) can be calculated using the following equation:

VOC Emission Factor (lbs/gal) x Annual Solvent Usage (gal/yr) = Annual Emissions (lbs/yr)

Using this equation, we can calculate the total VOC emissions per dry cleaning facility as approximately 14.04 to 280.80 lbs/yr of VOC emissions for 1 to 20 gallons of petroleum-based solvent used per month.[23]

Boiler Emissions

Boilers used in dry cleaning facilities vary in size depending on operational demands. Smaller shops may use natural-gas-fired steam boilers below 10 boiler horsepower (BHP), while larger operations may operate boilers in the 20 to 30 BHP range or above. Boiler manufacturers in the dry cleaning sector show commercial units ranging from 5 to 50 BHP. For the purpose of illustrating potential emission reductions, this emission reductions calculation uses a 20 BHP natural-gas-fired steam boiler as representative of a typical commercial operation with a mid-size unit.

To estimate the fuel input, BHP is converted using an assumed thermal efficiency of approximately 80%, which is consistent with performance specifications of natural-gas-fired steam boilers published by local

[20] For South Coast AQMD-established methodologies quantifying capital and operating costs of dry cleaners converting to PWC, see Sinsheimer, P., Grout, C., Namkoong, A., Gottlieb, R., & Latif, A. (2007). The viability of professional wet cleaning as a pollution prevention alternative to perchloroethylene dry cleaning. *Journal of the Air & Waste Management Association*, *57(2)*, pages 172-178, https://www.tandfonline.com/doi/epdf/10.1080/10473289.2007.10465320?needAccess=true

[21] South Coast AQMD, Rule 1109 – Dry Cleaners Using Solvents other than Perchloroethylene, https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1102-dry-cleaners-using-solvent-other-than-perchloreothylene.pdf

[22] South Coast AQMD, *Guidelines for Reporting Emissions from Dry Cleaning Operations*, March 2023: https://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/guidelines-for-reporting-emissions-from-dry-cleaning-operations.pdf?sfvrsn=6x

[23] Solvent use range based on current South Coast AQMD dry cleaning facility Permits to Operate and the operating conditions listed therein. For more information, see South Coast AQMD's Facility INformation Detail (F.I.N.D.): https://xappprod.aqmd.gov/find/

manufacturers.[24] Actual efficiency may vary depending on the type, maintenance, and operating conditions of each equipment.

(A) Converting Boiler Horsepower to Fuel Input

1 BHP is equal to 33,475 British Thermal Units per hour (Btu/hr).[25] Using the representative 20 BHP natural-gas-fired steam boiler unit size, this equates to 669,500 Btu/hr of thermal energy output. Assuming 80% efficiency, fuel input in millions of British Thermal Units per hour (MMBtu/hr) can be calculated using the following equation:

Thermal Energy Output (Btu/hr) ÷ Thermal Efficiency (%) = Fuel Input (MMBtu/hr)

Using this equation, we can calculate the fuel input as approximately 0.837 MMBtu/hr.

(B) Dry Cleaning Facility Operation Scenarios

Annual fuel use depends on the dry cleaning facility's hours of operations. For reference, we will consider the following two scenarios:

- Scenario A: 300 operating days per year at 6 hours per day (hr/day), equivalent to 1,800 hours per year (hr/yr)
  - 0.837 MMBtu/hr x 1,800 hr/yr = **1,506 MMBtu/yr**
- Scenario B: Weekday only operations of 261 days per year at 6 hours per day, equivalent to 1,566 hr/yr
  - 0.837 MMBtu/hr x 1,566 hr/yr = **1,311 MMBtu/yr**

(C) AP-42 Emission Factors

The U.S. EPA's AP-42 Section 1.4 provides emission factors for natural gas combustion, expressed in pounds of pollutant per million standard cubic feet of natural gas fired (lbs/10^6 scf).[26] AP-42 provides instructions for converting these factor to lbs/MMBtu by dividing by 1,020 Btu/scf. For a small commercial natural-gas-fired steam boiler like those used by dry cleaning facilities, the factors are:

- CO_2: 120,000 lbs/10^6 scf ÷ 1,020 Btu/scf = 117.65 lbs/MMBtu
- NO_X (Controlled – Low NO_X burners): 50 lbs/10^6 scf ÷ 1,020 Btu/scf = 0.05 lbs/MMBtu[27]
- CO: 84 lbs/10^6 scf ÷ 1,020 Btu/scf = 0.08 lbs/MMBtu
- VOC: 5.5 lbs/10^6 scf ÷ 1,020 Btu/scf = 0.005 lbs/MMBtu

(D) Calculating Annual Fuel Input

The emissions for each pollutant can be calculated by multiplying the following:

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[24] South Coast AQMD does not endorse or promote any specific technology or vendor. This figure is used solely as a reference point for calculation purposes. For more information, see the Parker Boiler Company's "Steam Boilers" webpage at https://parkerboiler.com/products/steam-boilers/

[25] American Boiler Manufacturer Association, Boiler Horsepower: History of Definitions in the Firetube Boiler Industry, page 4, https://www.abma.com/assets/docs/Tech_Resources/2015%20-%20boiler%20hp%20history.pdf

[26] See Footnote 7, AP-42: Compilation of Air Emissions Factors from Stationary Sources, Section 1.4 – Natural Gas Combustion, page 5 and 6, Tables 1.4-1 and 1.4-2

[27] South Coast AQMD Rule 1146.2 sets NO_X emission limits which may be achieved by low- NO_X or ultra-low-NO_X burner, thus this Project Plan uses the 50 lb/10^6 scf controlled factor when estimating NO_X emissions. For more information, see https://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1146-2.pdf?sfvrsn=4.

Annual Fuel Input (MMBtu/yr) x Emission Factor (lbs/MMBtu) = Annual Emissions (lbs/yr)

Using this equation, we can calculate the total emissions per pollutant per dry cleaning facility hours of operation scenario:

- Scenario A: 1,506 MMBtu/yr
  - CO_2: 177,180.90 lbs/yr, or approximately 88.59 tons per year (tpy)
  - NO_X: 75.30 lbs/yr
  - CO: 81.60 lbs/yr
  - VOC: 7.53 lbs/yr
- Scenario B: 1,311 MMBtu/yr
  - CO_2: 154.239.15 lbs, or approximately 77.12 tpy
  - NO_X: 65.55 lbs/yr
  - CO: 104.88 lbs/yr
  - VOC: 6.56 lbs/yr

Actual emissions at individual dry cleaning facilities will vary depending on operating schedule, equipment, and materials used. These estimates help to provide a baseline for illustrating potential emission reductions when dry cleaning facilities transition to professional wet cleaning and electric boilers, which produce zero on-site emissions.

Calculating Operating Costs (Pre-Conversion)

Recurring operating costs for dry cleaning facilities are primarily from natural gas, electricity use, and the petroleum-based solvent use. The following provides a baseline estimate for typical small dry cleaning facilities operating a 20 BHP natural-gas-fired steam boiler, baseline electricity loads, and petroleum-based solvent use. Actual dry cleaning facility costs vary with equipment size and individual business practices.

(A) Estimated Operating Conditions and Rates

- Boiler size: 20 BHP (1 BHP = 33,475 Btu/hr)
- Boiler efficiency: 80% efficiency rate
- Operating Schedule Scenarios
  - Scenario A: 300 operating days/yr at 6 hr/day, equivalent to 1,800 hr/yr
  - Scenario B: Weekday only operations of 261 days/yr at 6 hr/day, equivalent to 1,566 hr/yr
- Energy Rates (August 2024 Los Angeles-Long Beach-Anaheim area averages)[28]
  - Natural gas: $1.63 per therm
  - Electricity: $0.282 per kilowatt-hour(kWh)
- Electricity use baseline: 63 to 72 kWh/day (includes lighting, finishing equipment, plug loads; excludes boiler fuel)
- Solvent Use: 1 to 2.5 gal/month (subject to South Coast AQMD permit conditions) at $14.95 to $22.95 per gallon

(B) Calculating Natural Gas (Boiler) Cost

- Fuel input for 20 BHP boiler at 80% efficiency = 0.837 MMBtu/hr (as noted above)

[28] United States Bureau of Labor Statistics, *Average Energy Prices, Los Angeles-Long Beach-Anaheim – August 2024*, https://www.bls.gov/regions/west/news-release/2024/averageenergyprices_losangeles_20240916.htm

- 8.37 therms/hr x 6 hr/day = 50.22 therms/day
- Daily cost = 50.2 therms/day x $1.63 per therm = $81.85 per day
- Annual Totals
  - Scenario A: $81.85 x 300 days = $24,555.00 per year
  - Scenario B: $81.85 x 261 days = $21,362.85 per year

(C) Calculating Electricity Cost

Typical floor area data and energy intensity benchmarks were reviewed to determine the electricity use baseline of a dry cleaning facility. Listings for dry cleaning facilities in Los Angeles County show a range from approximately 700 ft^2 (square feet) to 2,000 ft^2.[29] For purposes of estimating operating costs, an average of 1,350 ft^2 was used.

The U.S. EPA states that "Personal Services (Health/Beauty, Dry Cleaning, etc.)" buildings report a Site Energy Use Intensity (EUI) of 47.9 kBtu/ft^2 per year.[30] To express this figure in kWh/ft^2:

- 47.9 kBtu/ft^2 divided by 3.412 kbtu/kWh = 14.04 kWh/ft^2

For 1,350 ft^2, this is approximately 18,954 kWh/yr. Per operating day scenarios:

- 300 days: 63.2 kWh/day x $0.282/kWh = **$17.82 per day**
- 261 days: 72.6 kWh/day x $0.282/kWh = **$20.47 per day**

While fewer operating days increases per-operating-day average, the annual usage remains the same and thus equates to $5,346 per year.

(D) Calculating Solvent Use Cost

The use of 1 to 2.5 gallons per month of hydrocarbon solvent DF-2000 ranges from $14.95 to $22.95 per gallon based on the purchase size of 1-gallon pails to 55-gallon drums with a local vendor.[31] This equates to the following costs based on usage:

- Low use (1 gal/month): 12 gal/yr x $14.95-$22.95 per gal = **$179.40 to $275.40 per year**
- High use (2.5 gal/month): 30 gal/yr x $14.95-$22.95 per gal = **$448.50 to $688.50 per year**

(E) Total Annual Operating Costs

Scenario	Natural Gas ($/yr)	Electricity ($/yr)	Solvent ($/yr)	Total ($/yr)
300 days	24,555.00	5,345.00	179.40 to 688.50	29,852.40 to 30,361.50
261 days	21,362.85	5,345.00	179.40 to 688.50	26,660.25 to 27,169.35

[29] For purposes of determining an average dry cleaning facility size, a listing of dry cleaning facilities for sale in Los Angeles County was used for reference. Additional examples of facilities for sale may be found at the BizBuySell website at: https://www.bizbuysell.com/california/los-angeles-county/dry-cleaners-for-sale/.

[30] U.S. Environmental Protection Agency, *ENERGY STAR Portfolio Manager: Technical Reference – U.S. Energy Use Intensity by Property Type*, August 2024, https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf

[31] South Coast AQMD does not endorse or promote any specific technology or vendor. This figure is used solely as a reference point for calculation purposes. For more information, see 3Hanger Supply Company's listing for DF-2000 at https://3hangersupply.com/products/hydrocarbon-call-to-order?variant=47611978023214.

These totals estimate current dry cleaning operation dependency on natural gas boilers, with boiler fuel cost accounting for roughly 80 to 85% of annual operating costs expenses. While the exact cost may vary by facility, this estimate provides a baseline that can be used to evaluate post-conversion cost effectiveness and benefits.