> To appropriately plan for such a catastrophic event, the large-scale lithium ion battery facility using the same chemistries as the APS Elden Substation (Flagstaff) facility fire and the McMicken facility would need to be built in isolation far from everything else, because an explosion could potentially level buildings at some distance from the battery facility site. The energy stored at a 2 MW battery facility is equivalent to 1.72 tons of TNT. The energy stored at a 250 MW battery facility is equivalent to 215 tons of TNT. Also, large amounts of hydrogen fluoride could be released and dispersed that would affect and harm the public at a substantial distance downwind. There would be concerns also about lingering hydrogen fluoride contamination in the affected areas.

D-240 cont.

Based on this analysis, an explosion at the proposed BESS alternatives BS-2 and BS-3 would be equivalent to 47 and 103 tons of TNT, respectively.[263] This is sufficient to seriously damage adjacent residential neighborhoods, vineyards, shopping malls, commercial properties, schools, and parks, resulting in significant property damage, mortality, and health impacts to residents, agricultural, vineyard and other workers. The DEIR fails as an informational document under CEQA for failing to disclose and evaluate the risk and consequences of explosions and fires at the proposed BESS alternatives. If these impacts are not analyzed in the FEIR for this Project, a future EIR will be required to analyze them. The NFPA concluded as follows based on the experience in Arizona:[264]

> However, as the Arizona fire illustrates, this technology is not risk free. BESS technologies, which are typically large configurations of chemical batteries, can explode, catch fire, and release toxic gases under certain conditions. They are also subject to the phenomena of thermal runaway, which means they can burn intensely for significant periods of time.
>
> These hazards are dangerous for firefighters and for anyone else nearby an emergency incident. Policymakers must make sure first responders and other officials have the tools necessary to deploy BESS safely.

In contrast to lithium-ion battery hazards, reviewed above, there is no published operating history on flow batteries. These batteries contain electrolytes, including vanadium and zinc, which can be toxic to the environment or to people.[265] Further, their size limits their application to large stationary industrial applications, and their complex system of pumps, sensors, vessels, and so on, provide ample opportunity for upsets with the potential to release electrolytes into the environment.

---

[263] The 2 MW battery at the Arizona McMicken facility is equivalent to 1.72 tons of TNT. Thus, Project alternative BS-2 (55 MW) is equivalent to (1.72)(55/2) = **47 tons TNT** and BS-2 (120 MW) is equivalent to (1.72)(120/2) = **103 tons TNT**.

[264] NPFA, August 2019, p. 1.

[265] David Rosewater, First Responder Safety for Grid Energy Storage, Sandia National Laboratories, 2015, pdf 14, 21; https://www.osti.gov/servlets/purl/1334066.

66

D-241 In sum, there is no BESS technology that will not have significant impacts, given the proximity of sensitive receptors to all proposed BESS sites. The EIR must be revised to disclose their impacts, or a future EIR must be prepared to evaluate these impacts when the battery technology is selected.

4.3. Impacts of Flow Batteries

D-242 The DEIR suggests that flow batteries would solve the significant impacts of lithium-ion batteries discussed in Comments 4.2 and 5, stating "Flow battery technology, which could be deployed at FTM Site 6, would have reduced fire risk because the electrolyte material is not flammable."[266] However, flow batteries have potentially significant impacts that were not disclosed in the DEIR. A recent report explains:[267]

> Flow batteries have two electrolytes- catholyte for the positive electrode (cathode) and anolyte (anode) for the negative electrode. The terms cathode and anode correspond to reduction and oxidation occurring at positive and negative terminals during discharge. Flow battery electrolytes can be hazardous in several ways including acidity and toxicity. Acidity is measured on the ph scale. Flow battery electrolyte is not especially acidic when compared to lead-acid battery electrolyte (close to ph = 0). If human skin is exposed to electrolyte, it may cause rashes or chemical burns if not treated quickly. Similarly, eye contact may result in irritation, lacrimation, pain, redness, corneal burns, and possible permanent, partial, or complete blindness if not treated quickly. The toxicity of the electrolyte has additional effects if ingested, inhaled, or released to the environment. Large pools from electrolyte spills can generate localized gas clouds that can be hazardous to human health. In an analysis of a hypothetical 500-gallon spill from a specific vanadium redox flow battery, with reasonable assumptions about hydrochloric acid (HCl) concentration in solution, spill volume, ground absorption, and local weather conditions, HCl concentrations in the air could reach potentially lethal exposure levels, after 60 minutes, at a range of 28m from the edge of the spill (using acute exposure guideline levels (AEGL)). Note that vanadium redox electrolyte can also contain sulfuric acid. As high temperatures can reduce vapor pressures significantly, a coincident fire can exasperate the toxicity hazard, however flow battery electrolytes are generally not flammable. While these specific figures do not apply across all technologies, the hazard from chemical off-gassing of large spills should be considered in the design, siting, installation, and emergency response procedures.

Further:[268]

> When the positive and negative charged electrolytes mix at a high state-of-charge, significant heat is generated, with violent release of toxic and/or flammable gases. For a vanadium flow battery, hydrogen and oxygen may be released, for a mixed acid vanadium flow battery, chlorine may also be released. Hence it is critical that the electrolytes that are stored in separate tanks, do not mix. This requires secondary containment for each tank. The secondary containment volume must be sufficiently large to accommodate the electrolyte volume contained in the tank. The electrolyte captured in the secondary containment may not be reused before treatment. Proper procedure for treating this spilled electrolyte before reuse has yet to be standardized and may lead to a delay in restoring system functionality.
>
> The ecological impact of a large spill should also be considered. The material safety data sheet (MSDS) from a large zinc bromide flow battery manufacturer describes that major components of their electrolyte "are considered to be very harmful to aquatic life" [51]. So, proximity to nearby water sources or aquifers should be taken into consideration in siting.

The DEIR fails as an informational document under CEQA for failing to disclose these significant impacts of flow batteries.

---

[266] DEIR, pdf 655.

[267] David Rosewater and others, Grid-scale Energy Storage Hazard Analysis & Design Objectives for System Safety, Sandia Report SAND2020-9360, August 2020, p. 31; https://www.sandia.gov/ess-ssl/wp-content/uploads/2020/09/Rosewater-APS.pdf.

[268] Ibid.

D-243

4.4. Battery Handling and Transportation Accidents

CEQA Guidelines Section 15126.2(c) requires a discussion of any significant irreversible environmental change that would be caused by a project. A project would result in significant irreversible changes if it involves uses in which irreversible damage could result from any potential environmental accidents associated with the project.[269] The batteries will likely be shipped from warehouses in unknown location(s) and transported to the site from these undisclosed locations by undisclosed means (rail, truck, ship?), over undisclosed routes and roadways. Transportation could result in crush or puncture damage, possibly leading to the release of electrolyte material along transport routes or in storage. These routes could include sensitive habitat that would be irreversibly damaged in the event of a transportation accident. Further, an explosion triggered by a fire during handling and transportation could result in injuries and deaths of workers and motorists.

Lithium-ion batteries are sensitive to damage, especially during handling and transport.[270] They are also sensitive to high ambient temperatures,[271] which will be experienced by the Project's batteries as they will likely have to pass through sensitive biological habitat in desert areas. It is well known that battery accidents occur during handling, loading, and unloading in warehouses and during transportation.[272] The DEIR fails to discuss the risk of accidents during battery storage, handling, and transportation to the site and thus fails as an informational document under CEQA.

D-244

5. IMPACTS OF PROPOSED BESS FACILITIES

The DEIR's screening process identified two BESS alternatives that were carried forward for analysis in the DEIR: BS-2, battery storage to address the distribution need; and BS-3, third-party, behind-the-meter solar and battery storage.[273]

---

[269] 14 CCR § 15126.2; DSEIR, p. ES-8.

[270] Kjell-Arne Jonsson, The Dangerous Consequences of Taking Shortcuts When Shipping Lithium-Ion Batteries, March 9, 2018; http://info.nefab.com/lib-blog/lithium-ion-batteries-shipping-shortcuts.

[271] Allianz Risk Consulting, Lithium-Ion Batteries, Risk Bulletin, 2017; https://www.agcs.allianz.com/content/dam/onemarketing/agcs/agcs/pdfs-risk-advisory/risk-bulletins/ARC-Lithium-Ion-Batteries.pdf.

[272] FAA Office of Security and Hazardous Materials Safety, Lithium Batteries & Lithium Battery-Powered Devices, August 1, 2019; https://www.faa.gov/hazmat/resources/lithium_batteries/media/Battery_incident_chart.pdf.

[273] DEIR, Sections 3.3.7 and 3.3.8.

68

D-244 cont.

5.1. The DEIR Omits Risk of Upset Analyses

The proposed BESS alternatives are very close to many sensitive receptors, requiring a formal risk of upset analysis to estimate potential public health and property damage risks. The Alternative Screening Report admits that "fire risk is a concern with BESS installations (particularly lithium-ion BESSs)…" and further asserts that "should BESS facilities catch fire, they could potentially pose a hazard to fire fighters and other first responders due to their chemical components. These issues will need to be fully evaluated in the EIR..."[274] This is confirmed by the review in Comment 4.2.

However, the DEIR contains no analysis of these issues for any alternative, which typically requires a formal risk of upset analysis. Thus, the DEIR fails as an informational document under CEQA. Instead, the Alternative Screening Report asserts similar facilities "in other parts of the world ( ) suggest that any fire risk of BESS facilities can be adequately mitigated."[275] However, the Screening Report and DEIR fail to disclose the history of accidents at BESS facilities, therefore failing as an informational document under CEQA. The proximity of sensitive receptors to the proposed BESS alternatives and the history of accidents at these facilities (Comment 4.2) require the preparation of formal risk of upset analyses, which likely will eliminate many potential BESS sites from consideration.

D-245

5.1.1. Alternative BS-2

This alternative would reduce peak loads during the summer to relieve pressure on the area substations and feeders. The batteries would discharge stored energy to the grid during peak demand and charge from the grid during hours of low demand (e.g., nighttime).[276]

The potential locations of BS-2 battery sites are shown in DEIR Figures ES-3 and 3-16. Land use designations for these sites are summarized in DEIR Table 3-17. This summary shows that some of these alternatives are located near sensitive receptors. Four potential sites are located within residential land uses (FTM Sites 2, 3, 4, 8); one is located in a "regional commercial" land use, the Woodland Shopping Center (FTM Site 2) and is likewise near residential areas;[277] and one is located adjacent to the CAL FIRE Attack Base, next to the Paso Robles Municipal Airport (FTM Site 5). The other two (FTM Sites 6 and 7) are designated as located within "county other" and unidentified

[274] DEIR, Appendix A, p. 3-73, pdf 109.

[275] Ibid.

[276] DEIR, p. 3-112, pdf 308.

[277] DEIR, Appendix A, pdf 93, Figure 3-13.

69

D-245 cont.

"public facilities." The locations of alternatives close to areas where sensitive receptors would be located—in residential and commercial areas—are summarized in Figure 15. In addition, FTM Site 7, not shown on Figure 17, is located close to a church.[278]

Figure 15: BESS Alternatives Located Near Sensitive Receptors[279]

FTM Site 1:

FTM Site 2:

FTM Site 3:

[278] DEIR, p. 4.3-10, pdf 428.

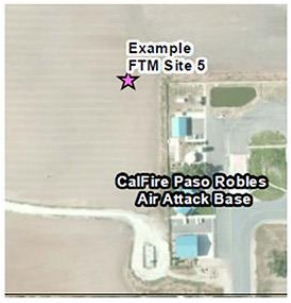
[279] DEIR, Figure 3-16, pdf 309.

70

D-245 cont.

FTM Site 4:

FTM Site 5:



Despite the numerous nearby sensitive receptors, the DEIR failed to analyze impacts of accidents. The DEIR indicates that the BESS technology that would be used at these eight sites is lithium ion, with the exception of Site #6, where both lithium-ion and flow batteries[280] are proposed.[281] Lithium-ion batteries were ultimately selected for evaluation due to space requirements of the redox flow batteries[282] and lack of experience with this technology.[283,284]

D-246

The DEIR explains that lithium-ion batteries are the most space-efficient and cost-effective technology currently available, particularly at sites such as those with

[280] DEIR, p. 3-126, pdf 322.

[281] DEIR, Table 3-18, pdf 321.

[282] DEIR, Appendix B, p. 3-65, pdf 101 and Table 3-8, p. 3-70, pdf 106.

[283] SDGE, Innovative Battery Storage Technology Connected to the California Grid, April 30, 2019; https://sdgenews.com/article/innovative-battery-storage-technology-connected-california-grid.

[284] Jens Noak and others, Redox Flow Batteries for Renewable Energy Storage, Energy Storage Summit 2021; https://www.energy-storage.news/blogs/redox-flow-batteries-for-renewable-energy-storage.

71

limited available space (e.g., sites 1-4).[285] The DEIR states that the analysis of these alternatives was based on 2019 Tesla Megapack specifications and redox flow batteries, enclosed in buildings.[286]

D-246 cont.

The DEIR mentions that lithium-ion BESSs have downsides, "such as potentially elevated fire hazard risk in comparison to other technologies."[287] The DEIR also explains that the alternative to lithium-ion batteries, redox flow batteries, offers "potential advantages, such as long lifecycles, low temperature ranges for operation, and easy scalability…" and "may have reduced fire risk compared to lithium-ion batteries, but they require the use of liquid electrolyte with high concentrations of acid."[288] However, due to the significantly larger footprint of redox flow batteries, they would be best suited to FTM Site #6, where there is ample space.[289] Further, redox flow batteries are not yet commercially available. The DEIR fails to mention the hazards associated with flow batteries, which include large tanks of electrolytes, including vanadium, zinc-bromine, and organic compounds[290]—toxic compounds that would be released into the environment in an accident. Comment 5.1.

D-247

The DEIR repeatedly points to the fire risk of the BESS alternatives. The Hazards and Hazardous Material section, for example, explains with respect to Alternative BS-2:[291]

> and 8 would both be within the SRA HFHSZ, and thus would have elevated fire risk. Fire risk is a concern with BESS installations (particularly lithium-ion BESSs) and could pose a hazard to fire fighters and other first responders due to their chemical components. Fires associated with electric vehicles and various consumer electronics have shown that lithium-ion batteries have the potential to catch fire (Business Insider 2019; CNET 2016). Lithium-ion batteries contain a flammable electrolyte and have the potential for "thermal runaway," which is a self-perpetuating cascade process where one compromised battery cell ignites adjacent cells, potentially resulting in a large-scale fire (SP Global 2019). Fires have occurred at utility-scale lithium-ion BESS installations, including one at the 2 MW BESS in Surprise, Arizona in April of 2019; however, utility-scale lithium-ion BESSs have been widely deployed in the U.S. (SP Global 2019; U.S. Energy Information Administration 2019). Improved safety standards are in development and safety certifications have been developed to reduce fire safety risk from lithium-ion BESSs as much as possible (SP Global 2019). Flow battery technology, which could be deployed at FTM Site 6, would have reduced fire risk because the electrolyte material is not flammable.

It also explains with respect to Alternative BS-3:[292]

[285] DEIR, p. 3-126, pdf 322.

[286] DEIR, Alternative B, p. 3-60, pdf 96.

[287] Ibid.

[288] Ibid.

[289] DEIR, p. 3-127, pdf 323.

[290] Robert F. Service, New Generation of "Flow Batteries" Could Eventually Sustain a Grid Powered by the Sun and Wind, *Science*; https://www.sciencemag.org/news/2018/10/new-generation-flow-batteries-could-eventually-sustain-grid-powered-sun-and-wind.

[291] DEIR, p. 4.9-39, pdf 655.

72

> Lithium-ion BTM storage facilities could pose a fire safety hazard (see discussion under Alternative BS-2 above), but, when installed properly, this risk can be greatly mitigated. It is assumed that all applicable local codes and requirements would be followed for the permitting, siting, and installation of third-party BTM facilities that may result from procurement via the DIDF.

The Wildfire section of the DEIR similarly recognizes the fire hazards of BESS alternatives BS-2 and BS-3. As to alternative BS-2:[293] D-247 cont.

> serve to minimize ignition potential and related wildfire risks. Once constructed, BESSs (in particular, lithium-ion BESSs) may present a fire risk, particularly for FTM sites located within the SRA, such as the illustrative FTM Sites 6 or 8. UL 9540 is a safety standard specifically designed for electrochemical BESSs and includes, among other things, size and separation requirements to prevent a fire originating in one BESS unit from propagating to adjacent units (i.e., thermal runaway) (UL LLC 2020). Implementation of this standard, along with compliance with local laws and regulations for fire safety, would reduce potential impacts from BESSs related to fire risk. Further, FTM BESSs under Alternative BS-2 would be operated remotely and, therefore, these facilities would not expose structures or people to pollutant concentrations from a wildfire, uncontrolled spread of wildfire, and/or expose people or structures to significant downslope or downstream flooding, landslide affects, and post-wildfire-related hazards.

As to Alternative BS-3:[294]

> ignition. As discussed in Section 4.9, "Hazards and Hazardous Materials," BTM solar systems and BESSs do have some potential to increase fire hazard during operation. It is assumed that all applicable local codes and requirements would be followed for the permitting, siting, and installation of third-party BTM installations that may result from procurement via the DIDF. No new or additional infrastructure (e.g., roads, fuel breaks, or emergency water sources) would likely need to be installed or maintained as a result of Alternative BS-3.

The PEA acknowledges these impacts and states that "[t]hese issues will need to be fully evaluated in the EIR…"[295] However, the EIR fails to evaluate these issues, instead just repeating the unsupported assertions in the PEA.

Thus, mitigation relies on "local codes and requirements" to prevent BESS accidents, without ever disclosing what those codes and requirements are or evaluating their potential effectiveness.

First, it is well known that "local codes and requirements" do not prevent accidents, which are often triggered by external events or defective battery cells.[296] A helicopter accident, a traffic accident, a terrorist attack, or an external fire could cause an accident. D-248

[292] DEIR, p. 4.9-41, pdf 657.

[293] DEIR, p. 4.20-21, pdf 903.

[294] DEIR, p. 4.20-22, pdf 904.

[295] DEIR, Appendix A, pdf 109, p. 3-73.

[296] See, for example, Andy Colthorpe, Arizona Battery Fire's Lessons Can be Learned by Industry to Prevent Further Incidents, DNV GL Says, *Energy Storage*, Summer 2021, July 29, 2020; https://www.energy-storage.news/news/arizona-battery-fires-lessons-can-be-learned-by-industry-to-prevent-further.

73

D-248 cont.

However, despite recognizing some of the hazards of the BESSs, the DEIR fails to actually analyze them, which is typically done in a "risk of upset analysis." A risk of upset analysis should have been prepared for favored BESS alternatives BS-2 and BS-3. As shown in Figures 2 and 5, these alternatives are very close to sensitive receptors. Alternative BS-2 is adjacent to a shopping mall and BS-3 is surrounded by dense residential neighborhoods. Thus, an accident at these facilities would result in significant impacts, including potentially property damage, health impacts from toxic chemicals, and even mortality. Thus, the DEIR fails as an informational document under CEQA for failing to disclose and mitigate these risks.

D-249

5.2. The DEIR Omits Hazards Associated with the Transportation and Disposal of Batteries

The PEA states that "[o]ther potential impacts of BESSs include hazards associated with recycling and disposal of batteries and materials at the end of their usable life. BESSs contain hazardous materials, which could expose workers, the public, or the environment to risks if not disposed of properly. This is another area that will be evaluated in the EIR…"[297]

The DEIR contains a section on "hazards and hazardous materials"[298] under Impact HAZ-1, "create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials." However, the DEIR fails to address the impacts associated with the transportation of the batteries to the site and their disposal.

The DEIR does not disclose how the batteries will be transported to the site (ship, rail, flatbed truck), the transportation routes, details of on-site storage during construction, where the batteries will be manufactured and recycled, or the routes and means of transport to the recycling center. Accidents can occur during transport, storage, and recycling. Lithium-ion batteries are sensitive to damage, especially during handling and transport.[299] It is well known that battery accidents occur during handling, loading, and unloading in warehouses and during transportation.[300] The DEIR is also silent on the disposal of the batteries at the end of their useful life.

[297] DEIR, Appendix A, p. 3-73, pdf 109.

[298] DEIR, Section 4.9, pdf 617.

[299] Kjell-Arne Jonsson, The Dangerous Consequences of Taking Shortcuts When Shipping Lithium-Ion Batteries, March 9, 2018; http://info.nefab.com/lib-blog/lithium-ion-batteries-shipping-shortcuts.

[300] FAA Office of Security and Hazardous Materials Safety, Lithium Batteries & Lithium Battery-Powered Devices, August 1, 2019; https://www.faa.gov/hazmat/resources/lithium_batteries/media/Battery_incident_chart.pdf.

74

D-250 CEQA Guidelines Section 15126.2(c) requires a discussion of any significant irreversible environmental change that would be caused by a project. A project would result in significant irreversible changes if it involves uses in which irreversible damage could result from any potential environmental accidents associated with the project.[301] The batteries will likely be shipped from a factory or warehouses in unknown location(s) and transported to the site from these undisclosed locations by undisclosed means (rail, truck, ship?), over undisclosed routes and roadways. These routes could include sensitive desert habitat that would be irreversibly damaged in the event of a transportation accident. Further, an explosion triggered by a fire during handling and transportation could result in injuries and deaths of workers and motorists and could irreversibly damage the immediately adjacent CSE facility, as well as other nearby solar facilities.

6. OPERATIONAL GREENHOUSE GAS EMISSIONS ARE UNSUPPORTED, UNDERESTIMATED, AND SIGNIFICANT

D-251 The DEIR estimated criteria pollutants and greenhouse gas (GHG) emissions from Project operation and concluded they were not significant.[302] However, as discussed below, the DEIR omitted the major sources of these emissions, which when included result in significant GHG impacts.

DEIR Table 4.8-1 indicates that the major source of GHG emissions is construction, primarily "ground-based construction" (2,025 MT CO_2e) and helicopter emissions (699 MT CO_2e). A secondary source of operational emissions is sulfur hexafluoride (SF_6) from Project equipment (96 MT CO_2e/yr).[303] These emissions are underestimated and exclude the major source of Project GHG emissions, operation of the BESS facilities.

6.1. Operational GHG Emissions

D-252 The Project is a major source of operational GHG emissions, which arise from three sources: (1) sulfur hexafluoride (SF_6) used in Project equipment; (2) helicopters patrolling power lines;[304] and (3) charging of the BESSs. The DEIR fails to support the SF_6 emissions and omits the latter two sources of emissions.

[301] 14 CCR § 15126.2; DSEIR, p. ES-8.

[302] DEIR, Section 4.8.

[303] DEIR, Table 4.8-1, pdf 407.

[304] DEIR, p. 2-87, pdf 167.

75

D-253

6.1.1. Sulfur Hexafluoride (SF_6)

The DEIR reports 96 MT CO_2e/yr from sulfur hexafluoride (SF_6) leakage from "gas insulated switches and equipment"[305] and asserts that emission support is in Appendix C.[306] Appendix C to the DEIR does not contain any support for the SF_6 emissions. Instead, the support for these emissions is in Appendix C of the PEA.

D-254

6.1.2. CO_2e Emissions from the Use of Helicopters for Facility Inspection

The DEIR indicates that annual inspections of the 70 kV power line segment will be conducted either "from the ground or by helicopter… The inspection process involves routine patrols from existing local staff either on the ground or by helicopter tasked with patrolling the power lines."[307] Elsewhere, "[r]outine maintenance of the power line structures and conductors would require travel overland on access roads or off-road and may require the use of helicopters to access the site."[308] In the discussion of noise: "[t]he use of a helicopter… for routine maintenance inspection was evaluated separately."[309] Further, nesting bird survey will be accomplished by ground surveys and/or by helicopter…"[310] The DEIR does not include any GHG emissions from the use of helicopters for these inspection activities.

D-255

6.2. Emissions from Charging the BESSs

The batteries in BESS facilities must be charged with energy from the grid. The generation of this energy emits GHGs and criteria pollutants. Further, a BESS requires electricity to operate its ancillary cooling and control systems, including inverters, transformers, and HVAC units. The DEIR did not include emissions from any of these sources. As demonstrated below, GHG emissions from the Project are significant and unmitigated when battery charging emissions are included.

D-256

The emissions from Project operation depend on how many megawatt hours (MWh) of generation are required to charge the Project batteries, which grid sources are

[305] DEIR, Table 4.8-1.

[306] DEIR, p. 4.8-6, pdf 606.

[307] DEIR, pdf 167, 767, 812.

[308] DEIR, pdf 682.

[309] DEIR, pdf 747.

[310] DEIR, pdf 174.

76

D-256 cont.

the marginal sources[311] of supply during the hours when Project charging or discharging is occurring, and the emission rates of those grid sources. The number of MWh of charging energy required will in turn depend on the expected Project generation and the Project efficiency (the percentage of charging energy which can be recovered as generation during discharge).

The DEIR contains no information on the net generation of electricity needed to operate the proposed BESS(s). Absent regulatory requirements or mitigation measures to the contrary, battery storage facilities store whatever energy is the cheapest and displace whatever is the most expensive, with no concern for emissions that would result from this exchange.

If the charging energy is from conventional sources, such as gas or coal-fired generation, charging will generate emissions as those sources would not otherwise operate because there would be no market for them. That fraction is likely quite low because only a small fraction of solar generation (and virtually no non-solar renewable generation) is curtailed[312] generation that could be used for battery charging. Thus, if charging occurs in hours when the marginal fuel in the CAISO-controlled grid is a fossil fuel, the facility would increase GHG and criteria pollutant emissions that were not included in the DEIR's analyses.

D-257

The DEIR makes no commitment that the batteries will be charged with renewable energy. The DEIR states that the BESSs will "defer the need for additional distribution capacity… to 'shave' peak loads during periods when energy use along these feeders is high (i.e., reduce peak loads during summer) to relieve pressure on the area substations and feeders. BESSs would likely operate on a daily cycle where they would discharge during hours of peak demand and charge during hours of lower demand (e.g., nighttime)."[313]

---

[311] The marginal source of supply in a given hour is the source whose output would be increased if demand increases in that hour from the previous hour, or whose output would be decreased in that hour if demand decreases in that hour from the previous hour.

[312] Renewable energy is "curtailed" when it could have been physically produced (e.g., the sun is shining or the wind is blowing), but it was not produced due to economic (e.g., prices too low to be worth generating) or electrical system factors (e.g., the renewable generation would cause a nonrenewable generator to be turned off that is expected to be needed in the near future, without adequate time to restart it if it is turned off, and thus the CAISO orders renewable curtailment to avoid nonrenewable curtailment). The great majority of curtailment in California to date has been economic (over 99% in 2017, in 2018, and in 2019). Comparable data are not currently available for 2020. See http://www.caiso.com/Documents/Wind_SolarReal-TimeDispatchCurtailmentReportDec31_2017.pdf; http://www.caiso.com/Documents/Wind_SolarReal-TimeDispatchCurtailmentReportDec31_2018.pdf; and http://www.caiso.com/Documents/Wind_SolarReal-TimeDispatchCurtailmentReportDec31_2019.pdf.

[313] DEIR, pdf 37, 308.

77

D-258 The DEIR is silent on the source(s) of the charging energy, a phrase that is absent from the DEIR and how often or how much renewable energy, if any, will be used for charging, let alone renewable energy generated on site. As the facility is a net consumer of electricity (to operate support equipment), operation of the Project will increase GHG and criteria pollutant emissions to operate the BESS and when the batteries are charged with nonrenewable energy sources, which will occur whenever incremental[314] wind and solar are not available to meet incremental charging loads because they are already being fully used.

D-259 The DEIR fails to provide the key information required to estimate charging emissions, including the battery storage efficiency and expected energy output of the batteries. The storage capacity of the various BESS options, the amount of energy the batteries can store, is included in Table 3-18 of the DEIR. However, the expected energy output was not provided. This is the number of MWh of generation expected over the course of a typical year, which will be less than the storage capacity x 8,760 hours[315] due to hours when the Project will be either charging or not operating or generating at less than full capacity.

D-260 The storage efficiency (sometimes also called "round-trip efficiency") depends on the battery technology used and is relevant to the environmental impacts of the Project because lower efficiency means more grid generation required for each MWh of expected energy output. It is the ratio of energy output per MWh of charging energy (i.e., MWh of battery generation divided by MWh of battery charging energy).

D-261 All of this information is required to estimate emissions from Project operation. The DEIR fails as an informational document under CEQA for failing to calculate emissions from BESS battery charging and for failing to include the information required to calculate these emissions.

D-262 Because the DEIR does not provide any data on the expected efficiency, capacity factor, or its expected charging energy requirements or energy generation, we used CAISO data for existing energy storage projects. Specifically, we looked at four 2-week periods in each of the four annual seasons (fall 2020, winter 2020–21, spring 2020, and summer 2020).[316] Our analysis is summarized in Exhibits 2A and 2B.[317]

---

[314] "Incremental" is analogous to marginal. Incremental wind and solar means solar and wind in addition to what is already generating; incremental charging loads means charging loads in addition to whatever charging loads, if any, are already happening. Marginal can refer to small changes either up or down from the status quo ante, while incremental refers to upward changes only ("decremental" refers to small downward changes).

[315] 8,760 is the number of hours in a year.

[316] See the attached spreadsheet of CAISO storage data, Exhibit 2B.

78

D-262 cont.

The CAISO provides data at 5-minute intervals for the net MW of storage generation (positive numbers) or charging (negative numbers). We downloaded the 5-minute data for 56 days over the last year, selected to represent two weeks in each of the four seasons of the year.[318] The use of two full weeks of data for each season accounts for day-of-the-week variation and also for multi-day responses to weather, where generation on one day may reflect charging on the previous day.[319] The use of data from each of the seasons of the year accounts for seasonal variation in insolation and loads.

We aggregated the CAISO 5-minute data by day, by season, and for the full year represented by the data.[320] From the aggregated data, we calculated an overall annual capacity (220 MW), generation capacity factor (4.1%), efficiency (71.2%), and charging energy (131,424 MWh, or 131.4 gigawatt hours (GWh)).[321] Assuming the proposed Project storage components will have the same efficiency and capacity factor as the CAISO storage in operation in 2020–2021, the corresponding expected charging energy requirements for the Project will be 0.5048 GWh per year per project MW.[322] The net increase in energy generation, after taking account of hours when the Project would be discharging, will be 0.1454 GWh per year per Project MW.[323]

The CAISO does not provide any data on the marginal sources of supply for storage charging on its system. Nor does it provide any data on marginal sources of supply for individual time periods, which could be cross-matched with the 5-minute storage charging data to calculate the marginal sources of charging energy. The DEIR also provides no information on the sources of charging energy, other than to suggest that some unspecified fraction will come from renewable energy resources.[324] That fraction is likely quite low because only a small fraction of solar generation (and virtually no non-solar renewable generation) is curtailed generation that could have

[317] Emission calculations by David Marcus. Calculations based on Otay Mesa Emissions in Exhibit 2A and CAISO storage data in Exhibits 2B; Marcus resume in Exhibit 3.

[318] See Exhibit 2A, Storage Data Spreadsheet, Columns I to KJ. The two-week periods were the most recent available data for the winter season (January 13-26, 2021) and the periods exactly 3 months earlier for each preceding season.

[319] See, e.g., Exhibit 2A, Storage Data Spreadsheet, lines 12, 14, 26, 27, 33, 35, 42, 49 and 65-66), where daily generation exceeded charging. This is only possible if some of the generation relied upon charging in the prior day(s).

[320] See Exhibit 2A, Storage Data Spreadsheet, columns C–G.

[321] See Exhibit 2A, Storage Data Spreadsheet, lines 80-81.

[322] See Exhibit 2A, Storage Data Spreadsheet, line 83, column D.

[323] See Exhibit 2A, Storage Data Spreadsheet, line 86, column D.

[324] DEIR, p. 4.3-28, pdf 446.

79

D-262 cont.

been used for battery charging.[325] Thus, the DEIR fails as an informational document under CEQA.

D-263

The CAISO grid covers most of California, and because of the Western Energy Imbalance Market,[326] marginal sources of generation outside the CAISO are also available from a wide swath of the Western U.S. grid. Thus, the CAISO's marginal source of generation is likely to be gas-fired generation in the great majority of hours. Therefore, we assumed that the most reasonable approximation to the expected emissions associated with battery charging is the emissions from a modern natural gas-fired combined cycle plant. Such plants are the most efficient gas-fired plants, and gas is the cleanest fossil fuel with the lowest emissions.

Thus, for any hour in which gas (or coal) is the marginal fuel, the emissions from a gas-fired combined cycle plant are a lower-bound emissions estimate. There will be a small number of hours in which solar or wind are the marginal resources, as shown by their being curtailed in the absence of battery charging to absorb their generation. In those hours, assuming a combined cycle plant as the marginal resource will overstate the emissions associated with battery charging. That overstatement is offset by the hours in which the marginal source is a combustion turbine or steam plant, whose emissions are greater than those of a combined cycle plant.

The Project would interconnect to the CAISO-controlled grid. A typical modern combined cycle gas plant connected to CAISO-controlled transmission lines is the Otay Mesa project, which began operation in October 2009. California Energy Commission (CEC) data for five recent years show that the average Otay Mesa heat rate over the 2014–2018 period was 7,183 Btu/kWh.[327] Based on that heat rate, and EIA data on emissions from Otay Mesa for the years 2013–2017,[328] we have calculated emission factors for Otay Mesa of 420 tons of CO_2 per GWh, 3.33 pounds of SO_2 per GWh, and just under 30 pounds of NOx per GWh.[329]

---

[325] In 2018, only 1.4% of solar generation and 0.2% of wind generation were curtailed, and no other renewable generation. The corresponding figures for 2019 are 3.1% for solar and 0.3% for wind. The 2020 figures are 4.9% for solar and 0.5% for wind. Source: David Marcus, personal communication, based on tracking of CAISO data for hourly curtailments and daily wind and solar generation. Exhibit 2C.

[326] The Western Energy Imbalance Market is a real-time, wholesale energy trading market that enables participants anywhere in the West to buy and sell energy when needed. See https://www.westerneim.com/pages/default.aspx.

[327] See Exhibit 2B, Otay Mesa Data Spreadsheet, bottom left.

[328] The 5 years of available data (2013–2017) are from https://www.eia.gov/electricity/data/emissions/. Otay Mesa is plant #55345 in the EIA database.

[329] Exhibit 2B, Otay Mesa Data Spreadsheet, bottom left, Excel cells C33-C35.

D-263 cont.

Assuming 0.145 GWh per year per MW of net charging energy for the Project, as discussed above, and further assuming emission rates for that energy equivalent to those for the Otay Mesa combined cycle project, the net emission increases that would occur to operate the Project are, for each MW of installed capacity:[330]

- 60.93 tons of CO2e per year
- 0.48 pounds of SO2 per year
- 4.30 pounds of NOx per year

The proposed Project as submitted to the CPUC included provisions for three new distribution circuits with a total load-serving capacity of approximately 28 MW. While the DEIR admits that there will be no need for these circuits through at least 2029, based on the current Paso Robles DPA load forecast,[331] it also says that PG&E anticipates needing new distribution capacity within 15 years. Assuming that there would eventually be 28 MW of new storage built in lieu of the proposed new distribution circuits from the Estrella substation, and assuming that storage would operate comparably to existing storage during the great majority of hours when it was not being dispatched to meet local reliability needs, the total incremental GHG emissions attributable to the Project would be 28 times the annual emissions of 60.93 tons of CO_2e per MW calculated above, or **1,552 MT CO_2e/yr**.[332]

D-264

Similarly, the NOx emissions attributable to the Project would be 28 times the annual emissions of 4.30 lb/yr calculated above, or **120.4 lb/yr**. The NOx emissions are not significant, based on charging energy from a new natural gas plant. However, if other sources of charging energy, such as an older natural gas plant or a coal plant provided the charging energy, NOx emissions also would be significant.

D-265

6.3. GHG Emissions from BESS Charging Are Significant

The DEIR estimated total annualized GHG emissions of 187 MT CO_2e/yr[333] compared to a significance threshold of 10,000 MT/yr[334] and concluded Project GHG

---

[330] Exhibit 2B, Otay Mesa Data Spreadsheet, bottom left, Excel cells C40-C42. Note that these emissions are based on net emissions of 0.145 GWh per year per MW, which is the net of the increased generation to provide charging energy and the reduced generation that would be displaced by battery generation. See Exhibit 2A. Storage Data Spreadsheet, lines 83 and 86.

[331] DEIR, p. 2-12, Table 2-5.

[332] Total GHG emissions from operating the BESSs = (60.93 ton/yr/MW)*28 MW*(0.91 MT/ton) **= 1,552 MT CO_2e/yr.**

[333] DEIR, Table 4.8-1, pdf 607.

[334] DEIR, p. 607.

D-265 cont.

emissions are not significant.[335] However, this threshold is for "stationary-source projects" that "would require an APCD permit to operate."[336] This project will not require an APCD permit to operate. Thus, this threshold does not apply. The GHG threshold for "land use development projects" is 1,150 MTCO_2e/yr.[337] Similarly, the BAAQMD's CEQA guidelines establish a GHG significance threshold for projects other than stationary sources that do not require a district permit of 1,100 MT MTCO_2e/yr.[338] The Sacramento Metropolitan Air Quality Management District (SMAQMD) likewise has established a threshold of 1,100 MT CO_2e/yr threshold for "land development and construction projects (all projects)."[339] These GHG significance thresholds are more appropriate for this Project than the 10,000 ton/yr thresholds for stationary sources used in the DEIR.

D-266

The total GHG emissions, based on the DEIR's estimate of other sources of GHG in Table 4.8-1 (187 MT CO_2e/yr) is 1,739 MT CO_2e/yr.[340] Actual GHG emissions could be significantly higher as this estimate is based on a new natural gas plant that has much lower emissions than many other sources on the grid that could charge the batteries. Thus, Project GHG emissions are significant (1,739 MT CO_2e/yr > 1,100 MT CO_2e/yr). This is a new significant impact not disclosed in the DEIR. The DEIR must be modified to include GHG mitigation and recirculated for public review.

D-267

This significant impact can be mitigated by requiring that the Project's batteries be charged only with renewable sources, including solar and wind. If it is anticipated that adequate solar and wind are not available from the grid, the Project should be required to install solar and/or wind facilities as part of this Project, sufficient to assure adequate charging energy.

D-268

6.4. Mitigation for Operational Emissions

The Project should be modified to require no net increase in GHG emissions over the baseline by implementing projects to reduce GHG emissions as follows:

---

[335] DEIR, Table 4.8-1 and p. 4.8-7, pdf 607.

[336] SLOCAPCD CEQA Guidelines, p. 3-6.

[337] Ibid.

[338] BAAQMD, California Environmental Quality Act Air Quality Guidelines, Table 2-1, pdf 20; https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en.

[339] SMAQMD, Thresholds of Significance Table; https://files.ceqanet.opr.ca.gov/123569-2/attachment/UL9obk_yjl5aUBxUrjyQ9P3HVyfSLoCEnhvRpgSHGIQmRUgvfjw0ZXCcdqPM73lOOUtFc8Rl7yI_48800.

[340] Total GHG emissions = 187 + 1,552 **= 1,739 CO_2e/yr.**

82

D-268

(1) Project design features/on-site reduction measures;
(2) GHG offsets off-site within San Luis Obispo County;
(3) GHG offsets off-site within the State of California;
(4) GHG offsets off-site within the United States;
(5) GHG offsets off-site internationally;
(6) Charging restrictions that constrain battery charging to hours when CAISO renewable resources would otherwise be curtailed, but the curtailment would be demonstrably avoided by using otherwise curtailed generation as battery-charging energy, or if such demonstrations are not feasible; and
(7) Charging restrictions that constrain battery charging to hours when solar generation is potentially being curtailed, which would at a minimum mean no charging during nighttime hours.

D-269

7. THE DEIR FAILS TO MITIGATE THE IMPACTS OF THE TRANSMISSION LINE

The Project includes a new 230 kilovolt (kV)/70 kV substation, a new 70 kV power line, variously reported as 7 to 16.5 miles in length[341] and replacement/ reconductoring of about 3 miles of an existing 70 kV power line.[342] The purpose of the Project is to mitigate thermal overloads and voltage concerns in the Los Padres 70 kV system. The DEIR states that the Project is needed to provide transmission system redundancy and power support in the event of outages, as well as increased distribution capacity to accommodate forecasted electrical load growth in the Paso Robles area.[343] These new facilities, especially the transmission line, will result in several significant impacts, including increased fire risk, public health impacts, aesthetic impacts, and biological impacts that are either not disclosed and/or not adequately mitigated in the DEIR.

D-270

The most common scoping comments were on aesthetic impacts, electromagnetic field hazards, fire hazards, noise impacts, and decreased property values due to the overhead transmission line.[344] In fact, the screening report admits that "[o]ne of the

[341] DEIR, Table 5-3, pdf 921.

[342] DEIR, p. ES-1, pdf 25.

[343] DEIR, p. ES-1, pdf 25.

[344] DEIR, Appendix A, Table 2-2, p. 2-4, pdf 30.

D-270 cont.

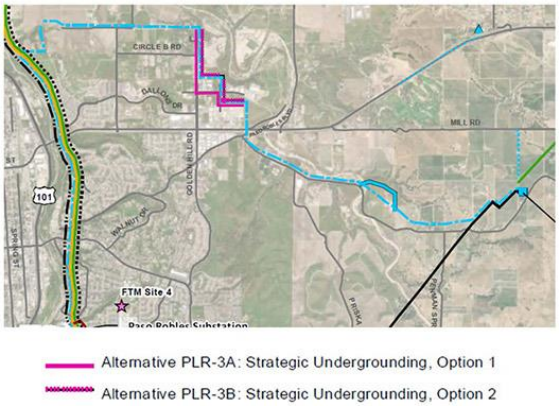
most common generalized comments received was that the proposed overhead power lines should be placed underground."[345]

In spite of these comments, the DEIR failed to adopt undergrounding of any portion of the transmission line. While the DEIR developed two undergrounding alternatives, the DEIR failed to evaluate or adopt them, thus failing as an informational document under CEQA.

D-271

The DEIR included two alternatives to the aboveground transmission line, Alternative PLR-3A and PLR-3B to underground small portions of it, as shown in Figure 16. However, the DEIR failed to adopt either or explain why they were not adopted as they reduce otherwise highly significant aesthetic, public health, and biological impacts in the area as well as the risk of fire.

Figure 16: Segments of Transmission Line (in blue) Proposed for Undergrounding (in pink)



The alternative screening analysis in Appendix A to DEIR indicates that both alternatives PLR-3A and PLR-3B meet all project objectives, are feasible, and reduce significant environmental impacts:[346]

Alternative PLR-3: Strategic Undergrounding (*Variations: Alternative PLR-3A and PLR-3B*)	Meets both objectives.	Potentially feasible. Could increase some environmental effects associated with trenching for installation of underground line, but these are unlikely to be significant.	Would reduce aesthetic impacts and could reduce potential impacts to special-status birds.

However, the alternative analysis in the DEIR, Table 5-1, concluded that Alternative Combination #2 "is considered the most advantageous option and is

[345] DEIR, Appendix A, p. 2-5, pdf 31.

[346] DEIR, Appendix A, Table 3-1, p. 3-2, pdf 38 and pp. 3-28/29.

84

D-271 cont.

identified as the Environmentally Superior Alternative for this DEIR."[347] This alternative (the Estrella Route) includes Alternative PLR-1A, Alternative BS-2, and Alternative BS-3.[348] It does not include any undergrounding, thus leaving unmitigated significant aesthetic, biology, and public health impacts from above-ground transmission line electromagnetic fields. While this alternative reduces significant aesthetic and biology impacts, it does not eliminate them. Further, it does not mitigate the significant EMF health impacts along the length of the transmission line.

D-272

The DEIR further failed to disclose many of the impacts of the aboveground transmission line and failed to adequately mitigate the impacts that it did disclose, fire, aesthetic, and biological impacts. As discussed in Comment 7.2, the entire transmission line should be undergrounded.

7.1. Impacts of the Transmission Line

D-273

There are numerous hazards associated with the proposed aboveground transmission line. The DEIR recognized some of them: aesthetic, biological, and fire impacts. These were superficially analyzed and not adequately mitigated. Further, there are other impacts that were not disclosed, including worker accidents,[349] health impacts from electromagnetic radiation, and power outages from high winds, which are common in areas such as the Project and that affect critical services such as hospitals. Thus, the DEIR fails as an informational document under CEQA.

7.1.1. Fire Risks of the Transmission Line

D-274

The DEIR admits that the "[o]peration of an electrified substation and new overhead 70 kV power lines in the Paso Robles area would inherently exacerbate the potential for wildfire risk above baseline conditions…"[350] Further, a significant portion of the transmission line is adjacent to a high fire hazard zone.[351] Wildfires are common

[347] DEIR, Section 5.3.2, pdf 917- 918.

[348] DEIR, Table 5-2, pdf 918.

[349] Exhibit 14.

[350] DEIR, pdf 893.

[351] DEIR, Figure 4.9-2; PEA, pdf 435, Figure 3.8-1.

85

D-174 cont.

in San Luis Obispo County.[352] In 2020 alone, 16 major fires burned 14,008 acres of land.[353]

Portions of the power line route and reconductoring segment will traverse areas of oak woodlands, grassland, and other flammable habitat types.[354] The DEIR further admits that "[o]peration of an electrified substation and new overhead 70 kV power lines in the Paso Robles area would inherently exacerbate the potential for wildfire risk above baseline conditions."[355] Recently, the U.S. Forest Service completely closed several California national forests due to extreme heat and threat of wildfires, including Los Padres National Forest,[356] close to the Project.

D-275

However, despite these conditions, the DEIR asserts that the maintenance of acceptable clearances between the power lines and nearby vegetation would minimize the risk of energized lines igniting wildfires and concludes the impact is less than significant.[357] This is inconsistent with fire history and presents a significant risk of fire in the area serviced by the Project.

D-276

The DEIR fails to disclose that recent history shows wildfires triggered by electrical infrastructure have the potential to cause horrible catastrophes and are frequently caused by transmission lines, such as the proposed transmission line.[358] Further, the DEIR fails to disclose that Pacific Gas and Electric (PG&E), one of the applicants of this Project, has experienced significantly more fire incidents than other large utilities in California.[359]

---

[352] CAL FIRE/San Luis Obispo County Fire, July 2013; https://www.slocounty.ca.gov/Departments/Public-Works/Forms-Documents/Projects/SLO-Watershed-Project/Resources/CAL-FIRE-Unit-Strategic-Fire-Plan.pdf.

[353] Cal Fire, 2020 Incident Archive. The fires were: Wale (312 acres), Placer (53 acres), 3-2 (20 acres), Carriza (183 acres), Pass (280 acres) 166 Fire; Pond (1,962 acres), Branch (3,022), Lake (588 acres), Soda (157 acres), Gage (33 acres), Bend (263 acres), Riata (18 acres), Avila (445 acres), Soda (1,672 acres), Range (5,000 acres). https://www.fire.ca.gov/incidents/2020/.

[354] DEIR, p. 4.20-10, pdf 892.

[355] DEIR, p. 4.20-11, pdf 893.

[356] Lindsey Holden, "Unprecedented and Dangerous" Fire Conditions Close Los Padres National Forest in SLO County, September 7, 2020; https://www.sanluisobispo.com/news/local/article245548775.html.

[357] Ibid.

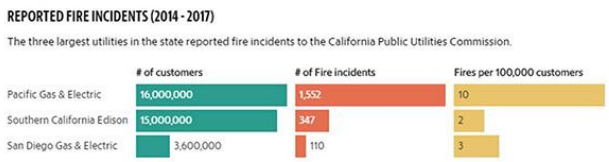
[358] See, e.g., William Atkinson, The Link Between Power Lines and Wildfires, *Electrical Contractor*, November 2018; https://www.ecmag.com/section/systems/link-between-power-lines-and-wildfires.

[359] Michael Finch II, CA Utilities Cause Hundreds of Fires Every Year: Here's Where They Were and How Many, *The Sacramento Bee*, January 15, 2019; https://www.sacbee.com/news/state/california/fires/article221924560.html.

D-277

Most power outages are triggered by fires. Strong winds can topple trees or blow branches onto power lines, pulling them down and causing them to arc, sending sparks into dry vegetation. A voltage surge in a line can cause it to arc to a nearby tree, causing a fire. PG&E, for example, reported 1,554 fires caused by its equipment between June 10, 2014, and December 29, 2017, mostly from overhead conductors. Southern California Edison reported 347 fires in that same time. Electrical line malfunctions sparked most of the PG&E fires.[360] Figure 17.

Figure 17: Reported Fire Incidents Triggered by Electrical Line Malfunctions, 2014–2017



The PG&E Fire Incident Data Collection Plan indicates that between June 2014 and December 2017, 1,552 fires were caused by PG&E's electrical infrastructure, affecting 16 million customers.[361] PG&E reported in 2021 that over the last four years, "approximately 35 percent of reportable ignitions in PG&E's HFTD areas have been caused by vegetation contact with electrical equipment and another 33 percent were caused by utility equipment failures; the remaining ignitions were caused by third-party actions, animals, and other causes."[362] The wildfires caused by PG&E's infrastructure have the potential to cause horrible catastrophes and are frequently caused by transmission lines, such as the transmission line proposed for the Project.[363] PG&E will operate the transmission line and other Project components.[364]

A report by the California Department of Forestry and Fire Protection (CalFire), for example, concluded that numerous PG&E-caused fires started when trees and branches came into contact with power lines. One such fire, the Redwood Fire, burned

[360] Taryn Luna, California Utility Equipment Sparked More Than 2,000 Fires in Over Three Years, *Los Angeles Times*, January 28, 2019; https://www.latimes.com/politics/la-pol-ca-california-utilities-wildfires-regulators-20190128-story.html.

[361] Finch, January 15, 2019.

[362] PG&E, 2021 Wildfire Mitigation Plan Report, Rulemaking 18-10-007, February 5, 2021, p. 11, pdf 34; https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan/2021-Wildfire-Safety-Plan.pdf.

[363] See, e.g., William Atkinson, The Link Between Power Lines and Wildfires, *Electrical Contractor*, November 2018; https://www.ecmag.com/section/systems/link-between-power-lines-and-wildfires.

[364] DEIR, Section 2.3, pdf 98.

87

D-277 cont.

over 36,000 acres, destroyed 543 structures, and resulted in 9 civilian deaths. Another, the Atlas Fire, burned 52,000 acres, destroyed 781 structures, and resulted in 6 civilian deaths.[365] During the summer of 2018, the Department reported at least 17 more major wildfires that were triggered by power lines. One of these, the Thomas Fire, burned 281,893 acres, destroyed 1,063 buildings[366] and caused a mudslide that killed 22 people.

Five of the 10 most destructive fires in California since 2015 have been linked to PG&E's electrical network.[367] One of the biggest fires started near Sacramento in 2015, when a tree that PG&E failed to maintain hit one of its power lines. The fire covered more than 70,000 acres and two people died. In 2017, four fires erupted in the Napa area when trees hit PG&E power lines in several locations. In total, more than 100,000 acres and 1,475 structures burned.[368] A PG&E transmission line has recently been implicated in the Camp Fire as the "deadliest and most destructive fire in California history." This fire killed 85 people, destroyed 18,804 structures and burned 153,336 acres.[369] CalFire has determined that the Camp Fire was caused by electrical transmission lines owned and operated by PG&E, located in the Pulga area.[370] In response to this tragedy, PG&E has announced that it will rebuild the transmission lines underground.[371]

Many other fires have been caused by PG&E transmission lines and other facilities. The Pythian/Oakmont Fire destroyed 56,556 acres of mixed wildland and 1,272 structures were damaged. "The fire ignited after PG&E re-energized downed powerlines causing the lines to arc in a receptive fuel bed."[372] The Atlas fire burned 51,624 acres, damaged 783 structures, destroyed 120 structures, and caused 6 fatalities.

---

[365] CalFire, Top 20 Deadliest California Wildfires; http://calfire.ca.gov/communications/downloads/fact_sheets/Top20_Deadliest.pdf.

[366] CalFire, Top 20 Deadliest California Wildfires.

[367] CalFire, Top 20 Deadliest California Wildfires.

[368] https://www.nytimes.com/interactive/2019/03/18/business/pge-california-wildfires.html?te=1&nl=california-today&emc=edit_ca_20190516.

[369] CalFire, Top 20 Deadliest California Wildfires.

[370] CalFire News Release, CAL FIRE Investigators Determine Cause of the Camp Fire, May 15, 2019; http://calfire.ca.gov/communications/downloads/newsreleases/2019/CampFire_Cause.pdf. See also: Butte County District Attorney, Press Release, CAL Fire Press Release on Camp Fire, May 15, 2019. Exhibit 12.

[371] Dale Kasler, PG&E Says It Will Build Paradise Power Lines Underground, *The Sacramento Bee*, May 22, 2019; https://amp.sacbee.com/latest-news/article230732884.html.

[372] Cal Fire, Investigation Report, Pythian/Oakmont, October 13, 2017; http://s1.q4cdn.com/880135780/files/doc_downloads/2019/06/17CALNU010348-Pythian-Oakmont_Redacted_Redacted.pdf.

88

D-277 cont.

It was caused when trees fell, breaking conductors.[373] Other fires caused by PG&E transmission lines are documented in CAL Fire Reports.[374]

D-278

PG&E, the largest investor-owned utility in the state, supplying power for 40% of Californians, filed for bankruptcy protection due to these fires.[375] As PG&E is currently burdened with responding to this fire history and will likely be responsible for maintaining the new transmission line and other Project facilities, enforceable mitigation for the Project is required to assure proper maintenance of an aboveground transmission line. A bankrupt utility, such as PG&E, already burdened with correcting historic maintenance failures may be unable to adequately carry out its obligations to mitigate its historic misconduct and adequately maintain the proposed aboveground transmission line and other Project facilities.

In response to this history of fire, the California Legislature passed SB 901 in 2018 to hold utilities responsible for wildfires. SB901 requires utilities to consider several safety measures, including moving power lines underground, insulating wires, and replacing poles. The CPUC recently concluded that the 2019 Wildfire Mitigation Plan filed by Pacific Gas and Electric Company and other utilities contain the elements required under Senate Bill 901.[376] To ensure that the Wildfire Mitigation Plans actually reduce the risk and occurrence of catastrophic wildfires, the CPUC directed electrical corporations to track data and assess outcomes so that future plans reflect experience. However, in spite of these measures, the fires continue.

PG&E's Wildfire Mitigation Plans for 2020,[377] 2021,[378] and future Plans have been developed to comply with California SB 901, AB 1054, and direction from the CPUC outline programs to prevent catastrophic wildfires. The 2020 and 2021 Plans, which

---

[373] Cal Fire, Investigation Report, Atlas, October 8, 2017; http://s1.q4cdn.com/880135780/files/doc_downloads/2019/05/Atlas-Fire-LE-80_Redacted.pdf

[374] PG&E Corporation, CAL FIRE Reports, http://investor.pgecorp.com/wildfire-updates/CAL-FIRE-Reports/.

[375] Wildfires and Climate Change: California's Energy Future: A Report from Governor Newsom's Strike Force, April 12, 2019, p. 1, 45-46; https://www.gov.ca.gov/wp-content/uploads/2019/04/Wildfires-and-Climate-Change-California%E2%80%99s-Energy-Future.pdf.

[376] California Public Utilities Commission, CPUC Acts Quickly to Implement Key Wildfire Mitigation Measures, Press Release, https://electricenergyonline.com/article/energy/category/general/90/771184/cpuc-acts-quickly-to-implement-key-wildfire-mitigation-measures.html.

[377] PG&E, 2020 Wildfire Mitigation Plan Report Updated, Rulemaking 18-10-007, February 28, 2020; https://www.pge.com/pge_global/common/pdfs/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan/2020-Wildfire-Safety-Plan.pdf.

[378] PG&E, 2021 Wildfire Mitigation Plan Report, Rulemaking 18-10-007, February 5, 2021; https://www.pge.com/en_US/safety/emergency-preparedness/natural-disaster/wildfires/wildfire-mitigation-plan.page?WT.mc_id=Vanity_wildfiremitigationplan.

D-278 cont.

may reduce the number of wildfires triggered by PG&E facilities, will not eliminate them.[379] The most current Plan should be required as mitigation for this Project and updated as new Plans are published reflecting experience controlling wildfires caused by PG&E's facilities. Undergrounding is one of the mitigations included in these plans.[380]

7.1.2. Worker Impacts

D-279

The DEIR fails to recognize worker health impacts of the transmission line. Working with aboveground electrical power lines can be dangerous or even fatal. Aboveground transmission lines are prone to outages, physical deterioration, lack of critical maintenance, and dangers from storms and trees, which result in electrocution and mortality to transmission line workers and others:[381]

> The National Institute for Occupational Safety and Health's (NIOSH) National Traumatic Occupational Fatalities (NTOF) surveillance system identified power line workers as a high-risk occupation group for work-related deaths. According to NTOF data, the average annual fatality rate for power line workers is 56.3 deaths per 100,000 employees.(2) The Bureau of Labor Statistics' (BLS) Census of Fatal Occupational Injuries (CFOI) identified 42 fatalities among electric power installers and repairers in 1993 (38 deaths per 100,000 workers). (3) These rates correspond to a risk of between 17 and 23 deaths per thousand workers over a working lifetime of 45 years. The risk may actually be higher, however, because available data do not provide specific numbers for construction workers.

D-280

Electrical powerline installers and repairers are among the top 10 most dangerous jobs in America,[382,383] with a 19.2 fatality rate per 100,000 workers.[384] The leading cause of death among power line tree trimmers, for example, is electrocution.[385] NIOSH reports 160 electrocution cases involving workers in the vicinity of or working on transmission lines.[386] The U.S. Bureau of Labor Statistics reports: "Line installers and

---

[379] Ibid., Table 31-2.

[380] PG&E, 2021, pdf 130.

[381] NIOSH, Fatality Assessment and Control Evaluation (FACE) Program; https://wwwn.cdc.gov/NIOSH-FACE/Default.cshtml?Category=0006&Category2=ALL&Submit=Submit.

[382] David Shadle, Electrical Workers Still on Top 10 Most Dangerous Jobs List, T&D World eNewsletters, April 11, 2016; https://www.tdworld.com/grid-innovations/article/20966311/electrical-workers-still-on-top-10-most-dangerous-jobs-list.

[383] Bailey, Javins, and Carter, LC, What is the Death Rate for Power Linemen?, Bailey Javins & Carter, July 22, 2019; https://www.baileyjavinscarter.com/what-is-the-death-rate-for-power-linemen/.

[384] Krysti Shallenberger, Electric Line Workers Listed Among Top 10 Most Dangerous Jobs.

[385] Jeffrey Feldman, Why Aren't Power Lines Buried in the U.S. Like They are in Europe?, August 25, 2016; https://www.electrocuted.com/2016/08/25/bury-power-lines-underground-to-prevent-electrocution-deaths/.

[386] NIOSH, Fatality Assessment and Control Evaluation (FACE) Program; https://www.cdc.gov/niosh/face/default.html.

D-280 cont.

repairers face dangerous working conditions. In severe cases, these conditions could lead to fatal injuries."[387] Table 6.

Table 6: Number of Fatal Work Injuries and Nonfatal Occupational Injuries and Illnesses Involving Days Away from Work, 2011–2015[388]

Occupation	Fatal injuries					Nonfatal injuries and illnesses				
	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
Line installers and repairers	38	37	42	44	40	5,540	5,000	6,640	6,260	6,250
Electrical power-line installers and repairers	26	27	27	25	26	2,500	2,090	2,310	2,510	2,240

Electrocutions accounted for 3% of fatal occupational injuries overall but caused nearly one-half of the fatal injuries to electrical power-line installers and repairers. The Bureau of Labor Statistics concluded that "[t]he increasing use of underground utility lines and the waning popularity of landlines may ultimately reduce the number of falls."[389] The DEIR fails to disclose the impact of repairing the aboveground transmission line on worker health.

D-281

7.1.3. Electric and Magnetic Field Impacts

Overhead transmission lines are a source of two fields: the electric field produced by the voltage and the magnetic field produced by the current. CPUC guidance specifically requires that "[t]he construction of a new transmission line will incorporate no-cost and low-cost magnetic field reduction measures. Magnetic field modeling is required."[390] The DEIR failed to discuss these fields and their impacts on sensitive receptors even though the proposed transmission line is within 50 feet of many homes.[391] It also fails to comply with the CPUC design guidelines.

D-282

Contrary to allegations in the PEA,[392] significant public health impacts have been consistently documented from exposure to electromagnetic fields, both extremely low-

[387] BLS, Monthly Labor Review, Workplace Hazards Facing Line Installers and Repairers, February 2018; https://www.bls.gov/opub/mlr/2018/article/pdf/workplace-hazards-facing-line-installers-and-repairers.pdf.

[388] Id., Table 1.

[389] Id., p. 11.

[390] California Public Utility Commission, EMF Design Guidelines for Electrical Facilities, Table 3-1, pdf 9, July 21, 2006; https://www.cpuc.ca.gov/General.aspx?id=4879.

[391] PEA, Appendix A.

[392] PEA, Appendix B. Electric and Magnetic Fields, pdf 23.

91

D-282 cont.

frequency ELF-EMF from sources like power lines and radiofrequency radiation (RFR) in refereed journal articles. These include short- and long-term health impacts:[393,394]

Short Term Health Impacts:

- Headaches
- Fatigue
- Anxiety
- Insomnia
- Prickling and/or burning skin
- Rashes
- Muscle Pain

Long Term Health Impacts:

- Impacts on gene and protein expression
- Genotoxic effects, including RFR[395] and ELF DNA damage
- Adverse impacts on stress proteins
- Adverse impacts on immune function
- Adverse impacts on neurology and behavior
- Brain tumors and acoustic neuromas
- Childhood cancers (leukemia)
- Adult cancers (breast cancer promotion)
- Adverse impacts on melatonin leading to Alzheimer's disease and breast cancer
- Changes in nervous system and brain function
- Impacts on DNA
- Impacts on stress proteins
- Impacts on the immune system
- Risk of leukemia
- Risk of neurodegenerative disease
- Risk of miscarriage

These significant public health impacts can be mitigated by undergrounding the transmission line and by adopting the recommendations in CPUC Design Guidelines.[396]

---

[393] Cindy Sage and David O. Carpenter (Editors), BioInitiative Report: A Rationale for Biologically Based Exposure Standards for Low-Intensity Electromagnetic Radiation, BioInitiative Working Group, December 31, 2012, Exhibit13.

[394] Jiguparmar, How HV Transmission Lines Affects Humans and Plants; https://electrical-engineering-portal.com/how-hv-transmission-lines-affects-humans-plants.

[395] RFR = radiofrequency radiation; ELF = (extremely low frequency).

92

D-282 cont.

At a minimum, Alternative PLR-3, strategic undergrounding, should be adopted, as this segment of the transmission line passes through the Golden Hill Road area north of SR 46, which has the greatest potential for public health, aesthetic, biological, and other environmental impacts. Figure 16.

Undergrounding will not eliminate electric and magnetic fields, but will minimize their impacts.[397] The California PUC, for example, has concluded that "Because underground conductors are insulated, they may be placed within inches of each other. This means that there generally can be greater magnetic field cancellation in an underground circuit than an overhead circuit."[398]

D-283

7.2. The Transmission Line Should Be Undergrounded

The adverse impacts of the transmission line can be completely eliminated (fire, aesthetic, biology) or minimized (public health) by undergrounding it. PG&E, for example, recently announced that it will underground 200 miles of the power lines that caused the Camp Fire.[399] Undergrounding is in progress.[400] PG&E is also currently undergrounding power lines through the CPUC's Rule 20A[401] program.[402] Further, there are many other benefits to undergrounding the transmission line.[403,404,405]

---

[396] California Public Utility Commission, EMF Design Guidelines for Electrical Facilities, July 21, 2006; https://www.cpuc.ca.gov/General.aspx?id=4879.

[397] See discussion of the impact of undergrounding transmission lines on electric and magnetic fields in: Undergrounding High Voltage Electricity Transmission Lines, Section 9: Electric and Magnetic Fields (EMFs) from Underground Cables, p. 18; https://www.nationalgrid.com/sites/default/files/documents/45349-Undergrounding_high_voltage_electricity_transmission_lines_The_technical_issues_INT.pdf.

[398] California Public Utility Commission, EMF Design Guidelines for Electrical Facilities, July 21, 2006, p. 5, pdf 7, Section 2.2

[399] Dale Kasler, PG&E Say It Will Build Paradise Power Lines Underground, *The Sacramento Bee*, May 22, 2019; https://amp.sacbee.com/latest-news/article230732884.html#referrer=https%3A%2F%2Fwww.google.com&amp_tf=From%20%251%24s.

[400] Kristian Lopez, PG&E Continues Moving Power Lines Underground in Paradise, *Action News Now*, November 5, 2020; https://www.actionnewsnow.com/content/news/PGE-continues-moving-powerlines-underground-in-Paradise-572976261.html.

[401] CPUC Underground Programs: Conversion of Overhead Electric Lines to Underground Facilities and Construction of New Underground Electric Lines; https://www.cpuc.ca.gov/General.aspx?id=4403.

[402] Deanna Contreras, PG&E Undergrounding Power Lines in Santa Rosa, PG&E Currents, July 27, 2020; http://www.pgecurrents.com/2020/07/27/pge-undergrounding-power-lines-in-santa-rosa/.

[403] Vince Curci, Underground Transmission Technical Lead, Blog, Top 5 Reasons to Use Underground Transmission Lines, February 19, 2018; https://www.hdrinc.com/insights/top-5-reasons-use-underground-transmission-lines.

[404] RETA, Burying High Voltage Lines; https://retasite.wordpress.com/burying-high-voltage-lines/.

D-283 cont.

As noted in a recent article, "Why aren't power lines in the U.S. buried underground like they are in some places in Europe?":[406]

> When utility power lines are above ground, they're prone to outages, physical deterioration and lack of critical maintenance, and dangers from storms and trees. These are what kill most people in electrocution lawsuits. These are the reasons that most power lines fall and kill an unsuspecting homeowner, child or utility worker.
>
> Although we regularly see outages and dangerous power lines that can kill innocent people here in America, we don't see anyone being electrocuted and killed in European countries such as Germany. Why? In Germany, the risk of outages or power-line dangers is greatly reduced, because the power lines are underground, according to an article on Outside the Beltway, "Why can't we just bury all the power lines?"

Most European countries[407] (e.g., UK, Belgium, Germany, Italy, Netherlands,[408] Finland[409]) routinely bury low-voltage transmission lines, such as the Project's 70-kV line, except for those near massive power plants and isolated homes in far-off places. Even in the United States, aboveground power lines are often absent in affluent neighborhoods and major cities, such as Manhattan, Washington DC, San Diego, and Tarzana, a suburb south of Los Angeles. PG&E's most recent Wildfire Mitigation Plan Report notes as follows:[410]

---

[405] Leonardo Energy, What are the Main Benefits of Underground Cables, March 28, 2019; https://help.leonardo-energy.org/hc/en-us/articles/202706932-What-are-the-main-benefits-of-underground-cables-.

[406] Jeffrey Feldman, Why Aren't Power Lines Buried in the U.S. Like They Are in Europe?, August 25, 2016; https://www.electrocuted.com/2016/08/25/bury-power-lines-underground-to-prevent-electrocution-deaths/.

[407] Commission of the European Communities, Undergrounding of Electricity Lines in Europe, Background Paper, Tables 1-3, December 10, 2003; https://www.stjornarradid.is/library/01--Frettatengt--myndir-og-skrar/ANR/ANR---Raflinur-i-jord/1-Commission.pdf.

[408] Robert Tarimo, Going Underground: European Transmission Practices, PowerGrid International, October 1, 2011; https://www.power-grid.com/td/going-underground-european-transmission-practices/#gref.

[409] Replacing Overhead Lines with Underground Cables in Finland; https://climate-adapt.eea.europa.eu/metadata/case-studies/replacing-overhead-lines-with-underground-cables-in-finland.

[410] PG&E, 2021, pdf 568, Section 7.3.3.16 Undergrounding of Electric Lines and/or Equipment.

D-283 cont.

> Undergrounding electric lines and facilities can significantly reduce wildfire risk by eliminating overhead lines which may be prone to wires down events or otherwise prone to potential wildfire ignitions. The installation of underground facilities is considered among a suite of alternatives to mitigate wildfire risk in areas prone to tree failures. PG&E also considers secondary risks such as PSPS impacts, egress/ingress routes to support fire department response times and public safety, past fire history and effects on available fuels, current system condition, environmental risks to reconstruction activities, and general accessibility considerations to enhance employee safety when determining whether specific facilities should be undergrounded.

PG&E has concluded that: "underground construction presents the most reliable method for mitigating the need for PSPS [public safety power shutoff] operations. There will be occasions that undergrounding is chosen even when it does not present the best Risk Spend Efficiency (RSE) of the hardening options because it is the most reasonable alternative to mitigate all risks considered."[411] A 1967 PUC case concluded as to undergrounding:[412]

> The record shows that California electric and communications utilities began installing their facilities underground during the latter part of the 19th century. Undergrounding proceeded at a leisurely pace until about five years ago. Since then, due to a combination of accelerated public interest and technical developments which substantially reduced the cost of undergrounding, a large percentage of new residential developments have been supplied from underground distribution systems. The record indicates that respondent utilities have followed acceptable standards of care based upon past experience and are continuing to improve methods of construction, including joint construction with other utilities, to better serve the public and reduce costs. The evidence further discloses that the present underground electrical and communications systems cannot be considered hazardous and the safety record is good.

D-284

The usual argument for declining to bury power lines is cost. However, when assessing the cost of burying power lines, cost must be weighed against the clear benefits. There will be far fewer electrical injuries and electrocution deaths, fewer bird deaths, fewer power outages, and fewer obstructed views from below-grade transmission lines. A price cannot be put on worker injuries and death, bird deaths,

[411] PG&E, 2021, pdf 574.

[412] CPUC, Rules for Construction of Underground Electric Supply and Communication Systems, General Order Number 128, Rules for Construction of Underground Electric Supply and Communication Systems, Decision No. 73195 and 73462, Case No. 8208, Adopted October 17, 1967; https://docs.cpuc.ca.gov/PUBLISHED/GENERAL_ORDER/52591.htm.

95

D-284 cont. and obstructed views. There are many compelling reasons to underground the transmission line.

D-285 First, visual impacts typically top the list of long-term impacts that cannot be mitigated.[413] The DEIR evaluated 23 key visual observation points (KOPs) and concluded that the observation points where the transmission line was visible had moderate to high visual impacts.[414] The DEIR proposed an alternative to undergrounding the portion of the transmission line where visual impacts were most significant, PLR-3, but declined to adopt it.[415]

PUC Section 320, established in 1972, requires both electric and telecommunications utilities to construct all new distribution facilities underground that are proposed to be erected within 1,000 feet from each edge of the right-of-way of designated State Scenic Highways pursuant to Article 2.5 of Chapter 2 of Division 1 of the Streets and Highways Code and which would be visible from such scenic highways if erected above ground.[416,417] Segments of the proposed transmission line are within 1,000 feet of SR 46, which meets these criteria. However, this highway section has not been formally listed, so the DEIR ignored this requirement and erroneously concluded aesthetic impacts in this area were not significant.[418]

D-286 Second, undergrounding eliminates electrocution and collision hazards for people, rodents, squirrels, and birds, and eliminates fire risk from arcing lines during windy conditions.[419] High winds, locally known as Santa Lucia winds, are common at the Project site.

D-287 Third, underground transmission lines are more reliable as they are not impacted by atmospheric conditions (e.g., high winds, ice storms, and lightning) that may result

---

[413] Curci, February 19, 2018: "While aesthetic impact isn't the only transmission line concern, it tops the list of long-term impacts that can't be mitigated."

[414] DEIR, Table 4.1-1, pdf 367-374. (KOP-1 to KOP-6, KOP-10, KOP-16 to KOP-19).

[415] DEIR, Chapter 5.

[416] PUC Code, Division 1, Chapter 2, Section 320; https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=320.&lawCode=PUC.

[417] CPUC, Electric Tariff Rules 15 and 16 – Electric Distribution Line Extensions and Service Line Extensions; https://www.cpuc.ca.gov/General.aspx?id=6442465113. See also Section IX; https://www.cpuc.ca.gov/General.aspx?id=4403.

[418] DEIR, Figure 4.1-1, pdf 349 and pdf 384.

[419] See, e.g., Vince Curci, Top 5 Reasons to Use Underground Transmission Lines, February 19, 2018; https://www.hdrinc.com/insights/top-5-reasons-use-underground-transmission-lines; and Peter H. Larsen, A Method to Estimate the Costs and Benefits of Undergrounding Electricity Transmission and Distribution Lines, *Energy Economics*, vol. 60, November 2016, p. 47–61, https://www.sciencedirect.com/science/article/pii/S0140988316302493.

D-287 cont. in outages or cause wildfires. High winds are common in the Project area. Underground lines are also more reliable due to reduced exposure to outages caused by trees during adverse weather and other conditions. The average outage duration on an underground line is typically more than 90% lower than on overhead lines.

D-288 Fourth, underground transmission lines provide better voltage support, have lower transmission losses, and can absorb emergency power loads.

D-289 Fifth, undergrounding reduces operating costs by: (1) reducing tree trimming costs; (2) reducing the number of maintenance repairs; (3) reducing maintenance time, by maintaining the system at ground level, rather than from poles and bucket trucks; (4) reducing maintenance cost because underground lines are not subject to tornadoes and other high wind storms, ice storms, general weather deterioration, birds colliding with lines and knocking out the power, and so forth; (5) reducing costs of transmission loss and feeder energy losses; (6) avoiding power outage costs due to less frequent outages; (7) reducing the thousands of outages of aboveground facilities caused every year by animals (mainly squirrels); (8) avoiding ecosystem-related restoration costs; and (9) reducing transmission loss (electricity to heat) costs by 50% to 67%. Recent experience indicates that transmission lines can be buried for almost the same capital cost as overhead lines.[420] In addition, exposure of overhead lines to weather conditions causes them to corrode and age faster than underground lines.[421]

D-290 Sixth, undergrounding eliminates the risk from human activities, such as vandalism and terrorism, and minimizes the risk from natural disasters, including earthquakes, landslides, and floods, thus improving system reliability.[422]

D-291 Seventh, underground transmission lines are inherently safe because cables are insulated, electrically shielded, and out of the way. Underground lines are not affected by fires and do not cause fires. They also decrease the need to shut down the line during a wildfire.

D-292 Eighth, underground lines do not lower adjacent property values.

[420] RETA, Burying High Voltage Lines: Benefits of Underground Lines; https://retasite.wordpress.com/burying-high-voltage-lines/

[421] Victor Glass, PG&E Case Study: Burying Lines to Prevent Wildfires is Cost Effective, T&D World, April 1, 2020; https://www.tdworld.com/wildfire/article/21127664/pge-case-study-burying-lines-to-prevent-wildfires-is-cost-effective.

[422] Kenneth L. Hall, Out of Sight, Out of Mind 2012: An Updated Study on the Undergrounding of Overhead Power Lines, Prepared for: Edison Electric Institute, January 2013; https://www.eei.org/issuesandpolicy/electricreliability/undergrounding/Documents/UndergroundReport.pdf.

97

D-293 Ninth, undergrounding reduces the area required around the line by about a factor of three, reducing construction impacts, biological impacts, and GHG emissions by reducing permanently disturbed surface vegetation.[423]

D-294 Tenth, undergrounding reduces concerns regarding the use of fire retardants on overhead transmission lines.

D-295 Undergrounding is clearly feasible and cost effective because California currently has 72,000 miles of underground distribution lines as well as a program to encourage undergrounding[424] (e.g., PUC Rule 20[425]). San Diego Gas & Electric reports that 60% of its distribution lines are now underground, including rural lines running through areas that are prone to wildfires, like the Project location.[426] Plans are underway to convert 20 miles of overhead wires to underground in a high fire-risk area around Cuyamaca Rancho State Park and the town of Campo and SDG&E is exploring dozens of other areas for potential future undergrounding for fire safety reasons.[427] PG&E is evaluating undergrounding its line along the Bohemian Highway in Sonoma County, where thousands live among densely wooded hillsides. Utilities now often underground power lines in newer urban developments[428] and elsewhere to avoid permitting delays and environmental impacts. Direct Connect Development Company (DC DevCo) has proposed a 349-mile, 2.1 GH, high-voltage direct current transmission line to bring renewable energy from the wind-rich West (starting in Mason City, Iowa) into wholesale power markets of the Upper Midwest to avoid permitting delays.[429]

---

[423] Siemens, Power Transmission Lines: Forward-looking Solutions for Electricity Transmission; https://new.siemens.com/global/en/products/energy/high-voltage/power-transmission-lines.html.

[424] CPUC, Overhead to Underground Conversion Programs, p. 9; https://www.cpuc.ca.gov/General.aspx?id=4403.

[425] See, e.g., PG&E, Electric Undergrounding Program; https://www.pge.com/mybusiness/customerservice/energystatus/streetconstruction/rule20/index.shtml.

[426] Atkinson, The Link Between Power Lines and Wildfires, November 2018. See also PUC, Rulemaking 17-05-010, February 13, 2020, Figure 1, pdf 16; https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M327/K199/327199859.PDF.

[427] J. Harry Jones, Power Lines and Poles to be Replaced in National Forest, *The San Diego Union-Tribune*, September 28, 2016; https://www.sandiegouniontribune.com/communities/north-county/sd-no-forest-power-20160927-story.html.

[428] Tony Bizjak, Sophia Bollag, and Dale Kasler, Power Lines Keep Sparking Wildfires: Why Don't California Utility Companies Bury Them, November 29, 2018, *The Sacramento Bee*; https://www.sacbee.com/news/business/article221707650.html.

[429] Michelle Froese, Proposed New Transmission Project Would Deliver Renewables Between PJM & MISO, WindPower, March 11, 2019; https://www.windpowerengineering.com/business-news-projects/uncategorized/proposed-new-transmission-project-would-deliver-renewables-between-pjm-miso/; Julia Gheorghiu, Independent Developer Proposes $2.5B Underground Transmission Line, to Bring Iowa Wind to PJM, MISO, *Utility Dive*, March 13, 2019; https://www.utilitydive.com/news/

D-296 In sum, undergrounding the entire transmission line is feasible and should be required. The DEIR lacks any substantial evidence that undergrounding of the transmission line is not feasible. Rather, as discussed above, undergrounding mitigates significant Project impacts including public health, biological, and aesthetic.

D-297 However, undergrounding in the selected location would increase significant public health impacts identified in Comment 2.8. These significant impacts can be mitigated by relocating the transmission line and/or implementing mitigation identified in Comment 2.8. If the transmission line is not relocated, it should be undergrounded to mitigate significant electromagnetic public health, biology, and aesthetic impacts. The significant public health and air quality impacts identified in Comment 2.8.1 to 2.8.3 during construction can be mitigated by using the mitigation measures in Comment 2.8.3 and extending construction duration to minimize the amount of equipment operating in a given area simultaneously.

---

independent-developer-proposes-25b-underground-transmission-line-adding/550399/. See also: https://www.desmoinesregister.com/story/money/business/2019/03/11/underground-transmission-line-would-take-wind-power-iowa-chicago/3128357002/ and https://www.chicagotribune.com/business/ct-biz-iowa-wind-power-to-chicago-20190312-story.html.

99

Phyllis Fox, Ph.D, PE
Environmental Management
745 White Pine Ave.
Rockledge, FL 32955
321-626-6885
phyllisfox@gmail.com

Dr. Fox has over 40 years of experience in the field of environmental engineering, including air pollution control (BACT, BART, MACT, LAER, RACT), greenhouse gas emissions and control, cost effectiveness analyses, water quality and water supply investigations, hydrology, hazardous waste investigations, environmental permitting, nuisance investigations (odor, noise), environmental impact reports, CEQA/NEPA documentation, risk assessments, and litigation support.

EDUCATION

Ph.D. Environmental/Civil Engineering, University of California, Berkeley, 1980.
M.S. Environmental/Civil Engineering, University of California, Berkeley, 1975.
B.S. Physics (with high honors), University of Florida, Gainesville, 1971.

REGISTRATION

Registered Professional Engineer: Arizona (2001-2014: #36701; retired), California (2002-present; CH 6058), Florida (2001-2016; #57886; retired), Georgia (2002-2014; #PE027643; retired), Washington (2002-2014; #38692; retired), Wisconsin (2005-2014; #37595-006; retired)
Board Certified Environmental Engineer, American Academy of Environmental Engineers, Certified in Air Pollution Control (DEE #01-20014), 2002-2014; retired)
Qualified Environmental Professional (QEP), Institute of Professional Environmental Practice (QEP #02-010007, 2001-2015: retired).

PROFESSIONAL HISTORY

Environmental Management, Principal, 1981-present
Lawrence Berkeley National Laboratory, Principal Investigator, 1977-1981
University of California, Berkeley, Program Manager, 1976-1977
Bechtel, Inc., Engineer, 1971-1976, 1964-1966

PROFESSIONAL AFFILIATIONS

American Chemical Society (1981-2010)
Phi Beta Kappa (1970-present)
Sigma Pi Sigma (1970-present)
Who's Who Environmental Registry, PH Publishing, Fort Collins, CO, 1992.
Who's Who in the World, Marquis Who's Who, Inc., Chicago, IL, 11th Ed., p. 371, 1993-present.

Who's Who of American Women, Marquis Who's Who, Inc., Chicago, IL, 13th Ed., p. 264, 1984-present.
Who's Who in Science and Engineering, Marquis Who's Who, Inc., New Providence, NJ, 5th Ed., p. 414, 1999-present.
Who's Who in America, Marquis Who's Who, Inc., 59th Ed., 2005.
Guide to Specialists on Toxic Substances, World Environment Center, New York, NY, p. 80, 1980.
National Research Council Committee on Irrigation-Induced Water Quality Problems (Selenium), Subcommittee on Quality Control/Quality Assurance (1985-1990).
National Research Council Committee on Surface Mining and Reclamation, Subcommittee on Oil Shale (1978-80)

REPRESENTATIVE EXPERIENCE

Performed environmental and engineering investigations, as outlined below, for a wide range of industrial and commercial facilities including: petroleum refineries and upgrades thereto; reformulated fuels projects; refinery upgrades to process heavy sour crudes, including tar sands and light sweet crudes from the Eagle Ford and Bakken Formations; petroleum, gasoline and ethanol distribution terminals; coal, coke, and ore/mineral export terminals; LNG export, import, and storage terminals; crude-by-rail projects; shale oil plants; crude oil/condensate marine and rail terminals; coal gasification and liquefaction plants; oil and gas production, including conventional, thermally enhanced, hydraulic fracking, and acid stimulation techniques; underground storage tanks; pipelines; compressor stations; gasoline stations; landfills; railyards; hazardous waste treatment facilities; nuclear, hydroelectric, geothermal, wood, biomass, waste, tire-derived fuel, gas, oil, coke and coal-fired power plants; wind farms; solar energy facilities; battery storage facilities; transmission lines; airports; hydrogen plants; petroleum coke calcining plants; coke plants; activated carbon manufacturing facilities; asphalt plants; cement plants; incinerators; flares; manufacturing facilities (e.g., semiconductors, electronic assembly, aerospace components, printed circuit boards, amusement park rides); lanthanide processing plants; ammonia plants; nitric acid plants; urea plants; food processing plants; wineries; almond hulling facilities; composting facilities; grain processing facilities; grain elevators; ethanol production facilities; soy bean oil extraction plants; biodiesel plants; paint formulation plants; wastewater treatment plants; marine terminals and ports; gas processing plants; steel mills; iron nugget production facilities; pig iron plant, based on blast furnace technology; direct reduced iron plant; acid regeneration facilities; railcar refinishing facility; battery manufacturing plants; pesticide manufacturing and repackaging facilities; pulp and paper mills; olefin plants; methanol plants; ethylene crackers; alumina plants, desalination plants; battery storage facilities; data centers; covered lagoon anaerobic digesters with biogas generators and upgrading equipment to produce renewable natural gas and electricity; selective catalytic reduction (SCR) systems; selective noncatalytic reduction (SNCR) systems; halogen acid furnaces; contaminated property

redevelopment projects (e.g., Mission Bay, Southern Pacific Railyards, Moscone Center expansion, San Diego Padres Ballpark); residential developments; commercial office parks, campuses, and shopping centers; server farms; transportation plans; and a wide range of mines including sand and gravel, hard rock, limestone, nacholite, coal, molybdenum, gold, zinc, and oil shale.

EXPERT WITNESS/LITIGATION SUPPORT

- For plaintiffs-intervenors (Sierra Club), in civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications at Rush Island Units 1 and 2 and Labadie Energy Center, assist counsel in evaluating best available control technology (BACT) to reduce SO2 emissions, including wet and dry scrubbing, sorbent injection, and offsets. Case settled. *U.S. and Sierra Club vs. Ameren Missouri*, Case No. 4-11 CV 77 RWS, U.S. District Court, Eastern District of Missouri, Eastern Division, September 30, 2019.
- For the California Attorney General, assist in determining compliance with probation terms in the matter of People v. Chevron USA.
- For plaintiffs, assist in developing Petitioners' proof brief for National Parks Conservation Association et al v. U.S. EPA, Petition for Review of Final Administrative Action of the U.S. EPA, In the U.S. Court of Appeals for the Third Circuit, Docket No. 14-3147.
- For plaintiffs, expert witness in civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1997-2000) at the Cemex cement plant in Lyons, Colorado. Reviewed produced documents, prepared expert and rebuttal reports on PSD applicability based on NOx emission calculations for a collection of changes considered both individually and collectively. Deposed August 2011. *United States v. Cemex, Inc.*, In U.S. District Court for the District of Colorado (Civil Action No. 09-cv-00019-MSK-MEH). Case settled June 13, 2013.
- For plaintiffs, in civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1988 – 2000) at James De Young Units 3, 4, and 5. Reviewed produced documents, analyzed CEMS and EIA data, and prepared netting and BACT analyses for NOx, SO2, and PM10 (PSD case). Expert report February 24, 2010 and affidavit February 20, 2010. *Sierra Club v. City of Holland, et al.*, U.S. District Court, Western District of Michigan (Civil Action 1:08-cv-1183). Case settled. Consent Decree 1/19/14.
- For plaintiffs, in civil action alleging failure to obtain MACT permit, expert on potential to emit hydrogen chloride (HCl) from a new coal-fired boiler. Reviewed record, estimated HCl emissions, wrote expert report June 2010 and March 2013 (Cost to Install a Scrubber at the Lamar Repowering Project Pursuant to Case-by-Case MACT), deposed August 2010 and

March 2013. *Wildearth Guardian et al. v. Lamar Utilities Board,* Civil Action No. 09-cv-02974, U.S. District Court, District of Colorado. Case settled August 2013.

- For plaintiffs, expert witness on permitting, emission calculations, and wastewater treatment for coal-to-gasoline plant. Reviewed produced documents. Assisted in preparation of comments on draft minor source permit. Wrote two affidavits on key issues in case. Presented direct and rebuttal testimony 10/27 - 10/28/10 on permit enforceability and failure to properly calculate potential to emit, including underestimate of flaring emissions and omission of VOC and CO emissions from wastewater treatment, cooling tower, tank roof landings, and malfunctions. *Sierra Club, Ohio Valley Environmental Coalition, Coal River Mountain Watch, West Virginia Highlands Conservancy v. John Benedict, Director, Division of Air Quality, West Virginia Department of Environmental Protection and TransGas Development System, LLC*, Appeal No. 10-01-AQB. Virginia Air Quality Board remanded the permit on March 28, 2011 ordering reconsideration of potential to emit calculations, including: (1) support for assumed flare efficiency; (2) inclusion of startup, shutdown and malfunction emissions; and (3) inclusion of wastewater treatment emissions in potential to emit calculations.
- For plaintiffs, expert on BACT emission limits for gas-fired combined cycle power plant. Prepared declaration in support of CBE's Opposition to the United States' Motion for Entry of Proposed Amended Consent Decree. Assisted in settlement discussions. *U.S. EPA, Plaintiff, Communities for a Better Environment, Intervenor Plaintiff, v. Pacific Gas & Electric Company, et al.*, U.S. District Court, Northern District of California, San Francisco Division, Case No. C-09-4503 SI.
- Technical expert in confidential settlement discussions with large coal-fired utility on BACT control technology and emission limits for NOx, SO2, PM, PM2.5, and CO for new natural gas fired combined cycle and simple cycle turbines with oil backup. (July 2010). Case settled.
- For plaintiffs, expert witness in remedy phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1998-99) at Gallagher Units 1 and 3. Reviewed produced documents, prepared expert and rebuttal reports on historic and current-day BACT for SO2, control costs, and excess emissions of SO2. Deposed 11/18/09. *United States et al. v. Cinergy, et al.*, In U.S. District Court for the Southern District of Indiana, Indianapolis Division, Civil Action No. IP99-1693 C-M/S. Settled 12/22/09.
- For plaintiffs, expert witness on MACT, BACT for NOx, and enforceability in an administrative appeal of draft state air permit issued for four 300-MW pet-coke-fired CFBs. Reviewed produced documents and prepared prefiled testimony. Deposed 10/8/09 and 11/9/09. Testified 11/10/09. *Application of Las Brisas Energy Center, LLC for State Air Quality Permit*; before the State Office of Administrative Hearings, Texas. Permit remanded 3/29/10 as LBEC failed to meet burden of proof on a number of issues including MACT.

Texas Court of Appeals dismissed an appeal to reinstate the permit. The Texas Commission on Environmental Quality and Las Brisas Energy Center, LLC sought to overturn the Court of Appeals decision but moved to have their appeal dismissed in August 2013.

- For defense, expert witness in unlawful detainer case involving a gasoline station, minimart, and residential property with contamination from leaking underground storage tanks. Reviewed agency files and inspected site. Presented expert testimony on July 6, 2009, on causes of, nature and extent of subsurface contamination. *A. Singh v. S. Assaedi,* in Contra Costa County Superior Court, CA. Settled August 2009.
- For plaintiffs, expert witness on netting and enforceability for refinery being upgraded to process tar sands crude. Reviewed produced documents. Prepared expert and rebuttal reports addressing use of emission factors for baseline, omitted sources including coker, flares, tank landings and cleaning, and enforceability. Deposed. *In the Matter of Objection to the Issuance of Significant Source Modification Permit No. 089-25484-00453 to BP Products North America Inc., Whiting Business Unit, Save the Dunes Council, Inc., Sierra Club., Inc., Hoosier Environmental Council et al., Petitioners, B. P. Products North American, Respondents/Permittee,* before the Indiana Office of Environmental Adjudication. Case settled.
- For plaintiffs, expert witness on BACT, MACT, and enforceability in appeal of Title V permit issued to 600 MW coal-fired power plant burning Powder River Basin coal. Prepared technical comments on draft air permit. Reviewed record on appeal, drafted BACT, MACT, and enforceability pre-filed testimony. Drafted MACT and enforceability pre-filed rebuttal testimony. Deposed March 24, 2009. Testified June 10, 2009. *In Re: Southwestern Electric Power Company*, Arkansas Pollution Control and Ecology Commission, Consolidated Docket No. 08-006-P. Recommended Decision issued December 9, 2009 upholding issued permit. Commission adopted Recommended Decision January 22, 2010.
- For plaintiffs, expert witness in remedy phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications (1989-1992) at Wabash Units 2, 3 and 5. Reviewed produced documents, prepared expert and rebuttal report on historic and current-day BACT for NOx and SO2, control costs, and excess emissions of NOx, SO2, and mercury. Deposed 10/21/08. *United States et al. v. Cinergy, et al.*, In U.S. District Court for the Southern District of Indiana, Indianapolis Division, Civil Action No. IP99-1693 C-M/S. Testified 2/3/09. Memorandum Opinion & Order 5-29-09 requiring shutdown of Wabash River Units 2, 3, 5 by September 30, 2009, run at baseline until shutdown, and permanently surrender SO2 emission allowances.
- For plaintiffs, expert witness in liability phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for three historic modifications (1997-2001) at two portland cement plants involving three cement kilns. Reviewed produced documents, analyzed CEMS data covering subject period, prepared netting analysis for NOx, SO_2 and CO, and prepared expert and rebuttal reports. *United States v. Cemex California*

Cement, In U.S. District Court for the Central District of California, Eastern Division, Case No. ED CV 07-00223-GW (JCRx). Settled 1/15/09.

- For intervenors Clean Wisconsin and Citizens Utility Board, prepared data requests, reviewed discovery and expert report. Prepared prefiled direct, rebuttal and surrebuttal testimony on cost to extend life of existing Oak Creek Units 5-8 and cost to address future regulatory requirements to determine whether to control or shutdown one or more of the units. Oral testimony 2/5/08. Application for a Certificate of Authority to Install Wet Flue Gas Desulfurization and Selective Catalytic Reduction Facilities and Associated Equipment for Control of Sulfur Dioxide and Nitrogen Oxide Emissions at Oak Creek Power Plant Units 5, 6, 7 and 8, WPSC Docket No. 6630-CE-299.
- For plaintiffs, expert witness on alternatives analysis and BACT for NOx, SO2, total PM10, and sulfuric acid mist in appeal of PSD permit issued to 1200 MW coal fired power plant burning Powder River Basin and/or Central Appalachian coal (Longleaf). Assisted in drafting technical comments on NOx on draft permit. Prepared expert disclosure. Presented 8+ days of direct and rebuttal expert testimony. Attended all 21 days of evidentiary hearing from 9/5/07 – 10/30/07 assisting in all aspects of hearing. *Friends of the Chatahooche and Sierra Club v. Dr. Carol Couch, Director, Environmental Protection Division of Natural Resources Department, Respondent, and Longleaf Energy Associates, Intervener*. ALJ Final Decision 1/11/08 denying petition. ALJ Order vacated & remanded for further proceedings, Fulton County Superior Court, 6/30/08. Court of Appeals of GA remanded the case with directions that the ALJ's final decision be vacated to consider the evidence under the correct standard of review, July 9, 2009. The ALJ issued an opinion April 2, 2010 in favor of the applicant. Final permit issued April 2010.
- For plaintiffs, expert witness on diesel exhaust in inverse condemnation case in which Port expanded maritime operations into residential neighborhoods, subjecting plaintiffs to noise, light, and diesel fumes. Measured real-time diesel particulate concentrations from marine vessels and tug boats on plaintiffs' property. Reviewed documents, depositions, DVDs, and photographs provided by counsel. Deposed. Testified October 24, 2006. *Ann Chargin, Richard Hackett, Carolyn Hackett, et al. v. Stockton Port District*, Superior Court of California, County of San Joaquin, Stockton Branch, No. CV021015. Judge ruled for plaintiffs.
- For plaintiffs, expert witness on NOx emissions and BACT in case alleging failure to obtain necessary permits and install controls on gas-fired combined-cycle turbines. Prepared and reviewed (applicant analyses) of NOx emissions, BACT analyses (water injection, SCR, ultra low NOx burners), and cost-effectiveness analyses based on site visit, plant operating records, stack tests, CEMS data, and turbine and catalyst vendor design information. Participated in negotiations to scope out consent order. *United States v. Nevada Power*. Case settled June 2007, resulting in installation of dry low NOx burners (5 ppm NOx averaged over 1 hr) on four units and a separate solar array at a local business.

- For plaintiffs, expert witness in appeal of PSD permit issued to 850 MW coal fired boiler burning Powder River Basin coal (Iatan Unit 2) on BACT for particulate matter, sulfuric acid mist and opacity and emission calculations for alleged historic violations of PSD. Assisted in drafting technical comments, petition for review, discovery requests, and responses to discovery requests. Reviewed produced documents. Prepared expert report on BACT for particulate matter. Assisted with expert depositions. Deposed February 7, 8, 27, and 28, 2007. *In Re PSD Construction Permit Issued to Great Plains Energy, Kansas City Power & Light – Iatan Generating Station, Sierra Club v. Missouri Department of Natural Resources, Great Plains Energy, and Kansas City Power & Light.* Case settled March 27, 2007, providing offsets for over 6 million ton/yr of CO2 and lower NOx and SO_2 emission limits.
- For plaintiffs, expert witness in remedy phase of civil action relating to alleged violations of the Clean Air Act, Prevention of Significant Deterioration, for historic modifications of coal-fired boilers and associated equipment. Reviewed produced documents, prepared expert report on cost to retrofit 24 coal-fired power plants with scrubbers designed to remove 99% of the sulfur dioxide from flue gases. Prepared supplemental and expert report on cost estimates and BACT for SO2 for these 24 complaint units. Deposed 1/30/07 and 3/14/07. *United States and State of New York et al. v. American Electric Power*, In U.S. District Court for the Southern District of Ohio, Eastern Division, Consolidated Civil Action Nos. C2-99-1182 and C2-99-1250. Settlement announced 10/9/07.
- For plaintiffs, expert witness on BACT, enforceability, and alternatives analysis in appeal of PSD permit issued for a 270-MW pulverized coal fired boiler burning Powder River Basin coal (City Utilities Springfield Unit 2). Reviewed permitting file and assisted counsel draft petition and prepare and respond to interrogatories and document requests. Reviewed interrogatory responses and produced documents. Assisted with expert depositions. Deposed August 2005. Evidentiary hearings October 2005. *In the Matter of Linda Chipperfield and Sierra Club v. Missouri Department of Natural Resources.* Missouri Supreme Court denied review of adverse lower court rulings August 2007.
- For plaintiffs, expert witness in civil action relating to plume touchdowns at AEP's Gavin coal-fired power plant. Assisted counsel draft interrogatories and document requests. Reviewed responses to interrogatories and produced documents. Prepared expert report "Releases of Sulfuric Acid Mist from the Gavin Power Station." The report evaluates sulfuric acid mist releases to determine if AEP complied with the requirements of CERCLA Section 103(a) and EPCRA Section 304. This report also discusses the formation, chemistry, release characteristics, and abatement of sulfuric acid mist in support of the claim that these releases present an imminent and substantial endangerment to public health under Section 7002(a)(1)(B) of the Resource Conservation and Recovery Act ("RCRA"). *Citizens Against Pollution v. Ohio Power Company*, In the U.S. District Court for the Southern District of Ohio, Eastern Division, Civil Action No. 2-04-cv-371. Case settled 12-8-06.

- For petitioners, expert witness in contested case hearing on BACT, enforceability, and emission estimates for an air permit issued to a 500-MW supercritical Power River Basin coal-fired boiler (Weston Unit 4). Assisted counsel prepare comments on draft air permit and respond to and draft discovery. Reviewed produced file, deposed (7/05), and prepared expert report on BACT and enforceability. Evidentiary hearings September 2005. *In the Matter of an Air Pollution Control Construction Permit Issued to Wisconsin Public Service Corporation for the Construction and Operation of a 500 MW Pulverized Coal-fired Power Plant Known as Weston Unit 4 in Marathon County, Wisconsin*, Case No. IH-04-21. The Final Order, issued 2/10/06, lowered the NOx BACT limit from 0.07 lb/MMBtu to 0.06 lb/MMBtu based on a 30-day average, added a BACT SO2 control efficiency, and required a 0.0005% high efficiency drift eliminator as BACT for the cooling tower. The modified permit, including these provisions, was issued 3/28/07. Additional appeals in progress.
- For plaintiffs, adviser on technical issues related to Citizen Suit against U.S. EPA regarding failure to update New Source Performance Standards for petroleum refineries, 40 CFR 60, Subparts J, VV, and GGG. *Our Children's Earth Foundation and Sierra Club v. U.S. EPA et al.* Case settled July 2005. CD No. C 05-00094 CW, U.S. District Court, Northern District of California – Oakland Division. Proposed revisions to standards of performance for petroleum refineries published 72 FR 27178 (5/14/07).
- For interveners, reviewed proposed Consent Decree settling Clean Air Act violations due to historic modifications of boilers and associated equipment at two coal-fired power plants. In response to stay order, reviewed the record, selected one representative activity at each of seven generating units, and analyzed to identify CAA violations. Identified NSPS and NSR violations for NOx, SO_2, PM/PM10, and sulfuric acid mist. Summarized results in an expert report. *United States of America, and Michael A. Cox, Attorney General of the State of Michigan, ex rel. Michigan Department of Environmental Quality, Plaintiffs, and Clean Wisconsin, Sierra Club, and Citizens' Utility Board, Intervenors, v. Wisconsin Electric Power Company, Defendant*, U.S. District Court for the Eastern District of Wisconsin, Civil Action No. 2:03-CV-00371-CNC. Order issued 10-1-07 denying petition.
- For a coalition of Nevada labor organizations (ACE), reviewed preliminary determination to issue a Class I Air Quality Operating Permit to Construct and supporting files for a 250-MW pulverized coal-fired boiler (Newmont). Prepared about 100 pages of technical analyses and comments on BACT, MACT, emission calculations, and enforceability. Assisted counsel draft petition and reply brief appealing PSD permit to U.S. EPA Environmental Appeals Board (EAB). Order denying review issued 12/21/05. *In re Newmont Nevada Energy Investment, LLC, TS Power Plant*, PSD Appeal No. 05-04 (EAB 2005).
- For petitioners and plaintiffs, reviewed and prepared comments on air quality and hazardous waste based on negative declaration for refinery ultra low sulfur diesel project located in SCAQMD. Reviewed responses to comments and prepared responses. Prepared declaration and presented oral testimony before SCAQMD Hearing Board on exempt sources (cooling towers) and calculation of potential to emit under NSR. Petition for writ of mandate filed

March 2005. Case remanded by Court of Appeals to trial court to direct SCAQMD to re-evaluate the potential environmental significance of NOx emissions resulting from the project in accordance with court's opinion. California Court of Appeals, Second Appellate Division, on December 18, 2007, affirmed in part (as to baseline) and denied in part. *Communities for a Better Environment v. South Coast Air Quality Management District and ConocoPhillips and Carlos Valdez et al v. South Coast Air Quality Management District and ConocoPhillips.* Certified for partial publication 1/16/08. Appellate Court opinion upheld by CA Supreme Court 3/15/10. *(2010) 48 Cal.4th 310.*

- For amici seeking to amend a proposed Consent Decree to settle alleged NSR violations at Chevron refineries, reviewed proposed settlement, related files, subject modifications, and emission calculations. Prepared declaration on emission reductions, identification of NSR and NSPS violations, and BACT/LAER for FCCUs, heaters and boilers, flares, and sulfur recovery plants. *U.S. et al. v. Chevron U.S.A.*, Northern District of California, Case No. C 03-04650. Memorandum and Order Entering Consent Decree issued June 2005. Case No. C 03-4650 CRB.
- For petitioners, prepared declaration on enforceability of periodic monitoring requirements, in response to EPA's revised interpretation of 40 CFR 70.6(c)(1). This revision limited additional monitoring required in Title V permits. 69 FR 3203 (Jan. 22, 2004). *Environmental Integrity Project et al. v. EPA* (U.S. Court of Appeals for the District of Columbia). Court ruled the Act requires all Title V permits to contain monitoring requirements to assure compliance. *Sierra Club v. EPA*, 536 F.3d 673 (D.C. Cir. 2008).
- For interveners in application for authority to construct a 500 MW supercritical coal-fired generating unit before the Wisconsin Public Service Commission, prepared pre-filed written direct and rebuttal testimony with oral cross examination and rebuttal on BACT and MACT (Weston 4). Prepared written comments on BACT, MACT, and enforceability on draft air permit for same facility.
- For property owners in Nevada, evaluated the environmental impacts of a 1,450-MW coal-fired power plant proposed in a rural area adjacent to the Black Rock Desert and Granite Range, including emission calculations, air quality modeling, comments on proposed use permit to collect preconstruction monitoring data, and coordination with agencies and other interested parties. Project cancelled.
- For environmental organizations, reviewed draft PSD permit for a 600-MW coal-fired power plant in West Virginia (Longview). Prepared comments on permit enforceability; coal washing; BACT for SO_2 and PM10; Hg MACT; and MACT for HCl, HF, non-Hg metallic HAPs, and enforceability. Assist plaintiffs draft petition appealing air permit. Retained as expert to develop testimony on MACT, BACT, offsets, enforceability. Participate in settlement discussions. Case settled July 2004.
- For petitioners, reviewed record produced in discovery and prepared affidavit on emissions of carbon monoxide and volatile organic compounds during startup of GE 7FA combustion

turbines to successfully establish plaintiff standing. *Sierra Club et al. v. Georgia Power Company* (Northern District of Georgia).

- For building trades, reviewed air quality permitting action for 1500-MW coal-fired power plant before the Kentucky Department for Environmental Protection (Thoroughbred).
- For petitioners, expert witness in administrative appeal of the PSD/Title V permit issued to a 1500-MW coal-fired power plant. Reviewed over 60,000 pages of produced documents, prepared discovery index, identified and assembled plaintiff exhibits. Deposed. Assisted counsel in drafting discovery requests, with over 30 depositions, witness cross examination, and brief drafting. Presented over 20 days of direct testimony, rebuttal and sur-rebuttal, with cross examination on BACT for NOx, SO_2, and PM/PM10; MACT for Hg and non-Hg metallic HAPs; emission estimates for purposes of Class I and II air modeling; risk assessment; and enforceability of permit limits. Evidentiary hearings from November 2003 to June 2004. *Sierra Club et al. v. Natural Resources & Environmental Protection Cabinet, Division of Air Quality and Thoroughbred Generating Company et al.* Hearing Officer Decision issued August 9, 2005 finding in favor of plaintiffs on counts as to risk, BACT (IGCC/CFB, NOx, SO_2, Hg, Be), single source, enforceability, and errors and omissions. Assist counsel draft exceptions. Cabinet Secretary issued Order April 11, 2006 denying Hearing Offer's report, except as to NOx BACT, Hg, 99% SO2 control and certain errors and omissions.
- For citizens group in Massachusetts, reviewed, commented on, and participated in permitting of pollution control retrofits of coal-fired power plant (Salem Harbor).
- Assisted citizens group and labor union challenge issuance of conditional use permit for a 317,000 ft^2 discount store in Honolulu without any environmental review. In support of a motion for preliminary injunction, prepared 7-page declaration addressing public health impacts of diesel exhaust from vehicles serving the Project. In preparation for trial, prepared 20-page preliminary expert report summarizing results of diesel exhaust and noise measurements at two big box retail stores in Honolulu, estimated diesel PM10 concentrations for Project using ISCST, prepared a cancer health risk assessment based on these analyses, and evaluated noise impacts.
- Assisted environmental organizations to challenge the DOE Finding of No Significant Impact (FONSI) for the Baja California Power and Sempra Energy Resources Cross-Border Transmissions Lines in the U.S. and four associated power plants located in Mexico (DOE EA-1391). Prepared 20-page declaration in support of motion for summary judgment addressing emissions, including CO_2 and NH_3, offsets, BACT, cumulative air quality impacts, alternative cooling systems, and water use and water quality impacts. Plaintiff's motion for summary judgment granted in part. U.S. District Court, Southern District decision concluded that the Environmental Assessment and FONSI violated NEPA and the APA due to their inadequate analysis of the potential controversy surrounding the project, water impacts, impacts from NH_3 and CO_2, alternatives, and cumulative impacts. *Border Power Plant Working Group v. Department of Energy and Bureau of Land Management*, Case No. 02-CV-513-IEG (POR) (May 2, 2003).

- For Sacramento school, reviewed draft air permit issued for diesel generator located across from playfield. Prepared comments on emission estimates, enforceability, BACT, and health impacts of diesel exhaust. Case settled. BUG trap installed on the diesel generator.
- Assisted unions in appeal of Title V permit issued by BAAQMD to carbon plant that manufactured coke. Reviewed District files, identified historic modifications that should have triggered PSD review, and prepared technical comments on Title V permit. Reviewed responses to comments and assisted counsel draft appeal to BAAQMD hearing board, opening brief, motion to strike, and rebuttal brief. Case settled.
- Assisted California Central Coast city obtain controls on a proposed new city that would straddle the Ventura-Los Angeles County boundary. Reviewed several environmental impact reports, prepared an air quality analysis, a diesel exhaust health risk assessment, and detailed review comments. Governor intervened and State dedicated the land for conservation purposes April 2004.
- Assisted Central California city to obtain controls on large alluvial sand quarry and asphalt plant proposing a modernization. Prepared comments on Negative Declaration on air quality, public health, noise, and traffic. Evaluated process flow diagrams and engineering reports to determine whether proposed changes increased plant capacity or substantially modified plant operations. Prepared comments on application for categorical exemption from CEQA. Presented testimony to County Board of Supervisors. Developed controls to mitigate impacts. Assisted counsel draft Petition for Writ. Case settled June 2002. Substantial improvements in plant operations were obtained including cap on throughput, dust control measures, asphalt plant loadout enclosure, and restrictions on truck routes.
- Assisted oil companies on the California Central Coast in defending class action citizen's lawsuit alleging health effects due to emissions from gas processing plant and leaking underground storage tanks. Reviewed regulatory and other files and advised counsel on merits of case. Case settled November 2001.
- Assisted oil company on the California Central Coast in defending property damage claims arising out of a historic oil spill. Reviewed site investigation reports, pump tests, leachability studies, and health risk assessments, participated in design of additional site characterization studies to assess health impacts, and advised counsel on merits of case. Prepare health risk assessment.
- Assisted unions in appeal of Initial Study/Negative Declaration ("IS/ND") for an MTBE phaseout project at a Bay Area refinery. Reviewed IS/ND and supporting agency permitting files and prepared technical comments on air quality, groundwater, and public health impacts. Reviewed responses to comments and final IS/ND and ATC permits and assisted counsel to draft petitions and briefs appealing decision to Air District Hearing Board. Presented sworn direct and rebuttal testimony with cross examination on groundwater impacts of ethanol spills on hydrocarbon contamination at refinery. Hearing Board ruled 5 to 0 in favor of appellants, remanding ATC to district to prepare an EIR.

- Assisted Florida cities in challenging the use of diesel and proposed BACT determinations in prevention of significant deterioration (PSD) permits issued to two 510-MW simple cycle peaking electric generating facilities and one 1,080-MW simple cycle/combined cycle facility. Reviewed permit applications, draft permits, and FDEP engineering evaluations, assisted counsel in drafting petitions and responding to discovery. Participated in settlement discussions. Cases settled or applications withdrawn.
- Assisted large California city in federal lawsuit alleging peaker power plant was violating its federal permit. Reviewed permit file and applicant's engineering and cost feasibility study to reduce emissions through retrofit controls. Advised counsel on feasible and cost-effective NOx, SOx, and PM10 controls for several 1960s diesel-fired Pratt and Whitney peaker turbines. Case settled.
- Assisted coalition of Georgia environmental groups in evaluating BACT determinations and permit conditions in PSD permits issued to several large natural gas-fired simple cycle and combined-cycle power plants. Prepared technical comments on draft PSD permits on BACT, enforceability of limits, and toxic emissions. Reviewed responses to comments, advised counsel on merits of cases, participated in settlement discussions, presented oral and written testimony in adjudicatory hearings, and provided technical assistance as required. Cases settled or won at trial.
- Assisted construction unions in review of air quality permitting actions before the Indiana Department of Environmental Management ("IDEM") for several natural gas-fired simple cycle peaker and combined cycle power plants.
- Assisted coalition of towns and environmental groups in challenging air permits issued to 523 MW dual fuel (natural gas and distillate) combined-cycle power plant in Connecticut. Prepared technical comments on draft permits and 60 pages of written testimony addressing emission estimates, startup/shutdown issues, BACT/LAER analyses, and toxic air emissions. Presented testimony in adjudicatory administrative hearings before the Connecticut Department of Environmental Protection in June 2001 and December 2001.
- Assisted various coalitions of unions, citizens groups, cities, public agencies, and developers in licensing and permitting of over 110 coal, gas, oil, biomass, and pet coke-fired power plants generating over 75,000 MW of electricity. These included base-load, combined cycle, simple cycle, and peaker power plants in Alaska, Arizona, Arkansas, California, Colorado, Georgia, Florida, Illinois, Indiana, Kentucky, Michigan, Missouri, Ohio, Oklahoma, Oregon, Texas, West Virginia, Wisconsin, and elsewhere. Prepared analyses of and comments on applications for certification, preliminary and final staff assessments, and various air, water, wastewater, and solid waste permits issued by local agencies. Presented written and oral testimony before various administrative bodies on hazards of ammonia use and transportation, health effects of air emissions, contaminated property issues, BACT/LAER issues related to SCR and SCONOx, criteria and toxic pollutant emission estimates, MACT analyses, air quality modeling, water supply and water quality issues, and methods to reduce