

**BEFORE THE ENVIRONMENTAL APPEALS BOARD
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

In re:)
)
Palmdale Energy, LLC's)
(subsidiary of Summit Power Group, LLC))
)
Palmdale Energy Project)
)
PSD Permit No. SE 17-01)
)

**PETITION FOR REVIEW
SUBMITTED BY CENTER FOR BIOLOGICAL DIVERSITY, DESERT
CITIZENS AGAINST POLLUTION, CALIFORNIA COMMUNITIES
AGAINST TOXICS, AND SIERRA CLUB**

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- Ex. 5 Utility Dive, "California solar spike leads to negative CAISO real-time prices in March"
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REQUEST FOR ORAL ARGUMENT

Petitioners request oral argument. In addition to more “traditional” issues like the application of the term “ambient air” in the context of an ambient air impacts analysis, this case presents issues regarding the rapidly changing field of energy storage technology and electrical grid operations that may benefit from oral argument.

INTRODUCTION

Pursuant to 40 C.F.R. § 124.19(a), the Center for Biological Diversity, Desert Citizens Against Pollution, California Communities Against Toxics, and Sierra Club [collectively “Petitioners” or “Conservation Groups”] petition for review of Prevention of Significant Deterioration (PSD) Permit No. SE 17-01 which the United States Environmental Protection Agency Region 9 (Region 9) issued for the construction and operation of the Palmdale Energy Project (Palmdale). Palmdale is a proposed nominal 704 megawatt (mw) combined cycle natural gas (CCNG) power plant with duct burners and associated equipment. Palmdale is likely to be one of the last fossil fuel burning power plants proposed for California.

Region 9 rejected the inherently cleaner technology of batteries rather than duct burners to serve Palmdale’s peaking function, that is producing electricity to meet a peak demand on the grid. In doing so, Region 9 made numerous erroneous findings of facts and conclusions of law including failure to consider the economic benefit of batteries and the multi-pollutant emission reductions when considering the cost of batteries as a basis for BACT for the duct burners. Considering these costs issues is an important policy consideration as is the use of modern energy

storage technology to continue the Clean Air Act's push to provide the Nation with healthful air.

Region 9 also erred by excluding emissions from jet engines and impacts on the neighboring property in the ambient impacts analysis for the one-hour nitrogen oxides (NO_x) national ambient air quality standard (NAAQS). To avoid including this critical emission source, Region 9 expanded the definition of "ambient air" to include private property owned by entities other than the permittee. This irrational approach results in significantly less protection from air pollution.

Finally, Region 9 erred in not conducting a cumulative impact analysis for the annual NO_x NAAQS and the carbon monoxide NAAQS. Region 9 used significant impact levels (SILs) and a flawed qualitative analysis to justify this.

THRESHOLD PROCEDURAL REQUIREMENTS

Petitioners satisfy the threshold requirements for filing a petition for review under 40 C.F.R. § 124.19(a):

1. Petitioners filed comments on the draft permit.¹

¹ See EPA-R09-OAR-2017-0473-0016, October 6, 2017 Comments on Proposed Clean Air Act Prevention of Significant Deterioration Permit for the Palmdale Energy Project, PSD Permit No. SE 17-10 by Center for Biological Diversity, California Communities Against Toxics, Desert Citizens Against Pollution and Sierra Club, National Air Team (Conservation Groups Comments). Subsequent references to documents in the administrative record will be cited as AR-XXXX. The Administrative Record is available at www.regulations.gov under Docket Id. EPA-R09-OAR-2017-0473.

2. The issues raised herein by Petitioners were raised during the public comment period.²

3. This petition is timely filed. The Public Notice states the Issue Date is April 26, 2018. AR-0029, 13.4. 30 days after that is May 29, 2018. *See* 40 C.F.R. §124.20; <https://www.opm.gov/policy-data-oversight/snow-dismissal-procedures/federal-holidays/#url=2018> (May 28th is a federal holiday).

STANDARD OF REVIEW

The Board's review of PSD permitting decisions is governed by 40 C.F.R. § 124. *In re Prairie State Generating Co.*, PSD Appeal No. 05-05, 13 E.A.D. 1, 13 (EAB 2006). The Board will review a permitting authority's decision to issue a PSD permit if the decision is based on either a clearly erroneous finding of fact or conclusion of law, or involves an important matter of policy or exercise of discretion that warrants review. *Id.* The burden of demonstrating that review is warranted rests with the petitioner challenging the permit decision. *Id.* Here, the Region's decisions are premised upon clearly erroneous interpretations of statutory PSD requirements and implementing regulations as well clearly erroneous findings of fact.

² AR-0016, Conservation Groups Comments at 4-6 (Batteries rather than duct burners for BACT); 14-16 (failure to included emission from jet engines and Plant 42); 13-14 (lack of cumulative impact).

Neither the Region’s interpretation of the Clean Air Act nor its interpretation of regulatory requirements is entitled to deference. *In re Lazarus, Inc.*, 7 E.A.D. 318, 351 n.55 (EAB 1997). As the final decision maker for EPA, the Board performs its own “independent review and analysis of the issue.” *In re Ocean State Asbestos Removal, Inc.*, 7 E.A.D. 522, 543 n.22 (EAB 1998) (quoting *In re Mobil Oil Corp.*, 5 E.A.D. 490, 508-09 & n.30 (EAB 1994)). Where a Region has based a permit decision on an erroneous interpretation of the Clean Air Act, the permit must be remanded. See *In re Hadson Power 14—Buena Vista*, 4 E.A.D. 258, 273-75 (EAB 1992).

When interpreting a statute, the Board begins by reviewing the plain meaning of the statutory language, in order to “give effect to the unambiguously expressed intent of Congress.” *In re Ocean*, 7 E.A.D at 542 (quoting *Chevron U.S.A., Inc. v. Natural Res. Def. Council*, 467 U.S. 837, 843 (1984)). “An agency is given no deference at all on the question whether a statute is ambiguous” *Old Dominion Elec. Coop. Inc. v. FERC*, 518 F.3d 43, 48 (D.C. Cir. 2008). To determine Congress’s intent, the Board uses “traditional tools of statutory construction, which include examination of the statute’s text, legislative history, and structure.” *In re Ocean*, 7 E.A.D at 542 (citing *Southern Cal. Edison Co. v. FERC*, 116 F.3d 507, 515 (D.C. Cir. 1997)). “If the intent of Congress is clear, that

is the end of the matter; for the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress.” *Chevron*, 467 U.S. at 843. 10

“When construing an administrative regulation, the normal tenets of statutory construction are generally applied,” including the rule that “[t]he plain meaning of words is ordinarily the guide.” *In re Bil-Dry Corp.*, 9 E.A.D. 575, 595 (EAB 2001) (citations omitted). In addition, a “regulation must . . . be ‘interpreted so as to harmonize with and further and not to conflict with the objective of the statute it implements.’” *Id.* (quoting *Sec’y of Labor v. W. Fuels-Utah, Inc.*, 900 F.2d 318, 320 (D.C. Cir. 1990)).

Agency action is arbitrary and capricious if, *inter alia*, “the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, [or] offered an explanation for its decision that runs counter to the evidence before the agency.” *Motor Vehicle Mfrs. Ass’n of the U.S., Inc. v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 43 (1983). Further, an agency “must cogently explain why it has exercised its discretion in a given manner” or its actions will be deemed arbitrary. *Id.* at 48; *see also In re Port Authority of New York and New Jersey*, 10 E.A.D. 61, 91 (May 30, 2001) (agency must provide “a reasoned explanation of the basis for the conclusion”).

ARGUMENT

I. REGION 9 IMPROPERLY REJECTED BATTERIES AS THE BASIS FOR BACT FOR THE DUCT BURNERS

A. INTRODUCTION

Region 9's BACT analysis improperly rejected batteries rather than duct burners to achieve BACT. In reaching this conclusion, Region 9 made several erroneous findings of facts and conclusions of law described below. This includes the clear error of law in assuming that a battery storage facility would have to purchase electricity at a retail price when FERC Order 841 requires that battery storage facilities be able to purchase electricity at a wholesale price. This issue also raises important policy considerations as California in particular, and the Nation as a whole, transitions to a clean energy economy. The question is whether EPA will use outdated, and thus inaccurate data, to stick with its old ways of only truly examining "end of the pipe" pollution approaches or whether EPA will properly consider approaches which result in less pollution, as well as save ratepayers money and support increased grid resiliency as a co-benefit.

B. FACTS AND PROCURAL BACKGROUND

We begin with an explanation of the proposed power plant. Palmdale is proposed to be a "standard 2 x 1 configuration" combined cycle natural gas power

plant. AR-0004, 2.2, Fact Sheet at 4. That means that it will have two natural gas-fired combustion turbine generators, two heat recovery steam generators (HRSG) and one steam turbine generator. After the hot combustion exhaust gas leaves the combustion turbines, it flows to the HRSG which is a heat exchanger which generates steam which is fed into the one steam turbine. *Id.* at 4-5. Most relevant to this claim, Palmdale “will be equipped with duct burners firing natural gas to increase steam output from the HRSG **during periods of peak energy demand.**” *Id.* at 5 (emphasis added). In other words, the duct burners are like a peaking power plant that is built into a baseload or load following power plant. The Applicant anticipates that these peak energy demands will not be during the daytime hours because of the increasing amount of solar photovoltaic (PV) on the California grid. *Id.*, Fact Sheet at 27.

The natural gas burning duct burners are rated at 193.1 million British thermal units (MMBtu)/hour high heating value (HHV). *Id.* The Permittee is not allowed to operate the duct burners when the associated gas turbine is not operating. AR-0028, Final Permit at 7, Condition 21. Presumably, this is because the pollution control equipment, such as the selective catalytic reduction (SCR) and oxidation catalyst, could not operate with just the duct burners operating. But regardless of the reason, this restriction in the air pollution permit limits the

Permittee's ability to meet its business goal of serving to balance the needs of renewable energy, especially PV.

Similarly, the Permit limits the amount of natural gas which can be burned in the duct burners. *Id.* Region 9 states that fuel limit is equivalent to 1,500 hours per year for the duct burners. AR-0004, 2.2, Fact Sheet at 7. Again, this permit limit works as a limit on the Permittee's operations in fulfilling its stated business purpose.

Region 9 did not conduct a BACT analysis of the duct burners by themselves. *See Id.* at i-iii. Rather, the NO_x, CO, PM, PM₁₀, PM_{2.5}, and greenhouse gas (GHG), BACT emission limits all include the combustion turbines and duct burners. *Id.* at 14-35.

There is not an actual BACT analysis for the duct burners. Rather, Region 9 set the BACT limit based on the "highest expected emissions". *Id.* at 16. Setting a BACT limit based on the highest expected emissions is essentially the exact opposite of BACT. *See* 40 C.F.R. § 52.21(b)(12)(BACT is an emission limit "based on the maximum degree of reduction"). Setting BACT, which includes the duct burners, based on the highest expected emissions rather than the maximum degree of reductions in emissions is plain error enough for the Board to grant this petition and remand the Permit.

But continuing on, because there is no BACT analysis of the duct burners, Region 9 did not consider the use of batteries rather than the duct burners in its original BACT analysis in support of the draft permit. Nor did Region 9 consider any other technology like using Turbine Inlet Air Chilling instead of or in combination with duct firing. There is simply nothing there.

Note that the Applicant's original proposal was to use steam from a concentrating solar power (CSP) solar trough facility to supplement or wholly replace the duct burners. *Id.* at 27. However, according to the Permittee, the addition of large amounts of solar PV into the California energy market means that daytime hour need for the equivalent of duct firing will not be needed as much, making the CSP option originally proposed by the Permitted "not practical." *Id.* at 27.

Region 9 did consider a "hybrid battery design" for the greenhouse gas BACT in step 1 of the BACT analysis. *Id.* at 25. However, this was a design that would "increase the efficiency of the gas turbine and/or reduce fuel use." *Id.* The hybrid battery system is similar to a hybrid car. It allows the turbine to be in standby mode without using fuel and enable immediate response to changing energy dispatch needs. *Id.* at 30. In other words, when the operator first "steps on the gas pedal," electricity comes from the battery rather than the turbine as the

turbine spins up to load. As stated above, this discussion of batteries did not consider replacing the duct burners with batteries.

Region 9 did throw in a footnote stating:

Our analysis does not include battery storage projects that provide electricity to the grid independently (as their own power source), even if such projects are located adjacent to gas-fired CTs. Such independent power projects are outside the scope of this analysis as they would redefine the fundamental business purpose and design of the project, in that they would require the use of battery storage to generate power when the Project is clearly designed to generate power from natural gas-fired combined cycle units.

Id. at 29, ftnt. 49. Region 9 did not specifically refer to replacing the duct burners, which are essentially a peaker power plant built into a combined cycle natural gas power plant, in this footnote. As explained below, redefining the source was not one of the many bases for Region 9's rejection of batteries replacing the duct burners in the BACT analysis.

It makes sense that Region 9 would not pursue the "redefining the source" argument as it would be ridiculous. Choosing BACT as batteries rather than duct burners would still leave the design of the facility as a natural gas-fired combined cycle power plant. It would simply be one without duct burners, which is not uncommon. Palmdale's Parent Company's own webpage does not even mention the duct burners in describing Palmdale. *See* Ex. 1. More importantly, Palmdale's the business purpose is:

respond to changes in demand from the electric grid, making this the fundamental business purpose of the facility.[] In this case, the source's ability to respond to ramping and peak load needs, as well as operating in different modes in response to market demand, is inherent to the Applicant's basic business purpose and design.

Id. at 26. As noted above, the duct burners in Palmdale are for an even more limited purpose, that is meeting peak demand and ramping needs. There can be no serious debate that utility scale batteries in California can meet peak demand and ramping needs. That is actually their primary reason for existing. In other words, batteries offer “flexibility to adjust to rapid changes in renewable energy availability.” *Id.* at 27.

Region 9 included various pieces of information about battery storage facilities in the fact sheet via links to news articles. One story was about a 20 MW/80 MWH (so four hour duration) battery facility East of Los Angeles. *Id.* at 87, Appendix 3, “A look at the new battery storage facility in California built with Tesla Powerpacks” available at <https://arstechnica.com/business/2017/01/a-look-at-the-new-battery-storage-facility-in-california-built-with-tesla-powerpacks/>. This facility is notable for several reasons. First, it is a currently operating battery storage facility in California. *Id.* Second, it is also located adjacent to a peaking power plant. Third, this battery offers 4 hours of storage. *Id.* Fourth, it explains that the battery is actually a modular system, which in this particular application included 400 closet-sized batteries sitting on concrete pads. *Id.* And finally, it

explained that other battery storage facilities have been on line in California since at least 2014. *Id.*

Region 9 also included a story from the magazine Scientific America, although it notably failed to mention this in its response to comments. *Id.*, World's Largest Storage Battery Will Power Los Angeles available at <https://www.scientificamerican.com/article/world-s-largest-storage-battery-will-power-los-angeles/>. This is a story about a battery storage facility in California which will replace a natural gas peaker power plant, which as explained above, is what the duct burners at Palmdale serve as. *Id.* This battery storage facility will be 100 MW, which is twice as much as what the duct burners at Palmdale will be capable of generating. *Id.* It will offer four hours of storage for the 100 MW. *Id.* Its business plan is to charge in the morning on “cheap solar power that might have otherwise been wasted” and discharge to meet customary afternoon peaks. *Id.* It will then meet a second peak in the morning, having charged during the night on cheap power, most of it from wind turbines. *Id.* In other words, it will do what Palmdale's duct burners are designed to do, fill in when solar PV is not generating. This battery storage facility is designed to go online in 2021, which is the *same* year that Palmdale is expected to go on line. *See Id.*, and Ex. 1, Summit Power, the parent company of Palmdale, webpage, (“Commercial operations expected in 2021”). The article claims that the “economics are there,” meaning this facility

will generate a profit. AR-0004, Fact Sheet, at 87, Appendix 3, World's Largest Storage Battery Will Power Los Angeles. Scientific America says "the technology seems mature." *Id.*

Region 9 included a story about energy projects from 2015. *Id.* at 5 battery energy storage projects to watch in 2016, available at <http://www.utilitydive.com/news/5-battery-energy-storage-projects-to-watch-in-2016/409624/>. Because the transition in the energy field is happening so rapidly, a two and a half year old article is of limited use. However, this article is somewhat useful because it does discuss the concept of "revenue stacking" where battery storage facilities can get multiple revenue streams like managing demand during peak periods, providing reliable back-up power, and selling frequency regulation into the ISO or RTO. *Id.* As explained below, Region 9 ignored the fact of revenue stacking when it did its cost analysis of batteries in response to comments.

Region 9 also included the Wikipedia page on energy storage. *Id.* at https://en.wikipedia.org/wiki/List_of_energy_storage_projects. This includes a vanadium flow battery in China which is 200 MW, that is four times larger than the duct burners at Palmdale, with four hours of storage. *Id.* It also includes a 150 MW battery project in South Korea with unspecified duration which was expected to be commissioned in February 2018. *Id.*

The Wikipedia page references the U.S. Department of Energy's (DOE) Global Storage Database maintained by the Sandia National Laboratories as one of the references for the 800 MWH battery storage facility in China. *Id.* at ftnt. 4. The DOE Global Storage Database is filterable. For example, it shows over 1,000 lithium ion based battery storage systems in the world at over 10 MW which is the highest denomination in the filter. Although Region 9 should have been aware of this credible source of information when it included the Wikipedia page that referenced it, Region 9 decided to instead rely on news articles and Wikipedia pages.

Region 9 set higher mass emission based carbon monoxide (CO) and nitrogen oxides (NOx) BACT limits for Palmdale when it is using its duct burners then when it is not. *Id.* at 13; AR-0028, Final Permit at 6, Condition 18.c. The Greenhouse Gas BACT limit is simply the amount of carbon dioxide (CO₂) from natural gas burned in the duct burners plus the amount of CO₂ from various scenarios of combustion turbine operation chosen by the Permittee. So if the duct burners did not exist, the Greenhouse Gas BACT limit would also be lower. AR-0004, 2.2, Fact Sheet at 13.

The Conservation Groups submitted comments that batteries replacing the duct burners should be considered as the basis for BACT to reduce NOx, CO and GHG. AR-0016, Conservation Groups Comments, at 4-6, 8-10.

The Conservation Group comments explained that batteries rather than duct burners should be considering in step 1 of Region 9's BACT analysis because batteries larger than Palmdale's duct burners are commercially available. *Id.* The comments pointed to a Tesla facility in South Australia, which is twice the size of Palmdale's duct burners at 100 MW. *Id.* at Ex. 5. 50 MW of this facility, which is the size of the Palmdale duct burners, was installed in just two months. *Id.* The comments mistakenly stated that this was the largest battery storage facility in the world. However, as noted above, there is actually a 200 MW project in China, a 150 MW project in Korea and a 100 MW project in Los Angeles. The comments pointed to additional utility scale battery projects as well. *Id.* at 4-5, Ex. 2 & 3.

The comments also explained that the duct burners are not guaranteed to be able to meet "extended peaks" because there is no evidence that the duct burners will have natural gas to burn during extended peaks because Palmdale has not shown that it has an uninterruptable supply of natural gas. *Id.* at 4.

The comments also explained that batteries would not redefine the source because batteries would meet the stated purpose of Palmdale, and the duct burners in particular, which is to meet the "energy market's ramping and peak load requirements in the morning and late afternoon, helping to integrate the ramp up and ramp down of solar generation." *Id.* at 5 quoting Fact Sheet at 26. In fact, as noted above, Region 9 own Fact Sheet Appendix 3 included an explanation of

another battery storage facility in Los Angeles which is designed to do exactly that. AR-0004, Fact Sheet at 87, Appendix 3, World's Largest Storage Battery Will Power Los Angeles.

The Conservation Group's Comments went on to explain that batteries actually better meet the business purpose of Palmdale, that is, helping California ISO integrate solar into the grid, than duct burners. AR-0016, Conservation Group comments at 5-6. The comments explain that when there is excess energy on the grid which can endanger the grid, batteries can take this excess energy off the grid but duct burners cannot. *Id.* Not only does this provide grid stability and resilience, it reduces the curtailment of zero emission wind and solar power generation, thus making the grid overall cleaner. *Id.* Duct burners cannot do this.

Finally, the comments explained that batteries can sell ancillary services into the market. *Id.* at 6. The comments explained that Region 9 needed to consider these income streams when it conducted a BACT step 4 analysis. *Id.* The Conservation Groups expected that Region 9 would conduct a new BACT analysis and hold a new public comment period on this new BACT analysis, but it did not.

Region 9 rejected the Conservation Groups comments and issued the final permit. AR-0029, 13.2, Response to Comments (RTC). Region 9 acknowledged that it failed to consider batteries to replace duct burners in its BACT analysis for the draft permit. *Id.* at 16.

Instead, Region 9 undertook a “back of the envelope”³ type of analysis of replacing the duct burners with batteries in its response to comments. *Id.* Region 9 called this a hybrid design although that is not what the Conservation Groups called it and it is not a hybrid system in the sense that the GE 50 MW LM6000 Hybrid EGT facilities are hybrid. The GE 50 MW LM6000 Hybrid EGT is called a hybrid because, as noted above, it operates similar to a most hybrid cars like the Toyota Prius. The Conservation Group’s BACT option of batteries replacing the duct burners would not integrate the mechanical operations of the combustion turbines and steam turbine at Palmdale with the battery. However, control room operations and the switch yard would be integrated so that delivery of the product, that is electricity, would be the same as, and actually better than, Palmdale with duct burners.

Region 9 rejected batteries replacing duct burners at Step 2 and then Step 3 and 4 of the BACT analysis. That is Region 9 said that it would be technically infeasible, would not rank higher than duct burners, and would not be cost effective. *Id.* at 16-18. Region 9 did **not** reject duct burners as redefining the source. *Id.*

Region 9 offered several reasons for why batteries replacing duct burners would be technically infeasible. First, Region 9 said that they were not aware of

³ Region 9 referred to it as a “preliminary analysis”. AR-0029, RTC, at 18.

any projects using batteries replacing duct burners. *Id.* at 16. Region 9 said that BACT does not require the consideration of technologies that have not been applied to or permitted for full scale operations. *Id.* Therefore, batteries in lieu of duct burners were technologically infeasible, according to Region 9.

Region 9 implicitly acknowledged, however, that BACT allows for the concept of technology transfer. *Id.* But, Region 9 rejected this by claiming that there could not be a battery big enough to meet the same output as the duct burners in terms of duration. *Id.* That is, Region 9 said Palmdale can use the duct burners for 1500 hours per year and “has full control” over how to use those 1500 hours. *Id.* Region 9 did not acknowledge what duct burners are actually used for, that is peaking, and even ignored in this context its previous discussion about the business purpose of Palmdale, which is to help the grid deal with peak demands and high ramp requirements. But to its credit, Region 9 did later backtrack and say that “being able to provide battery storage for a continuous period of 1500 hours is not the correct metric to determine whether this technology is feasible.” *Id.* at 18.

Furthermore, later on, Region 9 did acknowledge that the Conservation Groups’ comments discussed the lack of an uninterruptable natural gas supply for Palmdale. *Id.* at 18. However, Region 9 said it was unclear what the commenters are referring to in the context of an “uninterruptable supply of natural gas” for the duct burners. *Id.* Apparently, Region 9 did not understand interruptible versus

uninterruptible natural gas supplies for gas fired power plants, which with all due respect to Region 9, is a basic reality of power plant operations that everyone in the power plant business is familiar with. Or Region 9 chose to ignore that its claim about Palmdale having full control over the 1,500 hours of duct burner use was not true in light of the fact that Palmdale will not actually have full control because its gas supply can be interrupted because of the business needs of Palmdale's gas supplier.⁴

In considering this issue, Region 9 only referenced the Tesla 100 MW project which is only rated at 129 MWH. *Id.* Region 9 did not mention any of the projects it claimed it had reviewed in Appendix 3 of the Fact Sheet or the DOE Battery Database. *Id.* For example, Region 9 did not mention the 100 MW/ 400 MWH project near Los Angeles which would provide the equivalent of the duct burners at Palmdale operating continuously for 8 hours. *See Supra.* Region 9 said that if Palmdale installed the exact same battery system as the Tesla 100 MW project with its 129 MWH this would only provide 2.5 hours of additional power but that Palmdale may need 4 hours of additional power to meet the evening peak in energy demand. AR-0029, RTC, at 16 and ftnt. 11.

⁴ In their comments, the Conservation Groups specifically invited Region 9 to “not hesitate to contact [the Conservation Groups] if [Region 9] have any questions about these comments.” AR-0016, Conservation Group Comments at 23.

Region 9 went on to talk about “multiple batteries,” *Id.* at 17, which seems to indicate that Region 9 did not understand the modular nature of utility scale lithium ion batteries even though the literature Region 9 provided in its Appendix 3 to the Fact Sheet explained the modular natural of utility scale lithium ion batteries. In any event, Region 9 rejected the “multiple batteries” scenario under step 3 or step 4.

In both its step 3 and step 4 analysis, Region 9 assumed that Palmdale would purchase electricity to recharge its batteries at the retail price for electricity. *Id.* at 17. Region 9 assumed that Palmdale could not purchase electricity to recharge its batteries at wholesale prices, which is also referred to as the locational marginal price (LMP). *Id.* Region 9’s assumption was based on a conversation with an unnamed person at Southern California Edison’s (SCE) Norwalk Facility, which is a simple cycle peaker plant with a hybrid battery, who told Region 9 that if SCE where to charge the battery from the grid, they would have to pay “regular” price, which Region 9 interpreted to mean retail prices. *Id.*, citing AR-0027, 12.5, Memorandum re: Summary of Air Permits Office Trip to Southern California Agencies and Industrial Facilities. The Response to Comments makes no mention of FERC Order 841, which requires that battery storage facilities be able to purchase electricity at wholesale rates. *See Ex. 4.*

Under the assumption that Palmdale could not buy electricity to recharge its batteries at wholesale rate, Region 9 assumed that the batteries would be recharged from the combustion turbines at Palmdale. AR-0029, RTC, at 17. Region 9 said this would “not result in a measurable tpy [tons per year] reduction in emissions.” *Id.* at 17. But then, in the next paragraph Region 9 give the reduction in CO₂e as 170,000 tpy. *Id.* And in the next paragraph Region 9 also gives the tpy reduction of NOx and CO. *Id.* Although the Region 9 calculation is incorrect, in that they only considered one of the two duct burners so the values should be twice as high, nevertheless, Region 9 acknowledged that the reductions are indeed measurable.

Region 9 also said there are no energy or environmental impacts associated with using duct burners. *Id.* Region 9 did not consider gas leaks at gas storage facilities an energy or environmental impact. In contrast, the Los Angeles Times considered the blowout at Aliso Canyon natural gas storage well “one of the worst environmental disasters in U.S. history.” Ex. 3. It caused thousands of residents to be evacuated after complaining of headaches and nosebleeds. *Id.* Its energy impacts included disrupting gas delivery to power plants years after the blowout. *Id.* There are 10,000 more storage wells like Aliso Canyon. *Id.*

Region 9 said that if Palmdale’s batteries where recharged from the grid, they would fail under step 4 as not economical. *Id.* Again, in this cost analysis, Region 9 assumed that Palmdale would have to buy electricity at the **retail** rate of

\$0.1135/kwh. *Id.* at ftnt 15. Region 9 assumed Palmdale would need 4 “sets of batteries” comparable to the 129MWH Tesla project in Australia so that “two” could operate during a “long peaking period and two could be recharging or waiting for the next peak in demand.” *Id.* at 17.

Region 9 did not consider any cost savings in its cost analysis. Most obviously, it did not consider the capital cost savings of not building duct burners. It also did not consider the cost savings of reducing the size of other equipment such as the HRSG and steam turbine and generator to account for not having duct burners. For example, the steam turbine and generator could be sized 50 MW smaller. Region 9 did not consider the cost or GHG savings from the improved heat rate that a combined cycle natural gas power plant without duct burners enjoys. It did not consider the cost savings of having to purchase less carbon credits in the California or any other GHG trading program. It also did not consider any additional revenue from the batteries being able to sell ancillary services.

Region 9 concluded that the batteries would result in a cost of \$85/ton of CO₂e removed. *Id.* Region 9 found that \$85/ton is not “within the range that is cost effective for GHGs under a BACT analysis.” Region 9 provided no range of what is cost effective and thus no authority or basis for that range.

C. BATTERIES SHOULD BE BACT FOR THE DUCT BURNER

Region 9 did not reject batteries replacing the duct burners because it would redefine the source. Rather, Region 9 gave four reasons for rejecting batteries. At step 2 of the BACT analysis, Region 9 said there was not a combined cycle natural gas plant that used batteries rather than duct burners to meet peaking need and thus that was not a commercially available technology. Region 9 said under the technology transfer approach to a step 2 analysis, the Conservation Groups did not present evidence of batteries with sufficient duration to meet the needs served by Palmdale's duct burners and Region 9 did not have an obligation to conduct an independent analysis. Region 9 then did a back of the envelope type independent analysis and concluded in step three that batteries would not provide a measurable emission reductions in tons per year of NO_x and CO if the batteries were charged with Palmdale's combustion turbines and thus would not be ranked higher than duct burners. If the batteries were charged from grid electricity, batteries would fail under Step 4 as not cost effective. As explained below, Region 9's analysis fails.

1. REGION 9 DID NOT DECIDE THAT BATTERIES REPLACING DUCT BURNERS WAS REDEFINING THE SOURCES AND THE BOARD SHOULD NOT REVISIT THAT ISSUE.

Region 9 did not reject batteries replacing the duct burners at step 1 of the BACT analysis. Region 9 did not determine that batteries for the limited purpose of meeting peak energy needs that the duct burners would redefine the source.

To the extent Region 9 or any other party to this case argues that replacing duct burners with batteries should not be included in step 1 of the BACT analysis, the Board must reject that argument. The decision to exclude a control alternative in step 1 as defining the source is discretionary with the permitting authority, which in this case was Region 9. *In re Arizona Public Service Company*, 17 EAD 323, 328 (EAB Sept. 1, 2016)(*APS*). Region 9 exercised its discretion to include batteries replacing the duct burners in Step 1, in response to the Conservation Groups' comments. No one has appealed that issue and so it is beyond the scope of this case.

Region 9's included batteries replacing the duct burners was completely consistent with the Board's decision in *APS*. In that case, the Board states that *APS* should not be read as "an automatic off-ramp for energy storage technology as a consideration in Step 1 of future BACT analyses." *Id.* at 347. Back in 2016, the Board noted that there were promising developments in the recent evolution of energy storage technology. *Id.* As explained above, there are commercially

developed energy storage projects that are many times larger than when Palmdale needs, both in terms of MW and MWH.

We will note that replacing the duct burners with batteries would not redefine the source. Palmdale will still be a load following facility to help the grid with ramps and peaks created by integrating large amounts of renewables, especially solar PV. Batteries would just make it better at this because it could ramp quicker and it could provide other functionality like absorbing electricity if solar pv was overproducing what the grid could handle. Palmdale will also still be a combined cycle natural gas plant with its primary fuel being natural gas.

**2. UTILITY SCALE BATTERIES ARE A
COMMERCIALY AVAILABLE TECHNOLOGY AND
THE FACT THAT THEY WOULD BE CO-LOCATED AT
A COMBINED CYCLE NATURAL GAS POWER PLANT
DOES NOT CHANGE THAT FACT.**

Region 9 rejected batteries replacing duct burners at Step 2 of the BACT analysis because they said that they were not aware of any power plant projects where batteries had replaced duct burners. AR-0029, RTC, at 16. Region 9 claimed that “technologies” that have not at least been applied to (or permitted for) full scale operations are not considered to be technically feasible. *Id.* Region 9 determined that replacing the duct burners with batteries at Palmdale would fall into this category.

This is largely an academic point. As explained in the next section, Region 9 acknowledged that BACT has long accepted the concept of technology transfer.

Nevertheless, the technologies at issue here are combined cycle natural gas power blocks and utility scale batteries. There is no dispute that combined cycle natural gas power blocks are available and mature.

Nor should there be any reasonable dispute that utility scale batteries are available because they have been applied to and permitted for⁵ full scale operation. For example, there are currently operating utility scale batteries. AR-0004, 2.2, Fact Sheet at 87, Appendix 3, “A look at the new battery storage facility in California built with Tesla Powerpacks. Some in California have been on line since at least 2014. *Id.* DOE’s Global Storage Database shows over 1,000 utility scale batteries larger than 10 MW.⁶ Scientific America has described a 100 MW/400 MWH battery system as a technology which “seems mature.” AR-0004, Fact Sheet, at 87, Appendix 3, World’s Largest Storage Battery Will Power Los Angeles.

So Region 9’s qualm here appears to be there is no evidence in the record of a co-located combined cycle natural gas plant and utility scale battery. There are battery storage facilities located adjacent to peaking power plants. AR-0004, 2.2,

⁵ Region 9 probably meant obtained an air pollution permit when it said “or permitted for.” However, it would be arbitrary to discriminate against batteries because they do not emit air pollution and therefore do not need air pollution permits.

⁶ Available at <http://www.energystorageexchange.org/projects>

Fact Sheet at 87, Appendix 3, “A look at the new battery storage facility in California built with Tesla Powerpacks.” There are utility scale batteries integrated into the operations of simple cycle natural gas power plants. AR-0029, RTC, at 16. But no evidence of a utility scale battery and a combined cycle natural gas plant on the same property.

Region 9’s position fails because co-location is not a technology. There are two technologies; utility scale batteries and combined cycle natural gas plants. Putting them at the same location does not somehow convert them from mature technologies to not mature technologies.

3. REGION 9’S OWN EVIDENCE SHOWS THAT THERE ARE COMMERCIAL AVAILABLE BATTERIES, ESPECIALLY CONSIDERING THE MODULAR NATURE OF BATTERIES, CAPABLE OF SERVING THE NEEDS ADDRESSED BY PALMDALE’S DUCT BURNERS

Region 9 did acknowledge that the technology transfer concept does allow technologies which have been proven elsewhere to be considered for BACT in a setting in which they have not previously been applied. AR-0029, RTC at 16. However, Region 9 rejected batteries in Step 2 as technically infeasible because Region 9 claimed that one particular facility which the Conservation Groups had referenced in their comments, the Tesla 100 MW facility in Australia, could only

provide 2.5 hours of equivalent generation from the duct burners, but Palmdale may need four hours. *Id.*⁷ There are numerous flaws in this analysis.

The first is even though one particular battery system would only offer 2.5 hours of power equivalent to the duct burners, others would offer 4 hours or more. Region 9 claims it is not required to conduct an independent analysis. However, a review of Region 9's own data that it included in the record demonstrates systems with adequate duration to meet Palmdale's need are commercially available. It is one thing to not conduct an independent analysis. It is another thing for Region 9 to ignore its own data which it claims it reviewed and then put into the record and Fact Sheet.

Reviewing Region 9's own data, there are batteries which offer 4 hours of storage. AR0004, 2.2 at 87, Appendix 3, "A look at the new battery storage facility in California built with Tesla Powerpacks". This is an existing 20 MW facility which provides 80 MWH of storage. *Id.*

Region 9's own data identified also identified a contracted battery facility that is a 100 MW and provides 4 hours of storage which works out to 400 MWH.

⁷ In support of this assertion that Palmdale's will need four hours of equivalent generation, Region 9 points to a chart of system demand in California. *Id.* at 16, fnnt 12 citing to *Id.* at 27, Figure 2. Figure 2 on page 27 actually shows a 3 hour peak, not 4 hours. *Id.* However, for the sake of argument, Petitioners will assume that Palmdale needs to respond to 4 hour peaks. The two duct burners are rated at 193.1 MMBtu/hr each. AR-0028, Final Permit, at 2. They are limited to 2.75×10^8 SCF per year. 2.75×10^8 scf/year \times 1037 Btu/ft³ \times 1MMBtu/10⁶ Btu = 285,175MMBtu/yr divided by 193.1 MMBtu/hr equals 1476 hours per year per unit. 1476/366 = approximately 4 hours per day.

Id. at World's Largest Storage Battery Will Power Los Angeles. This is equal to 8 hours of storage to serve the 50 MW equivalent of Palmdale's duct burners even though Palmdale is only allowed 4 hours per day if it used the duct burners the same amount every day. This system is also essentially big enough to serve the scenario Region 9 developed in its cost analysis, discussed below, of Palmdale having two sets of batteries so that one can be delivering 4 hours of 50 MW and another can be standing by or charging. If Southern California Edison could contract for this system from AES Corp. in 2016 after reviewing 1,800 other offers, there is no reason why Palmdale cannot do the same in 2018, or more likely in 2020.

There are even other, larger systems in the information Region 9 provided to the public in its Fact Sheet. There is a Chinese 200 MW/800 MWH system. *Id.* at List of energy storage projects, Wikipedia. This system is twice as large as the largest system Region 9 postulated and four times as large as the system Palmdale actually needs to meet its stated business need. Region 9's Fact Sheet also included a 150 MW lithium-ion system of unspecified duration in South Korea.

However, whether there are battery storage systems that are currently 50 MW/200 MWH or 50 MW/400 MWH should not be the deciding factor in the Step 2 analysis. As explained above, it is not subject to reasonable debate that utility scale lithium ion batteries have been demonstrated in practice and are

commercially available today. Lithium ion batteries are actually modular systems, consisting of hundreds of closet-sized batteries sitting on concrete pads. *Id.* at 87, Appendix 3, “A look at the new battery storage facility in California built with Tesla Powerpacks”. These closet-sized batteries are themselves made up of thousands of lithium ion battery packs. *Id.* at World’s Largest Storage Battery Will Power Los Angeles.

Region 9 did not identify any chemical or physical characteristics that differ between larger or smaller utility scale lithium ion batteries. That is because there are none. It is differences in chemical or physical characteristics which would exclude technology transfer under Step 2. For lithium ion batteries, larger and longer duration systems are only a matter of space, which is not an issue for Palmdale, and money, which is relevant to Step 4 not Step 2.

Region 9 did apply technology transfer correctly in regarding to CO and the auxiliary boiler by looking at chemical and physical characteristics, that is the air flow and temperature. *See* AR-0029, RTC at 38. Similarly, SCR cost evaluation was based on “scale up” from SCR on a boiler that was less than half the size of the auxiliary boiler at Palmdale. *See* AR-0004, 2.2, Fact Sheet at Appendix 5. Region 9 erred by not considering the same chemical and physical characteristics, to determine if a utility scale lithium ion battery is technically feasible for Palmdale.

Region 9 also erred in both Step 2 and Step 4 by setting the bar too high in terms of what a battery system at Palmdale must be able to do. Region 9 stated that “the Applicant has full control over how to use those 1,500 hours [that the duct burners are permitted to operation.]” AR-0029, RTC, at 16. This is plainly erroneous.

If the current configuration cannot meet its stated business need, then it would be arbitrary for Region 9 to reject another control option for not being able to meet the needs. Palmdale, with its current configuration of duct burners suffers from two short comings that could, theoretically, present the same problems as batteries losing their charge. First, as Region 9 of course acknowledges, the Permit limits the natural gas to the equivalent of 1,500 hours per year. Just as a battery could run out of charge, the duct burners could run out of permitted natural gas to burn.

The second related problem is that there is no requirement in the Permit for Palmdale to have a contract for an uninterruptable supply of natural gas and there is no evidence in the record that Palmdale has, or even can, obtain an uninterruptible supply of natural gas, especially one to serve both the combustion turbines and the duct burners. As noted above, the Conservation Groups raised this issue in their comments but Region 9 did not seem to understand what this means and did not accept the Conservation Groups’ invitation to ask them about the issue.

Even if one ignores times when the duct burners are not available due to routine maintenance and forced outages due to equipment failure, an interruptible supply of gas means the Applicant does not have full control over the use of its 1,500 hours of permitted duct burner use.

Nor is Palmdale a dual fuel facility with on-site backup fuel like fuel oil. Perhaps if that was the case, Region 9's analysis of what batteries must be capable of doing would have been fair.

In reality, almost every merchant gas-fired power plant in the country is on interruptible natural gas, otherwise they would be the last unit called to provide power in a competitive power market due to higher fuel costs. California is a competitive power market (CAISO). All of the merchant gas-fired power plants in the LA Basin, which is most of them, are on interruptible gas. Most of those operators were storing gas in Aliso Canyon. Even the LADWP generators are on interruptible gas, which they get from SoCalGas. However, many of the LADWP generators have dual-fuel capability, so they have an onsite solution if their gas gets interrupted.

Region 9's analysis makes it sound like Palmdale is responsible for "keeping the lights on." But reality is Palmdale is a merchant plant and its responsibility is to make money for its owners. CAISO's responsibility is to keep

the lights on and it does it by using a wide variety of resources, one of many may be Palmdale.

4. REGION 9 ERRORED BY REJECTING BATTERIES AT STEP 3

a. REGION 9 ERRED AS A MATTER OF LAW IN ASSUMING THAT PALMDALE CANNOT BUY ELECTRICITY TO RECHARGE BATTERIES AT WHOLESALE RATES WHEN CALIFORNIA DOES ALLOW THAT AND FERC ORDER 841 GUARANTEES IT.

In its Step 3 analysis, Region 9 concluded that Palmdale would have to recharge its batteries with electricity from its own combustion turbines because if it recharged them with electricity from the grid, Palmdale would have to pay retail rates. *Id.* at 17. This is a plainly erroneous legal conclusion.

FERC Order 841 provides that “each RTO/ISO must specify that the sale of electric energy from the RTO/ISO markets to an electric storage resource that the resource then resells back to those markets must be at the wholesale locational marginal price.” Ex. 1, Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Order No. 841 (Feb. 15, 2018) (FERC Order 841) at ii. Thus, as a matter of law, Palmdale would be able to charge its batteries with grid electricity while there is significant solar PV, as well as other renewables, and pay wholesale rates. It is

worth noting that CAISO did allow storage devices to purchase electricity at wholesale prices even before FERC Order 841 was issued.

However, Region 9 was not factually wrong about the Southern California Edison's Norwalk Facility, This hybrid simple cycle combustion turbine and battery facility is interconnected and registered only as the single generator but only because that is how its owner chose to register it. So CAISO does not "see" a storage device, and energy from grid should be retail.

b. REGION 9 PLAINLY ERRED FACTUALLY IN CONCLUDING THAT THE NO_x AND CO EMISSION REDUCTIONS ARE NOT MEASURABLE WHEN REGION 9 PROVIDED THE MEASURE OF THESE REDUCTIONS AS WELL AS GREENHOUSE GASES.

Region 9 legal error above is sufficient grounds for granting this petition. However, we will further note that as to Step 3, Region 9 was plainly factually wrong when it said batteries "would therefore not result in measurable tpy reductions in emissions." *Id.* at 17. We know this is wrong because in the very next paragraph, Region 9 states that charging the batteries with Palmdale's own combustion turbines would result in a reduction of only about "1.0 tpy of NO_x and 2.6 tpy of CO." *Id.* at 18. Thus, the tpy reduction can be measured.

Actually, though those figures are for only one duct burner and there are two of them. The emission limits are from “each CTG unit”. AR-0028, Final Permit, at 5, Condition 18. There is a 1.4 lb/hr different between duct burners and no duct burners so that works out to 2.1 tpy ($1.4 \text{ lb/hr} * 2 \text{ ductburners} * 1500 \text{ hr/yr} / 2000 \text{ lb/ton} = 2.1$). Following a successful demonstration period, the CO reductions would be 5.25 tpy. ($3.5 \text{ lb/hr} * 2 \text{ ductburners} * 1500 \text{ hr/yr} / 2000 \text{ lb/ton} = 5.25$).

It could be that Region 9 meant to say there would be no significant pollution reduction rather than no measurable reduction. However, we cannot be required to guess at what Region 9 might have meant. *State Farm Mut. Auto. Ins. Co.*, 463 U.S. at 48. Moreover, “significant” would have to be gauged considering the Palmdale is located in an area which is a severe ozone nonattainment area for both the 1997 and the 2008 ozone national ambient air quality standard. NO_x and CO are both ozone precursors and Palmdale’s duct burners would tend to operate on hot sunny days when ozone formation tends to be the worst.

Finally, as to Step 3, batteries have an energy advantage over duct burners. As explained elsewhere, batteries can do things that serve Palmdale’s business purpose that the duct burners cannot. For example, Palmdale’s business purpose is the serve CAISO’s need to integrate renewables, especially solar. The batteries can absorb electricity when there is too much electricity on the grid, again

effectively on an instantaneous basis. Duct burners have zero ability to absorb excess electricity on the grid caused by a rapid increase in solar PV output.

5. REGION 9 ERRORED BY REJECTING BATTERIES AT STEP 4

a. REGION 9 ERRED AS A MATTER OF LAW IN ASSUMING THAT PALMDALE CANNOT BUY ELECTRICITY TO RECHARGE BATTERIES AT WHOLESALE RATES WHEN CALIFORNIA DOES ALLOW THAT AND FERC ORDER 841 GUARANTEES IT.

Region 9's Step 4 cost analysis was based on Palmdale having to buy electricity at the retail rate, that is \$0.1135/kwh. *Id.* at 17, ftnt. 15. This was \$8.9 million per year or 61.4% of the annualized cost. But as explained above, this was a clearly erroneous legal finding because FERC Order 841 mandates that Palmdale's battery storage system could buy electricity at the wholesale rate.

Region 9's Step 4 analysis also had a clearly erroneous "fact." That is it effectively assumed that the electricity which went into the batteries never came out but rather just disappeared. It did not include the sale of this electricity, even at a wholesale rate, which is what would happen. *Id.*

Even if we leave the capital cost as Region 9 assumed, which, as explained below, is actually twice as high as it should be, the price per ton could still plunge to around \$19/ton if we correctly assume that Palmdale would be buying and

selling electricity for and from the batteries at wholesale rates. If we assume that Palmdale can sell its electricity for \$30/mwh more than it buys it, even though the daily swing in CAISO wholesale prices can be twice that at \$60/mwh, that would equal \$2,340,000 per year in income from the 78,000 mwh that the duct burners are permitted for. *See e.g.* Ex. 5 at 1 and 2. Thus, the \$14.5 million annualized cost minus the \$8.9 million in retail electricity purchases minus the \$2.34 million in income from buying at low wholesale prices and selling at higher wholesale prices equals \$3.26 annualized cost. When divided by the 170,000 tpy of CO₂e Region 9 used, that comes out to \$19.18. Again, that is including a capital cost which is more than twice as high as it should be and it ignores revenue stacking from income streams such as ancillary services and resource adequacy.

b. REGION 9 ERRED AS A MATTER OF LAW BY NOT CONSIDERING COST SAVINGS AND ADDITIONAL REVENUE FOR BATTERIES

Not only did Region 9's cost analysis get the cost of electricity to charge the batteries wrong, Region 9 also failed to consider capital cost savings. Region 9's analysis included the capital cost of a battery system but did not subtract the savings from not building the duct burner. Also, without duct burners the HRSG, steam turbine and generator would all be smaller. Region 9 failed to include any of these savings.

Region 9 also did not include an additional income from “revenue stacking,” that is the multiple revenue streams that the battery storage system could generate, some of which the duct burners cannot provide. *See* AR-0004, Fact Sheet at 87, App. 3, “5 battery energy storage projects to watch in 2016.” This includes ancillary services like frequency regulation, managing demand during peak periods, and providing reliable back-up power. As mentioned above, batteries have the ability to absorb excess electricity from the grid but duct burners do not. Batteries could also provide these at any time, whereas the duct burners are limited to 1,500 hours per year and can only operate when the combustion turbines are operating.

c. REGION 9 ERRED AS A MATTER OF FACT BY ASSUMING PALMDALE WOULD NEED TWO “SETS” OF BATTERIES AND OVERESTIMATED CAPITAL COSTS.

Region 9’s cost analysis assumed that “would need at least 4 sets of batteries comparable to the 129MWh project in Australia (two that could operate during a long peaking period and two that are being recharged or waiting for the next peak in demand.)” AR-0029, RTC at 17, ftnt. 15. Region 9 assumed this would cost \$200 million based on a 2017 Forbes magazine article. *Id.*

Yet, earlier, Region 9 had said peaks are 4 hours, even though the evidence Region 9 pointed too actually showed a 3 hour peak. Again, this is a merchant

plant. It's function is not to keep the lights on in California all by itself. Its function is to make money off of serving CAISO's ramping and peak needs created by extensive PV on the system.

The evidence in the record shows that the 100 MW battery storage facility in Southern California will charge in the afternoon mainly off of cheap PV, provide peak power during the ramp when the PV cuts out, and then charge again over night to serve the morning peak. AR-0004, 2.2, Appendix 3, World's Largest Storage Battery Will Power Los Angeles. There is no reason to think Palmdale would not do the same.

There is also no reason to this Palmdale will buy its batteries in 2017. It is common knowledge in the industry that the price of batteries are dropping rapidly. Palmdale has said they expect to begin commercial operations in 2021. Ex. 1. That means, even assuming it would take a whole year to install the battery system rather than the two months it took Tesla to install 50 MW in Australia, Palmdale could purchase its battery system in 2020.

Turning to a more authoritative source than a general circulation magazine, the New York State Energy Research and Development Authority (NYSERDA) puts the cost of a 4 hour battery in 2020 at \$1280 / kw. Ex. 6, NYS Energy Storage Roadmap, at 11. This would be \$64 million capital cost rather than the \$200 million used by Region 9. This is conservative because it includes bulk

distribution or transmission system installed cost and land lease costs, which is already including in the Palmdale plant. *Id.* Even if one assumed Palmdale needed a 50 MW system with 6 hours of storage, that would still only be \$1,800 per kw in 2020. *Id.* That works out to \$90 million, or less than half the capital cost assumed by Region 9. Therefore, Region 9 plainly erred in its capital cost estimate in Step 4.

If the annualized capital costs based on the 6 hours of storage were \$90 million rather than \$200 million, that is 45% of Region 9's estimated \$6.67 million, or \$3 million. This is less than the \$1.1 million in natural gas savings plus the \$2.34 million in income from buying wholesale electricity when it is cheap and selling it when it is more expensive. In other words, the dollars per ton of GHG for batteries would be less than \$0. Although Region 9 does not tell us what is an acceptable dollars per ton figure, obviously, less than \$0/ ton is cost effective. This conclusion makes sense. If there was not money to be made in battery storage, companies would not be doing it.

II. REGION 9 FAILED TO INCLUDE EMISSIONS FROM THE JET ENGINES AND IMPACTS ON PLANT 42 PROPERTY IN ITS ONE-HOUR NO_x NAAQS AMBIENT IMPACTS ANALYSIS

A. FACTS AND BACKGROUND

Region 9 explained:

A PSD permit applicant for a new major stationary source must provide separate modeling analyses for each criteria pollutant (other than nonattainment pollutants, which are not subject to PSD review)[] with potential emissions at or above the applicable PSD significant emission rate (SER). [] Modeling is performed in accordance with the EPA's Guideline on Air Quality Modeling, in Appendix W to 40 CFR Part 51 (Appendix W). AERMOD with its default settings is the standard model choice. A cumulative impact analysis under 40 CFR 52.21(m) is required for each such criteria pollutant unless a preliminary project-only analysis is conducted that the permitting authority determines is sufficient to demonstrate that the project will not cause or contribute to a violation of the applicable NAAQS and PSD increments.

...

When a cumulative impact analysis is conducted for a pollutant, the analysis must demonstrate that the Project under consideration will not cause or contribute to a NAAQS or increment violation. A cumulative impact analysis includes appropriate nearby pollution sources in the modeling, **and** adds a monitored background concentration to account for sources not explicitly included in the model. Required model inputs characterize the various emitting units, meteorology, and the land surface, and define a set of receptors.

AR-0004, 2.2, Fact Sheet at 49 (emphasis added).

Region 9 again explained that modeling is based on considering three categories of pollution, (1) the source applying for a permit, (2) nearby sources, and (3) a background value. Region 9 explained:

A cumulative impact analysis for comparison to the NAAQS includes nearby sources in addition to the project undergoing PSD review. ... For demonstrating compliance with the NAAQS, a background concentration is added to represent those sources not explicitly included in the modeling, so that the total predicted impact accounts for all contributions to current air quality.

Id. at 66.

There is a national ambient air quality standard (NAAQS) for nitrogen dioxide (NO_x) based on a 1-hour averaging time. It is the three year average of the 98% percentile of the 1-hour daily maximum value. The level is 100 parts per billion which translates to 188 micrograms per cubic meter (ug/m³). *Id.* at 51.

Palmdale is above the significant emission rate for NO_x. *Id.* at 50. Thus, it performed a modeling analysis.

Region 9 and Palmdale agreed that the preliminary modeling analysis for the 1-hour NO_x NAAQS showed that a cumulative analysis was necessary. *Id.* at 52. For the Palmdale project only impacts, the maximum projected impact was 57 ug/m³. *Id.* at 53. Although not the highest, there were high impact levels from the Palmdale project alone on and near the runway shared by the Palmdale Region Airport and the Plant 42 Government Owned/Contractor Operated (GOCO). *Id.* These were in the 40-45 ug/m³ range. *Id.*

For “monitored background concentration to account for sources not explicitly included in the model” Palmdale chose, and Region 9 accepted, the Lancaster Division Street monitoring station which “is the nearest station

available.” *Id.* at 51. The value at this monitoring station was 81 ug/m³ although Region 9 ended up not using this value but rather used an hourly seasonal background value. *Id.* at 51, 58, note. Palmdale was totally at liberty to gather on-site background NOx values but it chose not to do this.

Region 9 also explained that “building downwash (that is, turbulence created by the nearby buildings) and conditions related to stagnant air play a greater role than the prevailing winds when evaluating the maximum impacts.” *Id.* at 52. Furthermore, “prevailing winds” are not relevant to the 1-hour NOx NAAQS because, by definition, 98% of the wind direction and speed are not relevant as the value is based on only 2% of the ambient impact values out of an entire year.

For the cumulative impact analysis, Region 9 said the maximum impact was 126 ug/m³. *Id.* at 58. However, this cumulative analysis ignored impacts on the Palmdale Regional Airport/Plant 42. *Id.* at 59, figure 8; AR-0003, 1.1, Application, Main Document at 6.4-1 – 2. The Application states:

Concentrations within the facility fenceline were not calculated. Neither were impacts calculated for locations inside the Plant 42 fenceline in the NO₂ and PM₁₀/PM_{2.5} cumulative impact analyses which includes sources at the Lockheed-Martin, Northrup-Grumman, and Boeing facilities inside Plant 42 (Plant 42 is not open for public access).

Id. The Applicant claimed this was based on the fact that “Plant 42 is not open for public access.” *Id.* The Applicant acknowledged that Plant 42 included Lockheed-Martin, Northrup-Grumman and Boeing facilities.

Region 9 claimed that Palmdale did model impacts within Plant 42, just without the Plant 42 impacts included. AR-0004, 2.2, Fact Sheet at 74. However, Region 9 provided no citation to this claim which contradicts what the Applicant stated it did in its modeling.

The highest impact was right on the border of Palmdale Regional Airport/Plant 42, which would seem to indicate that higher values would have been detected if Palmdale Regional Airport/Plant 42 was not ignored. AR-0004, 2.2, Fact Sheet at 59. However, for the cumulative impact analysis for the 24-hour PM2.5 NAAQS, the modeling did look at impacts on the Palmdale Regional Airport/Plant 42 area. *Id.* at 62, Figure 11.

Region 9 said it did an additional analysis that included “impacts from USAF Plant 42 sources inside the Plant 42 fence line”. *Id.* at 74 & Appendix 6. This resulted in impacts of 175 ug/m³ or 93% of the NAAQS. But by USAF Plant 42 sources, Region 9 meant the stationary sources operated by Boeing, Lockheed and Northrup-Grumman. AR-0003, 1.1, Application at 7.4-4, Tab 7-5. Region 9 did not include emissions from airplanes using the runways at the Palmdale Regional Airport/Plant 42. *Id.*

In terms of which nearby pollution sources to include in the cumulative impact analysis, Region 9 explained that for NO_x, the inventory “should focus on the area within 10 kilometers of the project location.” AR-0004, 2.2, Fact Sheet at

67. The runways at the Palmdale Regional Airport/Plant 42 are within 10 kilometers of Palmdale. *Id.* at 59. At their closest, they are less than ½ a kilometer away and at their furthest, around 4 kilometers away. *Id.* The Applicant described the Palmdale Airport meteorological monitoring site as 2.5 kilometers away from Palmdale, which the Applicant described as “very close proximity”. AR-0003, 1.1, PSD Permit Application for Palmdale Energy Project - Main Application Document (Application) at 6.5-2. The nearest part of the runway is actually significantly closer to the proposed power plant than the meteorological monitoring site, which is referred to as ASOS. *Id.* at 6.5-12.

Yet, Palmdale did not include emissions from aircraft using the runway, which as in very close proximity. *Id.* at 7.4-4, Table 7-5.

The Conservation Groups submitted comments explaining that Air Force Plant 42 and the Palmdale Regional Airport share a common runway. AR-0016, Conservation Group Comments, at 15. The Comments explained that that the runways are used by the B-2 Bomber, which is an old jet design not subject to an emission limit which indicated its NOx emission were likely very high. *Id.* The comments explained that NOx emissions from the planes using the runway are substantial and possibility greater than the emissions from Palmdale itself. *Id.* at 14.

The Comments explained that the modeling did not include emissions from airplanes using the runways despite the fact that Palmdale's NOx impacts overlap with the runway and the modeled impacts without the planes is very close to the NAAQS. *Id.* The Comments explained that the cumulative NAAQS modeling needed to include emissions from the aircraft. *Id.* The comments also explained that the modeling had to include receptors inside the Plant 42 fence line. *Id.* at 15-16.

In the Response to Comments, Region 9 admitted that "cumulative modeling conducted for 1-hr NO2 ... did not include Plant 42 receptors". AR-0029, RTC at 55. Region 9 said this was because:

(1) the Applicant did not need to model Plant 42's impacts within Plant 42's own fenceline, (2) there were no additional nearby sources outside Plant 42 that required modeling, and (3) the PEP's impacts within the Plant 42 fenceline had already been modeled in the Project-only analysis.

Id. Region 9 said the excluded receptors within Plant 42 because "Plant 42 is closed to public access". *Id.* at 56.

Region 9 stated that the Palmdale Regional Airport is within the Plant 42 complex. AR-0029, RTC at 55. Region 9 included a reference to a Wikipedia page which said the Palmdale Regional Airport has not had commercial operations since 2008. *Id.* at Ftnt. 57. However, Region 9 did not deny that civilian general aviation aircraft can still use the Palmdale Regional Airport. *See e.g.* Ex. 8

(Cessna C172 using the Palmdale Regional Airport on 5/28/18); AR-0029, RTC at Ftnt. 72 (“transient aircraft may use the runways.”).

Region 9 stated that it did not need to consider aircraft emissions on Plant 42 property because it was not considered ambient air because the public does not have access to it. *Id.* at 58. As to aircraft emissions off of Plant 42’s property, Region 9 said it expected impacts to be similar to other mobile sources. *Id.*

B. ARGUMENT

1. REGION 9 FAILED TO CONSIDER IMPACTS ON PLANT 42 EVEN THOUGH THE PUBLIC HAS ACCESS TO IT AND IT HAS LESSEE

Region 9 did not consider the impacts of the NO_x emissions from manufacturing facilities or the aircraft during takeoff and landing within the Plant 42 boundary in the cumulative 1-hour NO_x NAAQS analysis because Region 9 determined that Plant 42 is not open to the public. Failing to consider these NO_x emission impacts within Plant 42 was an error.

To begin with, Plant 42 is ambient air because it is open to the public. Region 9 acknowledges that Plant 42 and Palmdale Regional Airport share runways. However Region 9 states that the Palmdale Regional Airport ceased commercial operations in 2008.

While this may be true, the public can still access the joint runway by flying into the Plant 42/Palmdale Regional Airport. Region 9 acknowledges that there can be transient aircraft using the runways. AR-0029, RTC at Ftnt. 72. These can include civilian general aviation aircraft. In fact, a review of the most recent data shows that on May 28, 2018, a civil aircraft, that is a Cessna C172 was landing and taking off from the Plant 42/Palmdale Regional Airport. *See e.g.* Ex. 8 (Cessna C172 using the Palmdale Regional Airport on 5/28/18). Thus, because the general public has access, it is ambient air and Region 9 must include receptors and consider Plant 42 emissions and aircraft emission impacts on those receptors.

Furthermore, the Palmdale Airport still has a meteorological data gathering system referred to as ASOS (Automated Surface Observing System). AR-0003, Application at 6.5-1. Civilians will still need to access this too. There may be other aspects of the Palmdale Regional Airport which still require public access even if it is accessed by flying in.

The Applicant's permit consultant also acknowledged that the Palmdale Regional Airport public terminal may reopen someday. AR-0027, 12.31, Email between G. Darwin, Atmospheric Dynamics, C. Anderson, MDAQMD, and L. Beckham, at 2. The Permit lasts forever and it does not prohibit the Terminal from reopening to the public. Thus, without this assurance, the whole Palmdale Regional Airport must be considered ambient air.

EPA has long held that areas which provide transportation to the public, such as a road, are “clearly ambient air” and must be modeled. AR-0027, 12.28, Memorandum Re: Ambient Air from G.T. Helms, Chief, Control Programs Operations Branch, EPA Office of Air Quality Planning and Standards, to Steve Rothblatt, Chief, Air Branch, EPA Region VI, at 1. EPA has said that even if there is “only a very remote possibility that the public would attempt to use [a] property” it should be considered ambient air. *Id.* Here, it is not only at least a very remote possibility of the public using the property, they are indeed doing so. Therefore, it is ambient air which must be modeled for all sources of pollution.

But even if the Board found that Plant 42/Palmdale Regional Airport are not open to the public, which it should not, Region 9’s analysis is still fatally flawed. Region 9 just assumed that all of Plant 42 should be treated as not ambient air and no emissions from any source on Plant 42 should be considered within Plant 42. This simplistic approach is inconsistent with EPA guidance.

Plant 42 is a government owned, contractor operated (GOCO) facility. AR-0029, RTC at 54. Thus, under the Clean Air Act, there are at least four separate facilities. They are the airport, the Boeing, the Lockheed and the Northrup

facilities.⁸ AR-0027, 12.32, Email from V. Rausch, AVAQMD to L. Beckham, EPA Re: CO Emissions from Plant 42 sources.

The airport part of Plant 42 is a separate SIC code from the aircraft factories. See https://www.osha.gov/pls/imis/sic_manual.display?id=926&tab=description. Thus, the Airport is a separate facility from the three contractor operated facilities and those three facilities are separate facilities because they are not under common control.

EPA's guidance explains:

When two (or more) companies operate separate sources on property owned by one company and leased in part to the other, and the lessor grants the lessee sole control over who may access the leased property (e.g., leased property with direct access via entrance on outer perimeter of lessor's land):

The air over the property retained for use by the lessor is not ambient air to the lessor if public access is precluded.

The air over the lessor property is ambient air to the lessee.

The air over the leased property is ambient air to the lessor.

The air over the leased property is ambient air to the lessee unless the lessee acts to preclude public access to the leased property.

Ex. 7, Interpretation of "Ambient Air" In Situations Involving Leased Land Under the Regulations for Prevention of Significant Deterioration at 2-3. But in its

⁸ We say "at least" because Lockheed has two separate areas which are not contiguous so they may be two separate facilities.

response to comments, Region 9 wholly failed to consider the relationship between the four facilities which make up Plant 42. This failure demands a remand of the Permit for a new NO_x NAAQS analysis.

2. REGION 9 FAILED TO CONSIDER AIRCRAFT EMISSIONS IMPACTS OUTSIDE OF PLANT 42

Region 9 also failed to consider the jet engine impacts to receptors off of Plant 42. Region 9 justifies this based on a non-modeling, qualitative analysis about what it expects aircraft NO_x emission impact to be.

But Region 9 itself said in the Fact Sheet that the cumulative impact analysis has to be based on modeling. *See also* 40 C.F.R. § 52.21(l)(1). The Board should not accept a post hoc, qualitative analysis as a substitute for modeling.

This is especially appropriate because nowhere does Region 9 discuss military jets. While Region 9 does discuss some examples of civilian aircraft, it is not analogous because civilian aircraft are subject to emission limits but military aircraft is not. *See e.g.* 77 Fed. Reg. 36,342, 36,343 (June 18, 2012).

Region 9 also tries to redefine EPA's guidance on NO_x analysis. Prior to the Conservation Groups raising the issue of considering the aircraft emissions, Region 9 acknowledged that EPA's guidance said that additional sources within 10 kilometers of the applicant's source should be considered. AR-0004, 2.2, Fact

Sheet at 67. But in its response to comments, Region 9 tries to shrink that distances because the jets are clearly within 10 kilometers of Palmdale.

Finally, Region 9 erred by considering irrelevant factors in its *post hoc* qualitative analysis. Region 9 talks about takeoffs and landings in certain directions “rarely occurring” and “prevailing wind direction”. *Id.* at 61. All this is arbitrary in the context of a NAAQS based on an 1-hour averaging time and where over 98% of the hours in a year are not relevant to whether there is a NAAQS violation.

III. REGION 9 SHOULD HAVE REQUIRED A CUMULATIVE IMPACT ANALYSIS FOR CO AND ANNUAL NO_x

The Fact Sheet issued with the Draft Permit relied on so-called significant impact levels (SILs) for the analysis of the project-only emissions to determine whether to conduct a cumulative impact analysis. However, the response to comments issued with the Final Permit provides new justifications and states that “this conclusion is justified and appropriate even without any consideration of or comparison to the SILs.” The revisions made to the CO and annual NO_x analysis regarding emissions associated with Plant 42 were not included in the Fact Sheet issued with the draft permit at the time of public comment. These issues arose from

the changes made by the Region between the draft and final permit. 40 C.F.R. § 124.13.

Petitioner raised issues with the lack of cumulative impacts analysis for CO and annual NO_x in our comments and specifically explained both that reliance on SILs for the project-only impacts was in error and that the failure to provide any modeling for aircraft using the adjacent runways and jet engine manufacturing facilities at Plant 42 was arbitrary and rendered the lack of a cumulative impacts analysis inadequate. (Comments at 13-14.)

Region 9 claimed that if a source by itself does not exceed a significant impact level (SIL) which it has decided to use, Region 9 may allow the permittee to avoid doing a cumulative impact analysis if Region 9 feels like that is appropriate, on a case by case basis, based on the record. AR-0004, 2.2, Fact Sheet at 51. EPA is incorrect. The statute and regulations require that sources demonstrate that they will not cause or contribute to a violation of the NAAQS and increments. This demonstration requires consideration of nearby sources, background concentrations, and the permittee's source.

For Palmdale, Region 9 proposes that because the project itself has impacts below the CO 1-hour and 8-hour SIL, a cumulative impact analysis is not required for CO. *Id.* at 57. Region 9 cites to 40 CFR 51.165(b)(2) as authority for these

SILs. *Id.* But 40 CFR 51.165 does not apply to this permit. Rather, 40 CFR 51.165 prescribes what must be in state permitting programs.

The Fact Sheet also states that a cumulative analysis is not required because project-only impacts and background concentrations are very small in comparison to the relevant CO NAAQS. The Fact Sheet ignores the fact that Palmdale is right next to airport runways which are mainly used by military aircraft. *Id.* at 53.

Military jets, such as the B-2 bomber which uses this runway, are unregulated for CO and NO_x emissions (77 Fed. Reg. 36,342, 36,343 (June 18, 2012)), which can be massive. There are also major industrial facilities right next to the Palmdale which again can have substantial CO emissions.

The statute and regulation prohibit Palmdale from contributing to violations of the CO NAAQS. The statute and regulation do not use the term “significantly” contribute. Rather, they say contribute. Thus, if the existing sources such as the jet engines and the manufacturing facilities at Plant 42 are causing CO NAAQS violations and Palmdale contributes to these violations at all, Region 9 must deny the permit. Therefore, Region 9 must require a cumulative impact analysis for CO.

Region 9’s decision to not require the source to demonstrate that will not cause or contribute to violations of the annual NO_x NAAQS or increment is also flawed. As to the NAAQS, jet engine NO_x emissions during takeoff can be substantial. For example, NO_x emissions from a B777, which is subject to

regulation unlike the military jets at Plant 42, is approximately 18 kg or approximately 40 lbs. AR-0016, Conservation Group Comments at Ex. 4, figure 3. This compares to the startup emission limit for Gen 1 and Gen 2 of 51.48 lb. The difference is that the startup emissions for Gen 1 and Gen 2 are spread out over up to 39 minutes. In comparison, the 40 lbs of NO_x from a commercial jet is spread out over only less than a minute. *Id.* at figure 2. Thus, on an annual basis, many more takeoffs are possible than startups and thus, the jet engines NO_x may swamp Palmdale. The Palmdale airport has an average of 175 operations per day with 141 of those being military. *Id.* at Ex. 12. If half the military flights are large planes and half those actions are takeoffs, that is 35 takeoffs per day. That equals 255 tons per year of NO_x being emitted at close to ground level and very near where EPA's modeling predicted the maximum impact from the stationary sources. This is not meant to be a substitute for a modeling analysis. It is just meant to show that it is arbitrary for EPA to leave the aircraft emissions out of the modeling analysis.

Furthermore, because the monitor Region 9 is using for background is miles away and in an urban area, it may not be picking up any of the NO_x from the jet engines which again are released very close to ground height with almost no vertical exit velocity. As to the annual NO_x increment, without Region 9 figuring out how much of the NO_x increment is currently consumed, Region 9 is simply guessing that Palmdale will not cause or contribute to a violation of increment.

Region 9 is not allowed to make this permitting decision based on guess work.

Therefore, Region 9 to require the applicant to conduct a cumulative annual NOx analysis.

In its Response to Comments Region 9 stated that its conclusions regarding cumulative impacts “is justified and appropriate even without any consideration of or comparison to the SILs.” AR-0029, RTC at 48. Putting aside whether reliance on SILs to address the project-only impacts was appropriate, the need for modeling of emissions from existing sources such as the jets utilizing the runway, jet engines and the manufacturing facilities at Plant 42 remains inadequately addressed by a lack of a cumulative impacts analysis.

The Region explained that:

A cumulative impact analysis is a more comprehensive modeling exercise that generally includes both modeled and monitored air quality impacts. Cumulative impact modeling uses the proposed source’s emissions and emissions from any nearby sources with air quality impacts **that are not adequately represented by the background monitoring data.**

Id. at 47 (emphasis added).

However, then the Region continued to rely on the background monitoring data (*Id.* at 47) although that monitoring data does not include the emissions from the jets utilizing the runway at Plant 42. *Id.* at 60-62.

The monitoring site relied on is the Lancaster-Division Street monitor which is 2.5 miles north Palmdale and Plant 42 and would not capture aircraft emissions.

AR-0003, Application at 4.4-2. Then, the Region provides a kind of “back of the envelope” calculation of likely emissions from aircraft and, based on a series of assumptions, and reaches a series of conclusions regarding the likely extent and amount of these emissions. AR-0029, RTC at 60-62. For example, the Region looks at prevailing winds and conjectures regarding runway use and then concludes that the majority aircraft emissions would be within Plant 42 or near the fence line in the northeast portion. *Id.* at 61 ([““This means that the majority of emissions from aircraft activity are occurring in the northeastern portion of the Plant 42 boundary, and the fenceline in that area is between 1,000 to 2,500 meters from the edge of the runways.”].) Because the Lancaster-Division Street monitor would not capture these emissions, the Region by its own statements should not have relied on the background monitoring data to justify the lack of a cumulative analysis, but it does.

Without providing the needed modeling, the Region builds on its conjecture that most emissions would remain within the fence line and would be concentrated by the northeast boundary to conclude: “we expect contributions from Plant 42 aircraft emissions to the 24-hr PM10, 24-hr PM2.5, annual PM2.5, 1-hr CO, 8-hr CO, 1-hr NO2, and annual NO2 concentrations in any area outside the Plant 42 boundary to be similar to or less than the contributions from vehicle traffic.” *Id.* at 61. It is impossible to discern how the Region arrived at the conclusion that

aircraft emissions from approximately 175 aircraft per day, many of them large military jets, which the Conservation Groups provided supporting documentation for in our comments (AR-0016, Conservation Group Comments at Ex. 12), would be similar or less than vehicle traffic in this area. The Region further concludes that “aircraft emissions impacts outside the Plant 42 boundary were adequately and appropriately accounted for in our consideration of monitored background concentrations that relied on a monitor heavily impacted by mobile source emissions.” AR-0029, RTC at 61-62. But this makes no sense in light of the fact that the only monitor relied on would not account for the aircraft emissions at all based on the Region’s hypothesis regarding those emissions.

Because cumulative impact modeling was not provided for the mobile source emissions from aircraft utilizing the neighboring Plant 42 site and the background monitoring data from the single source relied on could not adequately account for those emissions, the Region’s conclusions are arbitrary and the Permit should be vacated and remanded.

Respectfully submitted,

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STATEMENT OF COMPLIANCE WITH WORD LIMITATION

I certify that the foregoing PETITION FOR REVIEW does not exceed 14,000 words. As calculated by Petitioners' word processing software, this petition contains no more than 13,953 words, excluding the parts of the petition not required to be counted.

/s/ Robert Ukeiley

Robert Ukeiley

CERTIFICATE OF SERVICE

I certify that I had the above Petition for Review served by First Class Mail on May 29, 2018 on the following:

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