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Comments on Staff Assessment 5-5 Efficiency and Energy Resources

See Attached Comment Letter

Additional submitted attachment is included below.

California Energy Commission

Corby Battery Energy Storage System Project

Docket No. 24-OPT-05

Comments on Staff Assessment Section 5.5

Efficiency and Energy Resources

Commissioners:

I submit these comments regarding Section 5.5 of the Staff Assessment, Efficiency and Energy Resources.

I do not contend that battery energy storage is inherently inefficient or that energy losses associated with charging and discharging a battery necessarily constitute a significant environmental impact. All battery storage involves some loss of energy.

My concern is more basic.

Section 5.5 is supposed to determine whether the Corby Battery Energy Storage System would result in wasteful, inefficient, or unnecessary consumption of energy resources. Yet Staff does not actually disclose and evaluate the project-specific energy-efficiency information that the applicant itself provided for Corby.

Instead, Staff relies principally on a generic statement that utility-scale battery energy storage systems have approximately 85 percent round-trip efficiency and concludes that the new LG batteries and battery-management systems proposed for Corby should perform comparably to other modern BESS facilities.

That approach overlooks considerably more specific information already contained in the project record.

The applicant has quantified Corby's expected energy losses, auxiliary loads, and declining round-trip efficiency over time. Those calculations should be disclosed and evaluated in the very section charged with determining whether Corby will use energy efficiently.

1. Staff Uses a Generic 85 Percent Efficiency Figure Instead of Corby's Project-Specific Performance Information

Staff acknowledges that there is no quantitative threshold of significance for the round-trip efficiency of a utility-scale BESS.

Staff therefore adopts a qualitative threshold: if the selected technology uses components and systems typical of a utility-scale system at the time of project filing, Staff considers the project's energy consumption not wasteful or inefficient. The weakness in this approach is its reliance upon a generalized comparison rather than the project-specific performance information already available in the record.

Staff then states that a BESS generally has a round-trip efficiency of approximately 85 percent and explains that Corby will use new LG batteries and contemporary battery-management systems. From that, Staff concludes that Corby's efficiency will be comparable to other recent BESS facilities.

But the applicant supplied considerably more useful information than that.

The applicant's project-specific calculations estimate Corby's overall round-trip efficiency at approximately 84.6 percent in Year 1 and approximately 80.4 percent in Year 15.

Those values account for more than the electrochemical efficiency of the batteries themselves. They reflect the actual energy required to charge and discharge the facility and the auxiliary electricity necessary to operate it.

Those project-specific calculations are far more informative than the generic 85 percent NREL figure relied upon in Section 5.5.

The problem is not that Corby's first-year efficiency is approximately 85 percent.

The problem is that Staff had Corby's actual efficiency calculations available and did not analyze them in the section specifically intended to determine whether Corby's energy consumption is wasteful or inefficient.

2. The Record Shows Material Decline in Efficiency During the Project's Operating Life

The applicant's calculations also demonstrate that Corby's efficiency is not expected to remain constant.

In Year 1, approximately 1,343 MWh of grid electricity would be required to produce a full 1,200-MWh discharge.

By Year 15, approximately 1,404 MWh would be required to produce the same 1,200-MWh discharge.

The resulting overall round-trip efficiency declines from approximately 84.6 percent to 80.4 percent.

That is important because Corby is expected to operate for approximately 30 years.

Section 5.5 evaluates the project primarily by asking whether the equipment selected at the time of filing is typical of a modern utility-scale BESS. But equipment that is efficient when newly installed does not necessarily remain equally efficient throughout three decades of operation.

The applicant itself recognizes this issue elsewhere in the record. Battery capacity diminishes over time, and the project therefore includes periodic battery augmentation to maintain project capability.

The decline in efficiency is consequently not speculation. It is reflected in the applicant's own calculations.

Staff should therefore evaluate efficiency over the expected operating life of the facility—not merely by comparing newly installed equipment to other recently constructed battery systems.

At a minimum, the Commission should know:

- the anticipated round-trip efficiency at relevant points throughout the 30-year project life;
- how battery degradation affects charging requirements and energy losses;
- how augmentation affects those losses;
- whether auxiliary loads increase as additional batteries and equipment are installed; and
- what operating or maintenance measures will be used if actual efficiency falls below the performance assumptions relied upon in the Staff Assessment.

Section 5.5 does not answer those questions.

3. Staff's Description of Operational Electricity Consumption as “Minimal” Is Not Supported by the Scale of the Applicant's Own Calculations

Page 5.5-5 states that Corby would not include permanent diesel, natural-gas, or LPG emergency generators and then characterizes project energy consumption as being limited to “minimal electricity for charging and maintenance.”

That description understates the scale of the facility's actual operating energy requirements.

The applicant estimates that, in Year 1, approximately 52,000 MWh annually would be lost through charging and cycling, together with approximately 23,600 MWh annually in auxiliary electricity consumption.

That produces total annual energy losses of approximately 75,600 MWh in the first year of operation.

By Year 15, the applicant estimates approximately 74,400 MWh in annual charging/cycling losses and approximately 26,000 MWh in annual auxiliary consumption, for total annual losses exceeding 100,000 MWh.

Those quantities may or may not ultimately constitute wasteful or inefficient consumption when considered in relation to the benefits provided by a 300-MW/1,200-MWh storage facility.

But they are not properly evaluated by simply describing electricity use as “minimal.”

Page 5.5-5 itself confirms that Corby will charge from PG&E's electric grid and will have a capacity of up to 300 MW and 1,200 MWh. It also states that PG&E's cited 2023 Base Plan contained 32.8 percent eligible renewable electricity.

The Commission should therefore evaluate the magnitude of the actual electricity entering Corby, the electricity returned to the grid, the electricity consumed by cooling and other auxiliary equipment, and the energy lost through the storage process.

That is the energy balance relevant to the question Section 5.5 is supposed to answer.

Staff also identifies the Solano County General Plan as an applicable local planning document and states that its Resources Chapter promotes energy conservation, energy efficiency, and utilization of renewable energy resources. Yet Section 5.5 does not test Corby's project-specific energy balance against those local conservation and efficiency principles. Having identified the General Plan as relevant, Staff should explain how annual losses on the scale disclosed by the applicant support its conclusion that the Project will conserve and utilize energy resources efficiently.

4. Auxiliary Loads Are a Material Part of Corby's Energy Consumption

Corby's auxiliary electricity consumption is not trivial.

The applicant estimates approximately 20 kW of cooling demand for each battery enclosure.

As the project is augmented over time, the number of battery enclosures increases. Accordingly, the facility's auxiliary load increases as well.

The applicant estimates an auxiliary load of approximately 7.68 MW in Year 1, increasing to approximately 8.46 MW by Year 15.

That load exists before considering the additional electricity lost during charging and discharging.

Cooling is also directly relevant to local operating conditions. Battery thermal-management systems must maintain appropriate operating temperatures, and this project will operate in Solano County during hot summer conditions.

Section 5.5 does not disclose the applicant's auxiliary-load calculations or explain how those loads were incorporated into Staff's conclusion that project operations would not result in wasteful or inefficient energy consumption.

The Commission does not need to assume that these loads are excessive.

It does need to examine them.

5. The Absence of a Regulatory Minimum Efficiency Standard Does Not Eliminate CEQA's Efficiency Inquiry

Staff also proposes a finding that no minimum efficiency standard applies to the project.

I do not contend that Corby violates an established minimum round-trip-efficiency requirement.

That is not the issue.

The absence of a numerical regulatory minimum does not answer CEQA's separate question: whether the project would cause wasteful, inefficient, or unnecessary consumption of energy resources.

Indeed, Staff expressly undertakes that inquiry in Section 5.5.

Having done so, Staff cannot reasonably resolve it merely by stating that Corby uses equipment typical of other utility-scale battery facilities.

“Typical” and “efficient” are not necessarily synonymous.

The appropriate inquiry is whether the actual energy requirements and losses of this project are reasonable in relation to its function and whether feasible measures exist to avoid unnecessary consumption.

That requires consideration of the project-specific information already contained in the record.

6. Staff Finds That Corby Will Conserve and Use Energy Efficiently but Proposes No Performance or Monitoring Requirement

Section 5.5 concludes that Corby will “conserve and utilize energy resources efficiently.”

Yet Staff proposes no Condition of Certification for Efficiency and Energy Resources.

There is no minimum round-trip-efficiency requirement.

There is no requirement to meter and report annual charging energy versus discharged energy.

There is no maximum auxiliary-load requirement.

There is no requirement to report actual round-trip efficiency as the batteries age.

There is no trigger requiring corrective measures if efficiency declines materially below the assumptions relied upon during environmental review.

This creates a substantial disconnect between the finding and the project Staff would actually certify.

If Staff's conclusion depends upon Corby achieving reasonably efficient operation throughout its useful life, the Commission should consider whether actual performance should be monitored.

At a minimum, periodic reporting of electricity used to charge the facility, electricity discharged back to the grid, auxiliary electricity consumption, calculated annual round-trip efficiency, and changes associated with battery augmentation would allow the Commission to determine whether the project is operating consistently with the assumptions on which its environmental findings were based.

Staff currently proposes no such requirement.

7. Efficiency Losses Are Also Relevant to the Project's Claimed Greenhouse-Gas Benefits

The efficiency issue does not exist in isolation.

Energy lost in charging, discharging, cooling, and operating Corby must be replaced by additional electricity from the grid.

The applicant's own calculations therefore translate round-trip losses and auxiliary consumption into indirect greenhouse-gas emissions.

Those calculations show that efficiency assumptions have environmental consequences beyond Section 5.5.

This is particularly relevant because elsewhere in the Staff Assessment Staff relies heavily upon Corby's role in reducing fossil-fuel generation and facilitating California's greenhouse-gas reduction goals.

Those benefits may be genuine.

But an accurate evaluation of those benefits must account for the energy required to operate the facility and the electricity lost between charging and discharge.

Round-trip losses and auxiliary loads are also relevant to Staff's greenhouse-gas conclusions.

The Commission should therefore ensure that the efficiency assumptions used in Section 5.5 are consistent with those used in the Climate Change and Greenhouse Gas Emissions analysis.

This cross-check is particularly important because the same electricity cannot be treated one way when Staff evaluates energy efficiency and another way when Staff evaluates greenhouse-gas benefits. The charging energy, auxiliary consumption, storage losses, battery degradation, and augmentation assumptions should be stated consistently across both sections so that the Commission can see the net energy and emissions consequences of operation over time.

8. Staff Should Be More Precise About “Renewable Electricity”

Section 5.5 states that Corby will charge from the PG&E grid.

The same section identifies PG&E's cited 2023 Base Plan as containing 32.8 percent eligible renewable electricity and concludes that Corby will assist California's renewable-energy goals by storing and discharging renewable electricity.

Corby can certainly facilitate renewable-energy integration.

If Staff intends the cited 32.8 percent annual PG&E renewable content to approximate the renewable content of electricity used to charge Corby, the applicant's own Year-1 overall round-trip efficiency materially affects what comes back out of storage.

Using those two figures as a simplified illustration, 32.8 percent multiplied by 84.6 percent equals approximately 27.7 percent. Thus, for every 100 MWh charged under an assumed 32.8 percent renewable grid mix, approximately 32.8 MWh would be renewable-origin electricity entering storage, while approximately 27.7 MWh of renewable-origin energy would remain after applying the project's overall Year-1 storage losses proportionally.

That calculation should not be misunderstood as establishing that only 27.7 percent of Corby's actual output will be renewable. PG&E's 32.8 percent figure is an annual portfolio figure, while the generation mix on the grid varies by hour. Corby could charge during periods when renewable generation is substantially higher or lower than that annual average.

That uncertainty is precisely the point. If Staff expects Corby to preferentially charge during periods of abundant renewable generation, the Staff Assessment should identify the dispatch assumptions, contractual requirements, or operating conditions supporting that expectation. The annual PG&E power-content percentage, standing alone, does not establish the renewable content of the electricity Corby will actually store and discharge.

During periods of high renewable production, battery storage can absorb electricity that might otherwise be curtailed and return that electricity to the grid at a more useful time.

But Corby is not directly coupled to a dedicated renewable generator.

It charges from the grid.

Unless the project is subject to an operating requirement restricting charging to renewable generation, Staff should distinguish between storing electricity from the grid and facilitating the increased use of renewable electricity.

That distinction is particularly important where renewable-energy benefits are being used elsewhere in the Staff Assessment as a justification for project approval.

9. The Cumulative-Impact Discussion Adds Little to the Analysis

Staff's cumulative-impact discussion concludes that the project would have no adverse cumulative efficiency and energy-resource impact.

One possible concern is that Staff states that it is using a list-based cumulative methodology but does not actually evaluate the energy consumption of the other listed projects.

I believe the more important issue is the adequacy of Corby's own project-level efficiency analysis.

If Staff first establishes, using project-specific evidence, that Corby's energy consumption is not wasteful or inefficient, the cumulative inquiry becomes considerably less consequential.

For that reason, I do not believe the Commission needs another lengthy cumulative-project inventory in Section 5.5.

It does need a transparent evaluation of Corby's actual energy balance.

10. Requested Action

I respectfully request that the Commission direct Staff to revise or supplement Section 5.5 before adopting its final findings.

The revised analysis should:

1. Disclose and evaluate the applicant's project-specific round-trip-efficiency calculations rather than relying primarily upon a generic 85 percent BESS efficiency figure;
2. Evaluate expected efficiency over the project's operating life, including the applicant's estimated decline from approximately 84.6 percent in Year 1 to approximately 80.4 percent in Year 15;
3. Disclose project-specific charging losses and auxiliary electricity consumption rather than characterizing operational electricity use simply as "minimal";
4. Explain the effect of battery degradation and augmentation on energy consumption and efficiency;

5. Reconcile the efficiency assumptions used in Section 5.5 with those used in the Climate Change and Greenhouse Gas Emissions analysis;
 6. Clarify that Corby charges from the electrical grid and facilitates renewable-energy integration rather than implying that all electricity discharged by the facility is necessarily renewable electricity; and
 7. Consider Conditions of Certification requiring periodic metering and reporting of charging energy, discharged energy, auxiliary loads, and actual round-trip efficiency throughout the operating life of the project.
8. Address the Solano County General Plan energy-conservation and energy-efficiency principles that Staff itself identifies as applicable, using Corby's project-specific energy balance rather than a generic industry comparison;

The central concern is straightforward.

Corby necessarily loses energy in the process of storing and returning electricity. That fact alone does not make the project environmentally unacceptable.

But Staff's responsibility is to determine whether those losses and other operating energy requirements are wasteful, inefficient, or unnecessary.

The applicant has already supplied detailed project-specific information that would allow Staff to make that evaluation.

Section 5.5 largely does not use it.

Instead, Staff relies upon a generic industry efficiency figure, describes Corby's operating electricity consumption as minimal, and concludes that the project will conserve and efficiently utilize energy resources.

Before making that finding, the Commission should require Staff to evaluate Corby's actual anticipated performance—not merely the performance of a generic modern BESS.

Until that project-specific analysis is completed and the resulting efficiency assumptions are reconciled with the Climate Change and Greenhouse Gas Emissions analysis, the Commission should not rely on Section 5.5 as support for approval of the Corby Project. The present record does not demonstrate that Corby's actual operating energy requirements over its useful life have been adequately evaluated under the standard Staff itself selected.

In addition to these comments, I formally incorporate by reference and fully support the technical comment letter submitted by Keep Vacaville Safe.

Respectfully submitted,

Michael Geller

Record sources consulted: CEC Staff Assessment §5.5; Applicant Responses to CEC Data Requests addressing operational energy balance and round-trip efficiency; updated project description; and related Staff Assessment sections addressing Climate Change and Greenhouse Gas Emissions.