DOCKETED	
Docket Number:	26-SPPE-01
Project Title:	RB Inyokern Data Center (RBIDC)
TN #:	269666
Document Title:	SPPE Application - Appendix O
Description:	N/A
Filer:	Kyle Mohr
Organization:	R&L Capital Inc
Submitter Role:	Applicant Representative
Submission Date:	4/28/2026 2:59:17 PM
Docketed Date:	4/28/2026

RB INYOKERN DATA CENTER

Application for Small Power Plant Exemption (SPPE)

Inyokern, Kern County, California

Docket Number - 26-SPPE-01

Supporting Document Appendix O

Subsection(s):

- O.1 – Environmental Sustainability Plan and Best Management Practices

RB Inyokern Data Center Project

Environmental Sustainability Plan and Best Management Practices

Prepared for:

The RB Inyokern Data Center
R&L Capital, Inc.

Prepared by:

RESET

and

Valley Wide Engineering & Construction, Inc.

April 28, 2026

Environmental Sustainability Standards

Scoping and Planning Document

Purpose

This chapter identifies the industry standards and regulatory frameworks used to identify Best Available Technology (BAT), Best Management Practices (BMPs), energy efficiency ratings, and renewable fuel qualifications for data center components. It covers both general (national/international) standards and California-specific requirements, which are typically the most stringent in the U.S.

Executive Summary

This document provides a comprehensive engineering reference for data center standards compliance. Key conclusions for project planning:

The Three Regulatory Layers

- **Federal / International** — ASHRAE 90.4 for energy efficiency, EPA Tier standards for generator emissions, EPA RFS for renewable fuels. These establish the floor.
- **California State** — Title 24 for building energy, CARB for emissions and fuels, CEQA for environmental review. Generally the strictest U.S. layer.
- **Local AQMD / Jurisdiction** — Eastern Kern Air Pollution Control District (EKAPCD) for stationary engine emissions and permitting. Sets the binding permit conditions for the Project.

What Triggers Compliance

- Facility with conditioned floor area >20 W/ft² AND ITE load >10 kW → ASHRAE 90.4 applies
- New construction or major alteration in California → Title 24 2025 Energy Code applies (effective Jan 1, 2026)
- Any new stationary generator in California → EKAPCD permit required; typically Tier 4 Final emissions equivalent with SCR+DPF
- Off-road fleet operations in CA → CARB renewable diesel mandate (R99/R100) since Jan 2024
- Any discretionary project in CA → CEQA review (Initial Study → MND or EIR) by local lead agency

- Aggregate backup generator capacity ≥50 MW in CA → CEC jurisdiction (SPPE pathway for 50–100 MW; full AFC above 100 MW)

Top Five Action Items for New California Projects

- Confirm ASHRAE 169 / Title 24 climate zone before schematic design — drives MLC target and economizer strategy
- Engage local AQMD (EKAPCD for the Project) early; pre-screen Tier 4 Final generator feasibility and operating-hour caps
- Develop CBECC-Com energy model during design development, not after — compliance is mandatory before permit
- Plan for continuous energy monitoring (sub-metering) from design; Title 24 ongoing documentation requirement
- Monitor pending legislation: SB 57 findings (Jan 2027), AB 222 reporting (pending), SB 978 generator limits (proposed), CARB Tier 5 (workshop Feb 2026)

High Level Sustainability Targets: 2026

- PUE: 1.20 or better for new builds; liquid-cooled AI facilities achieving 1.10 or below
- WUE: <0.5 L/kWh with modern dry or closed-loop cooling; zero with air cooling / dry coolers
- UPS: 96%+ average efficiency (ENERGY STAR VFI); modular architectures to improve part-load performance
- Server PSUs: 80 PLUS Titanium (typical for hyperscale)
- Renewable energy coverage: Where feasible, 100% renewable PPA is increasingly the baseline expectation; alternatively incorporate renewable energy in project design
- Generator fuel: renewable diesel (R99/R100) — drop-in replacement with ~75% GHG reduction

Quick-Reference Compliance Matrix

One-view summary of which standards apply to each major component system, with California-specific additions, and for compliance decisions.

Component	General / Federal Standards	California-Specific Additions
Cooling / Mechanical	ASHRAE 90.4 MLC; ASHRAE TC 9.9; AHRI 550/590, 340/360, 1360; CTI (cooling towers); ASHRAE 90.1 equipment minimums	Title 24 Part 6 prescriptive (economizer, fan W/CFM, containment, VFD fans); CBECC-Com modeling

Component	General / Federal Standards	California-Specific Additions
UPS / Power	ASHRAE 90.4 ELC; ENERGY STAR UPS (VFI/VI/VFD tiers); IEC 62040-3; IEEE 1250; DOE 10 CFR 431 transformers	Title 24 Part 6 electrical provisions; Title 20 appliance standards (some exceed DOE)
Servers / IT	ENERGY STAR for Servers; SPEC SERT benchmark; 80 PLUS PSU certification; IEEE 1680.4 / EPEAT	No California-specific ITE efficiency mandate yet (AB 222 pending)
Storage	ENERGY STAR for Data Center Storage; SNIA Emerald benchmark	Same as federal
Network	Manufacturer-stated efficiency; no unified efficiency standard	Same as federal
Building Envelope	ASHRAE 90.1 (via 90.4 prescriptive); IECC where adopted	Title 24 Part 6 envelope requirements (climate-zone specific)
Lighting	ASHRAE 90.1; IES design standards	Title 24 Part 6 lighting power allowance; occupancy controls
Backup Generators	EPA 40 CFR 60 Subpart IIII; EPA Tier 4 Final (new non-emergency)	Per EKAPCD, the local air district with jurisdiction over the Project Site, binding permit conditions under Rules 202, 425, and 427 relating to Tier 4 final equivalent emissions with SCR+DPF external after treatment; operating-hour caps
Fuel (Generators)	ASTM D975, D6751, D7467; BQ-9000 for biodiesel; EPA RFS	Voluntary R99/R100 renewable diesel commitment for Scope 1 GHG reduction; LCFS credit opportunity
Water / Cooling Towers	CTI certification; local water agency	AB 93 (vetoed but water scrutiny increasing); local drought response plans
Monitoring / BMS	ISO/IEC 30134 KPIs; ENERGY STAR Portfolio Manager	Title 24 ongoing energy monitoring documentation (sub-metering required)

Component	General / Federal Standards	California-Specific Additions
Whole Facility	Uptime Tier I–IV; TIA-942 Rated 1–4; ISO/IEC 22237; ENERGY STAR score	CEQA environmental review; CPUC large-load tariffs (post-SB 57)

1.0 Best Available Technology (BAT) / Best Available Control Technology (BACT)

1.1 Definitions of “BAT” and “BACT”

The term "Best Available Technology" originated in water pollution permitting under the federal Clean Water Act and related state and local regulations and refers to the preferred technology for a given application, selected after weighing technology maturity, economics, energy impact, safety, and policy considerations.

The term “Best Available Control Technology” is used in air pollution regulation under the federal Clean Air Act and state and local regulations. The application of BACT is required for new or modified "major" stationary sources (factories, power plants) under New Source Review (NSR).

Both BAT and BACT are **not** fixed specifications, rather they are the outcomes of rigorous evaluation processes. For data centers, BAT and BACT benchmarks are established through a combination of engineering standards, regulatory codes, and voluntary best-practice catalogs. Further, the principles of BAT and BACT apply to other aspects of the Project including, but not limited to, energy efficiency.

For the purposes of this Environmental Sustainability Plan and Best Management Practices analysis the term “BAT” is used generally to describe government and industry standards that are intended to maximize, to the extent feasible, environmental protection technologies and practices.

1.2 General Industry Standards for BAT

Standard / Framework	What It Covers / When to Apply
ASHRAE 90.4	Energy Standard for Data Centers. The primary U.S. performance-based standard for mechanical and electrical systems. Sets maximum Mechanical Load Component (MLC) and Electrical Loss Component (ELC) values by climate zone. Applies to facilities >20 W/ft² and >10 kW IT load. Latest version is 90.4-2022 with addenda through 2025.

Standard / Framework	What It Covers / When to Apply
ASHRAE TC 9.9 Thermal Guidelines	Defines allowable and recommended temperature/humidity envelopes for IT equipment (Classes A1–A4, plus new H-1 high-density class and W17–W+ liquid cooling classes). This is the *de facto* BAT reference for setting cooling setpoints and designing airflow.
EU Code of Conduct on Data Centre Energy Efficiency	JRC Best Practice Guidelines — the most comprehensive component-by-component BAT catalog globally. Updated annually. Covers IT equipment, cooling, power distribution, building fabric, and monitoring. Widely referenced even outside the EU as a design benchmark.
ISO/IEC 22237 Series	International standard for data center facilities and infrastructure. Parts cover construction (22237-2), power distribution (22237-3), environmental control (22237-4), telecommunications cabling (22237-5), and security (22237-6).
ANSI/TIA-942-C	Telecommunications infrastructure standard for data centers. Defines Rated-1 through Rated-4 availability classifications, covering architectural, electrical, mechanical, and telecom design.
Uptime Institute Tier Standard	Tier I–IV classification for facility resilience (topology and operational sustainability). Not an efficiency standard but frequently used alongside BAT discussions to match technology choices to availability targets.

1.3 California-Specific BAT Requirements

Standard / Framework	What It Covers / When to Apply
Title 24, Part 6 (2025 Energy Code)	California Building Energy Efficiency Standards, effective January 1, 2026. Most stringent commercial energy code in the U.S. Mandates cooling system efficiency, economizer performance, fan power limits, and containment strategies for data centers across 16 climate zones. Compliance requires CBECC-Com modeling, Certificate of Compliance, Installation Certificate, and

Standard / Framework	What It Covers / When to Apply
	Certificate of Acceptance verified by ATTCP-certified technicians.
CALGreen (Title 24, Part 11)	California Green Building Standards Code. Includes voluntary Tier 1 and Tier 2 provisions for enhanced energy efficiency, water efficiency, and material sustainability that go beyond mandatory Title 24 requirements.
Local AQMD Rules Eastern Kern Air Pollution Control District (EKAPCD)	The EKAPCD is the local air district with jurisdiction over the project site and sets the binding permit conditions under Rules 202, 425, and 427. The Project's Tier 4 Final equivalent emissions with external SCR+DPF aftertreatment satisfy applicable EKAPCD requirements.
CEC Data Center Load Forecasts	The California Energy Commission tracks data center load growth and is developing efficiency guidance as part of the 2028 Title 24 update cycle, which will expand coverage of liquid-cooled servers and high-density deployments.

2.0 Best Management Practices (BMPs)

2.1 What BMPs Cover

BMPs are operational and design practices — not products. They address how a facility is run: airflow management, temperature setpoints, capacity planning, decommissioning, monitoring, and maintenance. The most widely referenced BMP frameworks for data centers are:

2.2 General Industry Frameworks

Standard / Framework	What It Covers / When to Apply
EU Code of Conduct — Best Practices Guidelines	The gold standard BMP catalog. Contains hundreds of specific practices across IT, cooling, power, environmental controls, and monitoring, each with an "expected minimum" and "optimal" practice level. Used globally even outside Europe.

Standard / Framework	What It Covers / When to Apply
The Green Grid — Data Center Maturity Model (DCMM)	Self-assessment tool covering facility and IT in five categories (Power, Cooling, Compute, Storage, Network) across five maturity levels. Useful for identifying where a site sits vs. industry leaders.
ISO/IEC 30134 Series	Key Performance Indicators for data center resource effectiveness. Includes PUE (30134-2), Renewable Energy Factor (30134-3), IT Equipment Energy Efficiency (30134-4), IT Equipment Utilization (30134-5), Energy Reuse Factor (30134-6), and Cooling Efficiency Ratio (30134-7).
ISO 50001 — Energy Management Systems	Framework for establishing an ongoing energy management program. Requires baseline measurement, targets, action plans, and continual improvement. Certifiable and commonly held by large operators.
Uptime Institute M&O Stamp of Approval	Operational sustainability assessment covering staffing, training, preventive maintenance, planning, coordination, and operating conditions — the operational half of resilience.
ENERGY STAR for Data Centers (Portfolio Manager)	Whole-building 1–100 score based on measured source energy and IT load. Facilities scoring 75+ are eligible for ENERGY STAR certification. Good proxy for BMP effectiveness.

2.3 California-Specific BMP Requirements

Standard / Framework	What It Covers / When to Apply
Title 24 Acceptance Testing & Commissioning	2025 code requires formal acceptance testing of regulated systems by ATTCP-certified technicians before occupancy — effectively mandating commissioning as a BMP. Ongoing energy monitoring documentation is also required.
SB 57 (Chapter 647, 2025)	Signed October 2025. Directs the CPUC to assess how new data center loads shift costs to other ratepayers, with findings due January 1, 2027. Does not currently impose

Standard / Framework	What It Covers / When to Apply
	operational BMPs but is expected to shape future reporting and tariff design.
AB 222 (pending)	Proposed legislation that would require annual reporting to the CEC on energy consumption, PUE, renewable energy share, and AI-model training energy use. Passed Assembly but held in Senate; may return in 2026.
AB 93 (vetoed 2025)	Would have required water-use disclosure before permit approval. Vetoed by Governor Newsom, but water BMPs remain under active legislative discussion. Expect water reporting to return in a future cycle.
Water Efficiency BMPs	No statewide data center water mandate yet, but local water agencies increasingly require WUE disclosure and water-efficient cooling system design (e.g., closed-loop, adiabatic, dry coolers) during the permit process, especially in drought-impacted regions.

3.0 Energy Efficiency Ratings by Component

3.1 Whole-Facility Metrics

Standard / Framework	What It Covers / When to Apply
PUE (ISO/IEC 30134-2:2026)	Power Usage Effectiveness — total facility power divided by IT equipment power. The 2026 revision standardizes calculation methodology and reporting boundaries for auditability.
WUE (ISO/IEC 30134-9)	Water Usage Effectiveness — liters per kWh of IT energy. Increasingly important as cooling technology and location selection are scrutinized for water impact.
CUE (ISO/IEC 30134-8)	Carbon Usage Effectiveness — kg CO_2e per kWh of IT energy. Tied to grid carbon intensity and on-site generation.
REF (ISO/IEC 30134-3)	Renewable Energy Factor — share of total energy from renewable sources, with specific accounting rules for PPAs, on-site generation, and certificates.

Standard / Framework	What It Covers / When to Apply
ERF / ERE (ISO/IEC 30134-6)	Energy Reuse Factor / Effectiveness — credits waste-heat recovery sent to district heating, adjacent buildings, or industrial processes.
ENERGY STAR Score (1–100)	EPA Portfolio Manager rating for whole facility. 75+ required for certification.

3.2 Mechanical / Cooling Systems

Standard / Framework	What It Covers / When to Apply
ASHRAE 90.4 MLC	Mechanical Load Component — sum of cooling, fan, pump, and heat rejection design power divided by IT design power, with climate-zone-specific maximums. This is the enforceable design benchmark for cooling efficiency under U.S. codes.
AHRI Certification (Chillers, DX, CRAH/CRAC)	Air-Conditioning, Heating and Refrigeration Institute third-party performance certification. AHRI 550/590 for chillers (IPLV, NPLV), AHRI 340/360 for unitary AC, AHRI 1360 for computer room air handlers.
ASHRAE 90.1 Chiller Efficiency Minimums	Minimum IPLV/EER/COP values for air- and water-cooled chillers referenced by Title 24 and 90.4.
CTI Certification (Cooling Towers)	Cooling Technology Institute thermal performance certification — required for many permit applications.

3.3 Electrical Systems / Power Chain

Standard / Framework	What It Covers / When to Apply
ASHRAE 90.4 ELC	Electrical Loss Component — worst-case losses across UPS and ITE distribution segments (the incoming service segment was removed in recent addenda). Sets the floor for electrical design efficiency.
DOE 10 CFR Part 431 (Transformers)	Federal distribution transformer efficiency standards. Low-voltage dry-type transformers must meet DOE 2016 levels;

Standard / Framework	What It Covers / When to Apply
	medium-voltage standards also apply. NEMA TP-1 is the earlier reference.
ENERGY STAR for UPS	Efficiency tiers across load levels (25%, 50%, 75%, 100%). Because redundant data center UPS typically operates at lower loads, the flattened efficiency curve of ENERGY STAR–listed units materially improves real-world performance.
IEC 62040-3 / IEEE 1250	UPS classification and performance standards — includes double-conversion vs. line-interactive vs. eco-mode operating modes and their efficiency tradeoffs.

3.4 IT Equipment (Servers, Storage, Network)

Standard / Framework	What It Covers / When to Apply
ENERGY STAR for Servers	Idle and active-state efficiency requirements. Version 4.0 covers enterprise servers with tiered requirements by configuration.
ENERGY STAR for Data Center Storage	Covers online and near-online storage products against a workload-based efficiency benchmark.
SPEC SERT	Server Efficiency Rating Tool — standardized workload benchmark (used by ENERGY STAR for Servers) that measures performance per watt across CPU, memory, and storage-bound workloads.
SNIA Emerald	Storage Networking Industry Association efficiency benchmark for storage systems. The reference methodology behind ENERGY STAR storage.
80 PLUS (Power Supplies)	Efficiency certification for internal server PSUs: Bronze, Silver, Gold, Platinum, Titanium levels. Titanium-rated PSUs are typical for modern hyperscale builds.
IEEE 1680.4	Environmental assessment standard for servers, used in the EPEAT registry alongside EPEAT Server criteria.

3.5 California-Specific Efficiency Requirements

Standard / Framework	What It Covers / When to Apply
Title 24 Prescriptive Requirements	Includes specific mandates for economizer operation, fan power limits (W per CFM), hot/cold aisle containment where applicable, variable-speed fan control, and differential pressure-based airflow control. Applies to new construction, additions, and alterations affecting cooling systems.
Title 24 Performance Path (CBECC-Com)	Most large data centers use the performance compliance path, where total modeled energy must meet or beat a prescriptive baseline. This offers design flexibility but requires whole-building energy modeling in CEC-approved software.
Ongoing Energy Monitoring	Title 24 mandates continuous energy monitoring documentation for data centers. Sub-metering of IT vs. mechanical vs. electrical loads is effectively required to demonstrate compliance.
Appliance Efficiency Regulations (Title 20)	California has state-level appliance efficiency standards that in some cases exceed federal DOE minimums for transformers, motors, and other components commonly used in data centers.

4.0 Renewable Fuels for Backup Generation

4.1 Overview

Renewable fuels are increasingly used to reduce Scope 1 emissions from emergency standby generators. The two fuel families seeing adoption are renewable (paraffinic) diesel — chemically near-identical to petrodiesel and usable as a drop-in — and biodiesel (FAME), which is typically blended up to B20. Sustainability credentials are proven through third-party certification schemes that verify feedstock origin, GHG reductions, and chain of custody.

4.2 General Industry Standards

Standard / Framework	What It Covers / When to Apply
ISCC (International Sustainability & Carbon Certification)	Globally recognized scheme certifying renewable fuels against sustainability and GHG-savings criteria. ISCC EU is recognized under the EU Renewable Energy Directive (RED III); ISCC PLUS covers voluntary markets including North America. Verifies chain of custody from feedstock to final product.
RSB (Roundtable on Sustainable Biomaterials)	The other leading sustainability certification, considered best-in-class by WWF and IUCN. RSB Global Fuels Certification applies worldwide; RSB EU RED certification meets EU regulatory requirements.
ASTM D975	Standard Specification for Diesel Fuel Oils — renewable diesel (R99/R100) meets D975 and is a direct petrodiesel substitute. Biodiesel blends meet D975 only up to B5; above that they fall under D7467 (B6–B20).
ASTM D6751	Standard for B100 biodiesel blend stock quality.
BQ-9000	U.S. voluntary quality management program for biodiesel producers, marketers, and distributors. Managed by the National Biodiesel Accreditation Commission. Covers storage, sampling, testing, distribution, and fuel management.
EPA Renewable Fuel Standard (RFS)	Federal program that defines what qualifies as a renewable fuel, assigns RIN (Renewable Identification Number) credits, and sets annual volume obligations. Governs the underlying fuel market.
EPA 40 CFR 60 Subpart IIII	New Source Performance Standards for stationary compression-ignition engines (diesel). Defines Tier requirements for emergency standby engines.

4.3 California-Specific Renewable Fuel & Generator Requirements

Standard / Framework	What It Covers / When to Apply
CARB Renewable Diesel Mandate (Off-	Since January 1, 2024, all California fleets subject to the In-Use Off-Road Diesel-Fueled Fleets Regulation must use

Standard / Framework	What It Covers / When to Apply
Road Regulation, §2449)	R99 or R100 renewable diesel. Exemptions exist for fleets composed entirely of Tier 4 Final off-road engines, MY2010+ on-road engines, or ZEVs, and for captive attainment area fleets. Record-keeping of purchase date and volume is required for three years.
CARB Tier 4 Final (Stationary CI Engines)	Consistent with California's stationary engine rules, implemented through local AQMDs, the Project will achieve Tier 4 final equivalent emissions per NFPA 110 TIA 22-1 with external SCR+DPF aftertreatment. Particulate matter and NOx are the key pollutants targeted.
LCFS (Low Carbon Fuel Standard)	CARB program that assigns carbon intensity (CI) values to fuels and generates credits for low-CI fuels like renewable diesel, biodiesel, RNG, and hydrogen. Operators using renewable fuels in on-site generation may be able to generate LCFS credits, improving project economics.
South Coast AQMD Rule 1110.2 / Rule 1470 (Cited as background reference)	Among the strictest stationary-engine rules in the U.S. Limits operating hours, sets NOx/PM limits, and requires permit conditions that typically drive selection of Tier 4 Final equivalent emissions with SCR and DPF external aftertreatment.
Bay Area AQMD Regulation 9, Rule 8 (Cited as background reference)	Governs NOx from stationary IC engines in the San Francisco Bay Area, with permit conditions that often mirror or exceed CARB Tier 4 Final expectations.
Eastern Kern Air Pollution Control District (EKAPCD), Rule 425 and 427; Rule 202 Guidelines	• **Rule 425 (Stationary Gas Turbines):** Applies to turbines $\geq$ 0.88 MW. It sets NOx limits, requires continuous emissions monitoring (CEMS), and mandates 5 years of record retention. Recent 2024/2025 updates (approved June 2025) address EPA-identified deficiencies, setting lower NOX limits (down to 20 ppmv for certain units). • **Rule 427 (Stationary Piston Engines):** Defines a stationary piston engine as any spark or compression-ignited reciprocating internal combustion engine attached to a foundation or operated at the same site for over one year.

Standard / Framework	What It Covers / When to Apply
	• **Emergency Engines:** Emergency standby engines are typically required to meet strict emission standards and recordkeeping (often hours per year) and usually must adhere to 17 CCR § 93115, California's Airborne Toxic Control Measure (ATCM). • **Permitting:** Stationary sources, including engine operators, must obtain an Authority to Construct (ATC) and follow Rule 202 guidelines. • **Criteria pollutants:** EKAPCD-specific thresholds (e.g., 137 lbs/day for NOx, VOC, PM10). Compare to modeled emissions from Section A.5 Tier 4 Final specs to ensure emissions remain below the EKAPCD significance thresholds.
CARB Portable Equipment Registration Program (PERP)	Required for portable/temporary generators in California; they must use certified engines and meet equipment labeling rules.
SB 978 (pending, 2026)	Proposed legislation specifically targeting diesel backup generators in hyperscale data centers. Would ban new diesel installations in certain high-pollution zones in favor of hydrogen fuel cells or long-duration battery storage. Worth monitoring for projects in planning.
Pending Tier 5 (CARB)	CARB workshops began February 2026 to develop Tier 5 standards targeting roughly a 90% further reduction in NOx vs. Tier 4 Final. Facilities planned now for 2027–2029 occupancy should anticipate Tier 5 as the future minimum.

5.0 California Compliance Checklist

For a new or expanding California data center, the following compliance steps are typical:

- **Title 24 (2025) energy compliance** — CBECC-Com energy modeling, Certificate of Compliance before permit, Installation Certificate during construction, Certificate of Acceptance before occupancy (ATTCP-certified technician required).
- **EKAPCD permitting** — Authority to Construct and Permit to Operate for stationary generators; expect Tier 4 Final emissions equivalent requirement, operating-hour caps, and SCR/DPF aftertreatment.

- **CEQA review** — California Environmental Quality Act analysis for new facilities, addressing energy, water, air quality, traffic, and other environmental impacts.
- **Water agency coordination** — WUE disclosure increasingly expected at permitting even absent a statewide mandate; local drought response plans may constrain cooling choices.
- **CARB renewable diesel procurement** — R99/R100 purchase documentation retained for three years where the Off-Road Regulation applies; annual compliance affirmation by March 1.
- **Ongoing energy monitoring** — Sub-metering and Title 24 documentation program for cooling, electrical, and IT loads.
- **Voluntary overlays** — ENERGY STAR Portfolio Manager benchmarking, ISO 50001 certification, and LCFS credit generation via low-CI fuels where applicable.

6.0 General Evaluation Process

The following process integrates the standards in Sections 1–4 into a structured, repeatable evaluation methodology. It consists of two sequential phases: BAT selection (how to choose technology), followed by compliance verification (how to prove the chosen design meets mandatory requirements).

6.1 Phase A — BAT Selection Methodology

BAT selection is an engineering evaluation, not a catalog reference. For each major component system (cooling, electrical, IT, backup generation), the following steps apply. This methodology follows the U.S. DOE/EPA "BAT Selection Process" structure adapted for data center applications.

Step A.1 — Define the Functional Requirement

Before evaluating technologies, establish objective performance criteria:

- IT design load (kW, current and future) and redundancy target (N, N+1, 2N, 2N+1)
- Availability target (Uptime Tier I–IV or TIA Rated 1–4); drives redundancy and maintainability
- Thermal envelope (ASHRAE TC 9.9 class — A1 through A4, or water class W17–W+ for liquid cooling)
- Climate zone (ASHRAE 169 — drives economizer feasibility, MLC target, and water risk)
- Sustainability targets (PUE, WUE, CUE, REF, on-site renewables, Scope 1–2 reduction)
- Regulatory constraints (Title 24 climate zone, local AQMD attainment status, water agency restrictions)

- Budget envelope (CapEx and OpEx, including a TCO horizon — typically 15–20 years)

Step A.2 — Identify Candidate Technologies

Screen available technologies for each component using the following sources, in priority order:

- **EU Code of Conduct Best Practice Guidelines** — the most comprehensive and current BAT catalog; maps practices to "expected minimum" and "optimal" levels.
- **ASHRAE 90.4 and TC 9.9 publications** — codified and semi-codified technology benchmarks.
- **The Green Grid publications and DCMM** — pragmatic maturity-level examples.
- **Peer facility benchmarks** — ENERGY STAR Portfolio Manager, Uptime/TIA-certified facilities, published case studies.
- **Manufacturer-certified equipment lists** — AHRI directory, ENERGY STAR qualified product lists, 80 PLUS, CTI.

Step A.3 — Apply the BAT Selection Criteria

For each candidate technology, evaluate against the eight-factor DOE BAT test. Document each factor with quantitative evidence where possible; BAT is defensible only when the record shows all factors were considered.

Standard / Framework	What It Covers / When to Apply
1. Technology Maturity	Is the technology commercially proven (not prototype)? Have multiple installations been operating for at least three years? Reference: manufacturer references, third-party case studies.
2. Economics	CapEx, OpEx, and lifecycle cost (TCO). Use 15–20 year analysis with realistic discount rate. Include utility incentives, LCFS credits (CA), and ITC/PTC where applicable.
3. Age / Applicability	Suitable for the design life of the facility and the equipment's intended service? New build vs. retrofit may yield different BAT.
4. Process Employed	Compatible with the selected topology and operating strategy (e.g., evaporative cooling incompatible with water-restricted sites; 2N UPS efficiency penalty).

Standard / Framework	What It Covers / When to Apply
5. Engineering Aspects	Constructability, maintainability, spare parts ecosystem, integration with BMS/DCIM, and operator skill requirements.
6. Process / Design Changes	Does adoption require design changes elsewhere (e.g., higher supply temps enable free cooling but may require server qualification against A3/A4)? Quantify second-order impacts.
7. Other Environmental Impacts	Water use (WUE), refrigerant GWP, embodied carbon, noise, air emissions, end-of-life. BAT minimizes cross-media transfers.
8. Safety & Policy	Code compliance (NFPA, NEC, IBC), worker safety, fire suppression implications, and local/state policy signals (e.g., CARB trajectories, pending legislation).

Step A.4 — Document the Selection

BAT documentation should be a retained project record. At minimum:

- Functional requirements matrix (Step A.1)
- Candidate technology inventory with screening results
- Eight-factor evaluation matrix with supporting data per factor
- Selected technology rationale and expected performance (e.g., annualized MLC, PUE, WUE)
- Residual risks and mitigation plan
- Review / approval signatures (engineer of record, owner, commissioning authority)

Phase B — Compliance Verification

Once BAT is selected, the design must be demonstrated to meet mandatory standards. This is a distinct exercise from BAT selection — a BAT choice that cannot be shown to comply with codes is not usable.

Step B.1 — Map Applicable Standards

For each component system, identify every standard and regulation that applies. Categorize as (1) mandatory codes, (2) contractual obligations, and (3) voluntary programs being pursued.

Step B.2 — Calculate Design Compliance Values

Perform the prescriptive and performance calculations required by each mandatory standard:

- **ASHRAE 90.4** — annualized MLC at 25/50/75/100% ITE load across 8,760 hourly bins; design ELC per segment at matching load points. Compare to climate-zone-specific maxima in Tables 6.5 and 8.6.
- **Title 24 (if CA)** — CBECC-Com performance-path modeling vs. prescriptive baseline, or full prescriptive package compliance.
- **EKAPCD permits**— engine emission calculations vs. Tier 4 Final thresholds; BACT review; health risk assessment where required.

Step B.3 — Construction & Installation Verification

Before occupancy, verify the installed system matches the approved design:

- Title 24 Installation Certificate (CA)
- Submittal review against basis of design
- Factory acceptance tests (FAT) for major equipment (UPS, chillers, generators)
- Site acceptance tests (SAT) and integrated systems testing (IST)

Step B.4 — Acceptance Testing & Certification

Perform performance verification before operations:

- Title 24 Certificate of Acceptance by ATTCP-certified technician (CA; required before occupancy)
- Functional performance testing per Cx specification
- Energy verification — measure actual MLC/PUE at multiple load points to confirm design values
- Third-party certifications as pursued: Uptime Tier Certification of Constructed Facility, TIA Rated Certification, ENERGY STAR, ISO 50001

Step B.5 — Operational Phase Compliance

Ongoing compliance obligations continue for the life of the facility:

- Title 24 ongoing energy monitoring documentation (CA)
- EKAPCD annual emissions reporting, source testing, and Permit to Operate renewal (CA)
- CARB Off-Road Regulation renewable diesel purchase records (CA — retained three years)
- CARB annual compliance affirmation by March 1 (CA)
- ENERGY STAR Portfolio Manager benchmarking (annual re-certification if applicable)
- ISO 50001 surveillance and re-certification audits
- Uptime Tier Certification of Operational Sustainability (recommended every 2 years)

7.0 End-to-End Compliance Workflow

The following sequence integrates evaluation and compliance activities across project phases from site selection through steady-state operation. Timing shown is typical for a new greenfield data center; retrofits compress or skip some steps.

Phase 1 — Site Selection & Preliminary Design (Months -24 to -18)

- Confirm ASHRAE 169 climate zone → drives 90.4 MLC target
- Confirm Title 24 climate zone and local jurisdiction requirements (CA)
- Identify EKAPCD and attainment status; pre-screen Tier 4 Final feasibility (CA)
- Review water agency supply constraints; evaluate dry-cooled vs. evaporative feasibility
- Preliminary utility service study; transmission adequacy
- CEQA lead-agency determination (CA)

Phase 2 — Schematic & Design Development (Months -18 to -9)

- BAT selection per Section 6, Phase A
- Preliminary MLC and ELC calculations (ASHRAE 90.4)
- CBECC-Com energy model development (CA, Title 24 performance path)
- Preliminary AQMD air permit application; BACT analysis and health risk assessment (CA)
- CEQA Draft EIR or Mitigated Negative Declaration, including public comment (CA)
- Water supply assessment (SB 610) for projects ≥ 500,000 SF (CA)
- SPPE pre-application consultation with CEC for projects ≥50 MW aggregate backup generation (CA; see Section 8)

Phase 3 — Permitting (Months -9 to -3)

- Building permit application; Title 24 Certificate of Compliance required before permit approval (CA)
- EKAPCD Authority to Construct issued (CA)
- CEQA Final EIR certification and Notice of Determination filed (CA)
- SPPE application filed with CEC for ≥50 MW projects
- Utility service agreement and large-load tariff execution (watch CPUC SB 57 findings, due Jan 2027, for new tariff structures)

Phase 4 — Construction (Months -3 to +12)

- Submittal reviews against design basis

- Title 24 Installation Certificate filings at specified milestones (CA)
- Commissioning plan execution; functional performance testing
- Factory and site acceptance tests for UPS, chillers, generators, switchgear
- Integrated systems test (IST) of all critical systems at full design load

Phase 5 — Acceptance & Occupancy (Month +12)

- Title 24 Certificate of Acceptance — ATTCP-certified technician verification (CA)
- EKAPCD Permit to Operate issued after initial source testing (CA)
- Certificate of Occupancy issued
- Measurement & verification of MLC/PUE at actual load conditions
- Third-party certifications submitted (Uptime Tier Certification of Constructed Facility, TIA)

Phase 6 — Steady-State Operation (Month +12 onward)

- Continuous energy monitoring, sub-metered IT/mechanical/electrical (Title 24 mandate in CA)
- EKAPCD annual emissions reporting and periodic source testing (CA)
- Annual CARB compliance affirmation by March 1 (CA)
- ENERGY STAR Portfolio Manager benchmarking (annual)
- ISO 50001 management system operation (surveillance audits annual, re-cert every 3 years)
- Uptime M&O Stamp of Approval (biennial recommended)
- Equipment renewal and technology refresh — trigger re-evaluation against current BAT

8.0 Integration with CEQA & CEC SPPE Requirements

The BAT, BMP, efficiency, and renewable fuel documentation developed under Sections 1–6 feeds directly into California's two primary environmental review processes for data centers: CEQA (California Environmental Quality Act) and the CEC Small Power Plant Exemption (SPPE) process. This section shows how each element of the standards framework maps to specific review deliverables.

8.1 CEQA & SPPE Jurisdiction over Data Centers

Any new or expanded California data center triggers CEQA review because it is a discretionary project requiring building permits, land-use entitlements, and air quality permits. Additionally, if the aggregate backup generation capacity reaches 50 MW or more, the CEC has exclusive jurisdiction under the Warren-Alquist Act — triggering

either a full Application for Certification (AFC) or, more commonly, a Small Power Plant Exemption (SPPE) for facilities between 50 and 100 MW.

Key thresholds to track:

- Any data center in CA → CEQA review by local lead agency (city or county)
- Aggregate backup generator nameplate capacity ≥ 50 MW → CEC jurisdiction (SPPE pathway)
- Aggregate ≥ 100 MW → full AFC required (no SPPE available)
- Projects with potentially significant environmental impacts → full Environmental Impact Report (EIR) instead of Mitigated Negative Declaration (MND)

Benchmark Projects (all CEC-docketed SPPEs): Great Oaks South (Equinix, ~99 MW, 36 × 3.25 MW generators), San José Data Center 04 (Microsoft, 32 × 3 MW + smaller units, Tier 4 Final with SCR/DPF), McLaren (Vantage, 47 × 2.75 MW = 98.67 MW), Santa Clara SC-1 Phase 2 (DuPont Fabros, 16 × 2.25 MW addition beyond the initial 50 MW threshold), Gilroy (50 × 2.5 MW = 96 MW), Lafayette (Digital Realty). Each illustrates the same pattern: aggregate generator capacity pushes the project over 50 MW and triggers CEC jurisdiction.

8.2 — CEQA Framework for Data Centers

8.2.1 Lead Agency Determination

- **Local lead agency** — Typical for data centers under 50 MW aggregate generation. The city or county permitting the project acts as lead agency (e.g., Kern County).
- **CEC as lead agency** — For projects ≥50 MW requiring SPPE or AFC, the CEC is lead agency under its "certified regulatory program," which is functionally equivalent to CEQA EIR review.
- **Whole-of-the-action principle** — CEQA requires the lead agency to consider the entire project, including the data center facility AND the backup generating system together — not just the generators in isolation.

8.2.2 CEQA Document Type Selection

Standard / Framework	What It Covers / When to Apply
Categorical Exemption	Rarely available for substantial new data centers. May apply to minor alterations of existing facilities.
Negative Declaration (ND)	Project has no significant environmental effects. Rare for new data centers given air, water, and energy impacts.

Standard / Framework	What It Covers / When to Apply
Mitigated Negative Declaration (MND)	Project has potentially significant effects but mitigation reduces them to less-than-significant. Common for smaller or well-sited projects with robust BAT/BMP commitments. The Santa Clara SC-1 project used an MND.
Environmental Impact Report (EIR)	Required when significant effects cannot be mitigated to less-than-significant, or when lead agency determines an EIR is needed for transparency. Becoming more common for hyperscale projects in water-stressed or air-quality-constrained regions.

8.2.3 CEQA Appendix G Checklist — Data Center Relevance

CEQA Guidelines Appendix G provides 20 environmental topics with approximately 89 questions. The following topics carry the heaviest weight for data center projects, with specific links back to this document's standards framework:

Standard / Framework	What It Covers / When to Apply
Aesthetics	Building massing, light trespass, visual character. Informed by ASHRAE 90.1 lighting requirements (Section 3.2).
Air Quality	Generator emissions (NOx, PM, CO, HC), operational emissions, construction emissions. Directly tied to Section 4 (Target CARB Tier 4 Final emission equivalent with external after treatment, AQMD rules). CRITICAL TOPIC.
Biological Resources	Site-specific; not standards-driven.
Cultural / Tribal Resources	Site-specific; AB 52 tribal consultation required.
Energy (Appendix F)	Energy consumption, efficiency, renewable sourcing. Directly tied to Sections 1–3 (ASHRAE 90.4, Title 24, PUE/WUE/REF metrics). CRITICAL TOPIC.
Geology & Soils	Site-specific; seismic design per CBC.
Greenhouse Gas Emissions	CEQA §15064.4 requires quantification or qualitative analysis. Tied to Section 4 (fuel CI, LCFS) and Section 3 (REF, CUE). CRITICAL TOPIC.

Standard / Framework	What It Covers / When to Apply
Hazards / Hazardous Materials	Fuel storage (diesel), refrigerants (GWP), battery electrolyte, dielectric fluids (PFAS concern).
Hydrology / Water Quality	Stormwater, wastewater, cooling water discharge. BAT/BMP language from Clean Water Act flows into CEQA analysis.
Land Use & Planning	Zoning, General Plan consistency, Specific Plans.
Mineral Resources	Site-specific; rarely controlling.
Noise	Generator testing noise, chiller/cooling tower noise, substation hum. Site-specific mitigation typically required.
Population / Housing	Rarely controlling for data centers (low employment).
Public Services	Fire, police, emergency response. Generator fuel risk addressed via hazard analysis.
Recreation	Site-specific.
Transportation	Construction traffic; minimal operational traffic.
Utilities / Service Systems	Electric service, water, wastewater, solid waste. Tied to Section 3 (efficiency reducing demand) and pending CA legislation (SB 57, AB 222). CRITICAL TOPIC.
Wildfire	Site-specific; PSPS events and generator readiness often addressed.

8.2.4 CEQA Thresholds of Significance

Each lead agency establishes its own thresholds. The following, among other criteria, are commonly used benchmarks for data center review and map to this document's technical content:

- **GHG emissions:** typical threshold is 900 metric tons CO_2e/year operational (varies by agency). Quantify per Section 4 CI values applied to generator test hours and scope 2 electricity.
- **Criteria pollutants:** EKAPCD-specific thresholds (e.g., 137 lbs/day for NOx, VOC, PM10). Compare to modeled emissions from Section A.5 Tier 4 Final emissions equivalent with aftertreatment to ensure emissions remain below the EKAPCD significance thresholds.

- **Water use:** water supply assessment required under SB 610 for projects ≥500,000 SF. Document WUE per Section B.1.
- **Energy efficiency:** no single threshold, but CEQA Appendix F requires "no wasteful, inefficient, or unnecessary" energy use. Demonstrated via Title 24 compliance and BAT selection (Section 6).

8.3 CEC SPPE Framework

8.3.1 SPPE Applicability & Thresholds

- **Trigger** — Aggregate thermal power generation ≥50 MW on the project site. For data centers, this is calculated using the nameplate capacity of all standby generators combined.
- **Upper limit** — ≤100 MW. Projects >100 MW require full AFC, which is substantially more involved.
- **Legal basis** — Public Resources Code §25541; California Code of Regulations Title 20, Division 2, Chapter 5.
- **Standard of review** — CEC grants exemption only if it finds the project will not create a substantial adverse impact on the environment or energy resources.
- **CEQA status** — SPPE review is a "certified regulatory program" functionally equivalent to an EIR. CEC prepares the environmental document (typically an Initial Study / MND or an EIR).

8.3.2 SPPE Application Contents

An SPPE application must demonstrate that the proposed facility will not substantially adversely impact environment or energy resources. Required contents map directly to this document:

Standard / Framework	What It Covers / When to Apply
Project Description	Complete description of data center AND generating facility. Includes aggregate capacity, generator count, individual MW rating, fuel storage, operational hours, testing protocols. Example (Great Oaks South): 36 × 3.25 MW standby + 3 × 0.5 MW life-safety generators.
Facility Design & Operations	Engineering basis of design covering mechanical, electrical, and fuel systems. Should reference ASHRAE 90.4, TC 9.9, Title 24 compliance (Sections 1–3 and Appendices A.1–A.4).
Air Quality Analysis	Emission inventory, modeling, health risk assessment. Documents Tier 4 Final equivalent emissions compliance

Standard / Framework	What It Covers / When to Apply
	(Section 4, Appendix A.5), SCR/DPF aftertreatment, and local AQMD Rule compliance. Example (San José DC 04): Tier 4 Final with SCR and DPF explicitly cited.
GHG Analysis	Scope 1 (generator combustion) and Scope 2 (grid electricity) quantification. Document voluntary use of renewable diesel as a Scope 1 GHG reduction measure (Appendix A.5) and renewable energy procurement (Sections 3, B.1 REF target).
Water Supply & Quality	Water demand, supply source, discharge. Document WUE target (Section B.1) and cooling technology selection (Section C.1).
Energy Resources Analysis	Demonstrate facility will not waste energy; document efficient design per ASHRAE 90.4, Title 24, and BAT process (Sections 1, 3, 6). Use cases: discuss PUE target, server efficiency, on-site renewables.
Alternatives Analysis	CEQA requires discussion of reasonable alternatives — including alternative sites, alternative cooling technologies, alternative backup power (batteries, fuel cells), and a "no project" alternative.
Cumulative Impacts	Assess with other past, current, and foreseeable data center projects in the region. Especially important in Santa Clara / San José, San Francisco, Los Angeles, and emerging Inland Empire clusters.
Mitigation Measures	Proposed measures to reduce impacts to less-than-significant. BAT/BMP commitments become enforceable conditions of certification.
Plume Dispersion Modeling Study	Characterizes emergency generator exhaust dispersion using EPA's AERMOD model with CARB-provided AERMET meteorological data from the Edwards Air Force Base monitoring station, demonstrating compliance with applicable NAAQS and CAAQS at all off-site receptors and supporting the Air Quality Impact Analysis (AQIA) and EKAPCD significance threshold determinations.

Standard / Framework	What It Covers / When to Apply
Nitrogen Deposition Analysis	Quantifies modeled nitrogen deposition from generator operations on sensitive habitat within the project vicinity (Yorke Engineering, March 2026; Application Appendix E.2), supporting the Biological Resources impact analysis (Section 4.4) and demonstrating that combined project plus background deposition remains below the 5 kg/ha/yr CEC significance threshold at all offsite sensitive habitat locations.

8.3.3 SPPE Process Timeline

The SPPE review timeline depends substantially on the completeness and quality of the initial application filing. Two general tracks are observed in recent CEC practice:
Expedited Track (complete application filing): Where an applicant files a comprehensive CEQA-level environmental analysis with all supporting technical studies (air quality, biological, cultural, hydrology, noise, visual, etc.), executed utility documentation, and pre-consultation with CEC Staff, the review timeline compresses significantly:

- Application submittal and data adequacy/completeness review: 30–45 days
- Staff analysis concurrent with any targeted data requests: 60–90 days
- Public review and comment (MND): 30 days
- Commissioner decision: approximately 180 days total from submittal

This track is achievable when the application is filed with sufficient environmental documentation that CEC Staff can proceed directly to analysis rather than issuing broad data requests. Pre-application consultation with CEC Staff (as conducted for the RBIDC project on April 3, 2026) further reduces the likelihood of extended data adequacy proceedings by confirming the scope and format of required materials before filing.
Standard Track (iterative filing): Where an applicant files a preliminary application and relies on iterative data requests to develop the environmental record, the timeline extends:

- Application submittal and data adequacy review: 30–60 days
- Data requests and responses: 3–6 months
- Staff analysis and draft environmental document: 6–9 months
- Public review and comment: 30–45 days (MND) or 45+ days (EIR)
- Evidentiary hearings (if contested): additional 2–4 months
- Commissioner decision: typically 12–18 months total from submittal

The RBIDC Application is structured for the expedited track, with complete environmental documentation across all CEQA resource areas required by the CEQA

Guidelines (note that *Environmental Justice* is not a traditional CEQA Appendix G checklist item and *Energy Conservation* is addressed under CEQA Appendix F both of which have been addressed by the Project Applicant as supplementary analyses), executed utility will-serve documentation (SCE MOS174 and Inyokern CSD WSL), and supporting technical appendices filed concurrently with the application.

8.3.4 SPPE vs. Full AFC

Standard / Framework	What It Covers / When to Apply
SPPE (50–100 MW)	Exemption from CEC certification requirement. If granted, local jurisdiction handles construction permits and compliance monitoring. Faster and less costly than AFC. CEQA-equivalent review by CEC.
AFC (Full Certification, >100 MW)	CEC retains jurisdiction throughout construction and operation. Full environmental assessment. More extensive conditions of certification. Longer process (18–24+ months typical).
Opt-in Certification (AB 205)	Available for certain clean energy projects; not typically used for conventional data center backup generation.

8.4 How This Document's Content Maps to CEQA/SPPE Deliverables

The following table shows how each section of this document provides material that will be needed in CEQA/SPPE filings. Use this as a checklist when preparing an application.

CEQA/SPPE Deliverable	Supporting Content in This Document	Typical Reviewer Expectations
Project Description	Sections 1–4 (standards scope), Appendix A (engineering detail), Appendix C (topology selection)	Complete generator count, ratings, fuel type, cooling architecture, aggregate load
Air Quality — Generator BACT analysis	Section 4 (Renewable Fuels), Appendix A.5 (California Generator Emissions)	Demonstration that Tier 4 Final emissions equivalent with SCR+DPF is BACT; AQMD rule-by-rule compliance

CEQA/SPPE Deliverable	Supporting Content in This Document	Typical Reviewer Expectations
Air Quality — Health Risk Assessment	Section 4, Appendix A.5 (operating hour limits)	Modeled cancer risk & non-cancer hazard within AQMD thresholds (typically <10 in a million)
Air Quality — Cumulative Analysis	Appendix E (Policy Watch), Section 5 (CA context)	Discussion of other regional data centers and air district attainment status
GHG — Scope 1 Inventory	Section 4 (CI values), Appendix A.5 (LCFS pathways)	Quantified emissions from generator testing and actual outages; use of R99/R100 documented
GHG — Scope 2 Inventory	Section 3 (REF), Appendix B.1 (REF targets)	Grid electricity emissions; documented PPA coverage, on-site renewables, or REF metric
Energy — CEQA Appendix F	Sections 1–3 (all efficiency standards), Section 6 (BAT process)	Demonstration that design is not wasteful; Title 24 compliance; BAT record retained
Energy — Efficiency Commitment	Section 3 (all efficiency metrics), Appendix B (performance targets)	Stated PUE/WUE/CUE targets; commitment to ENERGY STAR equipment where applicable
Water Supply Assessment	Section 3 (WUE), Section C.1 (cooling topology), Appendix B.1 (WUE targets)	Cooling topology selected with water efficiency; local water agency coordination
Alternatives Analysis	Appendix C (decision matrices), Appendix E (emerging tech)	Reasonable alternatives evaluated including dry cooling, battery backup, fuel cells
Mitigation Measures	Section 6 (BAT outcomes), Appendix F (failure modes)	Enforceable conditions: fuel type, Tier level, operating hours, monitoring requirements

CEQA/SPPE Deliverable	Supporting Content in This Document	Typical Reviewer Expectations
Monitoring & Reporting Plan (MMRP)	Appendix G (M&V protocols), Section 6 Phase B.5	Ongoing compliance — sub-metering, annual AQMD reports, CARB affirmations

8.5 Why BAT Documentation (Section 6) Matters for SPPE

The SPPE "no substantial adverse impact" finding is, in practice, the CEC determining that the project has selected Best Available Control Technology for air emissions, Best Available Technology for water and energy, and Best Management Practices for operations. Projects that cannot document these selections face regulatory risk:

- Denial of SPPE and forced application for full AFC (substantially more expensive)
- Requirement to upgrade to more expensive equipment (e.g., hydrogen fuel cells vs. diesel) late in design
- Conditions of certification that are more restrictive than the applicant proposed
- Successful CEQA legal challenges by community groups or competitors
- Delays while addressing CEC staff data requests

Best practice: Begin the BAT selection methodology in Section 6 early — during schematic design. Document each of the eight selection factors with quantitative evidence. This documentation becomes the technical backbone of the SPPE application's air quality, water, and energy sections. Applicants who file complete applications with rigorous BAT documentation and pre-consultation with CEC Staff have achieved expedited review timelines of approximately 180 days. Applicants who file preliminary applications without this foundation typically require 12–24 months due to iterative data requests.

8.6 — Key Case Patterns from Recent CEC SPPE Dockets

Recent SPPE decisions in California illustrate the level of analysis and commitment required. Common patterns across approved projects:

Standard / Framework	What It Covers / When to Apply
Tier 4 Final as baseline	Consistent with California's stationary engine rules, implemented through local AQMDs, per the EKAPCD the Project targets achieving Tier 4 final equivalent emissions per NFPA 110 TIA 22-1 with external SCR+DPF

Standard / Framework	What It Covers / When to Apply
	aftertreatment. Particulate matter and NOx are the key pollutants targeted.
Operating hour limits codified	Non-emergency operating hours (testing + maintenance) limited by permit — typically ≤50–100 hours/year. Enforced through annual reporting.
Health risk assessment with modeling	Applicants use AERMOD or similar dispersion modeling to demonstrate compliance with AQMD cancer risk thresholds (often <10 in a million). Sensitive receptors (schools, hospitals, residences) mapped and analyzed.
Renewable diesel commitment	Post-2024 applications typically commit to R99 or R100 renewable diesel, both to comply with CARB §2449 and to strengthen the SPPE finding.
Water efficiency commitment	Projects in Santa Clara Valley and San José typically commit to closed-loop or adiabatic cooling with specified WUE targets; evaporative cooling faces additional scrutiny in drought-constrained areas.
PUE / Title 24 over-compliance	Applicants often commit to Title 24 + 5–15% energy performance to strengthen the energy resources finding.
Enforceable mitigation monitoring	Final decisions impose conditions of certification (or MMRP in local MND cases) requiring annual reporting, periodic source testing, and recordkeeping.

9. Project Overview: RB Inyokern Data Center (RBIDC)

This section summarizes how the RB Inyokern Data Center (RBIDC), an R&L Capital hyperscale data center campus in Inyokern, Kern County, California, aligns with the standards framework presented in Sections 1–8. The SPPE application was submitted to the CEC in April 2026 at conceptual engineering stage. This summary is intended as a high-level reference for internal project discussions and does not constitute a legal or engineering opinion. Specific compliance determinations and technical calculations remain the responsibility of the project team and its engineer-of-record.

9.1 Project Profile

Project Parameter	Description
Project	RB Inyokern Data Center (RBIDC)
Applicant / Owner	R&L Capital, Inc.
Location	Inyokern, unincorporated Kern County, CA; Indian Wells Valley / Mojave Desert
Site	~50 acres, 4 APNs (lot line adjustment; submittal pending); M-2 PD zoning; Inyokern Specific Plan area
Building	~238,000 SF single integrated building, 30 ft max height, 6 modular data halls
IT Load	~70 MW aggregate (10–12 MW per hall × 6 halls)
Rack Density	10–50 kW (supports HPC/AI workloads)
Total Electrical Demand	~99 MW (confirmed SCE interconnection per MOS174)
Phased Load Ramp	99 MW permanent service (2029+); SCE evaluating 20 MW temporary service (mid-2028)
Backup Generation	40 × 3 MW Caterpillar 3516E diesel gensets; 120 MW gross nameplate (N+2)
Emissions Controls	EPA Tier 4 Final emissions equivalent with SCR + DPF on all generators
Fuel	Renewable diesel (R99/R100) primary; ULSD backup; 24–72 hr on-site storage
Availability Design	Tier III concurrent maintainability / Tier IV functional redundancy
Cooling	Hybrid cooling towers + water-cooled chillers with free-cooling coils; direct liquid cooling of IT racks via CDUs
Water Supply	Inyokern CSD (annexation submittal pending); ~12–16 MGY operational
Target PUE	PUE targets vary significantly by climate zone and cooling topology; while liquid-cooled facilities in cold climates may target 1.20, highly resilient (Tier IV) hybrid-cooled facilities

Project Parameter	Description
	in desert climates (California Title 24 Climate Zone 14, high desert; ASHRAE 169 Climate Zone 3B) typically target 1.30–1.45. The RBIDC design basis PUE is 1.41, consistent with the SPPE Application Basis of Design.
Ancillary Generation	Rooftop and parking canopy PV (non-export, non-merchant)
Air District	Eastern Kern Air Pollution Control District (EKAPCD)
CEQA Posture	CEC lead agency for SPPE; Kern County lead agency for full project; CPUC responsible agency for SCE facilities
Construction Schedule	48-month project process beginning 2027

9.2 Alignment with Industry Standards Framework

The RBIDC conceptual design reflects current California and industry benchmarks for hyperscale data center projects. The following design commitments are well-aligned with the standards referenced throughout this document:

- **Generator emissions controls** — Consistent with California's stationary engine rules, implemented through local AQMDs, the Project will achieve Tier 4 final equivalent emissions per NFPA 110 TIA 22-1 with external SCR+DPF aftertreatment. Particulate matter and NOx are the key pollutants targeted. This is consistent with the emissions package used by other recently approved California SPPE projects (see Section 8.6 patterns).
- **Fuel selection** — Renewable diesel (R99/R100) as the primary fuel choice when available, with ultra-low sulfur diesel (ULSD) as the documented alternative, is implemented as a voluntary BMP to reduce Scope 1 GHG emissions and generate LCFS credits.
- **Cooling strategy** — The hybrid cooling tower + water-cooled chiller design with free-cooling coils is well-suited to the Mojave Desert climate and supports the stated PUE target range.
- **IT infrastructure readiness** — Direct liquid cooling via CDUs provisions the facility for 40–50 kW racks consistent with HPC/AI workload requirements.
- **Reliability design** — Tier III/IV design criteria and N+2 generator redundancy support the >99.982% availability objective.
- **Site selection** — The Inyokern site addresses all seven CEC Appendix B §(b)(1)(D) site selection factors: compatible zoning, confirmed utility service, confirmed water

service, fiber access, regional transportation, suitable terrain, and absence of prime farmland or scenic constraints.

- **CEQA coverage** — The Application addresses all CEQA environmental topics with supporting technical studies (AQIA, biological resources, cultural resources, hydrology, noise, etc.). Note that *Environmental Justice* is not a traditional CEQA Appendix G checklist item and *Energy Conservation* is addressed under CEQA Appendix F both of which have been addressed by the Project Applicant as supplementary analyses.

9.3 Procedural Matter: SPPE Jurisdictional Threshold

The Application's SPPE jurisdictional basis — that the 99 MW maximum operational load governs for SPPE eligibility under PRC §25541 — is addressed in the Application (Sections 1.4 and 1.6). The 120 MW gross nameplate reflects N+2 generator redundancy consistent with Tier III/IV reliability design; the facility's maximum simultaneous electrical demand is contractually and operationally limited to 99 MW per the SCE interconnection (MOS174, March 30, 2026).

9.4 Items That Will Advance with Design Development

Consistent with the conceptual engineering stage of the Application, certain technical deliverables are appropriately deferred to design development and final engineering. The Application itself identifies these as pending items; this document notes them only to connect them to the standards framework:

- Final ASHRAE 90.4 MLC/ELC calculations and Title 24 CBECC-Com energy modeling (Sections 1, 3, Appendix A.1, A.4)
- Final cooling system, UPS, and electrical distribution specifications (Appendices A.2, A.3, A.4)
- Final EKAPCD air permit applications with source-specific emissions calculations (Section 4, Appendix A.5)
- Final hydrology study and stormwater retention basin sizing (Application Section 4.10)
- LAFCo annexation into Inyokern CSD for water service (Application Section 4.18)
- CDFW Incidental Take Permit for biological resources (Application Section 4.4)
- SCE Real Properties analysis and final 115 kV transmission corridor alignment (Application Section 1.5)

These items are part of the normal sequencing of a SPPE application and are appropriately identified in the Application as pending at conceptual stage.

9.5 External Factors to Monitor

The following regulatory developments may affect the project during the SPPE review period and should be tracked:

- **CARB Tier 5 rulemaking** — Workshops began February 2026. May affect generator specifications for facilities in planning for 2028+ operation.
- **Pending California legislation** — AB 222 (energy/AI reporting), SB 978 (generator restrictions in high-pollution zones), and CPUC SB 57 findings (due January 2027) may evolve during the review period.
- **2028 Title 24 cycle** — Pre-rulemaking workshops underway; may affect later phases of the project.

9.6 Summary

The RBIDC conceptual design reflects current industry practices for California hyperscale data center development and incorporates emissions, cooling, fuel, and reliability commitments consistent with the standards framework in Sections 1–8. Specific compliance calculations, technical specifications, and legal determinations remain with the project team and counsel.

Permitting Timeline and Parallel-Path Strategy. The RBIDC SPPE Application (CEC Docket No. 26-SPPE-01) was filed with the CEC in April 2026 following a pre-application conference with CEC Staff on April 3, 2026. The Application includes complete CEQA-level environmental documentation across all 20 resource areas with supporting technical studies, executed utility will-serve documentation from both SCE (MOS174, March 30, 2026) and the Inyokern CSD (WSL, April 2, 2026), and the full range of Appendix B exhibits and appendices. The Applicant is targeting a completeness determination within 45 days of filing and a Commissioner decision within approximately 180 days, consistent with the expedited review track described in Section 8.3.3.

Concurrent with the CEC SPPE process, the Applicant is pursuing Kern County land use entitlements, including a Conditional Use Permit (CUP), Inyokern Specific Plan Amendment (to eliminate the future 90-foot secondary collector road reservation), and Lot Line Adjustment No. 28-25. The parallel-path strategy is designed to position the project for construction start in Q2 2027, following receipt of both CEC and Kern County approvals.
LAFCo annexation into the Inyokern CSD is required prior to construction per the executed WSL (§5.5) and is being coordinated to align with the CUP and SPPE timelines.

9.7 Consistency with Kern County General Plan

The RBIDC project is consistent with the goals, policies, and implementation measures of the Kern County General Plan applicable to the project site. The Energy Element (Chapter 5) encourages the safe and orderly development of transmission lines to access Kern County’s electrical resources along routes that minimize potential adverse environmental, economic, and social impacts (Section 5.4.7), which the project addresses through SCE’s customer-dedicated 115 kV transmission interconnection per

MOS174. The Energy Element also supports solar energy development in desert planning regions that does not pose significant environmental or public health and safety hazards (Section 5.4.5, Policies 1 and 3), which the project supports through its ancillary 1 MW rooftop and parking canopy photovoltaic system. The Land Use, Open Space, and Conservation Element (Chapter 1) directs that light and glare from new discretionary projects be minimized in rural and urban areas (Policies 47–48, Section 1.10.7), which the project addresses through compliance with the Dark Skies Ordinance (Chapter 19.81) and the Conceptual Outdoor Lighting Control Plan (Appendix I.1). The project's M-2 (Medium Industrial, Precise Development) zoning designation and location within the Inyokern Specific Plan area are consistent with the General Plan's land use map designations for the site. The project's BAT and BMP commitments — including Tier 4 Final equivalent generator emissions with SCR and DPF aftertreatment, renewable diesel as the primary fuel when available, hybrid cooling with a design basis PUE of 1.41, and continuous energy monitoring via the RESET platform — directly support the County's policy objectives for environmentally responsible energy and industrial development in the Indian Wells Valley.

Appendix A — Engineering Detail Data by Standard

Reference data for each major standard is presented below. Numeric thresholds, applicability triggers, and scope boundaries. Engineers should confirm the current edition of each standard at the time of use; addenda and revisions are issued frequently.

A.1 — ASHRAE 90.4-2022 (with addenda through 2025)

Scope trigger: Data centers with conditioned floor area >20 W/ft² AND ITE load >10 kW. Applies to new construction, additions, and alterations affecting mechanical or electrical systems.

Compliance structure: Two-part test — prescriptive requirements from ASHRAE 90.1 for envelope, SWH, lighting; performance requirements from 90.4 for mechanical (MLC) and electrical (ELC). Section 11 provides an alternative combined MLC+ELC tradeoff path with on-site renewable energy credit.

Maximum Annualized MLC — Table 6.5 (representative values)

Values shown are illustrative maxima from ASHRAE 90.4-2022 Table 6.5 as modified by Addendum g. The standard lists all 19 ASHRAE 169 climate zones with separate columns for ITE design power ≤300 kW and >300 kW. **Always refer to the current published tables for compliance calculations.** Representative points:

- Climate Zone 1A (very hot humid, e.g., Miami): ~0.26 for ITE >300 kW
- Climate Zone 2B (hot dry, e.g., Phoenix): lower MLC than 1A (better economizer potential)
- Climate Zone 3B (warm dry, e.g., Los Angeles, Las Vegas): further reduced MLC
- Climate Zone 4A (mixed humid): moderate MLC with seasonal economizer
- Climate Zone 5A/5B (cool, e.g., Chicago/Denver): lowest MLC values — free cooling dominant
- Climate Zone 6A/6B and 7/8 (cold/very cold): lowest MLC; year-round economizer typical
- Smaller facilities (ITE ≤300 kW) have higher MLC allowances to account for part-load inefficiencies

MLC Calculation Requirements

- Must be calculated at 25%, 50%, 75%, and 100% ITE power load conditions
- Requires 8,760-hour simulation using TMY3 weather for project location, or bin calculations
- Includes cooling energy, pump energy, AHU/CRAH fan energy, heat rejection fan energy

- UPS and transformer cooling loads must be included at matching part-load efficiencies
- Redundant equipment allowed in calculations only if actual operation uses partial-load efficiencies
- Credit available for heat recovery shared with non-data-center spaces (Addendum a)

Maximum Design ELC — Table 8.6 (representative values)

ELC is calculated as the sum of worst-case losses across the UPS segment and ITE distribution segment. The incoming service segment was removed in recent addenda. Representative maxima: **UPS segment:** approximately 0.040–0.050 for VFI topology at design load. **ITE distribution:** approximately 0.025–0.035. **Total ELC:** approximately 0.100–0.125 depending on topology.

ELC Calculation Requirements

- UPS segment efficiency calculated at multiple load points depending on topology:
  - Single-feed UPS (N, N+1, etc.) — evaluated at 100% and 50% ITE load
  - Active dual-feed UPS (2N, 2N+1) — evaluated at 50% and 25% ITE load (never expected above 50%)
- All ELC segments now calculated at 25%, 50%, 75%, and 100% design load (aligning with MLC)
- Transformer efficiency curves required in ITE distribution segment (DOE-compliant baseline)
- UPS efficiency based on manufacturer's published performance at matching load points

Documentation Submittals Required

- Basis of design including calculations
- Electrical single-line diagram
- ELC calculations (as-designed and compliance values)
- Floor plans identifying distribution areas
- Mechanical systems schematic with part-load operating strategy
- Hourly simulation output with annualized MLC result

A.2 — ASHRAE TC 9.9 Thermal Guidelines (5th Edition, 2021)

Scope: Defines allowable and recommended inlet-air temperature and humidity envelopes for data center ITE. Referenced (but not mandated) by 90.4 and used universally for setpoint specification.

Recommended Envelope (all air-cooled classes A1–A4)

- Dry-bulb temperature: 18°C to 27°C (64.4°F to 80.6°F)

- Dew point range: −9°C DP (lower bound for ESD control) to 15°C DP
- Maximum relative humidity: 70% RH (noncorrosive) or 50% RH (corrosive environments)

Allowable Envelopes — Air-Cooled Classes

Standard / Framework	What It Covers / When to Apply
Class A1	15–32°C (59–89.6°F); max DP 17°C; 8–80% RH. Enterprise servers, storage, tape. Most restrictive allowable.
Class A2	10–35°C (50–95°F); max DP 21°C; 8–80% RH. Volume servers, storage, personal computers.
Class A3	5–40°C (41–104°F); max DP 24°C; 8–85% RH. Extended temperature operation; requires qualified ITE.
Class A4	5–45°C (41–113°F); max DP 24°C; 8–90% RH. Maximum flexibility; requires specifically qualified ITE.
Class H1 (new, 5th ed.)	High-density air-cooled. Inlet air limited to 25°C (77°F) maximum to maintain chip junction temperatures.

Allowable Envelopes — Liquid-Cooled Classes (Supply Water Temperature)

Standard / Framework	What It Covers / When to Apply
Class W17	≤17°C (52.6°F) — chiller-dependent; legacy liquid cooling
Class W27	≤27°C (80.6°F) — water economizer feasible in many climates
Class W32	≤32°C (89.6°F) — year-round free cooling with cooling towers in most climates
Class W40	≤40°C (104°F) — dry cooler feasible in temperate climates
Class W45	≤45°C (113°F) — dry cooler year-round in many climates
Class W+	>45°C — waste heat recovery applications

Other Operational Parameters

- Rate of change: max 5°C/hr for tape storage; 20°C/hr for all other ITE (max 5°C in any 15-minute period)
- Elevation derating: A1/A2 derate 1°C per 300m above 950m; A3 per 175m; A4 per 125m
- ESD mitigation required at low RH; proper grounding permits 8% RH lower limit

A.3 — ENERGY STAR UPS Specification (Version 2.0)

Effective date: January 1, 2019. **Scope:** AC- and DC-output UPS for commercial, data center, and telecommunications applications. Excludes UPS internal to computers, industrial UPS, transmission/distribution UPS, mobile UPS, and cable-TV network UPS.

Efficiency Calculation (AC-output)

Average efficiency is calculated as a weighted average across four load points, using time-weighting factors that reflect typical operating profiles:

EffAVG = t25% × Eff25% + t50% × Eff50% + t75% × Eff75% + t100% × Eff100%

Minimum EffAVG varies by input dependency characteristic and rated output power. Representative minimum values:

Standard / Framework	What It Covers / When to Apply
VFD (Voltage/Frequency Dependent)	Smaller offline UPS (≤1500 VA). Lower efficiency floor as mains typically feeds load directly in normal operation.
VI (Voltage Independent / Line-Interactive)	Up to 5,000 VA. Minimum ~95–97% EffAVG depending on size class. Power factor ≥ 0.90 at 100% load required.
VFI (Voltage/Frequency Independent / Double-Conversion)	Data center topology, up to 1,000+ kVA. Minimum EffAVG scales with rated output; representative ~94% for smaller units, ~96%+ for large modular. Power factor ≥ 0.90 at 100% load.

FEMP reference point: An ENERGY STAR-certified 900-W VI UPS meets a 98.4% efficiency minimum, vs. ~97.3% for standard models.

Real-World Efficiency Behavior

- Efficiency follows a load-dependent curve; most data center UPS operate at 20–50% load due to redundancy

- Efficiency drops off below 50% load and substantially below 30%
- 2N topology inherently operates each UPS at ≤50% — selection must account for part-load efficiency
- Modular UPS architectures mitigate part-load penalty by sizing closer to actual load
- Eco-mode / bypass mode can add 2–8% efficiency but with documented power quality tradeoffs

A.4 — California Title 24, Part 6 (2025 Energy Code)

Effective date: January 1, 2026 for permit applications. **Scope trigger:** All new data center construction, additions to existing facilities, and alterations affecting cooling, electrical, lighting, or envelope systems in California.

Compliance Pathways

Standard / Framework	What It Covers / When to Apply
Mandatory Requirements	Apply to all buildings regardless of path chosen. Include minimum insulation, air barriers, equipment efficiencies, controls, and commissioning.
Prescriptive Path	Checklist approach — meet each line-item requirement. Most restrictive, least flexible. Feasible for small facilities but generally not used for large data centers.
Performance Path (most common for large DCs)	CBECC-Com whole-building energy model must meet or beat prescriptive baseline energy budget. Allows tradeoffs between systems. Requires CEC-approved software.

Data-Center-Specific Mandatory Provisions

- Economizer operation requirements (air-side or water-side depending on climate zone)
- Fan power limits expressed as W/CFM for supply and return systems
- Hot/cold aisle containment where applicable to the cooling topology
- Variable-speed fan control for CRAH/CRAC and AHU fans
- Differential pressure-based airflow control
- Continuous energy monitoring — sub-metering of IT, mechanical, and electrical loads required for documentation

Climate Zone Applicability

California has 16 climate zones defined in the Reference Appendices. Zones drive economizer type, minimum equipment efficiency, and envelope requirements. Common data center locations:

- Zone 3 (Oakland, coastal SF Bay): moderate, air-side economizer viable most of the year
- Zone 6 (LA coastal): moderate with humidity considerations
- Zone 10 (Riverside, inland Southern CA): hotter; water-side or evaporative often used
- Zone 12 (Sacramento, Central Valley): hot summers, cool winters; large economizer window
- Zone 13 (Fresno): hotter; evaporative cooling common
- Zone 14 (high desert, e.g., Palmdale): wide diurnal swings; dry coolers feasible

Certification Documents Required

Standard / Framework	What It Covers / When to Apply
Certificate of Compliance (CF1R)	Required before permit approval. Demonstrates design meets Title 24. Produced by CBECC-Com modeler.
Installation Certificate (CF2R)	Signed by contractor/installer during construction confirming equipment matches approved design. Filed at key milestones.
Certificate of Acceptance (CF3R)	Required before occupancy. Verified by ATTCP (Acceptance Test Technician Certification Provider) certified technician. Confirms installed systems achieve designed performance.

Non-Compliance Consequences

- Permit denial (most common — cannot proceed without CF1R)
- Stop work orders during construction if violations discovered
- Civil penalties $500–$2,000 per day per violation category

A.5 — California Generator Emissions & Fuel Requirements

Regulatory framework: Overlapping CARB statewide rules and EKAPCD rules. EKAPCD sets the binding permit conditions for the project site in Inyokern.

EPA Tier Standards (Federal Baseline)

Standard / Framework	What It Covers / When to Apply
Tier 1	1996 — initial nonroad diesel emissions standards for engines ≥37 kW
Tier 2	2001 — reduced NOx and PM
Tier 3	2006 — further NOx and PM reductions
Tier 4 Interim	2011 — significant NOx reduction; aftertreatment introduced
Tier 4 Final	2014–2015 — current federal standard; NOx ~0.4 g/kWh, PM ~0.02 g/kWh (varies by power band). Requires SCR and DPF typically.
Tier 5 (pending)	CARB workshops began February 2026; target ~90% further NOx reduction beyond Tier 4 Final. Expected to become baseline for facilities in planning now for 2027–2029 occupancy.

Emergency Standby Exemptions (Federal vs. California)

- **Federal (EPA NSPS):** Emergency standby generators allowed up to Tier 2/3 in most attainment areas; up to 100 hours/year maintenance and testing; unlimited hours during actual emergencies.
- **California non-attainment areas:** Most data center locations. Tier 4 Final typically required even for emergency standby. Operating hour caps typically 50–100 hours/year for non-emergency use.
- **California attainment areas (limited):** Some rural inland counties. Less restrictive but still stricter than federal baseline.

CARB Renewable Diesel Requirement (Off-Road Regulation §2449)

- Effective January 1, 2024 for fleets subject to In-Use Off-Road Diesel-Fueled Fleets Regulation
- Required fuel: R99 or R100 renewable diesel (meets ASTM D975)
- **Exemptions:** Fleets entirely composed of Tier 4 Final off-road engines, MY2010+ on-road engines, or ZEVs; fleets operating in designated captive attainment areas
- Record-keeping: purchase date, volume retained three years
- Annual compliance affirmation due to CARB by March 1
- Cold-weather exemption: Low-temp diesel allowed Nov–Feb where January 10th-percentile min temp < 20°F

Local AQMD Rules (most stringent typically apply)

Standard / Framework	What It Covers / When to Apply
Eastern Kern Air Pollution Control District (EKAPCD)	The local air district with jurisdiction over the RBIDC project site in Inyokern, Kern County (Mojave Desert Air Basin). Rule 425 (Stationary Gas Turbines) sets NOx limits and requires CEMS for turbines > 0.88 MW. Rule 427 (Stationary Piston Engines) governs reciprocating IC engines. Emergency standby engines must comply with 17 CCR § 93115 (ATCM) and obtain an Authority to Construct (ATC) per Rule 202. The Project's Tier 4 Final equivalent emissions with external SCR+DPF aftertreatment exceed EKAPCD requirements.
Comparative References Only:	
Mojave Desert AQMD	Covers the desert portion of San Bernardino County. Less restrictive than coastal districts but still stricter than federal baseline. Not the serving district for this project.
South Coast AQMD	Rule 1110.2 — stationary IC engines; Rule 1470 — portable/emergency engines. Among the strictest U.S. requirements. Tier 4 Final + SCR + DPF typical. Operating hour caps strictly enforced.
Bay Area AQMD	Regulation 9, Rule 8 — NOx from stationary IC engines. Requirements often mirror or exceed Tier 4 Final.
San Joaquin Valley APCD	Stringent due to ozone non-attainment status; similar Tier 4 Final requirements.
Sacramento Metro AQMD	Non-attainment for ozone; engine permit conditions generally require Tier 4 Final.

Carbon Intensity & LCFS Credit Pathways

CARB LCFS assigns carbon intensity (CI) values to fuels in gCO_2e/MJ. Generators fueled with low-CI fuels may generate credits. Representative values:

- Conventional ULSD: ~100 gCO_2e/MJ
- Renewable diesel (typical): 20–50 gCO_2e/MJ depending on feedstock and pathway
- Renewable diesel from waste fats: ~20–30 gCO_2e/MJ
- Biodiesel (soybean): 50–60 gCO_2e/MJ

- Biodiesel (waste grease): 15–30 gCO_2e/MJ
- Renewable natural gas (landfill/dairy): can be negative
- Green hydrogen: 0 gCO_2e/MJ (if fully renewable-sourced)

Appendix B — Performance Targets & Benchmarks

Numeric targets representing "good" performance for modern data center deployments. Targets assume new construction or major retrofit; legacy facilities typically perform worse. Use these as design goals and post-commissioning verification benchmarks.

B.1 Facility-Level Efficiency Targets

Standard / Framework	What It Covers / When to Apply
PUE — Target	PUE targets vary significantly by climate zone and cooling topology; while liquid-cooled facilities in cold climates may target 1.20, highly resilient (Tier IV) hybrid-cooled facilities in desert climates (California Title 24 Climate Zone 14, high desert; ASHRAE 169 Climate Zone 3B) typically target 1.30–1.45. The RBIDC design basis PUE is 1.41, consistent with the SPPE Application Basis of Design.
WUE — Dry Cooled	0.0 L/kWh (water-free)
WUE — Closed-Loop Chilled Water	0.1–0.3 L/kWh
WUE — Evaporative / Adiabatic	0.5–2.0 L/kWh (climate-dependent)
WUE — Industry Leading	<0.1 L/kWh (most hyperscalers committing to water-free in drought zones)
CUE	Drives to grid carbon intensity; target <0.1 $kgCO_2e/kWh$ ITE with 100% renewable PPA coverage
REF (Renewable Energy Factor)	1.0 (100% renewable match) is now baseline expectation for new hyperscale; 0.5+ minimum for credibility
ERF (Energy Reuse Factor)	Typically 0 in U.S.; 0.2–0.5+ in Europe where heat reuse infrastructure exists

Standard / Framework	What It Covers / When to Apply
Facility ENERGY STAR Score	75+ for certification; 90+ for leadership

B.2 Cooling System Targets

Standard / Framework	What It Covers / When to Apply
Supply Air Temperature (ASHRAE TC 9.9)	24–27°C (recommended upper) — elevated setpoints save cooling energy
Return Air / Chilled Water ΔT	10–15°C (air); 6–10°C (chilled water) — higher ΔT reduces pump/fan energy
Chiller Efficiency — Water-Cooled Centrifugal	≤0.55 kW/ton IPLV (0.43 kW/ton best-in-class)
Chiller Efficiency — Air-Cooled	≤0.90 kW/ton IPLV
Fan Power — Cooling System	<0.15 W/CFM (Title 24 prescriptive); <0.10 W/CFM best-in-class
Air-Side Economizer Hours	>4,000 hr/yr in favorable climates (e.g., Seattle, Denver, Phoenix night)
Cooling Tower Approach	3–5°C approach to wet-bulb typical
Containment Effectiveness	>95% of supply air should bypass the ITE before returning (measured via return air temperature rise)
Liquid Cooling Supply Temperature	W27–W32 class for year-round free cooling; W45 (Nvidia Vera Rubin, 2026) enables dry coolers year-round
Rack Density Support	Air: ≤20 kW/rack practical ceiling; Rear-door HX: 20–50 kW; D2C hybrid: 50–150 kW; Immersion: 100–250+ kW

B.3 Electrical System Targets

Standard / Framework	What It Covers / When to Apply
UPS Efficiency (VFI, double-conversion, at 50% load)	96–97% ENERGY STAR; 97%+ best-in-class modular
UPS Efficiency (eco-mode / bypass)	98–99% (with power quality tradeoffs)
Transformer Efficiency (DOE 2016, @35% load)	98.8% for 500 kVA dry-type; 99.3% for 2500 kVA
Power Factor — Utility Interface	>0.95 lagging (often required by tariff); 0.99 with power factor correction
Server Power Supply (PSU)	80 PLUS Titanium: 90%/94%/96%/91% at 10%/20%/50%/100% load
Distribution Voltage (hyperscale)	415/240 V (380/220 V IEC) direct to rack reduces step-downs vs. 480V
DC Distribution (where used)	380 VDC from rectifier direct to server — eliminates inverter losses

B.4 — IT Equipment Targets

Standard / Framework	What It Covers / When to Apply
Server Active Efficiency (ENERGY STAR)	Varies by configuration; SPEC SERT score ≥ Tier requirements by server class
Server Idle Power	ENERGY STAR caps idle by server class; target <20% of active for modern servers
Storage Efficiency (SNIA Emerald)	IOPS/W and TB/W benchmarks — varies by workload class
Server Utilization	Target >40% average; hyperscale aggregation achieves >60%; enterprise often <20%

Standard / Framework	What It Covers / When to Apply
Virtualization Consolidation	>10:1 VM-to-host typical; >20:1 with modern hardware
Hardware Refresh Cycle	3–5 years for servers to keep efficiency gains current with silicon generation
Embodied Carbon — Server	~1,500–2,500 kgCO_2e per typical 2U rack server (includes manufacturing)

Appendix C — Selection Decision Matrices

Engineering decision aids for major architectural choices. These matrices synthesize trade-offs; final selection should apply the full BAT methodology in Section 6.

C.1 Cooling Architecture Selection

Standard / Framework	What It Covers / When to Apply
Hot/Cold Aisle Air Cooling	Rack density ≤20 kW. Traditional enterprise and colocation. Simplest, lowest CapEx. PUE 1.3–1.45.
Air + Rear-Door Heat Exchanger	20–50 kW/rack. Retrofit-friendly. Passive RDHX free; active RDHX requires pumped water. PUE 1.3–1.45.
Direct-to-Chip (D2C) Liquid (Hybrid)	50–175 kW/rack. Cold plates on CPU/GPU capture 70–75% of heat; remaining 25–30% via air. Standard for AI workloads 2026+. PUE 1.3–1.45.
Single-Phase Immersion	40–250 kW/tank equivalent. Higher density, ~90% less water. Dielectric fluid $2–10/L. Economic crossover ~50 kW/tank. PUE 1.3–1.45.
Two-Phase Immersion	150–250+ kW/tank. To achieve PUE target involves fluorocarbon fluids which contain PFAS; 3M has exited the market. Cost and regulatory headwinds.
Direct Liquid to Silicon (SiCP, emerging)	Microchannel cooling etched into silicon. HP/Nvidia drop-in upgrades planned 2026–2028. Cutting edge; not yet production-scale for most operators.

C.2 UPS Topology Selection

Standard / Framework	What It Covers / When to Apply
Single-feed N	No redundancy. Single point of failure. Only acceptable for non-critical or dev/test environments.
N+1 (single feed)	One extra module. Tolerates one UPS failure. Common for Tier II. Higher part-load efficiency than 2N.
2N (dual feed)	Two fully independent systems. Tolerates total path failure. Tier III/IV. Each UPS typically ≤50% loaded — efficiency penalty significant.
2N+1	Two systems each with redundancy. Highest availability. Tier IV. Highest CapEx and efficiency penalty.
Distributed Redundant (3N/2, 4N/3)	Shared redundancy across multiple systems. Better average loading than 2N — improves efficiency. Popular in modern hyperscale.
Lithium-ion vs. VRLA	Li-ion: 2–3× longer life, smaller footprint, faster recharge, higher upfront cost. VRLA: lower cost, shorter life (3–5 yr), larger footprint. Li-ion TCO better for most new builds 2026+.

C.3 Generator Fuel Selection (California)

Standard / Framework	What It Covers / When to Apply
Conventional Diesel (ULSD)	Lowest CapEx. Not compliant with CARB Off-Road Reg §2449 for most fleets since Jan 2024. Still acceptable in limited carve-outs (Tier 4 Final fleets, captive attainment areas).
Renewable Diesel (R99/R100)	Drop-in replacement for ULSD — no engine modifications required. Meets CARB §2449. Generates LCFS credits. ~75% GHG reduction vs. ULSD. Currently 15–25% fuel cost premium partially offset by LCFS credits.
Biodiesel (B5–B20 blends)	Partial substitute. B5 meets ASTM D975; B6–B20 meets D7467. Can increase NOx slightly. Less favored than R99 for new projects.

Standard / Framework	What It Covers / When to Apply
Natural Gas / RNG	Lower criteria pollutants than diesel; RNG can achieve negative CI via LCFS. Requires gas service infrastructure; slower start-up than diesel (60+ sec vs. 10 sec).
Hydrogen Fuel Cells	Zero local emissions. High CapEx, nascent fuel supply chain. SB 978 (proposed 2026) pointing this direction in CA high-pollution zones. Emerging — not yet mature for 24/7 backup at scale.
Battery Energy Storage (BESS) as Backup	Complements or replaces generators for short outages. 15–60 min typical runtime. Combined with generators for "bridging" during transfer. Grid services revenue available.

Appendix D — Economics, Incentives & TCO

Typical cost ranges and economic considerations. All figures are 2026 U.S. dollars and should be treated as order-of-magnitude; actual project costs vary with scale, location, supply chain, and specification.

D.1 — Typical CapEx Ranges (per kW of IT Load)

Standard / Framework	What It Covers / When to Apply
Tier II Air-Cooled	$7,000–$10,000/kW — shell, power, cooling, fit-out
Tier III Air-Cooled	$10,000–$14,000/kW
Tier IV Air-Cooled (2N+1)	$14,000–$20,000/kW
Hyperscale Air-Cooled	$8,000–$12,000/kW — economies of scale
Liquid-Cooled (D2C Hybrid)	$12,000–$18,000/kW — additional cooling infrastructure partially offset by density
Single-Phase Immersion	$4,500–$6,800/kW (tanks, CDU, fluid, rejection) — but density savings reduce building shell costs 40–55%

Standard / Framework	What It Covers / When to Apply
Tier 4 Final Diesel Generator (CA)	$400–$700/kW installed with SCR+DPF aftertreatment
Hydrogen Fuel Cell Backup	$3,000–$6,000/kW — emerging pricing
Li-ion UPS (including batteries)	$800–$1,500/kW
VRLA UPS (including batteries)	$600–$1,100/kW — lower up-front, higher lifecycle cost

D.2 — Typical Annual OpEx (per kW of IT Load)

Standard / Framework	What It Covers / When to Apply
Electricity (PUE 1.3 @ $0.10/kWh)	~$1,100/kW/yr
Electricity (PUE 1.5 @ $0.10/kWh)	~$1,300/kW/yr
Electricity (CA commercial avg ~$0.20/kWh, PUE 1.3)	~$2,300/kW/yr
Water (WUE 1.0 L/kWh @ $5/kgal)	~$160/kW/yr
Staffing (allocated)	$200–$600/kW/yr for large facilities
Maintenance & service contracts	$150–$400/kW/yr
Generator fuel (renewable diesel premium)	~$50–$100/kW/yr incremental vs. ULSD at typical test-hour usage

D.3 — California Incentive & Credit Programs

Standard / Framework	What It Covers / When to Apply
LCFS Credits	Generated by low-CI fuels used in CA. Renewable diesel generates ~$0.50–$1.50 per gallon of credits depending on CI pathway and credit price. Monetized via brokers.
California Competes Tax Credit	Competitive income tax credit for job creation and investment. Not DC-specific; DC operators can apply if scoring well.
Manufacturing & R&D Partial Sales Tax Exemption	Partial exemption on qualifying equipment purchases for manufacturers, R&D, and (since 2018) certain electric power generation/distribution businesses.
Self-Generation Incentive Program (SGIP)	CPUC program for on-site generation and storage, including fuel cells and batteries. Caps apply.
Utility DR / Grid Services	PG&E, SCE, SDG&E demand response programs; operators can monetize flexible loads and on-site generation.
Federal ITC (Investment Tax Credit)	Applies to qualifying renewable energy and storage — 30% base + adders for domestic content, energy communities.
Federal §179D Energy Efficient Commercial Building Deduction	Up to $5/SF deduction for efficient building systems meeting 25% improvement over baseline.

D.4 — TCO Analysis Framework (15-year horizon, typical)

- Base CapEx (shell, M&E, fit-out) — single up-front outlay, depreciated over facility life
- Cooling CapEx premium — increment over baseline air cooling (e.g., liquid cooling adder)
- Equipment refresh — UPS batteries at year 5–10 (VRLA) or 10–15 (Li-ion); chillers at year 15–20
- Annual electricity — largest OpEx line; drives PUE/efficiency business case
- Annual water — material in evaporative designs; minor in dry
- Annual maintenance, staffing, consumables
- Annual fuel for generator testing + actual outages

- Incentive credits (LCFS, ITC/§179D, utility rebates) — offsetting income
- End-of-life / decommissioning — immersion fluid disposal material ($8–18/L); equipment resale
- Discount rate — typically 7–10% WACC for data center assets

Appendix E — Emerging Technology & Policy Watch

Technologies and policies that will materially affect projects reaching operation in 2027–2030. Track these during the design phase to avoid obsolescence.

E.1 — High-Density Cooling

- **Warm-water liquid cooling at 45°C supply** — Nvidia Vera Rubin (CES 2026) enables dry-cooler-only heat rejection, eliminating chillers. Production availability H2 2026.
- **Silicon-level cooling (SiCP)** — Microsoft-Corintis microchannel etching; HP/Nvidia drop-in SiCP devices planned 2026–2028. Cold plates with 300–600 W/cm² heat flux capability.
- **PFAS restrictions on two-phase immersion fluids** — 3M exited fluorinated fluid production; EU and U.S. restrictions tightening. Single-phase immersion and D2C becoming preferred paths.
- **AI-optimized CDUs** — Coolant distribution units with onboard inference for predictive thermal management; up to 20% pump energy reduction vs. reactive systems.

E.2 — Power & Generation

- **Private natural gas "shadow grids"** — Hyperscalers building dedicated gas-fired generation to bypass utility queues; raises Scope 1 emissions and regulatory questions.
- **Hydrogen fuel cells for prime and backup** — Microsoft, Bloom Energy, and others piloting. SB 978 (CA, proposed 2026) pointing this direction for high-pollution zones.
- **Small Modular Reactors (SMR)** — Multi-year lead time but gaining hyperscale interest for 24/7 firm carbon-free power.
- **Long-duration battery storage** — Iron-air, flow batteries, etc., for 10+ hour storage. Changes the generator-vs-battery calculus for backup.
- **Grid-interactive data centers** — On-site generation exported to grid during peaks; revenue stream and community benefit.

E.3 — Policy & Regulatory Signals

- **California CPUC SB 57 findings (due January 1, 2027)** — Will likely drive new data center tariffs, cost-allocation rules, and possible new reporting requirements.

- **California AB 222 energy / AI training reporting** — Pending; may be enacted 2026. Would require annual PUE and AI energy disclosure to CEC.
- **California SB 978 generator restrictions** — Proposed Feb 2026; would ban new diesel backup in hyperscale DCs in high-pollution zones.
- **CARB Tier 5 (workshop Feb 2026)** — ~90% further NOx reduction beyond Tier 4 Final. Facilities planning now for 2028+ occupancy should anticipate.
- **2028 Title 24 cycle** — Explicit coverage of liquid-cooled servers, high-density deployments, and possibly on-site generation. Pre-rulemaking workshops underway.
- **EU AI Act and CSRD data center reporting** — Affects U.S. multinationals; indirect reporting pressure on California operators.
- **Federal FERC large-load interconnection reform** — Ongoing; will affect utility service timelines (currently 3–7+ years in constrained markets).

Appendix F — Common Compliance Failure Modes

Risks commonly missed or underestimated in data center projects. Mitigate each during design; catching these in commissioning or operations is substantially more expensive.

F.1 — Design Phase Risks

Standard / Framework	What It Covers / When to Apply
Undersized economizer capacity	Title 24 prescriptive requires economizer in most climate zones. Undersized economizer causes compliance failure AND operational inefficiency. Size for 100% ITE load at economizer changeover temperature.
MLC calc using steady-state ITE	ASHRAE 90.4 requires 25/50/75/100% ITE load points with hourly weather. Steady-state calc will not comply.
Ignoring UPS cooling load in MLC	UPS inefficiency dissipates as heat that must be cooled. Must be included in MLC at matching part-load efficiency.
Generator Tier assumption wrong for zone	Federal baseline (Tier 2/3 OK for standby) does not apply in most CA AQMDs. Confirm with local AQMD before specifying.
Water-intensive cooling in drought zone	Evaporative/adiabatic cooling may be permitted today but face future restrictions. Dry cooling increasingly required.

Standard / Framework	What It Covers / When to Apply
No sub-metering plan	Title 24 mandates ongoing monitoring documentation. Retrofit metering is 5–10× cost of designed-in metering.
Missing CEQA trigger	Projects near sensitive receptors or with substantial water/energy demand may trigger full EIR, adding 12–18 months.
Inadequate utility service study	Power delivery timelines in constrained markets (PG&E, Dominion, etc.) can be 3–7+ years. Confirm before selecting site.

F.2 — Construction Phase Risks

Standard / Framework	What It Covers / When to Apply
Substitutions without engineer review	Equipment swaps during construction can invalidate the Title 24 CF1R. All substitutions must be re-modeled and approved.
FAT / SAT scope too narrow	Factory and site acceptance tests must cover the full range of operating modes, including economizer changeover and failure modes.
Inadequate integrated systems test (IST)	IST at partial load misses interactions that occur at design load. Full-load IST with load banks is essential before occupancy.
Missing ATTCP credentials	Title 24 CF3R requires specific ATTCP credentials for each system type. Verify before scheduling acceptance tests.

F.3 — Operations Phase Risks

Standard / Framework	What It Covers / When to Apply
DPF regeneration failures on low-load generators	Tier 4 Final DPFs rely on high exhaust temp to burn off soot. Low-load monthly test runs do not reach temp → clogged filter → emissions violation OR generator unavailable. Active DPFs or load bank testing mitigate.

Standard / Framework	What It Covers / When to Apply
Drift from design setpoints	Operators often lower supply air temps for "comfort" or perceived risk. Each 1°C reduction increases cooling energy ~3–4%.
Missed annual CARB affirmation (CA)	March 1 annual affirmation required for Off-Road Regulation compliance. Missed deadlines trigger enforcement.
Inadequate renewable diesel records	Three-year retention of purchase date and volume records required. Gaps can trigger violations even when fuel was compliant.
Aging UPS efficiency degradation	UPS efficiency degrades with component aging. Regular measurement and battery replacement needed to maintain ENERGY STAR performance claims.
Hardware refresh lag	Server efficiency improves each generation. Facilities that don't refresh every 3–5 years fall behind on IT efficiency and effectively worsen their PUE-equivalent.
Shadow IT / unmanaged growth	Racks added outside the original design envelope can push localized densities beyond cooling capacity, causing hot spots and throttling.

Appendix G — Measurement & Verification Protocols

Standardized methods for measuring efficiency metrics post-commissioning and for ongoing operations. Rigorous M&V is required for Title 24 compliance, ENERGY STAR certification, and credible sustainability reporting.

G.1 — PUE Measurement (ISO/IEC 30134-2)

Standard / Framework	What It Covers / When to Apply
Measurement Category 1 — Basic	Monthly or annual totals; one-time spot measurements acceptable for basic reporting. Metering at utility meter and UPS output.

Standard / Framework	What It Covers / When to Apply
Measurement Category 2 — Intermediate	Continuous metering at facility boundary and UPS output; hourly data logging. Suitable for most compliance and reporting needs.
Measurement Category 3 — Advanced	Continuous metering at multiple points including PDU/rack level. Required for granular analysis and detailed sustainability reporting.
Measurement Boundary	Total facility power includes cooling, lighting, UPS losses, and non-IT office loads within the DC boundary. IT power measured at UPS output (most common) or at PDU/rack.
Measurement Period	Annualized PUE uses 12 months of data to capture seasonal variation. Monthly PUE values vary significantly; only annualized PUE is comparable across sites.
Reporting Precision	Report to two decimals. Do not compare PUE values computed under different measurement boundaries or methodologies.

G.2 — WUE Measurement (ISO/IEC 30134-9)

- Include all water consumed on-site for cooling (make-up water for cooling towers, evaporative coolers, humidification)
- Exclude potable water for occupants, irrigation, and fire protection testing
- Source-side WUE includes water used in generating the electricity consumed (typically reported separately as Water Usage Effectiveness — Source)
- Report liters per kWh of IT equipment energy

G.3 — MLC/ELC Verification (ASHRAE 90.4)

- Document measured MLC at 25%, 50%, 75%, 100% ITE load during commissioning
- Use load banks if actual ITE has not yet populated the facility
- Verify UPS segment efficiency at the same four load points using UPS-reported input/output
- Compare measured to design values — deviations >5% warrant investigation
- Repeat measurement annually and after major modifications

G.4 — Instrumentation Requirements

Standard / Framework	What It Covers / When to Apply
Utility meter (revenue grade)	Utility-provided; 0.2% accuracy typical
UPS input/output metering	±1% accuracy per IEC 62053-21 Class 1
PDU metering	±2% acceptable for most applications; per-breaker monitoring for granular analysis
Rack-level / intelligent PDU	±2% per outlet; enables per-server tracking
Temperature sensors (air)	±0.5°C for supply/return; critical for validating ASHRAE TC 9.9 compliance
Temperature sensors (water)	±0.2°C; required for accurate chiller performance measurement
Flow meters (water)	±1%; magnetic or ultrasonic preferred for low maintenance
Humidity sensors	±3% RH typical; ±2% for precision humidity control

G.5 — Data Retention & Reporting

- Title 24 ongoing monitoring: data retention typically 3+ years; available for AHJ audit
- ENERGY STAR Portfolio Manager: 12 months continuous data required for certification
- ISO 50001: records per management system procedures; typically 5+ years
- CARB compliance: 3 years for fuel purchase records
- SEC climate disclosure (if publicly traded): Scope 1/2/3 reporting requirements expanding

Appendix H — Acronyms & Glossary

Terms and abbreviations used throughout this document. Where a term has a standard definition, the controlling source is indicated.

H.1 — Standards & Regulatory Bodies

- **AHJ** — Authority Having Jurisdiction (local building/code official)
- **AQMD / APCD** — Air Quality Management District / Air Pollution Control District (California local air authorities)
- **ASHRAE** — American Society of Heating, Refrigerating and Air-Conditioning Engineers
- **ASTM** — ASTM International (formerly American Society for Testing and Materials)
- **BAAQMD** — Bay Area Air Quality Management District
- **CARB** — California Air Resources Board
- **CEC** — California Energy Commission
- **CEQA** — California Environmental Quality Act
- **CPUC** — California Public Utilities Commission
- **CTI** — Cooling Technology Institute
- **DOE** — U.S. Department of Energy
- **EPA** — U.S. Environmental Protection Agency
- **IEC** — International Electrotechnical Commission
- **ISO** — International Organization for Standardization
- **NFPA** — National Fire Protection Association
- **SCAQMD** — South Coast Air Quality Management District
- **SJVAPCD** — San Joaquin Valley Air Pollution Control District
- **SNIA** — Storage Networking Industry Association
- **SPEC** — Standard Performance Evaluation Corporation
- **TIA** — Telecommunications Industry Association

H.2 — Metrics & Measurements

- **BAT** — Best Available Technology
- **BMP** — Best Management Practice
- **CI** — Carbon Intensity (gCO_2e/MJ, fuels; $kgCO_2e/kWh$, electricity)
- **COP** — Coefficient of Performance (heating/cooling efficiency)
- **CUE** — Carbon Usage Effectiveness (ISO/IEC 30134-8)
- **EER / SEER / IEER** — Energy Efficiency Ratio / Seasonal / Integrated
- **ELC** — Electrical Loss Component (ASHRAE 90.4)
- **ERF / ERE** — Energy Reuse Factor / Effectiveness (ISO/IEC 30134-6)

- **IPLV / NPLV** — Integrated / Non-standard Part Load Value (chillers)
- **ITE** — Information Technology Equipment
- **MLC** — Mechanical Load Component (ASHRAE 90.4)
- **PUE** — Power Usage Effectiveness (ISO/IEC 30134-2)
- **REF** — Renewable Energy Factor (ISO/IEC 30134-3)
- **TDP** — Thermal Design Power (chip-level)
- **TCO** — Total Cost of Ownership
- **WUE** — Water Usage Effectiveness (ISO/IEC 30134-9)

H.3 — Equipment & Technology

- **BMS** — Building Management System
- **CDU** — Coolant Distribution Unit (liquid cooling)
- **CRAC / CRAH** — Computer Room Air Conditioner / Air Handler
- **D2C** — Direct-to-Chip (liquid cooling)
- **DCIM** — Data Center Infrastructure Management
- **DPF** — Diesel Particulate Filter
- **DRUPS** — Diesel-Rotary UPS
- **HVAC** — Heating, Ventilation, and Air-Conditioning
- **PDU** — Power Distribution Unit
- **PSU** — Power Supply Unit
- **RDHX** — Rear-Door Heat Exchanger
- **SCR** — Selective Catalytic Reduction (NOx aftertreatment)
- **SMR** — Small Modular Reactor
- **UPS** — Uninterruptible Power Supply
- **VFD / VI / VFI** — Voltage/Frequency Dependent / Voltage Independent / Voltage-Frequency Independent (UPS classes per IEC 62040-3)

H.4 — Fuels & Sustainability

- **B5 / B20 / B100** — Biodiesel blend percentages (FAME content)
- **BQ-9000** — U.S. biodiesel quality management program
- **CORSIA** — Carbon Offsetting and Reduction Scheme for International Aviation
- **FAME** — Fatty Acid Methyl Ester (biodiesel)
- **HVO** — Hydrotreated Vegetable Oil (renewable diesel)
- **ISCC** — International Sustainability & Carbon Certification
- **LCFS** — Low Carbon Fuel Standard (CARB program)

- **PPA** — Power Purchase Agreement
- **R99 / R100** — Renewable diesel (99% / 100% blend); drop-in ULSD substitute
- **RED III** — EU Renewable Energy Directive (third revision)
- **RFS** — Renewable Fuel Standard (EPA)
- **RIN** — Renewable Identification Number (EPA RFS credit)
- **RNG** — Renewable Natural Gas
- **RSB** — Roundtable on Sustainable Biomaterials
- **SAF** — Sustainable Aviation Fuel
- **ULSD** — Ultra-Low Sulfur Diesel (conventional petrodiesel)

H.5 — California Regulatory Terms

- **AFC** — Application for Certification (CEC full power plant licensing)
- **ATTCP** — Acceptance Test Technician Certification Provider (Title 24)
- **BACT** — Best Available Control Technology (AQMD permitting)
- **CBECC-Com** — California Building Energy Code Compliance (Commercial) software
- **CEQA** — California Environmental Quality Act
- **CF1R / CF2R / CF3R** — Certificates of Compliance / Installation / Acceptance (Title 24)
- **EIR / MND / ND** — Environmental Impact Report / Mitigated Negative Declaration / Negative Declaration (CEQA)
- **MMRP** — Mitigation Monitoring and Reporting Program (CEQA enforcement mechanism)
- **NOD / NOE** — Notice of Determination / Notice of Exemption (CEQA filings)
- **PERP** — Portable Equipment Registration Program (CARB)
- **SPPE** — Small Power Plant Exemption (CEC, 50–100 MW threshold)
- **SB 57, AB 222, AB 93, SB 978** — California data center legislation (see Section 5)

References and Additional Resources

Direct links to the primary sources, standards bodies, and regulatory pages cited throughout this document. URLs are current as of April 2026.

Best Available Technology (BAT) — General

- **ASHRAE Standard 90.4 —** Energy Standard for Data Centers (overview, purchase, addenda) https://www.ashrae.org/technical-resources/standards-and-guidelines/titles-purposes-and-scopes

- **ASHRAE 90.4-2022 Fact Sheet —** Official summary from ASHRAE Government Affairs https://www.ashrae.org/file%20library/about/government%20affairs/advocacy%20toolkit/virtual%20packet/standard-90.4-2022-fact-sheet.pdf
- **ASHRAE TC 9.9 —** Mission Critical Facilities, Data Centers Technical Committee — thermal guidelines and datacom publications https://tc0909.ashraetcs.org/
- **EU Code of Conduct on Data Centre Energy Efficiency —** JRC Best Practice Guidelines (current edition, PDF) https://e3p.jrc.ec.europa.eu/communities/data-centres-code-conduct
- **ISO/IEC 22237 Series —** Information technology — Data centre facilities and infrastructures (standard family page) https://www.iso.org/standard/74030.html
- **ANSI/TIA-942 —** Telecommunications Infrastructure Standard for Data Centers https://tiaonline.org/products-and-services/tia942certification/
- **Uptime Institute Tier Standard —** Tier classification system overview https://uptimeinstitute.com/tiers

BAT — California-Specific

- **California Title 24, Part 6 — 2025 Energy Code —** California Energy Commission official landing page https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency
- **CEC Building Energy Efficiency Standards Hub —** Compliance manuals, forms, software, and training https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards
- **CALGreen (Title 24, Part 11) —** California Green Building Standards Code https://www.dgs.ca.gov/BSC/CALGreen
- **Eastern Kern Air Pollution Control District (EKAPCD)** — Rules and regulations for the Mojave Desert Air Basin portion of Kern County (incl. Rule 425 Stationary Gas Turbines, Rule 427 Stationary Piston Engines, Rule 202 Authority to Construct) https://www.kernair.org/rules-and-regulations/
- **South Coast AQMD —** Rules and regulations (incl. Rule 1110.2, Rule 1470 for stationary engines) https://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book. (Comparative reference — LA Basin, not applicable to project site)
- **Bay Area AQMD —** Regulations (incl. Regulation 9 Rule 8 for stationary IC engines) https://www.baaqmd.gov/rules-and-compliance/current-rules. (Comparative reference — San Francisco Bay Area, not applicable to project site)

- **San Joaquin Valley APCD —** Rules and regulations https://ww2.valleyair.org/rules/current-rules/. (Comparative reference — San Joaquin Valley Area, not applicable to project site)

Best Management Practices (BMPs)

- **EU Code of Conduct — Best Practices Guidelines —** Downloadable annual practices catalog (JRC) https://e3p.jrc.ec.europa.eu/publications/2024-best-practice-guidelines-eu-code-conduct-data-centre-energy-efficiency
- **The Green Grid —** Home of the Data Center Maturity Model, PUE/WUE/CUE metrics https://www.thegreengrid.org/
- **ISO/IEC 30134 Series —** Key Performance Indicators for data centres https://www.iso.org/standard/63451.html
- **ISO 50001 —** Energy management systems standard https://www.iso.org/iso-50001-energy-management.html
- **Uptime Institute M&O Stamp of Approval —** Management and operations assessment https://uptimeinstitute.com/services/certification/management-and-operations-stamp-of-approval
- **ENERGY STAR Portfolio Manager — Data Centers —** Whole-building benchmarking and 1–100 score https://www.energystar.gov/buildings/benchmark/understand_metrics/data_center_metric

Energy Efficiency Ratings — Metrics & Components

- **ISO/IEC 30134-2 (PUE) —** Power Usage Effectiveness standard https://www.iso.org/standard/79077.html
- **ENERGY STAR for Servers —** Product specification and qualified product list https://www.energystar.gov/products/enterprise_servers
- **ENERGY STAR for Data Center Storage —** Product specification https://www.energystar.gov/products/data_center_storage
- **ENERGY STAR for UPS —** Uninterruptible Power Supplies spec and listings https://www.energystar.gov/products/uninterruptible_power_supplies
- **SPEC SERT —** Server Efficiency Rating Tool https://www.spec.org/sert2/
- **SNIA Emerald —** Storage efficiency measurement program https://www.snia.org/emerald
- **80 PLUS Program —** Power supply efficiency certification levels https://www.clearesult.com/80plus/

- **AHRI Certification Directory —** Chillers, DX equipment, CRAH/CRAC performance certification https://www.ahridirectory.org/
- **DOE Transformer Efficiency Standards (10 CFR Part 431) —** Federal efficiency rules for distribution transformers https://www.energy.gov/eere/buildings/distribution-transformers
- **CBECC-Com Software —** CEC-approved compliance software for commercial buildings (Title 24 performance path) https://cbecc.org/

Renewable Fuels — General

- **ISCC System —** International Sustainability & Carbon Certification (EU, PLUS, CORSIA schemes) https://www.iscc-system.org/
- **RSB — Roundtable on Sustainable Biomaterials —** Global fuels, EU RED, and CORSIA certification https://rsb.org/certification/
- **BQ-9000 —** U.S. National Biodiesel Accreditation Program (quality management) https://bq9000.org/
- **EPA Renewable Fuel Standard (RFS) —** Federal program overview, RIN system, annual volumes https://www.epa.gov/renewable-fuel-standard-program
- **EPA 40 CFR Part 60 Subpart IIII —** NSPS for stationary compression-ignition engines https://www.epa.gov/stationary-engines/stationary-internal-combustion-engines-compression-ignition-regulatory-actions
- **ASTM D975 / D6751 / D7467 —** Diesel and biodiesel fuel specifications (purchase through ASTM) https://www.astm.org/d0975-25.html

Renewable Fuels & Generators — California

- **CARB Renewable Diesel Fuel Requirements —** Fact sheet and Off-Road Regulation (§2449) guidance https://ww2.arb.ca.gov/resources/fact-sheets/fact-sheet-renewable-diesel-fuel-requirements
- **CARB Off-Road Diesel In-Use Regulation —** Program page with rule text, reporting, and compliance tools https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation
- **CARB Low Carbon Fuel Standard (LCFS) —** Program page — carbon intensity pathways and credit generation https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard
- **CARB Portable Equipment Registration Program (PERP) —** Program for portable/temporary engines in California https://ww2.arb.ca.gov/our-work/programs/portable-equipment-registration-program-perp

- **EPA Nonroad Engine Tier Standards —** Federal Tier 1–4 standards reference https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-emissions-nonroad-vehicles-engines-and

CEQA & CEC SPPE Resources

- **CEC Power Plant Licensing —** Overview of AFC, SPPE, and Opt-in Certification programs https://www.energy.ca.gov/programs-and-topics/topics/power-plants/power-plant-licensing
- **CEC Backup Generating Systems Dockets —** Searchable list of data center SPPE proceedings and decisions https://www.energy.ca.gov/powerplant
- **Warren-Alquist Act (Public Resources Code §25500 et seq.) —** Statutory basis for CEC jurisdiction over thermal power plants https://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PRC&division=15.&title=&part=&chapter=6.&article=
- **California Code of Regulations, Title 20, Division 2, Chapter 5 —** CEC siting regulations (SPPE and AFC procedures) https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=IC080FC605B6111EC9451000D3A7C4BC3
- **Great Oaks South Generating Facility (20-SPPE-01) —** Example SPPE docket — Equinix San José, 99 MW https://www.energy.ca.gov/publications/2021/great-oaks-south-generating-facility-20-sppe-01
- **San José Data Center 04 —** Example SPPE docket — Microsoft, Tier 4 Final with SCR+DPF https://www.energy.ca.gov/powerplant/backup-generating-system/san-jose-data-center-04
- **McLaren Backup Generating Facility —** Example SPPE docket — Vantage, 47 × 2.75 MW = 98.67 MW https://www.energy.ca.gov/powerplant/backup-generating-system/mclaren-backup-generating-facility
- **CEQA Statute (Public Resources Code §21000 et seq.) —** Complete statutory text of the California Environmental Quality Act https://leginfo.legislature.ca.gov/faces/codes_displayexpandedbranch.xhtml?tocCode=PRC&division=13.&title=&part=&chapter=&article=
- **CEQA Guidelines (14 CCR §15000 et seq.) —** Implementing regulations including Appendix G checklist https://califaep.org/statute_and_guidelines.php
- **Governor's Office of Land Use & Climate Innovation (LCI) —** Lead state agency for CEQA policy (formerly OPR) https://lci.ca.gov/
- **CEQAnet —** State Clearinghouse database of all CEQA documents https://ceqanet.opr.ca.gov/
- **Association of Environmental Professionals —** Professional association — CEQA training and resources https://califaep.org/

California Legislation & Policy

- **SB 57 (2025, Padilla) —** Bill text and status — CPUC data center ratepayer-impact study https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202520260SB57
- **AB 222 (2025, pending) —** Data center energy and AI training reporting bill https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202520260AB222
- **AB 93 (2025, vetoed) —** Data center water-use disclosure bill https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202520260AB93
- **California Legislative Information —** Search portal for all California bills and statutes https://leginfo.legislature.ca.gov/

Supporting Agencies & Reference

- **California Energy Commission (CEC) —** State energy policy, code, and data center load forecasts https://www.energy.ca.gov/
- **California Air Resources Board (CARB) —** Clean air and mobile/stationary source programs https://ww2.arb.ca.gov/
- **California Public Utilities Commission (CPUC) —** Rate-setting and SB 57 study lead agency https://www.cpuc.ca.gov/
- **U.S. DOE Better Buildings — Data Centers —** Federal efficiency resources and case studies https://betterbuildingssolutioncenter.energy.gov/sectors/data-centers
- **Lawrence Berkeley National Laboratory — Data Centers —** Research, tools, and the 2024 U.S. Data Center Energy Use Report https://datacenters.lbl.gov/

Notes and Caveats

Standards and regulations referenced in this document are current as of April 28, 2026 to the best of available information. California regulations in particular are evolving rapidly: SB 57 findings are due January 1, 2027, AB 222 and SB 978 may advance in 2026, and the 2028 Title 24 cycle will expand data center coverage (particularly for liquid-cooled and high-density deployments). For project-specific compliance, confirm current requirements with the local authority having jurisdiction, the serving air quality management district, and legal counsel.

Appendix I - Alignment of RESET Platform to RB Inyokern Data Center Project

RESET Standard

Purpose

The RESET Standard is a performance-based sustainability framework providing continuous, real-time operational data — distinguishing it from design-based certification systems such as LEED. This chapter consists of a consolidated reference covering the RESET Standard's integration with California Building Codes, Data Center Sustainability and Regulatory Alignment, and Benchmarking Performance Against Global Industry Frameworks.

RESET Standard Integration with California Building Codes

The **RESET Standard** aligns with **CalGreen (Title 24, Part 11)** and **California Building Code Title 24, Part 6** by providing a quantitative, performance-based framework that verifies compliance with California's mandatory and voluntary environmental standards.

Alignment with CalGreen (Title 24, Part 11)

RESET serves as a technical alternative for achieving the higher-level sustainability goals defined in CalGreen:

- **Voluntary Tier Alignment:** CalGreen includes voluntary **Tier 1 and Tier 2 provisions** for enhanced energy and water efficiency that go beyond mandatory requirements. The **RESET certification pathway** is being evaluated as a rigorous, data-driven alternative to LEED to satisfy these enhanced sustainability requirements.

- **Renewable Energy Credits:** RESET's tracking of **on-site renewable energy generation** directly supports the credits found in **CalGreen §A5.211** for voluntary renewable energy tiers.

Environmental Leadership: For projects seeking status as an Environmental Leadership Development Project (ELDP), RESET certification—combined with other commitments—is intended to satisfy the requirement for a major sustainability certification

(traditionally LEED Gold). Alignment with California Building Code Title 24

RESET's continuous monitoring requirements are designed to satisfy the strict documentation and metering mandates of the **2025 Energy Code (Title 24, Part 6)**:

- **Continuous Energy Monitoring:** Title 24, Part 6 mandates **continuous energy monitoring** and the **sub-metering** of IT, mechanical, and electrical loads. **RESET Pro Operational Energy** aligns with these mandatory measures by requiring granular metering at the UPS output and utility entrance to produce auditable performance records.

- **Compliance Documentation:** The **RESET PUE metric** generates 15-minute interval data streams, providing the verified, time-stamped records necessary for **CEC compliance documentation** and ongoing energy benchmarking.

- **Water Management:** Title 24 requires specific **water management and blowdown controls** for cooling towers. **RESET Water** aligns with these requirements by providing continuous metering of total consumption and optional monitoring of quality parameters like **Total Dissolved Solids (TDS) and pH**, which are critical for cooling tower efficiency.

- **Indoor Air Quality:** While Title 24 sets standards for building ventilation, **RESET Air** provides the infrastructure for **continuous monitoring** of PM2.5, CO2, and TVOCs in occupied spaces, ensuring these systems perform to regulatory expectations over time.

- **Structural and Safety Standards:** RESET Pro modules for noise and infrastructure monitoring work alongside general **California Building Code (CBC)** requirements, such as **seismic anchoring** for equipment and fire protection systems per **CBC Chapter 16**.

The RESET Standard: Data Center Sustainability and Regulatory Alignment

This report integrates the operational intelligence of the **RESET Standard** with its specific regulatory alignments for the RB Inyokern Data Center (RBIDC), appending the relevant industry and state standards to each performance metric.

1.0 Construction and Material Inputs (RESET Embodied)

RESET Embodied evaluates the “upstream” impacts of construction and IT hardware throughout their lifecycle stages (A1–A3 through C).

- **Embodied Carbon:** Quantifies greenhouse gas (GHG) emissions from the extraction and manufacturing of structural steel, concrete, and copper.

  RESET Aligned Standards: ISO/IEC 30134-8 (CUE) for carbon usage effectiveness, **SB 253 (Climate Corporate Data Accountability Act)** for mandatory reporting, and **CEQA Appendix G** for GHG quantification.

- **Material Circularity:** Measures the percentage of materials by weight that are sourced from regenerated origins or have a high capacity for end-of-life recovery.

  RESET Aligned Standards: CalGreen (Title 24, Part 11) voluntary **Tier 1 and Tier 2** material sustainability provisions and the **EU Code of Conduct for Data Centres** Best Practice Guidelines.

- **Chemical Health:** Screens for **"Red List" chemicals** (e.g., flame retardants, heavy metals) to ensure they are not specified into the facility.

  RESET Aligned Standards: CEQA Hazards/Hazardous Materials checklist and the **California Health & Safety Code** regarding the elimination of toxic substances.

- **IT Hardware Lifecycle:** Tracks the embodied carbon and circularity of hardware refresh cycles (servers, storage, networking) every three to five years.

  RESET Aligned Standards: IEEE 1680.4 / EPEAT environmental assessment for servers and the **California Electronic Waste Recycling Act (SB 20/SB 50)**.

2.0 Operation and Maintenance Metrics (RESET Operational & Pro)

RESET Pro for Data Centers utilizes continuous, 15-minute interval data streams to monitor the ongoing performance and health of the facility.

- **Energy and Real-Time PUE:** Continuous metering at the UPS output and utility entrance provides a dynamic **Power Usage Effectiveness (PUE)** profile and tracks the **Renewable Energy Fraction (REF)**.

  RESET Aligned Standards: **Title 24, Part 6 (2025 Energy Code)** mandatory sub-metering, **ASHRAE 90.4** (Energy Standard for Data Centers), **ISO/IEC 30134-2** (PUE), and **ENERGY STAR Portfolio Manager**.

- **Water and WUE:** Monitors **Water Usage Effectiveness (WUE)** and cooling tower health via quality parameters like **Total Dissolved Solids (TDS)**, **pH**, and **Oxidation Reduction Potential (ORP)**.

  RESET Aligned Standards: **ISO/IEC 30134-9** (WUE), **Title 24, Part 6** cooling tower conductivity and blowdown controls, and **Title 22 Water Recycling Criteria** for the use of recycled water.

- **Air Quality and Equipment Protection:** Continuous monitoring of **PM2.5** and **corrosive gases (H_2S, SO_2)** at server inlets prevents “copper/silver whisker” creep corrosion and maintains filtration efficiency.

  RESET Aligned Standards: **ASHRAE TC 9.9 Thermal Guidelines**, **ASHRAE Standard 71.4** (Equipment Environmental Conditions), and local **AQMD/CARB** air quality standards for perimeter and generator emissions.
- **Waste and E-Waste:** Tracks total waste mass and diversion rates for e-waste, packaging, and hazardous battery electrolytes.

  RESET Aligned Standards: **CalRecycle** mandates, **SB 20/SB 50** electronic waste requirements, and **CARB Off-Road Regulation (§2449)** for record-keeping of renewable fuel use.
- **Noise and Predictive Maintenance:** Monitors **low-frequency community noise** at property lines and uses **acoustic signatures** to detect early-stage mechanical degradation in fans or chillers.

  Aligned Standards: **Kern County Noise Ordinance (Chapter 8.36)**, **OSHA 29 CFR 1910.95** occupational noise limits, and **Uptime Institute M&O Stamp of Approval** for preventive maintenance.

3.0 Strategic Regulatory Significance

Beyond standard metrics, RESET is positioned to satisfy high-level California environmental mandates.

- **SB 887 & ELDP Expedited Review:** RESET is being evaluated as a rigorous, operationally oriented **alternative to LEED Gold** to satisfy the sustainability certification requirement for **Environmental Leadership Development Projects (ELDP)**.

- **Zero-Carbon Electricity Pathway:** RESET's real-time **REF metric** tracks the commitment to **100% zero-carbon electricity** required for ELDP certification.

- **Transparency and Disclosure:** By using the **RESET Cloud**, the project provides verifiable, third-party audited data that aligns with anticipated **AB 1577** monthly operational reporting and **SB 253** climate disclosure laws.

4.0 Benchmarking Performance Against Global Industry Frameworks

The following table summarizes the similarities and differences between the **RESET Standard** and the various industry, state, and international standards identified in the sources.

Comparison of RESET vs. Industry and Regulatory Standards

Standard / Framework	Similarities to RESET	Key Differences from RESET
LEED (Gold/Platinum)	Both are global green building frameworks focused on environmental impact and sustainability.	Design vs. Performance: LEED is design-based (point-scoring for intent); RESET is performance-based (continuous data).
California Title 24 (Energy Code)	Both mandate/encourage continuous energy monitoring and granular sub-metering.	Mandatory vs. Voluntary: Title 24 is a mandatory state law; RESET is a voluntary certification used to verify compliance.
ISO/IEC 30134 Series (PUE, WUE, CUE)	RESET adopts these standardized international methodologies for calculating PUE, WUE, and CUE.	Metric vs. Audit: ISO defines the metric calculation; RESET provides the third-party auditing and the RESET Cloud platform.
ENERGY STAR (Portfolio Manager)	Both evaluate facility efficiency using IT load and total energy data.	Annual vs. Granular: ENERGY STAR provides an annual 1–100 score; RESET requires 15-minute interval data streams.

Standard / Framework	Similarities to RESET	Key Differences from RESET
ASHRAE 90.4 & TC 9.9	Both focus on mechanical efficiency (MLC/ELC) and the thermal envelope for IT equipment.	Design Target vs. Operation: ASHRAE sets the technical "floor" or design targets; RESET verifies actual operational performance.
Uptime Institute (Tier I–IV) & TIA-942	Both are used to classify and benchmark data center facility infrastructure.	Resilience vs. Sustainability: Uptime/TIA focus on reliability and availability; RESET focuses strictly on sustainability and health.
CARB & Local AQMD Rules	Both address emissions (NOx, PM, CO) from stationary backup generators.	Regulation vs. Monitoring: CARB/AQMD set legal limits; RESET Pro Air provides the continuous monitoring to prove adherence to those limits.
EPEAT & IEEE 1680.4	Both track the environmental lifecycle and circularity of IT hardware and servers.	Hardware Label vs. Facility Metric: EPEAT is a product label; RESET Embodied tracks the total mass and carbon of hardware refresh cycles.
ISO 50001 (Energy Management)	Both establish frameworks for ongoing monitoring and continual energy improvement.	Management System vs. Technical Standard: ISO 50001 is a management process; RESET is a technical standard requiring specific hardware and data auditing.

Key Technical Distinctions

The sources highlight that the primary differentiator of RESET is its move away from **point-in-time or design-based certification**. While standards like LEED or ASHRAE 90.4 often rely on projected modeled performance, RESET certification is directly tied to **verifiable, longitudinal records** of actual performance. This makes RESET a unique tool for satisfying the “continuous energy monitoring” documentation required by **Title 24** and the transparency commitments expected for **ELDP** status.