

CGC Grid Benefits Analysis

Value to the Grid, Utility & Ratepayers · Community Grid Compact (CGC) · 2026

The CGC VPP generates quantifiable value for the grid, the utility, community, and all ratepayers. This document summarizes grid benefit categories, illustrative valuations, and the additionality argument: the data center causes grid costs; its Community Energy Fund contribution funds assets that measurably offset those same costs on the same circuits. Domestic content preference additionally supports U.S. manufacturing and may unlock IRA bonus credits that extend fund value.

ILLUSTRATIVE GRID BENEFIT SUMMARY · Per \$10M CEF Fund (= \$1B Data Center at 1%)

3.0–5.4 MWTotal
flex capacity
Peak
demand reduction

\$2–8MPer deferred
upgrade
Distribution
n deferral value

\$0.10–0.25Per kWh
at peak
Avoided
peak energy cost

800+ MWhPer
year
Clean solar
export to grid

GRID BENEFIT CATEGORIES

Benefit Category	Mechanism	Illustrative Value	Who Benefits
1. Distribution Infrastructure Deferral	VPP battery dispatch reduces peak load on circuits stressed by data center; defers or eliminates substation and feeder upgrades	\$2M–8M per deferred upgrade; \$5–15/kW-yr capacity value (EPRI/NREL)	All ratepayers on affected circuit; utility (CapEx avoided)
2. Avoided Peaker Energy Cost	Battery + solar discharge during peak hours displaces high-cost peaker generation; heat pump pre-conditioning reduces coincident peak	\$0.10–0.25/kWh avoided at peak vs. \$0.04–0.06 baseload; ~920 kWh/yr dispatched per system	All ratepayers (socialized energy cost reduction); grid operator
3. Capacity Resource Value	Aggregated dispatchable battery capacity registered as a capacity resource; reduces need for new utility-scale generation	\$50–150/kW-yr; \$1B project VPP = 3.0–5.4 MW → \$150K–810K/yr	Grid operator; utility; all ratepayers (avoided)

			generation CapEx)
4. Transmission Congestion Relief	Local solar generation and demand reduction reduce power flows on congested transmission interfaces serving data center load pockets	\$5–30/MWh congestion cost avoided; concentrated in Northern VA, ERCOT West TX, AZ corridors	All ratepayers in congested zone; transmission owners (deferred upgrades)
5. Frequency Regulation & Ancillary Services	Fast-response battery inverters provide frequency regulation and spinning reserve — services data centers themselves require for reliability	\$15–35/MW-hr regulation value; \$10–25/MW-hr spinning reserve (ERCOT/PJM averages)	Grid operator; all load-serving entities; the data center itself benefits from a more stable grid
6. Avoided Grid Charging Emissions	50% of fleet solar-paired: batteries charged by solar, not grid. Peak dispatch delivers low-carbon energy when grid carbon intensity is highest	~0.4 kg CO ₂ /kWh avoided at peak; ~260–400 tonnes CO ₂ /yr avoided per \$10M fund	Environment; state carbon goals; utilities with IRP carbon targets; ESG-focused developers
7. Net Solar Export to Distribution Grid	40% of solar generation exported back after self-consumption and battery charging; adds local generation on circuits the data center is stressing	800+ MWh/yr per \$10M fund ≈ equivalent of ~70 average homes' annual consumption added as distributed generation	All customers on affected distribution circuit; utility (avoided grid purchases)
8. Heat Pump Demand Response	Heat pump pre-conditions home before peak and cycles off during peak,	\$25–60/kW-yr DR value (ERCOT ECRS, PJM DR programs); \$10M	Grid operator; utility (peak

(Heat Pump Package)	providing 2.5 kW shiftable load; battery handles home energy during the peak event; coordinated DR+storage system	fund → +0.4 MW HP DR → \$10K–24K/yr	shaving); all ratepayers
8a. Smart Thermostat DR Package	Standalone DR Package: smart thermostat enrolled in VPP demand response; 1 kW peak reduction per home during 4-hour events; 75% realization rate; no battery required; broadest eligible population (all homes with central AC)	\$80/kW-yr annualized hyperscaler cost (Brattle Group / NRDC, June 2026); lowest-cost firm capacity in CGC portfolio; 7–8% participation achievable in 3–5 years; \$10M fund → est. 8,000–10,000 thermostat enrollments	Grid operator; utility; all ratepayers; broadest community reach of any CGC package
9. Grid Flexibility Package Demand Response	Smart thermostat enrollment aggregated into VPP provides immediate, low-cost dispatchable capacity. Each thermostat contributes ~1 kW of peak reduction during 4-hour events (Brattle Group, 2026). No rooftop work or structural modification required. Renter-eligible. Deployable within months, not years. Lowest annualized capacity cost of any CGC measure.	~\$80/kW-yr annualized (Brattle Group, 2026); \$75 per participating household	All ratepayers (peak demand reduction); grid operator (system reliability); LMI households (no upfront cost)
10. Urban Heat Island Mitigation	Data center waste heat and impervious surfaces contribute to localized heat island effects. Distributed solar reduces rooftop temperatures; community resilience hubs (cooling centers) provide direct relief to heat-vulnerable populations	Reduced cooling loads; lower emergency heat-related health costs; improved outdoor air quality	Medically vulnerable populations; LMI households without air conditioning; public health systems

11. Domestic Content & Supply Chain Resilience	Preference for U.S.-manufactured batteries, inverters, solar panels, heat pump HVAC strengthens domestic supply chain and qualifies systems for IRA bonus credits	+10 ITC percentage points for systems meeting domestic content threshold ($\geq 40\%$); credit value reinvested in additional deployments	U.S. manufacturing sector; CCEF fund (extended purchasing power); state economic development goals
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THE ADDITIONALITY ARGUMENT · Why This Is Not Just a Tax

What the data center causes:

- 20%+ load growth on local distribution circuits
- Substation and feeder upgrades costing \$2M–15M+
- Transmission congestion on interfaces serving data center load pockets
- Higher peak energy costs socialized to all ratepayers
- Grid carbon intensity spike as data center load triggers peaker dispatch
- Urban heat island effects from facility waste heat and impervious surfaces

What the CEF directly offsets:

- Peak demand reduction on the same stressed circuits
- Distribution deferral documented and credited to CCEF VPP capacity
- Local solar generation added to the same congested zone
- Peak energy cost reduction via battery + HP dispatch
- Low-carbon peak energy via solar-charged batteries
- Heat island mitigation via distributed solar and cooling center funding
- U.S. manufacturing jobs via domestic content preference

Nexus principle: The CEF contribution is not a general community benefit payment. It is a cost-internalization mechanism. The data center causes specific, quantifiable grid costs. The CEF funds assets that offset those same costs on the same circuits. This nexus is essential to the legal defensibility of the CEA requirement and to the utility's willingness to credit deferral value back to the program.

Illustrative nexus for a \$1B project: Data center causes ~\$5–15M in distribution upgrades → CEF funds 3.0–5.4 MW of VPP flex on same circuits → deferral value \$2–8M per avoided upgrade → \$10M contribution is commensurate with the infrastructure cost imposed.

SOLAR vs. HEAT PUMP · Comparative Grid Benefit Profile

Grid Benefit	Battery + Solar	Battery + Heat Pump	Combined (50/50)
Peak demand reduction	High: battery dispatch + solar gen during peak	High: battery dispatch + HP pre-conditioning DR	Maximum: two independent mechanisms
Distribution deferral	Strong: local generation reduces circuit load	Strong: DR load shifting reduces coincident peak	Strongest combined
Grid carbon reduction	High: solar charges battery; dispatch is low-carbon	Moderate: HP efficiency reduces total kWh demand	Moderate-High overall
Net export to grid	Yes: ~5,040 kWh/yr per solar home (40% of output)	No net export	~800 MWh/yr per \$10M fund (solar homes only)
Ancillary services	Battery only (9.2 kWh dispatchable)	Battery + HP load shift (~2.5 kW)	Battery + HP combined: complementary
All-weather reliability	Solar output varies; battery provides consistency	HP load shift consistent regardless of weather	Battery ensures consistency for both
Heat island mitigation	Yes: rooftop solar reduces surface temperatures	Moderate: efficient HVAC reduces outdoor heat rejection	Yes: both contribute
Domestic content fit	Solar panels, inverters, battery: all covered	Heat pump compressor, battery, controls: all covered	Full coverage across both technology types

Grid benefit valuations based on EPRI, NREL, Lawrence Berkeley National Laboratory, and ERCOT/PJM market data. Actual values depend on local grid conditions, market rules, utility avoided cost studies, and regulatory treatment. · Community Grid Compact (CGC) · 2026 · All figures illustrative · Not legal or financial advice