MOCSI Compute: facility upgrades

A separate sub-project. Draft, November 2026. Figures from model 0e13319.

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What the facility needs

The compute fleet needs a building that can power it, keep it running through an outage, and remove its heat. We will build those three things in a renovated building in Maine, where the host community will be a stakeholder in the data center.

Subsystem	What it is	Mid estimate	Range
Electrical service and distribution	500 kVA transformer, 800 A service at 480 V, distribution to rack power	$695k	$313k to $1.43M
Backup power	200 kW diesel standby generator, transfer switch, uninterruptible power supply (UPS)	$443k	$291k to $664k
Liquid cooling plant	Coolant distribution units, outdoor dry coolers, trim chiller, room cooling, heat recovery to the building	$910k	$422k to $1.76M
Total		**$2.05M**	**$1.03M to $3.85M**

Maintenance runs about $36,769 a year, plus about $3,811 a year for UPS batteries. Recovered server heat could displace about $13,404 a year of the building's heating oil, and an Efficiency Maine incentive of about $18,050 offsets part of the heat-recovery cost. Both depend on the building's heating taking water at the loop's temperature. At the water class these figures assume, the loop runs too cool for the building's radiators, so heat recovery also needs servers that accept warmer water, low-temperature distribution in the building, or a heat pump. The estimate carries the heat pump: about $82k before contingency, and $2,403 a year of maintenance inside the figure above. It runs on about 24,000 kWh a year of electricity ($3,023 at the host utility's rate, assuming it delivers 3.5 units of heat per unit of electricity), which leaves the building a net saving of about $10,381 a year. Servers that accept warmer water would make the heat pump unnecessary. The water class is still open. These are planning estimates built from list prices and trade guides; budgetary quotes for the cooling units, dry coolers, and switchgear will narrow the range.

Why it is a separate project

- **Life.** The transformer and service entrance last 30 to 40 years, the generator 20 to 30, and the cooling plant 15 to 20. The GPUs last five to seven years and are replaced by generation.

- **Ownership.** The service entrance, dry coolers, and heat-recovery connection become part of the building and stay with it. The racks, power distribution, UPS, and generator move with the operator.
- **Funding.** Building improvements fit infrastructure and energy grants. The compute fleet pays for itself from customers and can be financed as equipment.

How the compute pays for it

The compute pays the facility a charge per kilowatt of its 110.4 kW design capacity, from the first year, whether or not the fleet has filled it yet. The charge depends on how the upgrades are funded:

Facility funding	Charge per kW per year	Compute cash at year 5
Grant covers the upgrades	$598	$4.68M
20-year loan at 8.5% (assumes a loan guarantee)	$2,541	$3.34M

Year-5 cash is after the compute build's own loan is repaid. At the design load of 110 kW, the loan case works out to about $214,535 a year of loan payments plus maintenance, batteries, and $25,458 a year of property tax, as if the improvements are not exempt.

Design

- **Load.** 12 used 8-GPU NVIDIA servers by year 4, fitted with liquid cold plates. Each draws about 9.2 kW at nameplate, 110.4 kW in total. Year 0 has 8 servers (74 kW).
- **Heat.** About 78% of server heat goes to the liquid loop. The rest stays in room air.
- **Cooling.** A glycol loop runs to outdoor dry coolers, which handle most of the year in a Maine climate. A small trim chiller covers the warmest hours, and in-row units handle room air.
- **Backup power.** The 200 kW generator carries servers and cooling through an outage; the UPS bridges the seconds before it starts. The UPS is modular, with one spare power module, so a module can fail or be replaced without dropping the load. Its lithium-ion batteries last about 12 years rather than the four and a half a sealed lead-acid string manages, which cuts the replacement reserve to $3,811 a year and removes a service trip to the site every few years.
- **Network.** The site sits on a fiber ring. The building has one entrance to it today, and the estimate carries a second, physically diverse entrance so a cut on either side of the ring leaves the service reachable.
- **Redundancy, stated plainly.** Two sources of power (the utility and the generator), six dual-corded racks fed from A and B panelboards, a spare UPS module, and two fiber entrances onto a ring. One transformer, one switchboard, one transfer switch, and one generator. A fault in any of those four stops the site, and the design accepts that. Adding a second set of them was priced at about $640,000 and judged not worth it at this scale.
- **Electrical.** The service is sized for the full build on day one, since upsizing later costs a second outage and a long equipment lead time.

Schedule

Electrical equipment sets the critical path. A pad-mount transformer takes 40 to 65 weeks to arrive, a switchboard 32 to 41, and a transfer switch 24 to 40. We plan on 9 to 15 months from order to energized service; a transformer the utility holds in stock, or a remanufactured unit, would shorten it.