

Residential Distributed AI Infrastructure: Unit Economics and Investment Thresholds

An independent analysis of capital requirements, GPU utilization, electricity costs, and the conditions necessary to achieve attractive project returns.

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Key takeaways

- 1. The gap is roughly 3.4x.** A 16-GPU residential node needs a starting rental rate of about **\$5.23 per GPU-hour** to earn a 15% unlevered return. Advertised asks for the same GPU centered on **\$1.52** on October 22, 2026; at the higher ~\$1.80 seen on October 30 the gap remains about 2.9x.
- 2. None of the individual changes tested produces a 15% return.** Flat pricing, 70% utilization and lower hardware cost each improve value by \$88k–\$133k per node. An illustrative contract package (fixed \$1.30 rate, 70% guaranteed capacity) improves it by about \$212k. None reaches the hurdle on its own.
- 3. Certain combinations produce positive NPVs.** Favorable pricing, utilization and hardware cost together produce positive NPVs of about +\$16k to +\$50k per node.
- 4. The margin for error is small.** Site infrastructure (enclosure, cooling, installation) is not publicly costed and reduces NPV dollar for dollar. At \$25k per node, the contracted case with \$250k hardware turns negative.
- 5. Utilization, hardware cost and price decline matter most.** Overhead and hardware resale value have substantially less impact on the modeled results.

~\$430k

Identified capital per node (GPU servers plus home solar and batteries), excluding unestimated site infrastructure

\$5.23 vs. \$1.52

Starting rate needed for a 15% return vs. midpoint of advertised asks observed Oct 22, 2026 (\$/GPU-hour)

(23%)

Unlevered pre-tax IRR in the reference case (spot pricing, 40% utilization, rates falling 24% a year)

~4.6x

Node electricity use relative to an average Texas home

Why this question matters

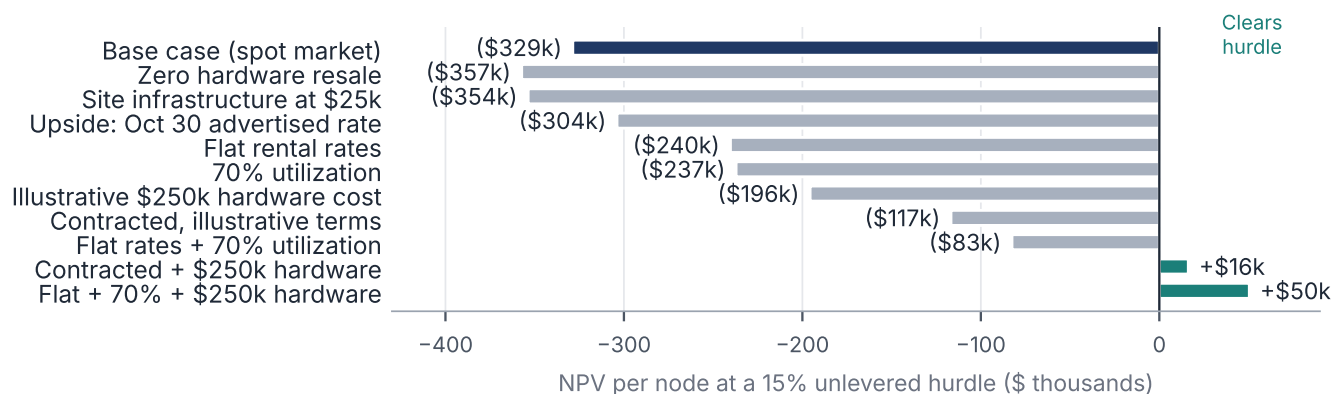
Grid interconnection queues have made power, not chips, the binding constraint on new AI compute. One response is to bypass the queue: place small GPU clusters behind existing service connections, in homes and small businesses, and aggregate them into a distributed fleet. SPAN announced its XFRA product on this thesis in April 2026, describing hosts who receive "fixed, discounted rates for electricity and internet," and says XFRA will scale to more than 1 GW of annual capacity from 2027. In September 2026 Sunrun and SPAN expanded their partnership to pair XFRA nodes with Sunrun solar and storage on a prepaid lease in Texas.

The approach could reduce the time required to bring new compute capacity online. What is not yet visible from public information is whether the unit economics work. This note builds a reference node from public prices and asks a narrower question than "does it work": **what has to be true for a residential node to earn an infrastructure-style return?**

We use SPAN's published node specification as the reference case because it is the most detailed public design. Commercial terms, actual procurement costs and contract arrangements are not public, and our estimates should not be read as SPAN's or Sunrun's economics.

Exhibit 1: Only stacked favorable assumptions clear a 15% hurdle

NPV per node at a 15% unlevered hurdle, by case; one change from the reference case unless stated



Source: Ochsner Interests model (v4). Contracted case uses illustrative terms (\$1.30/GPU-hr fixed, 70% guaranteed paid capacity); no public evidence of such a contract exists.

The reference node

The modeled node holds 16 NVIDIA RTX PRO 6000 Server Edition GPUs in two Supermicro servers with four AMD EPYC 9554 CPUs, 3 TB of memory and NVMe storage, drawing 12.5 kW at full load. It sits at a home in the Oncor (Dallas–Fort Worth) service area with an 8.8 kW solar array and two batteries. Power is bought on a retail fixed plan at 13.85¢/kWh, the median 24-month-plus fixed plan for ZIP 75009 on PowerToChoose.org on October 30, 2026, and the node connects over 1 Gbps business fiber. The 13.85¢ rate is illustrative, based on a 2,000 kWh monthly consumption benchmark. A household hosting this node could consume approximately 6,000 kWh monthly. Plan eligibility and pricing at that load are unconfirmed. We assume a five-year life, 100% equity, a 15% unlevered pre-tax hurdle and spot-market GPU rental revenue.

Exhibit 2: Identified capital is ~\$430k per node, about 89% of it compute hardware

Capital per node, reference case

Component	Per node	Basis
GPUs, servers, CPUs, memory, storage	\$383,900	Component prices verified Oct 30, 2026 (\$451,600) less an assumed 15% volume discount
Home solar (8.8 kW) and two batteries	\$46,700	Texas installed-cost benchmarks; Sunrun's actual costs undisclosed
Site infrastructure (enclosure, cooling, install)	Not estimated	No independent public source; tested at \$0–\$40k below
Identified capital	\$430,600	≈ \$34,400 per kW of node capacity

Source: CDW and GPUoet (GPUs), Wiredzone and Supermicro eStore (servers), PassMark (CPUs), CoreWave Labs (memory), CDW (storage); EnergySage, NuWatt (solar and storage); Ochsner Interests. A single press report values the hardware package at "more than \$250,000"; its scope is not stated. Exhibits 1 and 5 use \$250k as an illustrative cost, not a confirmed procurement price.

Why the reference case falls short

Revenue is the product of three numbers: GPU-hours available, the share that is billed, and the price per hour. In the reference case the node bills 40% of its hours, the top of a published 20–40% range for GPU clouds that are not heavily optimized. It starts at \$1.52 per GPU-hour, the midpoint of advertised marketplace asks for this GPU observed on October 22, 2026. Asks are not realized revenue: executable and wholesale rates are likely lower. Asks observed on October 30 were higher (about \$1.60–\$2.05) and are tested as an upside case. Rates then fall 24% a year, in line with the decline in H100 marketplace pricing from late 2024 to late 2025. On those inputs, peak-year revenue is about \$63k against roughly \$27k of operating cost. Five years of operating cash plus resale value return about \$161k against about \$431k of capital.

Exhibit 3: Operating cash flow peaks in year 2 and fades as rental rates fall

Reference case, per node (\$ thousands except rate)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Spot rate (\$/GPU-hr)		1.52	1.16	0.88	0.67	0.51
Revenue		31.1	63.0	47.9	36.4	27.7
Power (net of solar)		(2.8)	(6.5)	(6.5)	(6.5)	(6.5)
Fiber and host costs		(6.2)	(6.2)	(6.2)	(6.2)	(6.2)
Maintenance, insurance, loss		(7.3)	(7.3)	(7.3)	(12.0)	(12.0)
Overhead (10.6% of revenue)		(3.3)	(6.7)	(5.1)	(3.9)	(2.9)
Demand-response revenue		0.1	0.2	0.2	0.2	0.2
Capital / resale value	(430.6)					80.9
Net cash flow	(430.6)	11.6	36.6	23.1	8.1	81.2

Note: Year 1 reflects a three-month install-to-revenue lag and a 50% utilization ramp; availability is net of 40 hours a year of demand-response curtailment. Resale value is 15% of hardware plus the remaining value of the solar and battery system. Source: Ochsner Interests model (v4).

Deployment prerequisites

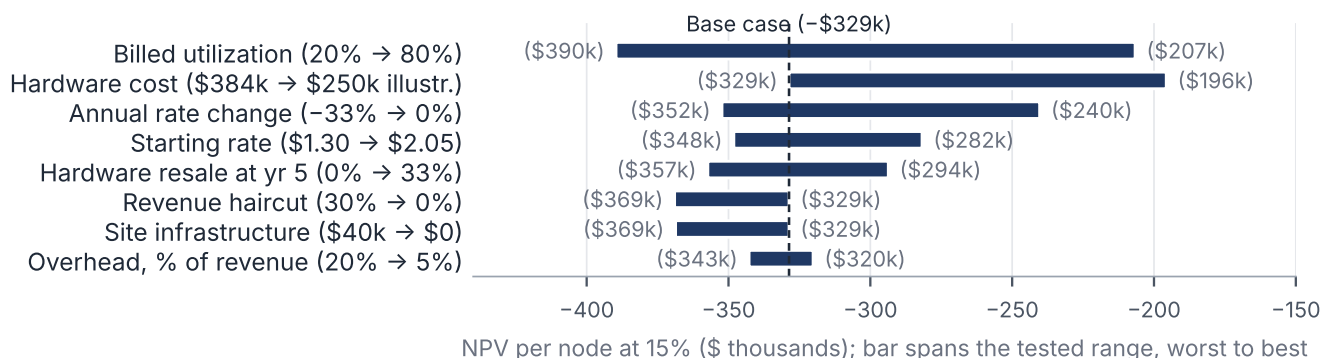
Deployment also depends on residential electrical capacity and utility requirements. At full load the node draws about 52 amps at 240 V. Rated at 125% as a continuous load, that is roughly a third of a standard 200 A residential service. It uses about 4.6 times the electricity of an average Texas home. For many homes, service capacity, utility interconnection rules and the availability of a residential retail plan for a load this size will decide whether a node can be installed at all, regardless of its returns. We treat these as preconditions for deployment, not cost inputs.

What has to be true

Exhibit 4 shows how individual assumptions affect returns. Exhibit 5 evaluates combinations of assumptions against a 15% hurdle. Two findings stand out. First, every individually tested change remains well short. Second, the cases that do clear combine favorable pricing, utilization and procurement, and they clear narrowly: \$25k of site infrastructure would erase the contracted case, and \$40k would leave the strongest case only about \$10k above the hurdle.

Exhibit 4: Utilization, hardware cost and price decline drive the answer; overhead barely matters

NPV per node at 15% across the tested range of each input, all other inputs at the reference case



Source: Ochsner Interests model (v4). Ranges are test points, not forecasts.

Exhibit 5: Threshold table: spot and contracted economics side by side

Per node; shaded cells differ from the reference case. Breakeven = starting rate that gives zero NPV at 15%, holding the row's other inputs

Case	Starting rate (\$/GPU-hr)	Utilization / paid capacity	Annual rate change	Hardware	NPV at 15%	Breakeven rate	Clears?
Reference case, spot	1.52	40%	(24%)	\$384k	(\$329k)	\$5.23	No
Contracted, illustrative terms	1.30	70%	0%	\$384k	(\$117k)	\$1.73	No
Upside: Oct 30 advertised rate	1.80	40%	(24%)	\$384k	(\$304k)	\$5.23	No
Zero hardware resale	1.52	40%	(24%)	\$384k	(\$357k)	\$5.56	No
Site infrastructure \$25k	1.52	40%	(24%)	\$384k	(\$354k)	\$5.52	No
Flat rental rates	1.52	40%	0%	\$384k	(\$240k)	\$3.16	No
70% utilization	1.52	70%	(24%)	\$384k	(\$237k)	\$3.05	No
Illustrative \$250k hardware cost	1.52	40%	(24%)	\$250k	(\$196k)	\$3.73	No
Flat rates + 70% utilization	1.52	70%	0%	\$384k	(\$83k)	\$1.84	No
Flat + 70% + \$250k hardware	1.52	70%	0%	\$250k	\$50k	\$1.32	Yes
Contracted + \$250k hardware	1.30	70%	0%	\$250k	\$16k	\$1.24	Yes

Note: Contracted rows assume a 2% annual counterparty default probability, a 99% availability SLA and fallback to spot after default; terms are illustrative, not SPAN's. The upside row uses the midpoint of advertised asks observed October 30, 2026, not an executable rate. Source: Ochsner Interests model (v4).

What would change our view

- Signed, multi-year capacity contracts with creditworthy buyers at or above ~\$1.73/GPU-hour at 70% guaranteed capacity, or ~\$1.30 alongside materially lower procurement costs
- Disclosed hardware procurement materially below component list prices
- Published site infrastructure and installation costs
- Observed utilization and realized (not asked) pricing from operating pilots
- Evidence that rental rates for this GPU class decline more slowly than recent H100 pricing

What we do not know

- Host terms: bill discounts, compensation and who pays node power
- How capital, revenue and tax benefits are split between SPAN, Sunrun and investors; we model combined project economics only
- Actual contract terms, if any, with compute buyers
- Installed base: no confirmed count of operating nodes has been published
- Financing structure: we show total capital from all sources, not equity any party must raise

Investment implications

Under the reference assumptions, residential distributed compute is unlikely to reach conventional infrastructure return thresholds on spot-market GPU rentals alone. Attractive returns require favorable combinations of revenue durability, sustained utilization and equipment procurement costs, and the margin that results is small enough that site and installation costs can decide the outcome.

The investment case therefore depends less on deploying GPU capacity than on securing the commercial arrangements that monetize it: multi-year capacity contracts with creditworthy buyers, procurement terms, and host agreements that hold costs fixed. For investors and acquirers, those contracts, not the hardware, are the assets to diligence.

Company comment

We sent questions on deployment status, hardware costs, homeowner terms, financing and compute contracts to SPAN and to Sunrun on October 22, 2026, with follow-ups on October 28. A Sunrun spokesperson said the company has not yet publicly disclosed the requested details and plans to share them in the coming months. SPAN had not responded as of publication. We will update this analysis if either company provides additional information.

Methodology

The model is a five-year, per-node discounted cash flow of combined project economics: every cost and revenue of the node, whoever bears it. Cash flows use mid-year timing with a three-month install-to-revenue lag and a 50% first-year utilization ramp, which is why year-1 revenue is about half of year 2. NPV, IRR and breakeven calculations use the same timing convention, and the workbook tests each against the others. Hardware maintenance applies after a three-year warranty. Availability is reduced by an assumed 40 hours a year of utility demand-response curtailment (Oncor's 2026 program has no annual cap), during which the node earns no compute revenue. Overhead is a proxy taken from Sunrun's G&A-to-revenue ratio, and the rental-rate decline is a proxy from H100 marketplace data. Utilization and hardware resale value are analyst judgments; each is tested across a range. Results are pre-tax and unlevered. After-tax results are not presented because tax attributes cannot be assigned to asset owners from public information. The underlying workbook includes 19 arithmetic and model-linkage checks. These confirm internal consistency, not the accuracy of the assumptions. Every source cited in the workbook was checked against the original publication on October 30, 2026, and the solar yields were reproduced in PVWatts; live marketplace prices could not be re-confirmed for earlier dates and are shown with their observation dates.

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Important disclosures

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