SAMPLE MEMO · 100 MW AI CAMPUS, BASE CASE

What a 100 MW AI campus implies for solar, storage, tokens, and a lunar contrast

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Preset: 100 MW AI campus, 2026 costs (base). First-order estimates, not a bid.

Question

What does a 100 MW AI campus imply for solar, storage, tokens, and a lunar mass-driver contrast?

This sample uses the Abundance Bench Base preset already published at https://sovereignagentics.io/abundance-bench/. A commissioned memo replaces these defaults with the reader's assumptions. The three headline outputs on the homepage are the Base facility load, the 24/7 solar-plus-storage capex, and the energy-floor cost per million tokens.

Three outputs (Base)

100.0 MW facility. $687.3M solar-plus-storage capex. $0.414 per million tokens at the energy floor.

Worked Base, same run: 80.0 MW IT and 100.0 MW facility from 1,000 racks at 80 kW IT and PUE 1.25. 24/7 solar plus storage: 400.0 MW nameplate, 1,818.2 MWh of battery, $687.3M capex. Solar overbuild with no storage: 400.0 MW, 727,273 panels at 550 W, $360.0M. Tokens at the physical energy floor: 347.83 billion tokens/day, $0.414 per million tokens. Lunar delivery: $100,000/kg expendable versus $20.07/kg on the driver. Fleet: 66.7 cargo ships and 533.3 tankers for 1,000 t.

Low / Base / High

Low and High scale Base levers only: capacity factor x1.28 / x0.72; solar and battery capex x0.72 / x1.40; grid price x0.67 / x1.50; expendable $/kg x0.50 / x2.00; Starship payload x1.20 / x0.80; mass-driver capex x0.70 / x1.50. Campus facility does not move because racks, kW/rack, and PUE are not levers.

Metric	Low	Base	High
Campus facility	100.0 MW	100.0 MW	100.0 MW
24/7 nameplate	312.5 MW	400.0 MW	555.6 MW
24/7 battery	1,818.2 MWh	1,818.2 MWh	1,818.2 MWh
24/7 capex	$438.1M	$687.3M	$1.16B
Overbuild nameplate	312.5 MW	400.0 MW	555.6 MW
Overbuild panels	568,182	727,273	1,010,101
Overbuild capex	$202.5M	$360.0M	$700.0M
Tokens / day	347.83 billion	347.83 billion	347.83 billion
Energy cost / MTok	$0.277	$0.414	$0.621
Expendable lunar	$50,000/kg	$100,000/kg	$200,000/kg
Mass-driver lunar	$14.05/kg	$20.07/kg	$30.11/kg

Metric	Low	Base	High
Fleet ships	55.6	66.7	83.3
Fleet tankers	444.4	533.3	666.7

Constants used (Base)

Every number is a default. Where the Bench marks a row as an illustrative default, this memo repeats that label. Replace those rows before you cite the figure. Source text is the Bench registry as of last review 2026-10-11.

Id	Value	Unit	Source
it_watts	1000	W	illustrative default, replace before citing
kw_per_rack	80	kW/rack	illustrative default, replace before citing
pue	1.25	—	Site writing: typical 1.1–1.5
solar_capex	900	$/kW	illustrative default, replace before citing
battery_capex	180	$/kWh	illustrative default, replace before citing
solar_cf	0.25	—	illustrative default, replace before citing
rte	0.88	—	illustrative default, replace before citing
autonomy_h	16	h	illustrative default, replace before citing
grid_price	0.06	$/kWh	Site writing: $0.06/kWh in the joules-per-token example
j_per_token	24.84	J/token	Site writing: 6.9 Wh per 1,000 tokens at a 1.2 kW GPU, 60 tok/s, PUE 1.25
starship_leo_kg	100000	kg	Public reusable LEO-class figure used on this site; not an official SpaceX number
starship_lunar_kg	15000	kg	illustrative default, replace before citing
tankers_per_ship	8	—	illustrative default, replace before citing
expendable_lunar_usd_kg	100000	$/kg	illustrative default, replace before citing
md_exit_v	2400	m/s	illustrative default, replace before citing
md_eff	0.7	—	illustrative default, replace before citing
md_capex	2000000000	$	illustrative default, replace before citing
md_lifetime_kg	100000000	kg	illustrative default, replace before citing
lunar_solar_cf	0.45	—	illustrative default, replace before citing
he3_ppb	8	ppb	Site writing: mare regolith roughly 4–20 ppb by mass; 8 ppb worked example
land_w_m2	60	W/m2	illustrative default, replace before citing
panel_w	550	W	illustrative default, replace before citing

Formulas

Campus: IT MW = racks x kW/rack / 1,000; facility MW = IT x PUE.

24/7 solar + storage: nameplate = load / CF; battery MWh = load x autonomy / RTE; land = nameplate W / W/m2; capex = solar kW x $/kW + battery kWh x $/kWh.

Solar overbuild: nameplate = average MW / CF; panels = nameplate W / panel W; land and capex as above, no storage.

Tokens: tokens/s = facility watts / J/token; cost/MTok = (1e6 x J/token / 3.6e6) x grid $/kWh. Physical floor, not an API price.

Lunar $/kg: expendable is typed. Driver = (1/2 v^2 / eta in kWh x grid price) + (driver capex + solar capex) / lifetime kg. Driver assumed already on the Moon.

Fleet: ships = cargo t / payload t; tankers = ships x tanker ratio; one cargo ship per window.

What this sample leaves out

The bench leaves out interconnection, land, tax credits, battery replacement, interest, launch of the driver itself, weather, demand charges, networking, staff, and API margin. Tokens are a joule floor, not a vendor price. Starship payload is a public reusable-class planning figure, not an official quote. Helium-3 grade is on the registry as a caution; this memo does not run a mining model on it. No outside papers are cited here because this sample is the model on the page, not a literature review.

Disclaimer

First-order estimates for learning and argument, not design, investment, or mission sign-off. Not affiliated with SpaceX, NASA, or any agency. If a constant is wrong, the model should change.

A commissioned 6-10 page memo uses the reader's assumptions in place of these defaults, keeps Low/Base/High, dates every constant, writes each formula in one line, and repeats this disclaimer. $3,500, two weeks, paid by invoice. No subscription.