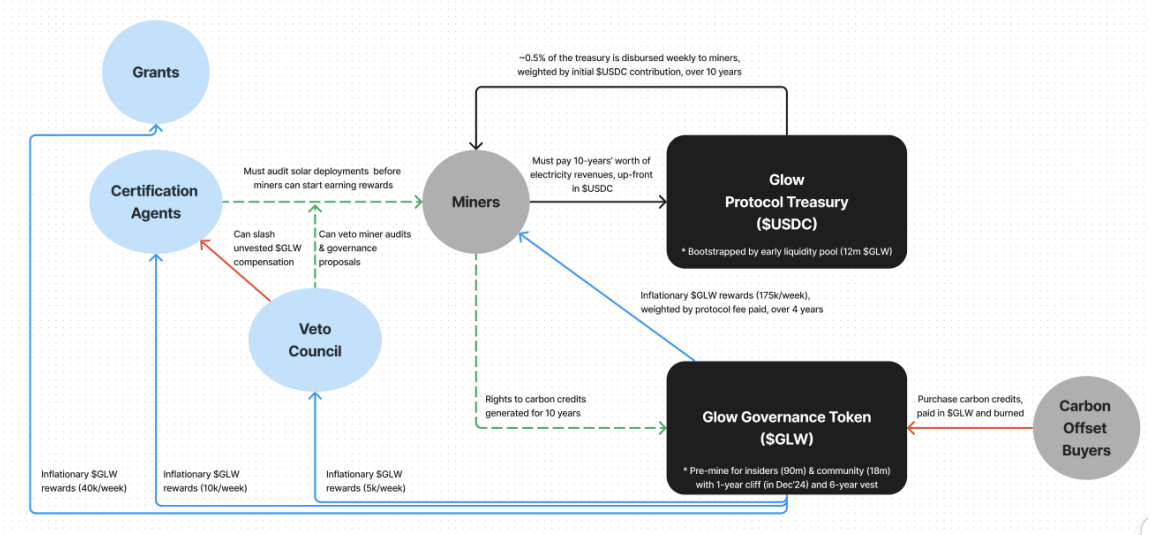
Glow is a DePIN protocol that incentivizes new solar deployments in areas with high cost of energy.

Key Links: Audits, Governance, Whitepaper, Docs, App, Tokenomics, Contributors, Github, Holders

How does Glow mining work?

- A "miner" decides to install new solar panels on their home or business. They must do two things to participate in the Glow network:
  - 1) Pay a "protocol fee" equal to the estimated discounted value of 10-years' worth of future electricity revenues. This fee is paid in $USDC into the protocol treasury, and is typically 1-4x the cost of the actual install, depending on local electricity prices.
  - 2) Undergo an "audit" by one of Glow's "certification agents". The audit involves two in-person inspections (one pre-installation and one post-installation), a review of relevant legal documents (including local permits), and typically costs ~$1k.
- Upon joining the network, miners earn two types of rewards:
  - 1) Each week, 175k $GLW tokens are minted for inflationary mining rewards. $GLW rewards are weighted by protocol fees paid by each miner, relative to the total amount of protocol fees paid by active miners. Miners stop earning these rewards after four years.
  - 2) Each week, a fraction (1/192) of the protocol treasury is paid out to miners directly in $USDC. $USDC rewards are weighted by carbon credit production of each miner, relative to the total amount of carbon credits produced by the network in a certain timeframe. Miners stop earning these rewards after ten years.
- The Glow protocol measures the carbon offsets generated within the network and auctions them for $GLW which is subsequently burned, driving value accrual to the token via buyback-&-burn.

In short, miners loan $USDC to the protocol on a 4-year term (on average). Principal repayments are based on carbon offset production (relative to other miners). Yield is based on how soon a miner joins the network (relative to other miners), and of course the market price of $GLW. Capital providers are incentivized to finance new solar that are coming online ASAP (to maximize yield), but only for farms that can be long-term competitive at generating carbon credits (to minimize principal/credit risk).



The network launched in testnet in December 2023, and the first miners went live earning rewards at the end of March 2024. There are 13 farms on the network today generating ~100 carbon credits on an annualized basis. The protocol has $4.7m USDC TVL in its treasury. At the current price ($2.40), the network is valued at an $18m market cap or $570m "FDV" (10-year forward basis).

What's the game theory for miners?

- Miners pay an up-front protocol fee (in $USDC) in order to share in the liquidation of the treasury (in $USDC). The treasury is liquidated to miners over a rolling 4-years forward basis (~0.5% per week) weighted by the number of verified carbon offsets produced.
    - Miners are effectively staking $USDC to bet on their ability to produce carbon credits. In theory, the average miner should breakeven in $USDC terms over four years. Since the treasury is bootstrapped with an initial liquidity pool with $4.5m raised to date, there is effectively a subsidy that ensures miners will - on average - make money. As the network grows, this subsidy's impact is reduced as it gets split amongst a larger group.
    - Factors that impact miners' $USDC earnings are: 1) the amount of $GLW sold out of the early liquidity pool (more is better), 2) when the miner joins the network (earlier is better), 3) how quickly the network grows (slower is better), and 4) how competitive the miner is at producing carbon credits (outperformance is better).
    - Miners earn $USDC rewards for 10 years after joining the network assuming they are still competitive at producing carbon credits. So, the average miner can expect to break-even in the first four years + earn a proportional share of the initial liquidity bootstrap ($4.5m today) + earn a residual from the treasury over the following six years—all in $USDC.
- 175k $GLW are minted weekly for inflationary miner rewards, weighted by protocol fees paid:
    - <u>There is a strong incentive to deploy ASAP.</u> There are 13 farms on the network today splitting the 175k tokens, i.e. the average farm is earning $32k per week at today's prices with a payback of 4-5 days based on GLW rewards alone. Any new solar deployment that we can get live by July is likely to pay back in less than a month.
    - <u>It is a capital-constrained strategy.</u> The average protocol fee per residential solar installation is only $18k, but can be as high as $60-75k in areas like San Mateo. The protocol is designed to incentivize new solar in the highest-cost-of-energy areas.
- Tokenomics:
    - <u>230k $GLW issued each week in perpetuity</u> as follows: 175k to miners, 40k to grants, 10k to certification agents, and 5k to veto council members. Mining rewards can be sold at any time. Grant requests can be vetoed by the veto council, but once disbursed can be sold at any time. Certification agents' and veto council members' compensation vests linearly over 100-weeks, during which the unvested portion can be slashed.
    - <u>108m $GLW were premined</u> as follows: 47m for investors, 43m for insiders, 12m to bootstrap the early liquidity pool, and 6m to bootstrap the grants pool. The tokens for insiders and investors are on a 6-year linear vest with a 1-year cliff in Dec'24. To date, 30% of the liquidity pool has been sold and 2% of the grants pool has been disbursed.

At GLW = $2.50	Circulating (Glow)	Circulating (EV3)	Nov'24 pre-unlock	YE'26 post-unlock	YE'33 ("FDV")
Market Cap	$12m	$18m	$72m	$215m	$570m

What do we need to believe about Glow long-term?

1. **Solar installers will jump at the opportunity to mine $GLW at scale.**
    - Mining $GLW requires 1) access to homeowners in high-cost-of-energy areas looking to deploy new solar quickly, and 2) access to capital to finance protocol fees. It's possible - but in my opinion, unlikely - that folks with capital will be unable to find willing solar installers partners, especially with paybacks in the range of weeks or months.
    - The Glow protocol natively supports financing arrangements, such that capital providers never have to take custody risk to hosts (like in Helium) or take extra layers of smart contract risk (like with SolSplits).

2. **Carbon credit buyers will jump at the opportunity to buy Glow carbon credits at scale.**
    - Glow believes they can pioneer a market for solar carbon credits at $5-10/credit. Historically, solar farms generate renewable energy credits which trade at $0.5-$1/credit. The former provide stronger guarantees of additionality (carbon avoidance) whereas RECs offer a weaker claim of renewable energy production.
    - Because Glow miners are 'foregoing' (ie, paying up-front as a protocol fee) for 10 years of forward electricity revenues, theoretically farms do not earn an economic profit outside of Glow-related subsidies. Glow believes they can use this argument to prove additionality and legitimize the carbon credits generated within the network.

3. **Markets will value Glow based on "book value" multiples and not "earnings" multiples.**
    - Let's assume Glow is successful and scales to 10k+ farms by 2026 and is able to auction carbon credits at a premium price of $10/credit. Glow would be generating only ~$25k MRR based on $GLW burn, which would make it not even a top-10 on DePIN Ninja. However, at the same scale, the protocol treasury holds $350-500m of $USDC.
    - Even though the treasury "belongs to" and will be paid out to miners over time, governance technically has some amount of control over the onchain funds. Markets must value Glow on the basis of "book value" of the treasury (4x multiple today) rather than on "earnings" from carbon credit sales (35,000x today) for us to do well.

What do we need to believe about a specific deployment?

1. **The biggest driver of returns is being early.** The payback for a new farm coming online today is 4-5 days. Any farm that goes live before July will likely pay-back in weeks, with half of all lifetime earnings coming in the first month. It's not clear how long the music will last; my gut feel is the opportunity will be compelling enough throughout Q3 but not in Q4.

2. **The biggest driver of capital constraints is local energy costs.** Recall that the protocol fee paid - which determines the amount of $GLW mined - is equivalent to the discounted value of 10 years. The average protocol fee across the 13 live farms is only $18k ($1,400/kWh). The San Mateo property will have a protocol fee of $60-70k, because it is a large property in an area with some of the most expensive electricity rates in the country (~5x national average).

3. **The biggest driver of counterparty risk is fraud.** If hosts commit fraud, they can be kicked off the network and forfeit future rewards. This happened in February, when Glow kicked off ~75% of its network at the time for falsifying installation dates in order to be eligible to mine Glow.

What are the key risks?

- The market may treat Glow like a carbon credits business and value it on the basis of $GLW burned for carbon credit auctions. If so, it's unlikely Glow can grow big enough to deliver meaningful returns from its current valuation (35,000x multiple). In the downside case, if $GLW goes to zero we can expect to recover 30-50% of our investment via $USDC distributions.

- The host could move out of his house, the solar panels could break, or something else could take the solar panels offline. In this case, our miner would stop producing carbon credits and therefore stop earning $USDC rewards. However, the miner would continue earning $GLW rewards, proportional to the original protocol fee, for 4 years regardless of whether it is operational. We expect the vast majority of returns to be generated by the $GLW portion of the mining rewards.

- The host could commit some sort of fraud, such as tampering with the monitoring device, that gets them kicked off the network by a certification agent. In this case we would forfeit *future* $USDC and $GLW earnings. However, given the front-loaded nature of mining returns (we expect ~50% of lifetime $GLW earnings in the first month) the risk decays quickly over time. The most important thing is to avoid hosts who will commit fraud immediately after the deployment.

- The faster the Glow protocol grows, the less attractive our early mining investment becomes. We own XX tokens today at a blended cost basis of $2.50. The token trades at $2.40 on Uniswap on $60k TVL, or at $3.25 from the bootstrapped liquidity contract. If Glow grows from 13 farms today to 50 farms by the end of Q3, we can expect to mine tokens at a cost basis roughly equal to Glow's seed investors ($0.30). If the network grows to 200 farms by the end of Q3, we would be better off buying tokens in the liquid market today ($2.40).

- The longer a farm takes to start earning rewards, the lower our ultimate returns will be. Only after getting local permits, completing the construction, and passing the Glow audit does a farm begin earning rewards. Up to half of lifetime GLW rewards will be mined in the first month, therefore any construction- or audit-related delays can materially impact overall returns. We are targeting a July launch for the San Mateo property.

- Glow could fail to get centralized exchange listings or meaningful DEX liquidity in $GLW, making it difficult for us to exit our position. Our existing $GLW position is already bigger than the Uniswap liquidity pool. We note that Glow's founder's previous project, Sia, is listed on tier-1 exchanges including Binance, Bybit, OKX, Upbit and Crypto.com.

- Glow's management team has a polarizing reputation among investors in their past projects. We haven't worked closely with the team long enough to have built a strong direct relationship yet outside of reading the protocol's public disclosures and community discussions.

- The early liquidity contract will soak up token demand that would otherwise drive price discovery. The protocol launched with 12m $GLW for sale at an initial price of $0.3 with price doubling linearly for every 1m tokens sold. So far, 3.5m tokens have been sold at an average price of $1.3 and the current price is $3.2. The pool will absorb the following buy pressure: $10m before $10 (+4x from today), $25m before $20 (+8x from today), and $67m before $50 (+20x from today).
    - Proceeds from the early liquidity contract are added to the $USDC mining rewards pool and distributed over four years. Therefore, we mitigate this risk by investing in miners, which earn a share of the residual token sale proceeds, rather than owning GLW directly.

What's the underwriting case?

- We consider three cases based on network growth scenarios: the slow-growth path, the medium-growth path, and the high-growth path (think XNET vs Pollen vs Helium in 2022). In the medium- and high-growth paths, we assume $6m and $14m respectively of net inflows into the early liquidity contract (i.e. net buy pressure from the market) through 2026.

- All cases assume a $20k investment, go-live in July, and 50% reward split. Under these terms, we expect to pay-back our investment in weeks and be fully unlocked on our position (with a 4-9x MOIC) before insider token unlocks begin in December 2024. In the armaggeddon case where $GLW goes to zero, we'll recover 30-50% of our investment in $USDC over four years.

- The best case scenario is that the network grows slowly in the near-term and sees continued net onchain demand for $GLW in the range of $500k-$1m per month. If either of these things becomes true, we'll see a 5-10x return; if they both become true, we'll see 50-100x.

$ amounts shown in thousands	Slow-growth case			Medium-growth case			Fast-growth case		
	Before 12/24 unlocks	**Before YE2025**	**Before YE2026**	**Before 12/24 unlocks**	**Before YE2025**	**Before YE2026**	**Before 12/24 unlocks**	**Before YE2025**	**Before YE2026**
Total active miners	43	102	182	145	705	1,085	341	2,616	5,259
Protocol treasury or TVL	$4,586	$4,408	$4,739	$8,122	$21,789	$29,289	$15,007	$89,376	$194,711
Assumed liquidity pool inflows	$0	$0	$0	$1,400	$4,000	$6,400	$3,500	$10,000	$14,000
Implied GLW liquidity pool price	$3.4	$3.4	$3.4	$4.3	$6.1	$7.8	$5.8	$10.3	$13.1
GLW earned	52	118	151	23	34	38	13	16	17
Effective entry price	$0.38	$0.17	$0.13	$0.87	$0.59	$0.53	$1.54	$1.25	$1.21
Premium/(discount) to current price	*-85%*	*-93%*	*-95%*	*-65%*	*-76%*	*-79%*	*-39%*	*-50%*	*-52%*
Premium/(discount) to seed round	*27%*	*-43%*	*-56%*	*190%*	*96%*	*77%*	*412%*	*318%*	*303%*
USDC earnings	$7	$16	$20	$3	$7	$9	$2	$4	$6
GLW earnings	$176	$396	$506	$100	$208	$293	$75	$164	$216
MOIC	**9.2x**	**20.6x**	**26.3x**	**5.2x**	**10.8x**	**15.1x**	**3.9x**	**8.4x**	**11.1x**
IRR	**4867%**	**525%**	**243%**	**1709%**	**321%**	**178%**	**988%**	**263%**	**148%**
Payback (months)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Downside if GLW goes to zero	0.4x	0.8x	1.0x	0.2x	0.3x	0.5x	0.1x	0.2x	0.3x
Token price required for 10x	$3.7	$1.6	$1.2	$8.5	$5.7	$5.1	$15.2	$12.3	$11.7
Circulating mkt cap required for 10x	$82,271	$90,272	$102,310	$190,497	$329,125	$435,066	$339,569	$709,619	$1,004,297
"Fuly-diluted" mkt cap required for 10x	$838,839	$355,113	$271,509	$1,942,320	$1,294,720	$1,154,573	$3,462,271	$2,791,517	$2,665,188
Host USDC earnings	$7	$16	$20	$3	$7	$9	$2	$4	$6
Host GLW earnings	$176	$396	$506	$100	$208	$293	$75	$164	$216

Source: https://docs.google.com/spreadsheets/d/1Y7YFYw1Wm3a3iuZFvr407e5dXg0vQctu/

In short, the risk/return on mining $GLW today is extremely attractive for both capital providers (us) and hosts (solar installers). We can lose -50% of our investment in the downside case or make +50x in the upside case. Solar installers can earn $5-10k in cash plus $75-250k worth of tokens for every residential deployment they onboard—assuming no rise in crypto prices from today. It's a no brainer.

We want to deploy capital aggressively here by partnering with solar installers who:

1. will install new solar panels before Q2-Q3 2024, especially in areas with high energy costs
2. will agree to a 50% share of rewards, and won't attempt to defraud the protocol

If you know anyone, please let us know.