

State of Solana DePIN

An Overview of Decentralized Physical Infrastructure Networks (DePIN) and Their Growth on Solana



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Introduction

In *The Age of Spiritual Machines* (1999), futurist Ray Kurzweil envisioned a world where digital technologies, artificial intelligence, and human intelligence would merge, driven by exponential advances in computing. Today, this digital transformation is underway, with AI, blockchain, and decentralized systems reshaping how we work, communicate, and organize. Yet despite these breakthroughs, we continue to live in a physical world that depends on roads, energy, devices, and connectivity. How can we bridge the digital and physical realms? The answer lies in Decentralized Physical Infrastructure Networks (DePIN), blockchain-powered systems that enable and incentivize communities to build and maintain real-world infrastructure.

This report evaluates the current state of Decentralized Physical Infrastructure Networks (DePIN) on Solana

1.1 Methodology

This report draws data from platforms such as Top Ledger, Dune, Messari, and Syndica (full citations are provided in the references). It examines leading DePIN projects on Solana across core verticals, including wireless, mapping, compute, and bandwidth, while identifying the Solana-native tools they utilize (e.g., Squads, Realms, Clockwork, Phantom, Pyth, Switchboard), using Helium as a case study. Key performance indicators such as user growth, revenue generation, node count, and enterprise integrations are analyzed to assess project traction.

2.0 What Is DePIN?

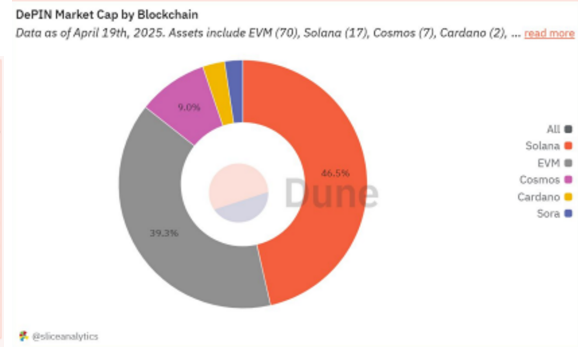
Decentralized Physical Infrastructure Networks (DePIN) are blockchain-powered systems that incentivize individuals or communities to deploy and operate real-world infrastructure. These networks replace traditional, centralized infrastructure providers with open, token-incentivized alternatives that are owned and operated by users themselves.

By combining crypto incentives, real-world hardware, and decentralized protocols, DePIN projects allow anyone to contribute to and benefit from building things like wireless networks, mapping systems, energy grids, and distributed computing.

2.1 Why Solana DePIN?

Solana offers a scalable, low-cost, and composable infrastructure that supports DePIN protocols in efficiently managing real-world data and interactions, helping teams to build and operate decentralized physical networks with reduced complexity.

Project_Name	Market_Cap	FDV	Blockchain
Render	\$2.15b	\$2.21b	Solana
JaanyCoin	\$781.78m	\$724.68m	EVM
Helium	\$616.23m	\$764.45m	Solana
AIOT Network	\$319.52m	\$320.63m	Cosmos
Akash Network	\$263.23m	\$264.13m	Cosmos
Aethir	\$233.67m	\$1.16b	EVM
Ankr Network	\$187.85m	\$187.05m	EVM
OriginTrail	\$178.51m	\$178.72m	EVM
IoTeX	\$178.46m	\$178.46m	EVM



3.0 State of Solana DePIN 2025

Market Capitalization

As of mid-2025, the Decentralized Physical Infrastructure Networks (DePIN) sector is experiencing rapid expansion. According to DePIN Scan, a dedicated data explorer tracking DePIN activity, there are currently 417 active DePIN projects, representing a combined market capitalization of over \$12 billion and totaling more than 41.3 million connected devices across categories like connectivity, compute, mapping, and bandwidth.



A recent April 2025 report by Dune further breaks down the on-chain DePIN landscape. When excluding standalone Layer 1 chains operated by some projects, the total DePIN on-chain market cap stands at approximately \$7.1 billion. Of that total, Solana leads with \$3.25 billion, positioning it as the most valuable DePIN platform by blockchain market share.

Why Market Cap Matters

Market capitalization serves as a proxy for how the broader market values a DePIN project's future potential, adoption curve, and economic sustainability.

Higher valuations often translate into better access to liquidity, stronger brand awareness, and greater opportunities for partnership and infrastructure scaling, factors critical for bootstrapping global, decentralized networks.

Still, market cap is only one part of the picture. Adoption milestones, real-world integrations, and performance metrics offer a more grounded view of Solana's growing leadership in DePIN.

Recent Milestones in Solana DePIN (2025)

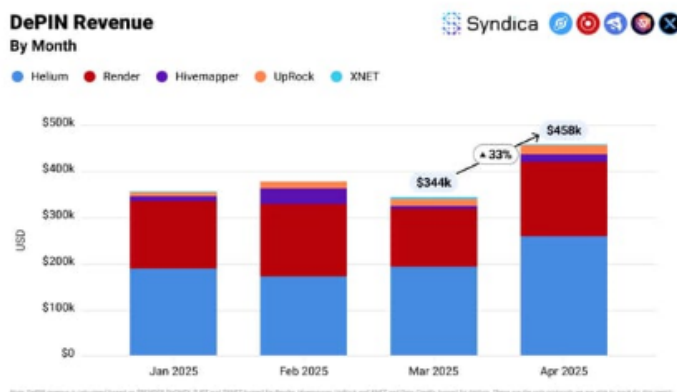
Solana's DePIN ecosystem has seen meaningful momentum throughout 2025, with several projects achieving real-world deployment and revenue growth milestones. These events highlight Solana's growing role as a foundational layer for decentralized physical infrastructure:

- **April 3, 2025 – Wingbits launches first satellite**

Wingbits, a Solana-based aviation DePIN, launched its first satellite in partnership with Spire Global aboard SpaceX's Transporter-13 mission. This historic event marked the deployment of the first orbital DePIN node, extending coverage to previously unreachable airspaces and reinforcing the global reliability of Wingbits' community-powered flight-tracking network.

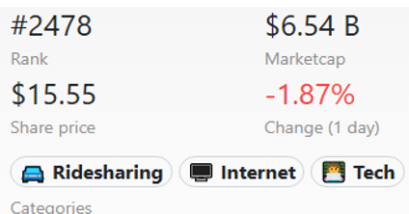
- **April 2025 – Solana DePIN revenue hits YTD high**

According to Syndica's April 2025 report, DePIN protocols on Solana, including Helium, Render, Hivemapper, Uprock, and XNET, collectively generated \$458K in monthly revenue, a 33% month-over-month increase and the highest revenue performance of the year to date.



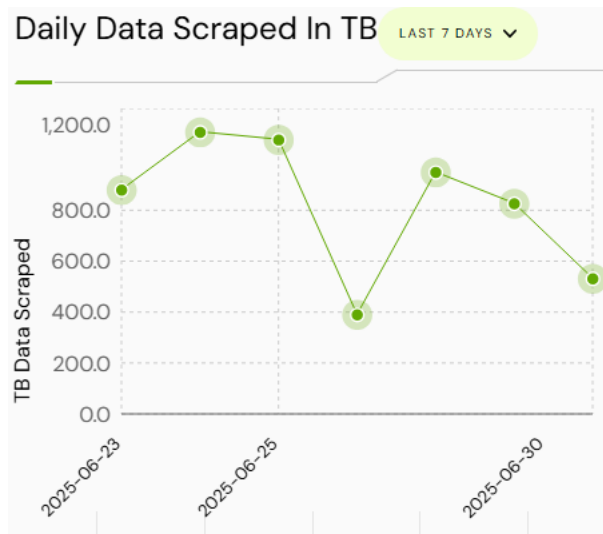
- **May 2025 – Lyft taps Bee Maps for real-time mapping**

\$6B+ ride-hailing company Lyft partnered with Bee Maps, powered by Hivemapper on Solana, to integrate real-time, crowdsourced geospatial data into its mapping infrastructure. This enterprise use case marked a major step forward in the adoption of DePIN data services by consumer-facing tech platforms.



- **June 23, 2025 – Grass unveils Grasshopper device**

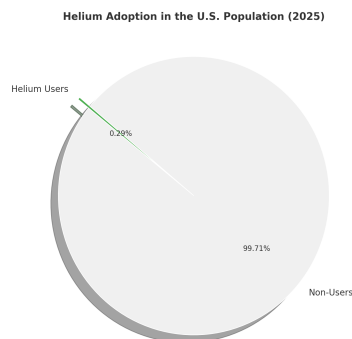
Grass, a decentralized bandwidth-sharing protocol, launched Grasshopper, its first plug-and-play hardware device, enabling 24/7 residential bandwidth sharing. The device improves routing efficiency and enhances public web data collection across the Grass network. As of June 2025, Grass reports daily collection of approximately 881 TB of bandwidth data across 190 countries, monetized for AI training, positioning it as one of the largest decentralized data pipelines in the DePIN space.



Number of Countries: 190

- **June 25, 2025 - Helium's CLO, Sarah Aberg, stated on Capitol Hill**

That over 1 million Americans are active Helium users. This public acknowledgment underscores the tangible adoption of DePIN infrastructure in the U.S., reflecting not just token speculation but real utility and usage at scale. That's ~0.29% of the U.S. population, a notable foothold for blockchain-powered.



These milestones illustrate that Solana's DePIN ecosystem is not only increasing in market value but also advancing in real-world deployment and technological maturity.

With this foundation established, the next section takes a closer look at DePIN verticals on Solana.

4.0 Leading DePIN Projects on Solana

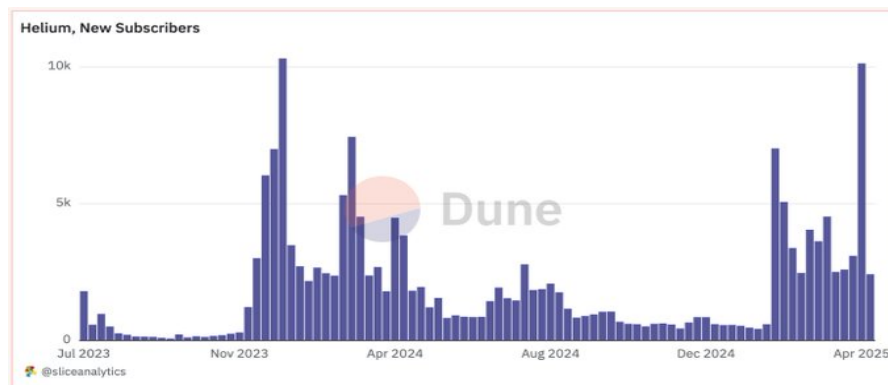
Helium

Helium is a decentralized physical infrastructure network (DePIN) built on Solana, focused on wireless connectivity. It enables individuals and organizations to deploy Helium Hotspots that contribute to a community-powered 5G and IoT network.

These hotspots reward users for providing wireless coverage, enabling a scalable alternative to traditional telecom infrastructure.

Key Stats (as of Q2 2025)

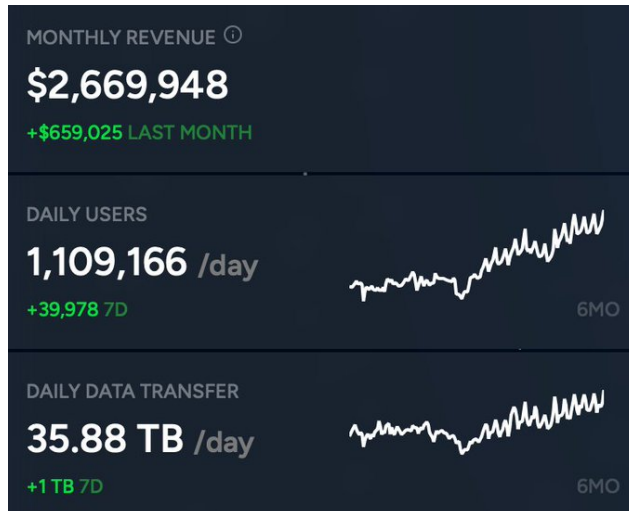
- 176,000+ mobile subscribers
- 69,000+ active nodes
- \$2.3M in monthly on-chain revenue
- Strategic partnerships with AT&T and the launch of the Zero Plan, the first free 5G plan in the U.S.



User Adoption & Network Usage

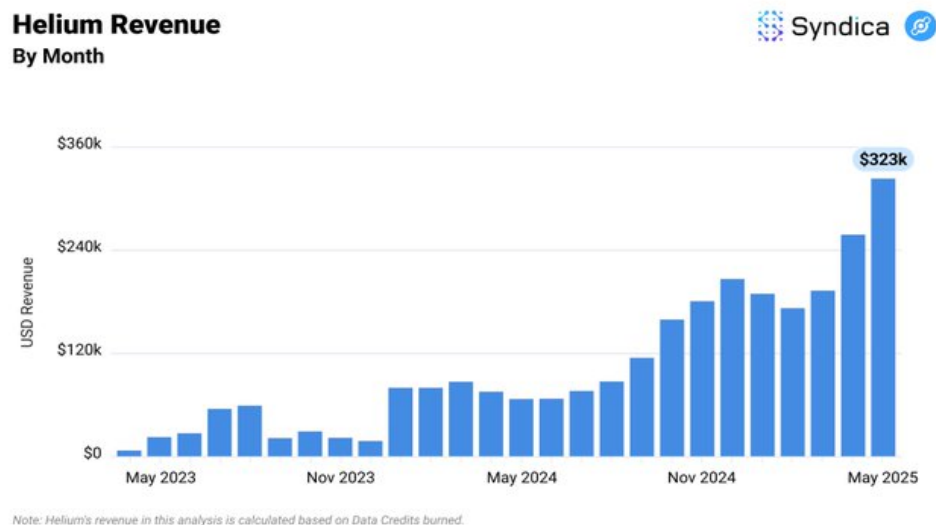
Since migrating to Solana in 2023, helium's growth has accelerated rapidly:

- Over 1 million mobile devices now rely on Helium Mobile in the U.S., including 300,000+ active subscribers.
- Daily usage hit an all-time high of 1.1 million users and 36 TB of data transferred, as traditional carriers increasingly offload traffic to Helium's decentralized hotspots.



Revenue Performance

Helium achieved a new all-time high (ATH) of \$323K in on-chain revenue, according to Syndica's recent report.



Historical Context

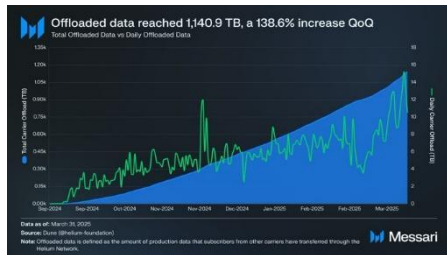
Founded in 2013, Helium pioneered decentralized wireless infrastructure before transitioning to Solana. Prior to its migration, the network had already surpassed

250,000 Wi-Fi users and 1 million mobile users, highlighting long-term traction even before leveraging Solana's scalability.

Quarter-over-Quarter Growth (Q1–Q2 2025)

According to Messari:

- Total offloaded data: +138.6% QoQ
- Helium Mobile signups: +28.5% QoQ
- Total data transferred: +42.5% QoQ



Date as of: March 31, 2025



Date as of: March 31, 2025

Summary

Helium exemplifies a mature, high-throughput DePIN protocol operating at scale on Solana. Its consistent growth in users, revenue, and offloaded mobile traffic validates Solana's ability to support mission-critical, real-world infrastructure powered by crypto-native incentives.

Additional resources on Helium further support the argument for building DePIN on Solana, demonstrating that Solana's scalability, speed, and composability are not just theoretical advantages, but essential enablers of real-world decentralized infrastructure at scale.

Hivemapper

Hivemapper is redefining digital mapping by turning everyday driving into a source of real-time, street-level data. Unlike centralized incumbents like Google Maps, which deploy expensive camera fleets and refresh imagery infrequently, Hivemapper uses crypto incentives and consumer dashcams to build a decentralized, continuously updating map of the world.

A Decentralized Alternative to Google Maps

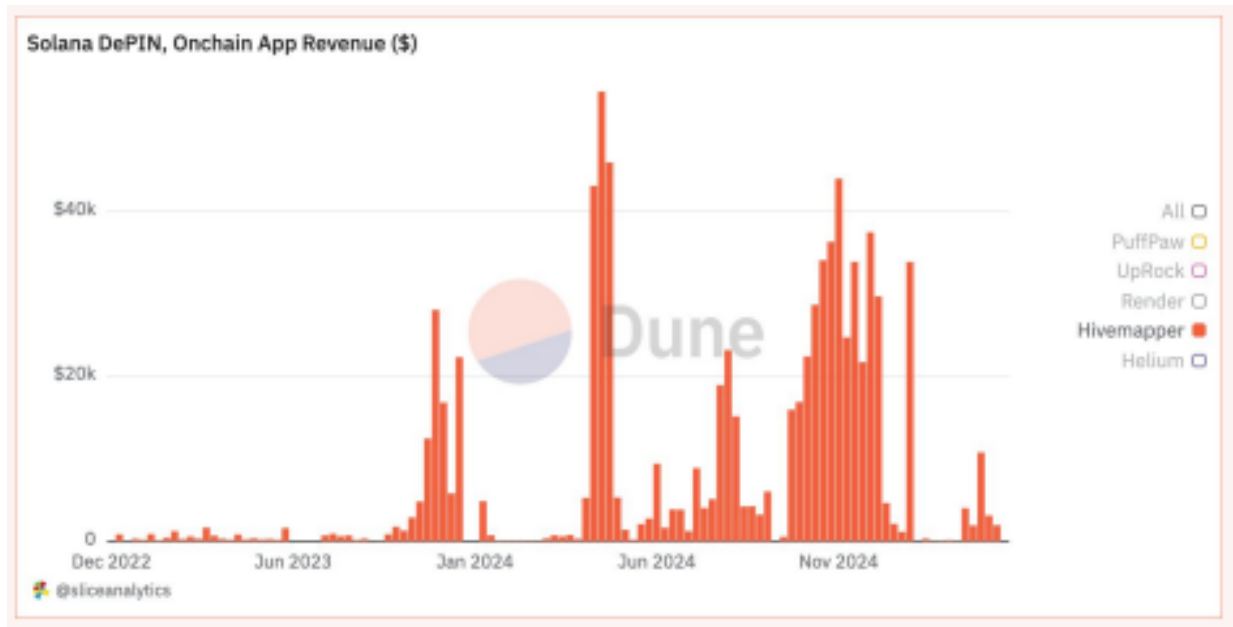
Hivemapper's model is faster, cheaper, and more scalable than traditional mapping approaches:

	Hivemapper	Google Maps
Ownership & Model	\$589 paid for by dashcam owners Maps are crowdsourced via dashcams operated and purchased by users. Mapping is incentivized through crypto rewards.	~\$500,000 per Google Street View vehicle per year
Coverage and update speed	Rapid, frequent updates—roads often mapped multiple times per year, especially in active regions. Average mapped 10x/year in active regions. 20+ million unique kilometers in 100+ countries (~33% of global roads); strong in both developed and emerging markets	Updates vary: major cities updated regularly, remote/rural areas can go years between updates Global coverage; over 220 countries and territories
Deployment flexibility and refresh rate	Highly flexible - dashcams are user deployed, with higher rewards flowing to areas that require data contributions	Medium - requires centralized planning and cost-benefit analysis on when and whether to refresh underserved or low-density areas
Imagery Resolution	4K street-level imagery, extracted map features and semantic map layers	High-resolution panoramic imagery, satellite, and aerial photos
Privacy & Data Control	Data is community-owned, blockchain-verified, and contributors can influence governance	Data is owned and controlled by Google

Growth and Market Validation

Since launching in 2022, Hivemapper has scaled rapidly:

- Node Count: 77,000+ active contributor nodes as of April 2025, most participating in either map coverage or AI data bounties.
- Geographic Footprint: 20M+ kilometers of unique roads mapped across 100+ countries, about one-third of the global road network.

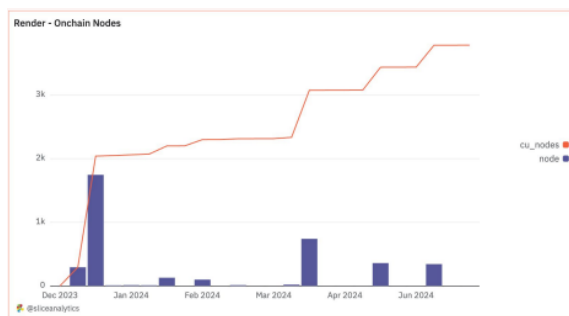


Hivemapper's On-chain Network Revenue directly correlates with the amount of HONEY tokens users burn to obtain Map Credits for data access. Following a "Burn and Mint" paradigm, 75% of this burned HONEY is permanently removed from the supply. The remaining 25% is reminted to compensate contributors, adhering to a weekly cap. Map Credit costs are denominated in USD, and HONEY is burned according to its prevailing market rate.

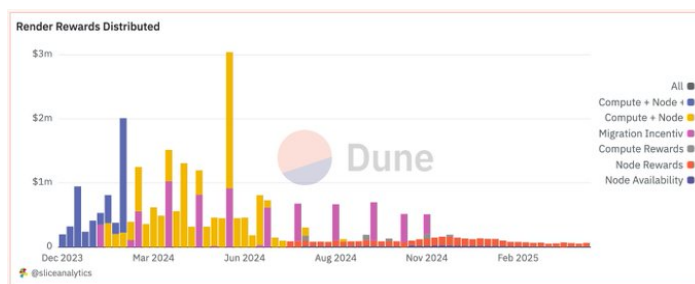
Render

Render turns idle GPU power into a decentralized rendering marketplace for creators and AI developers. Users burn RENDER tokens for compute access, while node operators earn newly minted rewards through the Burn-Mint Equilibrium model.

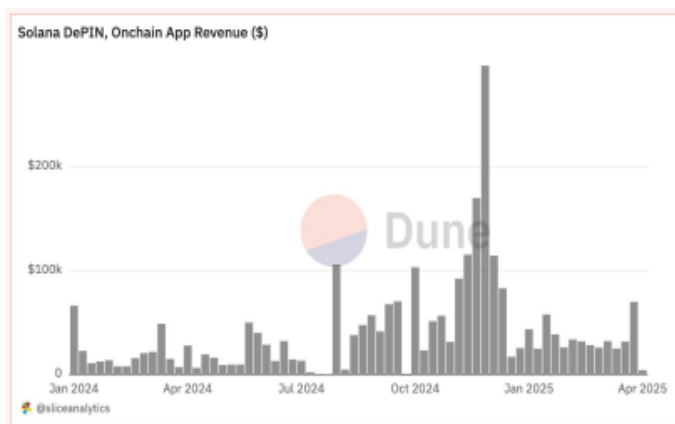
- Node Count: 3,784 active GPU providers as of April 2025.



- Currently, users have burned over 121 million RENDER tokens by utilizing GPU resources, while more than 2.4 million tokens have been minted as rewards for node operators. This highlights strong demand and ongoing active involvement within the ecosystem.



- Revenue Performance: Peaked at \$300K/week in late 2024; second peak at \$70K/week in April 2025.



The displayed revenue represents the full volume of RENDER tokens burned by users to access GPU compute tasks, serving as the network's on-chain revenue. Protocol-specific fees, such as the standard 5% per job, occur off-chain and are not captured in the on-chain metrics. By providing low-cost, scalable compute for high-demand tasks, Render has emerged as both a web3 infrastructure layer and a monetization engine for idle hardware.

5.0 Carbon Offset DePIN in Pakistan

Pakistan is among the countries most vulnerable to climate change, facing frequent floods, extreme heatwaves, and accelerating deforestation. At the same time, the nation has pledged to reach net-zero emissions by 2050 but struggles with limited financing for climate action. This creates a strong case for a **DePIN model focused on carbon offsets**, where local communities are incentivized to capture and verify environmental impact using blockchain-powered infrastructure.

Why It Matters

- **Climate Urgency:** Ranked among the top 10 most climate-vulnerable nations, Pakistan needs scalable solutions for carbon sequestration, reforestation, and sustainable agriculture.
- **Agricultural Potential:** With more than 40% of the workforce employed in agriculture, there is a massive opportunity to incentivize greener farming practices (soil carbon capture, solar-powered irrigation, agroforestry).
- **Carbon Finance Gap:** International climate funds are insufficient to meet Pakistan's targets. A DePIN approach allows micro-contributions (such as planting 10 trees) to be transparently verified and monetized as carbon credits.

How a Carbon Offset DePIN Could Work

- **IoT Measurement Devices:** Affordable soil, air-quality, and forestry sensors record environmental data in the field.
- **Community Participation:** Farmers, students, and urban volunteers collect or maintain green infrastructure, earning tokens for verified contributions.
- **Tokenization of Offsets:** Verified data is used to mint on-chain carbon credits on Solana, enabling global buyers to directly fund local climate-positive actions.
- **Transparency & Scale:** Solana's low-cost and high-speed infrastructure ensures micro-actions are trackable, auditable, and tradeable on global carbon markets.

Local MVP Concept: *"Green Scouts Pakistan"*

An initial pilot could involve:

- **Urban Tree Planting:** Karachi and Lahore communities record and monitor new tree cover through IoT devices and drones.
- **Solar Irrigation in Punjab:** Farmers deploying solar-powered pumps log usage data, verified as carbon-saving activity.
- **Student Engagement:** University clubs act as node operators, collecting environmental data and feeding it into the Solana-based network.

This MVP could demonstrate how tokenized climate action provides **direct financial incentives** to local participants while positioning Pakistan as a pioneer in blockchain-powered carbon offset infrastructure.

Financial Potential

The voluntary carbon credit market is valued at over **\$2 billion annually** and growing, with credits trading at anywhere from **\$6–\$30 per tonne of CO₂** depending on quality. For Pakistani contributors:

- A small farmer practicing regenerative agriculture can sequester **3–10 tonnes CO₂ per hectare per year**, potentially earning **\$20–\$300 annually per hectare** in tokenized credits.
- A solar irrigation pump replacing diesel avoids about **1.5 tonnes CO₂ per year**, worth **\$10–\$45 annually** in credits—on top of direct fuel cost savings.
- Tree planting projects earn less per tree (~10–40 kg CO₂ per year), but at scale—such as 10,000 community trees—can generate **100–400 tonnes annually**, translating into **\$600–\$12,000 in credits** for local communities.

Strategic Impact

By aligning financial incentives with sustainability, a Carbon Offset DePIN can:

- Create new income streams for farmers and students.
- Build a transparent national registry of offsets.
- Attract global buyers of tokenized carbon credits.
- Contribute to Pakistan's commitments under the Paris Agreement while leveraging its young, tech-savvy population.

6.0 Conclusion

Decentralized Physical Infrastructure Networks (DePIN) are transforming the vision of a digitally integrated physical world into reality. **Solana has emerged as a leading base layer for these networks**, offering the **speed, low cost, and scalability required to support real-world deployment**.

In 2025, Solana-based DePIN projects have demonstrated measurable growth, with a market cap exceeding \$3.25 billion and millions of users participating across sectors such as wireless, mapping, compute, and AI. In late Q2 2025, Helium surpassed 1 million active U.S. users, around 0.29% of the population, highlighting Solana's capacity to support production-grade, high-throughput infrastructure.

The ecosystem's momentum is also driven by Solana's composable developer stack. As demonstrated in the Helium case study, native tools like Pyth, Switchboard, Clockwork, Realms, and Squads reduced friction and streamlined development, allowing the Helium team to focus on deploying real-world infrastructure rather than managing blockchain complexities. These tools make building DePIN on Solana faster, easier, and more scalable.

While challenges such as network reliability and token volatility remain, the combination of real-world utility, enterprise adoption, and developer activity positions Solana as a strong contender for powering the next wave of decentralized infrastructure.

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