

AXX Technical Documentation

Empowering Developers to Build the Future of Energy and Computation

The **AXX Technical Docs** provide developers, researchers, and integrators with the tools and resources needed to build within the **AXX ecosystem**, a decentralized, intelligent energy network where **renewable power becomes computational intelligence** and **computation becomes digital value**.

This documentation serves as a unified entry point for anyone looking to contribute, integrate, or extend the AXX platform, from node operators and AI developers to blockchain engineers and clean-tech innovators.

1. Introduction

What is AXX?

AXX is a decentralized compute and energy protocol designed to connect **clean energy sources, intelligent computation**, and **tokenized value creation** into one synchronized ecosystem.

By bridging renewable energy with high-efficiency compute nodes and blockchain verification, AXX enables energy producers, developers, and organizations to participate in a transparent, data-driven global compute network.

2. Developer Ecosystem Overview

The **AXX Developer Ecosystem** is structured around three core resources:

1. **Developer Guides**- Comprehensive tutorials and technical deep dives on how to integrate, deploy, and scale within the network.
 2. **API References** - Complete endpoint documentation for communicating with AXX Nodes, blockchain ledgers, and data oracles.
 3. **SDK Resources** - Multi-language SDKs and developer tools to simplify integration, automate operations, and accelerate build time.
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3. Developer Guides

3.1 Getting Started

- **Quick Setup:** Instructions for configuring your local development environment.
- **Network Requirements:** Supported operating systems, hardware specs, and compatible AXX Node firmware versions.
- **Onboarding:**
 - Generate an AXX Developer ID
 - Connect to the test network
 - Validate your node or API connection

3.2 AXX Architecture Overview

A modular explanation of how energy, computation, and blockchain layers interact within the AXX network:

- **Energy Layer:** Integrates with renewable sources (solar, wind, hydro) and converts real-time energy flow data into measurable compute units.
- **Compute Layer:** Uses distributed AXX Nodes for optimized AI and data processing tasks.
- **Blockchain Layer:** Validates energy-to-compute transactions and token issuance through a decentralized consensus protocol.

3.3 Node Deployment and Scaling

- **Deployment Models:**
 - Single-node (local compute)
 - Clustered (multi-node scaling)
 - Edge deployment (remote low-latency environments)
- **Monitoring Tools:**
 - Node health API
 - Power input/output tracker
 - Energy flow metrics dashboard
- **Maintenance:** Updating firmware, syncing data logs, handling network congestion.

3.4 Integration Guides

- **Integrate Energy Data Feeds** - connect renewable sources through IoT or API endpoints.
- **Compute Integration** - run machine learning workloads through AXX's distributed compute layer.
- **Blockchain Connection** - verify transactions using smart contract modules or AXX's blockchain SDK.

4. API Reference

The AXX API provides REST and GraphQL interfaces for interacting with the network programmatically.

4.1 Authentication & Security

- **OAuth 2.0 / API Key Auth** for developers and partners.
- Role-based access tokens (read/write/admin).
- Secure encryption layer with automatic key rotation.
- Real-time audit logging and anomaly detection.

4.2 Core Endpoints

Category	Endpoint	Description
Node Management	/api/v1/nodes	Query and manage AXX Node data.
Energy Flow	/api/v1/energy	Retrieve real-time renewable energy input/output metrics.
Compute Metrics	/api/v1/compute	Access compute performance, load, and utilization data.
Tokenization	/api/v1/tokens	Manage digital asset issuance and validation.
Blockchain	/api/v1/ledger	Query blockchain transactions and node validations.
AI Integration	/api/v1/ai	Submit workloads, retrieve results, and interact with distributed inference.

4.3 Data Models

Each API response returns data in JSON format, structured for scalability and clarity.

Example:

```
{  
  "node_id": "AXX-5321",  
  "energy_input_kw": 2.5,  
  "compute_cycles": 340000,  
  "tokens_generated": 0.0045,  
  "timestamp": "2025-11-14T10:35:00Z"  
}
```

5. SDK Resources

AXX provides SDKs and libraries to streamline development across major programming environments.

5.1 Available SDKs

Language	Package	Description
JavaScript / TypeScript	<code>@axx/sdk</code>	For web & Node.js developers.
Python	<code>axx-py</code>	Ideal for data engineers and AI workflows.
Go	<code>axx-go</code>	Optimized for system integration and backend ops.
Rust (coming soon)	<code>axx-rs</code>	For high-performance compute integration.

5.2 SDK Features

- Simplified wrappers for REST and GraphQL APIs.
- Built-in cryptographic verification for blockchain transactions.
- Helper functions for managing nodes, energy data, and token streams.
- Integrated simulation tools for testing workloads in sandbox mode.

5.3 CLI Tools

- **axx-cli** - A lightweight command-line tool to:
 - Monitor node activity
 - Fetch compute or energy metrics
 - Deploy and manage nodes
 - Sync data logs to the main AXX ledger
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6. Versioning and Changelog

All API endpoints and SDKs are version-controlled using **Semantic Versioning (SemVer)** for transparency and reliability.

Version	Release Date	Notes
v1.0.0	October 2025	Initial public release.
v1.1.0	November 2025	Added token metrics and AI inference API.
v1.2.0	Planned Q1 2026	SDK extensions for cross-chain energy verification.

Developers can access archived versions and migration guides in </docs/version-history>.

7. Developer Tools and Support

7.1 AXX Playground

A browser-based sandbox environment where developers can simulate:

- Node setup and operation
- Energy-to-compute conversion
- Token generation and verification

7.2 Logging and Monitoring

- Built-in observability stack using Prometheus + Grafana.
- Web dashboard with real-time performance tracking.
- Alert system for energy variance, latency spikes, or security events.

7.3 Support and Community

- **Developer Forum** – ask questions, share integrations.
 - **GitHub Repositories** – SDK source code, community extensions, templates.
 - **Discord/Slack Channels** – for direct technical collaboration and feedback.
 - **Bug Bounty Program** – earn rewards for finding vulnerabilities.
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8. Use Cases

- **AI and ML Workloads:** Train and deploy distributed models on renewable-powered compute.
 - **Decentralized Data Centers:** Operate small-scale compute nodes powered by solar/wind input.
 - **Blockchain Energy Auditing:** Verify and tokenize energy consumption transparently.
 - **Smart Grids:** Connect multiple energy sources for dynamic compute balancing.
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9. Future Roadmap

- **Edge AI Integration:** Expand to low-latency inference at the edge.
 - **Cross-chain Energy Verification:** Interoperability with Ethereum, Polkadot, and Solana.
 - **Global Node Network:** Deployment across North America, Europe, and Asia by Q3 2026.
 - **AXX Developer Grants:** Funding open-source tools and research projects that align with clean energy and AI goals.
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10. Conclusion

The **AXX Developer Platform** redefines how the world thinks about power, intelligence, and value creation.

With open APIs, flexible SDKs, and a growing network of nodes, AXX empowers innovators to build **applications, systems, and economies** that turn **clean energy into intelligent digital ecosystems**.