The National Energy Operation Centre

Enabling the New Energy Landscape

GREENSTAR
TECHNOLOGIES

Note: This white paper is the second in a series. The first white paper, titled "Energy Utilities on the Digital Front Line: Equipping Utilities for Success in the New Energy Landscape" can be accessed [here](#)

As anyone who works in the utility industry knows, that industry is undergoing sweeping changes. From how its product is made and delivered to the ways its customers – residential and commercial & industrial (C & I) – are engaged, the industry is evolving as more choices become available from alternative and renewable energy sources and providers. At the same time, customers are leveraging digital technology in order to better understand their energy usage and needs. The result is a radically different utility landscape that is adapting to meet the demands for sustainable operations in an increasingly digital, climate-focused world. Figures 1 and 2 show the transformation from a centralized and one-directional utility value chain to one that is distributed and multi-directional.
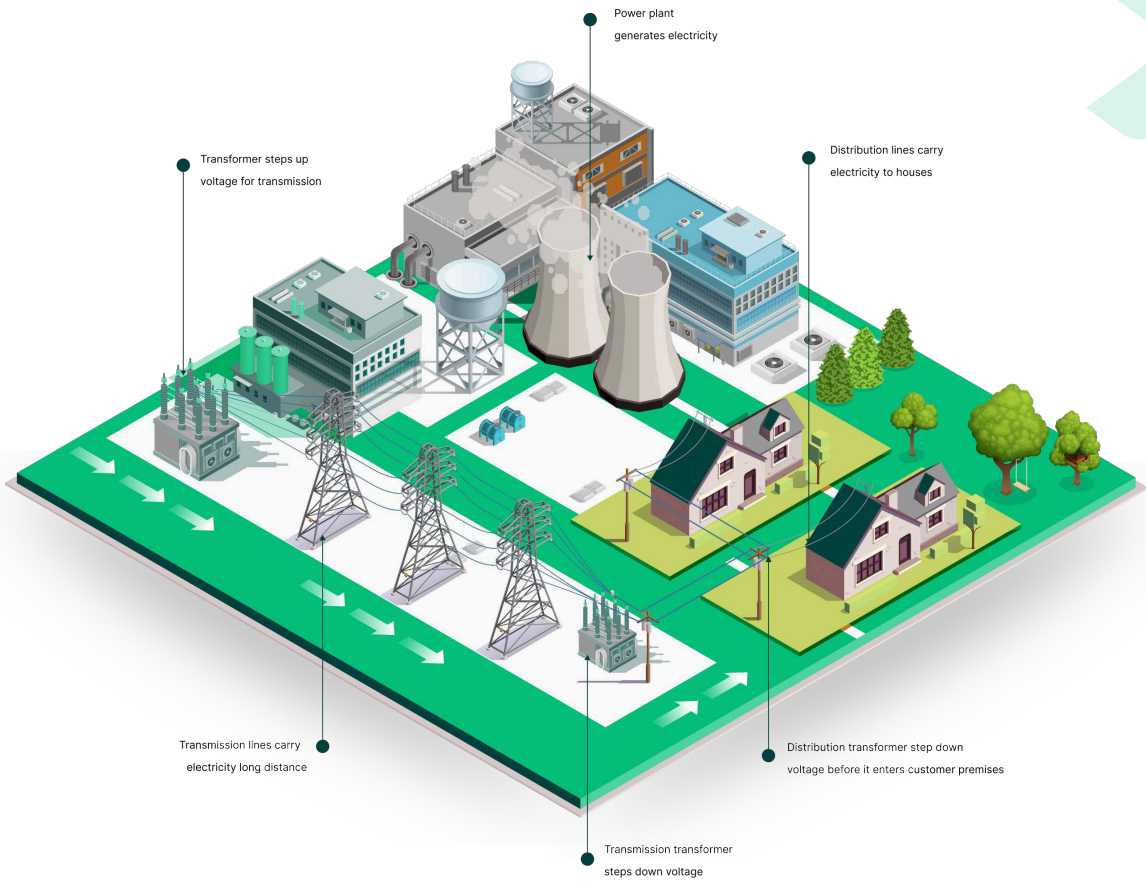
Figure 1. Centralized, linear utility landscape (Source: Greenstar Technologies).
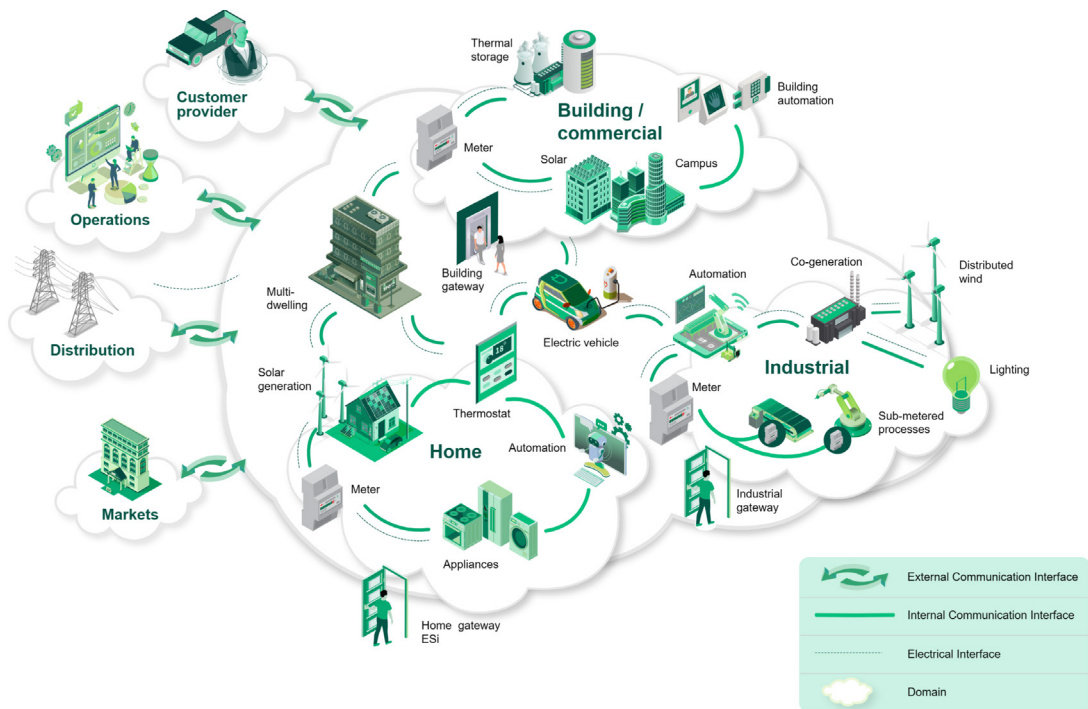

Figure 2. Distributed, multi-directional utility landscape . (Source: Greenstar Technologies).

These major shifts in the energy landscape call for a corresponding shift in how the utility operates and engages with its customers in this digital realm. Indeed, the data is becoming more valuable than the electrons. These shifts dictate that digitalizing the utility is a must.

The clarion call in the North American utility industry is for a digital platform that will enable the seamless coordination of new energy sources, manage assets to ensure reliability, and make a leap forward in the utility-customer relationship. Does such a digital platform – a virtual place where utility data meets solutions to solve the challenges of the new energy environment – exist?

The Energy
Future Is Now.
Are You Ready?

Driven by climate and environmental challenges and accompanying sustainability goals, energy generation is moving from centralized to distributed; grid management is striving to evolve to provide reliability, flexibility, and resiliency as millions of distributed energy resources (DERs) come online; and customer expectations are increasing every day. How do utility leaders prepare for and embrace these changes? Digital transformation lies at the heart of the answer, but it is really just the first step. Here's why:

Digital capabilities in the utility industry have been expanding over the last 15+ years. The smart grid and smart metering are the two clearest examples of this digitalization movement. Intelligent infrastructure enables many of the capabilities and use cases required for a utility to maintain reliability and to do so in a safe, affordable, sustainable operating model. The examples of this are many: DER management systems (DERMS) to manage the explosive growth of distributed energy resources; innovative customer programs that leverage smart meter data; and asset management programs that enable predictive maintenance practices, to name a few.

A common thread across many of the capabilities and use cases in the utility's digital realm is that the siloing of data, applications, processes, and people that has been endemic to the industry for decades is largely unchanged. It begs the question: "Why isn't there a single platform that can manage all of these core business operations, enabling new capabilities in a scalable, secure, open environment?"

The short answer there is:

National Energy Operation Centre (NEOC) from Greenstar Technologies.

What Is the NEOC, and Why Is It Essential Now?

Greenstar Technologies is the organization making the NEOC and utility digital transformation a reality. Established in 2016, Greenstar launched its digital utility platform in 2019, using cloud, artificial intelligence (AI), and blockchain technologies to provide integrated digital utility services that meet the demands of the digitally capable, climate-aware utility industry. The company has developed and implemented large-scale Internet of Things (IoT) processes enabling digital transformation solutions across various application areas in multiple industries.

The NEOC is unique to the North American utility industry, in that it is the first single-source platform to deliver end-to-end digital capabilities for the utility enterprise, providing opportunities for performance improvements and a more collaborative business strategy.

The NEOC is a big concept that requires utility leaders, practitioners, and utility partners to re-think their digital transformation strategy while still leveraging existing investments in different systems and services across an intelligent, digital infrastructure. Historically, utilities have built digital systems and capabilities that are generally specific to meeting one business need or a set of closely related business needs. An example of this strategy can be seen in a utility's customer information systems (CIS).

As the CIS is the "cash register' for the utility, great care is taken to ensure that the CIS is stable and able to generate bills and manage/provide customer data to support various customer, operational, and regulatory programs and requirements.

What if this customer data were on the same platform as other management and operational systems and their data? That model opens up many new possibilities in which data sets and applications can be managed in one system to enable new capabilities that are increasingly necessary to meet the utility's changing needs. Examples of how a utility can leverage the NEOC approach include dispatching fields crews and notifying customers about maintenance activities and planned outages with a few mouse clicks; managing virtualized substations and their assets from a single "version of the truth" in real to near-real time; or even modeling distribution system requirements as DER growth continues.

All of these examples might be achievable in a typical utility's enterprise today, but they would also be cumbersome and time-consuming even before data quality and integration issues are factored in. Clearly, the single platform approach will be essential to operate the utility of the future.

In considering use cases that can be performed with the NEOC, early research from the team at Greenstar indicates that a core of key AI-driven use cases will provide a fast path-to-value. These are immediately available with the NEOC launch and include:

AI As A Service

Utilize full-service AI without the full investment, enabling better decisions, improved efficiency, and reduced costs.

Asset Digital Twin As A Service

Optimize the full asset life-cycle with detailed, real-time views of asset performance. Identify issues and make necessary changes quickly and efficiently.

Asset Performance Management

Provide real-time data analytics to enable preventive and predictive maintenance processes, reducing downtime and maintenance costs.

Digital Workforce Management Solutions (Digiworx)

Manage staff and project progress, and make necessary changes while continuously updating mobile workforce and customer applications to ensure compliance and satisfaction, all in real time.

End-to-End Renewable Energy Management

Present a complete view of renewable energy assets to improve operational efficiency and optimize asset utilization at scale. Includes management and real-time coordination across microgrids, DERs and grid-scale energy storage, solar PV, and wind energy assets.

Utility Infrastructure Security Services

Monitor and analyze security events across the utility's cyber and physical infrastructure, providing real-time alerts and insights into potential security threats.

Utility Device Cloud Infrastructure Services

Analyze data from utility devices, including smart meters, sensors, and other IoT devices to provide real-time insights into performance and usage patterns.

Energy Conservation Services

Analyze data from energy consumption patterns to provide real-time energy conservation insights and opportunities, giving C & I customers opportunities to optimize energy usage and reduce costs while improving sustainability.

What Is "Under the Hood" of the NEOC?

Greenstar's capabilities include a wide range of edge devices, database and analytics capabilities, enterprise software integrations, and IoT applications hosted on leading cloud computing platforms. Core to the NEOC architecture is Greenstar's SurgeCloud IoT platform (referenced in Figures 3 and 4). Developed with Greenstar subsidiary Bluesurge, SurgeCloud provides vertically directed applications to meet industry and customer requirements, supporting various applications and optimizing operations, reducing service costs, and remotely managing assets in real time.

Ensuring reliability, security, and scalability are cornerstones of the NEOC. To this end, the NEOC features best-in-class security, communications, cloud, and data & analytics services, including:

Secure Private 4G/5G Network and Satellite Communication Networks

Using advanced 4G/5G and satellite communication technologies in the As A Service model, these networks enable seamless communication between various utilities, their assets, and their employees, providing real-time data and facilitating efficient operations even in remote or harsh environments.

Utility Device HyperCloud

Hybrid IT ecosystems that combine traditional cloud, hosting, born-in-the-cloud, and IoT systems from the network edge to the enterprise are all captured with Greenstar Technologies' Utility Device HyperCloud. HyperCloud is a comprehensive platform that provides cloud-based AI and ML solutions for managing and monitoring assets and devices, improving operational efficiency, reducing downtime, and making better-informed decisions.

Cybersecurity Services

Greenstar Technologies provides cybersecurity services designed to protect critical infrastructure against cyberattacks and data breaches. Greenstar Technologies' cybersecurity services include threat assess-ments, penetration testing, and security audits, among others.

Power Infrastructure Security Services

Greenstar Technologies offers power infrastructure security services to protect critical infrastructure assets such as power plants, substations, and transmission lines from physical attacks, sabotage, and theft. These services include risk assessments, vulnerability assessments, and emergency response planning.

Collaborative Data Analytics for Grid Management and Optimization

With the Greenstar Technologies As A Service model, utility companies can access real-time data and analytics, facilitating informed decision-making, enabling collaborative analysis, improving efficiency, and reducing costs.

Subject Matter Specialists

Unique to the Greenstar Technologies model, Subject Matter Specialists address real-time challenges with 24/7 availability. They provide technical support, advice, and guidance across a multitude of functions and use cases, enabling efficient and effective operations.

Given these capabilities and use cases, it is clear that AI is foundational for many of the services delivered by the NEOC. To this end, part of the NEOC is a dedicated lab environment where use cases that leverage AI to serve many of the emerging utility needs are tested and deployed. Examples include meeting sustainability goals; managing large, complex data centers; and using the Greenstar HyperCloud to manage multiple cloud environments in a single enterprise cloud infrastructure.

With such a unique and powerful value proposition, it is fair to ask, "How does this platform work?" Figures 3 and 4 provide high-level views of the NEOC architecture with the functional modules and services architecture displayed.
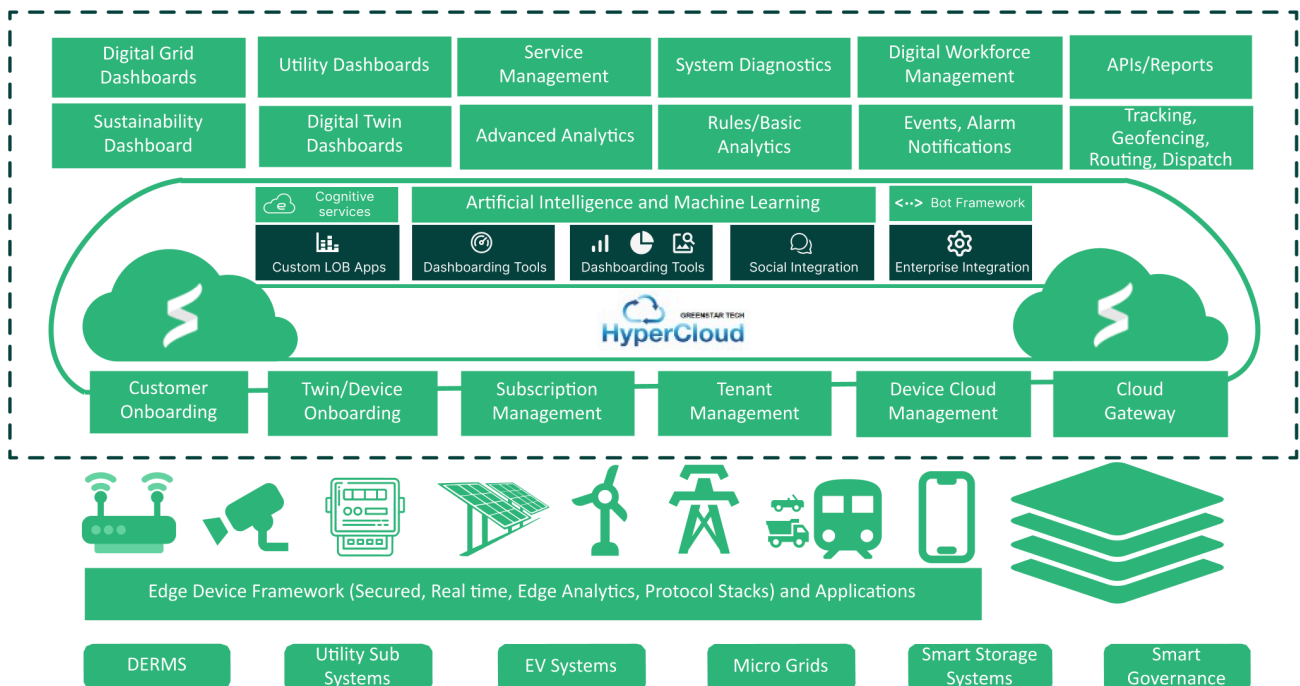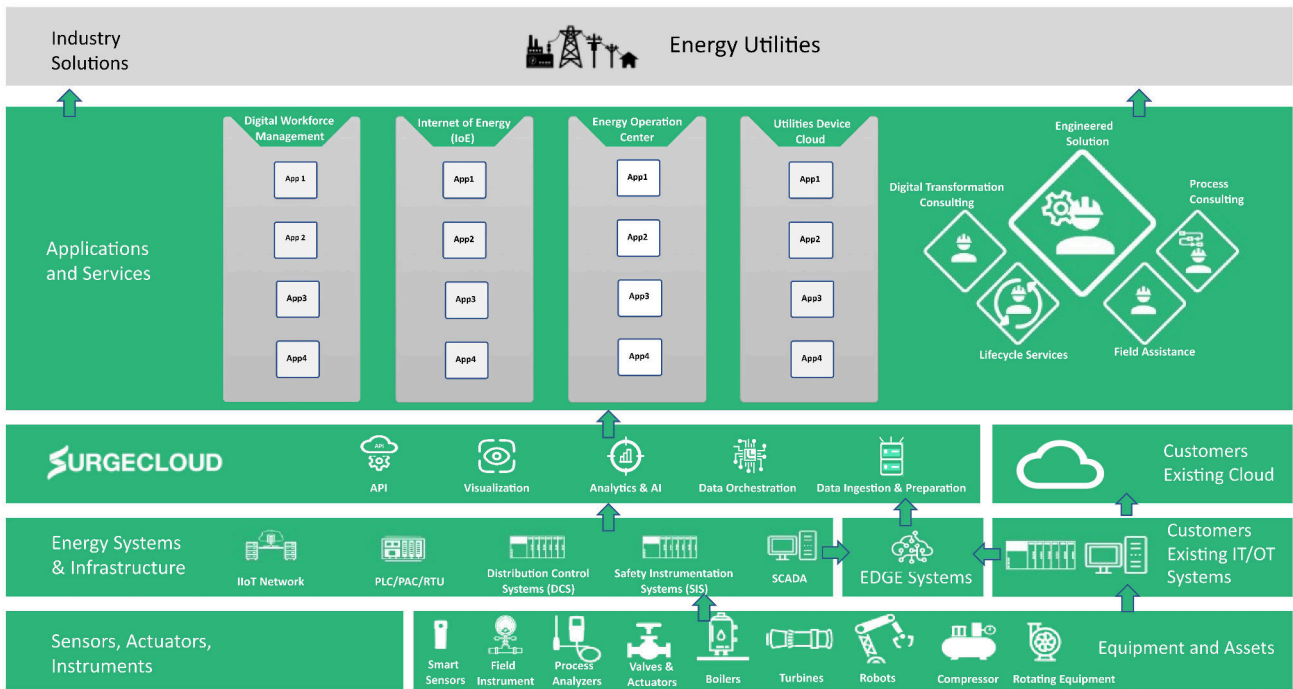

Figure 3. High-level NEOC architecture: Functional Modules (Source: Greenstar Technologies).

Figure 4. High-level NEOC architecture: Services Architecture (Source: Greenstar Technologies).

This architecture demonstrates that Greenstar's SurgeCloud – a centralized cloud platform that enables smart connected solutions for utilities – is core to how the NEOC delivers value. SurgeCloud is an open, secure, scalable, and flexible loT platform that can radically transform the way utilities accomplish their vital tasks and processes.

It leverages intelligence at the grid edge and across distribution systems for more efficient management of energy capacity, the integration of renewables, and enhanced consumer engagement while incorporating our deep understanding of utilities.
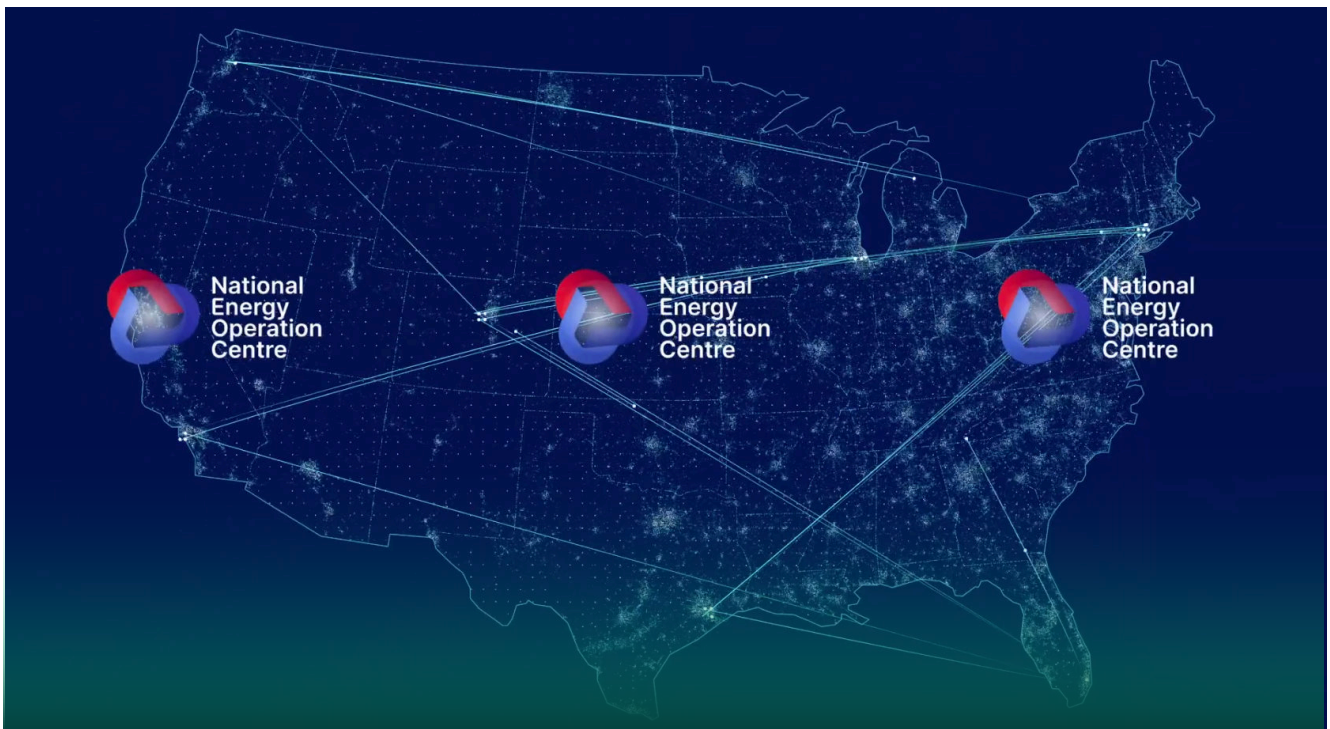
National Energy Operation Centre Infrastructure with triple modular redundancy in mainland USA.

The NEOC Ecosystem and Your Utility

The NEOC is more than simply "a system" or a "solution." The NEOC provides triple-redundancy across three coordinated, integrated operations centers located in the eastern, western, and central US. As noted in Figure 5, the NEOC's digital platform is a utility's connection to the new energy environment. At scale, this means engaging with and enabling new use cases and applications for C & I as well as residential customers, smart cities, and industrial IoT in the NEOC digitalized ecosystem.
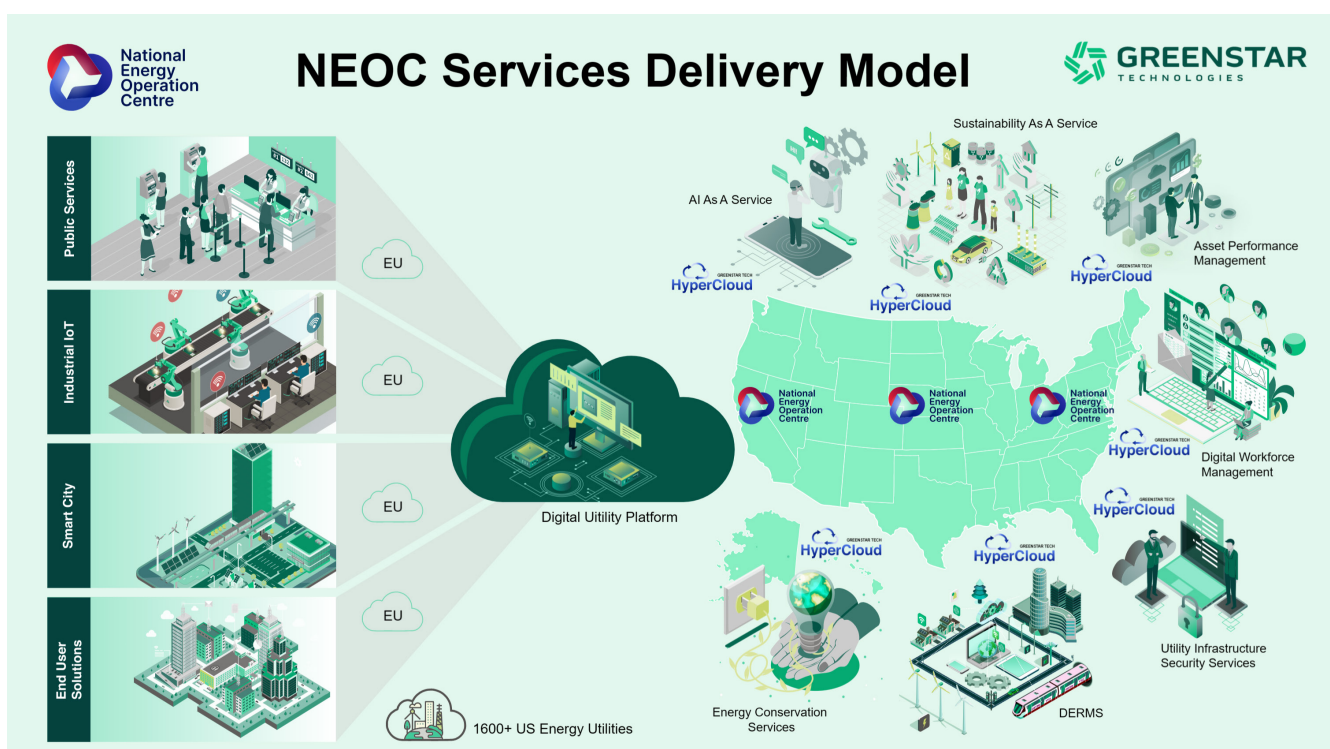

Figure 5. The Greenstar NEOC Services Delivery Model (Source: Greenstar technologies).

One other important feature of the NEOC ecosystem is Greenstar Technologies' commitment to all stakeholders to provide solutions that engage at the utility, state, and federal levels, and even globally. An example is Greenstar Technologies delivery of Sustainability As A Service for electric utilities based on the World Business Council for Sustainable Development (WBCSD) Sustainable Development Goals (SDGs), a universal framework that energy companies can use to build strategies to address the world's most challenging sustainability issues. This service underscores Greenstar's commitment to leveraging AI, cloud, and block-chain technologies not only to improve utility operations and financial performance but also to be a global leader in meeting the climate and environmental challenges confronting the utility and energy industries today and tomorrow. This approach can be a game changer for how energy is managed at a massive scale.

Getting Started

Greenstar will be launching the NEOC in 2025; however, the Platform Services and the AI Lab will commence operations in Q2 of 2024, enabling the development of prototype applications for partner utilities.

Becoming a partner in the Greenstar Technologies NEOC offers numerous benefits, and all utilities are invited to participate. The basic prerequisites for becoming an NEOC partner are to provide existing public data and to collaborate with other utilities to achieve operational optimization and stability in delivering sustainable energy to all customers in the country.

By participating as an NEOC partner, utilities can subscribe to a secure and reliable private communication **network** and cloud infrastructure and a host of digital technology solutions, all offered in the "A s A Service model". As utility leaders navigate the shifting sands of today's new energy environment, Greenstar's NEOC provides the certainty needed to be successful.
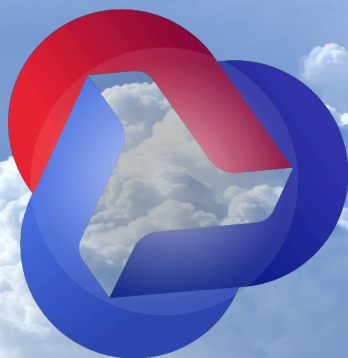
National Energy Operation Centre

To connect with a representative from Greenstar Technologies, go **here**. To learn more about Greenstar Technologies, visit the website **here**, call **640-204-6321**, or email **info@greenstartech.net**.

To access the accompanying White Paper from this series, go **here**.