intertrust®

WHITE PAPER

Toward a distributed energy ecosystem

Bridging fragmented DERs with Intertrust Energy

Building trust for a connected world.

Contents

Introduction

The energy industry is undergoing the greatest transformation since the invention of alternating current. For the past two centuries, electricity has flowed in one direction from generation to consumption. Today, that trend is changing direction with the transition from centralized power plants toward solar, wind, battery, and energy management systems. The future of energy depends on the successful orchestration of these distributed energy resources.

The ongoing digital transformation of the energy industry has not adapted to this new model. As with the traditional approach to power systems, data flows in one direction from device to cloud. This model was locked in by the capital, technological, and statutory requirements to create what are essentially legal and highly regulated monopolies. These conditions have allowed the energy industry to lag behind their contemporaries.

Take for example the fascination with digital power plants and digital twins. The digitization of industrial control systems promised a revolution but delivered little more than sophisticated systems of record. While the adoption of the industrial Internet of Things (IIoT) has introduced cheaper, smaller, and faster devices, the overall operational model has been left largely intact.

Even the most digitally savvy energy companies have constructed what amounts to a series of data silos, each consigned to their respective equipment manufacturer and cloud provider. Custom built for each site, these in-house systems deployed by veteran powerhouses are expensive to develop and slow to roll out.

These incumbents have laid ground for a new crop of nimble and highly disruptive players navigating uncharted waters. Artificial intelligence (AI) is pushing the boundaries of traditional optimization problems to diagnose and act on underperforming assets. Electric vehicle manufacturers and charge point operators are evolving into demand clearing houses to manage grid flexibility on a local and regional scale.

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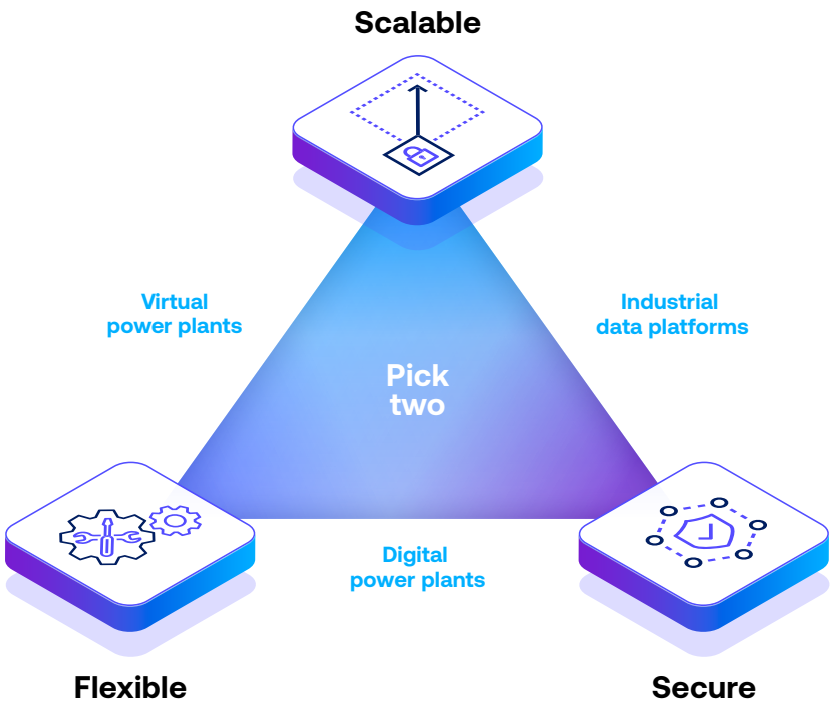
Virtual power plants are integrating deeper into the home, connecting to practically everything but the kitchen sink. Microgrids, demand response, and energy management systems are making inroads as energy-as-a-service (EaaS) providers. All of this is occurring behind the meter, out of sight from critical infrastructure regulators and out of mind for grid operators.

The resulting energy landscape is increasingly disjointed and dysfunctional, with a patchwork of vendor-dictated, vertically integrated technology platforms. The consequence is a tradeoff between security, flexibility, and scale. In the case of virtual power plants, they often have the flexibility to work with many types of assets and the scale to control many devices but do so at the expense of creating an unbounded attack surface for malicious actors. Digital power plants solve the challenge of security with strong perimeter defenses, but do so at the cost of closed, plant-specific deployments. Industrial data platforms can be easily deployed at many sites, but restrict access to data and control of devices.

The situation in the energy sector is rapidly approaching a tipping point. It's possible that just a few software updates transmitted over the air could enable manufacturers to control millions of appliances in ways that imperil traditional grid operations. Similarly, the move towards autonomous operations at energy sites has the potential to significantly alter the economics of power systems, challenging decades of established grid planning and design practices. Perhaps most alarmingly, the convergence of air gapped operational technology with highly interconnected information technology poses a significant risk to critical infrastructure on a scale never seen before.

At the heart of these developments is the crucial need to build trust in the data and devices that bridge old and new technologies. Addressing this challenge is the core mission of Intertrust.



The current state of energy digitalization: flexible, scalable, secure—you can pick only two.

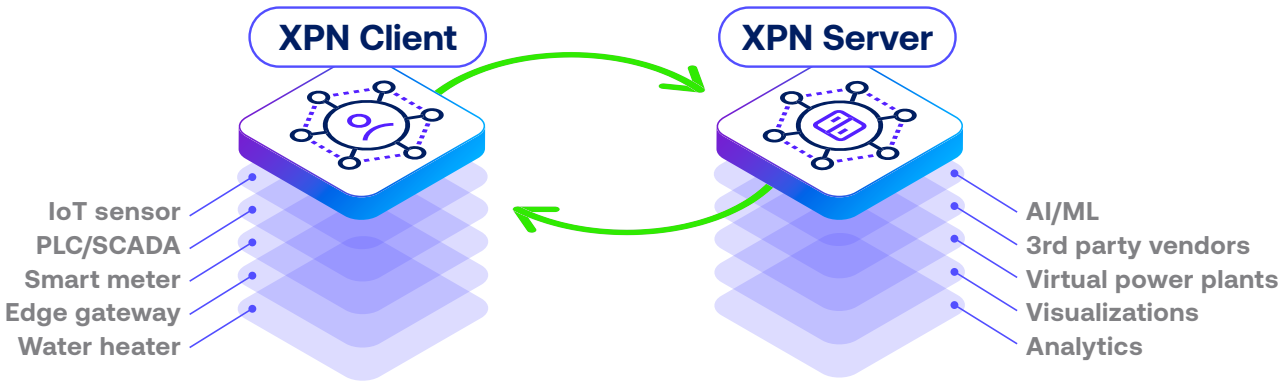
Intertrust Energy

Intertrust enters this space with the singular focus to unify disparate systems in a way that is flexible, scalable, and secure.

Our solution is designed to facilitate seamless integration across a wide range of devices and platforms, enabling energy companies to adapt to the evolving landscape without compromising on security or connectivity.

To achieve this, we put forward a mission critical technology: XPN (Explicit Private Networking). XPN is a secure communications service that persistently protects data from end-to-end—whether it is in transit or at rest. By explicitly authenticating and authorizing devices, applications, and the data itself, XPN can securely bridge across IT and OT environments and tunnel through widely adopted but poorly secured protocols.

XPN provides a complete end-to-end solution for access and control of disparate energy systems. The XPN client ferries data from the edge to the cloud where it can be distributed by the XPN server to internal parties and external partners in a governed fashion. The XPN server relays data to associated applications and can receive commands to push down to devices via the XPN client. This service is designed to stand on its own with a number of APIs for seamless deployment and integration. That way, messages can be configured to land a preferred data sink and commands can be issued in the format of an organization's choice without the risk of vendor lock in.



XPN bridges IT and OT environments to connect, control, and secure disparate energy systems.

Evolution, not revolution

The core technologies behind Intertrust operate to augment, not replace existing systems. XPN does not reinvent the wheel, it relies on the same industry standard encryption methods used in TLS. Nor does XPN require the companies to remove their virtual private networks, firewalls, TLS, or DMZs. While those technologies secure the wires, XPN goes further to secure the data flowing through those wires.

In doing so, older networks can be augmented with a zero trust architecture with minimal overhead and new systems can be built without the overcomplexity. The result is a communication system that can operate with more devices at a greater scale, without compromising on security or cost.

Building on the solid foundation provided by our core technologies, Intertrust is taking a leadership role in fostering broader industry collaboration to promote enhanced interoperability and security. Along with renowned energy players JERA, Origin, E.ON, and GS, Intertrust has founded the Trusted Energy Interoperability Alliance (TEIA).

TEIA aims to create standards and agreed upon formats and protocols for secure and interoperable data communications within the energy system. The first of these standards is a universal trust model to allow any device to authenticate itself to another.

Intertrust is also designed to equip organizations for the emerging developments and upcoming challenges in the industry. Our solutions, rooted in the principles of Zero Trust Architecture, ensure that organizations are not just staying in compliance with existing standards like NERC CIP but prepared for upcoming legislative regulations like the EU Cyber Resilience Act.

Conclusion

Our mission is to unleash the full potential of digital energy. Our technology ensures the flexible, scalable, and secure integration of distributed energy resources into distributed energy ecosystems. Through XPN and VOX, Intertrust Energy ensures the seamless, trusted orchestration of a wide array of energy systems, from traditional grids to the burgeoning network of solar, wind, and battery storage. Along with our work with the Trusted Energy Interoperability Alliance, we are laying the groundwork for a flourishing digital energy economy.

Learn more: intertrust.com
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