Belden

# Energy Use Optimization

Solution Brief

## Improve energy efficiency and reduce energy costs with energy optimization solutions

Leaders in manufacturing and industrial organizations today face a growing set of challenges when it comes to effective energy management. Optimizing power consumption, monitoring equipment usage efficiently and ensuring sustainability in operations are just a few of the hurdles companies must overcome. Accessing timely data, maintaining legacy systems and fostering a culture of innovation add further complexity.

Industrial IoT, edge orchestration, and cloud services are empowering manufacturers to tackle these energy management challenges head-on. Belden and our partners offer targeted solutions that can help manufacturers improve energy management capabilities and drive new levels of efficiency, cost savings and sustainability across their operations.

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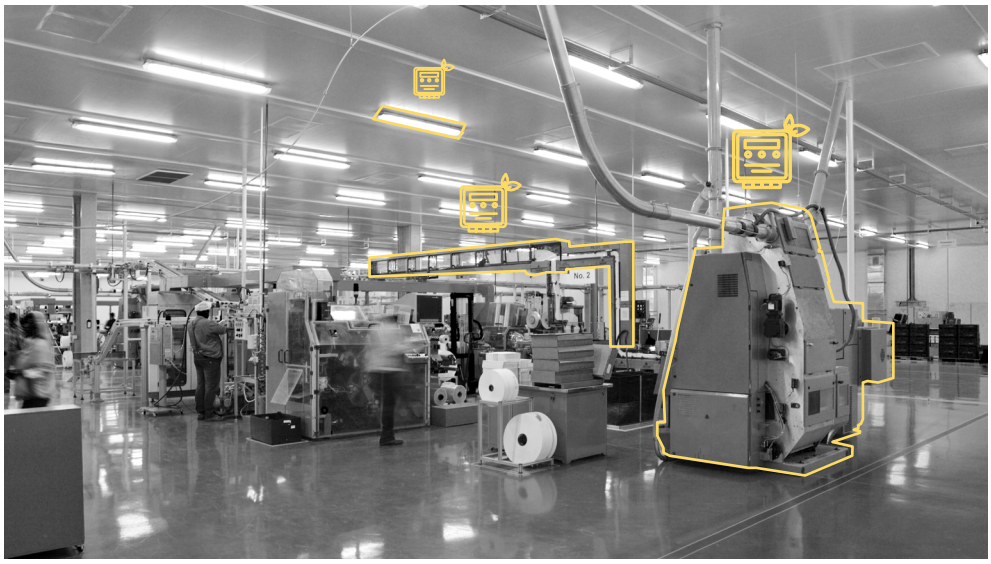

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## Current state and typical challenges

Discrete manufacturers are focused on upgrading existing assets with energy equipment and installing smart meters for energy accounting and monitoring. Typically, energy management capabilities are ad-hoc and project-based in nature, with challenges in the following three areas.

**Monitoring energy consumption**

- Intermittent energy audit studies
- Narrowly focused only on consumption reduction and not energy procurement
- Focus on short-term ROI only

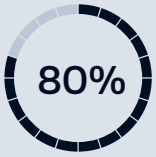
**Optimizing energy use in manufacturing operations**

- Energy planning in silos; energy consumption usually not considered in production planning
- Targets managed at plant or utility level and not process level

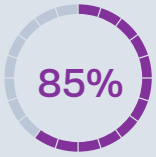
**Integrating with digital systems**

- Energy management through legacy/existing systems limited to energy consumption visibility
- Limited to manual and backward-looking analysis rather than real-time visibility

## Energy management in discrete manufacturing




of discrete manufacturers lack analytical capabilities to derive actionable insights from energy data.




of energy efficiency opportunities in discrete manufacturing remain underexploited due to ad-hoc energy consumption approaches.


of discrete manufacturers say fragmented energy data coming from varied devices hinders their ability in unlocking value from energy use information.


of discrete manufacturers rely on experience-based, rather than data-driven, operations for major energy-consuming equipment.

Source: Accenture Research

## Addressing key priorities

In many manufacturing organizations, optimizing energy use is a shared priority across multiple functional areas. Key leadership stakeholders may include the following:

**CEO**

How do I get anend-to-end real- time view of energy performance across my operations and apply AI for improvements?

**CIO/CSO**

How do I ensure the latest and best possible technology is used for energy management while also ensuring data security?

**EH&S VP**

How can I monitor EH&S data to find optimization opportunities?

**Manufacturing VP**

How can I reduce my energy costs and emissions right now without deploying scarce capex?

## Desired energy management capabilities

### Energy monitoring

Enable real-time monitoring and energy consumption analysis. Provide holistic visibility into equipment and building energy loads, allowing manufacturers to monitor energy usage in real-time.

### Energy optimization

By providing multi site data monitoring for equipment usage, manufacturers can identify underutilized assets and optimize their allocations across sites. This improves overall equipment effectiveness (OEE) and productivity.

### Autonomous energy management

Implement autonomous systems that can adjust energy consumption and production levels based on real-time data. Use data analytics to optimize energy planning and management in various shifts across different facilities, production lines and energy sources.

## Target outcomes

**10-20%**
Energy cost reduction

**15-20%**
Reduction in greenhouse gases

**10-15%**
Improved throughput

Data-driven sustainable energy operations

Source: Accenture Research

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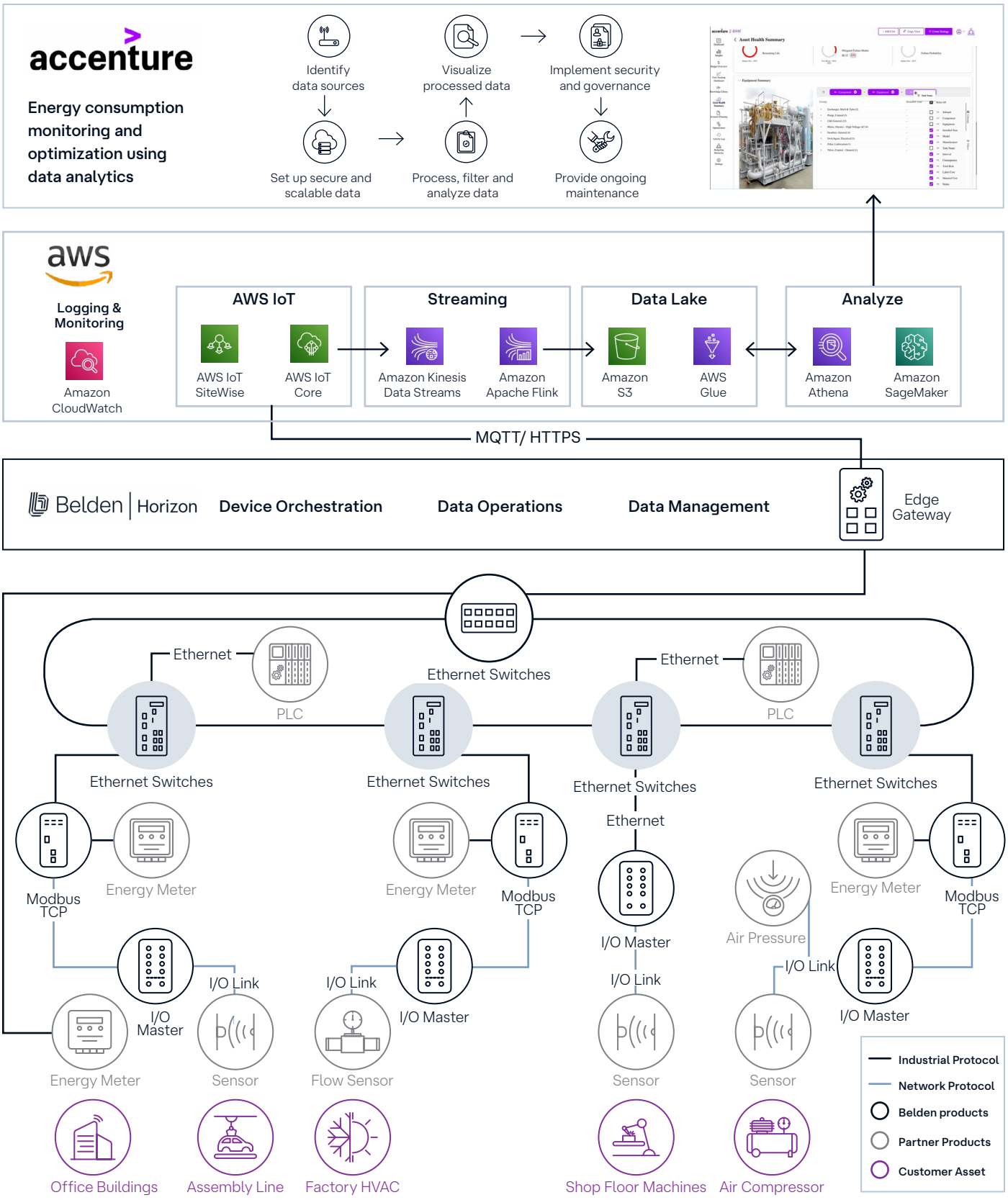
|---|---|---|---|---|
| accenture<br>**Comprehensive energy efficiency solutions: tools, expertise, and capability building.** | **Accelerators for energy efficiency:** Repository of assets for maturity assessment, optimization and forecasting tools. | **Process-led energy-efficiency solutions:** Practitioner team skilled in providing solutions with process efficiency as a key. | **Certified industry professionals:** Team of certified energy efficiency industry practitioners with 10+ years of experience. | **Training and capacity building:** Train site teams on energy efficiency tools and techniques |
| aws<br>**Fully managed, secure IoT platform allowing to millions of devices.** | **Complete industrial IoT solution** through a set of fully managed services that are easy to deploy and manage. | **Collect, store and analyze** device data through specifically designed services, even in noisy, unreliable environments. | **Massively scale** by allowing industrial IoT applications to connect to millions of devices. | **Secure** device fleets at scale with built-in device authentication and authorization to keep IIoT data and devices protected. |
| Belden<br>**Transform industrial operations with seamless, secure connectivity.** | **Offers End-to-end ruggedized edge hardware and, AWS-powere software platform** to improve energy management for manufacturers. | **Plug-and-play:** Secure and resilient network backbones that connect industrial assets in minutes. | **Near real-time insights** with edge computing on industrial gateways. | **Vendor-agnostic:** Convert 300+ industrial protocols to easily consumable formats. |

## Turning data into insights

An energy management solution can help manufacturers achieve new levels of efficiency. The example network diagram below shows how belden hardware and software can be combined with offerings from our partners to transform field-level data into the real-time insights needed to drive optimization.



## Case study: energy monitoring and optimization for a european beverage manufacturer

When a european beverage manufacturer realized inaccessible data was hindering their ability to monitor and manage energy consumption, they came to belden. The experts at belden delivered  a solution that acquired and transmitted data from field devices into a cloud-hosted iiot platform for seamless visibility. With the right data and insights now in hand, the company has achieved a 10% annual reduction in energy consumption.

**Challenges:**

- Energy measurement systems disconnected from IT infrastructure
- No unified data structure or connectivity platform
- Manual reporting process not scalable
- No mechanism for reducing operational costs through energy management
- Wide variety of production assets

**Solution:**

- Belden's plug-and-play solution connects smart meters and sensors to the cloud within minutes, enabling rapid deployment
- Data is sent directly to the cloud via dedicated connectors for easy consumption
- Pre-installed meters and sensors allow quick provisioning, reducing setup time
- Remote updates and configurations enhance asset security.
- Central device management enables remote updates and future scalability

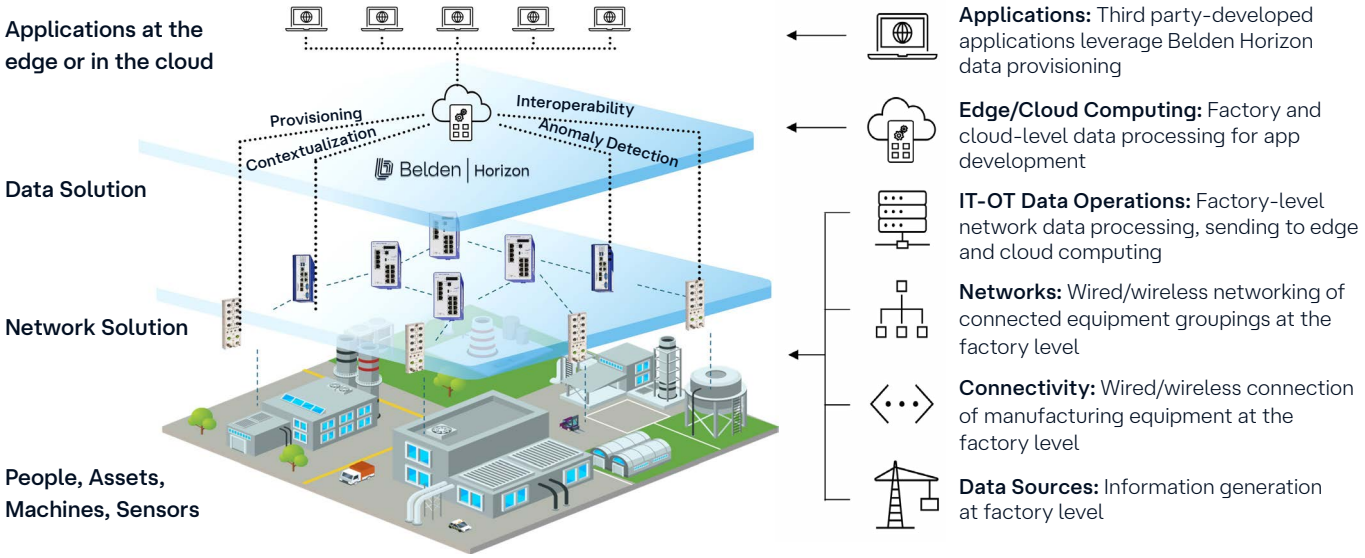
**10% Energy Consumption Savings**

**Results:**

- Connected 130+ devices to a cloud-hosted IIOT solution in 4 weeks
- Real-time energy consumption overview and optimization by connecting all smart meters; automated reporting
- Met strict company requirements with native security features like end-to-end encryption and remote firmware updates, ensuring stakeholder confidence for scaling

## The future of data convergence

Belden Horizon is a scalable, vendor-adaptable digital platform that encompasses our products and software, unifying data from disparate sources to deliver clean, analytics-ready information.




Belden engaged a variety of Cloud Service Provider and system integrator partners for joint sales and delivery of these use cases. Partners mentioned in this document are for indicative purposes only.

| Network and data foundation | Cloud infrastructure for data storage and processing | End user application and services |
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**Belden's network and data solution** connects various energy monitoring and consuming assets to energy management applications.

**Step 1: Build a resilient network to gather energy data using a combination of I/O systems, cordsets and managed switches.**

**BOBCAT:** Managed switch for compact IIoT networking with advanced security, high port count and real-time communication.

**I/O systems** portfolio offers intelligent and reliable data transmission solutions from passive distribution boxes, fieldbus and modular I/O systems to high-performance modules.

Broad range of single-ended and double-ended **cordsets** for faster, easier installation and maintenance, delivering optimum signal protection.

**Step 2: Activate edge computing to convert, contextualize and analyze data and run custom apps.**

**OpEdge-8D:** DIN-rail-mount edge gateway device for processing large volumes of operational data generated in industrial environments on the edge infrastructure.

**Step 3: Enable data interoperability to convert, contextualize and provision analytics-ready data to the cloud or other data destinations.**

Belden | Horizon **Belden Horizon:** Industrial remote connectivity and edge orchestration software platform enabling connection to OT assets and deploying AI models.

**ProSoft Gateways:** Enable dissimilar automation control equipment to share information and transfer control data through wired and wireless connectivity.

**CloudRail.Box Max:** Plug-and-play industrial edge gateway supporting connectivity methods like Secondary Sensors, OPC-UA, Modbus, and VSE.

**Amazon IoT Core** managed cloud platform that enables secure device connectivity and data processing at scale.

**AWS IoT SiteWise** simplifies industrial data collection, organization, and analysis at scale.

**Amazon Kinesis Data Streams** processes high-velocity IoT data for real-time analysis and insights.

**Amazon Managed Service for Apache Flink** dataflow engine for real-time data stream processing on high-through put data sources with low latency.

**Amazon S3** enables storage of high- velocity IoT data, like sensor data from IIoT devices, for real-time data processing and analysis.

**Amazon Glue** is a serverless data integration service that simplifies data discovery, preparation, and transformation for analytics.

**Amazon SageMaker** is a fully managed ML service enabling custom model to develop, train and deploy for IIoT analytics.

**Amazon Athena** offers a serverless, interactive query service for easy data analysis, providing fast performance and flexible pricing models.

**Amazon CloudWatch** provides real-time visibility into system performance, operational health, and resource utilization.

**Amazon Managed Grafana** is a fully managed service based on open-source Grafana that makes it easier for you to visualize and analyze your operational data at scale.

**Key Deliverables:**

**Identify data sources** sensors, systems, services to be integrated for energy monitoring.

**Set up secure & scalable data** ingestion and storage for the identified sources in real-time.

**Process, filter and analyze data** to leverage Data Analytics for extracting meaningful insights and patterns.

**Visualize processed data** on dashboard, report & recommend insights enabling stakeholders to make data-driven decisions.

**Implement security and governance** adhering to security best practices & regulatory requirements.

**Provide ongoing maintenance,** monitoring, and support to ensure the IIoT solution continues to operate effectively.

**Sustainability Maturity Assessment** helps assess client's current maturity in Energy Management with people, process and technology lenses and identifies key improvement opportunities.

**Accenture and AWS partnership:** With more than **26,000 certified AWS professionals and 45+ AWS-awarded qualifications,** Accenture provides highly differentiated joint and aligned execution with AWS.

Accenture has **30+ AWS-awarded competencies** and service delivery designations and competencies relevant to Energy optimization, include Data & Analytics, Manufacturing & Industrial Services and IoT competency.

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Solution Brief

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Click here to learn more about how to reduce your energy consumption and achieve your sustainability goals.

# About Belden

Belden Inc. delivers the infrastructure that makes the digital journey simpler, smarter and secure. We're moving beyond connectivity, from what we make to what we make possible through a performance-driven portfolio, forward-thinking expertise and purpose-built solutions. With a legacy of quality and reliability spanning 120-plus years, we have a strong foundation to continue building the future. We are headquartered in St. Louis and have manufacturing capabilities in North America, Europe, Asia, and Africa.

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