End Customer Vertical: Renewable Energy

Luis Aigner

4 July, 2025

Table of Contents

1 01 - Overview

1.1 Why Renewable Energy

The renewable energy sector addresses one of the most urgent needs of our time: the transition to clean, sustainable power to combat global warming and environmental degradation. Climate change, rising global temperatures, and increasing natural disasters are clear indicators that society must accelerate the shift away from fossil fuels. Supporting renewable energy is not only a technological challenge it is a societal responsibility.

A pressing social need	Sustained market growth	Strong political and regulatory support	Increasing cybersecurity requirements	Growing cybercrime risks	Long-term importance and resilience
• Climate change and environmental challenges require a decisive shift to clean, renewable energy. Supporting this transition is vital for a sustainable future. • Since renewable energy is widely viewed positively by the public, Endian's communication reflects this with a consistently positive undertone.	• The demand for energy continues to rise—driven by growing populations, digitization, and electrification. • The energy sector cannot afford to scale down. It must scale smartly and sustainably	The European Union's goal of 90% renewable energy by 2045 is driving innovation and infrastructure development. This clear policy direction creates a stable environment for long-term investment.	Regulations like NIS2 and IEC 62443 are raising the bar for security across the sector. Meeting these standards is essential for all energy providers.	As critical infrastructure, renewable energy systems face more frequent cyber threats. Protecting these assets is key to ensuring safety and operational continuity.	• Energy demand will continue to grow, making renewable energy a future-proof sector that remains central to economic and environmental strategies worldwide. • The global capacity for renewable energy production is increasing faster than at any point in the last three decades. According to the latest report by the IEA, this growth presents a realistic opportunity to triple global renewable capacity by 2030.

1.2 Renewable Energy Vertical Overview

The renewable energy sector is essential for building a sustainable and resilient energy future. It includes a diverse range of technologies that harness natural resources to generate clean power, reduce emissions, and support global climate goals.

Solar	Converts sunlight into electricity using photovoltaic panels or solar thermal systems, widely used for both residential and large-scale power generation.	Addition of renewable capacity by technology according to the main scenario and the scenario with high addition 2005-2028. ©Image: IEA. Licence: CC BY 4.0 https://suisse-eole.ch/de/news/iea-2023-wurden-weltweit-507-gw-leistung-fuer-erneuerbare-stromproduktion-zugebaut-50-mehr-als-im-vorjahr/
Wind	Utilizes wind turbines to produce electricity, suitable for onshore and offshore installations with increasing adoption worldwide.	
Hydro power	Generates energy from flowing or falling water, providing a reliable and flexible source of renewable electricity.	
Bioen ergy	Produces energy from organic materials such as plant biomass, agricultural waste, or biogas, supporting circular economy principles.	
Geoth ermal	Harnesses heat from the earth's interior to generate electricity or provide heating, offering a stable and continuous energy source.	
Conce ntrate d Solar Power (CSP)	Uses mirrors or lenses to concentrate sunlight to produce heat, which then drives a steam turbine to generate electricity, ideal for large-scale solar plants.	
Ocean Energ y	Exploits tidal, wave, or thermal energy from the oceans to create renewable electricity, an emerging and promising field.	
...		

Endian is focusing on the **Solar**, **Wind**, **Hydropower**, and **Bioenergy** subverticals within renewable energy due to their strategic importance and unique characteristics.

- Solar energy is one of the **fastest-growing** renewable sources worldwide, driven by rapid adoption across residential and commercial sectors.

- Wind energy, especially offshore, is often located in **challenging environments** where access is difficult and costly—making secure remote access solutions essential to save time and reduce operational expenses.
- Hydropower and Bioenergy may see slower growth compared to other renewables, they present significant opportunities for **retrofitting and modernizing existing** (brownfield) facilities, enhancing efficiency and security in critical infrastructure.

1.3 Renewable Energy Components Manufacturer

We need to research which components are used in renewable energy facilities, and which would be of interest to us. It is important to note that we already have customers who bulid energy components. For example, **Tesvolt** builds storage batteries and **Caterpillar Energy Solutions** builds gas generators that are also used in Bioenergy plants.

1.4 Relevance of Renewable Energy to Endian's Portfolio

The renewable energy vertical aligns closely with Endian's portfolio, which focuses on delivering **simple, reliable, and integrated cybersecurity solutions** for complex IT and OT environments. Endian's **Secure Digital Platform** is designed to address the unique challenges of distributed and digitalized infrastructures by providing comprehensive network segmentation, secure remote access, and continuous threat protection. This platform ensures resilient and manageable security tailored to the evolving needs of renewable energy systems.

Additionally, Endian's commitment to **responsibility, sustainability, and innovation** resonates deeply with the renewable energy sector's goals, making this vertical a strategic focus where Endian's technologies deliver lasting value and protection.

2 02 - Needs

The renewable energy sector has become a prime target not only for financially motivated cybercriminals, but increasingly for **state-sponsored cyber operations**—including actors from **Russia, China, Iran, and North Korea**. These operations aim to **destabilize critical infrastructure** and enable **industrial espionage**. As renewable energy forms the backbone of future energy supply, protecting it is essential for national resilience and public safety.

Operators must address both **technical vulnerabilities** and **regulatory obligations** to secure their infrastructure and ensure compliance.

1. Key Cybersecurity Risks and Threat Vectors	2. Applicable Regulations and Standards	3. Specific Technical and Organizational Cybersecurity Requirements

• **State-Sponsored Threats** Renewable energy infrastructure is increasingly targeted by state-supported cyber operations—particularly from Russia, China, Iran, and North Korea—aimed at destabilizing critical infrastructure and conducting industrial espionage.
 	
• **Remote Access Vulnerabilities** Solar parks, wind farms (especially offshore), and hydropower facilities rely heavily on remote access for maintenance and monitoring. These connections, if not properly secured, represent major attack surfaces.
 	
• **Legacy Systems and Brownfield Upgrades** Older hydropower and bioenergy plants often operate with legacy systems that were not designed with cybersecurity in mind. Modernizing these brownfield environments requires special care to avoid exposing vulnerabilities during integration or upgrade phases.
 	
• **Lateral Movement Between IT and OT** Poorly segmented networks allow attackers to move laterally between IT systems and critical OT components, potentially disrupting operations or manipulating control logic.
 	
• **Outdated or Unpatched Systems** Long equipment lifecycles and limited update mechanisms can leave critical components exposed to known exploits if patching is delayed or impossible.
 	
• **Supply Chain Vulnerabilities** Dependence on external vendors and third-party services increases exposure to indirect threats, such as compromised firmware, insecure update channels, or insider risks.
	• **NIS2 Directive (EU)** Strengthens cybersecurity and incident response obligations for energy operators in Europe. Introduces mandatory risk management, accountability, and network security measures.
	
	• **IEC 62443** Internationally recognized standard for securing industrial automation and control systems (IACS). Defines best practices for network segmentation, secure development, and access control in OT environments.
	
	• **GDPR (EU)** Ensures protection of personal data—relevant for workforce, user, or customer data processed within energy systems or smart grid interfaces.
	
	• **ISO/IEC 27001** Provides a framework for implementing a robust Information Security Management System (ISMS), often required for certification and audits.
	
	• **German BNetzA Requirements** National-level regulation governing critical infrastructure protection, including cyber requirements under the IT-Sicherheitsgesetz 2.0.
	
	• **NERC CIP (North America)** Applies to operators in the U.S. and Canada, covering mandatory controls for the protection of bulk electric systems against cyber threats.
		• **Technical Requirements**
		  • Zero-trust architecture and network segmentation between IT and OT
		  • Encrypted remote access with VPN, MFA, and role-based control
		  • Threat detection, anomaly monitoring, and secure logging
		  • Edge gateway hardening, firmware integrity, and update management
		  • Secure communication protocols and device authentication
		  • Compatibility with containerized or legacy OT applications
		
		• **Organizational Requirements**

1. Key Cybersecurity Risks and Threat Vectors	2. Applicable Regulations and Standards	3. Specific Technical and Organizational Cybersecurity Requirements
• **Physical Access Risks** Isolated or unmanned sites may lack sufficient physical protections, opening the door for unauthorized access via USB drives, laptops, or network ports.	• **Renewable Energy Directive (EU)** *(contextual reference)* Drives the expansion of renewable infrastructure, which in turn increases digital exposure and the need for comprehensive cybersecurity strategies. https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules_en	• Defined cyber risk ownership and incident response protocols • Documentation for audit and regulatory compliance • Staff training and contractor onboarding with security practices • Data governance and privacy policies (esp. for GDPR) • Centralized visibility, monitoring, and policy enforcement

The renewable energy sector faces a dual challenge: protecting itself from highly sophisticated, often state-sponsored attacks and aligning with increasingly strict regulatory frameworks. Operators must implement both robust technical protections and clear organizational processes. A comprehensive platform approach is key to meeting these evolving requirements—securely, efficiently, and at scale.
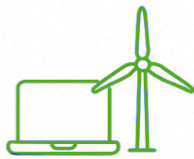
3 03 - Benefits

As renewable energy infrastructures grow in scale and complexity, so do the cybersecurity risks and operational challenges. Endian's Secure Digital Platform is designed to meet the specific needs of this critical sector—offering reliable protection, simplified operations, and long-term adaptability. The following points highlight how the platform supports the renewable energy industry and sets itself apart from other solutions.

3.1 Unique Selling Points of Endian's Secure Digital Platform for Renewable Energy

1. Key Product Features Aligned with Vertical Requirements	2. Advantages Over Competitors in Cybersecurity and Compliance	3. Operational Resilience and Long-Term Value
• **Secure Remote Access** Technicians can maintain and monitor remote solar farms, wind parks, and hydropower plants without needing to travel onsite. This is especially valuable for offshore and hard-to-reach locations, helping reduce costs and response times. • **Network Segmentation for OT Environments** The platform enables clear separation of critical systems into isolated zones, helping prevent cyber threats from spreading across the infrastructure. • **Integrated Cybersecurity Functions** Essential security functions such as firewall, VPN, intrusion prevention, and content filtering are built into a single, manageable solution. This reduces complexity and ensures consistent protection. • **Centralized Management and Monitoring** Operators benefit from full visibility and control of all connected assets across multiple sites, improving oversight and simplifying operations.	• **Security-by-Design Architecture** Endian's Linux-based operating system is hardened and built with security at its core. This ensures a reliable foundation for critical energy systems. • **Compliance with NIS2 and IEC 62443** The platform is designed to meet key regulatory frameworks and includes features that simplify policy implementation and audit readiness. • **Bridging IT and OT Cybersecurity** Endian provides a platform that secures both OT (operational technology) and traditional IT environments. This avoids gaps that can occur when using separate tools for each domain. • **Centralized Management and Monitoring** Unlike fragmented solutions, Endian offers a unified interface to monitor and manage all connected gateways and networks across locations. This simplifies operations, enhances scalability, and improves visibility across distributed assets. • **No Backdoors and Full Data Ownership** Endian's products are configured so that customers retain full control over their data. There is no vendor access or hidden entry point into the system, which is critical for trust and compliance. • **Pricing advantage?** do we want also to add that (if its true) endian costs less then the competitors?	• **Reduced Downtime and Operational Costs** Secure remote access and centralized control help operators respond quickly to issues, minimizing downtime and reducing the need for costly on-site interventions. • **Scalable and Flexible Architecture** Whether managing a single site or a distributed energy network, the platform scales easily to meet evolving operational demands. • **Future-Proof Solution** The platform is modular and adaptable, ready to support both current needs and future developments in the renewable energy sector.

1. Key Product Features Aligned with Vertical Requirements	2. Advantages Over Competitors in Cybersecurity and Compliance	3. Operational Resilience and Long-Term Value
• **Edge Computing and Container Support** The platform supports local data processing and third-party applications directly on the gateway. This allows for real-time analysis, predictive maintenance, or integration of proprietary control logic at the edge.		

Typical Scenarios Where the Secure Digital Platform Adds Value

Secure Remote Access to Remote Sites	Cybersecuritig Hardening for Legacy Infrastructure	Centralized Monitoring and Compliance Reporting	Secure Data Collection and Transfer to Cloud or SCADA
Role-Based Access Control Across Complex Organizations	Fast Rollout and Scalability Across Multi-Site Operations	Fast Rollout and Scalability Across Multi-Site Operations	Protection Against State-Sponsored Cyber Threats

3.2 Trends of the Market

• **Growing Adoption of Hybrid Renewable Energy Systems**
Hybrid energy systems combining solar, wind, and battery storage are becoming more popular as they improve efficiency and reliability. These systems ensure a steady power supply by balancing energy generation from different sources.

- **Increasing Use of Artificial Intelligence in Energy Management**
  AI is playing a crucial role in optimizing renewable energy operations. AI-powered systems analyze weather patterns, energy demand, and equipment performance to improve efficiency. Smart grids use AI to balance supply and demand, reducing energy wastage and enhancing grid stability.

- **Expansion of Floating Solar Power Installations**
  Floating solar power plants are gaining traction as an innovative solution to land constraints. These systems are installed on reservoirs, lakes, and other water bodies, reducing the need for large land areas. Floating solar panels benefit from natural cooling effects, improving efficiency compared to land-based installations.

Source: https://market.us/report/renewable-energy-market/

4 04 - Use Cases

The renewable energy sector is diverse—ranging from large-scale solar farms to offshore wind parks and legacy hydropower facilities. Each subvertical comes with specific operational, geographic, and technological challenges. At the same time, key components like inverters, battery storage systems, and gas generators require protection as they form the backbone of energy generation and distribution.

4.1 Use Cases in Renewable Energy Subverticals

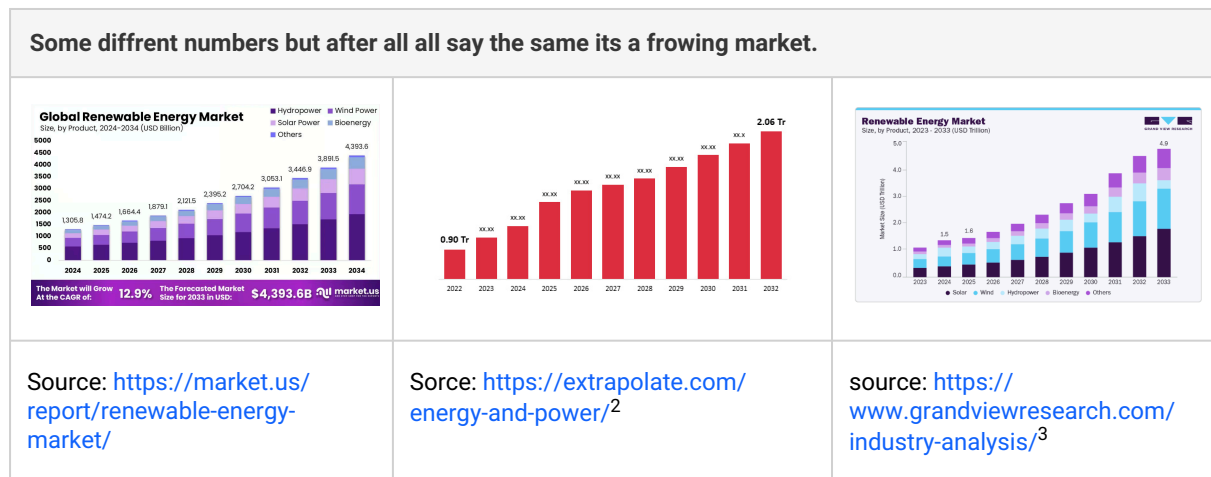| Subvertical	Description	Need	Endian Customer
Solar Energy	Solar farms often operate in widely distributed, unmanned locations. Secure remote access, real-time monitoring, and network segmentation of inverters, data loggers, and control systems prevent cyber tampering or data theft.	Remote management, SCADA protection, NIS2 and IEC 62443 compliance.	N/A
Wind Energy	Wind parks—especially offshore—are expensive to access physically. Enabling secure remote maintenance and monitoring significantly reduces cost and downtime, while protecting turbine control systems from attacks.	Operational cost reduction, remote maintenance, threat prevention.	??? Maybe Bachman advice as compononent: https://test.kreatif.it/endian_redaxo/media/endian_atvise-bachmann_casestudy_en.pdf
Hydropower	Many hydropower plants run on aging infrastructure. Adding secure access control, network segmentation, and detection mechanisms ensures safe operation without replacing core systems.	Brownfield security retrofits, legacy OT protection, compliance.	N/A
Bioenergy	Bioenergy plants often integrate various equipment from multiple vendors. Segmenting networks, managing user permissions, and protecting control systems (e.g., gas generators) ensures stability and safety.	Partner access control, system availability, secure data handling.	BTS https://bts-biogas.com/en/ (are they still clients from endian?)
...	...	...	...

4.2 Use Cases in Components

Components	Description	Need	Endian Customer
Battery Storage Systems	Battery storage is critical for balancing intermittent renewable generation. Secure remote diagnostics and encrypted software/firmware updates help prevent manipulation or malfunction of energy buffers.	Supply chain security, secure firmware deployment, zero-trust access.	Tesvolt https://www.tesvolt.com/[1]
Gas Generators	Used for converting biogas into electricity, gas generators must be protected from unauthorized access to avoid safety risks or downtime. Remote diagnostics and real-time monitoring help ensure operational integrity.	Safety, equipment health monitoring, cyber-physical threat mitigation.	Cat Energy Solutions https://caterpillar-energy-solutions.de/
Inverters	Inverters are essential for converting and stabilizing energy outputs. They are often internet-connected and require strong protection to avoid manipulation or failure. Role-based access, secure firmware updates, and anomaly detection help secure their operation.	Device integrity, attack surface reduction, lifecycle security.	N/A

---

1 https://www.tesvolt.com/de/

5 5 - Market Size & KPIs

5.1 Global Market

The Global **Renewable Energy Market** is expected to be worth around **USD 4,393.6 Billion** by 2034, up from **USD 1305.8 Billion** in 2024, and grow at a **CAGR of 12.9%** from 2025 to 2034. **Asia-Pacific** dominated Renewable Energy Market with **45.2%, USD 591.5 Bn**.

Some diffrent numbers but after all all say the same its a frowing market.		
Source: https://market.us/report/renewable-energy-market/	Sorce: https://extrapolate.com/energy-and-power/[2]	source: https://www.grandviewresearch.com/industry-analysis/[3]

5.1.1 Regional Analysis

In 2024, the Asia-Pacific region held 45.2% of the Renewable Energy Market, valued at USD 591.5 billion.

- **Asia-Pacific** leading the industry, accounting for **45.2%** of the total market share and valued at **USD 591.5 billion**. The region's dominance is fueled by rapid industrialization, strong government initiatives, and substantial investments in solar, wind, and hydropower projects, particularly in China and India.

- **North America** follows as a key market, driven by the United States and Canada, where increasing federal and state-level incentives, along with ambitious carbon neutrality goals, propel the adoption of renewable energy sources. The region is witnessing accelerated growth in offshore wind and solar photovoltaic (PV) installations, with the U.S. alone accounting for over 23% of global wind energy capacity.

- **Europe** remains a major contributor, backed by stringent sustainability policies, carbon pricing mechanisms, and the EU's Green Deal aiming for a 55% emissions reduction by 2030. Countries such as Germany, the UK, and France are aggressively expanding offshore wind and hydrogen projects.

---

[2] https://extrapolate.com/energy-and-power/renewable-energy-market/87379#:~:text=Description-,Market%20Perspective,%2C%20Spain%2C%20and%20other%20countries

[3] https://www.grandviewresearch.com/industry-analysis/renewable-energy-market#:~:text=The%20global%20renewable%20energy%20market,17.2%25%20from%202024%20to%202030

- **The Middle East & Africa** (MEA) is emerging as a lucrative market, leveraging abundant solar potential, with the UAE and Saudi Arabia leading large-scale solar initiatives. Lastly, Latin America sees growing adoption, particularly in Brazil and Chile, where favorable climatic conditions and government incentives are driving solar and wind energy capacity expansion.

5.2 European Market

As a European company, we will naturally focus on the European market. Given our current market presence, the DACH region and Italy are particularly noteworthy.

The European renewable energy market is projected to be worth around **$1.60 trillion in 2025**, with a projected growth rate of **14.9% CAGR** between 2025 and 2033, reaching an estimated **$4.86 trillion by 2033. (spurce**

Renewable energy sources represented 24.5% of the European Union's final energy use in 2023. The share is estimated to have increased by one percentage point since 2022, still largely driven by strong growth in renewable electricity supply. The share is also amplified by a small 2023 reduction in non-renewable energy consumption. Meeting the new minimum EU target of 42.5% for 2030 will demand doubling the rates of renewables deployment seen over the past decade and a deeper transformation of the European energy system.
Source: https://www.eea.europa.eu/en/analysis/indicators/share-of-energy-consumption-from#:~:text=Renewable%20energy%20sources%20represented%2024.5,of%20the%20European%20energy%20system.

5.2.1 Renewable Energy Market Size & Outlook, 2023-2030

Revenue, 2023 (US$B)	Forecast, 2030 (US$B)	CAGR, 2024 - 2030	Source	Wind Farms	Number of Solar farms	Hydropower	Bioenergy

Europe	$306.9	$939.8	17.3%	Source: https://www.grandviewresearch.com/horizon/outlook/renewable-energy-market/europe#:~:text=The%20renewable%20energy%20market%20in,market%20from%202024%20to%202030.	**27.475** individual wind farm Source: https://www.globenewswire.com/news-release/[4]	**161.000** individual solar farms Source: https://www.solarpowereurope.org/press-releases/[5]	**21.300** plants Source: https://www.wwf.eu/what_we_do/water/hydropower/	**19.000** plants Source: https://www.fortunebusinessinsights.com/[6]
Italy	$19.8	$52.0	14.8%	Source: https://www.grandviewresearch.com/horizon/outlook/renewable-energy-market/italy	**827** individual wind farm Source: https://www.epicos.com/article/[7]	????	**4.300** plants Source: https://www.webuildvalue.com/[8]	**1.500** plants Source: https://cordis.europa.eu/article/[9]

---

4 https://www.globenewswire.com/news-release/2025/02/13/3026075/0/en/Europe-Wind-Farms-Database-2025-27-475-Entries-Representing-240-1-GW-Onshore-and-526-1-GW-Offshore.html?utm_source=chatgpt.com
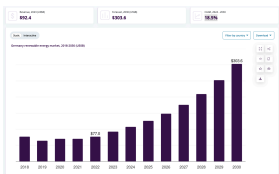
5 https://www.solarpowereurope.org/press-releases/new-report-eu-solar-reaches-record-heights-of-56-gw-in-2023-but-warns-of-clouds-on-the-horizon?utm_source=chatgpt.com
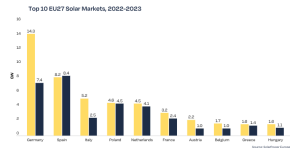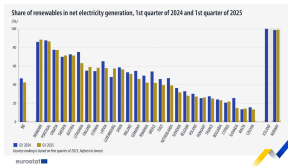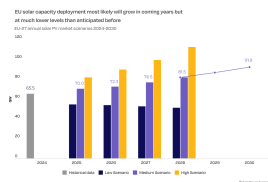
6 https://www.fortunebusinessinsights.com/de/markt-f-r-biogasanlagen-104667

7 https://www.epicos.com/article/935752/italy-wind-farms-database-2025-explore-827-wind-farm-entries-1287-gw-onshore-8322-gw?utm_source=chatgpt.com

8 https://www.webuildvalue.com/en/infrastructure-news/hydroelectric-plants-in-italy.html#:~:text=Hydroelectric%20Power%20in%20Italy,brought%20about%20by%20climate%20change

9 https://cordis.europa.eu/article/id/240837-biogas-in-italy-from-a-marginal-option-to-a-mainstream-energy-source/de#:~:text=In%20Italien%20sind%20mehr%20als,f%C3%BCr%20Biogas%20durchaus%20vielversprechend%20sind

Germany	$92.4	$303.6	18.5%	Source: https://www.grandviewresearch.com/horizon/outlook/renewable-energy-market/germany	**12.250** individual wind farm Source: chat GTP :-/	**14.000** individual Solar plant Source: https://listflix.de/produzierendes-gewerbe/energieversorger/solaranlagenbetreiber/	**7.200** plants Source: https://www.premel.ch[10]	**9.500** plants Source: h[11]https://www.bmel.de/DE/[12]/.

Top 10 EU27 Solar Markets, 2022-2023	**Share of ernergy from renewable sources in 2023**	**Share of renewables in net electricity**	**EU solar capacity deployment most likely will grow**
Source: https://www.solarpowereurope.org/[13]	source: https://energy.ec.europa.eu/topics/[14]	source: https://ec.europa.eu/eurostat/web/products-eurostat-news/[15]	source: https://www.solarpowereurope.org/[16]

---

10 https://www.premel.ch/IT/Hydroelectric-Power-In-Germany-Status-and-Overview-for-2023-6760e200#:~:text=Hydropower%20in%20Germany%20%2D%20Current%20Status%20Most,over%207%2C000%20hydropower%20plants%20in%20Germany%20today

11 https://www.bmel.de/DE/themen/landwirtschaft/bioeokonomie-nachwachsende-rohstoffe/bioenergie-nutzen-bedeutung.html#:~:text=Denn%20die%20deutsche%20Landwirtschaft%20ist,Megawatt%20(MW)%20in%20Betrieb

12 https://www.bmel.de/DE/themen/landwirtschaft/bioeokonomie-nachwachsende-rohstoffe/bioenergie-nutzen-bedeutung.html#:~:text=Denn%20die%20deutsche%20Landwirtschaft%20ist,Megawatt%20(MW)%20in%20Betrieb

13 https://www.solarpowereurope.org/insights/outlooks/eu-market-outlook-for-solar-power-2023-2027/detail

14 https://energy.ec.europa.eu/topics/renewable-energy/solar-energy_en

15 https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250619-2#:~:text=In%20the%20first%20quarter%20of%202025%2C%2042.5%25,4.3%20percentage%20points%20(pp)%20decrease%20(from%2046.8%25)

16 https://www.solarpowereurope.org/insights/outlooks/eu-market-outlook-for-solar-power-2024-2028/detail

6 6 - Actors & Customer Journey

As the transition to clean energy accelerates, the renewable energy ecosystem involves a wide range of actors—from homeowners and municipalities to large industrial firms and infrastructure developers. Each of these stakeholders follows a unique path from initial awareness to long-term system operation and support. Understanding the roles of key decision-makers, collaboration models between business partners, and the stages of the customer lifecycle is essential for successfully bringing renewable energy solutions to market.

6.1 End Customers

These are the asset owners who rely on connected infrastructure for energy generation and control:

Utilities & Energy Providers:	Operators of wind farms, hydro plants, solar parks — often managing SCADA, substation automation, and grid-connected assets.
Industrial & Commercial Operators:	Businesses using renewable installations for their operations (e.g., on-site solar, biogas facilities) with OT networks.
Public Sector / Municipalities:	Municipalities or agencies running solar/wind installations as part of climate initiatives.
Agriculture & Rural Communities:	Farmers using biogas, biomass, or small hydro for energy needs.

6.2 Actors

The development and operation of a solar park involves multiple coordinated phases — from securing land and planning, to construction, ongoing monitoring, and long-term asset management. Each phase requires expertise across technical, regulatory, financial, and operational disciplines to ensure a reliable and economically viable project.

Actor	Description	Phase duration	Possible Endian contribution
Project development	In the initial phase, suitable locations are identified, assessed, and secured through lease agreements or land purchases. This includes: • Engaging with local authorities and managing land-use and permitting procedures • Conducting environmental impact assessments and obtaining expert reports • Designing the technical concept and securing grid connection or feed-in agreements • Involving local stakeholders to build acceptance and long-term support A single project manager or development team typically coordinates communication with all parties involved, including municipalities, landowners, and regulators.	1 to 2 years	Low to moderate: • Early-stage consultation on **network segmentation** and **zero-trust architecture** • Advising on **secure remote access** for planners and surveyors (if used)
Investment Management	Before moving forward with construction, a detailed financial assessment is conducted to confirm the project's viability. This phase focuses on: • Evaluating capital and operating costs across all project stages • Calculating return on investment (ROI) and project payback periods • Selecting the optimal system layout for maximum energy yield and cost-efficiency • Securing financing options and ensuring alignment with applicable incentives or feed-in tariffs Comprehensive cost modeling helps to manage risk and optimize long-term profitability.	1 to 3 months	Moderate: • **Cybersecurity risk assessment** as part of technical due diligence • Help evaluate OPEX impact from secure network architecture, patching, updates, etc. • Showing how **secure remote access reduces operational costs**

Actor	Description	Phase duration	Possible Endian contribution
Planning and Realization – EPC (Engineering, Procurement, Construction)	This phase includes the technical implementation of the solar park. Key components are: • **Engineering**: Detailed site and electrical planning, efficient cable layouts, inverter placement, and module orientation • **Procurement**: Selection of quality components and reliable contractors • **Construction**: On-site execution, commissioning, and connection to the grid The EPC phase is typically managed by an experienced general contractor or project management team, ensuring technical compliance, safety, and adherence to schedule and budget.	2 to 6 months	High: • **Deployment of industrial security gateways (e.g. Endian 4i Edge)** in substations, inverter stations, etc. • Enable **secure remote access for EPC teams**, installers, and subcontractors • **Segmenting networks** to separate control systems, monitoring, and public access • Set up of **centralized monitoring platforms** (Endian Connect Platform) for secure management
Technical Management – O&M (Operation & Maintenance)	Once operational, the solar park must be maintained for consistent performance and value preservation. This includes: • Remote monitoring and performance analytics for early fault detection • Regular inspections, preventive maintenance, and vegetation control • Reporting and documentation to meet regulatory and technical standards • Compliance with safety and environmental requirements Operation and maintenance services are crucial to ensuring stable energy yields and minimizing downtime throughout the system's lifetime.	up to 30 years	Very high: • **Secure remote access for service teams** (VPN, MFA, role-based access) • Ongoing **threat monitoring and system hardening** • **Network segmentation** to isolate faults and limit breaches • Protecting data flows from edge to cloud for monitoring, analytics, and compliance • **Container-based software deployment** on edge gateways (e.g. for local SCADA monitoring or AI fault detection)

6.3 Customer Journey Phases

That is something that we deffenetly have to discuss. as the informations are form ChatGTP and i guess its not really that what we need.

1. Awareness	2. Evaluation	3. Adoption / Deployment	4. Operation / Support	Partnership & Expansion (Post-Sale)
Goal: Understanding risks of connectivity in renewable energy **Customer mindset:** "I need to connect my assets, but how do I keep them secure?" • **Touchpoints:** • Industry events, webinars, trade fairs (e.g. Intersolar, WindEurope) • Analyst reports on OT security (e.g. ENISA, BDEW) • Cybersecurity case studies from renewables • ESG & regulatory updates (NIS2, ISO 27001, IEC 62443) • **Endian contribution:**	**Goal:** Selecting secure, scalable connectivity and remote access solutions **Customer mindset:** "I need reliable infrastructure to manage my energy assets remotely." • **Touchpoints:** • POCs or pilot installations of secure gateways • Consultations with Endian or its partners • Integration assessments with SCADA/cloud platforms • Cybersecurity audits or investment evaluations • **Endian contribution:** • **Demo of EndianOS & Connect Platform**	**Goal:** Implementing security infrastructure across the plant portfolio **Customer mindset:** "How can I roll this out efficiently and securely?" • **Touchpoints:** • Deployment of **Endian 4i Edge** or industrial gateways • Integration into central operations (e.g. NOC or cloud dashboard) • Partner coordination (OEM, EPC, SCADA provider) • **Endian contribution:** • **Industrial-grade gateways** for solar/wind/H2/hydro plants • **Central management** via Endian Connect Platform	**Goal:** Ensure long-term performance, scalability, and protection **Customer mindset:** "I want stability, updates, and risk mitigation." • **Touchpoints:** • Remote monitoring and diagnostics • Firmware and security patch management • Compliance reporting (for regulators, investors) • Incident response, log management, audits • **Endian contribution:** • **Secure remote access for O&M teams**	• Upselling to new sites or expanding fleets • Co-innovation for digital services (e.g. predictive maintenance) • Support for compliance with evolving standards (NIS2, IEC 62443) • Cyber risk insurance alignment • **OEM or EPC partner enablemen**

1. Awareness	2. Evaluation	3. Adoption / Deployment	4. Operation / Support	Partnership & Expansion (Post-Sale)
• Educational content on **OT security risks** • Thought leadership on **zero-trust architectures** and **network segmentation** • Early collaboration with IT/OT architects	• Solution architecture for wind/solar plants (on/offshore) • **Total cost of ownership analysis** incl. reduced O&M costs via secure remote access • Integration support with existing systems (VPN, firewall, Docker-based apps)	• Support for **edge computing and containerized apps** • Training for technicians and IT teams	• Continuous updates and threat protection • **Role-based access management** • Isolation of critical components to contain incidents • Long-term platform support for up to 20+ years of operation	

7 7. Content

List the available content and documentation supporting this vertical, including ownership, links, and target audience.

Focus:

- Type of content (whitepapers, case studies, technical guides)
- Content owners or responsible teams
- Target audiences (sales, partners, technical teams)

Example:

Document	Owner	Target	Link to the file
Whitepaper "Cybersecurity in Renewable Energy"	Sales	System Integrators	
Case study "Securing a Wind Farm in Germany"	Brand & PR	End Customers & Business Partners	
Compliance checklist NIS2 (Owned by Legal)	Service	Consultants & System Integrators	
		Operation & Maintenance	