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Energy as a Cornerstone of Resilience in Europe's Telecom Sector

White paper, ETIS annual gathering 2026

Including contributions from:

Table of contents

01. Foreword 3

02. Energy as a cross-cutting dimension of telecom resilience 6

03. Operational resilience 9

04. Financial resilience 12

05. Policy resilience 14

06. Societal resilience 16

07. Cybersecurity resilience 18

08. Supply chain resilience 20

09. Capability resilience 22

10. Commercial resilience 24

11. Conclusion 26

01. Foreword

Energy has always been a critical enabler of telecom operations. What distinguishes the current moment, however, is that energy is increasingly becoming a strategic chokepoint. It shapes not only operational continuity, but also competitiveness, sovereignty, resilience, and geopolitical positioning across Europe's digital infrastructure landscape.

Within the ETIS community, we see energy-related challenges and opportunities no longer confined to a single operational domain. They now cut across the full breadth of the telecom organisation: from network design, data centres, and AI infrastructure to procurement, finance, regulation, sustainability, security, and risk management. As recent geopolitical developments have demonstrated, control over critical resources and infrastructure can rapidly become a source of dependency and vulnerability. In this context, energy resilience is no longer simply an efficiency topic, but a strategic priority for telecom operators.

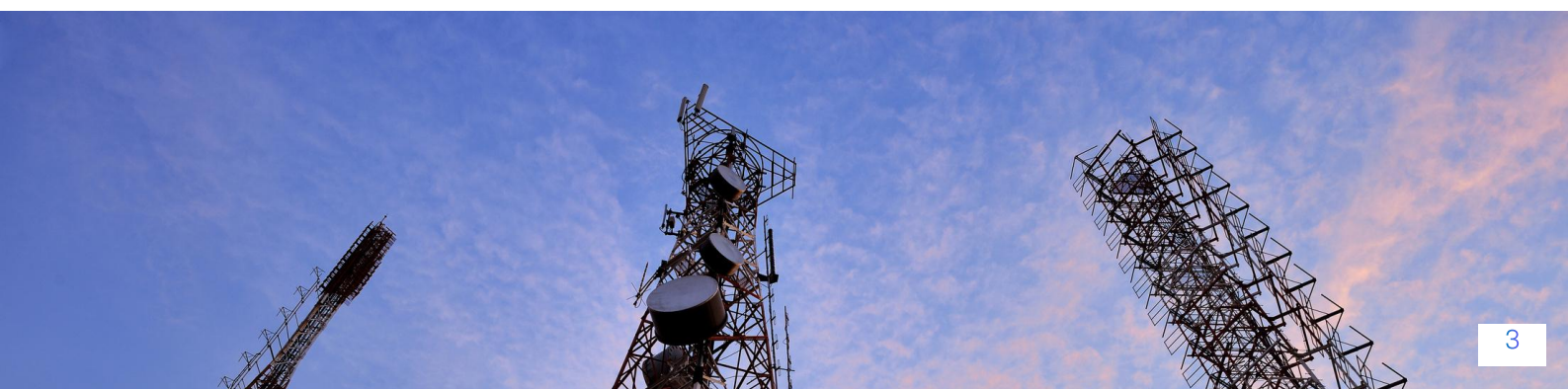
Across ETIS Working Groups, energy increasingly emerges as a common thread linking discussions on resilience, digital sovereignty, climate objectives, cost stability, cybersecurity, and infrastructure transformation. This makes it a natural area for peer exchange and collaboration within the trusted and confidential ETIS environment.

This paper reflects the way ETIS operates: grounded in real-world operational experience, shaped by practitioner insights, and focused on enabling meaningful dialogue rather than prescribing one-size-fits-all solutions. By framing energy through the broader lens of resilience and strategic autonomy, it provides a common structure through which members can exchange experiences, compare approaches, and learn from one another.

I would like to sincerely thank the members of the ETIS Energy Working Group and the contributing operators for their active engagement. Their openness and willingness to share both successes and challenges are what continue to make ETIS a unique and valuable community for telecom professionals across Europe.



Wim De Meyer
Managing Director
ETIS



Resilience has become a defining priority for the European telecom sector. As connectivity underpins economic activity, public services, and societal stability, expectations on network availability and continuity continue to rise, even under increasingly challenging conditions.

Energy plays a central role in this context. The ability of telecom operators to maintain services during periods of energy system stress, market volatility, or broader disruption is no longer a purely operational concern. It is a matter of public interest, with direct implications not only for customers and regulators, but also for security, trust and economic continuity.

This is particularly relevant in a European context, where secure and resilient connectivity is a cornerstone of both strategic autonomy and global competitiveness. As Europe accelerates its digital and green transitions, ensuring that telecom networks remain robust under all conditions becomes a prerequisite for delivering on these ambitions.
At the same time, the evolving energy landscape and shifting regulatory framework create both constraints and opportunities. Navigating them successfully requires strategic alignment, cross-functional collaboration, and informed engagement at both national and European levels.

This paper contributes to that discussion by highlighting the central role of energy in strengthening resilience across multiple dimensions of telecom operations and strategy. By bringing together perspectives from across the ETIS community, it fosters a shared understanding of the challenges ahead and reinforces the value of collaboration in addressing them.



Pedro Gonçalves
Chairman; Senior Advisor for EU Digital Policy & International Affairs
ETIS; MEO



From an operational perspective, telecom operators have always taken energy seriously. Reliability, availability and efficiency have been core design principles for networks and facilities for decades. Historically, the focus was to achieve the most robust power supply to achieve the highest available uptime. Later, reducing energy losses by introducing more energy efficient hardware, became the trend.

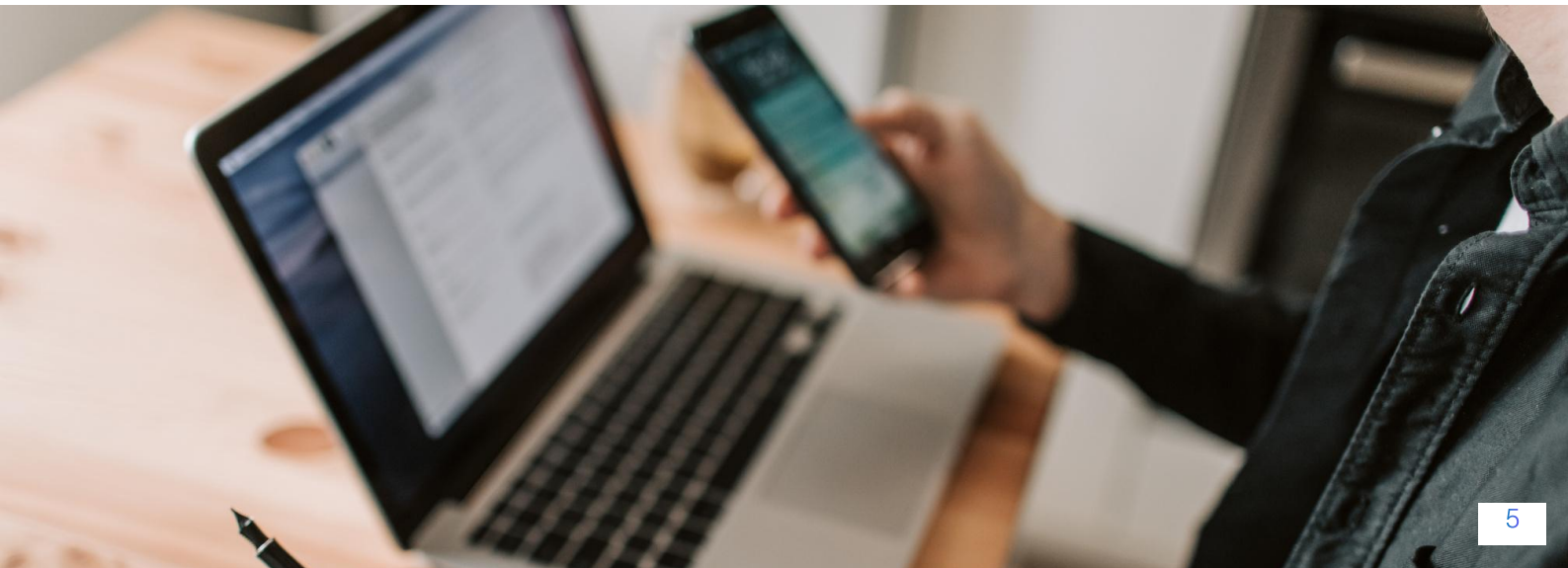
Today, however, energy has become more complex. Electrification of networks, integration of on-site generation, exposure to volatile energy markets, and expanding sustainability requirements mean that how to design and build your power supply is more complex than ever before. The power supply not only has the function to be robust and therefore contribute to a high resilience but also needs to be flexible and sustainable.

Within the ETIS Energy Working Group, we see a growing need for shared understanding and practical exchange on how operators navigate this complexity. The challenges differ by geography, network architecture, and organisational setup, but the underlying questions are often similar.

This paper aims to structure those questions by framing energy as a contributor to multiple dimensions of resilience. It is intended as a practical reference for peers: a way to recognise common patterns, learn from concrete examples, and support informed decision-making in a rapidly evolving energy landscape.



Marcon de Vrede
Chair Energy Working Group; Energy & Sustainability Consultant
ETIS; KPN



02. Energy as a cross-cutting dimension of telecom resilience

Several structural shifts are reshaping how energy must be managed within telecom organisations. Energy markets have become structurally volatile, exposing operators to price fluctuations and procurement risks that directly affect cost stability and financial resilience. Networks continue to electrify and digitalise, increasing both their dependence on energy and the number of assets whose operation is directly linked to power availability, with implications for day-to-day operational continuity. At the same time, expanding sustainability and regulatory requirements demand greater transparency, reporting, and long-term alignment with climate and policy objectives.

Recent geopolitical developments and sustained pressure on Europe's energy systems have further highlighted that energy security and availability can no longer be taken for granted, elevating resilience to external shocks and supply disruptions to a strategic concern. As society's reliance on digital connectivity continues to grow, expectations around service continuity now extend well beyond normal operating conditions, including periods of energy system stress, supply constraints, or broader geopolitical disruption.



Source: The Conversation, Datacenters.com, European Commission

Within the ETIS community, this shift is reflected in how energy-related topics surface across working groups and discussions. Questions traditionally addressed within networks, sustainability, procurement, security, or strategy are increasingly interconnected through an energy lens. While operators differ in geography, market exposure, network architecture, and organisational setup, many of the underlying challenges and decision points are shared.

This paper responds to that shared reality. Rather than treating energy as a standalone topic, it frames energy as a cornerstone of telecom resilience, cutting across multiple dimensions that are critical to the sector's ability to operate, adapt, and deliver value under changing conditions.

This paper is written with two audiences in mind:

- For energy teams, it is intended as a source of inspiration and a trigger for discussion. The case examples throughout the paper are not benchmarks or blueprints, but glimpses of how peer operators are approaching problems that most of the community is facing in some form. They are offered in the spirit of "if this is what they tried, what might we try?"

- For colleagues working outside energy, in networks, finance, procurement, sustainability, regulatory affairs, security, and strategy, it is intended to make the interdependencies visible. Many of the decisions that will define telecom resilience in the next few years sit at the boundary between energy and another domain: a network-design choice that shapes load patterns, a reporting obligation that depends on the granularity of energy data. This paper aims to surface those handoffs, so that the conversations happening within energy teams today can become shared conversations across the organisation tomorrow.

It is not a policy position paper, and it does not prescribe a single path forward. We aim to offer a shared structure, not a checklist.

The paper introduces eight complementary dimensions of resilience through which energy can be viewed:

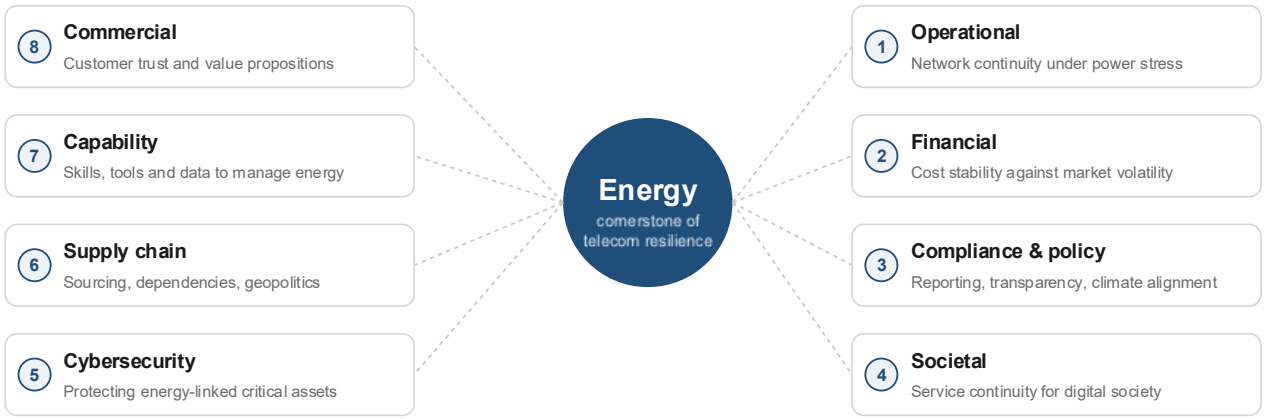
1. Operational
2. Financial
3. Compliance & policy
4. Societal
5. Cybersecurity
6. Supply chain
7. Capability
8. Commercial



These eight dimensions are not independent silos, but interconnected perspectives that together reflect the full impact of energy on telecom organisations. Each section explores how energy contributes to a specific aspect of resilience, illustrated where possible with real-world experiences from ETIS member operators.

Energy as a cross-cutting dimension of telecom resilience

Eight complementary perspectives on how energy shapes the sector's resilience



Source: Companion.energy

This perspective directly aligns with the theme of resilience of this year's ETIS Annual Gathering in Riga. As telecom leaders come together to discuss how the sector can remain robust, adaptive, and trustworthy in an increasingly complex environment, energy emerges as a common underlying factor across many of these conversations. By framing energy through multiple dimensions of resilience, this paper aims to support and enrich those discussions.

03. Operational resilience: energy underpins day-to-day network continuity and performance

Telecom networks are designed for continuous availability. From radio access sites to data centres, from fixed-line exchanges to edge computing nodes, every element of a modern telecom network depends on a stable and uninterrupted supply of energy. Operational resilience, the ability to maintain service continuity under both normal and abnormal conditions, is therefore inseparable from energy resilience.

Historically, this was addressed through proven and well-established mechanisms: redundant grid connections, battery backup systems, and diesel generators at critical sites. These measures continue to form the backbone of operational continuity in most European networks and represent decades of accumulated engineering expertise.

What is changing, however, is the environment in which these systems operate. Network architectures are evolving driven by 5G densification, edge computing, fibre rollout, and the phasing out of legacy copper and 2G/3G infrastructure. These transitions alter the energy profile of the network: consumption shifts, load patterns change, and the number and type of sites requiring active energy management grows. At the same time, operators are integrating new energy assets: on-site solar, new battery storage technologies, and increasingly sophisticated building management systems. They add operational capability, but also complexity.

The result is that operational energy management is no longer simply about ensuring backup power is available. It increasingly involves understanding, in near real-time, how energy flows through a diverse and distributed asset base, and making operational decisions that account for both network performance requirements and energy system conditions.

Case Example
Elisa Gridle's Virtual Power Plant

A growing number of European operators are rethinking site batteries not only as emergency backup, but as a network-wide Virtual Power Plant (VPP) that can be actively managed in real time.

The leading Finnish telecom operator, Elisa, developed in-house a Gridle AI-based optimisation solution to control and optimise telecom batteries in the RAN sites. Elisa's Gridle optimises distributed batteries across 2000+ mobile base station sites (about 150 MWh of distributed storage). Those intelligently managed batteries are centrally orchestrated to strengthen continuity of service, with resilience targets reaching up to 24 hours when required.

The operational shift is not "trading instead of backup" — it is backup-first VPP control. A purpose-built VPP for telecom infrastructure can maintain centralised control and transparency while protecting site availability: market participation is algorithmically constrained so that uptime requirements are not compromised, and capacity can be reserved centrally during high-risk periods (e.g., storms) with explicit prioritisation of network availability over market activity.

Elisa is offering Gridle optimisation service for other European telecom operators and is already working with companies such as Telenor's Group's DNA Tower Finland and Vantage Tower Spain.

"In moments when storms, power cuts and hybrid threats challenge the resilience of communications networks, it becomes our duty as an industry to explore all avenues that can help strengthen continuity of service"



Nicolas Mahler
Interim CEO
Vantage Towers

Case Example
INFRAVISTA's infrastructure management

INFRAVISTA™

Originally conceived and proven at scale inside Swisscom, INFRAVISTA has evolved into an independent company that sets a new standard for passive cell tower infrastructure management. By combining advanced monitoring, IoT-driven analytics, and AI-powered automation, INFRAVISTA moves operations from reactive maintenance towards proactive, data-driven management. This, with full transparency across every asset, site, and decision.

At its core, INFRAVISTA delivers real-time visibility across entire tower portfolios, enabling AI-powered anomaly detection, early warning on equipment health, additional equipment insights, and precise energy performance tracking. Embedded AI capabilities reveal patterns invisible to manual inspection, support full asset lifecycle management, and reduce unnecessary capital expenditure. These outcomes have already been demonstrated at over 2,000 sites in the Swisscom mobile network.



Source: INFRAVISTA

By embedding AI-driven energy monitoring directly into day-to-day operations, INFRAVISTA enables operators to identify inefficiencies, optimise energy consumption, and track progress against sustainability targets. This provides end-to-end transparency for internal stakeholders, regulators, and sustainability reporting requirements alike.

Having proven its value in one of Europe's most demanding network environments, INFRAVISTA is now attracting interest from telecom operators and beyond, including sectors such as rail, logistics, utilities, and real estate, where the challenge of managing distributed physical infrastructure at scale is equally pressing.



Source: INFRAVISTA

The growing role of real-time visibility

The Swisscom experience reflects a broader theme raised by several operators within the ETIS community: the importance of energy visibility as a foundation for operational resilience. Without accurate, timely, and granular data on energy consumption, generation, and storage across the network, it becomes difficult to detect anomalies, anticipate risks, or make informed operational decisions, whether during a crisis or in day-to-day operations.

This is not only a technical matter. It also involves organisational alignment, ensuring that the right information reaches the right people and teams in a format they can act on. In many operators, energy data has traditionally been managed within facilities or network operations teams, with limited cross-functional visibility. As energy's impact on operations grows, so does the need for shared situational awareness.

Looking ahead

Operational resilience will increasingly depend on the ability to manage energy proactively rather than reactively, integrating energy considerations into network planning, capacity management, and incident response processes. For operators managing thousands of sites across diverse geographies, this is not a trivial undertaking, but one that builds on a strong foundation of operational discipline.

The experiences of operators like Swisscom demonstrate that investments in data infrastructure and automation are not ends in themselves. They are enablers of faster response, better decisions, and a more sustainable network, built to perform reliably under conditions that continue to evolve.

04. Financial resilience: energy affects cost stability, risk exposure, and financial planning

Energy has always been a significant cost line for telecom operators. For most European operators, electricity represents one of the largest operational expenditures after personnel. Financial resilience in the context of energy means the ability to manage this exposure in a way that supports stable and predictable cost structures, even in volatile market conditions.

The European energy crisis of 2022–2023 brought this into sharp focus. Operators that had relied on short-term or spot-indexed procurement strategies faced dramatic cost increases within a matter of months. Others, with longer-term fixed contracts or hedging positions, were better shielded, but found themselves locked into structures that limited their ability to respond to subsequent price corrections. Neither approach proved universally optimal.

Across the ETIS community, operators now employ a range of procurement approaches. From fully fixed multi-year contracts to portfolio-based strategies that blend fixed, indexed, and forward components. Power Purchase Agreements (PPAs) are also gaining traction as a way to secure long-term price stability while supporting sustainability objectives. Each approach carries its own risk profile. Fixed contracts provide certainty but reduce flexibility. Spot exposure allows participation in favourable market conditions but introduces volatility. PPAs offer long-term price visibility but require careful structuring to match consumption profiles and manage volume risk.

Case Example
From volume to price: Proximus Group's energy control box

For years, telecom operators have focused on reducing energy volume through equipment efficiency, free cooling, and site pooling. That work remains important, but a growing number of operators are recognising that volume is only half the equation. The other half is price: what you pay at each moment, and how that interacts with the contracts and market mechanisms through which energy is purchased.

Proximus Group illustrates this shift. Like many European operators, Proximus Group historically benefited from profile-hedging contracts, in which the supplier absorbed the risk of matching consumption patterns. As European energy markets are liberalising and adapting to a new normal of sustained price volatility, these products have largely disappeared, replaced by baseload hedges that do not follow consumption. The consequence: a significant share of energy costs was, in practice, exposed to market prices, even under what looked like a well-hedged position.

In response, Proximus Group has been building an internal energy control box: a single operational layer where consumption forecasts, hedging positions, renewable production, site-level flexibility, and grid signals meet on the same time granularity, and feed a shared set of decisions. Hedging is spread systematically and day-ahead nominations are being piloted. Distributed assets (backup batteries, on-site solar) are being steered against real-time price predictions. Proximus Group is also among the first participants in DSO flexibility market testing in Belgium.

The underlying principle is that no single flexibility mechanism is large enough on its own. As ancillary services begin to saturate in more advanced markets, the business case for distributed assets increasingly depends on stacking value across several channels: cost optimisation, grid services, congestion services.

The control box is what makes that routing possible, and what closes the gap between procurement, operations, and finance.



Source: Proximus Group

The key insight shared across the community is that no single strategy is inherently superior, and that energy procurement has become a strategic discipline in its own right. One that requires active risk management, scenario planning, and continuous alignment between procurement decisions, operational realities, and financial objectives.

Towards integrated energy cost management

As energy markets continue to evolve with increasing granularity (hourly pricing, locational signals), new instruments (flexibility markets, demand response), and growing complexity, the case for integrated energy cost management strengthens. This can be achieved through shared KPIs, common data platforms, and cross-functional governance mechanisms.

What it does require is a recognition that energy cost management is not a one-time procurement exercise, but an ongoing, cross-functional capability.

05. Policy resilience: regulatory developments and sustainability frameworks shape energy strategy

European telecom operators face an increasingly dense regulatory environment around energy and sustainability. From the EU Energy Efficiency Directive and the Corporate Sustainability Reporting Directive (CSRD) to national regulations and sector-specific codes of conduct.

The obligations related to energy transparency, efficiency, and sustainability continue to expand, and with them, the reporting burden. CSRD and the associated European Sustainability Reporting Standards (ESRS) require detailed disclosure on energy consumption, greenhouse gas emissions, and progress toward climate targets. They demand not only accurate data, but auditability, consistency across reporting periods, and alignment with standardised methodologies.

In practice, energy data that was historically managed for operational purposes must now meet financial-grade reporting standards. For operators with large and heterogeneous asset portfolios spread across multiple countries, this is a significant undertaking.

Case Example
KPN's pursuit of 24/7 carbon-free energy

For most European companies, claiming "100% renewable electricity" has meant purchasing annual Guarantees of Origin (GOs) that offset total consumption on a yearly basis. A company that consumes power around the clock can meet this standard by holding certificates from solar generation that occurred entirely during summer daytime hours. The annual balance worked when almost all electricity came from fossil sources as any additional renewable electricity was bound to replace fossil electricity, but with the explosive rise of renewables the system no longer achieves its goals. As reporting standards tighten and stakeholder scrutiny increases, the gap between the two is becoming harder to sustain.

KPN has chosen to move ahead of this curve. The Dutch operator has committed to 24/7 Carbon-Free Energy (CFE), a framework in which renewable supply is matched against actual consumption on a(n) (quarter-)hourly basis, not annually. This move is not just motivated from a compliance standpoint, but primarily from a sustainability, cost stability and competitiveness strategy. For a telecom network that operates continuously, this is an ambitious target: it means ensuring that every hour of the day, including winter evenings when solar production is zero, is covered by verified renewable generation.



Source: KPN

KPN's energy strategy rests on four pillars: reducing consumption, procuring renewable energy, matching that procurement to actual usage on a 24/7 basis, and addressing grid congestion. The shift from annual to hourly matching is a fundamentally different way of structuring the relationship between energy procurement, renewable investment, and operational flexibility.

Crucially, KPN recognises that this cannot be achieved in isolation. Through its participation in Platform Energiebewustzijn (PEB), a Dutch multi-stakeholder platform, KPN is engaging with energy producers, grid operators, policymakers, and other large consumers to develop the market mechanisms and certification standards needed to make 24/7 CFE a practical reality.

The directionof travel is clear: reporting standards are moving towards greater temporal granularity, and operators that build the capability to track and manage energy provenance on a sub-annual basis will be better positioned as regulation catches up with ambition.

"We need pioneers, large companies that ask the question, producers that dare to develop the supply, and governments that help design the system."



Jorrit Bakker
Strategic Advisor Energy Innovation
KPN

Regulatory uncertainty is itself a resilience challenge

The compliance landscape is not only expanding, it is also moving. The practical definition of an "energy management system" under the EED remains unclear for telecom-specific footprints. At the same time, discussions are underway to strengthen RE100 and similar voluntary frameworks toward hourly granularity, even as the market for hourly Guarantees of Origin remains thin and operationally complex.

Policy engagement

The KPN example also illustrates a broader point about the telecom sector's role in shaping energy policy. Networks that run 24/7, manage thousands of distributed sites, and are investing in batteries and on-site generation are not passive consumers. They are increasingly active participants in the energy system, and regulatory frameworks need to reflect this.

Within ETIS, the opportunity for collective engagement on energy policy is a growing area of interest. Operators that engage proactively, individually and collectively, are better positioned to ensure that the regulatory environment supports rather than constrains their energy transition.

06. Societal resilience: the role of telecom energy continuity for society at large

Telecommunications infrastructure has become essential to the functioning of modern society. Healthcare, education, finance, public safety, and government services all depend on reliable connectivity. This dependence has only deepened with digitalisation, remote working, and the increasing integration of communications networks into critical societal systems.
This places a distinctive responsibility on telecom operators. Service disruptions, particularly those caused by energy-related events, are no longer solely a commercial or operational issue. They have societal consequences. A prolonged power outage affecting a mobile network can disrupt emergency services, isolate communities, and undermine public safety.

Energy as a societal continuity factor

The societal dimension of energy resilience becomes most visible during crises: natural disasters, extreme weather events, energy system disruptions, or geopolitical shocks. In these moments, telecom networks are expected to remain operational, often precisely when the energy systems that power them are under the greatest stress.
European operators have invested significantly in ensuring network continuity under adverse conditions, through battery backup, generator capacity, and mobile emergency response capabilities. Some have gone further, developing dedicated protocols for energy crisis scenarios that include coordination with energy utilities, grid operators, and national emergency services.

Case Example
FUDOKA: site-level autonomy under stress

The FUDOKA project focuses on the integration of MTS cabinets with lithium batteries into mobile network sites, aiming to improve operational resilience and efficiency while reducing electricity consumption. It replaces the traditional site configuration—based on containers with multiple racks, lead-acid batteries, legacy AC/DC rectifiers, and HVAC systems—which resulted in low autonomy, high maintenance costs, and increased energy consumption.

To address these challenges, a new-generation, rack-based energy solution for telecommunications was designed. This solution consolidates power systems, batteries, cooling, monitoring, and security into a single smart, compact infrastructure that can be deployed in different environments. The integration of lithium batteries significantly increased site autonomy and network resilience compared to traditional lead-acid batteries. The entire system is managed through an integrated OSS, enabling simpler deployment, easier maintenance, and intelligent energy management.



Throughout the project lifecycle, several key benefits were achieved: reduced maintenance effort and physical footprint, lower energy consumption through the shutdown of HVAC systems and improved DC efficiency, enhanced Quality of Service due to increased autonomy, and reduced energy costs by shifting consumption across tariff periods.

During the 2025 Iberian Peninsula blackout event, the project clearly demonstrated the superior resilience of the MEO mobile network compared to competitors, ensuring higher service availability at a critical time, largely due to enhanced energy autonomy and load management capabilities.



Ana Margarida Bastos
Head of Energy
MEO

The "always on" expectation

Beyond crisis scenarios, there is a broader societal expectation that telecom services are always available. This expectation is increasingly being codified in regulation, through critical infrastructure designations (such as the EU's NIS2 Directive), national resilience requirements, and service level obligations.

Telcos as contributors to grid stability

The same characteristic that makes telecom networks operationally complex (thousands of distributed sites with on-site generation, storage, and steerable loads!) also makes them potentially valuable contributors to broader grid stability. In countries such as the Netherlands, where congestion on the distribution grid is already a binding constraint, and in zones of Belgium where similar pressures are emerging, telecom operators could play a meaningful role in balancing services and congestion relief. Realising this potential, however, requires regulatory frameworks that recognise telecom assets as a legitimate source of flexibility, and commercial structures that reward the operator for providing it.

For operators, meeting these expectations requires that energy continuity planning is embedded in broader resilience frameworks, rather than treated as a separate discipline. It also requires engagement with external stakeholders, including regulators, municipalities, and other critical infrastructure operators, to ensure coordinated responses to systemic disruptions.

07. Cybersecurity resilience: the intersection of energy systems and cybersecurity in telecom

As telecom operators integrate more digital, connected, and distributed energy systems into their infrastructure, the cybersecurity implications of energy management grow. Energy management systems, smart meters, building management platforms, battery management systems, and grid-connected assets all represent potential entry points into, or attack surfaces on, the broader telecom environment.

Cybersecurity resilience in the energy context refers to the ability to protect energy-related systems from unauthorised access, manipulation, or disruption, and to ensure that energy system compromises do not cascade into network or service failures.

The expanding attack surface

Historically, energy systems within telecom environments were largely isolated: physical meters, manual readings, and standalone backup power systems. The transition to digitally managed, connected, and often remotely controlled energy systems changes this fundamentally. Smart meters communicate over networks. Building management systems are accessible via IP. Battery and generation assets are increasingly controlled through cloud-based platforms or third-party management tools. Each of these connections introduces cybersecurity considerations that must be addressed through appropriate architectures, access controls, monitoring, and incident response capabilities.

Vendor and supply chain considerations

Energy technology vendors and service providers also introduce cybersecurity risk. The platforms, protocols, and data flows associated with energy management solutions must be assessed within the operator's broader cybersecurity framework. This includes data handling practices, API security, access governance, and compliance with relevant security standards. Within the ETIS community, the intersection of energy and cybersecurity is a topic that bridges multiple working groups. The Security working group's expertise in threat assessment and risk management is directly relevant to the energy domain, and vice versa.

A live regulatory question is whether the controls applied to high-risk vendors in telecom systems should extend to vendors of energy management and grid-connected assets. The answer will materially shape the pace and shape of smart-energy deployment across the sector; it is one of the areas ETIS members are watching closely.

Resilience through design

The most effective approach to managing cybersecurity risk in the energy domain is to integrate security considerations from the outset, in the selection, design, and deployment of energy systems. This includes requirements for secure-by-design architectures, regular vulnerability assessments, and clear incident response procedures that account for energy system compromises.

Quote
A decade of change in European telecom

Over the past years, I have seen energy evolve from a technical cost item into one of the most strategic and multi-faceted topics in the European telecom sector. What used to be a relatively stable operational domain has become a field where uncertainty, ambition and resilience all come together. Energy now influences how fast operators can expand, how they manage risk, how they meet sustainability expectations and how they keep networks running under increasingly demanding conditions.

During my time chairing the ETIS Energy Working Group in 2023 and 2024, this shift became very clear. What started as a focus on efficiency quickly broadened into discussions on PPAs, storage, congestion, data architectures and the role of batteries in grid interaction. Energy moved from being an engineering topic to a cross-functional one involving procurement, finance, sustainability and regulatory teams. Operators began to realise that energy is not just about reducing consumption. It is about building resilience, managing exposure and preparing for a future where telecom and energy systems are far more intertwined.

One of the most striking evolutions is the rise of energy intelligence.

In earlier decades I saw the same thing happen in networks: once data, automation and AI enter the operating model, everything changes. The same is now happening in energy. AI helps operators understand where consumption really sits, how to steer the network in real time, how to avoid imbalance exposure and how to use storage in a smarter and more dynamic way. It shifts the focus from reporting energy to acting on it.

Even after my retirement I stayed involved as an observer, and the evolution continues. The discussions for Riga 2026 show how far the sector has come. Energy is now linked to resilience, flexibility, market participation and long-term decarbonisation. Operators are no longer passive consumers. They are becoming active players in the energy system, and some of the frontrunners are already showing what this next chapter can look like.

It is a privilege to have contributed to this evolution. And it is energising to see how far the sector has come, and how much potential still lies ahead as we bring together telecom engineering, sustainability ambition and intelligent energy management into one coherent transformation journey.



Dirk Desplanques
Former Chair Energy Working Group
ETIS

08. Supply chain resilience: energy underpins supply chain resilience in telecom

Telecom operators depend on complex and often global supply chains for their energy-related needs. This includes not only electricity procurement (with its chain of generators, traders, grid operators, and suppliers) but also the physical equipment that enables energy management: batteries, generators, solar panels, inverters, cooling systems, and their associated components. Supply chain resilience in the energy context means the ability to maintain access to essential energy resources and equipment, even when supply chains are disrupted by geopolitical events, trade restrictions, raw material shortages, or logistics constraints.

Electricity supply chain risks

The European energy market is interconnected but not immune to disruption. The 2022 energy crisis demonstrated how rapidly geopolitical events can propagate through electricity supply chains, affecting prices, availability, and contract terms. Subsequent developments, including ongoing tensions in the Middle East and their potential implications for global energy flows, are a reminder that supply chain stress is not a one-off event but a recurring feature of the energy landscape. Concentrated generation capacity, cross-border dependency, and sensitivity to fuel supply disruptions are structural vulnerabilities that operators must account for on a continuous basis, not only during acute crises. For telecom operators, this means that procurement strategies must account not only for price optimisation but also for supply security. Diversification of energy sources, geographic spread of supply relationships, and the ability to shift between sources are all elements of supply chain resilience.



"Developments in the European telecommunications market were dominated by technological advances, regulatory changes, cybersecurity concerns, competition, a focus on sustainability and green initiatives, supply chain challenges, rising energy costs, and geopolitical uncertainty.

Influenced by the European Commission's Green Deal, the telecommunications sector will take on a central role as strategic partner to strengthen Europe's ability to work towards greater resilience and accelerated digitalization."

Source: Deutsche Telekom, Annual Report 2024

Equipment and technology supply chains

The physical supply chain for energy assets is equally important. Battery storage, which is increasingly central to telecom energy strategies, depends on lithium, cobalt, and other materials with concentrated and sometimes geopolitically sensitive supply chains. Solar panels, power electronics, and critical components for cooling systems face similar dependencies.
Lead times, availability, and pricing of energy equipment can all be affected by factors outside the operator's direct control. Building supply chain resilience in this area involves long-term planning, vendor diversification, strategic inventory management, and, where possible, standardisation of equipment specifications to allow flexibility in sourcing.

For ETIS members, the strategic question is less whether these dependencies exist than how the sector responds to them collectively through joint planning, vendor-portfolio coordination, and engagement with EU industrial-policy efforts on critical materials.

Local energy ecosystems

An emerging dimension of supply chain resilience is the development of local or regional energy ecosystems. Operators that invest in on-site generation, energy storage, and local grid connections reduce their dependence on centralised supply chains and create buffer capacity that enhances resilience. Several ETIS members are exploring how local energy strategies, including energy communities and peer-to-peer energy models, can complement traditional procurement and supply chain approaches.



09. Capability resilience: building the organisational capacity to manage energy as a strategic function

The preceding dimensions of resilience all depend on a common foundation: the organisational capability to manage energy effectively as a cross-functional, evolving, and strategically significant domain. Capability resilience refers to an operator's ability to attract, develop, and retain the skills, knowledge, and organisational structures needed to address energy challenges both today and as they evolve.

Skills and expertise

Energy management in telecom is becoming a multi-disciplinary function. It requires a blend of expertise that spans power engineering, data analytics, financial modelling, sustainability reporting, regulatory knowledge, and increasingly, software and automation skills. Assembling and maintaining this breadth of capability is a challenge, particularly given competition for talent from the energy sector, technology firms, and other industries undergoing similar transitions. Within the ETIS community, knowledge sharing and peer exchange play a valuable role in supplementing internal capabilities. The ability to learn from the experiences of peers, what has worked, what has not, and what is on the horizon, is a distinctive advantage of collaborative networks such as ETIS.

Data and tools

Effective energy management requires robust data infrastructure, from metering and monitoring to analytics and reporting. The maturity of this infrastructure varies significantly across operators and often across sites within the same operator. Building a reliable, integrated, and scalable data foundation is a prerequisite for many of the capabilities discussed in this paper, from real-time operational awareness to financial risk management to regulatory reporting.

Increasingly, the effort required to manage data from thousands of energy-relevant connection points proactively is comparable to the effort telecom operators already devote to customer and network data. Treating energy data with the same seriousness in governance, tooling, and ownership, is becoming a prerequisite for cross-functional energy management.

This is an area where technology plays a clear enabling role. However, technology alone is not sufficient; it must be accompanied by clear data governance, defined processes, and organisational ownership.

A continuous journey of organisational positioning and governance

How energy is positioned within the organisation matters. In some operators, energy management sits within facilities. In others, within networks, sustainability, or procurement. A few have established dedicated energy functions with cross-functional mandates. There is no single correct model, but the effectiveness of any model depends on the clarity of its mandate, the seniority of its leadership, and the strength of its connections to other parts of the organisation. As energy becomes more strategic, the question of organisational positioning and governance becomes more consequential. Operators that have established clear ownership, cross-functional governance mechanisms, and senior-level sponsorship for energy are generally better positioned to respond to the evolving challenges described in this paper.

Case Example
AI Energy Management

Companion.energy has developed their platform to help energy-intensive operators turn raw meter, contract and market data into decisions.

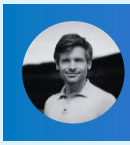


The platform unifies four workstreams that energy teams typically run across separate tools: data integrations (DSOs, suppliers, sub-meters), market analysis, contract mix simulation (hedge versus dynamic, capacity-tariff exposure), and reporting workflows for finance, sustainability and operations.

The company is now doubling down on what it calls agentic energy management: embedding AI as a co-pilot directly inside the platform, so that workflows which used to take an energy analyst a full week now resolve in minutes, with the human in the loop on every decision.

For telecom operators, that translates into faster visibility on capacity-tariff exposure across hundreds of sites, faster what-if analysis on supply contracts, and a credible path to per-site PV and battery business cases.
Beyond telecoms, Companion.energy serves multi-site consumers in retail, manufacturing and real estate, plus utilities and ESCOs building AI-native services on top of the platform.

"Energy resilience for Europe's telecoms is no longer a once-a-year planning exercise. It's a daily discipline. AI is reshaping how energy teams work, and at Companion.energy we're building alongside that shift. Our job is to give energy managers the most performant agentic AI capability available, so the visibility, market analysis, contract decisions, VPP optimisation , and reporting that used to take weeks now happen in minutes."



Thomas Vyncke
Co-founder
Companion.energy

10. Commercial resilience: energy is underpinning a new commercial frontier for telecom operators

For most telecom operators, energy has historically been a cost to manage rather than a value to create. That assumption is changing. A growing number of European operators are moving beyond energy efficiency and procurement optimisation to explore energy itself as a new business line, leveraging their existing infrastructure, customer relationships, and operational expertise to offer energy products and services to consumers and businesses.

This shift represents a distinct dimension of resilience: the ability to diversify revenue streams and reduce exposure to telecom-specific market pressures by building positions in adjacent, high-growth sectors. As energy markets decentralise and digitalise, telecom operators are increasingly well-placed to act as integrators, aggregators, and service providers in the energy transition.

From connectivity to energy: emerging operator models

Several ETIS members are at the forefront of this evolution. For example MEO, the Portuguese operator, has launched MEO Energia, bringing retail energy supply directly to its residential and business customer base. By bundling energy with connectivity services, MEO is able to deepen customer relationships, reduce churn, and capture a share of the significant energy spend that already exists within its customer portfolio.

Case Example
A telecom-built smart charging business

telenet



In April 2024, Telenet launched Blossom, a dedicated subsidiary that installs and operates smart charging for electric vehicles. Rather than entering the consumer EV charging market head-on, Blossom started with a deliberately narrow wedge: end-to-end charging solutions for Belgian corporate fleets.

The proposition is built as a total solution rather than as a hardware sale. Blossom handles installation, activation, and operation of the charger, and connects each session to the wider energy system: aligning charging with rooftop solar production and dynamic electricity tariffs for home and workplace charging infrastructure, and giving fleet managers a single portal to manage their employee charging estate.

Several elements make this a distinctive commercial-resilience play for a telecom operator. The go-to-market path leans on existing B2B relationships and on Telenet's national installation and field-service capability. These are assets few pure-play EV charging entrants can match. The product itself is a connected device with a recurring service component, which sits naturally next to a connectivity portfolio. And by anchoring early volume with internal fleets and a shareholder, Blossom de-risked its market entry while building operational scale.

The strategic logic mirrors what is emerging in several ETIS members: telecom operators are not entering the energy transition as new energy players, but as integrators that bring their installation, billing, customer relationship and connectivity assets to bear on adjacent, high-growth segments of the energy system.

A strategic lens on commercial resilience

What these examples share is a recognition that telecom operators possess distinctive assets that are directly relevant to the energy transition: nationwide infrastructure footprints, trusted customer relationships, billing and data capabilities, and experience managing distributed systems at scale. The question is no longer whether these assets are relevant to the energy sector, but how quickly and effectively operators can mobilise them.

Commercial resilience in this context means building the strategic and organisational capability to participate in energy markets as a value creator, not only as a consumer. It also means managing the risks that come with market entry: regulatory complexity, capital requirements, and the challenge of competing with established energy players. Operators that approach this thoughtfully, starting with areas of genuine competitive advantage and building incrementally, are best positioned to turn the energy transition into a commercial opportunity rather than just an operational challenge.

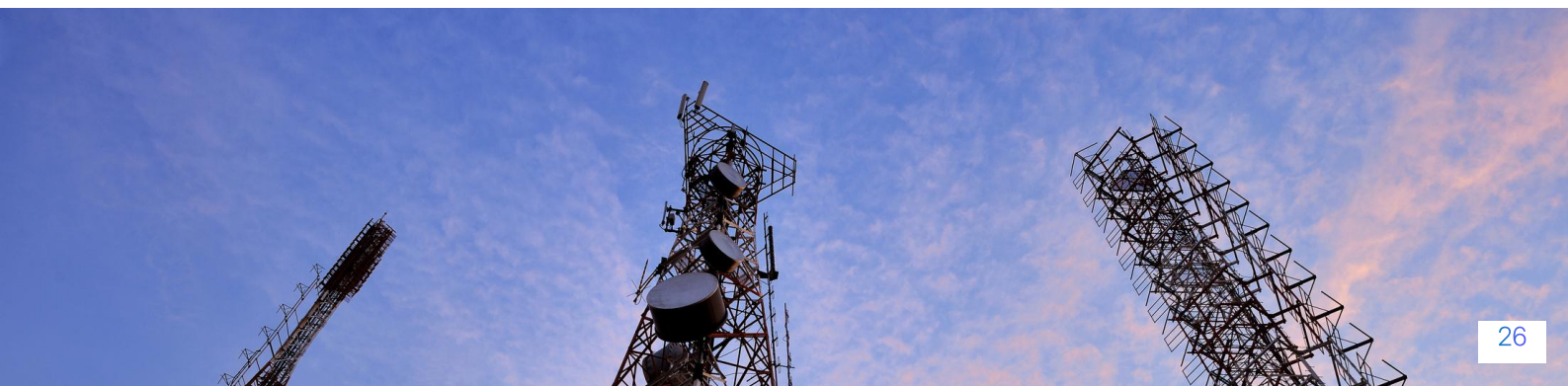
11. Conclusion: toward a shared resilience framework

The eight dimensions explored in this paper (operational, financial, compliance and policy, societal, cybersecurity, supply chain, capability, and commercial) are not independent categories. They are deeply interconnected, and progress in one dimension often supports or enables progress in others. Conversely, weaknesses in one area can undermine resilience across the board.

What connects them all is a recognition that energy has moved beyond its traditional position as a cost line or a technical parameter. It has become a strategic enabler of telecom resilience, one that touches every part of the organisation and extends into the operator's relationship with society, regulators, and the broader energy system.

This does not mean that every operator needs to approach energy in the same way. Geography, market structure, network architecture, organisational history, and strategic priorities all shape how energy challenges manifest and how they are best addressed. What the ETIS community offers is a trusted environment in which to compare approaches, learn from experience, and develop shared understanding, without prescribing uniform solutions.

As the telecom sector continues to navigate an increasingly complex and interconnected operating environment, energy resilience will remain a shared priority. The ETIS Energy Working Group will continue to serve as a platform for this dialogue, fostering the kind of open, experience-based exchange that helps European telecom operators build the resilience they need, together.



A note from us.

Putting this paper together has been a genuine privilege and, honestly, a lot of fun.

We came in as listeners, not lecturers: the operators, engineers, sustainability leads and policy thinkers across the ETIS community have been working on energy resilience far longer, and with far more at stake, than us.

Any insight in these pages belongs to them; any clumsy phrasing is ours.

To everyone who picked up a call, opened a slide deck or improved a draft: thank you!

We hope it serves the community half as well as the community has served us in writing it.

Please reach out to exchange thoughts!



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