NTT DATA

Energy & Utilities

Energy Trends

Innovation: The key to leading the energy future

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1. Introduction Innovation as a transformation lever.

Context: A transforming energy landscape

The energy sector is undergoing a structural transformation, driven by growing tension between three critical forces: climate urgency, security of supply, and the economic viability of the changes required.

The energy transition is no longer defined by a single vector of change. The energy transition is progressing unevenly, shaped by regional priorities, with different regions prioritizing distinct objectives, sustainability, industrial competitiveness, or energy security. While electrification, decarbonization, and the integration of renewable energy remain fundamental pillars, they are increasingly confronting practical constraints that demand new technological and organizational solutions.

In this context, **innovation shifts from a tactical function to a structural capability**. Companies must scale emerging technologies, expand beyond their traditional core business, and collaborate within dynamic ecosystems. Digitalization, driven by the rise of artificial intelligence and automation, is redefining operations, business models, and demand curves, particularly due to the growth of data centers and electricity-intensive uses.

This report marks a turning point for the energy sector. Its purpose is to offer a strategic guide to understanding how innovation models in energy are evolving, what structural challenges organizations are facing, and which capabilities must be developed to lead in a context of continuous change.

Innovation as a structural lever in the reshaping of the Energy Sector

In an increasingly complex and dynamic environment, **innovation has become a key structural capability for transforming the energy sector**. It is no longer seen as a tactical function limited to piloting solutions parallel to the business, but rather as a transversal lever that enables companies to adapt, anticipate, and lead the redesign of the energy system.

Beyond responding to external pressures, regulation, technology, consumption, innovating today means building capabilities to operate in unstable markets, with immature technologies and evolving business models. In this new scenario, leading energy companies are expanding their portfolios beyond the traditional core, exploring new technologies, operational formats, and collaboration models.

Innovation acts as the engine that allows companies to address this complexity with greater agility, exploratory logic, and a learning-driven approach. It enables companies to test new solutions, scale them quickly when impactful, and reconfigure their businesses around emerging opportunities.

Leading companies are reformulating their energy portfolios by integrating hydrogen, storage, smart grids, distributed solutions, and renewable generation, while experimenting with more agile operating models and more open structures. This evolution requires operating in more volatile markets, with early-stage technologies and business models that are not yet consolidated.

Unlike the past—when risk was managed through scale and efficiency, **today requires a new logic: more exploratory, agile, and centered on continuous learning.** In this context, innovation emerges as the muscle that enables not only new revenue streams but also strategic resilience.
As sector boundaries blur with utilities adopting startup dynamics, oil & gas companies repositioning themselves as integrators, and tech players entering the energy system, innovation becomes a strategic positioning factor. It drives new partnerships, demands new governance models, and redefines the link between corporate strategy and technological execution.

Purpose of the report

Energy Trends 2025 **aims to deliver a strategic, comparative, and actionable view** of how energy companies are structuring their innovation models to respond to the sector's transformation challenges.

The report analyzes the factors conditioning the impact of innovation, identifies the trends shaping new organizational models, and synthesizes the structural decisions that are making a difference in the most advanced companies.

Through in-depth interviews, benchmarking of sector leaders, and review of specialized sources, it builds a rigorous framework to serve as a roadmap for innovation leaders, strategy directors, and executive teams committed to accelerating change within their organizations.

Scope and methodological approach

The analysis is structured around five pillars that offer a comprehensive lens through which to evaluate innovation models: strategy, structure, culture, metrics, and ecosystem. This framework serves as a diagnostic tool to benchmark organizations, identify capability gaps, and uncover opportunities for evolution.

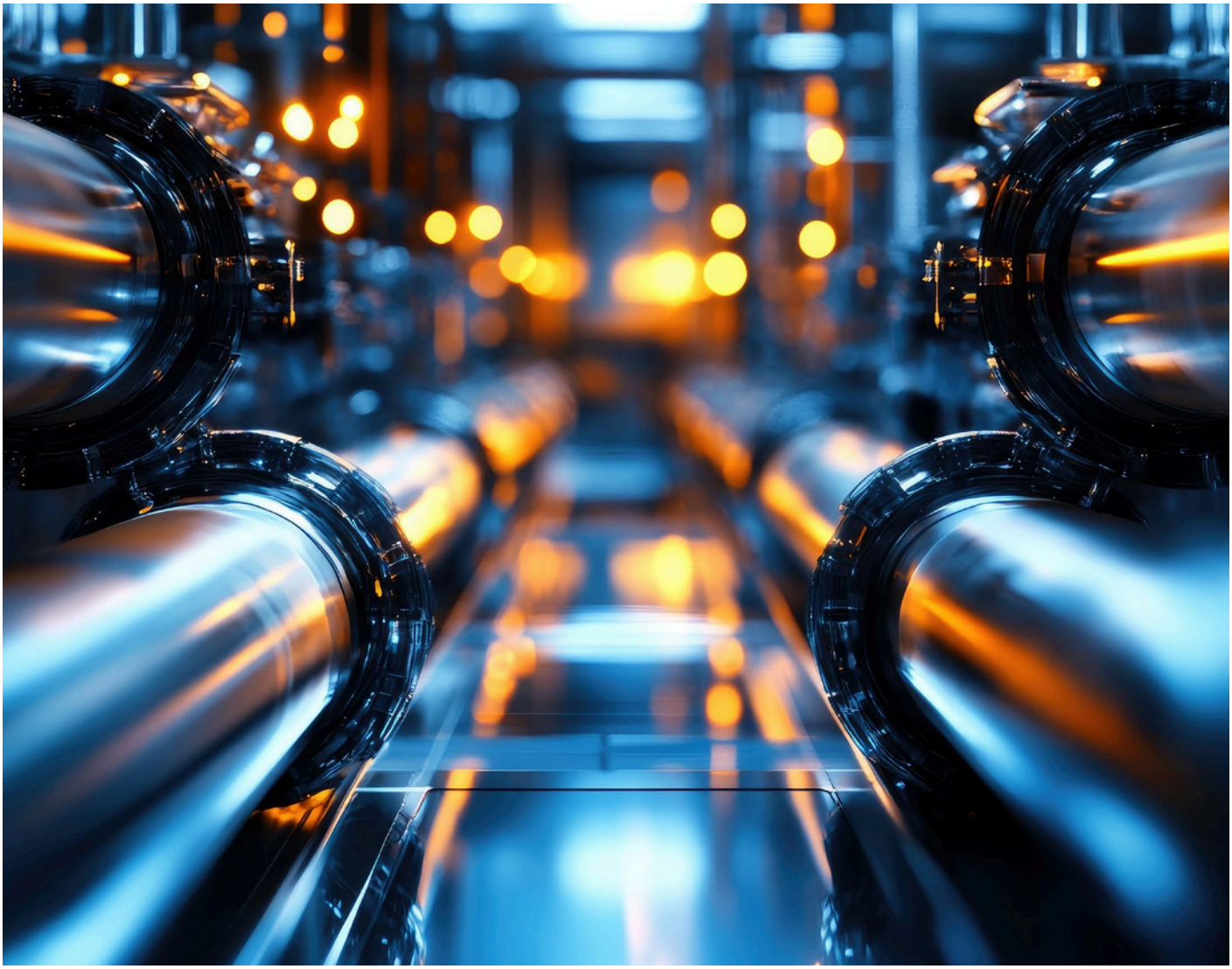
This report focuses on four key areas:

- The role of innovation in today's context.
- Structural challenges shaping the evolution of innovation models.
- Key trends influencing the future of energy innovation.
- Organizational archetypes and sector maturity models.

The report combines quantitative and qualitative methodologies to analyze how leading players in the energy sector are structuring and accelerating their innovation strategies to navigate the energy transition.

Qualitative analysis: In-depth interviews were conducted with innovation leaders from more than 15 companies across the energy sector including oil & gas, gas & power, utilities, venture capital, and research centers supported by public data from corporate sources and expert reports.

Quantitative analysis: The study includes investment data related to startups and emerging technologies, drawn from the expanded Energy Trends proprietary database. It incorporates more than 1,200 startups with publicly announced investment rounds between 2022 and 2025, providing insight into tech trends, capital flows, and geographic dynamics during this period.



Interviews with industry leaders.

Jesús Montes
Collaborative Innovation with Academia & partners, Moeve

Estela Vilches
Head of Open Innovation, Moeve

Belén Linares
Innovation Director, Moeve

Oscar Cantalejo
Head of Corporate Venturing & Open Innovation, Iberdrola

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Product Design Director, Energy Systems Deep Tech, Repsol

Fernando Ruiz
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Tema Benhalima
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Johann Boukhors
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José Biondi
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2.

Strategic challenges for innovation in the energy sector

2. Strategic challenges for innovation in the energy sector

A new environment for energy innovation

In a landscape shaped by th eenergy transition, regulatory volatility, and geopolitical shifts, the challenges go far beyond launching pilots. They span from redefining innovation as a strategic driver to orchestrating complex integrations with external ecosystems and internal cultures.

Complexity is on the rise. Innovation today requires more than isolated experimentation. It demands informed risk-taking, identifying value creation opportunities beyond the core, fostering ecosystem collaboration, and building internal capabilities to scale rapidly. Additionally, it necessitates that organizations function with a dual perspective: achieving immediate outcomes while establishing the foundation for long-term change.

In this new scenario, more complex and far-reaching challenges arise. The question is no longer whether to innovate, but how to structure and govern innovation so that it delivers concrete and sustainable results.

Key innovation challenges facing organizations

Based onreal-world casesand executive interviews, the report identifies ten structural challenges that directly affect the impact of innovation efforts. These go beyond operational hurdles they are strategic decisions that will shape the future of each company's ability to generate meaningful outcomes.

These challenges span critical areas: defining a clear, focused strategy; building agile organizational structures connected to the business; strengthening an internal culture of innovation; evolving metric systems toward value-oriented models; and intelligently engaging with the external ecosystem from startups to tech hubs and investment
funds.

However, addressing these challenges requires more than just tactical solutions, it requires a systemic approach that transforms innovation from a goal into a sustainable capability.

Top 10 innovation challenges

Measure the strategic impact of innovation.
Evolving from operational metrics to strategic and value-driven outcomes.

Define the capabilities model: internal development vs. external leverage.
Deciding when to lead and when to adopt, with clear purpose

Balance innovation team autonomy with business integration.
Empowering teams while maintaining a sharp focus on business priorities.

Position innovation as a strategic engine not just an operational function.
Turning innovation into a structural engine for transformation.

Scale innovation: from pilot to large-scale deployment.
Moving from pilot testing to mass adoption and tangible impact.

Orchestrate the balance between incremental and disruptive or transformational innovation.
Balancing operational efficiency with transformational innovation

Evolve startup engagement models.
Evolving from pilots to sustained, value-oriented partnerships.

Transform organizational culture to enable innovation agility.
Fostering agility, learning, and an innovative mindset.

Define innovation roadmaps in an uncertain and changing environment.
Designing flexible roadmaps to navigate regulatory and technological shift

Define innovation roadmaps in an uncertain and changing environment.
Balancing internal strengths with ecosystem leverage.

Measure the strategic impact of innovation

As innovation becomes a strategic lever for energy companies, measuring its impact with precision is no longer optional. Activity metrics and effort-based KPIs are no longer sufficient organizations must demonstrate how innovation initiatives contribute to business performance, competitive advantage, and strategic commitments.

The real challenge lies not just in what gets measured, but in establishing clear traceability between innovation efforts and captured value. This means setting shared strategic goals, aligning stakeholder expectations, and applying consistent evaluation criteria across the entire innovation cycle. Robust innovation measurement is essential for justifying future investments and guiding strategic decision-making toward sustained business growth.

Balance innovation team autonomy with business integration

As energy companies professionalize their innovation structures, a key challenge emerges: **how to grant innovation teams sufficient autonomy to explore new solutions without losing their connection to the business.**

The agility and creativity of innovation teams depend largely on their operational autonomy, which allows them to act quickly, experiment without undue constraints, and take controlled risks.

However, excessive independence or isolation can lead to a disconnect from corporate strategy and business priorities, limiting impact, complicating scale-up, and weakening the overall coherence of innovation initiatives.

The challenge is to strike the right balance between autonomy and connection, ensuring that innovation teams do not become satellites disconnected from the business, nor subordinated executors with no room for exploration. This requires strengthening a shared vision between innovation and the business, avoiding duplicated efforts, and ensuring that innovation initiatives remain aligned with strategic objectives without sacrificing agility, disruptive thinking, or future-readiness.

Scale innovation: from pilot to large-scale deployment

One of the most frequent **gaps in energy-sector innovation models lies between a successful pilot and real adoption at scale.**

Although many companies have built effective capabilities to explore technologies, validate concepts, experiment, and launch controlled pilots, ensuring that these solutions scale remains one of the most critical stages of the innovation cycle.

While it is natural that only a portion of exploratory initiatives progress to implementation since breadth in early stages is inherent to the innovation process a persistently low scaling rate severely limits the return on innovation efforts. When validated solutions fail to translate into real adoption, the system loses traction and, with it, the capacity to generate sustainable impact. The proliferation of pilots without a clearly defined adoption strategy undermines the internal credibility of the innovation system.

This is a structural challenge. It requires designing innovation from the outset with an adoption mindset, anticipating barriers early, and activating concrete implementation mechanisms.

> “In the past, the technologies energy companies needed already existed in the market; the challenge was gaining access to them. Today, many of the required solutions simply do not exist or remain at very early stages of maturity. This forces organizations to assume technological risks that were previously avoided.
>
> **Fernando Ruiz, Chief Technology Officer & Corporate Venturing Director, Repsol**

Evolving startup engagement models

Collaboration with startups has become a key pillar of open innovation in the energy sector. However, **this type of relationship is evolving rapidly — driven by the need to accelerate outcomes**, **scale validated solutions, and create business-aligned synergies.** Also, companies face the challenge of adapting so that these partnerships generate real and scalable value. Mechanisms such as innovation hubs, venture capital funds, or internal intrapreneurship programs remain relevant, but their role is shifting. What were once peripheral or financially-driven tools are now maturing into strategic platforms enabling tech scale-up, supporting the energy transition, and unlocking new sources of value.

These models helped companies initially engage with the ecosystem, but they now face a new challenge: aligning more closely with core strategy and operations.
The challenge is not to expand openness to the ecosystem, but to reposition that relationship as an active component of the innovation model. This means shifting to more selective, integrated models focused on scalability, where collaborations with startups become a key element of the corporate innovation strategy.

A new environment for energy innovation

In a landscape shaped by the energy transition, regulatory volatility, and geopolitical shifts, the challenges go far beyond launching pilots. They span from redefining innovation as a strategic driver to orchestrating complex integrations with external ecosystems and internal cultures.

Complexity is on the rise. Innovation today requires more than isolated experimentation. It demands informed risk-taking, identifying value creation opportunities beyond the core, fostering ecosystem collaboration, and building internal capabilities to scale rapidly. Additionally, it necessitates that organizations function with a dual perspective: achieving immediate outcomes while establishing the foundation for long-term change.
In this new scenario, more complex and far-reaching challenges arise.
The question is no longer whether to innovate, but how to structure and govern innovation so that it delivers concrete and sustainable results.

Define innovation roadmaps in an uncertain and changing environment

Energy companies are increasingly challenged to design innovation strategies in environments characterized by uncertainty. Frequent regulatory changes, geopolitical tensions, rapid evolution of key technologies, and pressure to accelerate the energy transition create an environment in which establishing a **clear, stable, long-term roadmap is particularly complex**.

The challenge is not only to adapt to the environment, but to make strategic decisions under high ambiguity: investing in technologies without a defined regulatory framework, building capabilities that may become obsolete, or deploying solutions whose commercial viability depends on political or regulatory signals.

In this context, innovation requires a new planning logic more flexible, iterative, and capable of being reconfigured as external conditions evolve. This implies prioritizing diversified portfolios, building adaptive capabilities, and maintaining constant monitoring mechanisms to detect external signals, anticipate scenarios, and adjust direction as needed.
Designing robust roadmaps in unstable contexts does not mean seeking certainty, but building strategic frameworks that are agile enough to maintain direction while preserving the ability to course-correct.

> “To achieve carbon neutrality by 2050, between 50% and 70% of the required technology is not yet commercially available; it remains in laboratories or technology centers. The technologies available in 2025 are not sufficient. For this reason, investing in technological innovation is not optional it is structural.
>
> **Emilio Martínez, Head of Entrepreneurship & Open Innovation, Enagás**

Define the capabilities model: internal development vs. external leverage

A central dilemma for energy companies is how to design their innovation capability architecture: Should they develop the necessary resources, teams, and technologies in-house or leverage external players in the innovation ecosystem?

Both approaches have advantages and limitations. Building in-house capabilities ensures control, protects critical know-how, retains talent, and enables direct integration with operations and strategy. However, building from scratch often requires more time, greater risk tolerance, and higher resource consumption. In contrast, the ecosystem startups, research centers, technology partners, and investment funds offers speed, access to mature solutions, and capabilities that may not exist within the organization. The challenge isn't about choosing one over the other it's about managing the structural tension between internal development and external openness, a tension that is becoming increasingly visible in the sector's innovation models.

This tension plays out in concrete decisions: where to allocate internal talent, what to scale with third parties, which capabilities to consider strategic, and which to delegate through partnerships.

Orchestrate the balance between incremental and disruptive or transformational innovation

One of the most common dilemmas in energy organizations is how to balance focus between continuous improvement initiatives and disruptive bets in technology or business models.
In a rapidly transitioning environment, it's critical to manage both incremental improvements and transformational innovation in parallel.

Incremental innovation focused on operational efficiencies or internal processes tends to dominate due to its lower risk and faster return. However, moving toward new energy businesses, digital models, or net-zero solutions also requires transformational innovation, with longer horizons and higher uncertainty.

The challenge lies in balancing both horizons and maturity levels ensuring that short-term urgency doesn't eclipse the bold bets required to shape the future of the business.

Position innovation as a strategic engine not just an operational function

Although innovation has been widely adopted by companies in the energy sector, its strategic role still shows varying levels of maturity.

In many organizations, **innovation is still viewed through an operational lens focused on solving technical challenges or supporting isolated initiatives**. Today's challenge is no longer about starting innovation, but about repositioning it as a central lever to enable growth, diversification, and the energy transition. Repositioning innovation also requires a cultural shift one that promotes new ways of working, integrates risk and opportunity, and embraces long-term, disruptive thinking.

This paradigm shift is essential for energy companies to adapt to sectoral change, generate competitive advantage, and lead the energy transition.

> "The demand for innovation talent is outstripping supply, and fierce competition from the digital sector is driving up turnover. For major energy companies, attracting and retaining these profiles has become a top-tier strategic challenge.
>
> **Pedro Rodriguez, Strategic development director, Aqualia.**

Transform organizational culture to enable innovation agility

One of the most recurring challenge in shaping innovation models in energy is adapting an organizational culture originally designed for control and efficiency into one that is more open to risk, agility, and continuous learning.
In many companies in the energy sector shaped by industrial, regulated, and low-risk trajectories cultural dynamics persist that hinder agility, experimentation, and the adoption of new ideas.
Key cultural obstacles include risk aversion, reliance on lengthy approval cycles, rigid internal processes, and difficulty integrating entrepreneurial talent profiles.

These factors slow down the pace at which innovative solutions can be developed, tested, and scaled.
The challenge lies in managing both horizons and levels of maturity simultaneously without allowing short-term urgency to overshadow the bold commitments needed to shape the business of the future. In many companies in the energy sector shaped by industrial, regulated, and low-risk trajectories cultural dynamics persist that hinder agility, experimentation, and the adoption of new ideas.

Define innovation roadmaps in an uncertain and changing environment

The advancement of technologies such as green hydrogen, next-gen batteries, artificial intelligence applied to energy networks, and flexibility solutions raises a fundamental strategic question for energy companies: **In which areas does it make sense to lead the technology curve — and where is it more efficient to adopt mature solutions?**

> “Today, we operate in a far more open and collaborative environment, driven by a dynamic ecosystem. For teams with a background in closed development models and intellectual property protection, moving toward co-creation has required a profound cultural shift in how we approach innovation.
>
> **Belén Linares, Innovation Director, Moeve**

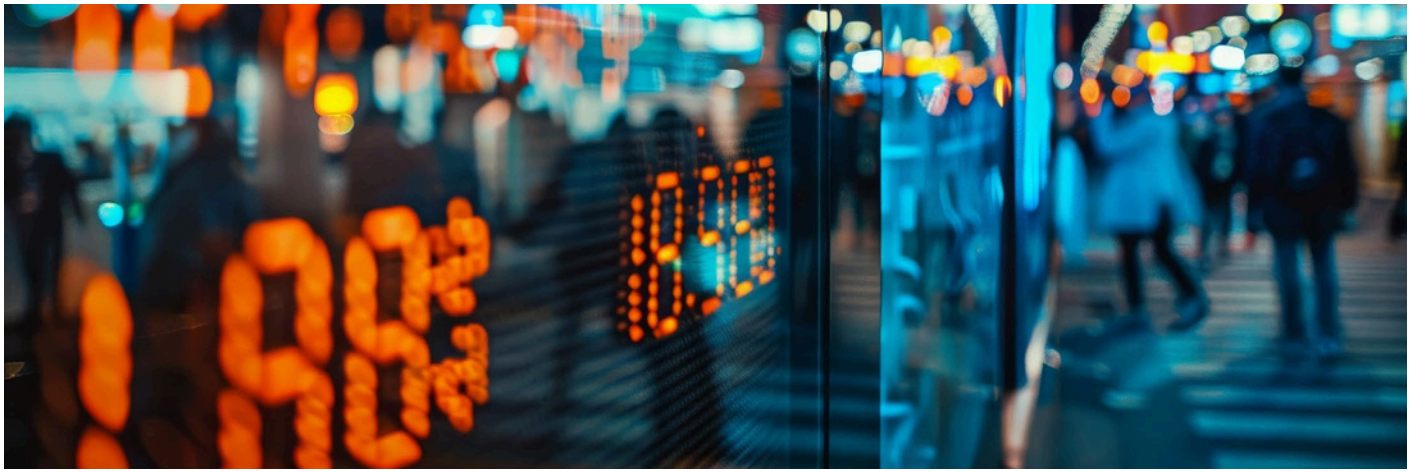
Innovation doesn’t always mean being the first mover. Being a technology leader promises advantages in differentiation and competitiveness, but it involves greater risk and investment. In contrast, adopting mature technologies offers stability though it may limit the ability to capture disruptive advantages.

This challenge is especially relevant in a sector exposed to markets where many technologies are still under development access to mature solutions is limited, and the innovation landscape is marked by significant technological uncertainty.

In this context, companies must make a key strategic decision: define in which areas they should take an active role in driving emerging technologies, and in which areas it is more efficient to adopt solutions validated by the market.

This challenge demands a strategic assessment of each technology and business vertical evaluating not only its level of technological maturity, but also its alignment with internal capabilities, corporate objectives, and market timing. Decisions about what to lead and what to follow define each organization’s risk profile and innovation ambition.

> “ENGIE does not manufacture technologies. Engie's value proposition and business model is to be an architect of solutions, integrating external technologies into our projects and infrastructure. So we take what exists on the market, we finance it, we build, we operate and maintain. Hence, getting privileged access to innovative technologies is key to be best in the energy transition.
>
> **Johann Boukhors, Managing Director of New Ventures, ENGIE**



Shared challenges map: what keeps energy innovation leaders up at night?

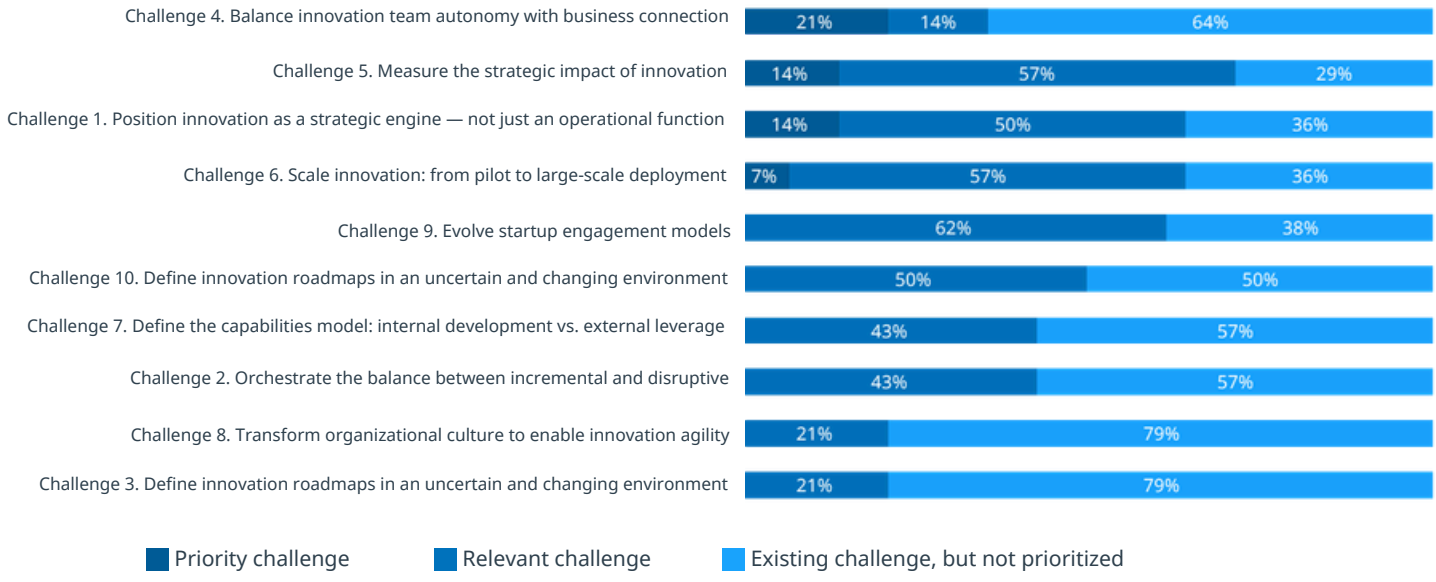
A tthe executive level, clear patterns emerge across energy companies around the strategic challenges involved in consolidating innovation models. While each company operates in a distinct context, these challenges emerge with varying degrees of presence and intensity reflecting the structural frictions that constrain progress toward more mature innovation models. This reinforces the need to address them as strategic priorities in organizational design and decision-making.

A sector in motion: adapting to meet the challenge

Overcoming these barriers isn't about applying standard solutions it's about designing innovation models tailored to each organization's strategy, portfolio, and operational reality. When innovation is treated as a structural function of the business not just a reactive capability companies are better positioned not just to respond to change, but to lead it.

The challenges in this matrix define the battleground for leadership. They are the tensions companies must manage so that innovation stops being a promise and becomes a true lever for transformation.

Priority level of strategic innovation challenges (from interview data)



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

Methodological Note

The chart represents the ten key challenges identified through qualitative analysis, categorized by level of mention: low, moderate, or high. The rows correspond to the companies interviewed; the columns represent strategic innovation challenges. This cross-reference highlights the cross-cutting nature and relative urgency of each challenge.

3.

Trends driving the evolution of energy innovation

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Trends redefining innovation models

The role of innovation in energy companies is undergoing a process of structural transformation. It is no longer just about generating new ideas or exploring technologies, but about redesigning organizational models capable of integrating innovation as a strategic and operational component of the business.
Based on in-depth interviews and best practices from leading players in the sector, a set of cross-cutting trends has been identified that define how innovation
is structured, governed, measured, and connected to the energy industry.

These trends are organized around five core dimensions: strategy, structure, culture, metrics, and ecosystem. Together, they offer a clearer lens for understanding how organizational models are evolving and the implications for future innovation management.

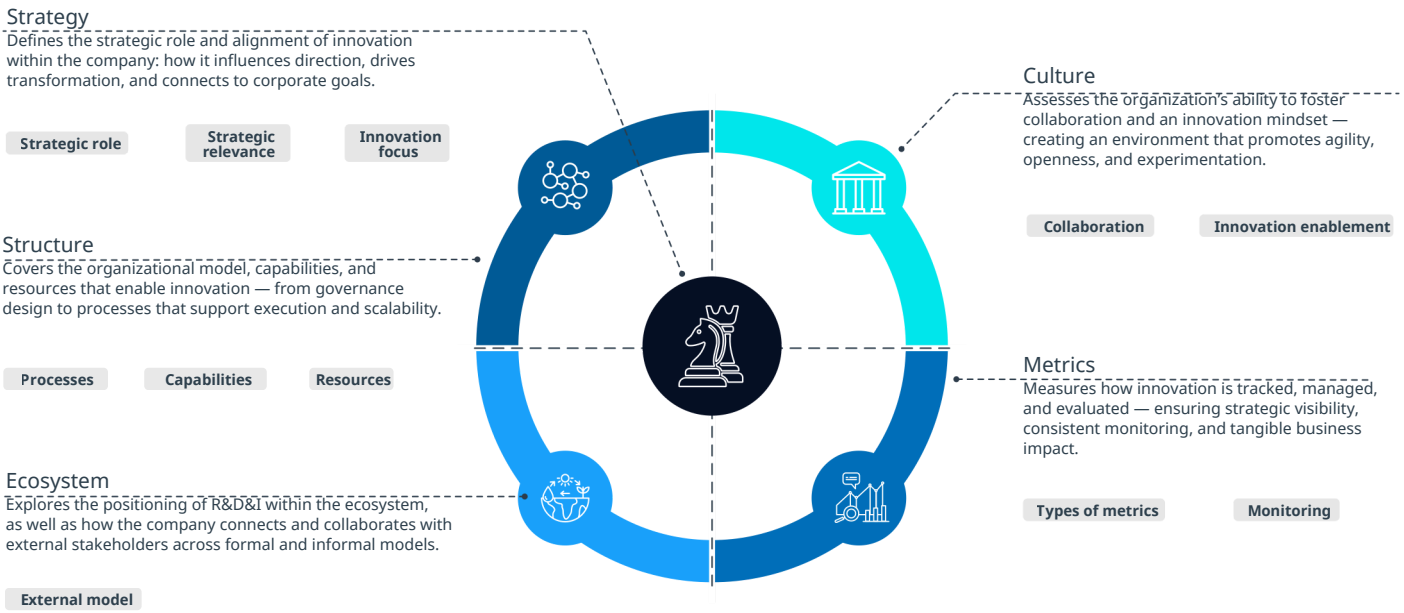
Decalogue of best practices for successful innovation

This section brings together **best practices in leading companies, both from the energy sector and complementary industries**, which can guide efforts toward more mature innovation models. The goal is not to replicate structures, but to adapt strategic principles that help strengthen internal capabilities and ecosystem engagement.

Through comparative analysis and interviews, key actions have been identified that are guiding the evolution of innovation models. These guidelines are not exhaustive but are designed to steer strategic decisions toward more effective models aligned with business strategy
and capable of delivering tangible outcomes.

The best practices are presented in alignment with the five pillars of our innovation framework.

Innovation framework



This framework allows for a comprehensive analysis of how companies structure, govern, and operate innovation. With five pillars, eleven attributes, and forty-seven variables, it supports maturity assessment, benchmarking, and identification of gaps and innovation opportunities.

Strategy: From enabler to driver of the transition

Innovation has evolved from a functional role into a core dimension of corporate strategy. It is shifting from a supporting channel to an active instrument of transformation—one capable of redefining competitive positioning and accelerating the achievement of structural goals.

A dual focus is emerging, encompassing both the optimization of the core business and the creation of new ventures. This positions innovation as an enhanced competitive advantage, deeply rooted in sustainability commitments and ESG strategies. A critical factor in this process is the clear definition of innovation's role and scope within the company. Establishing what innovation entails its boundaries, its exclusions, and its objectives—enables the alignment of expectations, the setting of priorities, and a stronger articulation of its link to the business. This strategic clarity is the foundational enabling condition for scaling and generating impact.

Best practices

Innovation as the engine of the energy transition

Innovation units are directly geared toward enabling decarbonization, electrification, and energy efficiency goals, as well as the deployment of technologies such as hydrogen and energy storage.

Innovation as a Source of competitive differentiation

There is a shift from defensive to offensive logic: innovation becomes a lever for sector positioning, technological leadership, and new revenue streams.

Alignment with ESG Strategy

Innovation is articulated through public sustainability commitments and Net Zero targets, integrating as an enabling lever for environmental, social, and governance goals. Reporting and traceability mechanisms are being strengthened to provide clear evidence of its contribution to overall innovation performance.

Long-Term Strategic Alignment Guided by Tech

Foresight Strategic decision-making is supported by foresight tools, technology scouting, and regulatory scenarios. This anticipatory capability ensures that investments are directed toward relevant solutions in contexts of accelerated change.

> We want to drive and enable the country's energy transition, and we are committed to that ambition. That is why we created a division called Copec Wind. There is a deep conviction, even at Board level, that this will work; we have been investing consistently for the past five years through a programmatic investment approach
>
> **Ramón Salinas, Head of Copec Wind Garage, Copec**

> We are in a stage of continuous technology scouting. From that screening, we create reflection spaces at the executive and advisory committee levels to anticipate trends and decide whether to position ourselves. This analysis feeds into the evolution of our roadmap, such as Positive Motion 2.0 or 3.0.
>
> **Belén Linares, Innovation Director, Moeve**

Open Innovation as a Structural Axis of Corporate Strategy

Open innovation is evolving from a tactical tool into a central pillar of corporate strategy. Faced with the need to accelerate solutions, scale technologies, and reduce time-to-market, external collaboration has become a vital pathway for incorporating capabilities and activating new business models. In this role, the company acts as an orchestrator. More than just an option, open innovation is now a primary differentiator within the sector.

Connected Autonomy

Priority is given to models that grant innovation units greater autonomy, allowing them to operate with agility and make decisions outside of traditional hierarchies. However, this independence is balanced by "business-linkage" mechanisms: joint committees, bridge roles, early involvement of business units, and shared tracking of strategic KPIs. This approach enables speed without sacrificing alignment with corporate priorities.

Balancing Core Optimization with New Business Creation

Governance frameworks are being solidified to balance incremental innovation with transformational bets. This duality ensures both short-term efficiency gains and the development of new capabilities for the medium and long term

> Business prioritization is important but it's not always what's best for the company. That's why we want to establish a governance model that separates ownership across different types of innovation projects: who owns the challenge, who owns the solution, and who owns the decision.
>
> **Elena de Benavides, Head of Corporate Venturing & Innovation Ecosystems, Elewit**

> We're not looking for incremental innovation. We ask a fundamental question: Are you sure this solution works? If yes, then it's your responsibility it's not innovation. That shift reflects a new mindset: when you're unsure if something will work, your mentality and approach are completely different.
>
> **António Coutinho, CEO EDP Innovation, EDP**

> Perseo has become our engine to explore more disruptive solutions beyond the traditional perimeter of R&D. It's our gateway to collaborate with startups and scale emerging technologies that take us further than internal development alone, accelerating transformation of our innovation model.
>
> **Oscar Cantalejo, Head of Corporate Venturing and Open Innovation, Iberdrola**

Sucess cases

Repsol Case Study | TechLab: Strategic center for technological innovation

Repsol's Technology Lab serves as the company's innovation core, blending internal R&D capabilities with strategic external alliances. Spanning over 530,000 square feet of laboratories and pilot plants, it accelerates the development of technologies such as renewable hydrogen, circular products, and digital solutions. Its model integrates proofs of concept (PoC), startup acceleration, and corporate venturing within a collaborative ecosystem that drives the company's sustainability and energy transformation.

Moeve Case Study | Innovation as the structural core of energy transformation

The transition from CEPSA to Moeve reflects a structural transformation of the energy business, where innovation has evolved from a support function into the central pillar of corporate strategy. It enables new technological vectors, accelerates the decarbonization agenda, and repositions the company as a key player in the new multi-energy paradigm. By 2030, 60% of total investment will be allocated to sustainable businesses, with innovation serving as the engine for developing solutions in green hydrogen, biofuels, electrification, and integrated digital services.

Structure: Organizational designs to integrate and scale innovation

Energy companies are reshaping their structures so innovation is not a peripheral function but a built-in, cross-company capability. Hybrid models are becoming standard, blending freedom to explore new solutions with clear operational links. This shift answers the need to speed up implementation, scale efficiently, and deliver measurable impact.

The most advanced models move away from static or centralized setups, adopting modular approaches that adjust roles, resources, and governance depending on the innovation stage. New key roles such as business partners, program owners, and expert domains help align tactical challenges with innovative value propositions. Established scaling processes, prioritization methods, and technology scanning strengthen the ability to turn ideas into solutions with real technical feasibility and adoption.

In this context, structure is no longer just support; it becomes a strategic enabler that defines the pace, reach, and long-term strength of the innovation portfolio.

Best practices

Business-aligned governance.
Mixed committees, co-investment mechanisms, and decision circuits bring business leaders into the process early, breaking the traditional isolation of innovation teams.

Scaling as a critical phase.
Scaling becomes a key lever for innovation. Companies define clear adoption criteria, dedicated resources, and people responsible for operational integration early on. To support this, they formalize the process with governance structures, dedicated budgets, and effective transfer mechanisms to the business.

Stage-based operating model.
Companies organize their operating model according to the maturity of each initiative, adjusting processes, governance, resources, and responsibilities throughout the innovation funnel. This approach helps manage everything from early exploration to business integration, improving how effort is allocated and speeding up key decisions.

Structured technology foresight.
Dedicated areas are established to monitor and analyze emerging technologies, producing regular outputs such as radars, technology maps, or evolution scenarios. These capabilities feed into strategic decision-making, helping anticipate disruptions, adjust the portfolio, and prioritize innovation areas with a stronger long-term view.

Portfolio segmentation by maturity, horizon, or impact.
The use of structured frameworks (such as TRL, horizons, and objectives) becomes consolidated, helping define the strategic makeup of the portfolio. This practice enables resource allocation, autonomy, and success criteria tailored to each type of innovation, balancing operational efficiency with transformational exploration.

Bridge roles with the business.
New roles emerge, such as innovation business partners or program owners within operational units, ensuring strategic alignment, tactical traction, and a sense of ownership from the business side. This direct connection between innovation and operations accelerates adoption, validates use cases, and scales with stronger internal legitimacy.

Hybrid and modular architectures.
Innovation structures blend different formats such as centers of excellence, open hubs, and distributed units organized by technology area, business maturity, or exploration needs. This modular setup allows flexible responses, the scaling of specific capabilities, and adaptation to different levels of autonomy or connection with the core.

Execution capability as the guiding force.
Innovation maturity is measured by the ability to implement real solutions. Beyond idea generation, mechanisms are established to coordinate resources, solve operational frictions, and transfer solutions to the business. Execution becomes a central criterion for assessing impact.

Sucess cases

EDP Case | Corporate Shark Tank for Emerging Opportunities.

EDP runs an internal "Shark Tank" through the GIS (Global Innovation Steering) committee, made up of innovation and business leaders. Ideas classed as Emerging Business Opportunities (EBOs) are presented and evaluated using four key questions: Does it matter? Is it viable? Is it aligned with EDP? Can we win? Each initiative receives resources to validate critical assumptions before scaling. The process brings business units in from the start, helping move ideas into adoption faster.
Domain-focused teams act as a constant bridge between innovation and operations.

Galp Case | Applying the 70/20/10 model to define portfolio balance.

Galp builds its innovation strategy around an annual roadmap with seven priority areas, applying the 70/20/10 model: 70% of the effort goes to incremental improvements requested by the business, 20% to disruptive solutions, and 10% to exploration. This approach is guided by a demanding KPI: scaling eight technologies or products into the business each year, with direct validation from operational units. The model helps balance the portfolio, ensure adoption, and maintain a clear link to strategic goals.

Orlen Case | Skylight Accelerator, an accelerator with distributed governance and an operational focus.

Orlen has structured its acceleration program (Skylight Accelerator) with a distributed governance model that strengthens its link to the business. Each unit has innovation coordinators and its own budget to run pilots without depending on the center, reducing friction and speeding up validation. Meanwhile, the central team provides project managers who support execution without overloading operational areas, ensuring alignment and agility. This mix of operational proximity, decentralized budgets, and expert guidance has helped scale solutions with strong adoption.

> Innovation is not just about the idea, but about how you bring it into the value chain. If I can't integrate it, no matter how good it is, without action it's not innovation. Innovation is an invention at scale; if it doesn't scale, it's just an invention.
> António Coutinho, CEO EDP Innovation

> We have what we call Expertise Domains, whose role is to serve as the entry point between innovation and the business. They act as the gatekeepers of the process and maintain an active, real-world network within the business unit.
> **António Coutinho, CEO EDP Innovation**

> We seek to identify technologies with the potential for massive, transformational impact, despite their high-risk nature. These projects are part of a curated portfolio that receives specialized treatment. This portfolio runs on a separate track, featuring dedicated oversight, tailored management, and a specialized team following a specific methodology.
> **José Biondi, Innovation & Technology Manager, Vista Energy**

Culture: Enabling an Innovative Environment

Organizational culture is establishing itself as a critical pillar for transforming innovation into a transversal, sustainable capability aligned with strategic business challenges. Leading energy companies are moving away from rigid, hierarchical models to foster environments where controlled risk-taking is legitimized, continuous learning is institutionalized, and people from all areas are empowered to propose, lead, and scale solutions.

This transformation is supported by a robust agenda focused on training, internal recognition, and an openness to external talent—breaking down silos and accelerating the connection between innovation and operations

Best practices

Distributed and cross-functional innovation.
Innovation involvement expands across all levels of the organization, reaching beyond technical teams. Each unit develops its own champions and business leaders who share responsibility for strategic initiatives, integrating innovation goals into their performance.

Continuous learning and institutionalized upskilling.
Training programs on agile methods, impact analysis, and innovation leadership are strengthened. These efforts boost organizational maturity and validate time spent innovating as part of formal work.

Shift in the corporate mindset.
Active change-management initiatives help overcome risk aversion, enable more collaborative ways of working, and open space for experimentation, even in traditionally conservative units.

Innovation communities and events.
Formal and informal spacessuch as innovation weeks, cross-regional workshops, and internal challenges bring together people from different areas, encourage co-creation, and reinforce a cultural identity focused on change.

Sponsors and ambassadors as internal enablers.
The roles of strategic sponsors and innovation ambassadors are being consolidated across different levels of the organization. These profiles—ranging from operational to executive levels—act as key allies in lowering barriers, facilitating the adoption of solutions, and accelerating business integration.

Environments that legitimize controlled risk.
A culture is promoted that recognizes failure as a core part of the learning process, enabling iterative piloting, continuous feedback, and decision-making based on hypotheses and early evidence

Strategic positioning through visible results and ongoing connection with the business.
Innovation teams strengthen their internal credibility by acting as drivers of organizational change and catalysts for growth. To achieve this, they focus on delivering tangible outcomes through scaled pilots, active support for business units, and consistent sharing of success stories.

> One of our core values is innovation and that means it's not just our team's responsibility. We act as enablers and connectors. This year, 27% of our employees took part in innovation activities, exceeding our original 25% goal. That level of engagement is made possible thanks to initiatives like the Innovation Festival and the role of innovation ambassadors across the company.
> **Angela MacOscar, Head of Innovation, NWG**

> In the first stages, we are intentionally open to risk, we only expect four out of ten projects to succeed, and that's by design. What matters most is capturing the learning. We don't discard ideas; we bank them, because valuable concepts often resurface when timing, technology, or business context is more favorable.
> **Angela MacOscar, Head of Innovation, NWG**

Sucess cases

NWG Case Study | Innovation Festival as a vehicle for connection, visibility, and cultural impact

NWG's Innovation Festival is a flagship initiative that brings together employees, partners, startups, and external experts in a creative and collaborative environment. More than just an event, it serves as a platform for strategic project visibility, cultural activation, and ecosystem connection. It has helped position innovation as a cross-cutting priority within the organization, fostering internal engagement and openness to new ideas aligned with real business challenges.

Elewit Case Study | Innovation as an internal career accelerator

Participation in innovation projects has become a reputational asset within the group. This approach positions employees who rotate through innovation as change agents within their units, strengthening the department's legitimacy and aligning talent development with an innovative culture. This experience is highly valued in promotions, recognizing expertise gained in collaborative, agile, and technological exploration environments.

Metrics: From operational tracking to adoption and strategic impact

Innovation measurement is evolving from operational control toward integrated systems that link innovative activity with strategic outcomes. Leading companies are redefining what success means in innovation: it is no longer just about generating ideas or pilots, but about effective adoption, scalability, tangible business value, and alignment with corporate goals.

A transition is underway from activity indicators (number of pilots, budget execution) toward metrics that evaluate innovation's concrete contribution to revenue, efficiency, decarbonization, or strategic positioning. This evolution requires building a common language with business and finance units, establishing standardized criteria, and strengthening impact traceability.

At the same time, organizations are refining their measurement systems: fewer, but more strategic indicators. Priority is given to key metrics aligned with innovation objectives that enable agile decision-making and demonstrate a real contribution to corporate growth. Furthermore, adoption metrics are being incorporated to assess the integration level of solutions into operations, alongside induced return indicators (such as savings, future revenue, or access to differential capabilities). In parallel, the use of OKRs (Objectives and Key Results) is gaining relevance as a framework to align innovation efforts with strategic goals, reinforcing execution discipline

Best practices

Shift toward strategic impact metrics.
Move from activity-based measures (pilots, budget) to indicators tied to new revenue, operational efficiency, emission reduction, and alignment with the strategic portfolio.

Focus on adoption and scale.
Initiatives are valued for their ability to be implemented in real operations. This avoids a “pilot inflation” without concrete results.

OKR systems as a unifying framework.
Using OKRs (Objectives and Key Results) is becoming a key way to turn strategy into action, enabling ambitious yet measurable goals and creating a shared narrative across technical teams, business units and senior leadership. In more mature organizations, OKRs work not only as a tracking tool but as a governance system linking innovation directly to corporate strategic priorities.

> “Projects are assessed using Copec’s ‘Right to Win’ logic, identifying where we have a clear competitive advantage: why are we best positionedto pursue this opportunity, and which capabilities enable us to scale the businessbeyond its currentstage and grow it in a differentiated way?
>
> **Ramón Salinas, Head of Copec Wind Garage, Copec**

> “The most relevant metric is the solutions adopted. That is, projects that have started and are being implemented in the business, because otherwise we run the risk of becoming a museum of great pilots that ultimately generate no value
>
> **Elena de Benavides, Head of Corporate Venturing & Innovation Ecosystems, Elewit**

Expanded strategic impact metrics

Innovation metrics are evolving toward a holistic vision that reflects not only financial or technical performance but also its contribution to broader strategic goals. Evaluation systems are being consolidated to account for impact on sustainability (ESG), talent development, cultural transformation, and corporate reputation.

Business and Finance participation

Cross-functional teams are being established to define common indicators that are understandable and acceptable to all involved departments.

Induced value metrics

Impact evaluation through expected benefits, generated savings, or enabled competitive advantages, even when no direct prior benchmarks exist.

Continuous project evolution tracking

Beyond final indicators, a structured monitoring system is established to track project progress throughout its entire lifecycle. Stage-gate metrics (scouting, validation, piloting, adoption) are utilized to enable informed decision-making, pivot direction when necessary, and evaluate key learnings. This approach promotes active portfolio management and strengthens organizational agility

Sucess cases

Vista Energy Case Study | OKRs as the axis of alignment between innovation and business

Vista Energy uses the OKR (Objectives and Key Results) methodology as a structural framework to align innovation with strategic business goals. Each innovation program—led by business leads—defines specific, measurable annual objectives, such as emission reductions, which serve as the foundation for building and prioritizing the technology initiative portfolio. This integration ensures focus, impact traceability, and operational commitment from the business, facilitating both the validation and the large-scale rollout of pilot technologies.

> “We have an Agile OKR methodology already utilized across several industries where we identify new technologies specifically aligned to improve Key Results based on our defined objectives. At the corporate strategy level, everything is quantified using these same indicators and managed by a centralized PMO (Project Management Office).
>
> **José Biondi, Innovation & Technology Manager,Vista Energy**

> “We measure the return on innovation through a 360-degree lens: not only in financial terms but also through talent, digitalization, and especially safety a core pillar for Moeve that encompasses people, processes, and assets. All of this impact is converted into value, including its equivalent in euros.
>
> **Belén Linares, Innovation Director, Moeve**

Ecosystem: Consolidating open innovation as a structural pillar of the model.

Open innovation has moved beyond being a complementary tactic to becoming a structural axis of innovation models. Leading energy organizations are articulating complex ecosystems that combine investment, operational collaboration, joint technological development, and international expansion to accelerate the access, validation, and scaling of disruptive solutions

Este nuevo enfoque implica un rediseño de los mecanismos de conexión con el entorno. Se observa una evolución desde programas aislados hacia plataformas permanentes de interacción con startups, universidades y socios tecnológicos. La figura del venture client se consolida como una vía efectiva para resolver retos de negocio con soluciones maduras, mientras que los CVCs reconfiguran su rol, pasando de vehículos financieros a instrumentos estratégicos para captar, escalar e internacionalizar innovación.

Furthermore, venture builders and sectoral co-investment models are being incorporated as tools to drive systemic solutions, while global capillarity is being reinforced through international hubs, funds, and cross-industry alliances.

Best practices

Strategic fit as a central criterion for collaboration and investment.
Strategic fit is becoming a key criterion in the selection of startups, technology partners, and collaborative initiatives. Companies are prioritizing solutions whose value proposition addresses specific business challenges, increasing the likelihood of adoption, scalability, and strategic return. This entails more rigorous screening processes, greater involvement from operational areas, and alignment from the outset.

Strategic positioning of Open Innovation.
They are evolving into hybrid structures that combine financial return with strategic alignment. They act as technological and commercial bridges, facilitating the adoption and scaling of solutions within the business.

Internationalization of access to innovation.
Hubs, funds, and networks are being established in key locations (Silicon Valley, Israel, Europe) to expand technological surveillance and detect solutions outside the local radar.

Corporates as market access platforms.
Large companies not only invest in or incubate startups, but also offer them privileged access to their infrastructure, customers, technical expertise, and distribution channels. This platformization accelerates solution validation, reduces barriers to entry, and generates mutual value: startups scale faster, and corporations gain access to applied innovation with greater agility.

> “The way CVC seeks to position itself in the startup world is by acting as a market access platform from the very beginning of the investment. In Latin America, our role is to offer that "unfair advantage" as a corporate host. Although we work in the pre-launch phase, much of our effort is focused on the follow-up, because that's where we truly generate value.
> **Ramón Salinas, Head of Copec Wind Garage, Copec**

Venture client as an operational adoption route.
The venture client approach is consolidated to validate mature technologies and accelerate their integration, with increasing rates of effective adoption.

Shared sector funds and platforms.
Alliances are emerging between competitors to co-invest, launch joint challenges, or scale startups systematically.

Venture building and intrapreneurship models.
Companies develop internal structures to incubate their own solutions or those of third parties, allowing them to capture value beyond the perimeter of their current business.

M&A as an accelerator of technological integration and scaling of solutions.
The use of alliances, technology integrations, spin-offs, and the creation of new business units to scale solutions originating outside the core business is expanding. Beyond its traditional role in corporate growth, companies are using M&A in innovation as a way to acquire critical technological capabilities, incorporate solutions, and accelerate their deployment at scale, integrating startups or scaleups as new business units. This consolidates a logic where M&A acts as a bridge between open innovation and structural transformation of the business portfolio.

CVC as an exploration and learning role.
The external innovation ecosystem (startups, funds, hubs, universities) operates as a strategic extension that allows for embracing technological uncertainty and accelerating learning in less familiar territories. This openness doesn't replace internal capabilities, but rather complements them by offering a space where it's possible to fail, iterate, and validate before scaling, mitigating risks without stifling innovative ambition.

Acceleration and scaling through third parties.
The use of alliances, technological integrations, spin-offs or the creation of new business units is being expanded to scale solutions that originate outside the core.

Permanent open innovation platforms focused on business challenges.
Spaces for continuous collaboration with startups, universities, technology centers and industrial partners are institutionalized and integrated into the innovation operating model.

> “Investing in external funds that support more mature startups can be ‘comfortable’ for industrial companies because it involves relatively low financial risk and works as a useful complement to a diversified investment strategy. However, it rarely transforms the business. The real value — and what is truly transformative — lies in engaging at earlier stages, adapting them and scaling them together with the business, or even exploring entirely new business models. Only then does innovation become a true engine of change rather than an isolated financial bet.
>
> **Emilio Martinez, Head of Entrepreneurship & Open Innovation, Enagás**

> “For years we have had a platform for launching challenges that serves as an open channel for collaboration. Through it, both the innovation team and other departments can pose strategic challenges, allowing us to identify and implement solutions across the organization.
>
> **Oscar Cantalejo, Head of Corporate Venturing and Open Innovation, Iberdrola**

Sucess cases

Copec Case | Wind Ventures: Structural CVC in Silicon Valley as a bridge for regional innovation.

San Francisco-based Wind Ventures positions Copec as a leading Latin American firm in strategic corporate venture capital. Beyond simply investing, the platform enables Copec to identify disruptions, build technological alliances, and adapt solutions to the regional context. Since 2019, it has invested over US$160 million in 24 startups, including several unicorns and successful exits. Recognized as CVC Impact Investor of the Year USA 2024, as well as the best CVC in Latin America in 2024 and 2025, Copec Wind Ventures exemplifies how to use CVC as an engine for structural integration into the global ecosystem.

Iberdrola case study | Perseo as a strategic platform to scale solutions and drive new businesses.

Perseo acts as a comprehensive open innovation platform within Iberdrola. Beyond its investment role, it facilitates the operational integration of startups and the co-creation of new companies with business units. Its activities include global scouting, technical validation, strategic investment, and support for business model design. This structure has accelerated the adoption of key technologies and generated new growth avenues aligned with the energy transition.

> Our Venture Client model allows us to address specific business challenges by collaborating with startups mature enough to scale on Redeia, but still open to co-development. This approach enables us to capture value early and accelerate adoption: 42% of pilot projects have been adopted by the business.
>
> **Elena de Benavides, Head of Corporate Venturing & Innovation Ecosystems, Elewit**

> Through Perseo, we foster the creation of new companies in areas adjacent to Iberdrola's core business, where we identify clear synergies and the potential to deliver complementary services. It provides a pathway to explore new businesses with scalability, leveraging the broader ecosystem.
>
> **Oscar Cantalejo, Head of Corporate Venturing and Open Innovation, Iberdrola**

4.

Investment analysis and trends in the energy sector

4. Investment analysis and trends in the energy sector

Global investment context in the energy sector

Investment in energy not only determines the pace of deployment of new technologies: it structurally shapes the future architecture of the energy system.

The energy transition is not achieved solely through political objectives or technological advances, but also through capital flows that prioritize decarbonized, digitalized, and resilient solutions. Therefore, understanding where investment is headed is essential for planning **the evolution of the global energy system and the areas where innovation should be directed.**

In 2024, global energy investment exceeded $3 trillion for the first time, with more than two-thirds allocated to clean technologies. The investment ratio between clean and fossil fuel generation (which increased from 2:1 in 2015 to 10:1 in 2024) is a clear sign of the shift in priorities in the global energy economy. (IEA 2024)

This dynamism responds both to regulatory pressure and to the need to anticipate the loss of value of traditional assets and capture opportunities in emerging markets.

Investment dynamics in energy sector startups

Global capital is flowing into the energy transition like never before. However, this investment surge is not keeping pace in the venture capital ecosystem. While startups play a key role in innovation, energy sector players, including corporate funds and specialized investors, are demanding more robust, interconnected, and integrable solutions to justify their capital commitments.

In this context, the dynamism that characterized investment in startups in recent years has begun to moderate. The demand for greater technological robustness and strategic alignment has reduced the appetite for

nascent projects, giving way to a more contained and selective phase within the energy venture capital ecosystem.

While the number of investments in energy sector startups has decreased, the volume of capital allocated to these deals remains steady. This trend reflects a more selective investment environment, where investors prioritize projects with greater stability, scalability, and integration potential within the energy ecosystem. Furthermore, factors such as tighter financial conditions and greater caution in resource allocation have led to a readjustment in venture capital dynamics.

Slowdown in the number of investment deals in startups in the energy sector

Between 2019 and 2022, the global energy startup ecosystem experienced a phase of strong acceleration, driven by financial conditions.

Favorable conditions, ambitious climate policies, and an unprecedented wave of technological innovation have fueled this trend. However, starting in 2023, this dynamic shows a clear shift: the number of startups invested in fell by 42% between 2022 and 2024, according to data from the Energy Trends database. This slowdown reflects a move towards a more strategic and selective investment approach.
Current dynamics are characterized by:

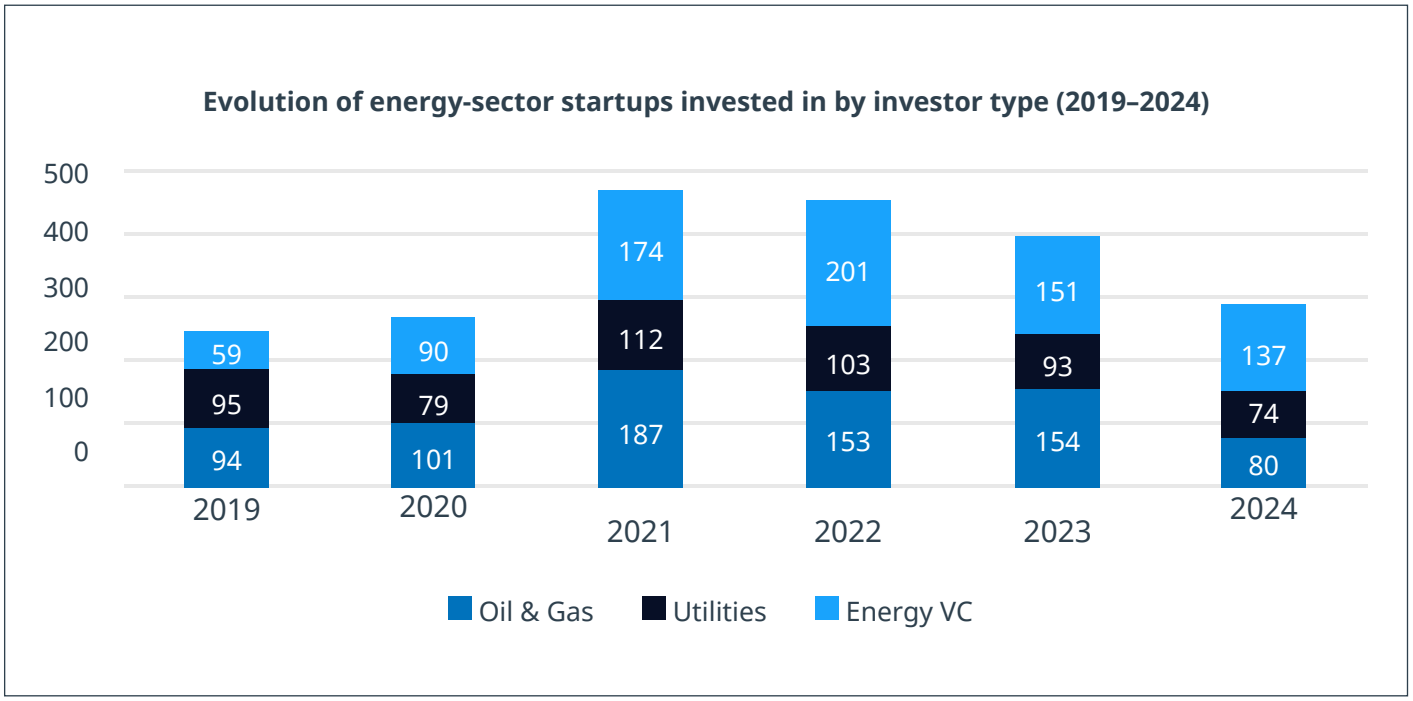
- **Slowdown in the volume of startups invested in.** The decline in volume reflects a more demanding investment environment, where quality takes precedence over quantity and projects with greater potential for scaling and return are filtered more rigorously.

- **Stability of committed capital.** Although the number of deals has decreased, investment volumes remain stable, indicating a greater concentration of capital in fewer startups and a preference for more solid bets.

- **Increased investment in scaling phases (Series A/B)**. Series A and B rounds are gaining prominence, targeting startups with proven technologies and industrialization capabilities, in line with the need to accelerate the commercial deployment of energy solutions.

- **Thematic focus.** Investment is increasingly concentrated on technologies directly linked to decarbonization and the transformation of the electricity system, reflecting a clear orientation towards the structural challenges of the sector.

- **Strategic alignment with the core business.** Energy corporations use corporate venture capital as a targeted innovation tool, seeking operational synergies and new growth platforms aligned with their energy transition objectives.



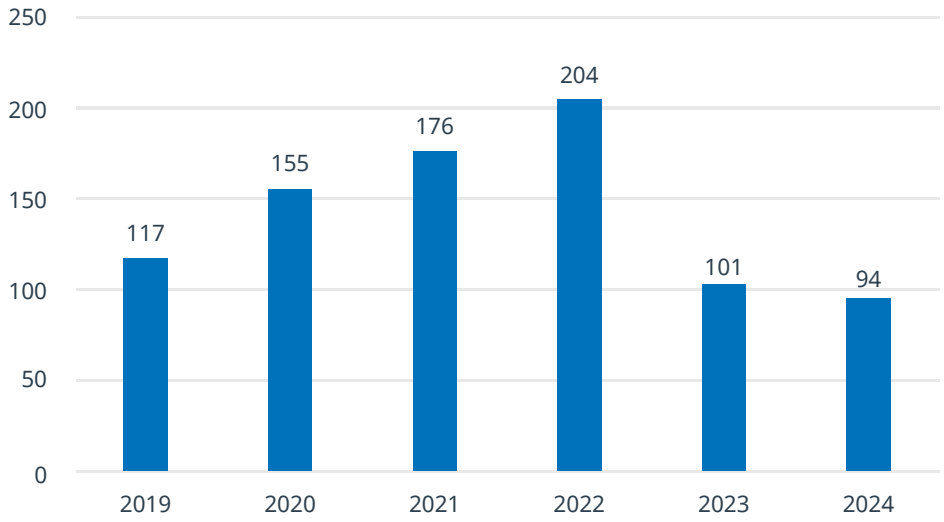
Investor type analysis reveals important insights Energy venture capital (Energy VC) funds, which led the expansion of the ecosystem between 2019 and 2021, have adjusted their activity in the current period, but consolidate their position as the main investors in energy startups over the period from 2022 to 2024. During these years, they have represented, on average, **36% of total investment volume**, reflecting a sustained long-term strategy aimed at identifying and scaling technologies with high transformational potential.

Oil & Gas companies, while still relevant players, have reduced their investment volume by more than 15% compared to 2022 and 2023 levels. This reflects growing caution in the face of regulatory and technological uncertainty, as well as a more selective approach.

Utilities have followed a much more stable path, integrating innovative solutions in areas such as smart grids, flexibility, and demand management.

Meanwhile, Big Tech players significantly increased their investment activity between 2019 and 2022, reaching a peak of 204 startup investments. Since then, their participation has fallen to 94 deals in 2024, representing a 54% drop. This mirrors the trend seen across the broader energy investment ecosystem. This decline in volume has been offset by a significantly higher average ticket size, targeting scalable digital solutions with strong technological synergy.

Evolution of startups invested in by Big Tech (2019–2024)



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

> “We’re witnessing a structural shift: the energy future will be increasingly distributed. Pressure on the grid is pushing the focus away from large-scale utility projects and toward local solutions — commercial and residential solar, home batteries, microgrids, and DC-based systems — offering resilience and flexibility where it’s needed most.”
>
> **Fred Beach, Director, Energy & Earth Resources Graduate Program, Jackson School of Geosciences, University of Texas at Austin**

The State of Energy Innovation report (IEA, 2025) corroborates this trend: during 2024, global venture capital allocated to energy startups fell by more than 20% in aggregate terms, in a context marked by several macroeconomic factors:
This trend is consistent with a macroeconomic environment marked by:

- **High interest rates,** which increase the cost of capital and reduce the interest in risky investments.
- **Increased scrutiny of expected returns,** especially in technologies with high capital intensity or long maturation periods.
- Skepticism towards new disruptive technologies that have not yet reached the expected milestones in commercial deployment, industrialization or scalability.

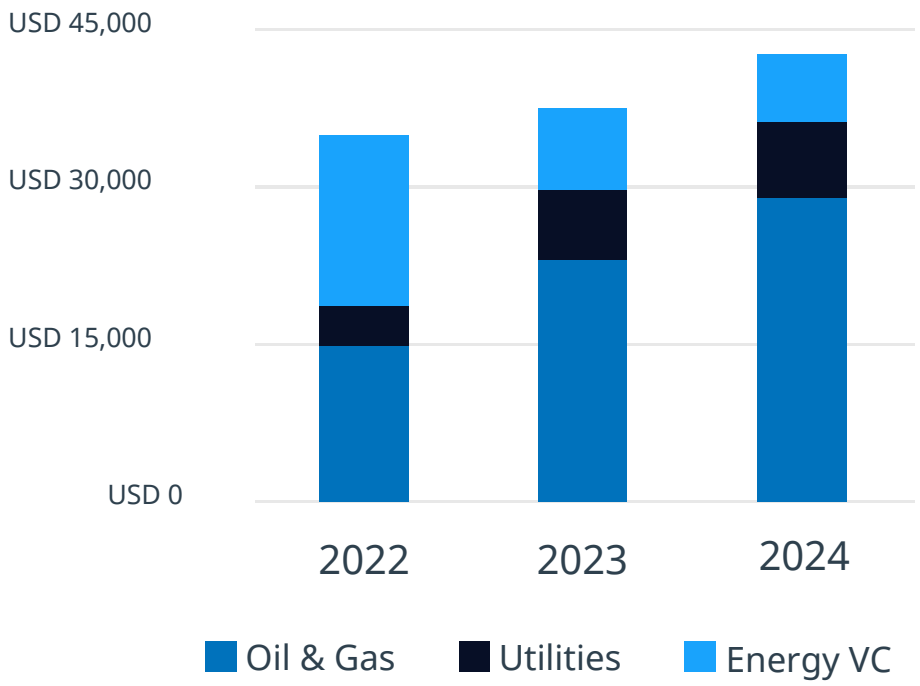
Continuity in investment amounts

Although the number of energy startups invested in has decreased significantly between 2022 and 2024, the total capital allocated to the sector has shown remarkable resilience.

In fact, aggregate investment has grown slightly, exceeding $40 billion annually in 2024. This trend suggests a greater concentration of resources in fewer startups, but with greater maturity and industrial potential, reflecting the transition to a more strategic investment approach.

By type of actor, companies in the energy sector, especially Oil & Gas and utilities, maintain or **increase their investment levels,** assuming a leading role in this new stage of the ecosystem.

Evolution of investment volume by investor type (2022–2024)



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

The evolution of the average transaction value reinforces the hypothesis of greater selectivity in investment theses during the 2022–2024 period. This trend is clear when comparing current data with that collected in the Energy Trends 2022 report, which covered the 2018–2021 period.

In the **Oil & Gas** sector, the average deal size rose from **$34 million** in 2018–2021 to **$82 million** in 2022–2024. This significant increase reflects a more focused investment strategy, where despite a reduction in the number of deals companies have opted to concentrate capital in startups with greater strategic or industrial potential.

Utilities sector has followed a similar trajectory. The average ticket rose from **$23 million** in 2018–2021 to **$35 million** in 2022–2024. While the growth is more moderate than in Oil & Gas, it still points to increased selectivity, with decisions leaning toward quality over quantity. Big Tech companies show a similar dynamic: although they have reduced the total number of deals, they have significantly **increased average transaction size**, reaching **$295 million per transaction in 2024**, up from **$170 million in 2022**.

Rise in scale-up stage investments (Series A/B)

The analysis by funding stages across **Oil & Gas, Utilities, and energy venture capital (Energy VC)** funds reveals a **progressive reconfiguration toward more advanced stages**, particularly **Series A and B**.
The evolution in funding stage profiles between 2022 and 2024 confirms a gradual realignment with corporate capital priorities, consistent with the trends documented in Energy Trends 2022 (2018–2021 period).

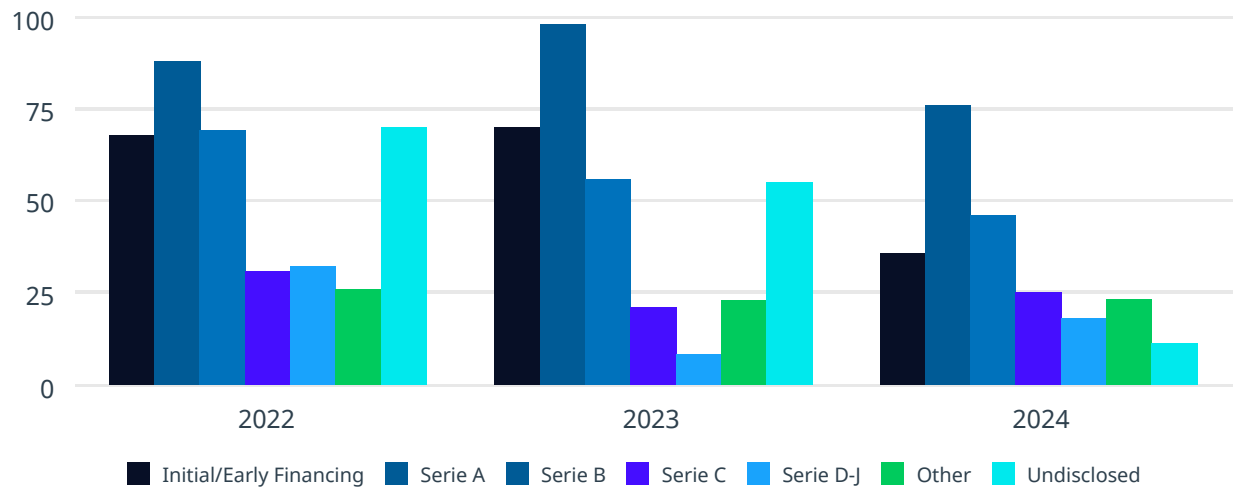
Series A rounds have been the main protagonists in the recent period, increasing their relative share from **22.1%** to **27.6%**, which represents a rise of more than 5 percentage points.

This growth cements their role as the preferred vehicle for channeling investment into companies with validated traction and industrial scalability.

Initial/Early financing rounds have also gained visibility, rising from **14.9%** to **18.3%**, indicating continued interest in early-stage opportunities—but with more rigorous selection standards. On the other hand, **Series B** rounds have slightly lost ground, falling from **19.1%** to **18%**, while **Series C** and **Series D–J** have seen sharper declines of **2.7** and **2.1 percentage points**, respectively.

In summary, these data reflect a more focused and selective investment strategy, where capital is directed toward proven, scalable solutions with lower risk profiles. In the current transition stage, energy capital appears to be shifting away from exploration and moving toward the industrial deployment of validated technologies.

Evolution of investment by funding stage (2022–2024) – Utilities, Oil & Gas y Energy VC



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

When analyzing the data by type of player, clear differences emerge in how each group allocates capital. From an overall perspective, investment trends between 2022 and 2024 show a shift toward a greater concentration in Series A and B rounds, while activity in the earliest stages (Pre-Seed and Seed) contracts.

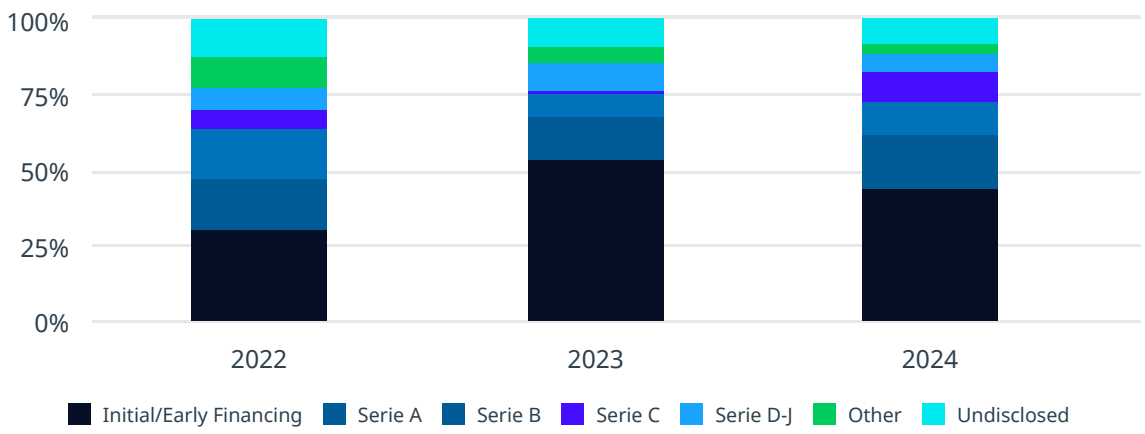
This pattern is particularly evident among **Energy VC funds**, which in 2024 directed **82% of their operations toward early-stage rounds** (Seed, Series A, and Series B), up from 77% in 2022. **Only 9%** of activity corresponds to advanced rounds (Series C and beyond), confirming an investment thesis focused on startups with validated technology that are still in a growth phase. Although the most exploratory stages account for a smaller share of overall activity (Seed declines from 25% to 20%), venture capital continues to be the player with the **strongest and most sustained commitment to the early stages** of technological development.

Within the **Utilities** segment, investment behavior remains broadly stable in early-stage rounds, albeit under a more **selective approach**. In 2024, **75% of operations are concentrated in Series A and B**, while **Seed accounts for just 12%**, indicating a clear preference for startups with validated solutions that are close to commercial deployment. Advanced rounds (Series C and beyond) maintain a limited presence, reinforcing the idea that this type of player prioritizes solutions aligned with operational needs, while deliberately avoiding exposure to immature technologies or late-stage scale-up strategies. The moderate decline in deal volume across all stages between 2022 and 2024 further points to a more cautious investment stance shaped by the current macroeconomic environment.

Oil & Gas follows a more pronounced trajectory, marked by a progressive **retreat from early-stage investment**. Between 2022 and 2024, the combined share of Seed, Series A, and Series B declines from **65% to 52%** of total operations. The most visible shift occurs in **Seed**, which falls from representing **17% of investments in 2022 to just 3% in 2024**, reflecting a reduced willingness to assume risk in exploratory stages. Unlike Utilities, this segment channels a larger proportion of its activity toward advanced rounds such as Series C, D, or even E and F (reaching up to **20% in 2024**), indicating a **growing preference for mature technologies** with proven scalability or demonstrated commercial traction. This evolution points to a **reconfiguration toward more conservative investment profiles, with a clear orientation toward the short to medium term**.

A different logic characterizes the approach adopted by large technology companies in the energy domain. While energy-focused venture capital funds concentrate most of their activity in **early-stage** rounds (Initial Financing, Series A, and B), **Big Tech** players tend to position themselves in more advanced rounds, such as **Series C or higher (D–J)**. Their preference for technologically mature startups reflects a **growth model centered on acquiring proven solutions** and **integrating already consolidated digital capabilities**, rather than directly supporting projects in their initial development stages. In this context, their role within the ecosystem aligns more closely with **rapid scaling and the capture of technological synergies** than with driving innovation at the seed stage.

Evolution of investment by funding stage (2022–2024) – Big Tech



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

Investment is regionally dominated by North America and Europe.

The regional distribution of investment in energy startups shows a clear concentration in two main poles: North America and Europe, which consistently account for more than 75% of the global total in the analyzed period.

North America, and especially
The United States is consolidating its position as the global epicenter of energy investment, with a relative weight that
exceeds 50% of the total in 2022 and 2023, and remains at 48.6% in 2024. This leadership is explained by a highly developed venture capital ecosystem, supportive public policies such as the Inflation Reduction Act, and the strong presence of corporate and technology funds.

Europe occupies second position
With 31.8% of the total in 2022, 33.7% in 2023, and 34.5% in 2024, Europe shows a moderate but steady growth trend. Although its volume is smaller than that of North America, it stands out for its more diverse investor ecosystem, with institutional, public, and corporate players, and a strong alignment with the climate objectives of the European Green Deal. In a global context of investment contraction, Europe maintains its resilience, consolidating itself as a stable hub for technology capital geared towards the energy transition.

On a smaller scale, Asia-Pacific
(APAC) represents between 8.9% and 9.6%
of the investments in the last three years, with a stable participation and sustained growth
in clean technologies, smart grids and storage.
Although its volume remains limited, it reflects the progress of economies such as South Korea, Japan, or Australia.

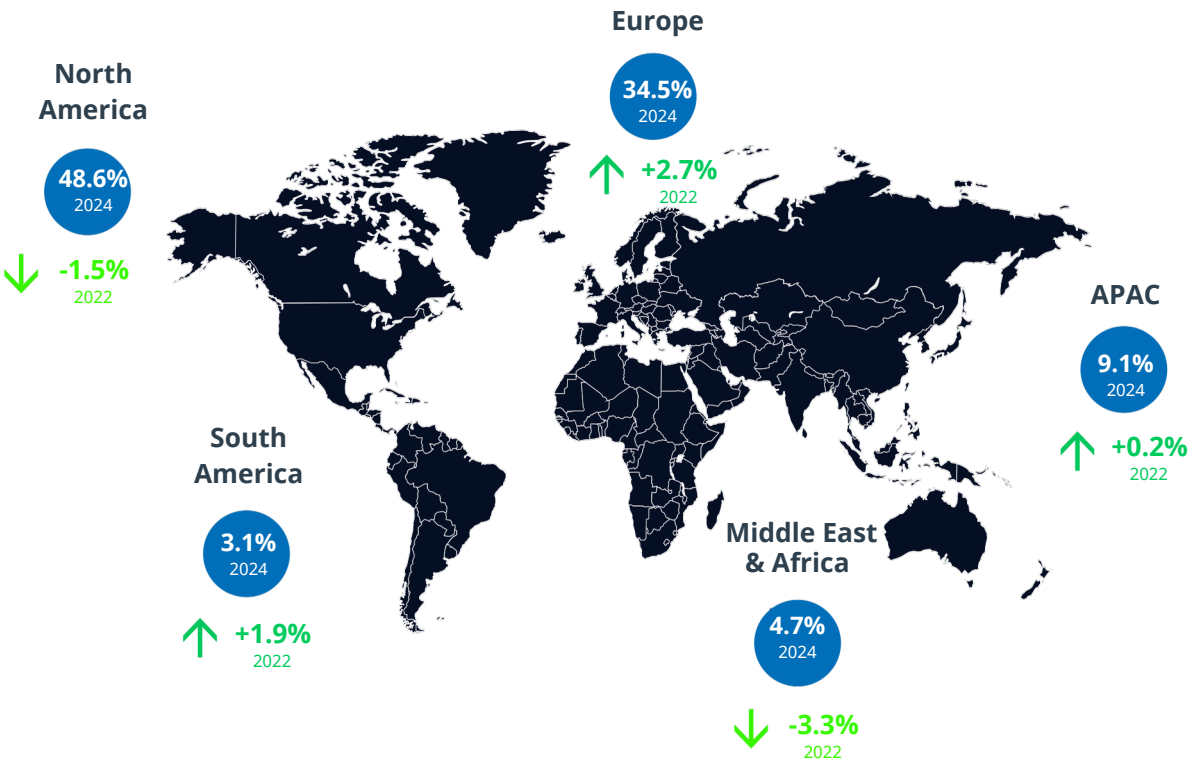
Middle East, Africa and South America
They still concentrate a marginal fraction **of global capital (less than 10%),** but they show growth **relative relevant.**

In particular, South America goes from 8 operations in 2022 and 2023 to 12 in 2024 (+50%), driven by the dynamism of hubs such as Brazil or Chile.

In the Middle East, the United Arab Emirates' position as an emerging player is beginning to translate into greater capital inflows.

This geographical evolution reflects the degree of maturity and sophistication **of the global ecosystem: the poles** Consolidated regions not only concentrate more capital, but also impose the technological agenda, while emerging regions are beginning to position themselves as new vectors of innovation in the energy transition.

Regional distribution of energy-sector startups invested in (2022–2024)



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

At a thematic level, regional biases are also evident in technological investment focuses. North America clearly leads in digital solutions, concentrating more than 35% of its investments in technologies associated with data analytics, traceability, and energy intelligence, reflecting its commitment to automation and advanced systems control.

Europe, on the other hand, presents a a more balanced distribution, with a combination of digitization **(approx. 20%), renewable generation and storage (more than 30%)** and electric mobility and efficiency. This distribution demonstrates an approach consistent with the principles of the Green Deal and with an orderly and multi-sectoral transition.

In Asia-Pacific, approximately 40% of investment is channeled towards **mobility solutions and new digital consumption models,** This indicates a preference for technologies geared towards the end user and the urban market.

Meanwhile, the Middle East and Africa concentrate approximately 30% of their investment in resilience and energy security technologies, including basic digitization of infrastructure, while South America, despite its smaller volume, shows signs of incipient specialization, allocating more than 25% of its investment to clean energy, distributed solutions and the circular economy.
These differences reveal that, beyond volume, each region is **consolidating a unique technological profile within the transition** global energy.

CVCs as key players in the investment ecosystem

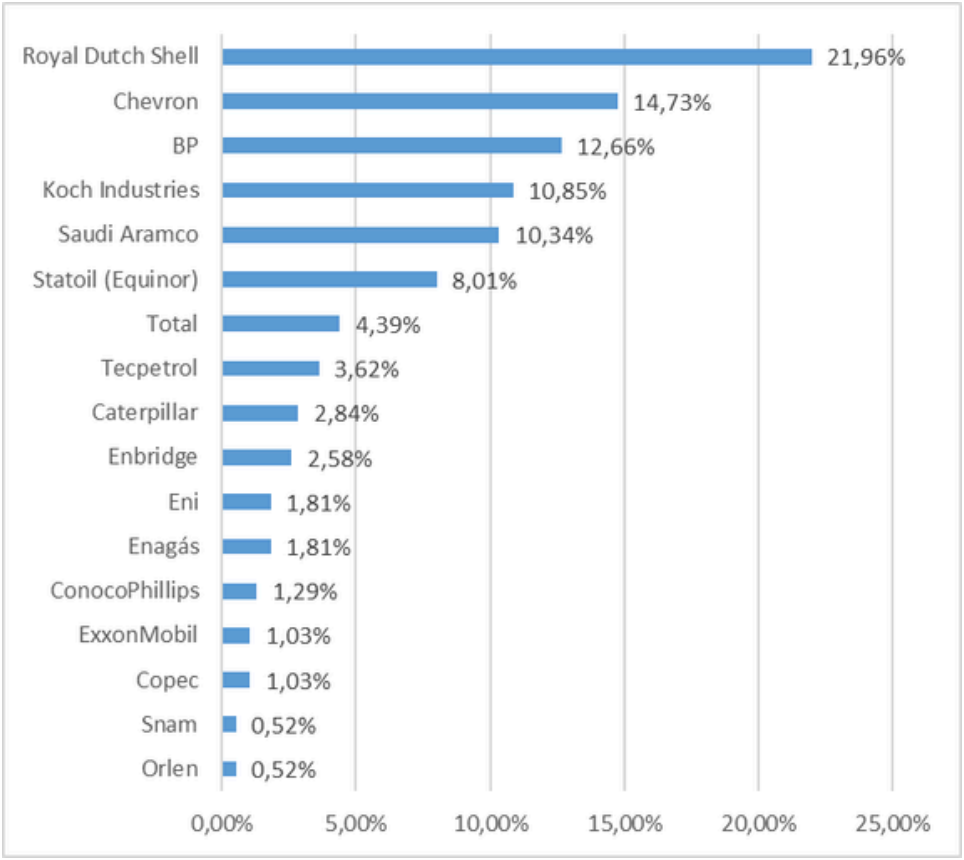
In recent times, some of the most significant investments in energy startups have been led by large corporations through their Corporate Venture Capital (CVC) vehicles. These transactions reflect a dual logic: on the one hand, the commitment with the energy transition; on the other hand, the need to incorporate disruptive innovation into their growth strategies.

Oil & Gas companies leading investment in the energy sector

In recent years, large groups in the Oil & Gas sector have intensified their investment activity in technology startups and strategic assets, in a shift towards a more selective approach aligned with the challenges of decarbonization, efficiency and operational transformation.

In quantitative terms, companies like Royal Dutch Shell, BP, Chevron, Aramco, and ConocoPhillips lead in the number of transactions for the 2022–2024 period, according to Energy Trends data. Shell is positioned as the most active player in terms of transaction volume, followed by BP and Chevron, with diversified investments in hydrogen technologies, carbon capture, charging networks, and advanced chemical solutions.

Key players investing in Oil & Gas 2022 – 2024 – Oil & Gas



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

Recent investments by major companies in the Oil & Gas sector reveal a common strategic pattern: investing in technologies that accelerate their energy transition using existing industrial capabilities. These investments are not only financial but also operational, aligned with the structural transformation of their businesses.

- **Caterpillar** has invested in Redwood Materials, one of the most significant emerging players in the circular economy for batteries. This investment reinforces its commitment to integrating advanced recycling solutions into its value chain, particularly in relation to electrified machinery.

- **Chevron** has backed TAE Technologies, which specializes in Compact nuclear fusion, suggesting a long-term commitment to disruptive sources of clean energy with high energy density potential.

- BP has diversified its strategy with two key moves: investment in RELEX Solutions, focused on energy optimization through artificial intelligence in logistics chains, and in Lightsource bp, its subsidiary specializing in the development and operation of large-scale solar projects, with a strong global deployment.

- Equinor has invested in Electric Hydrogen, one of the most promising startups in the industrialization of large-capacity electrolyzers for green hydrogen, consolidating its role in promoting scalable solutions in this energy vector.

These transactions reveal that Oil & Gas capital is converging around four major technological focuses:

- **Production and storage of hydrogen (green or solar).**
- **Recycling and circularity of critical materials.**
- **Renewable generation on an industrial scale**
- **Energy digitization applied to operational efficiency.**

Taken together, these investments reinforce a clear logic: it is not about just by diversifying portfolios, but rather to reconfigure capabilities industrial with proprietary or integrated technology, aimed at maintaining competitiveness in a context of accelerated energy transition.

Top 5 investments by Oil & Gas (2022–2024)

Inversor	Startup	Inversión	Año	Ronda	Tecnología
CATERPILLAR	**Redwood Materials**	3.817M USD$	2023	Serie D	Circular Economy
Chevron	**TAE Technologies**	1.166M USD$	2022	Serie G	Descentralized Energy
bp	**RELEX Solutions**	804M USD$	2023	Venture	Data Analisys
bp	**Lightsource BP**	643M USD$	2023	Olther	Grid-Scale Renewables
equinor	**Electric Hydrogen**	602M USD$	2023	Serie C	Hydrogen

Utilities leading investment in the energy sector

Utilities have maintained a steady pace of investment in energy startups during the 2022–2024 period, reinforcing their role as key players in the operational deployment of the energy transition. Unlike Oil & Gas, their strategy is

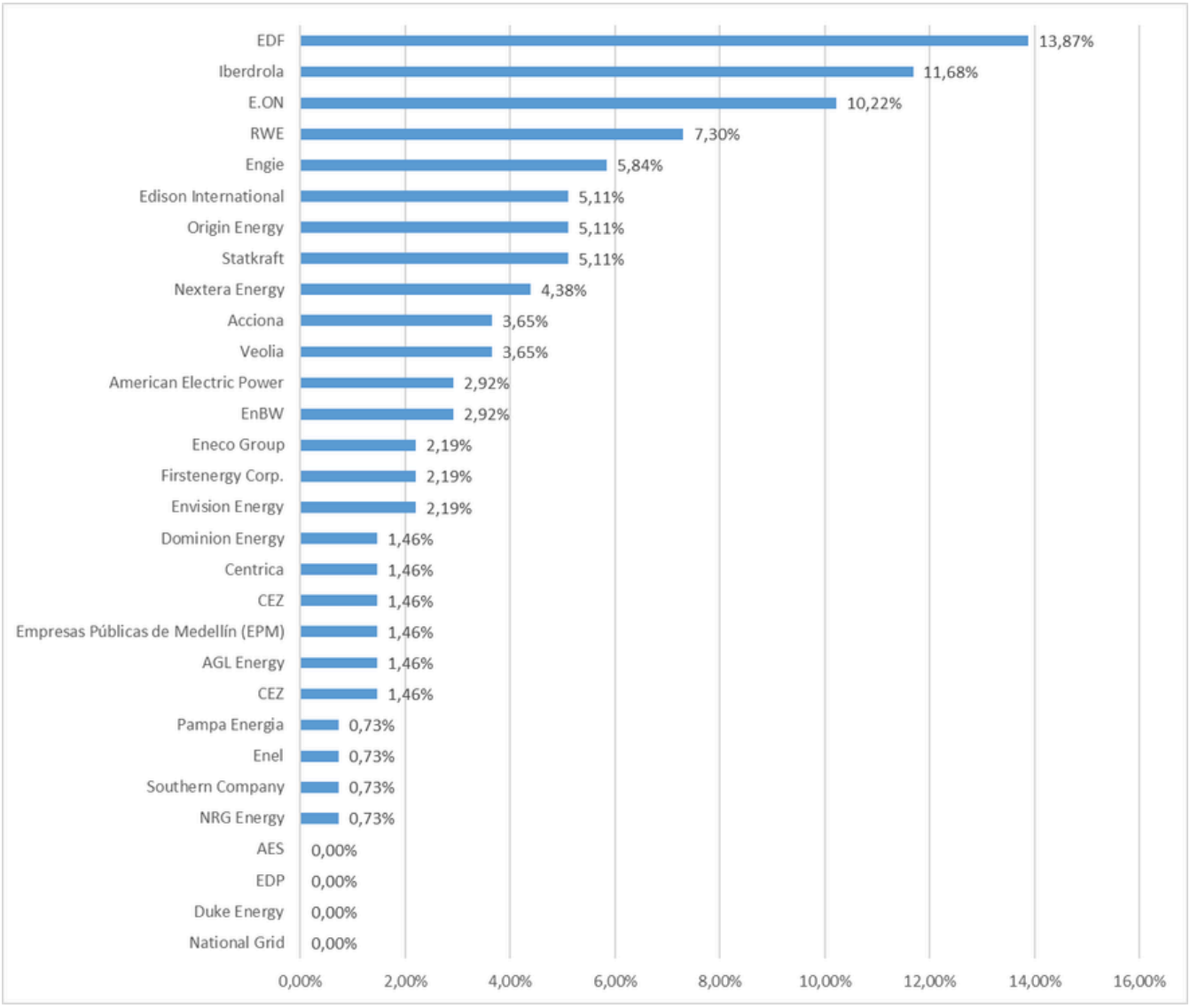
It is characterized by a greater diversity of actors and a more direct focus on the integration of solutions in networks, storage systems and digital management platforms.

Among the most active players are EDF, Iberdrola, E.ON and RWE, which lead the number of transactions in the last three years.
These companies don't just invest

capital, but they also act as technological integrators within their own energy systems.

The target technologies of their investments reflect an orientation **clear focus on flexibility, operational efficiency and last-mile decarbonization.**
Some notable transactions include:

Key players investing in Utilities (2022–2024)



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

The most significant investments of the 2022–2024 period reflect a firm commitment to solutions that combine technological scalability with direct integration into their operations.

- **Nextera Energy** has invested in Greenlance, a startup that develops solutions for the automation of the design and deployment of energy infrastructures, with a focus on accelerating the connection of renewable and grid projects.
- **Eneco participated in Sunvigo**, a platform focused on the flexible provision of solar energy for homes, combining distributed generation, smart contracts and direct consumer relations.
- **Duke Energy** backed Source, a company specializing in generating drinking water from solar energy, a technology with applications in climatically vulnerable environments and remote areas.
- **Statkraft Ventures** invested in Aira, a startup focused on residential electrification using heat pumps, key to decarbonizing thermal consumption in European homes.
- **National Grid Partners** allocated capital to Sitetracker, a distributed infrastructure and asset management platform used to optimize energy and telecommunications project deployments.

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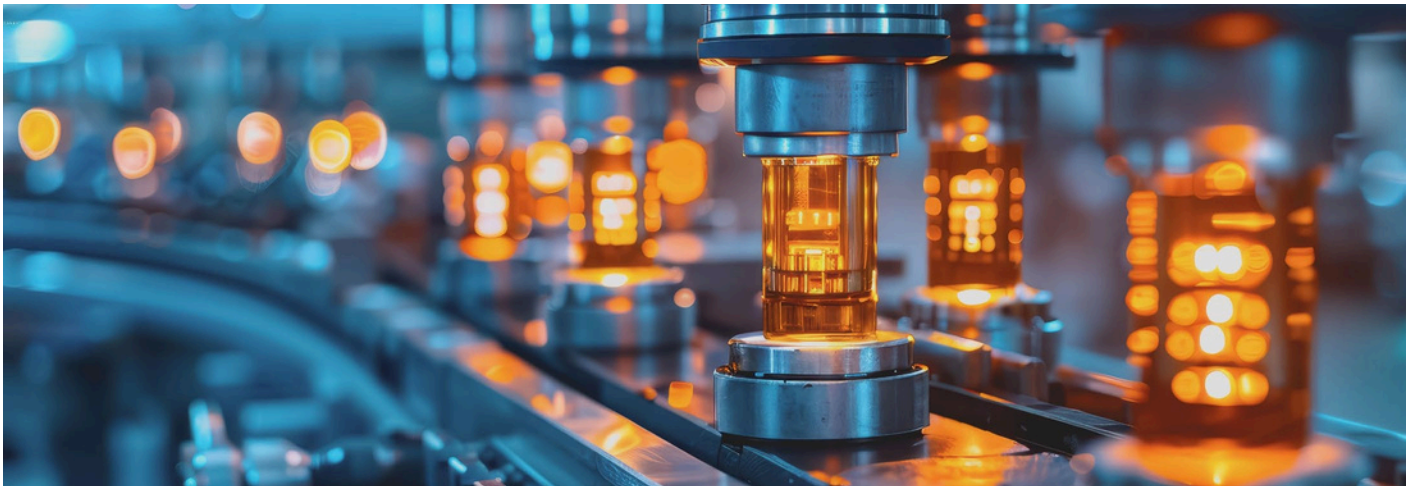
Top 5 investments by Utilities (2022–2024)

Inversor	Startup	Inversión	Año	Ronda	Tecnología
NEXTera ENERGY	**Greenlance**	675M USD$	2023	Undisclosed	E&P (Upstream)
Eneco	**Sunvigo**	487M USD$	2022	Undisclosed	Descentralized Energy
DUKE ENERGY.	**Source**	364M USD$	2022	Serie D	Solar Hydropanels
Statkraft	**Aira**	248M USD$	2024	Serie B	Grid-Scale Energy Generation
nationalgrid partners	**Sitetracker**	183M USD$	2022	Serie D	Smart Assets / Operations



These transactions reveal a clear pattern in the investment logic of utilities:

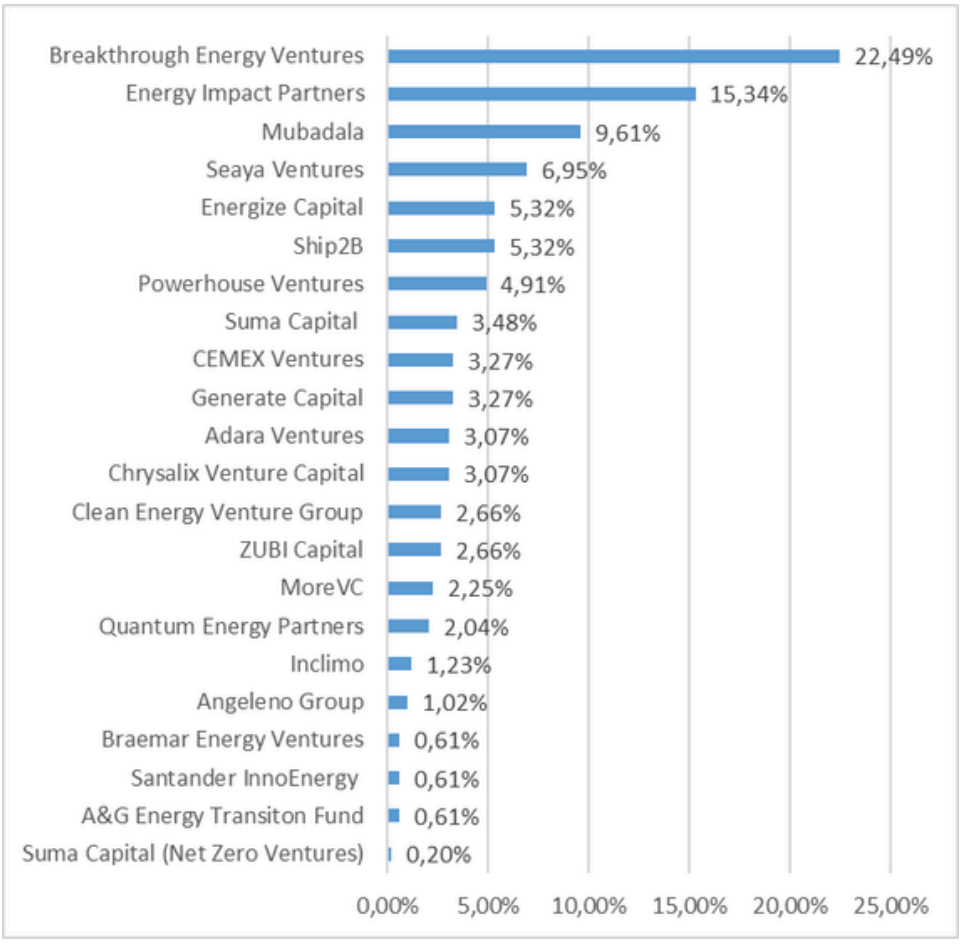
- **Automation and operational efficiency:** Digital tools that improve the planning, execution, and maintenance of assets are prioritized.
- **Proximity to the end consumer:** Focus on residential models, thermal electrification and distributed generation.
- **Immediate scalability:** All selected startups have the potential for industrial deployment within the next 3 to 5 years.

Energy VCs vs. Energy Companies: Two Visions to Lead the Energy Transition

Unlike utilities, which invest in technologies they can deploy directly, such as storage, residential electrification, or asset management, and unlike oil and gas, which prioritize scalable industrial technologies (hydrogen, carbon capture, advanced chemistry), energy venture capital funds adopt a radically different investment logic. They do not seek to operate infrastructure or transform physical assets; but rather to position itself as the digital brain of the energy transition: orchestrators of data, platforms and emerging technological capabilities applied to the energy system.

Among the most active funds in the 2022–2024 period, **Breakthrough Energy Ventures, Energy Impact Partners, Mubadala, Seaya Ventures y Energize Capital.** Together they account for 60% of the sector's operations.

Key players investing in Energy VCs (2022–2024)



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

Through their specialized vehicles, these funds channel capital towards startups that develop highly scalable solutions in areas such as decarbonization, decentralized energy, advanced data analytics, circular economy or large-scale renewables.

Their role is not that of system operators, but rather that of catalysts for technological disruption and accelerators of business models with global potential.

The main transactions of 2022–2024 illustrate this approach well:

- **Mubadala** invested $957 million USD in CityFibre, betting on a resilient digital infrastructure within the framework of the circular economy.
- **Breakthrough Energy Ventures,** the fund backed by Bill Gates, allocated $819 million to Form Energy (Series E, 2022), specializing in decentralized energy, and $602 million to Electric Hydrogen (Series C, 2023), reinforcing its commitment to industrial decarbonization.
- **Energy Impact Partners** also participated in Form Energy's funding round, raising $818 million, highlighting its focus on data analysis applied to energy management.
- **Generate Capital** invested $650 million USD in Pine Gate Renewables (2024), which focuses on the deployment of grid-scale solar energy with replicable models and high financial viability.

Top 5 investments by Energy VC (2022–2024)

Investor	Startup	Investment	Year	Ronda	Technology
MUBADALA	**Cityfibre**	957M USD$	2022	Undisclosed	Smart Assets / Operations
Breakthrough Energy	**From Energy**	819M USD$	2022	Serie E	Descentralized Energy
ENERGY IMPACT PARTNERS	**From Energy**	818M USD$	2022	Serie E	Descentralized Energy
GENERATE	**Pine Gate Renewables**	650M USD$	2024	Undisclosed	Descentralized Energy
Breakthrough Energy	**Electric**	602M USD$	2023	Serie C	Smart Assets /

In contrast to the infrastructure-led investment strategies pursued by utilities and Oil & Gas companies, **Energy VCs** operate under a more agile, exploratory, and technology-driven logic, investing in solutions thatdespite being at relatively early stages of maturity have the potential to **redefine the future energy system**.

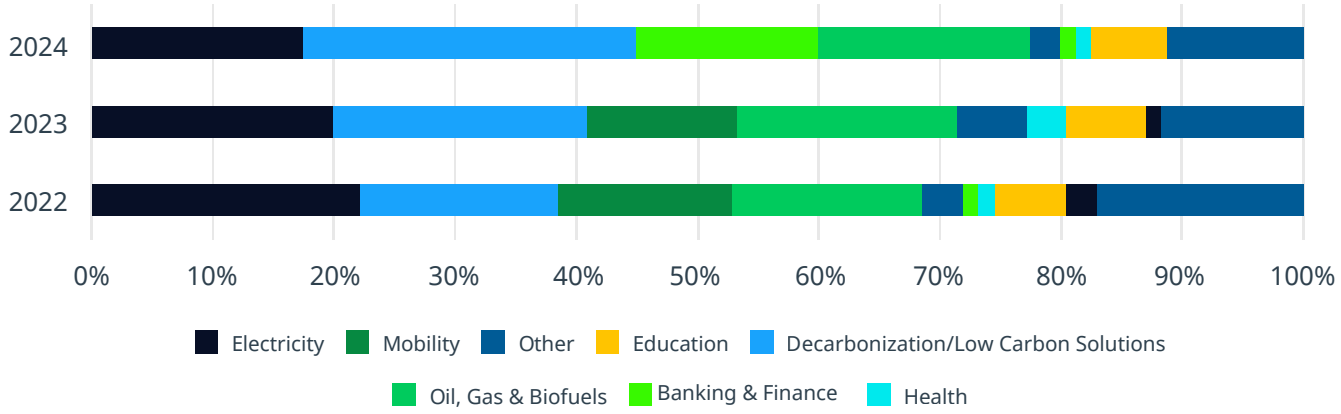
Investment focus in energy startups

Investment by technology type in the Oil & Gas sector vver recent years, Oil & Gas companies have clearly reoriented their investment activity toward technologies that enable progress in decarbonization without compromising industrial scalability. This shift is reflected in investment activity between **2022 and 2025**, which shows a gradual transition from traditional segments toward emerging solutions with transformational potential.

The main trends over this period include:

- **Sustained growth in decarbonization technologies:** The Decarbonization / Low-Carbon Solutions category increased from representing **20% of total investment in 2022** to over **35% in 2024**, positioning it as the sector's primary investment focus.
- **Declining relative emphasis on conventional Oil & Gas:** Investment in the Oil, Gas & Biofuels segment has nearly halved, falling from **30% in 2022** to below **15% in 2024**, pointing to a deliberate shift toward cleaner technologies.
- **Greater diversification toward services and cross-cutting capabilities:** Segments such as Electricity and Mobility remain stable, while new areas—including Banking & Finance and Health—are gaining traction, reflecting a strategy centered on diversification and the integration of complementary services.

Distribution of investment by market segment – Investor type: Oil & Gas



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

From a technological standpoint, the aggregated analysis of investments between 2022 and 2025 highlights the following priority areas:

• **Hydrogen:** The technology with the highest number of transactions over the period, consolidating its role as a key energy vector. Notable investments include Electric Hydrogen (backed by Equinor and BP with a combined $1.2 billion), as well as Ionomr (Shell and Chevron) and Aurora Hydrogen. Companies in this domain are developing advanced electrolysis technologies, proton-exchange membranes, and zero-emission hydrogen production systems, which are critical for decarbonizing industrial and transport sectors.

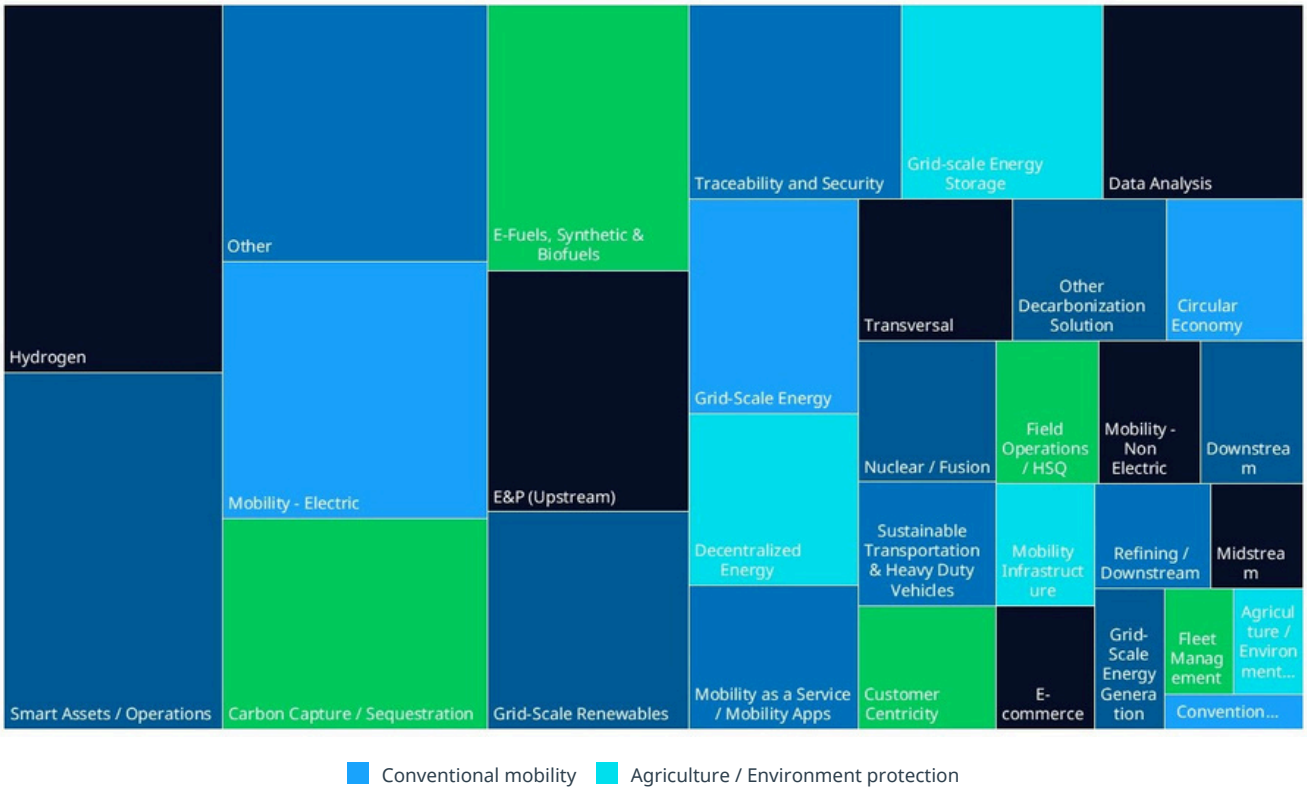
• **Carbon capture and storage (CCS):** Positioned as a critical solution for decarbonizing hard-to-abate industrial processes. Among the most prominent startups are **Carbon Clean Solutions** (Aramco and Chevron) and **Captura** and **RepAir** (Equinor and Shell), both focused on direct air capture technologies, advanced membranes, and modular solutions for industrial facilities. Cumulative investment in this segment exceeds $460 million.

• **Synthetic fuels and biofuels:** These technologies maintain a strong presence as transition solutions, particularly in sectors such as aviation, heavy transport, and agriculture, where near-term

decarbonization alternatives remain limited. Notable investments include **BP Bunge Bioenergia** (a $2.8 billion transaction), as well as investments in **Aether Fuels**, **Ductor**, and **Carbon Recycling International**, which are developing solutions for fermentation, waste conversion, and the synthesis of e-fuels from Captured C02

- **Industrial digitalization:** Technologies focused on operational improvement such as data analytics, smart assets, and traceability solutions continue to gain traction as critical enablers of efficiency and regulatory compliance. Notable examples include **RELEX Solutions** (BP), **Infinitum** (Caterpillar), **Celestial AI** (Koch Industries), and **AiDash** (Shell), which apply artificial intelligence, advanced sensors, and optimization platforms to transform the energy and operational management of infrastructure assets.

Distribution of investment by technology type – Investor type: Oil & Gas



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

These emerging investment areas are not driven solely by environmental considerations. Their attractiveness lies in their **ability to generate medium-term competitive advantages**, build **new industrial value chains**, and reduce **geopolitical risks** associated with dependence on critical raw materials or international energy flows.

This combination of consolidated and emerging technologies is shaping a more balanced investment portfolio, where scalability and innovation coexist as core criteria. Startups that succeed in positioning themselves within these strategic focus areas supported by robust value propositions and strong integration capabilities are emerging as key players in the next phase of the energy transition.

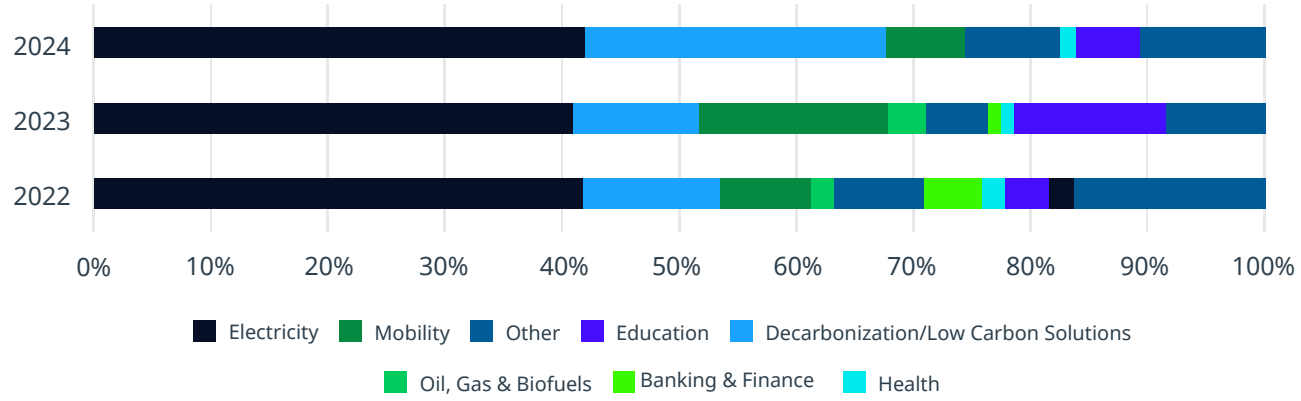
Investment by technology type – Utilities

Investments made by utilities companies between 2022 and 2024 have been consistently concentrated in the **electricity segment**, accounting for **more than 40%** of total investment on average over the past three years.

This stable and expanding focus reinforces the role of utility companies as key players in the deployment of electrical infrastructure, driven by the need to adapt grids to the large- scale integration of renewables, digitalization, and energy storage.

The Decarbonization / Low-Carbon Solutions segment has also gained relevance, increasing from **13% in 2022** to **23% in 2024**, reflecting a gradual shift toward technologies with direct climate impact. Areas such as Mobility and Banking & Finance maintain a secondary presence, remaining below 10%.

Distribution of investment by market segment – Investor type: Utilities



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

At a technological level, the specialization of utilities is manifested in the strong concentration of investments in certain verticals:

- **Smart Assets/Operations** represents the most prominent category of the period, with a clear focus on operational efficiency, asset digitization, and advanced grid management. Notable solutions include AiDash (Edison International, National Grid), which applies artificial intelligence and satellites for infrastructure monitoring; Buildots (E.ON), which optimizes construction projects using computer vision; and Prisma Photonics (E.ON), specializing in advanced sensors for electrical grids. Also noteworthy are LineVision (National Grid), with dynamic monitoring of transmission lines, and Barbara IoT (Iberdrola), focused on cybersecurity and edge computing for energy assets.

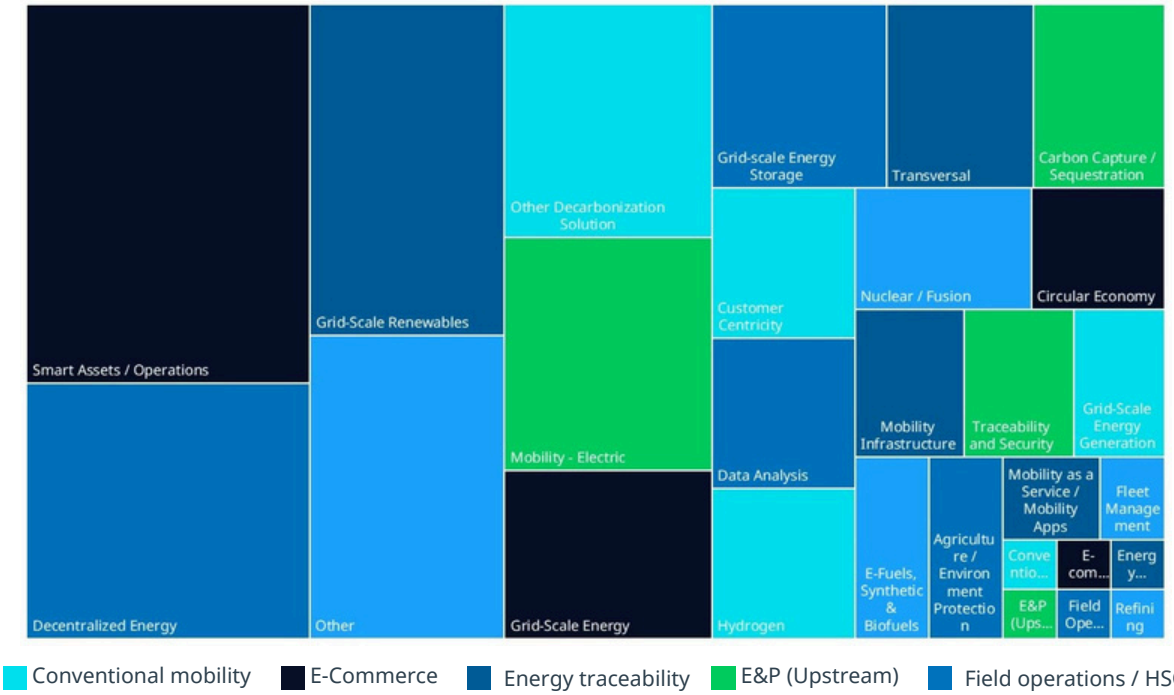
- **Decentralized energy** is consolidating its position as a key driver in the transition to distributed energy models. Startups like Zolar (CEZ, Statkraft) and Sunvigo (Eneco Group, E.ON) are leading the way in the installation and management of residential solar systems, while Leap (National Grid) enables the aggregation of distributed energy resources for participation in flexibility markets.

- Carbon capture is gaining traction as a solution for industrial decarbonization. Relevant examples include Captura (National Grid), which develops technologies for direct CO_2 capture from the air, and Horisont Energi (E.ON), which focuses on integrated capture and storage solutions for industrial processes.

- **Grid-scale Energy Storage** shows sustained growth, with Technologies that enable grid stabilization and renewable energy storage. Notable examples include Highview Power (Centrica), with large-scale cryogenic storage; Kyoto Group (Iberdrola), specializing in industrial thermal storage; and Element Energy (Edison International), which develops advanced batteries for stationary storage.

- **Customer centricity** and data analytics are emerging as key enabling technologies. Kaluza (AGL Energy) offers an intelligent demand management and customer experience platform, while eSmart Systems (E.ON) and Deepki (Statkraft) apply artificial intelligence and data analytics for network inspection and energy efficiency in buildings. Luminance (National Grid) automates legal and regulatory processes using AI, reinforcing the digitalization of corporate governance.

Distribution of investment by technology type – Investor type: Utilities



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

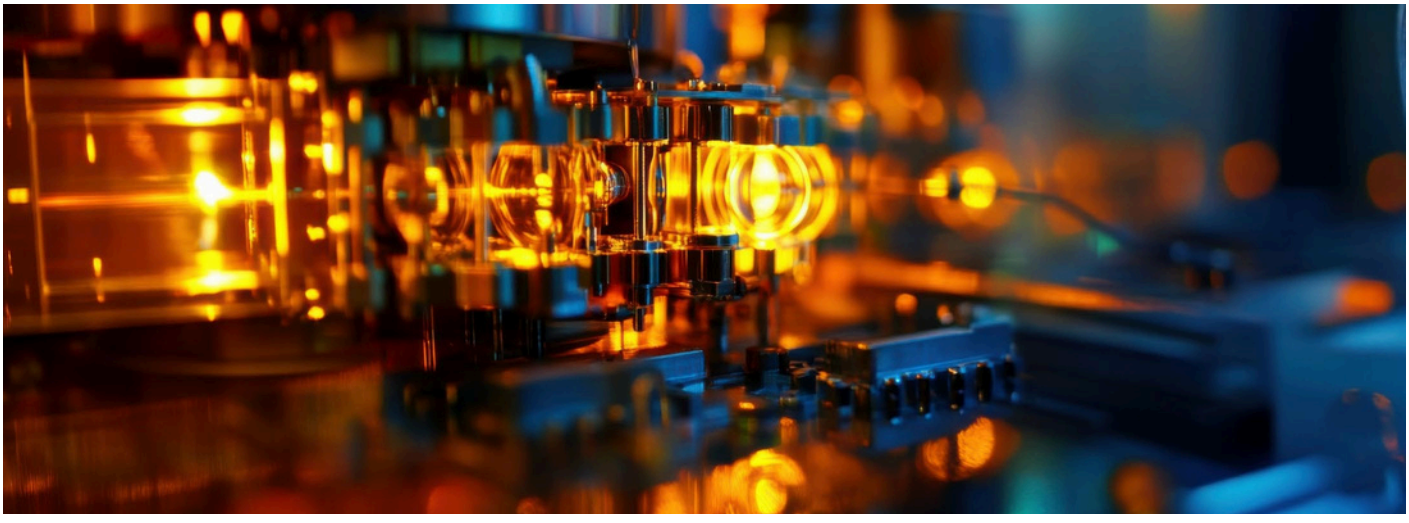
Investment by technology type by Energy VC

Venture capital investments in energy between 2022 and 2024 reflect a strategy focused on emerging, digital, and scalable climate technologies. The Decarbonization/Low Carbon Solutions segment is leading the way.

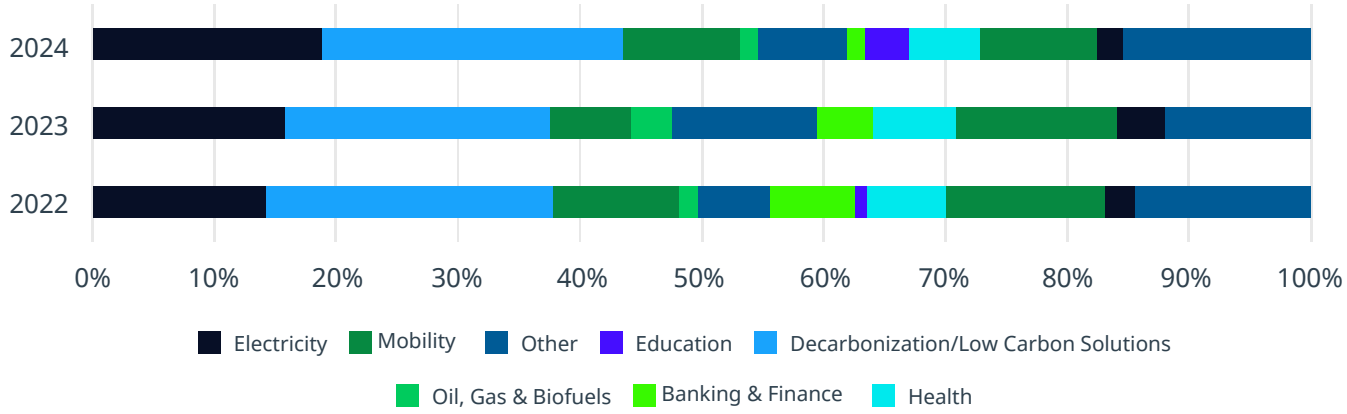
The annual distribution was consistent, with an average of close to 38% of the total during the period, confirming the role of VCs as key drivers of climate mitigation solutions.

The Electricity sector also maintains a significant presence, representing between 24% and 29% of annual investments.

This is complemented by a sustained commitment to cross-cutting segments, which group solutions applicable to multiple industries, averaging 23% over the three-year period. Furthermore, Mobility and Industry & Manufacturing each account for between 10% and 13% of investment in 2024, reflecting the interest in sectors undergoing structural transformation.



Distribution of investment by market segment – Investor type: Energy VC



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

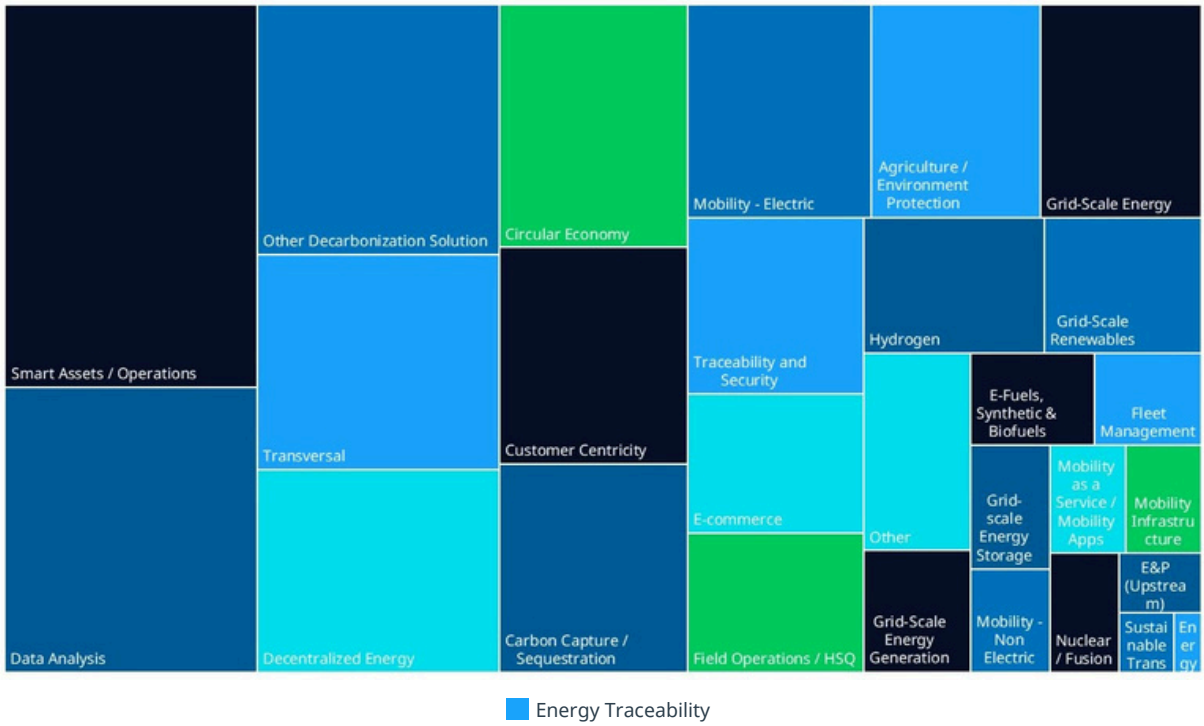
From a technological standpoint, energy-focused venture capital funds show a clear concentration across a limited set of verticals:

- **Smart Assets / Operations** is one of the most active areas for energy venture capital, with a strong focus on industrial digitalization and automation. Key examples include **Cityfibre** (Mubadala), **Havventus** (Quantum), and **Lilac Solutions** (Breakthrough), with solutions spanning smart grids, logistics hubs, and sustainable lithium extraction.
- **Data Analysis and Other Decarbonization Solutions** constitute a central pillar within VC portfolios. In data analytics, **eSmart Systems** (EIP) and **Albedo** (Breakthrough) are particularly active, alongside **Savana**, **Amperon**, and **Pexapark**, with applications in network optimization, forecasting, and risk management.

In decarbonization, leading investments include **Ambient Fuels** (Generate), **Aeroscale**, **Project Canary** (EIP), and **Pachama** (Breakthrough), delivering solutions across hydrogen, energy efficiency, and climate traceability.

- **Decentralized Energy**, **Carbon Capture**, and **Circular Economy** continue to attract stable investment flows. In distributed energy, **Form Energy** and **Rondo Energy** (Breakthrough, EIP), along with **Samara** (Seaya), are particularly active. In carbon capture, **Heirloom**, **CarbonCure** (Breakthrough), and **Aspen Power** (EIP) maintain strong visibility. In the circular economy, investments highlight **Cyclic Materials**, **Ceibo** (EIP), and **Source** (Breakthrough).
- In mobility, **Electric Mobility** remains a core focus alongside **Fleet Management** and **Mobility Apps**, reflecting a more digital and service-oriented approach. Key players include **KoBold Metals** (Breakthrough), **Monta** (Energize), **ev.energy** (EIP), and **TIER Mobility** (Mubadala). In fleet solutions, **Heart Aerospac**e (Breakthrough), **Sibros** (EIP), and **Stratio** (Adara) are particularly prominent. In applications, investments include **Cazoo**, **Getir** (Mubadala), and **WeaveGrid** (Breakthrough).
- Finally, **cross-cutting technologies**, including **Customer Centricity** and **Traceability & Security**, are consolidating their role as pillars of the new energy paradigm. Key examples include **wefox** (Mubadala), **Alma** (Seaya), and **Cyber Guru** (Adara) in customer experience; **Coro**, **Swimlane** (EIP), and **Urbint** (Energize) in cybersecurity and risk prevention; and **Trace Midstream** (Powerhouse, Quantum), **ESG Book**, and **6K** (EIP) in traceability and advanced materials.

Distribution of investment by technology type – Investor type: Energy VC



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

Technological priorities by actor type

Analysis of technological priorities in investments made between 2022 and 2024 reveals marked differences among the various actors in the energy ecosystem. While all share a common focus on decarbonization and efficiency enablers, capital decisions demonstrate distinct strategies depending on each actor's role in the value chain.

In 2024, Oil & Gas companies **and Utilities concentrate a portion** significant of its investments in **decarbonization technologies and smart grid management, which** together they represent more than **40% of its total operations.** These initiatives respond to a logic of operational transformation, emissions reduction and adaptation from critical infrastructure to a more flexible and decentralized energy system.

Decarbonization, in particular, emerges as a cross-cutting axis of **the investments of these actors,** not only because of its environmental implications, but also because of its capacity to generate new growth platforms and reduce the risk of stranded assets in the medium term. At the same time, management **intelligent networks, including** Digitalization tools, distributed control and flow optimization are consolidating as a priority field for investors most aligned with the operation of the real energy system.

In contrast, venture capital funds specializing in energy are betting on emerging, digital, and scalable technologies, with a clear leadership in the segment. of Decarbonization / Low Carbon Solutions, which on average accounts for 38% of investment between 2022 and 2024. This focus is complemented by a strong interest in Smart Assets / Operations, Data Analysis and Other Decarbonization Solutions, which reflect an approach based on operational efficiency, automation and advanced digital platforms.

Investments are also being distributed towards cross-cutting solutions and technologies such as Carbon Capture, Circular Economy and Mobility – Electric, which reinforce the role of Energy VCs as drivers of innovation with high disruptive potential.

This distribution of priorities reflects a more sophisticated investment system **and segmented, where each type of** This actor drives complementary innovation vectors. In a global environment conditioned by high interest rates, regulatory pressure, and

Given the climate emergency, investments are focused on validated, scalable technologies with a direct impact on operational competitiveness. This convergence of industrial, digital, and operational strategies consolidates an energy transition that no longer depends exclusively on technological disruption, but also on the integration capacity of the major incumbent players.

Emerging focal points and new investment niches

Recent trends in venture capital within the energy sector reveal a structural shift in technological priorities, characterized by greater diversification and increasingly sophisticated investment criteria. While technologies directly linked to the electricity generation system maintain a significant presence, with a stable share of around 25% annually, their relative importance has stagnated. This stagnation suggests a gradual maturation of the segment, which is giving way to new vectors of innovation. One of the most relevant movements is the rise of digital technologies

Customer-centric solutions have increased their share from 21% in 2022 to 26% in 2024, consolidating their position as the second largest investment segment. This progress reflects the digital transformation of the energy system, driven by the adoption of solutions based on artificial intelligence, advanced analytics, edge computing, and automation, with applications in operational optimization, demand forecasting, and improved user experience.

Also noteworthy is the growth of the Environment & Sustainability area, which has increased from 15% to 19% in just two years. This trend is due to a combination of factors: the tightening of regulatory frameworks aligned with decarbonization, the pressure of ESG commitments from large funds and corporations, and the emergence of technologies capable of measuring and mitigating environmental impacts. Among them, the solutions of **Carbon capture and storage,** circular economy, environmental traceability, and industrial sustainability. In contrast, investments in Mobility & Transportation remain relatively constant.

with a stable share between 7% and 8%. This suggests that, despite the central role of mobility in the energy transition, the recent period has not been marked by a significant wave of disruption or technological renewal in this area.

Cross-cutting technologies **or transversal, for their part,** They represent approximately 12% of investments. This group acts as an experimental space for solutions that, while not yet dominating a vertical segment, show potential for horizontal application in multiple areas of the energy system, such as data platforms, cybersecurity, or advanced visualization tools.

Taken together, the rise of digital and environmental categories not only reflects a technological shift, but also a convergence between **Innovation, regulation, and financial returns. The new wave of investment** prioritizes startups with the capacity to **operational integration, technological scalability and climate alignment,** emerging as the preferred bets of strategic funds in the new energy transition cycle.

Key findings from the investment analysis

Investment in energy startups is undergoing a profound transformation. Far from simply responding to the logic of traditional venture capital, capital is adopting more strategic and impact-oriented criteria. Analysis of the 2022–2024 period reveals a reconfiguration of the investment ecosystem, where new technological priorities, changes in risk attitudes, and greater integration with the structural objectives of the energy transition converge.

1. **The energy transition** is no longer just technological: it's financial and strategic. The shift towards clean, digital, and resilient technologies is taking hold: in 2024, more than two-thirds of global energy capital was directed towards low-carbon technologies, a fivefold increase compared to fossil fuels since 2015.

2. **The startup ecosystem** is entering a maturation phase. The number of startups invested in fell by 42% between 2022 and 2024, but total capital remained stable. More robust investments with industrial potential and strategic alignment are being prioritized.

3. **Each type of actor defines its own investment logic:**

- **Energy VCs** sustain their activity and lead the cumulative volume (36% in 2022–2024).
- **Oil & Gas** adjusts its exposure, but redirects capital to clean industrial technologies such as hydrogen or CCS.
- **Utilities** reinforce their role as integrators of operational solutions, with a focus on networks, assets and digitization.
- **Big Tech** reduces the number of transactions, but multiplies the average ticket, concentrating on AI, platforms and digital control.

4. **Capital** is shifting towards mid-stages. Series A and B rounds are surpassing early-stage funding for the first time. The ecosystem is favoring startups ready to scale, rather than early-stage exploration.

5. **North America and Europe lead** the investment, but new hubs are emerging. They account for more than 75% of the total, although regions like South America (+50% in the number of transactions in 2024) and the Middle East are beginning to attract increasing attention.

6. **Technology defines the role of each actor in the transition:**

- **Oil & Gas** is committed to decarbonized industrial solutions**.**
- **Utilities** focus on operational efficiency and electrical deployment.
- **Big Tech** leads the algorithmic and digital aspect of the energy system.

7. **New areas of focus are emerging** with increasing prominence. Digital and environmental technologies are gaining ground: from 21% to 26% and from 15% to 19%, respectively. Their rise reflects a convergence between innovation, regulation, and economic return that is redefining investment priorities.

5.

Innovation models and sector positioning

5. Innovation models and sector positioning

How are innovation models evolving in energy?

Innovation models in the energy sector are undergoing a sustained transformation. As challenges related to decarbonization, the digitalization of the energy system, and the demand for greater flexibility intensify, companies are not only increasing their investment in innovation but also rethinking how they organize, prioritize, and manage innovation within their structures. This evolution responds to a specific need: to maximize the **impact of innovation in a more uncertain, regulated and technologically dynamic.** Therefore, we observe a greater diversity of organizational models, new forms of governance, and a change in the way companies structure their internal capabilities and external relationships.

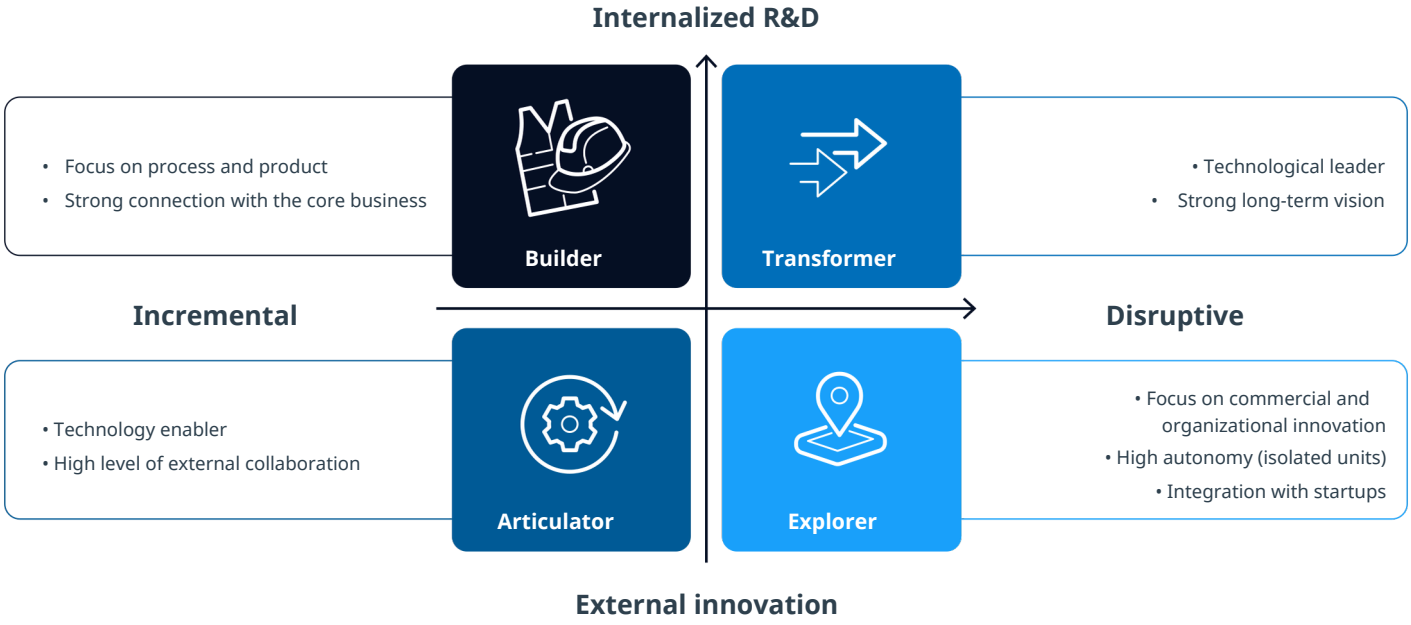
Archetypes of organizational innovation models

The innovation models implemented in organizations respond to different strategic decisions regarding focus, capabilities, how to relate to the ecosystem, and the long-term vision regarding the transformation of the sector.

Based on comparative analysis, interviews with leading companies in the sector and the study of innovation trends beyond the energy sector, four major archetypes are identified that reflect how organizations are structuring their innovation function to maximize their impact in transformation contexts and that are applicable to other industries.

The models applied in organizations do not respond to a **only formula.** However, from the analysis of real cases, these predominant organizational archetypes are identified, which allow the classification of companies' structural and strategic decisions based on their approach to technological development, relationship with the ecosystem, and alignment with the business.

Corporate innovation archetype model



Why are we innovating?	What do we want to achieve?	How are we going to innovate?	Where do we want to innovate?	Who will lead and support innovation?
What are the main drivers (for example, market changes, customer demands, technological shifts)? Are we seeking to grow, defend our position, or transform our business?	We aim to generate new revenue streams through new business models, products, or services. We seek greater efficiency through new ways of working and the disruption of existing processes and operations. Do we pursue incremental improvements, disruptive innovation, or both?	Will we build capabilities internally, partner, acquire, or co-create? Which processes and tools will support innovation? How do we balance short-term and long-term innovation?	Which areas do we prioritize, both from a business and a technology perspective? How do we define a clear innovation perimeter?	Who is responsible for the innovation agenda? How do we foster a culture of innovation across the organization? Which skills and talent do we require?

The archetype matrix draws on interviews with leaders in the energy sector and a comparative analysis of real-world practices. Each quadrant represents a distinct innovation approach, defined by key variables such as capabilities, business integration, and openness to the ecosystem. The analysis defines the axes based on recurring patterns—how companies develop internal capabilities, how they engage with the ecosystem, and which types of innovation they prioritize—allowing the grouping of organizational models with coherent strategic and operational logics.

Builder archetype: business optimizer

This model identifies those companies that are committed to developing robust internal capabilities, integrating specialized technical teams, their own laboratories and centralized structures, focused on operational efficiency and leveraging their accumulated technological experience. This approach prioritizes control over technological development, intellectual property, and a direct connection to the business.

- **Focus:** Innovation centered on improving and increasing the efficiency of the core business.
- **Capabilities:** Strong investment in internal R&D, with its own infrastructure and specialized technical staff.
- **Relationship with the ecosystem:** Low dependence on external actors, even though they have open models with constant collaboration.

This model seeks to optimize and sustain the current business, prioritizing Technological maturity and control of intellectual property are key. It is ideal for companies with extensive infrastructure, technical expertise, and an innovation strategy closely aligned with operations.

Explorer archetype: agile entrepreneur

This archetype is characterized by a high degree of openness to the external ecosystem as the primary means of accessing innovation. Companies that adopt it prioritize agility and the ability to quickly integrate solutions developed by third parties, focusing on scouting, collaboration, and integration with startups, research centers, and universities.

- **Focus:** Access to disruptive innovation through external collaboration.
- **Capabilities:** Limited internal development capacity, but strong muscle in scouting and linking with startups, universities and funds.
- **Relationship with the ecosystem:** High dependence on third parties as a way to accelerate innovation.

This model allows access to emerging technologies without assuming the full cost of their development, with leaner and more open structures. It is characteristic of companies in transformation phases or with less capacity for investment in their own R&D.

Transformative archetype: strategic evolutionist

It seeks to build new businesses and transform the company's strategic positioning. It is based on hybrid structures that combine exploration, incubation, and co-investment, with a portfolio approach that balances risk, maturity, and strategic focus.
They combine strong internal capabilities with external vehicles such as corporate venture capital, venture building or co-investment, operating with a diversified portfolio logic aligned with strategic objectives.

- **Focus:** Generating new lines of business from disruptive innovation, with high strategic impact.

• Capabilities: Hybrid: combines strong internal capabilities with advanced collaboration mechanisms (CVC, venture building, co-investment).

• Relationship with the ecosystem: Strategic articulation of alliances to jointly design high-impact solutions.

This model has more sophisticated structures, with exploration cells, clear scaling criteria, and a portfolio logic that allows for balancing risk and return.

Articulating archetype: ecosystem connector

Focused on facilitating the agile adoption of external solutions, ensuring their validation, operational integration, and alignment with short- and medium-term objectives. It acts as a link between innovation and business units.

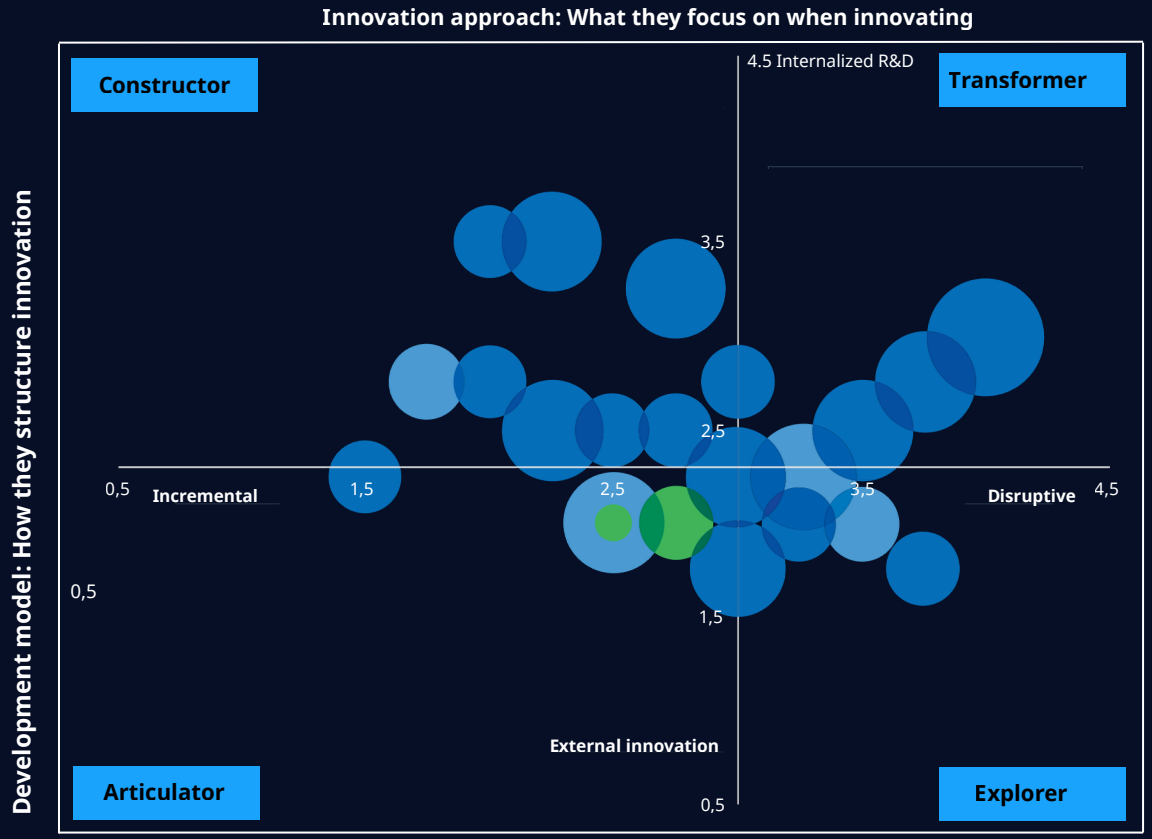
• **Focus:** Facilitator of operational innovation with a focus on efficiency, but also incorporating external solutions.

• **Capabilities:** Functional, with a focus on implementation.

• **Relationship with the ecosystem:** Active relationship with startups and third parties, but with a focus on applicable and short-term solutions.

This model focuses on implementing external solutions quickly and efficiently, with a high degree of pragmatism, while keeping the business as the center of gravity of innovation.

Positioning of leading companies in the sector within innovation archetypes



This chart positions a broad group of leading energy companies—including those interviewed and others analyzed using publicly available information and comparative models—within the innovation archetypes defined in the report. The ranking was constructed from in-depth interviews, benchmarking, and structural analysis of their organizational models. The size of each bubble reflects the estimated level of innovation maturity.

Oil & Gas Gas & Power Other

*Size defines the maturity level of organizations

Most companies fall into the Articulator and Transformer profiles, focusing on efficiency and business transformation.

Source: NTT DATA's own database, compiled from public data using scraping techniques

Organizational positioning matrix: innovation archetypes in energy companies

This matrix summarizes the relative position of the analyzed energy companies based on two key axes: the innovation approach (incremental vs. disruptive) and the development model (internal vs. external). The distribution allows for the identification of four main archetypes—builder, transformer, articulator, and explorer—which reflect predominant styles in the organization and deployment of innovation.

The analysis makes it easier to visualize organizational positioning patterns and understand how each company structures its innovation model in relation to its strategic and operational priorities.

Combinations and transitions between models

While each archetype has its own logic, hybrid models are most common. Many companies operate under a mixed architecture, combining models according to their technological or business objectives.
It is common to observe schemes that operate as "explorers" in new verticals, "builders" in core processes, or "transformers" in units satellites geared towards the creation of new businesses.

For example, companies with a history of internal innovation are developing new capabilities to open themselves up to the ecosystem. Others, born with models focused on external exploration, are beginning to consolidate more stable structures to gain scale and autonomy.

This evolution does not follow a single formula, but it does show a shared trend: moving from fragmented models towards more integrated schemes, with a focus on operational impact, strategic governance and alignment with corporate priorities.

Methodological Note
The matrix is built on the basis of a qualitative analysis of interviews and public sources, positioning each company according to its degree of internalization of the innovation model (vertical axis) and the type of approach that predominates in its initiatives (horizontal axis).

Bubble sizes represent the estimated level of organizational maturity in innovation, integrating aspects such as governance, autonomy, connection with the business, and enabling capabilities. Sector-based labels make it possible to identify sectoral trends without disclosing specific company names, facilitating comparative analysis.

6.

Organizational maturity model

6. Organizational maturity model

Stages of organizational maturity and transition

The maturity of innovation models in the energy sector depends not only on time or the size of the organization, but also on structural strategic decisions. Five levels of maturity have been identified that allow for the evaluation of how a company configures its innovation model in terms of governance, capabilities, portfolio, and connection to the business.
One of the critical elements in this evolution is the balance between autonomy and connection. In stages

Initially, innovation depends on the business to operate. In more advanced models, it gains autonomy to define agendas, manage resources, and scale solutions, without losing alignment with the core strategy.

As companies evolve, they gain greater freedom to define priorities, operate with their own resources, and scale solutions beyond their core operations. **Progressive autonomy allows innovation to exploit its transformational potential without losing strategic coherence.**

Maturity model for innovation in the energy sector

The following maturity model identifies the most frequent levels in the evolution of innovation models, based on comparative analysis of leading energy companies, in-depth interviews and reference to international frameworks.
Far from being a linear path, it allows mapping the level of sophistication around the five critical dimensions of the framework: strategy, structure, culture, metrics, and ecosystem.

Innovation maturity model for the energy sector

	Emerging and reagent	Functional and incipient	Integrated and aligned	Self-employed and strategic	Orchestrator and influencer systematic
Description	One-off innovations, without structure or strategic focus.	Basic unit with initial business-dependent processes.	Innovation aligned with the strategy, but with limitations in autonomy.	Innovation drives transformation with greater autonomy	Lead the ecosystem, scale solutions with systemic impact
Strategy	There is no formal innovation strategy. Initiatives are reactive and fragmented.	Initial focus areas are defined, linked to technical challenges. Innovation is subordinate to the operational strategy.	Innovation integrated into strategic pillars. Roadmaps linked to the business are developed.	Innovation as a lever for transformation. It supports new businesses or operating models.	Innovation defines competitive advantage. It influences industry evolution. It aligns with long-term corporate vision.
Structure	There is no unity or defined roles. It depends on ad-hoc or individual efforts.	There is a defined and focused unity and governance, but with limited resources.	Management structure and mixed budget. Structured portfolio.	Hybrid models with budgetary autonomy. Dedicated teams. Structured scaling flow.	Cross-cutting innovation, with distributed structures. Capacity for organizational redesign.
Culture	Culture focused on control and efficiency. Low appetite for risk or change.	Initiatives are being promoted, but without clear alignment or incentives.	Cross-functional participation and intrapreneurship are promoted. An exploratory mindset begins to take hold.	A culture that normalizes mistakes and values learning. Specific incentives. Leaders as sponsors.	A deeply adaptive, open, and cross-functional culture, with a focus on disruption. Innovation is part of our DNA.
Metrics	Without defined metrics. Impact or progress is not measured.	Activity metrics (number of ideas, pilots) or patents appear. Under monitoring.	Project results are measured. Learning and progress are evaluated against objectives.	Strategic impact is measured (new revenue, ESG positioning, time-to-market acceleration).	Comprehensive metrics system with traceability from idea to strategic impact. Real-time monitoring.
Ecosystem	Occasional relationships with third parties, without a collaboration strategy.	Occasional scouting or participation in open challenges. Occasional relationship with startups or universities.	Areas of collaboration are defined. Active participation in open innovation programs or funds.	Structural collaboration with third parties. Co-investment mechanisms, venture clienting, co-development	Ecosystem as an extension of capabilities. Active orchestration of the environment (regulators, startups, R&D)

Methodological Note

This maturity model is built on qualitative and comparative analysis of leading companies in the energy sector, integrating three primary sources:

– In-depth interviews with innovation, transformation, and strategy leaders, enabling identification of real practices, maturity levels, and challenges.

– Review of international references, including maturity frameworks developed for other categories or sectors.

– Case-based business analysis, identifying common patterns and differentiating factors, organized around five critical dimensions: strategy, structure, culture, metrics, and ecosystem.

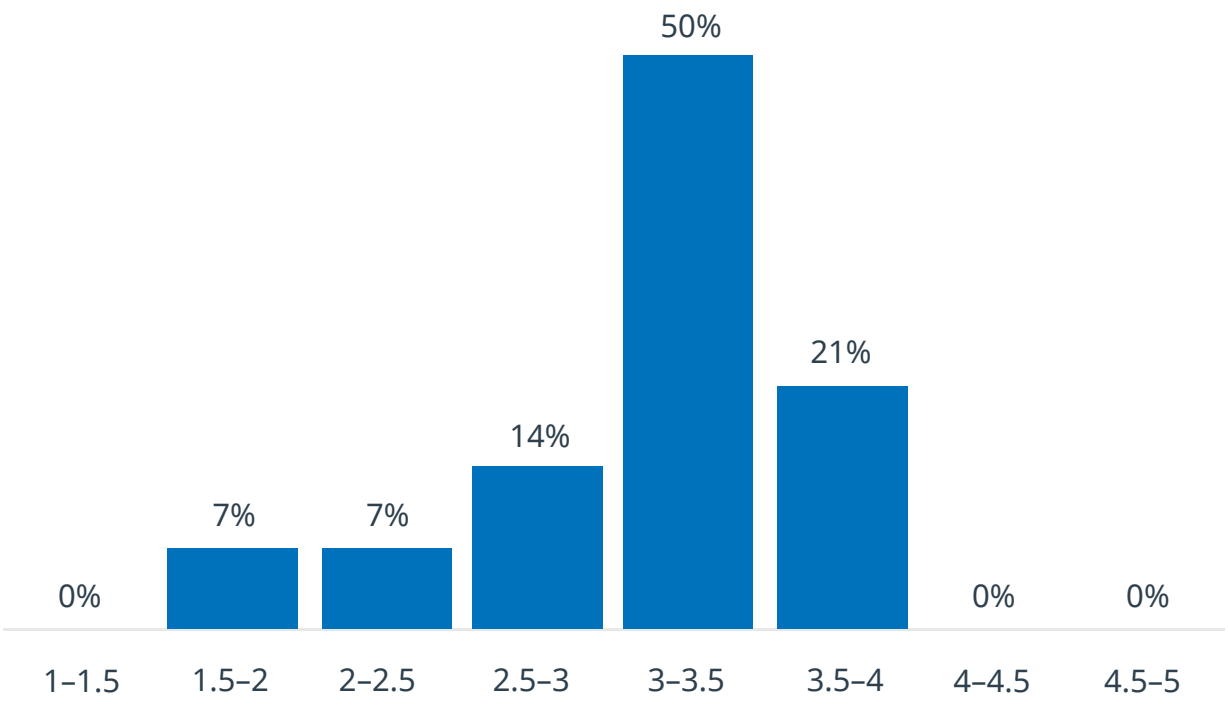
Rather than presenting a linear progression or a prescriptive path, this framework reflects the most frequent stages in the evolution of innovation models, capturing both diversity of approaches and the complexity of advancing organizational capabilities. Its purpose is diagnostic and orientative: it enables organizations to position themselves along their specific trajectory, identify maturity gaps, and project strategic evolution paths.

Where are energy companies positioned today on their path towards advanced innovation models?

Based on the qualitative and quantitative analysis of interviews and the benchmarking carried out, the companies were positioned according to their level of maturity, considering the five defined dimensions.

The chart illustrates the distribution of these companies across the five defined levels. While most are concentrated between levels 3 and 4 that is, with strategically integrated models or with relative autonomy and transformation capabilities cases still in functional stages are also identified, where innovation it operates with less autonomy and strategic focus. Beyond the current location, the model allows visualizing routes of possible evolution and enables strategic conversations about what capabilities must be strengthened to move towards more robust models, systemic and connected with the environmental challenges.

Maturity level of analyzed energy companies



Source: Proprietary NTT DATA database, developed using public data through web scraping techniques.

Methodological Note

The classification was developed based on the maturity model presented in Section 6.2, using information from in-depth interviews, public documents, and comparative analysis of best practices to assign a representative level based on the observed attributes.

7.

Designing the future of energy

7. Designing the future of energy

Towards a new architecture of innovation in energy

The energy sector is redefining its technological, operational, and market boundaries at an unprecedented pace. In this context, innovation has ceased to be a functional option and has become a strategic architecture: a set of decisions, structures, capabilities, and relationships that define the role each organization will play in the future of the sector.

It's not just about innovating more, but about innovating better. About doing it with
purpose, with focus, and with models that allow scaling what is relevant, abandoning what is secondary, and capturing value beyond the short term.

Throughout this report we have seen how leading companies are beginning to converge on certain principles, without losing their uniqueness: Innovation no longer exists on the margins of business,
But it cannot dissolve into it either. It requires its own space and simultaneous strategic alignment.
Talent, culture, and ecosystem are just as critical as technology.
The barriers are no longer technical, but organizational. Success lies not in launching more pilot projects, but in transforming them into growth platforms. The environment doesn't wait. Regulation, competition, sustainability, and technological disruption are forces that compel us to take a stand. Based on the findings and analyses carried out, three ideas summarize the current inflection point in innovation models:

1. The model is everything

Designing an innovation model is a top-priority strategic decision. It involves defining structures, governance, metrics, and links with the business. Having good ideas isn't enough: you need an architecture that allows them to scale, survive, and generate impact.

2. There is no maturity without direction

Progress toward more sophisticated models doesn't happen by inertia. It requires a clear vision, executive will, and consistent capabilities. Each level of maturity demands difficult decisions: what to keep internal, what to open to the ecosystem, what to govern in a network.

3. Innovation is not adaptation: it's leadership

The real advantage lies in anticipating, not reacting. Companies that place innovation at the heart of their strategy don't just survive change: they shape it. Moving from observers to orchestrators of change is the great leap that remains.

The challenge, then, is no longer whether to innovate, but how to design the innovation model that each company needs to lead the next stage of the energy sector.

Definition of the future model

Based on the analysis, these are key questions that every organization must answer clearly if it seeks to consolidate a solid and impactful model.

What degree of autonomy should the innovation area have?
Innovation can act as an enabler, an operational partner, or a strategic driver. Each option requires different levels of independence, resources, and business engagement. Defining that degree of autonomy is a structural, not an operational, decision.

Which capabilities should be built internally and which can be leveraged externally?
Investing in in-house capabilities provides control and differentiation. Leveraging the ecosystem offers speed and flexibility. The challenge lies in deciding what to keep internal, what to scale with third parties, and which functions should coexist in hybrid models.

How should an innovation portfolio balance current business needs with a vision for the future?
An effective portfolio is defined not only by the volume of initiatives, but also by their strategic alignment. Maintaining a balance between initiatives focused on generating short-term revenue and transformative ventures with future impact is one of the greatest management challenges.

NTT DATA Methodological Approach

Our methodological perspective: NTT DATA's vision, capabilities and approach to energy innovation

At NTT DATA, innovation is not just a concept: it's a strategic imperative embedded in our DNA and a fundamental pillar of our collaboration with energy sector clients. As the industry undergoes a profound transformation driven by decarbonization, digitalization, and decentralization, we are at the forefront, helping our partners navigate the complexity and capitalize on emerging opportunities.

Our vision for innovation is based on the conviction that technology, applied purposefully, can create a more sustainable and inclusive future. With over $3.6 billion invested in R&D,
With over 5,000 R&D professionals and a portfolio of 18,000 patents, we are committed to turning bold ideas into tangible solutions.

NTT DATA's approach to innovation in the energy sector is holistic and structured. Our Innovation as a Service (INNOVaaS) model supports clients throughout the entire innovation lifecycle: from strategic definition and solution design,

From testing and scaling to adoption, we handle everything from initial setup to implementation. We also have our own methodological framework that allows us to diagnose existing innovation models, identify key gaps, and define transformative roadmaps. We help define innovation strategies, build operational models, and foster an innovative culture that permeates all levels of the organization.
We work closely with leading energy companies to co-create solutions that address their most pressing challenges. Whether developing technological solutions like a digital twin for an industrial process or designing a new business in the energy transition or digital world, our multidisciplinary teams ensure that innovation is not only visionary but also viable and adoptable.

As the energy industry continues to evolve, NTT DATA remains a trusted partner, offering the strategic vision, technological expertise, and collaborative spirit needed to drive innovation at scale. We are not just advisors: we are co-creators, working alongside our clients to build the future of energy.

Together, we are building a smarter, cleaner, and more resilient energy ecosystem—one innovation at a time.

About us

About NTT DATA

NTT DATA is a leading enterprise and technology services company with revenues exceeding $30 billion, serving 75% of the Fortune Global 100 companies. We are committed to accelerating our clients' success and making a positive impact on society through responsible innovation. We are one of the world's leading providers of artificial intelligence and digital infrastructure, with unparalleled capabilities in enterprise-scale AI, cloud, security, connectivity, data centers, and application services. Our consulting and industry solutions help organizations and society move confidently and sustainably toward the digital future. As a Global Top Employer, we have experts in more than 70 countries. We also offer our clients access to a robust ecosystem of innovation centers, as well as established and emerging partners. NTT DATA is part of the NTT Group, which invests more than $3 billion annually in R&D.

Visit us at nttdata.com.

About Energy Trends

Energy Trends is an NTT DATA initiative that analyzes how innovation is transforming the energy sector in a context marked by decarbonization, digitalization, and the transition to more sustainable models. This report combines qualitative and quantitative research, interviews with industry leaders, and analysis of global trends to offer a strategic and actionable perspective. Our goal is to help organizations understand the challenges, identify opportunities, and design innovation models that boost their competitiveness in a constantly evolving environment.

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