



E-BOOK

The Next Era of Energy Innovation





A note about this e-book



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This e-book is an abridged version of our popular webinar “The Next Era of Energy Innovation.”

For the full webinar, which provides more research and context, [please visit our website here.](#)

EXECUTIVE SNAPSHOT

The Next Era of Energy Innovation

What You Need To Know

Energy innovation is getting harder, and disciplined, near-term-aligned strategies are essential to stay competitive.



PRODUCT DESIGN & INNOVATION

Ensure innovation projects align tightly with company goals, near-term priorities, and measurable business value.



BRAND

Use consumer sentiment and market signals to guide positioning, ensuring innovation efforts resonate with evolving expectations.



SUPPLY CHAIN & OPERATIONS

Strengthen resilience through techno-economics, partner ecosystems, and solutions that enhance efficiency, reliability, and emissions performance.



GROWTH POTENTIAL

Identify early market opportunities — data centers, geothermal, carbon management — before policy and cost shifts trigger rapid scaling.

Despite roadblocks, teams can't afford to pause

Energy innovation is entering a difficult but decisive phase. After several years of policy tailwinds, sustained investor enthusiasm, and expanding startup ecosystems, innovation teams across oil and gas and utilities now face rising headwinds. Government support is wavering, investors are demanding short-term returns, and startups struggle under high capital costs and limited exit opportunities. Yet the sector cannot afford to pause. Investments in low-carbon technologies continue to outpace fossil fuels, and companies that hesitate now risk falling behind the next decade's winners.

Drawing on insights from more than 80 corporate reports, 8,500 client questions, and over 30 industry interviews, Lux Research has identified 10 priority innovation themes between the oil and gas and utilities industries for the next era of the energy industry. This e-book distills the key pressures, strategic imperatives, and technology pathways shaping how innovation leaders should act today.



How innovation teams are changing

The global environment for energy innovation has shifted dramatically. Policy support is wavering, particularly as U.S. federal incentives come under threat, and European mandates struggle to deliver intended outcomes. Investor sentiment has cooled, especially toward long-horizon diversification bets. Meanwhile, high interest rates and limited exits have constrained startup formation and growth.

Three forces now define the innovation landscape:

1. **Anti-ESG* and policy volatility:** Political reversals have made long-term incentives uncertain in some regions.
2. **Capital discipline and operational focus:** Executives increasingly require projects with clear, near-term impact.
3. **Startup ecosystem contraction:** Momentum has slowed for many climate-tech categories.

The result: Innovation teams must deliver more with tighter constraints, requiring sharper prioritization and deeper integration with core business needs.



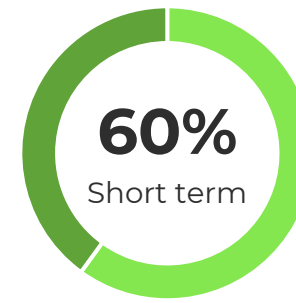
Why strategy matters in energy innovation

A strong innovation strategy is essential when external volatility is high. Companies that struggled most in recent years were those less aligned with the core business.

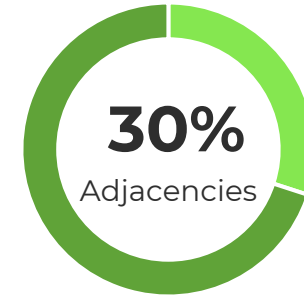
Key alignment factors:

- **Why vs. what:** Organizations must define why they are pursuing innovation before choosing what technologies to pursue.
- **Planning vs. acting:** Clear separation between long-term planning and short-term execution ensures that near-term wins support, rather than distort, long-term positioning.
- **Compressed timelines:** Both oil and gas and utilities now operate with shorter cycles for decision-making, deployment, and technology adoption. Strategy must reflect this acceleration.

Innovation leaders must navigate a three-to-five-year rolling horizon, constantly reevaluating assumptions as new signals emerge from policy, markets, and technology.



Incremental enhancements or transitions



Product or business model extensions



Net new innovations or transformation

After assessing discussions with our clients, we discovered most energy innovation teams are shifting their focus toward near-term, business-aligned impact. Only 10% of activity is aimed at longer-term, transformative innovation, reflecting today's emphasis on solving real operational challenges and aligning closely with executive priorities.

THE COST OF STANDING STILL

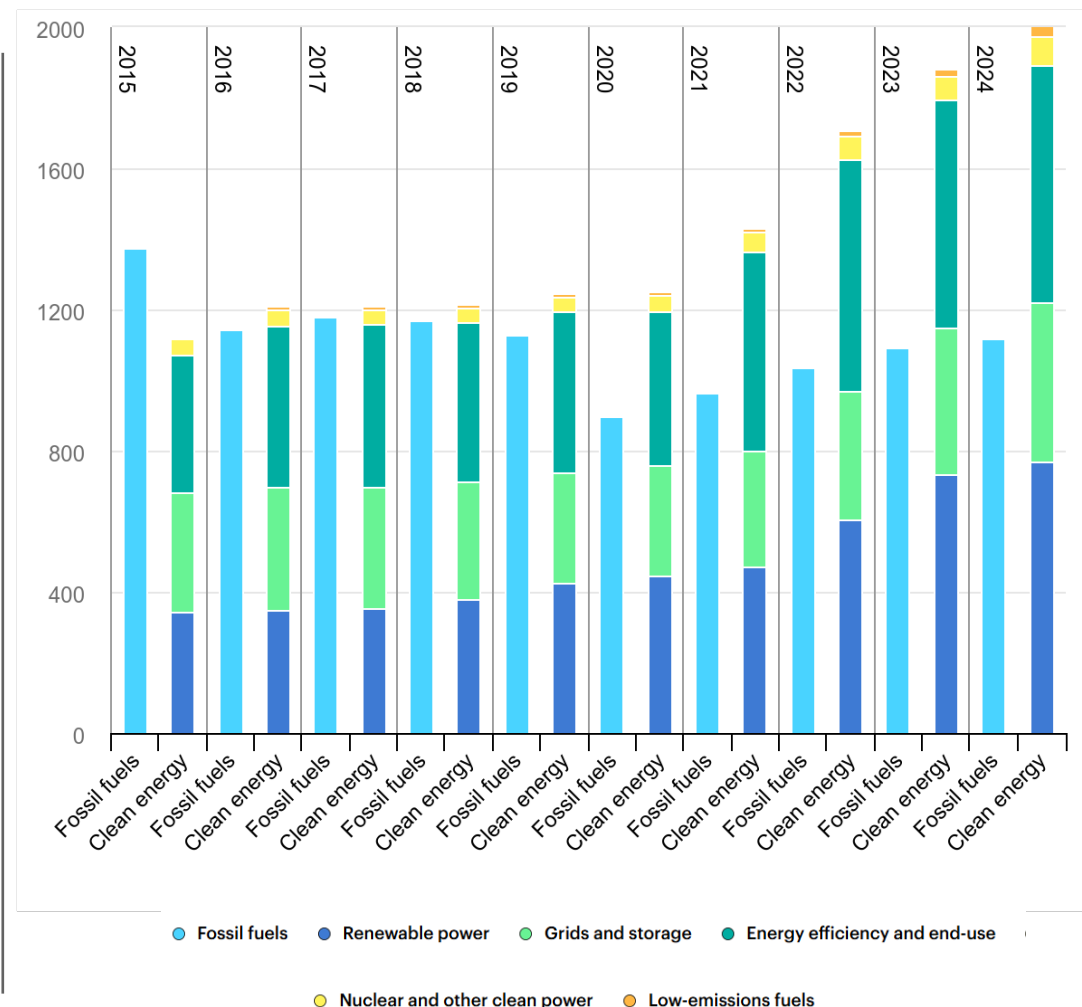
Why pausing innovation is the riskiest move in energy today

Innovation is difficult in today's energy environment, but it is even more dangerous to stop. Despite policy volatility, investor pressure, and tighter economics, the energy transition is accelerating, not slowing.

Investments in low-carbon technologies have outpaced fossil fuel investments for nearly a decade (see graph, right), and the gap continues to widen, spanning renewables, storage, grids, and low-carbon fuels. This capital shift signals where long-term growth will occur, even if margins are modest today.

Current policy headwinds won't last. As climate commitments tighten and energy infrastructure strains under new loads, governments will inevitably return to supporting novel technologies. When that happens, organizations that continued to innovate will be positioned to scale quickly. Those that paused will face a steep and costly restart.

Innovation is no longer optional; it is the foundation of long-term competitiveness.



Our focus for this e-book

Oil and Gas

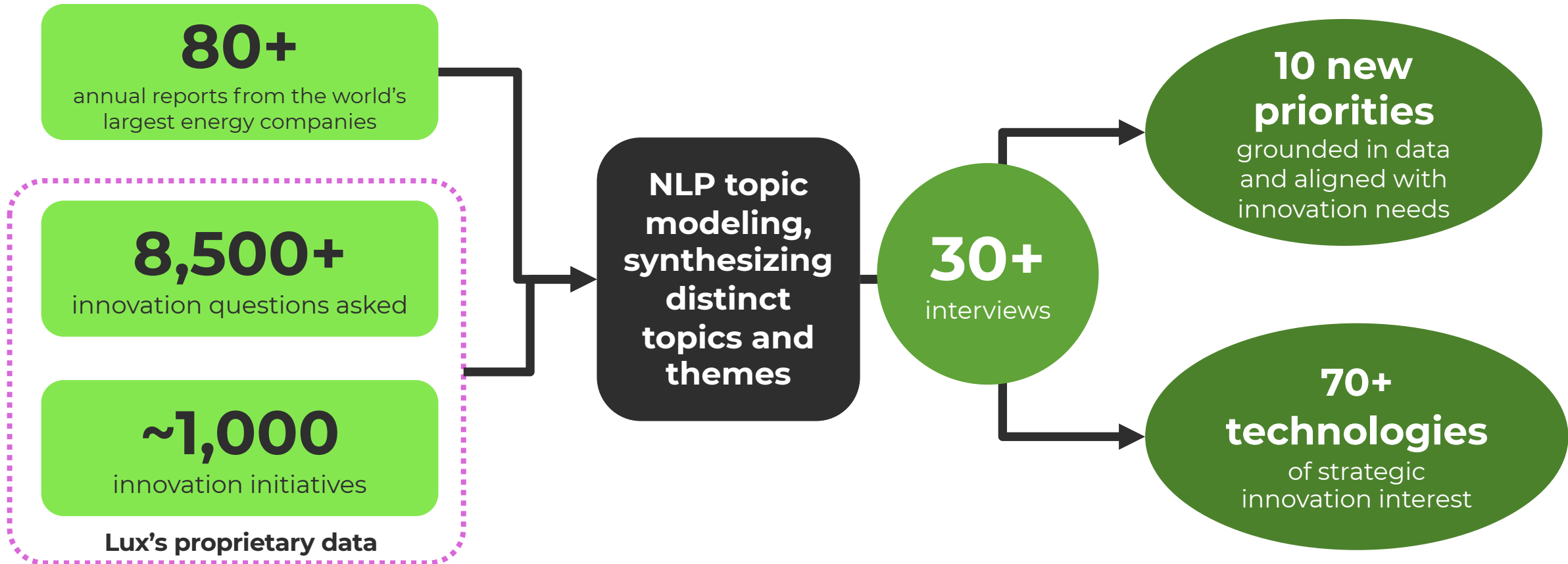


Utilities



How Lux determined the industry priorities

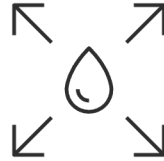
Lux Research identified the new priorities in this e-book through a rigorous, customer-centric methodology that blends quantitative scale with qualitative depth. Drawing on annual reports, client innovation questions, and documented innovation initiatives, Lux applied natural language processing (NLP)-driven topic modeling to uncover distinct themes emerging across the industry. These insights were then validated and refined through executive interviews, ensuring that the resulting 10 priorities and 70-plus high-impact technologies reflect real needs, real pressures, and real opportunities facing energy innovators today.



Oil & Gas Priorities



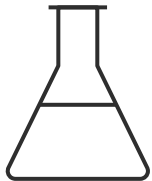
Harnessing External Innovations



Moving Beyond the Core



Meeting Net-Zero Targets



Future Chemicals



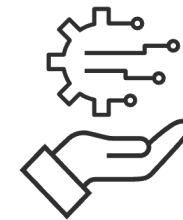
Meeting Demand for Energy



Policy and Regulations

In this e-book, we'll focus on the most-cited priorities.

Harnessing External Innovations



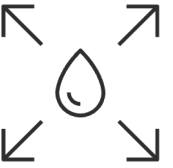
Leverage advances in materials science, AI, and other novel technologies

Understanding how to deploy AI in operations today, as well as how it can accelerate timelines to introduce future innovations, dominates this theme.

Novel materials, sensors, and robotics, used to improve efficiency or extend the life of assets, also rose to the top of our topical analysis of annual reports.

“Which innovators are developing new and enhanced functionalities in **industrial robotics** through the integration of **advanced sensors**?”

“How should an oil and gas company leverage **quantum computing**, and who are the most promising partners?”



Moving Beyond the Core

Identify opportunities to make new products or expand into new markets

Many companies today are revisiting tactics for exploring opportunities beyond the core, prioritizing those with near-term revenue opportunities.

Rising electricity prices, which impact direct opportunities in electrification as well as impact timelines for those requiring electricity, like e-fuels, should be watched.

“

*Which industries are showing the greatest demand for **carbon capture** solutions?*

”

“

*Can **battery swapping** viably compete with **fast charging** for EVs?*

”

Meeting Net-Zero Targets



Understand which technologies are needed to meet interim and long-term decarbonization goals

Many companies are pressing up against their first interim greenhouse gas reduction targets as many work toward net-zero targets for 2050 and require novel technologies to lower emissions from existing operations.

These plans need to be flexible, adapting to changes in technology costs and maturity.

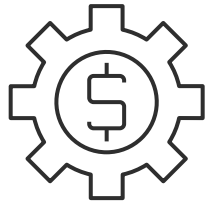
“Which technologies are suitable for deploying today in **low-carbon heat**?”

“How should my organization build a strategy around carbon offsets? How scalable and reliable are **carbon-offset technologies**?”

Utilities Priorities



**Innovating at
the Grid Edge**



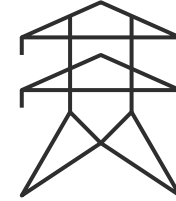
**Asset
Management**



**Low-Carbon
Electrons**



**Meeting Demand
for Power**



**Enhancing Resilience
& Reliability**



**Policy and
Regulations**

In this e-book, we'll focus on the most-cited priorities.

Low-Carbon Electrons



Identify sources of low-carbon power generation or consider concepts like carbon capture that can mitigate emissions from existing power plants

While solar and wind will be the backbone of the energy transition, their variability demands complementary, low-carbon dispatchable power sources to ensure reliability and energy security.

Utilities innovation leaders must develop strategies that integrate diverse, low-carbon generation assets while exploring technologies like carbon capture to decarbonize existing plants.

“

*Will **enhanced geothermal** technologies enable broader deployment and disruption in this mature sector?*

”

“

*What are the expected changes in cost and efficiency associated with **low-carbon combustion** technologies?*

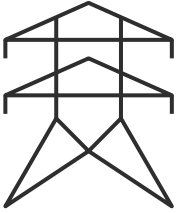
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Enhancing Resilience & Reliability

Identify solutions that can allow the grid to maintain operations in stressful conditions, both from extreme weather and demand events

As the grid continues to shift toward more intermittent and variable power flows, energy storage is becoming critical to balance supply and demand in real time.

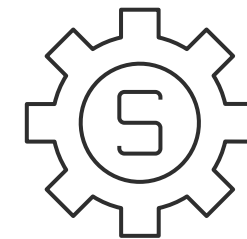
Resilience should be embedded across all stages of operations — from new asset planning to real-time management of existing infrastructure — to ensure assets and networks can withstand current and future disturbances.



“Which **grid-enhancing technologies** are the most relevant for utilities in the near and long term?”

“What are the latest advances in **lithium battery** technology, and how do **novel battery chemistries** compare?”

Asset Management



Guarantee current assets are used efficiently and maximize revenues, as well as figure out what investments should be made to ensure the most optimal infrastructure in the future

In preparation for a more decentralized, low-carbon grid, utilities are facing pressure to maximize the performance of existing infrastructure while expanding networks and increasing capacity.

Utilities innovation leaders should leverage digital technologies and performance-based insights to enable predictive, data-driven decisions.

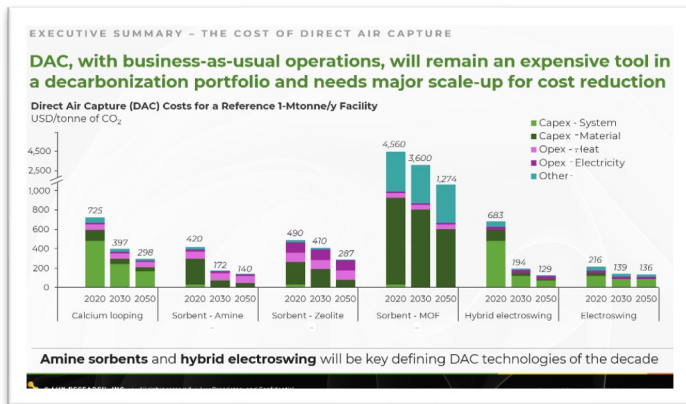
“What **digital innovations** can be retrofitted to improve performance of energy generation, storage, and grid assets?”

“Which **DERMS* platforms** can help improve grid management operations?”

Executing Innovation In A Harder Environment

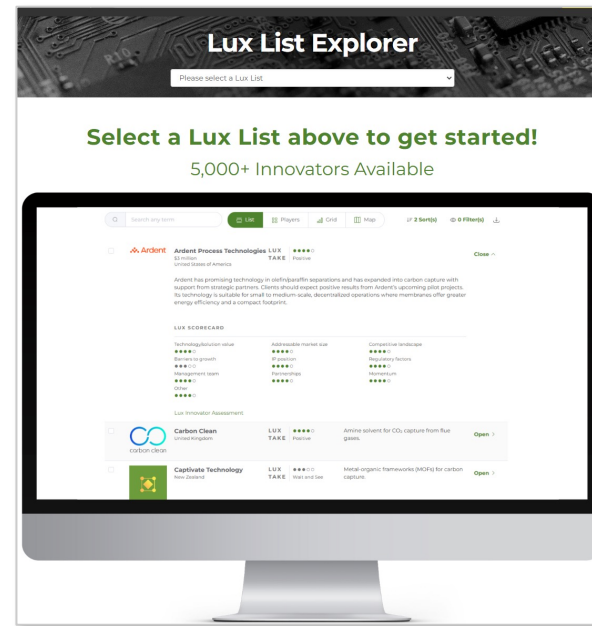
Executing innovation has become more complex as policy uncertainty, financial pressure, and tightening project economics reshape the energy landscape. Innovation teams must now deliver greater impact with fewer resources while staying tightly aligned to core business needs. The challenge is harder, but with the right tools and focus, it is still possible to innovate effectively amid volatility.

These steps form a pragmatic playbook for innovating with precision even when conditions are challenging.



1. Data-driven innovation

Use techno-economic analysis to understand tipping points and dial in the **timing** and **size** of investments; monitor the tipping points frequently.

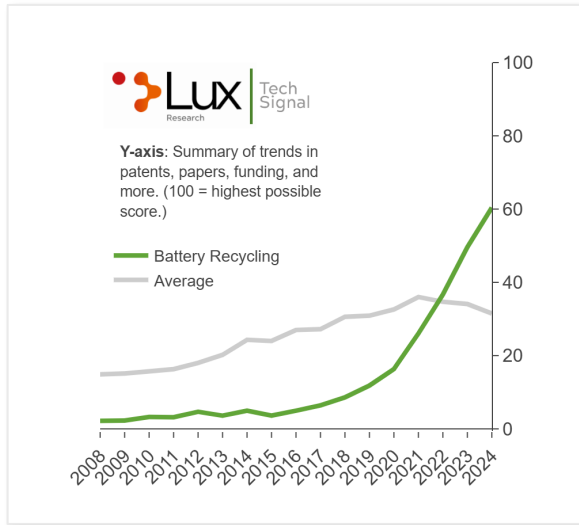


2. Identifying key players

With **Lux Lists**, members can examine funding activity plus assess companies and research centers.

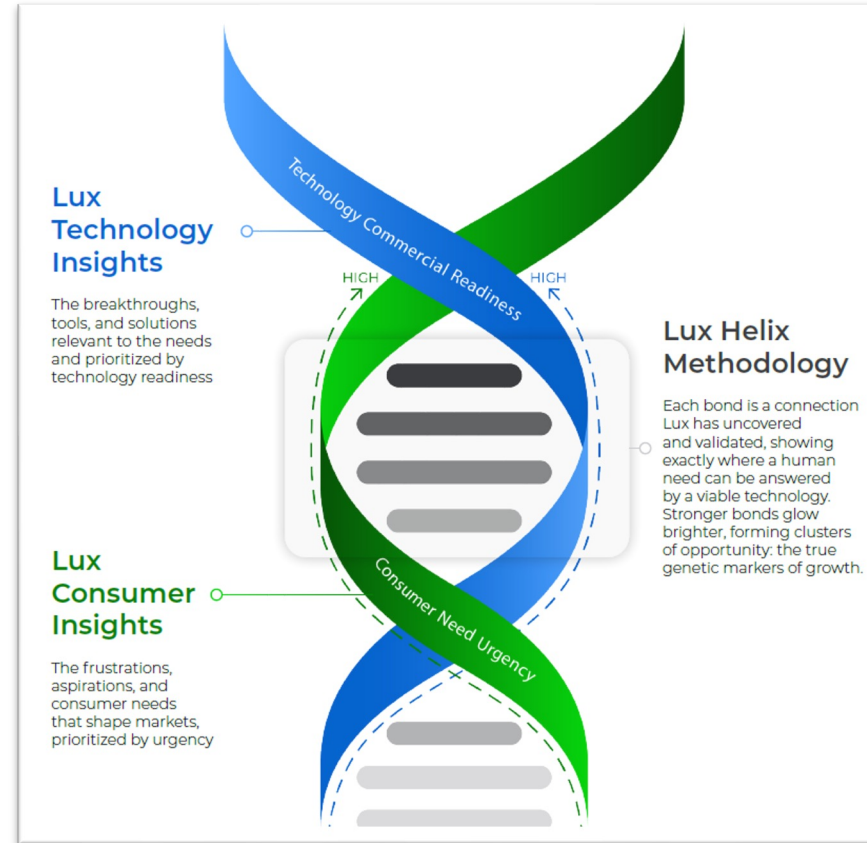
Execute innovation in a harder environment

These steps form a pragmatic playbook for innovating with precision even when conditions are challenging.



3. Watch for change

Stay at the forefront of innovation activities. [The Lux Tech Signal](#) can help monitor these indicators.



4. Understand consumer sentiment

Consumer adoption shapes energy demand more than ever. [The Lux Innovation Helix](#) can help leaders pair urgent consumer needs with commercially ready technologies.

Key Takeaways

01

Innovation teams are navigating turbulent times.

The policy, financial, and social environment is changing rapidly, and prioritization of near-term opportunities will continue into 2026.

02

Innovation teams are being pressured to look more near term.

Identify near-term opportunities with shorter paths to revenue generation.

03

Don't chase hype; stick to innovation fundamentals.

Keep a structured approach to evaluating opportunities, tied closely to solving business challenges.

About Lux

Lux Research fuels innovators to not only imagine what's possible in the future but also operationalize innovation success in the near term. We deliver research and advisory services to inspire, illuminate, and ignite innovative thinking that reshapes and grows businesses. Using quality data derived from primary research, fact-based analysis, and opinions that challenge traditional thinking, our experts focus on finding truly disruptive innovations that are also realistic and make good business sense.

The “Lux Take” is trusted by innovation leaders around the world, many of whom seek our advice directly before placing a bet on a startup or partner — our clients rely on Lux insights to make decisions that generate fantastic business outcomes. We pride ourselves on taking a rigorous, scientific approach to avoid the hype and generate unique perspectives and insights that innovation leaders can't live without.



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