NYU STERN

Center for Sustainable Business

10 YEARS OF BUILDING BETTER BUSINESS FOR A BETTER WORLD

ROSI™ Energy Decarbonization Project: *Research Findings*

March 2026

Acknowledgements

This report was written by Senior Research Lead Chisara Ehiemere, Senior Research Associate Divya Chandra, and Assistant Research Scholar Beverly Teng, of the NYU Stern Center for Sustainable Business. Funding for its development was provided by PwC. This report was written to summarize the most prominent findings from the development of the ROSI™ Energy Decarbonization framework and is not intended to serve as an endorsement, a source of primary data, or an illustration of either effective or ineffective management.

NYU Stern Center for Sustainable Business

The NYU Stern Center for Sustainable Business (CSB) was founded on the principle that sustainable business is good business. We provide education, conduct research, and influence industry practice by proving the financial value of sustainability for business management and performance. At CSB, we aim to equip future and current corporate leaders with updated business frameworks that embrace proactive and innovative mainstreaming of sustainability, resulting in competitive advantage and resiliency for their companies as well as a positive impact for society. For more information, visit www.stern.nyu.edu/sustainability.

Background

The global energy sector is rapidly evolving, with growth in global energy demand surging in 2024 to 2.2%, faster than the annual average rate of 1.3% seen between 2013 and 2023. Some of this growth is attributable to extreme weather which is responsible for as much as 15% of the overall increase in demand in 2024[1]. Energy is the foundation of global economic growth and development.

The energy sector comprises multiple industries spanning the exploration, extraction, production, transmission and distribution of power for commercial and residential use across the globe. Oil and natural gas made up the vast majority of energy consumed in the US in 2023, with oil at 38% and natural gas at 36% by British Thermal Units[2], and the remaining balance split evenly between coal, nuclear and renewable energy. US renewable consumption is just 9% compared with a global share of renewables consumption of 13% in 2023[3]. Given this low uptake of renewables, our review of the business case for decarbonization in energy examines not only the benefits of renewables, but also ways to drive decarbonization in fossil fuel production while the transition to lower carbon alternatives is underway.

There is evidence that the transition to renewables is happening, and that there is a business case for doing so. The International Energy Agency (IEA) found that globally, "investment in clean energy has accelerated since 2020, and spending on renewable power, grids and storage is now higher than total spending on oil, gas, and coal".[4] RMI also found in a 2024 report that "cleantech costs have fallen by up to 80 percent, while investment is up nearly tenfold and solar generation has risen twelvefold".[5] Notwithstanding, more needs to be done, particularly with the projected increase in energy demand due, in part, to increased AI usage. Global data center energy needs, alone, are projected to more than double to 945 TWh from 2024 to 2030, with the US accounting for the largest share of the projected increase[6].

With funding from PwC, NYU Stern Center for Sustainable Business (CSB) applied the Return on Sustainability Investment (ROSI™) Framework and methodology to decarbonization in the energy sector in the US, cataloguing the decarbonization practices that are used across the sector in the oil and gas, wind, solar, geothermal, hydroelectric, nuclear, hydrogen and bioenergy industries, and suggesting quantitative methodologies that can be used to build the internal business case for decarbonization for companies within the sector. The application of the framework explored benefits in the value driver categories of risk management, operational efficiency, talent management, sales and marketing, customer loyalty, stakeholder engagement, media coverage, supplier relations and innovation.

---

[1] Global trends – Global Energy Review 2025 – Analysis - IEA (Accessed 16 March 2026)
[2] U.S. energy facts explained - consumption and production - U.S. Energy Information Administration (EIA) (Accessed 16 March 2026)
[3] 2024 Renewables 2024 - Global review (Accessed 16 March 2026)
[4] Overview and key findings – World Energy Investment 2024 – Analysis - IEA (Accessed 16 March 2026)
[5] Cleantech Revolution (Bond, Butler-Sloss and Walter, 2024) (Accessed 16 March 2026)
[6] Executive summary – Energy and AI – Analysis - IEA (Accessed 16 March 2026)

Energy Decarbonization Framework Scope

Given the complexity of the energy sector, the analysis focused at a high level on generation, storage, transmission, distribution and the end consumer. While the framework primarily explores benefits to heavy emitters investing in lower emissions solutions, the benefits to renewable energy developers/companies are not extensively discussed beyond the role that they play in helping energy consumers decarbonize (as opposed to benefits of them decarbonizing themselves). We also did not directly address benefits to utilities due to the complexity of regulation and cost recovery mechanisms for regulated vs. unregulated utilities, which would warrant its own specific treatment. The findings acknowledge services provided by utilities under the practice "invest in storage, transmission, and distribution infrastructure to ensure long-term viability', but did not go into more detail. We also did not separately cover electricity, batteries and the battery charging infrastructure required for electric vehicles in this framework as they are included in the ROSI™ Automotive Framework.

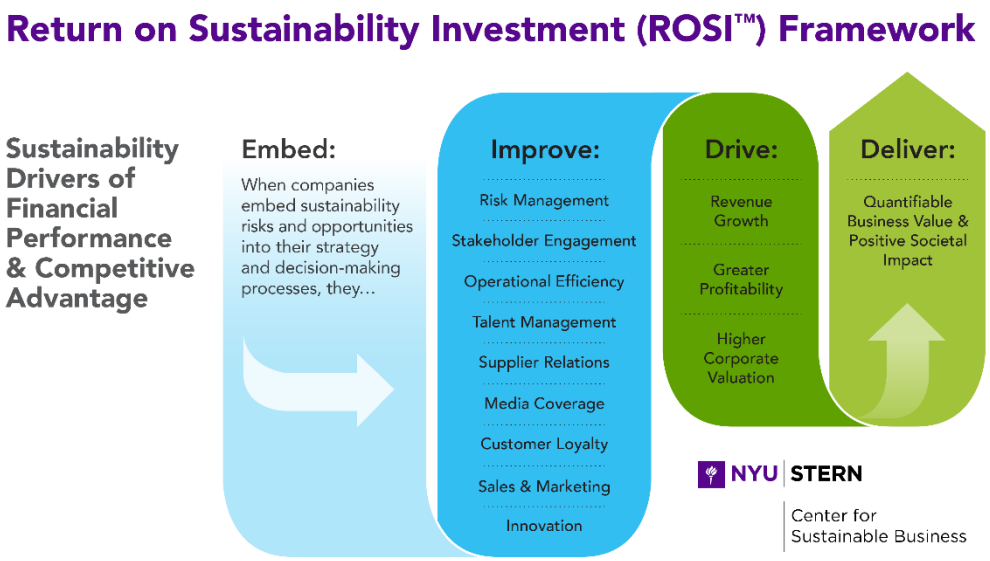
Framework Approach: Build, Improve Infrastructure, Convert, Reduce (BICR)

In designing this decarbonization framework, we found that all of the identified decarbonization practices across the different energy types could be grouped under one of the following four categories:

1. **Build** - This refers to the development and installation of new low carbon and/or renewable energy generation capacity, such as by investing in the installation of new wind or solar farms.
2. **Improve Infrastructure** - This refers to investing in the maintenance and improvement of existing low carbon and/or renewable energy infrastructure to allow for its continued viability and to ultimately increase efficacy & efficiency.
3. **Convert** - This refers to converting existing non-renewable energy generation (e.g. oil, natural gas) to a lower carbon and/or renewable type of energy generation (e.g. geothermal). In fact, one company went through a full conversion from fossil fuels to renewables.
4. **Reduce** - This refers to investing in adaptations (e.g. CCUS) that will allow companies to reduce emissions associated with existing non-renewable energy operations during the transition period. This practice group is especially important for high emitters operating in circumstances that are especially difficult to electrify.

Key Insights

1. **Of the nine value drivers included in the ROSI framework, four were overwhelmingly represented across the different energy types**



a. **Risk Management** - The Risk Management value driver is primarily driven by the reduced risk of business disruption and reduced exposure to regulatory & reputational risks resulting from reduced GHG emissions. In our research, we came across many cases where companies had been/will be penalized through government policy (e.g. various relevant fines & fees) and/or consumers (e.g. lawsuits, divestment) for their excessive GHG emissions. For example, Vermont is charging big polluters for their contributions to climate change based on their greenhouse gas emissions[7]. Similarly, in New York, Governor Hochul signed the Climate Change Superfund Act which will also hold high emitters financially accountable for their contributions to extreme weather fueled by climate change[8].

b. **Operational Efficiency** - The Operational Efficiency value driver is primarily characterized by various types of cost saving benefits (e.g. reduced energy costs, reduced repair & maintenance costs) caused by the increased resilience that the transition to renewable energy and/or the upgrading of critical energy infrastructure offers.

c. **Stakeholder Engagement** - The Stakeholder Engagement value driver demonstrates the potential for companies to access favorable financing incentives and structures (e.g. tax credits, sustainability-linked loans) allowing them to support a more robust business case for investing in low carbon and/or renewable energy. This value driver may be significantly impacted by the specific geography where a company is active, as some locations offer more financial incentives to support the transition to clean energy.

d. **Customer Loyalty** - The Customer Loyalty value driver is activated by the ability of energy companies to offer their customers lower carbon alternatives and more reliable and resilient service. This results in increased customer retention.

[7] Vermont officially becomes 1st state to charge big oil for climate change damage (Sarnoff, 2024) (Accessed 16 March 2026)

[8] Hochul Signs Law That Penalizes Companies for Greenhouse Gas Emissions (Howard, 2024) (Accessed 16 March 2025)

2. The energy sector's interdependencies and reliance on public policy are greater than in other sectors where ROSI has previously been applied, adding a level of complexity that cannot be adequately addressed within the construct of the framework

The US energy sector is characterized by complex and often aged/aging infrastructure, capital intensity, a broad diversity of fuel types, complex policy interventions and government regulations, and rapid technological innovation. This can make it challenging to develop a comprehensive catalog of all sustainability practices in energy and to propose associated calculations for all of them–there are far too many dependencies. CSB therefore focused on the most prominent groupings of decarbonization practices that did not entail as many interdependencies.

While CSB found numerous cases of individual companies making the business case for investments to meet their own energy needs, we frequently found that issues with permitting and grid dependence can significantly impede progress towards decarbonization. We also heard concerns about political risk which matched findings from a 2024 global survey by WRI stating that five of the ten biggest barriers to energy sector growth are policy-related, the top being political risk[9]. These factors infuse uncertainty into business case timelines, and can weaken the financial value of some of the potential benefits. For example, investing in behind-the-meter solutions that still rely to some extent on grid connection and performance does not achieve full energy independence which might have a stronger resiliency business case.

3. Renewable project approval and permitting roadblocks can be significant, and can't be solved by company investment alone

In our research, the approval & permitting process for renewable energy projects was cited as a significant roadblock to getting capacity online. One report highlights that from 2016-2023 the top three reasons for the cancellation of wind and solar projects were local ordinances or zoning, grid interconnection and community opposition[10], all three of which are connected to permitting to some extent. The same report found that in eight of nine U.S. regions, there is more energy generation and storage capacity seeking interconnection than there is running due to backlogs. This is an area where policy plays a significant part, some of which can be influenced by companies, but decisions are outside of companies' control. Another policy issue with even more profound effect is that as of January 2025, no new offshore wind project permits are being issued in the US (this still stands as of the writing of this article in September 2025). From a community engagement perspective to address community opposition, companies can invest in, and build time into their planning process for meaningful community engagement such as what is recommended in Pai's "A path to equitable permitting reform: Fast-tracking clean energy while empowering communities" (2024).

[9] Framework of the future: Evolving policy trends and the future of the energy industry (Accessed 16 March 2026)
[10] Eight facts about permitting and the clean energy transition | Brookings (Accessed 16 March 2026)

Some companies are partnering to offer solutions to the permitting problem. In Europe, there is the Amazon Web Services, Accenture and WindEurope collaboration to showcase digital tool to accelerate permitting - WindEurope. Other examples for solutions to permitting delays include digitalizing permit application and stakeholder engagement processes at the national level[11] though these can also come with their own complexities.

4. Many of the benefits of decarbonization practices are similar across energy types

Decarbonization practices are aimed at reducing greenhouse gas emissions and as such, the practices within the framework share a number of overlapping benefits. The reduction in emissions reduces the risk of emissions-related fines/fees, improves customer loyalty and generates new sales for existing and/or future commercial customers seeking ways to lower their emissions, particularly if they have made public commitments to do so. For heavy emitters there are additional associated benefits of lowering reputational risk, gaining operational efficiencies if the company is repurposing stranded assets and gaining access to new customers and markets. There were also practices that were too complex from a practice level to monetize without a full-blown study, including evolving solutions and innovation. Those include important emerging solutions, particularly in Europe such as Repurposing natural gas pipelines for hydrogen: Limits and options from a case study in Germany (Telessy, Barner & Holz, 2024) and Retrofitting gas turbine facilities for hydrogen blending (ICF, 2022).

5. The 2022 Inflation Reduction Act (IRA) strengthened the business case for decarbonization and renewables in the US and there is still a business case if it clawed back

The IRA significantly improved the business case for investments in decarbonization and renewables, and was lauded for its ability to spur investment in renewable energy. For example, renewable energy projects (e.g. wind, solar, hydrogen, battery storage etc.) could tap into production and investment tax credits in a phased manner over the next several years in order to cushion high upfront investment costs and make more expensive and emerging renewables more economical. However, new legislation passed in July of 2025 notably shortens the timeframe of their availability making it ever more urgent for companies to act sooner rather than later. Furthermore, the uncertainty around the continuance of incentives for these renewable energy credits may negatively affect the business case for many companies. Through our research, we know that there was a business case before the IRA and there will continue to be a business case for renewables due to lower costs of renewable electricity, reduced energy price volatility, resilience which lowers risk of energy-related shutdowns and associated lost productivity, and impact on employees among other factors.

[11] How innovation and digitalization can accelerate the permitting process for clean energy projects (WEF, 2023) (Accessed 16 March 2026)

6. Additional benefits associated with decarbonization provide an opportunity for further analysis

In one case that we studied, a geothermal company partnered with a university on an energy retrofit project that replaced an aging HVAC system with a geothermal solution. While the project focused on energy costs savings, it was noted that there are additional benefits that could be monetized with the right data: further reduced GhG emissions due to removal of R22 (HCFC-22 or Freon) equipment, reduced risk of Legionella by eliminating outdoor condensing units, reductions in overall maintenance costs, and extended equipment life due to reduced exposure to weather. Finally, an intangible related to comfort is that the consistent operation keeps temperatures exactly where they are set such that there are no hot or cold spots–just continual maintenance of the desired interior environment. This likely has an impact on student's comfort and ability to focus, which, if translated to an office environment, could lead to increases in employee productivity.

Conclusion

While the energy sector is complex and significantly interconnected with policy and regulation, decarbonization can create value for individual companies, and for value chains overall. The energy decarbonization framework is an overview of potential decarbonization strategies that can be broadly applied across various energy types and value chains. While utilities are not separately analyzed due to the nature of the business models, particularly for regulated utilities, there are many practices that are identified that are applicable to the industry. Utilities install, upgrade, and maintain the energy storage, transmission, and distribution infrastructure that is essential for the viability of all types of renewable energy. Another opportunity lies in addressing the roadblocks created by energy permitting processes and other regulatory and legislative constraints, which are all vital for advancing energy decarbonization but lie just outside the scope of the ROSI framework. We acknowledge the substantial impacts that these regulatory and legislative barriers and opportunities have on the energy sector while also recognizing the limitations of the ROSI framework itself.

With regulatory uncertainty in the United States, including the Inflation Reduction Act (IRA) which was lauded for unprecedented support of decarbonization, time is of the essence. In the face of these challenges, it is important to recall that even before the IRA, the cost of renewables was on the decline and was projected to become increasingly more cost competitive with fossil fuels—with wind and solar already being cheaper per MWh than fossil fuels and coal (Canary Media). Ultimately, there is no silver bullet for decarbonizing our energy system. The energy decarbonization framework demonstrates that there are numerous pathways for actors throughout the value chain and across different energy types to pursue decarbonization while creating tangible business value.

NYU Stern CSB thanks PwC for providing the financial support.

For questions on this case study and NYU Stern CSB's other research, feel free to contact:

Chisara Ehiemere, Senior Research Lead, NYU Stern CSB @ ce2198@stern.nyu.edu

Divya Chandra, Senior Associate Research Scholar, NYU Stern CSB @ dc4718@stern.nyu.edu

Beverly Teng, Assistant Research Scholar, NYU Stern CSB @ bkt244@stern.nyu.edu

Cover Photo Credit:
Photo by Quang Nguyen Vinh: https://www.pexels.com/photo/clouds-over-a-forest-wind-farm-in-summer-14024425/