

Energy Industry

Sustainability Report

CONTENTS

1	Executive Summary	1
2	Industry	2
	Overview	
	Big players	
	Demand drivers	
	ESG and energy sector	
	Outlook	
3	Analysis.....	6
	Environmental	
	<i>GHG Emissions</i>	
	<i>Energy Consumption</i>	
	<i>Water Consumption</i>	
	<i>Waste Management</i>	
	Social	
	<i>Demographics and Diversity Trends</i>	
	<i>Health and Safety Performance</i>	
	<i>Human Rights in Supply Chains</i>	
	<i>Community Engagement</i>	
	Governance	
	<i>Board Structure</i>	
	<i>Transparency</i>	
	<i>ESG-Related Compensation</i>	
	Player's comparison	
	<i>ESG Scores</i>	
	<i>ESG KPIs</i>	
5	Outlook.....	14
	Market trends	
	Roadmap & Recommendations	
6	Conclusion.....	16

Executive Summary

This focus of this report is to provide an in-depth assessment of the energy industry through the lens of Environmental, Social, and Governance (ESG).

The energy sector is responsible of nearly 40% of global CO₂ emissions, although cleaner segments are projected to grow by 8–12% annually through 2030, it is still very important within this industry to consider the environmental effect and impact on society and in the overall world through their climate action procedures. Governments, investors, and consumers are increasingly pressuring companies to follow international sustainability frameworks such as the EU Taxonomy, the Science Based Targets initiative (SBTi), and the Paris Agreement's 1.5°C pathway. So that, companies take more in account the adoption of responsible practices and by demanding from them greater transparency.

ESG compliance is no longer a matter of compliance alone but is key for firms access to capital, market share, and long-term resilience, specially in this sector. In order to, explore the sustainable practices in this sector it was developed a case with three of the biggest companies that work in this sector. With leading companies integrating ESG-linked compensation, increasingly considering their renewable energy usage, as the study case showed. However, this development towards sustainability is highly constrained by capital needed, the future still requires coordination between cross-sector strategies mainly focused on electrification, decarbonization, and robust circular economy practices.

Finally, the report develops strategic pathways for advancing sustainability in the energy sector, with coordination being key in order to develop new strategies. These include reducing Scope 1, 2, and 3 emissions, embedding sustainability into business models, and leveraging ESG leadership as a driver of innovation and competitiveness. The ability of the peers analysed to provide abundant, affordable, and clean power while maintaining high ethical and social standards will be the defining factor for sustainable economic growth through 2030 and beyond.

Industry overview

The global energy industry is undergoing structural transformation, shifting from a system historically dominated by fossil fuels to one increasingly powered by renewable and low-carbon sources. This transition, central to achieving global climate goals under the Paris Agreement, is redefining the sector's strategic priorities, investment flows, and operational models. The energy sector remains a cornerstone of the global economy, supporting almost all other industrial and commercial activities, from transportation and manufacturing to digitalization and residential consumption. The global energy market is vast, with total expenditure exceeding \$10 trillion annually.

The contemporary energy mix combines both traditional and emerging energy sources. Fossil fuel industries, which include the oil sector, the natural gas sector and the coal industry, still account for a significant share of global primary energy supply, although many energy companies are in an ongoing process of decarbonization leading to their growth to be declining in many developed countries. In contrast, renewable energy sources such as solar, wind, hydropower, and bioenergy represent the fastest-growing segment in this industry. According to IEA projections, renewables are expected to exceed 42% of global electricity generation by 2028. Nuclear power continues to play a stable role as a provider of baseload and low-carbon electricity in many countries. Finally, emerging technologies, including, for example, hydrogen (particularly green hydrogen), energy storage systems (batteries), and carbon capture, utilization, and storage (CCUS), are becoming critical enablers of a fully decarbonized energy system.

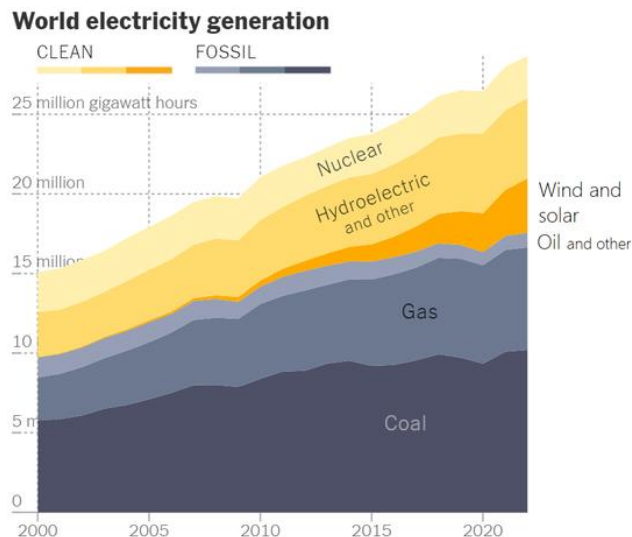


Figure 1; Source: The New York Times, The Learning Network. Published March 28, 2024.

This evolution is driven by the urgent motivation to mitigate climate change, as the energy sector is responsible for approximately three-quarters of global greenhouse gas (GHG) emissions it is imperative that its behaviours shift towards a more sustainable conduct. Furthermore, the industry's strategic importance extends beyond economics to national security and geopolitics. With energy independence, supply security, and the resilience of energy grids becoming major concerns for governments worldwide. As the world moves towards electrification and digitalization, the energy sector's ability to provide abundant, affordable, and clean power will be the defining factor for long-term, sustainable economic growth in a such an instable world.

Big Players

In this global industry companies are dominated by big, high-market capitalization corporations. In the following table 10 companies are selected of this vast industry.

Company	Market Cap	Country
 aramco	\$1.670 T	S. Arabia
 ExxonMobil	\$501.72 B	USA
 Chevron	\$305.00 B	USA
 PetroChina	\$284.75 B	China
 Shell	\$210.77 B	UK
 NEXTERA ENERGY	\$175.93 B	USA
 GE VERNOVA	\$158.62 B	USA
 CNOOC	\$158.62 B	China
 TotalEnergies	\$139.84 B	France
 Iberdrola	\$138.55 B	Spain

Table 1

Demand drivers

Key drivers for the energy sector focus on the following:

- **Population growth:** Global population is expected to rise from 8.1B (2024) to 9.6B (2050), although regions like the EU, China, and Japan expected to continue to see population decline, the forecasted growth on demand will be fuelled on account of regions like Africa and Asia-Pacific. Such that, the increase in population will fuel demand as urbanization drives higher energy consumption.
- **Expansion Of Data Centres:** Data centres development have been growing rapidly, with around 20% rise in installed capacity last year. With the AI boom showing no signs of slowing down with circular investment significant energy consumption is foreseen to keep rising even though they account for only about 1% of global electricity use now.
- **Rise In Cooling Demand:** Extreme heat driven by climate change pushes global cooling needs about 20% above the long-term average. This surge increased coal use to meet electricity demand, highlighting the need for cleaner and more efficient cooling solutions.
- Electricity demand itself is rising quickly, driven by **EV adoption, data centres, AI-related loads**, and growing cooling needs, requiring unprecedented expansion in generation, grid infrastructure, and storage.
- **End-User Energy Prices:** Taxes, subsidies, and CO₂ pricing shape consumption in all sectors. Energy-intensive sectors respond to price changes and policy incentives. Rising carbon prices increase the cost of fossil fuels, influencing fuel choice.

Industry and buildings are the leading source of electricity demand growth in most regions, while in North America, data centers are the main driver.

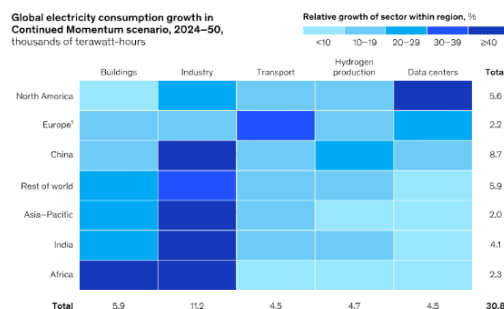


Figure 2; Source: McKinsey & Company Global Energy Perspective 2025

ESG and energy sector

The global energy sector is undergoing a profound transformation, driven by the dual imperatives of meeting growing demand and reducing environmental impacts. Energy production and distribution remain heavily reliant on fossil fuels, while renewable energy sources are rapidly expanding. As the sector scales up to meet increasing electricity, heating, and mobility needs, it faces mounting pressures related to greenhouse gas emissions, water use, land use, and biodiversity.

Both internal industry trends and external pressures are pushing energy companies toward stronger environmental, social, and governance (ESG) performance. Regulatory frameworks are tightening worldwide, linking sustainability compliance to market access, financing, and competitiveness. Investors, customers, and stakeholders increasingly demand transparent ESG reporting and demonstrable action on climate commitments, driving energy companies to integrate sustainability into strategic decision-making.

Energy production is inherently resource intensive. Many of the different processes require significant energy, water, and material inputs. In addition, the sector contributes substantially to global carbon emissions, accounting for nearly 40% of total anthropogenic CO₂ emissions.

ESG principles are particularly relevant for the energy sector due to its direct environmental footprint and social impacts, including community engagement, labour practices, and equitable energy access. Incorporating ESG considerations enables companies to manage risks, optimize resource use, and improve resilience in the face of climate-related disruptions. Renewable energy deployment, carbon capture, decarbonization of industrial processes, and energy efficiency initiatives are among the key levers for aligning operations with ESG goals. In this way, robust ESG reporting has become a cornerstone of responsible business practice in energy.

Outlook

The global energy industry, as previously mentioned, is expected to expand steadily over the next decade as electrification, digital infrastructure, and clean energy deployment accelerate. According to the IEA, total energy investment is set to remain above \$3–4 trillion annually, reflecting one of the largest capital shifts in modern economic history. When viewed as a whole, the global energy system is projected to grow at an estimated compound annual growth rate (CAGR) of around 3–4% through 2030, with clean-energy segments (solar, wind, storage, grids, and electrification technologies) growing significantly faster at 8–12% CAGR depending on region and technology.

Moreover, future growth is believed that it could follow three different scenarios.

In a **fast-transition scenario**, accelerating electrification and supportive policy environments could push renewables toward 60% of global electricity generation as early as 2030, with investment shifting heavily toward clean power and flexibility solutions.

A **moderate scenario** sees renewables expanding steadily, but fossil fuels, especially natural gas, remain essential for system reliability.

A **slow or fragmented scenario** reflects persistent policy, financing, or geopolitical obstacles, delaying decarbonization, and reinforcing reliance on fossil fuels.

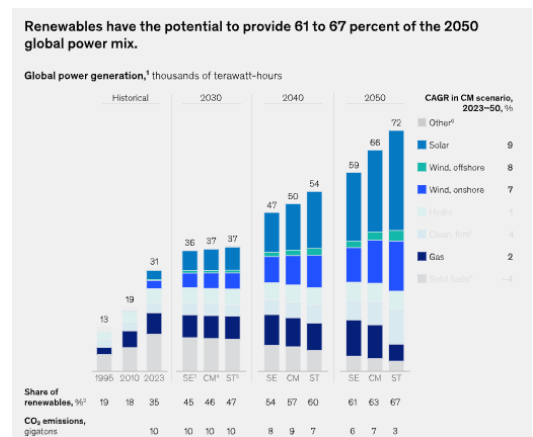


Figure 3; Source: McKinsey & Company Global Energy Perspective 2025

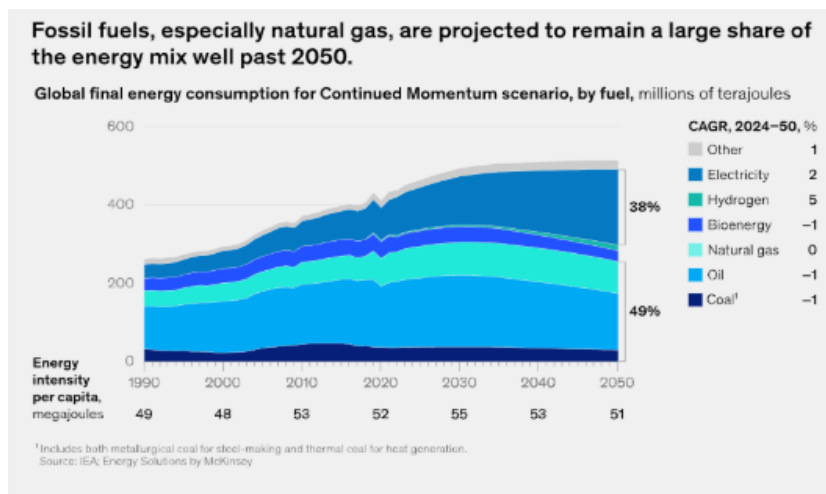


Figure 4; Source: McKinsey & Company Global Energy Perspective 2025

Key risks include supply-chain constraints for critical minerals, grid bottlenecks, permitting delays, commodity-price volatility, and rising exposure to climate-related disruptions. Despite these challenges, the structural drivers of the transition such as declining renewable cost, electrification, digitalization, and strong policy incentives, position the sector for sustained long-term growth. The balance of investment between clean and conventional energy, along with the speed of infrastructure build-out, will determine the trajectory of the industry's transformation through 2030 and beyond.

Analysis

Environmental

Greenhouse gases emissions

The energy systems sector stands as the single largest contributor to global greenhouse gases emissions. This sector includes the supply-side production of energy, primarily electricity and heat. These emissions are categorized into three scopes:

- **Scope 1 emissions:** Direct emissions from sources owned or controlled by the company, and in the energy context, this primarily falls to the power and heat production.
- **Scope 2 emissions:** Refers to indirect emissions from the generation of purchased electricity, or heating and cooling consumed by the company.
- **Scope 3 emissions:** All other indirect emissions that occur along the value chain, including those from the production of natural gas and coal that the utility purchases and from combustion of the fuel sold to customers.

According to IEA data, the energy sector alone emitted around 15.1 GtCO₂e of scope 1 emissions in 2023, making it the **single largest global contributor of greenhouse gases** (Lamb et al., 2021). Other rapidly growing Scope 1 sources include fugitive emissions from oil and gas infrastructure and coal mines, which saw increased growth in 2023.

The emissions from the energy sector's massive Scope 1 production become the Scope 2 responsibility of every consuming sector. This relationship is critical because it demonstrates that the **reduction of overall emissions** in consuming sectors is tightly linked to the decarbonization of the energy supply. Evidence from the European Union up to 2024 shows that the overall success in reducing the EU's total footprint is attributable to the decline in the upstream energy sector.

Global CO₂ emissions from energy combustion and industrial processes and their annual change, 1900-2023

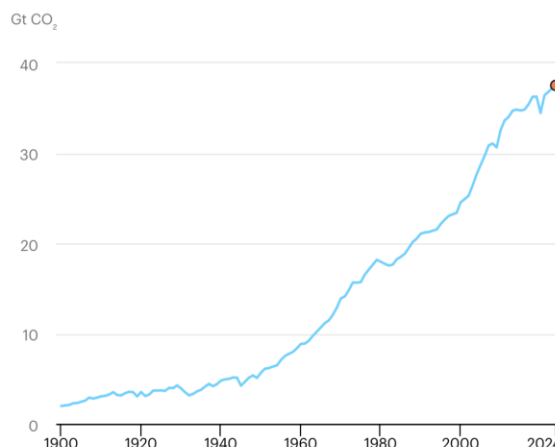


Figure 5; Source: IEA (2025), Global CO₂ emissions from energy combustion and industrial processes and their annual change, 1900-2023, IEA, Paris <https://www.iea.org/data-and-statistics/charts/global-co2-emissions-from-energy-combustion-and-industrial-processes-and-their-annual-change-1900-2023>, Licence: CC BY 4.0

Energy Consumption

The energy industry itself **consumes a significant portion of energy** in internal processes for conversion. In the European Union in 2023, the energy transformation sector (which includes energy lost during conversion of primary fuels, such as turning crude oil into motor gasoline or producing electricity from coal) accounted for the largest share of gross available energy use at 22.9%.

The energy demand is driven by two main aspects of the manufacturing process:

1. **Inefficiency of thermal cycles:** Over half of the chemical energy contained in the fuel is lost, primarily to the atmosphere or cooling water, and does not reach the consumer as electricity.
2. **Refining and processing of fossil fuels:** Turning extracted energy resources into usable products for consumers requires massive industrial processes that are inherently energy-intensive.

Industry's main energy sources

Fossil fuels

Mainly oil, coal and natural gas. They are extracted from the earth and burned to release thermal energy, resulting in high Scope 2 Emissions.

Nuclear

Its main source is uranium. Used to generate heat, provides highly reliable electricity with low carbon emissions during generation.

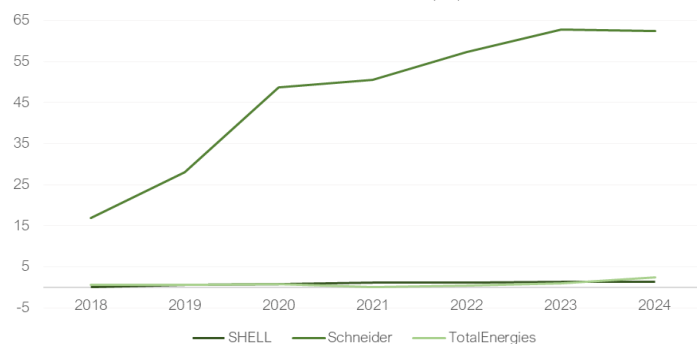
Renewables

These are naturally replenished and are rapidly increasing their share in the production of energy.

Transition to Renewables

The global shift toward 100% renewable energy supply is emerging as a critical strategy to combat climate change, bolster energy security, and drive sustainable development, fostered by the Paris Agreement. The transition to a CO2-free energy system has gained political momentum, with numerous countries setting net-zero emission targets. Despite the urgency, the transition requires extensive infrastructure restructuring and internationally coordinated policies, a process that historically aligns with a timeline of 40–50 years.

Renewables Use (%)



Graph 1; Source: Own analysis and company reports

Electricity generation by technology 2000-2028

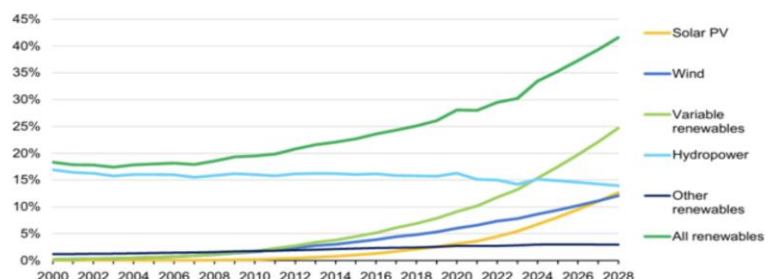


Figure 6; Source: IEA (2023). *Renewables 2023: Analysis and forecast to 2028*. Paris: International Energy Agency.

Water consumption

The production and supply of **energy require substantial quantities of water**, creating an intricate and increasingly critical water-energy nexus. Understanding the magnitude and distribution of water consumption within the energy sector is essential for ensuring both water security and sustainable energy development globally.

Water consumption, defined as the volume of water withdrawn but *not* returned to its source (due to evaporation or incorporation), represents an exclusive use of the resource, providing a direct measurable impact on water security. Globally, the energy sector is responsible for approximately **10% of total water withdrawals and about 3% of total water consumption**.

The power sector, particularly thermal power plants, is the largest source of water withdrawals within the energy sector, primarily due to cooling needs. There are three main types of cooling technologies:

- **Wet-Towers:** These systems withdraw less water than once-through systems but consume significantly more due to high evaporative losses.
- **Once-Through Cooling:** These systems have the highest withdrawal rate but generally lower consumption than wet-towers as most water is returned.
- **Dry Cooling:** This technology uses very little water, but it incurs an energy penalty, reducing the plant's efficiency and output.

Future trends show that the **interdependencies between energy and water** are set to intensify. Global water withdrawals for the energy sector are projected to rise, while water consumption is expected to increase by almost 60% by 2040 in the IEA's New Policies Scenario. This increase reflects a shift towards more consumption-intensive technologies in the power sector and a greater supply of water-intensive biofuels.

Fresh water consumption by company (millions of cubic meters)

	2023	2024
Saudi Aramco	89.9	83
Exxonmobil	290	330
Chevron	62	67
PetroChina	77	74.8
Shell	N/A	90
Nextera Energy	0.114	0.114
Ge Vernova	8.7	10
CNOOC	2.1	2.4
TotalEnergies	55	56
Iberdrola	79	61

Table 1; Source: Data compiled from corporate ESG reports.

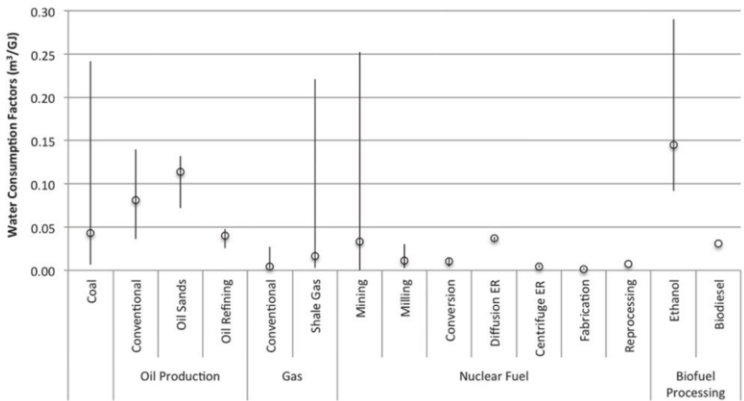


Figure 7; Source: Spang, E.S., Moomaw, W.R., Gallagher, K.S., Kirshen, P.H. & Marks, D.H. (2014). The water consumption of energy production: an international comparison. Environmental Research Letters, 9(10), p.105002.

Waste Management

The global expansion of the electricity sector has led to an **increase in the waste generated by its activities**, such as installation, maintenance, and renovation of electrical networks. As energy is considered an "environmentally sensitive sector", effective waste management is critical for mitigating environmental impacts and supporting climate action. Waste generated in the electricity sector is diverse and arises from the core activities of generation, transmission, and distribution.

Generation Phase: Electric generation plants convert mechanical, chemical, and/or fission energy into electric energy, and there are different types of processes employed to produce electricity.

1. **Fossil-fuel and Nuclear Plants:** All stages of the fuel cycle (mining, fabrication, power production, and decommissioning) generate waste, including hazardous wastes and large volumes of non-hazardous materials.
2. **Coal-fired Power Plants:** These generate high quantities of fly ash and bottom ash, which cause adverse environmental impacts due to their volume and large disposal areas.
3. **Hazardous Materials:** Power plants use and generate hazardous materials/wastes like oils, hydraulic fluids, battery electrolytes, and mercury-containing materials, with fossil fuel plants using and generating larger volumes compared to other technologies.

Transmission and Distribution Phases: Aim at transferring the electric energy generated in the power plants to the urban consumers. These phases can generate hazardous wastes from high-voltage power devices, power electronics (containing lead, cadmium, and brominated fire retardants), periodic cleaning of substations, and insulating materials (containing asbestos and PCBs).

The **proper management of waste** is a crucial strategy for climate change mitigation, adaptation, and overall environmental protection. International environmental regulations often propose a **waste hierarchy to guide priority options for waste disposal**. This approach was included in the EU action plan for the Circular Economy as a strategy to achieve the best overall environmental results and to reintroduce the valuable materials from waste back into the economy.

1. **Prevention and reduction**
2. **Preparation for reuse**
3. **Recycling or composting**
4. **Other types of recovery** (energy recovery, incineration, etc.)
5. **Disposal in landfills**

Landfilling remains the most common waste destination, receiving approximately 55% (28.15 Mt) of the total generated waste, even though a large part of it was recyclable, with over 54% of both hazardous and non-hazardous waste streams directed there. This contrasts with recycling, the second most frequent option, which accounted for only about 18.8% (9.65 Mt) of the total waste. Furthermore, reuse, an option that offers a higher added value within the circular economy framework, was significantly underexplored, representing only about 9.2% (4.71 Mt) of waste disposal. Nevertheless, the period from 2017 to 2019 demonstrated a positive trajectory toward sustainability, marked by a 17% reduction in total waste generation and a substantial 56% decrease in waste sent to landfills. This shift suggests a **growing trend toward increased sustainability and circularity**, potentially driven by factors such as the influence of EU policies and greater awareness among managers.

Social

The social pillar is a provider of essential infrastructure and a driver of economic development. Operations are often capital-intensive, influencing local employment, land use, public health, and regional development. At the same time, energy companies operate complex global supply chains and high-risk industrial environments, making labour practices, human rights protections, and safety performance critical components of responsible business conduct.

As the climate transition takes place toward low-carbon systems training the workforce is required. While companies are responsible supply chain management for critical minerals, and sustained community engagement to maintain a social license to operate. Furthermore, energy affordability and equitable access remain central to both economic stability and social cohesion. In this context, the Social pillar can be assessed through four key areas: community relations and engagement, labour standards and human rights, health and safety performance, and energy access and affordability.

Community relations engagement

It is the process that refers to how energy companies interact with local stakeholders to build trust, foster acceptance, and support sustainable implementation of energy projects. As companies rely on support from local communities, they must foster relationships in order to, for once, obtain permits and leases and as well the ability to conduct operations efficiently. By fostering agreements with municipalities and local governments and promoting disclosures procedures they ensure the covering of risk management strategy and to cover some community rights and interests. In the industry engagements often take form of energy communities, collective initiatives, where communities generate consume and share and even sell electricity and contribute to grid flexibility.

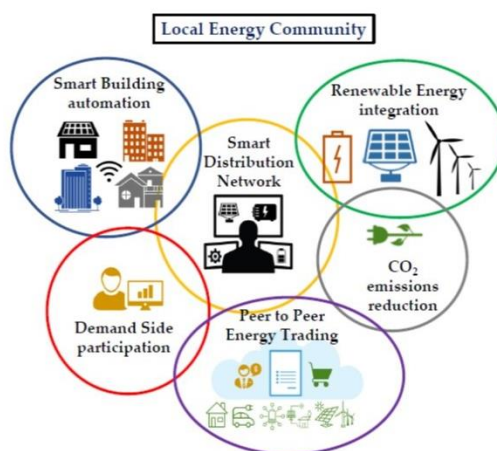


Figure 8; Source: Ghiani, E.; Giordano, A.; Nieddu, A.; Rosetti, L.; Pilo, F. Planning of a Smart Local Energy Community: The Case of Berchidda Municipality (Italy). *Energies* 2019, 12, 4629. <https://doi.org/10.3390/en12244629>

In terms of the companies analysed in the case of **Shell**, it aligns its social performance with UN Guiding Principles on Business and Human Rights. In the supply chain, they require suppliers to contractors to provide to adhere for “Building Responsibly” principles. While taking into account in conducting a new project the social impact by assessments to identify potential impact on indigenous populations, local livelihoods and cultural heritage.

TotalEnergies has an initiative to guarantee a common set of social standards across all 120n countries of operation, regardless of local relocation. By following four pillars, social protection, health, family sphere and working conditions in order to emphasize global protection and employee well-being. In the supply chain the company also requires all supplier to adhere to “Fundamental Principles of Purchasing”, that include strict prohibitions on forced labour and child labour.

Schneider Electric organizes its social commitments under three pillars, Trust, Equal and Generations. By ensuring a <1% pay gap between men and women across the organization, while offering professional training for energy transition and promoting youth entrepreneurship through its foundation. Additionally, they conduct regular “Vigilance Plan” audits to monitor human rights risk, including forced labour and health and safety across their value chains and own plants.

Governance

Typical governance structures in the industry

The energy industry governance refers to the framework of rules, policies and institutions that manage the production, distribution and consumption of energy resources. Beyond this influence and power of decision related to resources, namely, raw materials, and how these are used to produce energy (e.g. fossil fuels vs. renewable resources, ...) the governance area is also linked to other managerial functions and strategic oversights, such as decisions on capital investments, risks management, safety standards and even ethical and moral aspects, ensuring that the company goals are attained as expected.

This area faces major challenges mainly due to the sector's scale, the fact that energy is a capital-intensive industry, political exposure, and possible environmental impacts.

That is why governance, in this sector, is hugely important and therefore, why companies constantly adapt themselves to the current and uncertain world, as well as to society needs, trends and other geopolitical concerns.

			
% ind. directors	64,3%	83,3%	70,6%
Avg. Age	60,93	62,67	56,27
% women on board	42,857	41,667	53,33
ESG lined bonus	✓	✓	✓

Table 2; Source: Bloomberg Terminal

Table 2 shows how independence, age and diversity, in the Board of Directors of these three companies, is incorporated and managed.

BESG Scores

			
Governance Score	6,52	8,71	5,83
ESG Score	6,53	6,75	7,4

Table 3; Source: Bloomberg Terminal

Through the comparison of BESG Scores, namely the Governance Pillar Score and the overall ESG Score, we can easily conclude how impactful and relevant the governance sector is inside the broader one of ESG for each company. Shell, for instance, reveals a strong governance area, although Schneider Electric reveals the opposite, while Total Energies maintains its governance plain and aligned with the global ESG one.

ESG-related compensation

We have seen how concerned society is becoming, not only with environmental related factors, but also with social and governance related topics. Consequently, with a more ethically conscious consumer and a more ESG concerned investor, effective governance is essential for the overall company success, reason why most companies in the energy industry establish politics and compensation related to ESG goals, assuring that those are attained easily and effectively.

Companies usually provide **Short-Term Incentives (STI)** or **Long-Term Incentives (LTI)** to ensure that remuneration is aligned to the company's strategic ambitions, with energy sector companies focusing mainly on metrics like:

- **Reducing operational emissions of GHG**, such as CO2 and methane, aiming to decrease Scope 1 and 2 emissions.
- **Safety outcomes** – no fatalities as well as constantly focusing on reducing injury rates
- **Accelerating energy transition** – provide better solutions for renewable energy generation and energy storage
- **Diversity** – especially within the Board of Directors

Examples of **STI** and **LTI** of the analysed players:

STI – **Shell's** majority of employers participate in the annual bonus scheme which includes metrics like "Shells journey in the energy transition" or its net-zero emissions target (100% in 2050). Safety and energy related performance, together, form 30% of the annual bonus scorecard. For **Schneider electric**, every year the Schneider Sustainability Impact performance plan (SSI) is used as a criteria of STI for the group's executives and for around 76,000 eligible employees, forming 20% of their STI plans.

LTI – All employees at **TotalEnergies** can receive LTI in the form of shares. 30% of the criteria for awarding these performance shares are linked and depend on GHG absolute emissions reduction. This shows how focused the company is with emissions reduction since it weights almost one third of the LTI payout criteria. Executives face an even stronger weight in ESG-linked compensation (30-39% of bonuses/variable compensation). For **Shell**, in 2024 the energy transition performance condition had a 20% weight in the LTI plan and 12,5% for their Performance Share Plan (PSP). **Schneider Electric** also implemented in 2024 a new sustainability compensation policy in its LTI, linked to the reduction of CO2 emissions. It applies to 4,500 employees and, relatively to the CEO, represents 50% of his total compensation, in addition to the fact that 78% of his pay depends on performance.

Players Comparison

ESG scores

	Range	Schneider	Shell	TotalEnergies
Morningstar	0 - 100 (lower = lower risk)	33,63	7,14	24,26
MSCI ESG Ratings	AAA (leader) - CCC (laggard)	A	AAA	A
S&P Global CSA	0 - 100	85	38	42
Bloomberg ESG score	0 - 100	6,74	7,4	6,42

Table 4; Source: Bloomberg Terminal

ESG KPIs

ESG Pillar	Key Performance Indicator	Unit/Year	Shell	Schneider	TotalEnergies
Environmental	Absolute Scope 1 & 2 GHG Emissions	Mt CO ₂ e / 2024	58000	539,9	35200
	Renewable Electricity Use	% of Energy consumption / 2024	2700%	903,2	4500
	Water Recycling Cycle	% / 2024	N/A	N/A	N/A
	Waste Recycling Rate	% / 2024	27%	85%	71%
Social	Total Workforce (Approx.)	Headcount / 2024	97107	170844	107826
	Women in Leadership / Management	% /2024	33%	26%	29%
	Lost-Time Injury Rate (LTIR)	Cases per 200,000 hrs / 2023 - 2024	0,1	0,06	0,07
Governance	Board Independence	% Independent Directors / 2025	83%	71%	64%
	ESG-Related Executive Compensation	Status / 2025	Yes	Yes	Yes
	Responsible Sourcing Audit Coverage	Scope / 2024	100%	100%	100%

Table 5; Source: Bloomberg Terminal

Outlook

The combination of artificial intelligence, innovation and emerging energy demand is driving rapid changes across the energy industry, in addition to a volatile macroeconomic environment, geopolitical concerns and shifting policies. The main concern will continue to be around emissions (CO₂, GHG, ...) and how cleaner energy solutions can be implemented so that the desired and necessary net-zero scenario can be gradually achieved and with the least repercussions on customers lives and in companies overall success. Along with strong ESG practices the energy sector would keep attracting sustainable investment and contribute meaningfully to the global effort to limit temperature rise to 1.5°C, as outlined in the Paris Agreement.

Market Trends

The global energy sector is undergoing a structural transformation, driven by the accelerating transition toward clean and renewable sources of power. Decarbonization has become a fundamental objective for energy companies. These commitments underscore how environmental responsibility and energy security can coexist, often encouraging technological innovation across solar, wind, hydrogen, and battery storage. Achieving meaningful progress, however, requires sustained capital deployment and robust policy frameworks that align public ambitions with private sector incentives.

International energy agencies and research institutions are increasingly partnering with industry players to accelerate the deployment of low-carbon technologies and help firms exceed their emissions reduction targets. Yet a key challenge remains managing grid reliability and energy security amid rapidly growing electricity demand. Many nations are accelerating domestic clean energy investments as a matter of energy independence, not merely climate policy. Addressing these interconnected pressures will require sustained innovation, cross-sector collaboration, and strong policy alignment to ensure that energy sector growth supports both technological advancement and climate objectives.

The strategies developed in response to these trends will define the competitive landscape for energy companies over the coming decade and can be explored in the following section.

Roadmap & Recommendations

The energy sector still needs a lot of improvements to achieve the net zero targets by 2030, and to achieve other sustainability targets.

Companies can do that considering:

1. Coordinating progress in the energy sector that requires interdependence across four dimensions:
 - Deploying flexible low-carbon network technologies.
 - Reforming financial and institutional frame works to reduce barriers.
 - Embedding social justice and equity in energy planning.
 - Using developmental co-benefits to mobilize political and financial support.
2. Furthermore, companies should take into account the alignment of procurements KPIs with disclosure frameworks. Such that, procurement leaders should link procurement scorecards to SASB/ISSB in parallel with CSDR, SEC or ISSB filings in order to offer transparency for investors.

3. Prioritize decarbonization in sourcing.

- In the case of oil & gas companies should consider suppliers with methane-reduction initiatives, low-carbon operations
- In power generation they should favour lower-carbon fuels, by introducing for example gas over coal or green hydrogen, and negotiate long-term contracts for renewable inputs, with usage of turbines, boilers, CCS (carbon capture & storage) and introducing more efficiency in the processes

4. Introduce biodiversity safeguards, ensuring safe water management, by monitoring reinjection practices.

5. Increasingly introduce AI and machine learning to address the problems of efficiency in waste and water management and to be able to automate scope 1-3 emissions data capture and reporting across corporate operations and suppliers.

6. In terms of reducing the gas emissions (strategy 1 and 2) during the production line. Specific strategies for Scope 1, Scope 2, and Scope 3 are recommended.

6.1. Scope 1

The primary recommendation for reducing its emissions is through, as mentioned, fundamental process changes and decarbonization of primary energy production. Including the implementation of CO₂ capture equipment directly at production sites, such as power plants, or adopting processes that do not require fossil fuels as inputs. While the rationale for Scope 1 reporting is to understand where emissions occur, the mitigation action is directly tied to eliminating or capturing emissions at the source of combustion or release.

6.2. Scope 2

For addressing Scope 2 emissions companies should shift the source that purchased energy, by switching their electricity suppliers to those that use low-carbon or zero-emission sources. Since Scope 2 emissions for energy producers are often substantial, optimization of their energy across operations is fundamental to reduce the volume of purchased energy needed, thereby shrinking their indirect impact.

6.3. Scope 3

Mitigating Scope 3 emissions requires a broad strategic focus on supply chain leverage. For energy providers, Scope 3 typically refers to upstream emissions embodied in inputs from other sectors (like the steel needed for infrastructure) and, most critically, downstream emissions from the use of sold products (which are the Scope 1 emissions of their customers). Recommendations focus on redirecting investment toward products that require less energy-intensive materials and actively replacing high-emission products (like fossil fuels) with low-carbon alternatives to influence consumer behaviour and achieve reductions across the full value chain.

6.4. Cross-scope actions

An effective cross-scope strategy requires integrating actions that address the entire GHG footprint. The core recommendation is electrification with decarbonization, which involves transitioning industrial and operational energy needs to clean electricity, thereby simultaneously cutting direct Scope 1 emissions, by eliminating on-site fuel combustion, and reducing Scope 2 emissions, by shifting to zero-carbon power sources. This process, in turn, helps manage the largest challenge: Scope 3 emissions. The energy sector must address Scope 3 by strategically shifting investment toward low-carbon energy products (like biofuels or clean hydrogen) and away from fossil fuels.

Conclusion

In conclusion, the energy industry is one of the key industries for the functioning of the world, with a big impact at the social level. With energy production requiring substantial water withdrawals, and a complex energy transformation process that results in significant internal energy losses.

This intricate water-energy nexus, is the main challenge of the industry that requires, that requires addressing through a multifaceted approach. Environmentally, the sector is prioritizing electrification and the integration of carbon capture technologies to mitigate Scope 1 and Scope 2 emissions at the source. Socially and politically, the transition requires reforming financial frameworks and embedding social justice into energy planning to ensure that the shift to low-carbon technologies is equitable and widely supported

With the study case, of companies Shell, Schneider Electric and TotalEnergies, it is evident the steps that companies within the sector are taking towards the goals either established by each and the goals settled in the Paris Agreement. Although, it is still a long way to go with the future dependent on high capital reinvestment needs it is essential that companies focus on circularity of waste and increasingly take steps in increasing efficiency in their processes. Such that sector's roadmap depends on sustained innovation and a strategic shift in investment away from fossil fuels toward low-carbon alternatives like green hydrogen and biofuels.

By introducing and aligning infrastructure development with strict environmental standards to ensure transparency, the energy industry can underpin a modern economy while meeting the global climate objectives established by the Paris Agreement. Ultimately, strong ESG performance reduces several risks and brings several corporate benefits, ultimately contributing to resilient and sustainable business growth, addressing systemic environmental impacts

Sustainability Team

This report was prepared by the Equity Research team at the Lisbon Investment Society. Our analysts combine rigorous financial modeling, critical thinking, and collaborative research to deliver high-quality, student-led investment analysis.

We welcome your feedback, discussion, and questions regarding this report or our research process. Feel free to reach out to our team, we're always open to engagement.



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