World Energy Outlook 2026

International Energy Agency (IEA) | November 2026 | 564 pages

Detailed summary, analysis, and implications

Executive assessment

The International Energy Agency's *World Energy Outlook 2026* presents a global energy system undergoing two simultaneous transformations: an unprecedented disruption to oil and natural gas supplies, and an accelerating shift toward electricity, renewable energy, nuclear power, and technologies that reduce dependence on fossil fuels.

The report's central argument is that **energy security, affordability, and the transition toward lower-emissions energy are becoming increasingly interconnected**. The traditional assumption that energy security primarily means ensuring reliable supplies of oil, gas, and coal is no longer sufficient.

The IEA identifies five major developments:

1. **The 2026 Middle East energy crisis has fundamentally changed energy security calculations.** Countries are reconsidering their dependence on imported fuels, vulnerable shipping routes, and concentrated sources of supply.
2. **Electrification is becoming a central feature of the global economy.** Electric vehicles, industrial equipment, cooling systems, and data centers are increasing electricity demand much faster than overall energy consumption.
3. **Renewable energy and nuclear power are expanding across multiple scenarios**, driven by economics and national security considerations, not exclusively climate policy.
4. **Fossil fuels will remain important for decades, but their long-term prospects differ significantly.** Oil demand could keep increasing, plateau, or decline depending on government policies, technology adoption, and responses to the energy crisis.
5. **Current policies remain insufficient to meet international climate goals.** Even under scenarios involving faster clean-energy adoption, projected warming substantially exceeds the Paris Agreement's preferred 1.5°C limit.

My central conclusion from the report is that the energy transition is no longer solely a question of environmental policy. It is increasingly a question of national security, industrial competitiveness, technological investment, and the long-term cost of supplying energy.

However, the report also shows that replacing imported fossil fuels with electricity does not automatically eliminate energy vulnerabilities. It changes their nature.

The analysis below distinguishes between the IEA's findings and my interpretation of their implications. Page references refer to the printed page numbers in the report.

1. The 2026 energy crisis: An unprecedented supply shock

Sources: Foreword, pp. 3–4; Executive Summary, pp. 17–18; Chapter 2, pp. 89–124.

The report begins with the disruption of energy shipments through the Strait of Hormuz.

The IEA describes the crisis as the largest energy supply shock in history, exceeding the disruptions associated with the oil crises of the 1970s.

Key measure	Reported value
Cumulative oil supply lost as of November 2026	**2.8 billion barrels**
Cumulative natural gas supply lost	**60 billion cubic meters (bcm)**
Peak daily oil disruption	**16 million barrels per day**
Coordinated IEA emergency stock release	**400 million barrels**

Diesel prices exceeded $200 per barrel, according to the report. The consequences extend well beyond drivers and transportation companies.

The IEA emphasizes that energy disruptions affect entire production and distribution networks, including agriculture, manufacturing, aviation, petrochemicals, and food production.

Why the consequences have been so extensive

Before the crisis, approximately 80% of the oil and 90% of the liquefied natural gas transported through Hormuz was destined for Asia.

More than four billion people live in countries dependent on the Strait for over 30% of their oil supplies.

The report also identifies disruptions to shipments of fertilizers, aluminum, sulfur, and helium. These materials are important inputs to industries that may initially seem unrelated to petroleum.

The IEA estimates that global oil demand will decline by approximately 2.7 million barrels per day during 2026, while natural gas consumption will decline by approximately 1.5%.

These are responses to shortages and higher prices, not necessarily permanent improvements in energy efficiency.

Why the disruption did not produce an even worse outcome

Several protections helped:

- Emergency oil reserves and coordinated inventory releases.

- Alternative pipelines bypassing the Strait.
- Higher production and exports from countries outside the Persian Gulf.
- Reduced oil imports by China.
- Improvements in energy efficiency, electrification, and fuel diversification since the 1970s.

Nevertheless, the report warns that these buffers are becoming depleted. Increasingly, shortages must be resolved by higher prices and reduced consumption.

My analysis

One of the most important distinctions in this report is between **energy independence and protection from energy price shocks**.

A country can produce more petroleum than it consumes and still experience substantial economic damage when international prices rise. Oil remains a globally traded commodity, and changes in international supply affect domestic markets.

Likewise, expanding domestic production does not eliminate dependence on international refining capacity, shipping, specialized petroleum products, or industrial supply chains.

This has particular implications for U.S. agriculture, where diesel, fertilizers, transportation, and other energy-intensive inputs contribute to production costs.

The 2026 crisis demonstrates that energy security requires more than domestic drilling. It requires diversified suppliers, robust infrastructure, emergency reserves, efficient consumption, and alternatives to petroleum where they are economically practical.

---

2. Understanding the IEA's scenarios

Sources: Chapter 2, pp. 112–124; Chapters 3–6.

An essential feature of this report is that the IEA does not offer one definitive forecast of energy consumption in 2035 or 2050.

Instead, it explores several possible outcomes based on different government policies, technology assumptions, and reactions to the 2026 crisis.

Scenario	Main assumption	General outcome
CPS — Current Policies	Existing policies remain in place; cautious assumptions about technology change	Higher fossil fuel consumption and persistent emissions

Scenario	Main assumption	General outcome
STEPS — Stated Policies	Includes formally proposed policies and continuing technology improvements	Oil peaks around 2030, renewables expand, and emissions gradually decline
ARC — Additional Response Case	Countries take further measures to reduce fuel-import vulnerabilities	Faster electrification, lower oil demand, and reduced dependence on fuel imports
LHC — Low Hormuz Case	Producers and consumers aggressively reduce reliance on the Strait	Oil transit through Hormuz falls dramatically
NZE — Net Zero Emissions by 2050	Policies and investments are designed to achieve net-zero energy emissions	Much faster decarbonization and a pathway back below 1.5°C warming

Important methodological distinction: CPS, STEPS, ARC, and LHC explore potential developments. NZE instead works backward from a specified climate objective to determine the changes required.

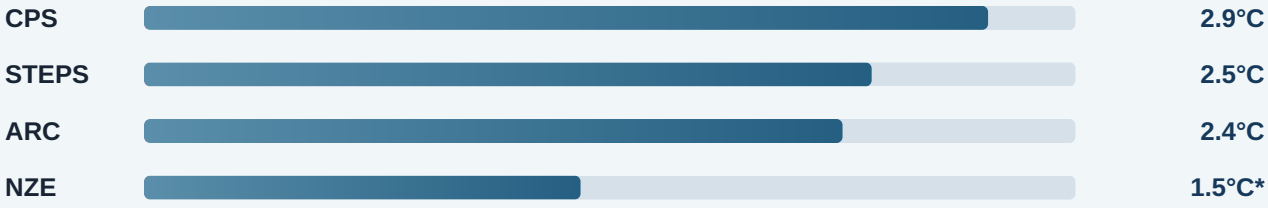
The scenarios largely share underlying assumptions about population and economic growth. Their differences primarily reflect choices about technology, policy, and fuel use.

The CPS and STEPS also assume that conditions in the Middle East stabilize sufficiently for normal transit through Hormuz by the end of 2027. This is a consequential assumption, not an established outcome.

Comparing the projected climate outcomes

Projected global warming by 2100

Degrees Celsius above pre-industrial levels, as reported by the IEA



*NZE represents a return to below 1.5°C by 2100, not its mid-century peak of nearly 1.7°C. Source: Chapter 6, p. 287.

The difference between STEPS and ARC is particularly revealing. An additional emphasis on energy security results in somewhat lower emissions, but produces only a modest improvement in the projected climate outcome.

This supports one of the report's most important conclusions: **Energy security measures can accelerate decarbonization, but they cannot substitute for deliberate climate policy.**

3. The future of oil, natural gas, and coal

Sources: Chapters 3–5, pp. 127–284.

Oil: The outlook depends heavily on policy and electrification

The IEA's contrasting projections demonstrate the uncertainty surrounding future petroleum demand.

Scenario	Oil demand outlook
CPS	Continues rising, reaching 114 million barrels per day in 2050
STEPS	Levels off around 103 million barrels per day by 2030, then slowly declines
ARC	Approximately 4.4 million barrels per day below STEPS by 2035
NZE	Falls much faster as transportation and other sectors decarbonize

The report identifies significant differences among the major uses of oil.

Passenger vehicles become less dependent on petroleum as electric vehicles improve, costs decline, and charging infrastructure expands.

However, aviation, heavy trucking, and petrochemicals maintain substantial demand for oil.

Under CPS, increased consumption from heavy trucks, aviation, and petrochemicals adds approximately five million barrels per day between 2025 and 2035, more than offsetting reductions in passenger car petroleum consumption.

Under ARC, electric vehicles displace more than 11 million barrels per day of potential oil demand by 2035, relative to a vehicle fleet without those electric vehicles.

Analysis: The IEA is not predicting the imminent disappearance of petroleum. It is identifying a structural transition in which petroleum becomes increasingly concentrated in industries that are more difficult to electrify.

That distinction matters for oil producers making investments that may take decades to recover their costs.

Natural gas: A potentially serious oversupply problem

The IEA anticipates a major expansion of liquefied natural gas export capacity, led by the United States.

If announced projects proceed, global LNG supply capacity could expand by more than 50%.

Three possible outcomes emerge.

Under CPS, strong global demand eventually absorbs the additional supply, and higher prices are needed to encourage further investment during the 2030s.

Under STEPS, supply exceeds demand for longer, keeping pressure on prices.

Under ARC, uncertainty over fuel-import security causes some countries to reduce their intended dependence on LNG. If exporters nevertheless complete their planned projects, the resulting oversupply could become severe and persistent.

This represents a significant financial risk to natural gas exporters, LNG terminal developers, and investors.

Analysis: The LNG market faces a potentially contradictory situation. Energy producers may interpret the 2026 shortage as justification to invest in additional production, while importers may interpret the same crisis as justification to reduce reliance on imported gas.

Both responses make economic sense individually, but together they could produce too much capacity.

The report does not establish that such an oversupply will occur. It identifies the conditions under which it could develop.

Coal: Declining overall, but not disappearing

Coal has benefited temporarily from the energy crisis because some countries have substantial domestic reserves and view coal as an alternative to imported oil and gas.

Nevertheless, the IEA projects declining global coal demand by 2030 across its major scenarios.

Under STEPS, by 2035:

- Global coal-fired electricity generation falls approximately 15%.
- Coal's share of global electricity generation declines from approximately 34% to just over 20%.
- Industrial coal consumption falls about 5%.

China is particularly important because it accounts for more than half of global coal consumption.

The IEA expects the Chinese coal fleet to shift increasingly from supplying continuous electricity toward providing backup capacity and meeting periods of high demand.

Analysis: Coal's declining share does not necessarily mean an equally rapid disappearance of coal-fired power stations.

Countries may retain existing plants to ensure system reliability, even while operating them less frequently. This can preserve electricity security but raises questions about maintenance costs, plant economics, and emissions.

The ARC also demonstrates a potentially uncomfortable tradeoff: policies intended to improve energy independence can encourage additional coal consumption, thereby offsetting some climate benefits from faster electrification.

4. Solar, wind, nuclear, and the changing electricity system

Sources: Executive Summary, pp. 20–22; Chapters 3–5.

One of the clearest conclusions in the report is that electricity is becoming more important in nearly every major economic sector.

Renewable energy

The IEA reports that solar photovoltaic generation increased by approximately 600 terawatt-hours in 2025.

That was the third-largest annual generation increase ever recorded for any individual energy source.

Renewable electricity is expected to expand under every major scenario, including the relatively conservative CPS.

Indicator	Share of global electricity generation
Renewables, 2025	**33%**
Renewables, 2035 STEPS	**50%**
Renewables and nuclear combined, 2035 NZE	**Nearly 90%**

The IEA sees several reasons for renewable energy's expansion beyond emissions reduction.

Solar and wind use domestically available resources, eliminate the need for ongoing fuel purchases, and can offer competitive generation costs.

The report also observes that global manufacturing capacity for solar panels and batteries is approximately twice the quantity deployed during 2025, contributing to competitive prices.

However, low generation costs do not eliminate the need for electricity transmission, storage, backup capacity, and other system expenditures.

Nuclear power

The IEA describes a revival in nuclear energy.

As of mid-2026, nearly 90 gigawatts of new nuclear capacity were under construction, the highest level in more than 35 years. More than 50 countries have nuclear development plans or targets.

In STEPS, nuclear electricity generation increases sufficiently to raise nuclear's global share from approximately 9% to 10% by 2035.

The potential advantages of nuclear power include reliable generation, relatively low operational carbon emissions, and reduced dependence on imported fossil fuels.

The major constraints include construction costs, financing, permitting, completion schedules, and the commercial uncertainty associated with emerging reactor designs.

Analysis: Nuclear power can complement renewables, particularly when electricity systems require dependable generation during extended periods of weak wind or sunlight. But the report's projections should not be interpreted as proof that planned nuclear projects will be completed on time or at their projected costs.

Electricity infrastructure may be the greatest constraint

The report estimates that over the next decade, the world will require at least:

Infrastructure requirement	Scale
New power lines	**25 million km**
Existing lines upgraded or replaced	**15 million km**

The detailed STEPS model indicates 26 million kilometers of new lines and 16 million kilometers of upgrades by 2035.

The IEA identifies several related bottlenecks: copper availability, transformers, skilled labor, equipment manufacturing, siting, permitting, and adequate investment incentives.

My assessment: The report provides substantial support for the proposition that electricity infrastructure deserves as much policy attention as electricity generation.

Constructing additional solar farms, nuclear reactors, or gas plants will not fully address electricity shortages if the resulting power cannot be reliably delivered to consumers.

---

5. Electrification, energy efficiency, and growing demand

Sources: Chapters 1, 3, and 4.

The IEA describes the world as entering an Age of Electricity.

Since 2019, global electricity demand has grown approximately 3.3% annually, compared with 2.9% annual global GDP growth and 1.5% annual growth in overall energy demand.

Electricity currently accounts for approximately 23% of final energy consumption. Under STEPS, that share approaches 30% by 2035.

The report estimates that, at prevailing 2025 prices, electrification is already cost-competitive for approximately half of the fossil fuel demand in road transportation, half of fossil fuel-based space heating demand, and nearly 40% of fuel-based demand for low- and medium-temperature industrial heat.

Why electrification changes energy consumption

Electric vehicles and heat pumps deliver substantially more useful energy services per unit of purchased energy than conventional combustion technologies.

Electric motors convert a larger proportion of their energy into motion. Heat pumps move thermal energy rather than producing all their heat through combustion.

Consequently, electricity demand can increase considerably without total primary energy demand rising at the same rate.

Under STEPS, total global energy demand grows only about 0.8% annually through 2035, compared with approximately 1.6% annually during the preceding decade.

This is a major finding: **The world can obtain more transportation, heating, cooling, and industrial services while reducing the energy required per unit of useful output.**

Cooling: An underestimated source of future demand

The IEA identifies air conditioning as one of the most important future drivers of electricity consumption.

In developing economies outside China, approximately 85% of households are exposed to high temperatures, but fewer than 20% of those households currently own air conditioners.

In STEPS, cooling-related electricity consumption increases by about 1,700 terawatt-hours by 2035.

Under a separate scenario involving more intense and frequent heatwaves, demand increases by another 700 terawatt-hours.

The implications extend to grid reliability, electricity affordability, building design, appliance efficiency, and peak-demand management.

For areas with very hot summers, this is an especially relevant long-term electricity planning issue.

---

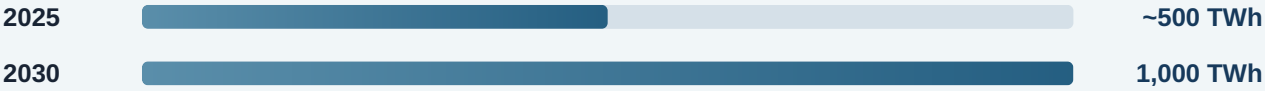
6. Artificial intelligence and data centers: A major new source of demand

Sources: Chapter 1, pp. 82–87; Chapter 8, pp. 400–404.

The report devotes significant attention to artificial intelligence because the expansion of data centers is changing electricity investment, infrastructure requirements, and the economics of power generation.

Global data center electricity consumption increased approximately 17% in 2025. Investment in data centers reached $565 billion that year, and the IEA anticipates another $4 trillion in associated investment through 2030.

Global data center electricity consumption, STEPS



Approximately doubling in five years. Source: Chapter 1, p. 82.

The IEA identifies several consequences.

First, data center projects can move faster than the construction of electric power lines, substations, transformers, and new power stations.

Second, these facilities require reliable electricity continuously, creating additional demand for dispatchable generation, backup power, and energy storage.

Third, increased demand creates pressure on equipment manufacturers and skilled labor markets.

Fourth, electricity requirements can be highly localized. A large data center development may create significant strain on a regional grid even if its consumption is modest relative to national electricity demand.

The report also observes that nearly half of global commercial data center electricity demand is backed by renewable power purchase agreements. However, having such an agreement does not ensure that renewable electricity is physically available at a particular location every hour.

Globally, the IEA expects natural gas and renewable generation to supply most additional data center electricity through 2030. It projects a roughly 70% increase in emissions associated with data center electricity consumption over that period.

My analysis

The report supports skepticism toward claims that artificial intelligence can expand indefinitely without major infrastructure consequences.

It also suggests a danger in assuming that every announced data center will be built, operate at maximum capacity, and require its projected electrical load.

AI computing efficiency, business economics, equipment supply, and electricity prices could change actual demand significantly.

The central policy challenge is making sure that the investments needed to serve exceptionally large customers do not impose unreasonable costs on other electricity consumers.

7. What the report says specifically about the United States

Source: Chapter 8, pp. 400–404, especially Figures 8.6–8.9.

The United States receives a particularly useful five-page assessment.

The IEA explains that American energy policy has shifted toward expanding domestic oil, natural gas, coal, nuclear, and geothermal resources.

It specifically discusses the 2025 One Big Beautiful Bill Act and related regulatory changes.

The analysis also incorporates reduced federal support for wind and solar development.

Major U.S. projections under the Current Policies Scenario

Indicator	IEA projection
Total energy demand, 2025–2035	Increases approximately 8%
Total electricity demand, 2025–2035	Increases about 25%
Natural gas production in 2035	More than 1,400 billion cubic meters
Oil production in 2035	Approximately 23 million barrels per day
Natural gas net exports in 2035	More than 320 billion cubic meters
Data center electricity use in 2035	More than 830 TWh
Solar electricity generation by 2035	More than doubles
Wind generation by 2035	Increases more than 40%
Coal consumption by 2035	Falls approximately 25%

These are scenario projections, not predictions that the values will necessarily materialize.

American fossil fuel policy

The IEA expects the United States to remain an exceptionally important oil and natural gas producer.

Under CPS, natural gas overtakes oil as the country's largest single energy source by 2035.

Natural gas use rises substantially, largely because of electricity demand. The IEA projects that gas-fired power stations will provide approximately 45% of the additional electricity generated between 2025 and 2035.

Coal-fired electricity generation remains higher than projected in the 2025 edition of the Outlook because of efforts to preserve existing generating plants. Nevertheless, the IEA still anticipates an approximately 25% decline in U.S. coal generation by 2035.

This suggests that government support may slow coal's decline without reversing the underlying trend.

American renewable energy

Despite reductions in federal tax incentives, the IEA expects solar and wind electricity generation to increase.

Together, their share of U.S. electricity generation rises from approximately 18% in 2025 to more than 25% in 2035.

This is significant because it indicates that renewable energy growth is not wholly dependent on expanding federal incentives. However, the IEA also expects reduced policy support to slow renewable deployment relative to previous projections.

American electricity investment

Figure 8.9 on page 404 is especially revealing.

The chart shows that rising electricity demand is met primarily through additional natural gas and renewable generation. The accompanying investment chart illustrates how electricity networks are becoming a dominant part of capital spending.

U.S. grid investment rose from approximately $73 billion in 2020 to $118 billion in 2025.

Under CPS, it averages nearly $140 billion annually over the following decade. Grid investment accounts for roughly half of projected U.S. power sector investment.

The same section projects that annual investment in gas-fired generation, which reached approximately $32 billion in 2025, peaks above $50 billion before 2030.

My assessment of U.S. policy implications

Four conclusions emerge.

First, the United States is likely to remain a major fossil fuel exporter. The size of its domestic resource base gives it advantages unavailable to most energy-importing nations.

Second, domestic fossil fuel abundance does not make electricity infrastructure unnecessary. The country still faces the expensive task of modernizing and expanding its grid.

Third, the rapid expansion of data centers could substantially increase natural gas consumption and create regional electricity supply constraints. That is a direct consequence of the report's demand and generation projections, although individual markets may develop differently.

Fourth, U.S. policy is moving in a different direction from the fastest global decarbonization scenarios. The CPS incorporates policies favoring expanded fossil fuel production and reduced support for some renewable technologies, while the IEA's NZE pathway requires much faster deployment of low-emissions technologies.

The important distinction is between increased energy production and the combined objectives of affordability, reliability, emissions reduction, and long-term resilience. Progress on one objective does not guarantee progress on the others.

---

8. Climate change: Progress is occurring, but not fast enough

Source: Chapter 6, pp. 287–332.

The report's climate findings are among its most consequential.

Global economy-wide greenhouse gas emissions reached a record 54.1 billion metric tons of carbon dioxide equivalent in 2025.

The IEA finds that improvements in efficiency and low-emissions generation have moderated emissions growth, but have not produced reductions large enough to meet international climate objectives.

The climate outcomes

Under CPS, energy-related CO_2 emissions remain near their present level, reaching approximately 38 billion tons in 2050.

Under STEPS, emissions peak before 2030 and then decline gradually.

Under ARC, additional energy security measures accelerate reductions. Energy-related emissions in 2035 are almost 9% below their 2025 level.

Under NZE, energy-related CO_2 emissions fall by more than half to less than 19 billion tons in 2035.

The NZE scenario requires much more than renewable electricity. Its four central components are low-emissions electricity generation, efficiency and electrification, low-emissions fuels and methane reductions, and carbon capture and storage.

An important finding about 1.5°C

The IEA does not suggest that the world can avoid temporarily exceeding 1.5°C of warming under its NZE pathway.

Instead, the report projects warming peaking just below 1.7°C around mid-century and then declining to below 1.5°C by 2100.

That outcome depends partly on large-scale removal of carbon dioxide from the atmosphere.

The report explicitly recognizes that some necessary carbon removal technologies have not yet been demonstrated at the required scale.

Analysis: This is an important source of uncertainty. A climate pathway can be internally consistent as a model while depending on future technologies, financing, and policy implementation that are not guaranteed.

The report is therefore more convincing as an illustration of the scale of the required changes than as evidence that the NZE outcome will actually occur.

Methane deserves greater attention

The IEA also emphasizes methane leakage from fossil fuel operations.

Methane has a much stronger warming effect than carbon dioxide over shorter periods, although it remains in the atmosphere for less time.

The NZE pathway requires major reductions in methane emissions from fossil fuel production, distribution, and use.

This is important because reducing methane leakage can provide relatively rapid climate benefits, even while fossil fuel production continues.

Economic implications

The IEA estimates that under NZE, clean energy investment must average approximately $4.5 trillion annually during the decade to 2035.

This is roughly three times the average of the previous decade.

The report also projects substantial employment changes, with approximately 15.6 million net additional energy-sector jobs worldwide by 2035, alongside major reductions in fossil fuel supply employment.

These figures represent modeled outcomes under an ambitious policy pathway. They do not mean employment gains would occur automatically, or that displaced workers would necessarily be located where new positions emerge.

---

9. Energy security: New vulnerabilities replace old ones

Source: Chapter 7, pp. 335–392.

The report broadens the traditional concept of energy security.

Historically, much of the discussion concerned reliable access to oil, natural gas, coal, and other fuels. The IEA argues that future security also depends on electricity infrastructure, critical minerals, technology manufacturing, cyber protection, and resilience to extreme weather.

Critical minerals and concentrated supply chains

The IEA identifies serious vulnerabilities in the supplies of copper, lithium, cobalt, graphite, and rare earth elements.

China dominates the refining of 19 out of 20 energy-related strategic minerals, according to the report.

The largest supplying country accounts for approximately 85% of refined magnet rare earths and about 75% of refined lithium and cobalt supplies.

The IEA also projects a copper supply shortfall of approximately 25% by 2035 under STEPS, based on existing and planned production relative to projected demand.

Figure 7.20 on page 367 illustrates this concentration across six minerals. It shows that announced investments provide some diversification, but the largest producers retain substantial market shares through 2035.

The report's point is not that electrification necessarily replaces dependence on foreign oil with an equivalent dependence on foreign minerals.

The distinction is that fuels must be supplied continuously, while many minerals are primarily required when constructing equipment and infrastructure. Nevertheless, concentrated supply chains create risks to costs, manufacturing, and infrastructure development.

Cyberattacks and extreme weather

The report identifies more than 2,000 cyberattacks per week against energy utilities globally in 2025.

It also cites approximately 3,000 major energy outages associated with natural hazards since 2022, affecting more than 850 million households and businesses.

The IEA estimates that global peak electricity demand could increase 40–50% by 2035 across its scenarios.

This requires not only additional generating capacity but also systems capable of meeting peak demand under adverse conditions.

Analysis: The resilience of electricity networks is becoming an issue of national economic security. A petroleum supply disruption may raise prices and constrain transportation. An extensive electricity outage can simultaneously disable communications, banking, water systems, industrial operations, and essential public services.

The energy transition therefore requires substantial investment in redundancy, grid protection, and operational flexibility.

---

10. Energy affordability: Are clean-energy systems actually cheaper?

Sources: Chapter 7, pp. 384–390; Chapter 6, pp. 328–331.

This is one of the report's most interesting economic findings.

The IEA estimates that the global energy system currently costs approximately $8 trillion annually to operate, including capital recovery, financing, operating expenditures, and fossil fuel rents, but excluding certain taxes and environmental surcharges.

By 2035, the total system cost under STEPS is projected to be almost 10% lower than under CPS.

Why?

Under CPS, higher fossil fuel consumption and higher assumed fuel prices increase operating expenditures and economic rents accruing to fossil fuel producers.

Under STEPS, greater use of renewable electricity, electric vehicles, heat pumps, and efficient equipment increases some upfront investment costs but reduces ongoing fuel requirements.

The report estimates fossil fuel rents, net of financing costs, in 2035 at approximately $2.5 trillion under CPS, compared with $1.7 trillion under STEPS.

That is a difference of $800 billion annually.

Household energy bills

Under NZE, the IEA projects that average household spending on energy falls approximately 5% globally by 2035.

In oil- and LNG-importing regions, the projected decline is almost 10% by 2035 and more than 30% by 2050.

The IEA attributes these savings to lower fuel consumption, improved efficiency, and electrification.

But it recognizes an important complication: a household may save money over the life of an electric vehicle, heat pump, or efficient appliance while being unable to afford the initial purchase.

Lower-income households may also face higher borrowing costs or limited credit access.

My analysis

The report makes a persuasive distinction between **upfront capital costs and the total cost of supplying energy over time**.

A capital-intensive electricity system can be economically advantageous even if it requires greater initial investment.

However, the projected savings depend on financing conditions, electricity tariffs, technology costs, grid investment, and actual energy consumption.

In particular, lower system-wide costs do not guarantee that every household's electricity bill will decline. Regulatory structures determine how infrastructure costs are recovered and how expenses are divided among consumers.

This is especially relevant to communities considering major investments in data centers, new generating plants, or transmission infrastructure.

11. Energy poverty: A major problem that remains unresolved

Sources: Executive Summary, pp. 23–24; Chapter 7, pp. 376–384.

The IEA emphasizes that energy security has a much more fundamental meaning for people who lack reliable electricity or modern cooking facilities.

Approximately 720 million people worldwide still have no access to electricity.

Nearly two billion people rely on polluting cooking methods, frequently involving traditional biomass.

The overwhelming majority of people without electricity live in sub-Saharan Africa.

The 2026 crisis threatens to reverse progress because many households depend on imported liquefied petroleum gas for cooking.

The report estimates that roughly three-quarters of people gaining access to clean cooking over the previous decade did so through LPG.

When international fuel prices rise, low-income households may be forced to return to more polluting traditional fuels.

The IEA explores a pathway to universal electricity access by 2035 and universal clean cooking access by approximately 2040.

It estimates that achieving these goals would require roughly $24 billion annually for electricity access and $4 billion for clean cooking.

These amounts are relatively small compared with total global energy investment.

Analysis: The energy access findings demonstrate why climate, development, and energy security policies cannot always be treated as identical.

For some households, switching from burning wood or charcoal to LPG represents a major improvement in health, convenience, and quality of life, despite LPG being a fossil fuel.

The report appropriately recognizes this practical tradeoff.

---

12. Regional findings: Different countries face different energy futures

Source: Chapter 8, pp. 393–444.

The IEA's regional analysis demonstrates why one energy policy cannot produce identical outcomes everywhere.

Region	Principal finding
China	Energy demand plateaus by 2035 in the major scenarios. Rapid electrification, renewable generation, and nuclear expansion reduce dependence on oil and coal.
India	The largest contributor to global energy demand growth through 2035. Rapid industrialization, transportation growth, and air conditioning increase demand.
European Union	Electrification, renewables, and efficiency reduce exposure to imported fuels, but high energy costs remain a challenge.
Southeast Asia	Energy demand rises approximately 28% by 2035 under STEPS, while electricity demand rises around 60%.
Africa	Rapid growth in energy needs is accompanied by persistent challenges involving electricity access, clean cooking, and infrastructure financing.
Middle East	Continued importance as a major energy exporter, alongside stronger incentives for export-route diversification and economic restructuring.
Latin America	Significant renewable electricity resources, particularly hydropower, and an important role in critical mineral production.
Japan and Korea	Strong incentives to diversify imported fuels, expand electrification, and strengthen domestic electricity security.

Two regional observations deserve additional attention.

India is expected to experience annual energy demand growth of approximately 2.5% to 2035 under STEPS, about three times the global average. Its choices concerning electricity generation, transportation, and industrial development will therefore be increasingly consequential for global energy markets.

The European Union provides an example of the connection between domestic electricity production and energy security. Approximately 80% of its electricity is generated from domestic resources, but domestic sources meet only about 40% of its total energy demand. Electrifying transportation, heating, and industry can therefore reduce dependence on imported fuels.

The broader implication is that **the greatest future growth in energy demand is expected outside the advanced economies**, especially in India, Southeast Asia, and other emerging economies.

Global energy policy must account for these countries' economic development and rising demand for modern energy services.

13. Critical evaluation: How convincing is the report?

The *World Energy Outlook 2026* is a substantial analytical work, drawing on the IEA's energy modeling, policy tracking, industry information, and international data.

Its greatest strength is that it treats energy as an interconnected economic system rather than examining individual fuels in isolation.

Nevertheless, several assumptions and limitations deserve scrutiny.

Strengths

1. It distinguishes scenarios from forecasts.

The IEA explicitly cautions that its scenarios are not predictions. This is an important methodological safeguard, particularly during an unprecedented geopolitical disruption.

2. It accounts for economic incentives.

The report recognizes that technologies are adopted for reasons beyond government mandates. Lower costs, improved efficiency, reduced exposure to imported fuels, and opportunities for industrial development can all encourage technological change.

3. It recognizes tradeoffs between energy objectives.

The analysis does not simply assume that every policy improving energy security also reduces emissions. It explicitly recognizes that domestic coal production, for example, can improve some dimensions of security while worsening climate outcomes.

4. It incorporates infrastructure and supply-chain limitations.

The report considers grids, mineral refining, equipment manufacturing, financing, and labor availability. These issues can be as important as the economics of individual generation technologies.

Important uncertainties and limitations

1. The assumption that the Hormuz crisis subsides by the end of 2027 is consequential.

Both CPS and STEPS rely on a recovery in fuel flows. If disruptions persist considerably longer, prices, investment, and economic growth could differ substantially from the modeled outcomes.

The ARC and LHC explore alternative responses, but they cannot encompass every possible geopolitical development.

2. Technology deployment may not proceed as modeled.

The projections depend on assumptions about the costs and adoption of electric vehicles, batteries, heat pumps, nuclear reactors, and other technologies.

Some technologies could advance faster than expected; others could face delays.

3. Artificial intelligence introduces unusual uncertainty.

The future size of the data center industry depends on developments in computing efficiency, investment returns, AI applications, and electricity supply.

This makes long-term electricity demand projections particularly uncertain in regions experiencing major data center investment.

4. Financial conditions could become a major obstacle.

Many lower-emissions technologies have relatively high upfront costs and low operating costs. High interest rates, political risk, or limited access to financing can therefore substantially change their competitiveness.

These issues are especially important in developing economies.

5. Some climate outcomes depend on technologies not yet proven at the necessary scale.

The NZE scenario's return to warming below 1.5°C relies partly on substantial carbon removal. The technical and economic feasibility of achieving this deployment remains uncertain.

6. Global averages can conceal significant local differences.

Lower worldwide energy system costs do not necessarily produce lower prices for every country, utility customer, or industry.

Likewise, global generating capacity can be sufficient while a particular region faces shortages because of transmission bottlenecks or inadequate reserve capacity.

My overall assessment

The report is strongest in explaining the structural forces transforming energy markets and the consequences of different policy choices.

It is less useful as a precise prediction of petroleum prices, data center electricity consumption, or the exact timing of technological transitions.

That is not necessarily a weakness in the methodology. It reflects the inherent uncertainty of the questions being examined.

The most defensible conclusions are those that remain broadly consistent across several scenarios: increasing electricity demand, expanding renewable generation, continued importance of fossil fuels, greater investment requirements for electricity infrastructure, and significant unresolved energy security risks.

---

14. The most important policy implications

The report points toward several broad priorities for governments and energy planners.

Diversification should be considered a national security investment. Relying heavily on one fuel, supplier, or shipping route creates vulnerability, even when that arrangement appears economically attractive during normal conditions.

Electricity infrastructure requires sustained attention. Expanding electricity generation without adequate transmission, distribution, storage, and flexibility can leave consumers exposed to unreliable service and higher costs.

Energy efficiency offers substantial economic benefits. Reducing the amount of energy necessary to provide transportation, heating, cooling, or industrial services can improve affordability and security without sacrificing those services.

Energy policy should examine total costs rather than individual fuel prices. Lower-priced natural gas or petroleum does not necessarily minimize the lifetime cost of supplying energy, especially when international price volatility and infrastructure investments are considered.

Climate policy requires objectives beyond fuel-import security. Renewables, nuclear energy, and electrification often align with energy security, but the IEA demonstrates that security-focused measures alone do not produce emissions reductions sufficient to meet international climate goals.

Policy makers should evaluate who pays for energy infrastructure. The growth of data centers, industrial electrification, and expanded electricity networks raises important questions about how infrastructure expenses are allocated among large customers, households, utilities, and taxpayers.

---

15. Final conclusions

I would identify six conclusions as particularly important.

1. **The 2026 energy crisis could become a turning point in energy history.** Its long-term significance may lie less in the immediate shortage of petroleum and more in the investments, policies, and changes in risk perceptions it creates.
2. **The electrification of the global economy appears likely to continue under a wide range of policies.** The strongest drivers include technological competitiveness, efficiency, energy security, and rising demand for electricity-dependent services.
3. **Oil and natural gas remain economically important, but their long-term demand is increasingly uncertain.** This creates substantial risks for producers making investments with long recovery periods.
4. **Renewables and nuclear power are increasingly strategic energy resources.** Countries are adopting them not only to reduce emissions but also to reduce dependence on international fuel markets.
5. **The cost and reliability of electricity will become increasingly important determinants of economic competitiveness.** Countries that develop adequate generation, efficient networks, and resilient infrastructure may enjoy significant advantages.
6. **The world remains far from meeting its climate objectives.** Improvements in technology and efficiency are real, but the difference between current policy trajectories and a net-zero pathway remains substantial.

The most consequential insight

The report suggests that the longstanding choice between energy security and cleaner energy is becoming less straightforward.

For many countries, the same investments that reduce fossil fuel imports can also improve efficiency, reduce pollution, encourage domestic investment, and limit vulnerability to international price shocks.

But these benefits depend on how the transition is implemented.

A poorly designed transition can create electricity shortages, expensive infrastructure, concentrated mineral dependencies, and disproportionate costs for households.

A carefully designed transition can improve reliability, affordability, resilience, and environmental outcomes together.

The IEA's central message is not that fossil fuels are about to disappear. It is that the economics, technologies, and security considerations governing the world's energy system are changing—and that decisions made during the present crisis could shape global energy markets for decades.

Source: International Energy Agency, World Energy Outlook 2026, particularly the Executive Summary (pp. 17–26), scenario analyses (pp. 127–284), energy transitions (pp. 287–332), energy security and affordability (pp. 335–392), and regional insights (pp. 393–444). All projections and numerical estimates presented above are from the uploaded report; evaluative commentary is my analysis.