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Options for Developing Jordan's Energy Sector

**From Security of Supply to Flexible Management and Integrated
Engineering**

Politics and Society institute(PSI)

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Executive Summary

Jordan's energy sector is undergoing a critical test that places it at the center of the country's economic and sovereign stability. While the national electricity system has achieved a high degree of technical reliability and continuity of supply, this success conceals deep structural imbalances. These include heavy reliance on imports, high energy costs, fragile supply chains, and mismatches between supply and demand—especially amid regional shifts and economic deterioration linked to geopolitical tensions and disruptions such as the closure of the Strait of Hormuz.

This situation reflects what can be described as the “Jordanian energy paradox”: surplus generation capacity alongside increasing financial pressure, and apparent diversification of energy sources masking structural external dependence. The key challenge is no longer simply securing energy, but redesigning the national energy model to balance cost, reliability, independence, and flexibility.

Data shows that Jordan has entered a more complex phase in energy management. Traditional tools—such as expanding generation or diversifying imports—are no longer sufficient. Excess generation capacity tied to long-term power purchase agreements (PPAs) has become a financial



burden. Meanwhile, renewable energy expansion, despite its success, has been constrained by the lack of storage systems and limited grid flexibility, leading to wasted clean energy.

At the same time, external supply chains for gas and oil remain vulnerable to geopolitical fluctuations, making energy costs dependent on external factors. Past supply disruptions demonstrate how cross-border energy routes can become sources of political and economic pressure.

Accordingly, this paper proposes transitioning from a “security of supply” model to a more advanced model of “flexible energy management.” This approach does not aim for full disengagement from global markets but seeks to rebalance relations by reducing dependency, increasing maneuverability, and strengthening national control.

The paper emphasizes that the optimal path for developing the sector does not lie in a single option, but rather in an integrated package of interrelated policies distributed across three time horizons:

- In the short term, there is a need for fast, relatively low-cost interventions, such as investing in energy storage systems, implementing time-of-use tariffs, and managing demand, with the aim of reducing waste and improving the efficiency of existing resources.
- In the medium term, efforts should focus on reforming the sector’s financial and regulatory structure by renegotiating power purchase agreements, strengthening local resources, and linking energy with the industrial sector to stimulate economic growth.
- In the long term, a comprehensive restructuring of the energy system is required, based on developing smart grids, enhancing cybersecurity, and exploring opportunities for transitioning toward a green energy economy under clear feasibility conditions.

The paper concludes that success depends not only on resources or technology but on governance quality, institutional coordination, and decision-making capacity. The challenge is

fundamentally political-economic, requiring a redefinition of the state’s role in the energy sector—from a financial burden to a strategic asset.

The energy sector in Jordan is one of the issues most closely tied to the concept of national sovereignty and economic stability, due to its strong connection to macroeconomic management, its various sectors, supply chains, and security in its comprehensive sense. In a turbulent regional environment, characterized by high import dependence and sharp fluctuations in global energy markets, the state’s ability to manage this sector has become a measure of its overall resilience.

Jordan’s experience over the past two decades reveals a striking paradox: clear technical success in ensuring the continuity of electricity supply, contrasted with structural fragility in energy sources and their costs. This paradox places Jordan among what can be described as “energy-sensitive dependency states”—countries that are capable of providing energy but do not have full control over the conditions of its production, cost, or sources.

From this standpoint, the paper is based on a central premise: the challenge is no longer “securing energy,” but rather rebuilding a national energy model that balances four key dimensions—availability, affordability, reliability, and ultimately, sovereignty.

Structural Diagnosis of the Energy Sector Crisis in Jordan

1. External Dependency: The Core Vulnerability

Jordan relies on importing nearly three-quarters of its energy needs, making its system highly exposed to geopolitical and regional fluctuations. Over the past two decades, this dependency has extended beyond heavy petroleum products to natural gas, which now forms the backbone of electricity generation.

Despite the diversification of supply sources (regional gas, liquefied natural gas, and oil from Saudi Arabia and Iraq), this diversity masks a structural fragility, as most of these sources remain outside direct national control.

2. The Paradox of Excess Capacity and Financial Deficit

Jordan possesses electricity generation capacity that exceeds actual demand by a comfortable margin. However, this surplus has turned into a financial burden due to:

- Long-term power purchase agreements (PPAs),
- Obligations to pay for capacity even when it is not utilized,
- Imbalances between supply and demand.

As a result, the problem is no longer **a shortage of electricity, but rather the cost of producing and managing it**. This has led to ongoing financial pressure on the National Electric Power Company and public finances.

3. The Renewable Energy Dilemma: An Incomplete Technical Success

Jordan has made significant progress in integrating renewable energy—particularly solar—into its energy mix. However, this success has been constrained by three main challenges:

- The absence of energy storage systems,
- Limited grid flexibility,
- Weak demand-side management.

As a result, part of the solar energy production is wasted through forced curtailment, especially during daytime hours. This reflects a flaw in **system design and management rather than a limitation in available resources**.

4. Supply Chain Fragility

Past disruptions in gas supplies—whether from Egypt previously or from other sources later—demonstrate that cross-border supply routes can shift from being an advantage to a point of vulnerability and pressure.

Moreover, reliance on maritime transport for oil exposes Jordan to risks associated with strategic chokepoints and regional tensions, adding a sharp geopolitical dimension to the country's energy security.

5. Imbalance in the Political Economy of Energy

The crisis is not limited to technical aspects; it extends to broader structural and economic dimensions, including:

- High energy costs for the industrial sector,
- Distortions in the tariff structure,
- Financial burdens on the state,
- Limited capacity to stimulate industrial investment.

As a result, the energy sector has become a constraint on economic growth rather than a driver of it.

Gaps

The essence of the crisis can be summarized through a policy matrix:

Gap	Impact	Response Tool
Excess generation capacity	High financial burden	Energy storage + demand management
Long-term energy contracts	Financial and structural rigidity	Renegotiation
Solar energy surplus	Energy waste	Batteries + time-of-use tariffs
Import dependency	Sovereign vulnerability	Diversification + local resources
High industrial energy costs	Weak competitiveness	Tariff reform + linking energy to industry

What options are available to Jordan?

1. Energy storage and grid management (top priority)

Investing in energy storage systems (BESS) is the most effective short-term option because it:

- Reduces energy waste
- Improves grid efficiency
- Increases renewable energy absorption
- Delays the need for costly new generation investments

In parallel, implementing time-of-use tariffs can shift industrial demand toward daytime solar production hours.

2. Financial and contractual reform

Renegotiating long-term power purchase agreements (PPAs) is a critical step to improve:

- Financial liquidity
- System flexibility
- Long-term planning capacity

Tariff reform is also needed to restore balance between:

- Social equity
- Economic efficiency

3. Maximizing local energy resources

This includes:

- Developing the Risha gas field
- Carefully assessing oil shale projects
- Expanding strategic fuel storage

However, this option must be guided strictly by economic feasibility, not only sovereignty considerations.

4. Linking energy and industry

This is one of the most transformative options and involves:

- Establishing industrial zones near energy sources
- Reducing transmission losses
- Providing low-cost energy for heavy industries

This approach turns energy from a cost burden into a production driver.

5. Future transition: smart energy systems

Jordan can move toward a smart, green energy economy by:

- Deploying smart grids
- Using AI-based energy management systems
- Optimizing generation, transmission, and distribution

This enhances efficiency and supports a low-carbon transition.

Comparison of options

Option	Policy Impact	Speed of impact	Cost	Feasibility
Storage	High	Fast	Medium	Very high
Demand management	Medium	Fast	Low	High
Renegotiation	High	Medium	Low	High
Local resources	Very high	Slow	High	Conditional
Artificial intelligence	Medium	Fast	Medium	Very high

Towards a “Flexible Energy Management” Model

The solution does not lie in full energy independence, but rather in building a model that combines:

- Reducing dependency,
- Increasing maneuverability,
- Diversifying energy sources,
- Maximizing national control.

This is what can be called “**flexible energy management,**” where the state does not seek to disengage from the market, but rather to control the terms of its engagement within it.

Governance as a Critical Condition for Development

Any transformation in the energy sector cannot succeed without institutional reform that includes:

- Strengthening the role of the regulatory authority,
- Redefining the role of the National Electric Power Company,
- Improving coordination between the energy, industry, and finance sectors,
- Developing the cybersecurity capabilities of the grid,
- Utilizing artificial intelligence tools for comprehensive automation.

Since energy is a **complex governance system, it relies fundamentally on flexible technologies and adaptable policies.**

Policy Priorities (Practical Roadmap)

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Short term (1–2 years):

- Launch energy storage projects
- Implement time-of-use tariffs
- Begin reviewing contracts

Medium term (3–5 years):

- Develop the Risha gas field
- Expand strategic energy storage
- Establish energy-based industrial zones

Long term:

- Transition to an integrated energy system model
- Invest in smart grid infrastructure

Energy as a Pillar of Jordan’s Political Economy



The core challenge in Jordan lies in managing decisions related to electricity production and consumption. Every unit of energy that is locally produced, efficiently managed, or fairly purchased translates into an additional margin of economic and political independence.

The shift from “security of supply” to “flexible management” is an existential necessity for the Jordanian economy and its various sectors in a volatile regional environment. A state that succeeds in redesigning its energy sector does not only ensure economic stability, but also redefines its position within the region.

Analysis

Energy Security in Jordan through the Lens of Global Geopolitics: A Study of Structural Transformations, Regional Scenarios, and Prospects for National Sovereignty

As the year 2026 approaches, the energy sector in the Hashemite Kingdom of Jordan presents a complex case study of what is known as the energy paradox. On the one hand, the national administration has successfully engineered a highly reliable electricity system with abundant generating capacity, preventing immediate supply crises. On the other hand, this system suffers from severe structural dependency, with approximately 76% of total energy needs being imported¹. This strategic vulnerability poses not only an economic challenge but also a national security vulnerability, making generation costs, domestic inflation, and financial stability hostage to geopolitical fluctuations in a highly volatile region. This article seeks to deconstruct Jordan’s energy balance in the context of the current conflict and analyze its regional and technical entanglements to offer a roadmap that moves the sector from crisis management and supply to the engineering of sovereignty and independence.

Jordanian Electricity: When Supply Security Becomes a Financial Burden: A Reading of Current Decade Figures

Monitoring the consumption patterns of the Jordanian electricity system during the first half of the current decade reveals profound shifts; while the continued dominance of the residential sector reflects increasing demographic and social pressures, the notable growth in the share of

¹ Khaberni, “Al-Kharabsha: Jordan Imports 76% of Its Energy Needs,” *Khaberni*, May 2025, [الخرايشة: الأردن يستورد 76% من احتياجاته من الطاقة](#).



the industrial and commercial production sectors indicates a stage requiring a re-engineering of pricing and incentive policies. The following matrix presents the precise relative distribution of this consumption, highlighting the sectoral variations that define the features of aggregate demand during the period between 2020 and 2024 ²:

Consuming Sector	Percentage of Consumption (%)
Household and Government Sector	46.2%
Industrial Sector	20.6%
Commercial and Hotel Sector	15.5%
Agriculture and Water Pumping Sector	13.5%
Street Lighting	1.6%
Electric Vehicle Sector	0.1%
Other Sectors	2.5%
Total	100%

Based on the table above, the problem in Jordan is no longer the availability of electricity, but rather the cost of providing it ³. Operational data for 2024-2025 showed significant growth in generating capacity; however, this growth resulted in clear financial imbalances in the dynamics of supply and demand, with the total installed capacity of the system reaching approximately 6,060 MW (4,443 MW conventional and 1,617 MW renewable directly connected to the national grid) ⁴. In contrast, the maximum-recorded peak load in 2025 reached approximately 4,810 MW ⁵. Financial analysis of the excess capacity indicates that this difference results in a reserve margin ranging from 20% to 30%. Despite the technical importance of this margin for grid stability, it becomes a significant financial burden due to the nature of long-term power purchase agreements.

These agreements obligate the National Electric Power Company to pay the fixed capacity costs of conventional power plants even when they are not operational, thus increasing the levelized

² Al-Ghad, "Residential and Government Buildings Consume Half of Electricity in Jordan," *Al-Ghad*, 2025, [المباني السكنية والحكومية تستهلك نصف الكهرباء في الأردن](#).

³ Al-Ghad, "Accumulated Debt of the 'National Electricity' One of the Key Challenges to Economic Stability," *Al-Ghad*, June 2025, [المدىونية... أحد أبرز التحديات أما "الكهرباء الوطنية" المتراكمة ل](#).

⁴ Attaqa, "Electricity Grids in Jordan 2024: Solar Energy Leads Growth," *Attaqa*, 2025, [شبيكات الكهرباء في الأردن 2024.. الطاقة الشمسية تتفوق على الرياح](#) (تقرير) - الطاقة.

⁵ Attaqa, "Electricity Production in Jordan: A Stable System and Growing Renewable Energy," *Attaqa*, 2025, [إنتاج الكهرباء في الأردن.. منظومة مستقرة](#) - وسرعة متنامية للطاقة المتجددة - الطاقة.



cost of energy and negating the financial returns achieved through system efficiency ⁶, which were estimated at savings of 90 million dinars in 2024. ⁷ Furthermore, electricity exported from the Jordanian grid to neighboring countries constituted approximately 1.2% of total energy sold in the first ten months of 2024. ⁸ According to official sectoral data for 2024, the electricity loss rate on the transmission network stabilized at 1.76%, while the recorded loss rate on distribution networks reached 11.85%. These figures reinforce the energy efficiency targets, showing a decline from the 2023 levels of 1.81% and 12.56%, respectively. ⁹

Hydrocarbon Supply Chains (Petroleum Products): Lifeline and Source of Danger

The energy supply structure in the Hashemite Kingdom of Jordan represents a complex model of combining local resources with reliance on external imports; Natural gas accounts for the largest share of the electricity generation mix at 58.08%, followed by renewable energy at 26.9%, and then the contribution of the Attarat oil shale project at 15% ¹⁰. Despite this relative diversification, the stability of the electricity grid and the efficiency of its load distribution remain contingent on the sustainability of transboundary primary energy flows. This places hydrocarbon supply chains at the heart of the conflict between the requirements of daily operations and the imperatives of national sovereignty. Oil and gas represent the economic lifeline of the Kingdom, while simultaneously emerging as the most acute source of strategic risk in the energy balance.

Regarding natural gas supplies, Jordan relies on four main sources to meet the needs of its power generation plants:

Supply Source	Logistics Channel	Contractual Framework/Importance	Supply Reliability and Security Assessment
Leviathan Field (Regional)	Onshore Pipeline	15-Year Agreement	Main Source: Affected by supply stability and experienced geopolitical disruptions in 2025/2026.

⁶ Al-Ghad, "Small Consumers in the New Electricity Law," *Al-Ghad*, April 2025, [صغار المستهلكين في قانون الكهرباء الجديد](#).

⁷ Al-Ghad, "Energy: JD 90 Million Reduction in Electricity Sector Costs," *Al-Ghad*, 2025, "الطاقة": [90 مليون دينار قيمة التخفيض على كلف قطاع الكهرباء](#).

⁸ Al-Ghad, "Exports of 1.2% of Total Electricity Production in Jordan," *Al-Ghad*, 2024, [1.2% من إجمالي إنتاج الكهرباء في الأردن](#).

⁹ Al-Ghad, "Experts: Reducing Electrical Losses Necessary to Cut Operating Costs," *Al-Ghad*, 2026, [خبراء: خفض الفاقد الكهربائي ضرورة لتقليص كلف التشغيل](#).

¹⁰ Attaqa, "Electricity Production in Jordan... A Stable System and Rapid Growth of Renewable Energy," *Attaqa*, 2025, [إنتاج الكهرباء في الأردن... منظومة مستقرة وسرعة متنامية للطاقة المتجددة - الطاقة](#).



Arab Republic of Egypt	Arab Gas Pipeline	Framework Agreement since 2004	Strategic alternative: Offers negotiating flexibility; historically experienced major disruptions (2011-2013).
Global markets (LNG)	Sheikh Sabah Port (Aqaba)	Immediate purchase	Safety valve: The most flexible option to compensate for the pipeline shortage, connecting the Kingdom to the global LNG exchange.
Risha Field (local)	The domestic gas network	National production (75 million cubic feet/day) ¹¹	Self-reliance: directed to support national industries and the Ruwashed region; represents the cornerstone of the local energy strategy.

This structural distribution in the gas sector reveals a state of forced diversification that masks a severe strategic vulnerability. Despite the multiplicity of logistical routes, the dominant structural dependence on the Leviathan field places Jordan's energy sovereignty at the mercy of sharp geopolitical fluctuations, as manifested in the repeated supply shocks during 2025 and 2026.¹²The reliance on fossil fuel alternatives, such as heavy fuel oil and diesel, instead of natural gas, has placed a severe financial burden on the general budget.

The additional cost borne by the National Electric Power Company because of the forced switch to alternative fuels is estimated at around 1.8 million dinars per day.¹³ From a strategic perspective, this dependence transforms pipeline efficiency from a technical advantage into a sovereign security vulnerability. In recent crises, the Israeli side has emerged as an unreliable supplier, using technical shutdowns or security conditions as undeclared pressure tools to influence the Kingdom's political positions. This situation reopens old wounds in the institutional

¹¹ Attaqa, "Risha Field in Jordan: Aspirations to Double Gas Production," *Attaqa*, 2025, [حقل الريشة الأردني... طموحات لمضاعفة إنتاج الغاز حتى 2034 - الطاقة](#).

¹² Attaqa, "Israel Shuts Down Leviathan Gas Field Without Notifying Egypt and Jordan," *Attaqa*, 2026, [إسرائيل تغلق حقل ليفيathan للغاز دون إبلاغ مصر والأردن - الطاقة](#).

¹³ Al-Jazeera, "For the Second Time... Israeli Gas Cut Puts Jordan Before a New Energy Crisis," Al-Jazeera, 2026, [للمرة الثانية.. انقطاع الغاز الإسرائيلي. يضع الأردن أمام أزمة طاقة جديدة | أخبار الجزيرة نت](#).



memory of the National Electric Power Company, which still bears the scars of the disastrous Egyptian gas supply disruptions between 2011 and 2014.

These disruptions created a black hole in public debt, accumulating nearly 4 billion dinars due to the need to purchase diesel at exorbitant international prices ¹⁴. The interest on this debt continues to erode the sector's ability to modernize. Meanwhile, the floating gasification unit in Aqaba serves as the last line of defense.

In the oil and derivatives sector, the Kingdom relies almost entirely on imports to meet domestic demand:

Supplier	Transporter	Purpose/Status
The Kingdom of Saudi Arabia	Maritime tankers	The sovereign source for supplying the Jordanian Petroleum Refinery with crude oil.
Republic of Iraq	Land tankers	Preferential price (16 dollar discount)
Global markets	Ready-made marine imports	Diesel and gasoline are available to compensate for the refinery's shortfall

Jordan's oil security dilemma falls within what can be described as a (one-lung problem,) as the country consumes approximately 127,000 barrels of oil daily, relying primarily on imports, most of which flow through the port of Aqaba. The Saudi route is the cornerstone of this supply, making national energy security contingent on the safety of navigation in the Red Sea and vulnerable to the risk premiums resulting from tensions in the straits. In an attempt to diversify these sources, Iraqi oil has emerged as a crucial tactical outlet, with Kirkuk oil imports jumping to nearly 3.8 million barrels annually in 2023 ¹⁵. However, this source remains constrained by rudimentary logistics, relying entirely on land-based tankers that cover only a small fraction of total demand and lack the strategic reliability required during major crises.

¹⁴ Khaberni, "Energy: JD 3.95 Billion Losses from Unregulated Consumption Patterns," *Khaberni*, 2026, <https://www.khaberni.com/news-الطاقة-395-مليار-دينار-خسائر-انماط-الاستهلاك-غير-المرشدة-135540>.

¹⁵ Attaqa, "Jordan's Daily Oil Consumption — How Much Is It?," *Attaqa*, 2024, <https://attaqa.net/2024/12/16/استهلاك-الأردن-من-النفط-يومياً-كم-يبلغ/>.



Despite the strategic bet placed on the Basra-Aqaba pipeline project as an alternative overland artery, this ambition was shattered by geopolitical rivalries and financial obstacles. The project faced an undeclared veto from regional powers seeking to keep Iraq's oil outlets within specific spheres of influence. Simultaneously, its multi-billion dollar cost, exceeding \$7 billion, clashed with the high risks of insurance and financing in the unstable transit areas. This external vulnerability is exacerbated by the decline in domestic production from the Hamza field to a symbolic level of no more than 200 barrels per day¹⁶this deepens the double vulnerability that forces the country to import crude oil and refined petroleum products in hard currency due to the aging of domestic refining capacity, particularly at the Zarqa refinery. This reality transforms Jordan's energy bill from an economic item into a sovereign vulnerability that drains national resources. This necessitates a radical shift towards energy sovereignty by maximizing domestic gas and oil shale resources to break free from dependence on transboundary supply routes.

The Difficult Equation of Independence: National Resources Facing Geopolitical Pressures

In an effort to break free from the shackles of import dependency, national policies have focused on maximizing the utilization of resources inherent in Jordan's geography. Oil shale stands out as a strategic asset for national sovereignty, as Jordan possesses the world's fourth-largest reserves, estimated at approximately 70 billion tons. This trend culminated in the Attarat Power Plant project, which attracted \$2.1 billion in Chinese-Malaysian investments to produce 470 megawatts, contributing about 15% of the Kingdom's needs¹⁷.

Despite the project's technical significance in providing a fully domestic base load, it presented the country with an unprecedented legal and financial challenge: an international arbitration case before the International Chamber of Commerce in Paris. The Jordanian government demanded a review of energy purchase costs, claiming gross unfairness due to high, long-term contractual obligations that burdened the National Electric Power Company's budget, compared to cheaper energy alternatives currently available. Despite the arbitration ruling that upheld the investors' contractual rights, this experience provided a harsh lesson in the necessity of balancing

¹⁶ Attaqa, "Jordan's Daily Oil Consumption — How Much Is It?," Attaqa, 2024, <https://attaqa.net/2024/12/16/استهلاك-الأردن-من-النفط-يومياً-كم-يبلغ/>

¹⁷ Sawalif, "Fourth in World Reserves... 70 Billion Tons of Oil Shale in Jordan," *Sawalif*, 2019, [70 مليار طن صخر زيتي في الأردن - سواليف](#).



purchase or payment contracts with global market fluctuations to ensure that sovereign projects do not become chronic debt burdens.

Furthermore, in 2024, Jordan worked to enhance its energy security by providing strategic storage capacity in the Madouna area, with a total capacity of 312,000 tons of petroleum products and liquefied gas. This is complemented by handling facilities in Aqaba with a capacity of 106,000 tons, including 6,000 tons of liquefied gas. Supported by storage capacity from the private sector, this system ensures the Kingdom's reserves are sufficient for more than 60 days, guaranteeing continuous supply under normal circumstances and in emergencies.¹⁸

In parallel with this development, the Risha gas field witnessed significant progress, with its production capacity increasing to 75 million cubic feet per day by early 2026. Furthermore, recent estimates by SLP present the Jordanian energy sector with a new reality, revealing gas reserves that could reach 14.6 trillion cubic feet in their highest-case scenario.

This vast reserve supports the Ministry of Energy's plans to increase production from current levels to 418 million cubic feet per day within the next four years, reaching half a billion cubic feet per day by 2034. The shift from previous modest estimates of approximately 300 billion cubic meters to these trillion-cubic-foot figures necessitates the optimal investment of these resources to ensure energy independence¹⁹.

Despite being a promising source for industrial consumption, it still covers a marginal portion of total demand. In the context of the clean energy transition, Jordan achieved a qualitative leap in 2024, ranking fourth in the Arab world, with the contribution of renewable energy reaching nearly 2,840 megawatts of installed capacity²⁰. However, this success was hampered by the duck curve phenomenon, where solar production is abundant during the day when demand is low, and ceases at night during peak load times.

¹⁸ Petra (Jordan News Agency), "Energy Security in the Kingdom Within Safe Limits with Strategic Reserves and Continuous Power Supply," *Petra*, 2023, <https://www.petra.gov.jo/Include/InnerPage.jsp?ID=262612&lang=ar&name=news>.

¹⁹ Attaqa, "Risha Field in Jordan: Aspirations to Double Gas Production," *Attaqa*, 2025, [حقل الريشة الأردني.. طموحات لمضاعفة إنتاج الغاز حتى 2034 - الطاقة](#).

²⁰ Ammon News, "Minister of Energy Dr. Basma: Not Exceeding 0.5% in 2014," *Ammon News*, 2026, <https://www.ammonnews.net/article/952846>.



Due to the absence of energy storage systems, the control center is forced to resort to the forced disconnection of solar energy projects, resulting in the waste of approximately 100 gigawatt-hours of clean energy annually. This necessitates a shift towards storage solutions and smart grids to ensure the efficiency of this national transformation.²¹

The Dilemma of Availability and Cost: An Analysis of Jordan's Sensitive Energy Dependence

A cross-referencing of gas and oil import data clearly demonstrates that the Jordanian state has technically succeeded in engineering a complex network of safeguards that ensure the continued flow of fuel under the most challenging regional circumstances. However, this success in securing supply does not necessarily translate into achieving energy security in its comprehensive sovereign sense. While long-term agreements with Saudi Arabia, Egypt, Israel, and Iraq guarantee fuel flows, the financial and political cost of these supplies remains the difficult variable in the equation of economic stability. Reliance on pipelines and transit routes from other countries transforms the energy bill from a mere economic item into a potential tool of geopolitical pressure.

Based on the literature related to the concept of energy security, Jordan can be classified among what are known as energy-sensitive states. These are countries where any disruption to regional supply chains leads to repercussions that extend beyond the direct economic impact, effectively becoming a threat that affects the state's social and sovereign stability. This close link between energy supply and sovereign stability is evident in the state's response to the four main energy security requirements²²:

- **Availability:** The physical presence of the resource. In Jordan, this is embodied in the need for more than the maximum load of the national system, a level that necessitates securing stable and flexible production capacity to guarantee uninterrupted supply.

²¹ Attaqa, "Renewable Energy in Jordan: A Recent Study Reveals Three Options and a 'Large Distortion'," *Attaqa*, 2025, <https://attaqa.net/2025/03/22/الطاقة-المتجددة-في-الأردن-دراسة-حديثية>.

²² London Premier Centre, "Energy Security: Securing Oil and Gas Supplies in the Twenty-First Century," *London Premier Centre*, October 25, 2023, [أمن الطاقة: تأمين إمدادات النفط والغاز في القرن الواحد والعشرين](#).



- **Accessibility:** The geopolitical and navigational ability to bring the resource through stable straits and supply lines. Jordan receives natural gas from four main sources via direct pipelines and supply agreements that secure its supply, thus reducing vulnerability to dependence on a single supplier.
- **Affordability:** Price sustainability, ensuring that generation costs remain within acceptable limits without creating an unsustainable burden on the public budget or economic sectors. This is a challenge exacerbated by the significant fluctuations in global gas prices, which reached record highs in spot contracts in early 2026.²³
- **Reliability:** Supply resilience, meaning the ability of the energy system to maintain continuous supply without major interruptions. This is what the national grid strives for to ensure the sustainable readiness of the electrical system.

Future Scenarios for Jordan's Sovereignty in the Aftermath of War

Accordingly, Jordan's ability to maneuver within these four dimensions varies drastically depending on the course the region takes in the aftermath of war. This can be detailed through the following future scenarios:

First: The Regional Hegemony Scenario (Iran and its Allies Win) – In this scenario, Jordan finds itself surrounded by what can be called the opposing energy crescent; an arc extending from Iranian gas fields through Iraq to the Syrian-Lebanese coast. This crescent does not function as a cooperative system, but rather as a tool of geopolitical strangulation. Energy resources are employed to serve the political agenda of the dominant axis, leading to Jordan's exclusion from any role as a transit state and the permanent freezing of the Basra-Aqaba pipeline project. Thus, access becomes a political impossibility, as the northern and eastern borders are closed to Arab energy flows, and Jordan is forced to remain in a state of financial depletion to secure costly alternatives via the southern sea routes or the Mediterranean Sea, making the Attarat project the only remaining pillar outside the circle of this material siege.

²³ Youm7, "Increase in Spot Charter Rates for Gas Carriers: Key Developments in Global Gas Markets," *Youm7*, March 15, 2026, [ارتفاع أسعار التاجير الفوري لنقلات الغاز.. أهم مستجدات أسواق الغاز العالمية - اليوم السابع](#).



Second: The Unilateral Hegemony Scenario (Israel and the US Win) – Forced Integration and the Undermining of Reliability. This path leads to what is known as forced energy integration, where the danger lies in transforming imported gas from a commercial commodity into a tool for forced displacement. Although this scenario may provide a superficial availability of the resource, it fatally undermines reliability. Fields like Leviathan give the opposing side the ability to invoke force majeure clauses to cut off supplies during moments of political crisis. Consequently, abandoning shale oil under the pretext of price acceptability becomes sovereign suicide, because the cost of losing political control far outweighs any financial differences in generation costs.

Third: The Scenario of Descent into Sovereign Anarchy (US Withdrawal) – The collapse of access guarantees: The absence of an international guarantor would transform cross-border gas pipelines and power plants into easy and vulnerable military targets, completely severing Jordan's access to external resources. In this scenario, reliance on international agreements securing supplies diminishes, and oil shale emerges as the only highly reliable option, not only for its calorific value but also for its potential to provide a stable generation base, insulated from the fluctuations of major international alliances and power vacuums. In such a power vacuum, Israel might resort to exporting its security crisis through forced displacement attempts to rapidly alter the facts on the ground. Here, oil shale transcends its calorific value to become the foundation of sovereign resilience; it is the only resource that guarantees Jordan the preservation of its institutions' cohesion, its army's capabilities, and the continuity of its public services, unaffected by the vagaries of collapsing alliances. Energy sovereignty through oil shale will enable Jordan to transform its borders into an impenetrable barrier against displacement, instead of being a victim of regional chaos that overturns paper agreements and leaves only what the state owns within its borders.

Fourth: The Gulf Intervention Scenario and the Strait's Conflict – This scenario presents Jordan with a price acceptance test. Conflict in the Straits of Hormuz and Bab el-Mandeb would lead to sharp increases in energy prices, exceeding \$120 per barrel.²⁴With the collapse of the economic

²⁴ G-FOCUS INTERNATIONAL MAGAZINE, "Study: Impacts of Closing the Strait of Hormuz — How the Shutdown of the Global Oil Artery Threatens Energy Security and Sparks a Broad Economic Recession," *G-FOCUS INTERNATIONAL MAGAZINE*, June 23, 2025, [دراسة: تداعيات إغلاق مضيق هرمز | كيف يهدد توقف الشريان النفطي العالمي أمن الطاقة ويُشعل ركوداً اقتصادياً واسعاً - مجلة جي فوكس الدولية.](#)



viability of imports, Jordan gains international immunity as a transit country and the only secure land route for daily oil transport. However, reliability here hinges on the ability to protect infrastructure and the smart grid from cyberattacks targeting SCADA systems and digital control.²⁵ In this scenario, the Kingdom transforms into a regional energy lifeline, necessitating a reformulation of its transit doctrine to include stringent military and cyber protection protocols for strategic supply lines. This must be coupled with investment in digital twin technology to predict malfunctions and contain digital threats before they reach central control rooms. The internal challenge becomes balancing the cost of sovereignty with inflationary pressures, requiring the development of price hedging models backed by international guarantees for transit security. Ultimately, Jordan will not just be a geographical corridor, but will become a guarantor of the stability of global markets, giving it diplomatic and economic weight that will reposition it in the new international energy equation.

Energy as a Sovereign Defense and a Doctrine of Existence

The set of forward-looking scenarios presented in this paper necessitates an immediate and radical shift in energy sector management; from a purely commercial equation based on profit and loss calculations to a sovereign doctrine based on calculations of survival and resilience. In critical historical moments, the independence of national decision-making is not measured by the financial cost per megawatt, but rather by its political cost and its ability to withstand regional blackmail. Therefore, the Attarat oil shale projects and the Risha gas exploration should be treated as a pre-paid national insurance premium, granting Jordanian decision-makers the immediate ability to protect national sovereignty from any dependence on an external supplier.

Jordanian energy security cannot be isolated from its turbulent geopolitical environment. Therefore, the Kingdom must transform its geographic location from a recipient of shocks to a strategic hub that enhances its resilience and negotiating position. To translate this vision into

²⁵ Time Technology Egypt, "What Is SCADA? And How You Can Use It to Monitor Your Entire Plant from One Screen," *Time Technology Egypt*, 2024, [وكيف يمكنك استخدامه لمراقبة مصنعك بالكامل من شاشة واحدة؟ SCADA ما هو نظام](#).

operational reality by 2026, this paper lays out a technological roadmap based on four imperatives that cannot be postponed:

- **Storage Revolution:** Immediately begin constructing energy storage plants with a capacity of at least 200 MW to stop the loss of 100 GWh annually resulting from the duck curve and forced power outages.
- **Pricing Reform:** Implement time-linked tariffs to shift industrial loads towards peak daytime solar hours.
- **Hydrogen Economy:** Direct surplus renewable energy towards green hydrogen projects and transform the Kingdom into a regional export hub.
- **Financial Engineering:** Renegotiate existing power purchase agreements to free up cash flow for investment in smart grid modernization.

In conclusion, the essence of this vision lies in considering energy independence as an invisible bulwark and an impenetrable barrier against forced displacement projects and the liquidation of the Palestinian cause. Every megawatt produced domestically is as an additional soldier stationed on the borders, protecting political will from succumbing to international bargaining. Only a state that controls its own energy resources can secure its borders and manage its crises without being beholden to the approval of others, thus thwarting any attempt to use dependency as a means to alter the demographic reality or erode national identity.

Discussion

Energy in Jordan: Between Supply Costs and Decision-Making Sovereignty: Why Do We Need a Comprehensive Sector Restructuring?

The debate surrounding Jordan's energy sector extends far beyond its technical considerations or its status as a limited, sector-specific discussion. It delves into the core issues related to economic stability, competitiveness, and even national sovereignty. Jordan's experience over the past years clearly demonstrates that securing electricity and ensuring a continuous supply—



important as that is—is no longer sufficient in itself if it is not coupled with the state's ability to control energy costs, sources, and management mechanisms.

The fundamental problem facing Jordan today is not a shortage of energy, but rather the nature of the model by which the sector is managed. This model, historically built on guaranteeing supply at any cost, has succeeded in sparing the Kingdom from severe power outages. However, it has also created deep financial and structural imbalances, transforming the energy sector from an engine of growth into a burden on the economy.

First: The Paradox of Technological Success and Economic Failure

One of the most prominent complexities in the Jordanian situation is what can be termed the paradox of technological success versus economic imbalance. The Jordanian electricity system enjoys a generating capacity exceeding actual demand, which enhances reliability and stability. However, this surplus has not translated into an economic advantage, but rather a financial burden, due to the nature of long-term power purchase agreements that impose fixed costs even when generating capacity is not utilized.

This paradox reveals a structural flaw in policy design, where energy has been treated as a purely engineering matter, without sufficient integration of the economic dimension. Investment in generation without parallel tools for demand management or energy storage has led to an imbalance between supply and demand, resulting in additional costs borne by the national economy.

Second: Energy Dependence as a Sovereign Constraint

Despite efforts to diversify energy sources, Jordan remains heavily reliant on imports, both oil and gas. This dependence not only presents an economic challenge but also constitutes a direct sovereign constraint, as energy costs and supply continuity become hostage to regional and international fluctuations.

Past experience has shown that cross-border supply chains can quickly become tools of pressure, whether due to political conflicts, security disturbances, or even commercial considerations. In this context, discussing “energy security” in its traditional sense is no longer sufficient. A broader concept is needed: the ability to control the terms of supply, not merely guarantee its occurrence.

Third: Renewable Energy: Between Wasted Potential and Lost Opportunities

Jordan has made significant progress in introducing renewable energy, particularly solar, benefiting from its geographical location and natural resources. However, this success remains partial due to the lack of necessary infrastructure to accommodate this shift, most notably storage systems and grid flexibility.

The phenomenon of forced disconnection of solar energy is a clear example of a strategic planning gap, where clean energy is produced without the ability to fully utilize it. This situation does not reflect a lack of resources, but rather a lack of management and integration tools.

Fourth: From an Energy Crisis to a Model Crisis

The foregoing leads to a fundamental conclusion: the challenge in Jordan is not a resource crisis, but rather a management model crisis. The current system suffers from:

- Imbalance in the cost structure,
- weak demand management,
- limited capacity to absorb renewable energy,
- and a high dependence on external sources.

Therefore, any genuine reform cannot be limited to partial solutions, but must aim for a comprehensive restructuring of the sector.

Fifth: Why are energy storage and demand management a game-changer?

Given these challenges, tools like energy storage and demand management emerge as high-impact, relatively low-cost solutions. Storage is not merely a technology; it's a tool for rebalancing the system by:

- Reducing waste,

- Improving the utilization of renewable energy,
- Reducing the need to operate expensive conventional power plants.

Demand management, particularly through time-based tariffs, represents a shift in the philosophy of energy management, moving from a system that passively responds to demand to one that reshapes demand itself.

Sixth: Financial and Regulatory Reform as a Prerequisite for Success

No technological transformation can succeed without parallel reform of the financial and regulatory structure. Long-term contracts, the current tariff system, and the nature of the national electricity company's operations all require review.

Freeing up the sector's financial space through contract renegotiation and tariff reform is essential to enabling the state to invest in future solutions, rather than continuing to manage accumulated burdens.

Seventh: Energy as an Industrial Lever, Not a Production Cost

One of the most important transformations required is redefining the role of energy in the national economy. Instead of viewing it as a production cost, it should be treated as a tool to stimulate industry.

Establishing industrial zones linked to energy sources, especially local ones, can achieve:

- Reduced production costs,
- Increased competitiveness,
- Investment incentives.

This link between energy and industry represents one of the most important keys to the transition towards a productive economy.

Eighth: Artificial Intelligence as a Tool for Redefining Sector Management



In the context of the global transformation of the energy sector, artificial intelligence is no longer a future option, but rather a central tool for managing complex energy systems. For Jordan, employing AI tools can represent a qualitative leap in sector management through:

- Improved demand and production forecasting, especially given the volatility associated with renewable energy.
- Intelligent grid management through real-time data analysis and efficient load routing.
- Reduction of technical and commercial losses through early detection of faults and overloads.
- Enhanced maintenance efficiency through predictive rather than reactive maintenance.
- Integration of different energy sources, allowing for flexible management of the energy mix.

Integrating AI in the energy sector is not limited to improving efficiency; it also contributes to redefining the relationship between production and consumption, transforming the system into a dynamic network capable of adapting to changes.

Ninth: Towards Flexible Energy Management

In light of the above, Jordan's realistic goal is not to achieve complete self-sufficiency, but rather to build a model of flexible energy management based on:

- Reducing dependence on external sources without isolating itself from them,
- Diversifying energy sources,
- Enhancing adaptability, and
- Improving management tools.

This model enables Jordan to transform from a recipient of shocks to an active agent capable of absorbing and managing them.

Redefining Energy as a Tool of National Power

The future of Jordan’s energy sector is determined not only by the quantity of available resources, but also by how they are managed. A nation that can manage its energy efficiently and flexibly is better equipped to protect its economy, enhance its decision-making independence, and achieve stability.

Therefore, the required reform does not consist of isolated projects or partial technological solutions, but rather a comprehensive shift in mindset that transforms the energy sector from a financial burden into a strategic pillar of national power.

In a world becoming increasingly complex and uncertain, energy will no longer be merely a service, but one of the most important tools for survival and influence. Jordan, with its experience and institutional framework, now has a genuine opportunity to reshape this sector in line with its sovereign and developmental aspirations.

Recommendations

First: Urgent Recommendations (Short-Term: 1–2 years)

1. Launch a National Energy Storage Program

- Immediately begin grid-scale battery storage projects.
- Prioritize areas with high solar production.
- Engage the private sector with innovative financing models (PPPs).

2. Implement Time-of-Use Tariffs

- Shift industrial loads to peak solar hours.
- Incentivize smart consumption and reduce evening grid strain.
- Reduce the need to operate costly conventional power plants.

3. Demand-Side Management

- Incentivize factories and institutions to adjust their consumption patterns.
- Support energy efficiency technologies.
- Gradually introduce smart meters.

Second: Structural Recommendations (Medium-Term: 3–5 years)

4. Renegotiate Power Purchase Agreements (PPAs)

- Review high fixed costs.

- Introduce greater flexibility in operation and payment.
- Restructure commitments to align with actual demand.

5. Reforming the Electricity Tariff System

- Achieving a balance between social justice and economic efficiency.
- Reducing the burden on productive sectors.
- Reducing price distortions.

6. Maximizing Local Resources

- Accelerating the development of the Risha gas field.
- Conducting rigorous economic evaluations of oil shale projects.
- Enhancing strategic reserves of petroleum products.

7. Establishing Energy Industrial Zones

- Connecting heavy industries to local energy sources.
- Reducing transmission losses.
- Enhancing the competitiveness of Jordanian exports.

Third: Strategic (Long-Term) Recommendations

8. Developing the Smart Grid and Enhancing Cybersecurity

- Updating Supervisory Control and Data Acquisition (SCADA) systems.
- Protecting infrastructure from cyberattacks.
- Introducing load forecasting and management technologies.

9. Adopting a National Green Energy Strategy

- Linking it to surplus renewable energy.
- Targeting specific export markets.
- Avoiding ill-considered investments.

10. Restructuring Governance in the Energy Sector

- Enhancing the independence and effectiveness of the Regulatory Authority.



- Redefining the role of the national electricity company.
- Improving coordination between the relevant ministries (energy, finance, industry).