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The Energy Transition in Jordan: Policy Lessons from Germany and the EU

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West Asia-North Africa Institute
70 Ahmad Al-Tarawneh St.
P.O. Box: 1438
Amman 11941 - Jordan
info@wana.jo
www.wanainstitute.org

Konrad-Adenauer-Stiftung Jordan Office
23 Isma'eel Haqqi Abdoh St.
P.O. Box: 831025
Amman 11183 - Jordan
Info.Jordan@kas.de
www.kas.de/jordan

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Author: Sanad Al-Quran
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Abstract

This paper addresses Jordan's Economic Modernisation Vision (EMV) target of a reliable, sustainable, and interconnected energy sector. To do so, the paper identifies the constraints that limit Jordan's energy transition and translates them into a reform package. Drawing on Jordanian legal documents, the paper classifies current regulations according to their impact on the energy transition as binding, partially binding, or enabling. Two constraints emerge as binding: connection regulations, which prevent viable solar projects from proceeding at scale, and the network services fee, which adds an additional monthly cost for renewables. Partially binding constraints include the electricity single-buyer model, absence of a renewable projects auction schedule, weak enforcement of energy efficiency obligations, and underdeveloped low-cost heat options. The paper applies a policy transfer approach, matching each constraint to specific instruments from Germany and the European Union (EU), assessing their design fit, and sequencing the recommendations into a three-phase roadmap. It complements this roadmap with a Key Performance Indicator (KPI) framework and cross-cutting risk mitigation and enabling measures. The paper's main contribution is to provide a concrete and time-bound policy package that advances the energy transition. Adopting these measures will help achieve three key objectives of the EMV, namely, Sustainable Resources, Invest Jordan, and Green Jordan.

الملخص

تتناول هذه الورقة هدف رؤية التحديث الاقتصادي المتمثل في إرساء قطاع طاقة موثوق ومستدام ومترابط. وتحقيقًا لذلك، ترصد الورقة القيود التي تكبّل مسار انتقال الأردن الطاقي، وتُترجمها إلى حزمة إصلاحية محددة المعالم. استنادًا إلى الوثائق القانونية الأردنية، تُصنِّف الورقة التنظيمات السارية بحسب أثرها في الانتقال الطاقي إلى ثلاث فئات: تنظيمات مُقيِّدة، وأخرى مُقيِّدة جزئيًا، وثالثة مُمكِّنة.

تُظهر النتائج بروز عقبتين مُقيِّدتين: أولاً، تنظيم ربط منشآت مصادر الطاقة المتجددة على النظام الكهربائي الذي يحول دون إنفاذ مشاريع طاقة متجددة مجدية اقتصاديًا على نطاق واسع، وثانياً، رسوم خدمات الشبكة الذي يضيف على مشاريع الطاقة المتجددة كلفة شهرية إضافية. أما العقبات المُقيِّدة جزئيًا فتشمل: نموذج المشتري الوحيد للكهرباء، وغياب جدول زمني واضح لمشاريع الطاقة المتجددة، وضعف إنفاذ كفاءة الطاقة، وقصور تطوير بدائل التدفئة منخفضة الكلفة.

تعتمد الورقة مقاربة نقل السياسات؛ إذ تُقابل كل قيد بأدوات تنظيمية محددة مُستقاة من ألمانيا والاتحاد الأوروبي، وتُخضعها لاختبار الملاءمة التصميمية مع السياق الأردني، ثم تُرتِّب توصياتها وتُسلسِلها ضمن خارطة طريق ثلاثية المراحل. وتكمّل هذه الخارطة بإطار مؤشرات أداء رئيسة، وبحزمة تدابير تمكينية وإجراءات لتخفيف المخاطر عابرة للقطاعات.

تتمثل الإضافة الرئيسة للورقة في تقديم حزمة سياسات عملية ومؤطَّرة زمنيًا تدفع الانتقال الطاقي إلى الأمام؛ إذ إن اعتماد هذه التدابير من شأنه أن يُسهم في تحقيق ثلاثة مقاصد محورية من محركات النمو ضمن رؤية التحديث الاقتصادي، ألا وهي: الموارد المستدامة، والاستثمار، وبيئة مستدامة.

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1 Introduction

Jordan's energy transition has advanced rapidly over the past decade, with renewables now accounting for %26.9 of the country's electricity,[1] placing it among regional leaders.[2] For the next phase, the EMV aims to achieve a reliable, sustainable, and interconnected energy sector that supports economic growth and job creation.[3] Jordan has advanced two major enabling pillars for this next phase. First, the General Electricity Law No. 10 of 2025, which expands the Energy and Minerals Regulatory Commission's (EMRC) powers and introduces an enabling framework for storage and gradual market opening.[4] Second, the Third National Energy Efficiency Action Plan (NEEAP) targets a %4.33 reduction in final energy use by 2026 (%5.44 for electricity) and outlines sectoral measures.[5] Moreover, some of the building blocks for this next phase are already in place. Smart meters are being rolled out, with completion targeted by the end of 2025.[6] Time-of-use (ToU)[7] tariffs are scheduled for full rollout by September 2026,[8] enabling the efficient operation of the energy sector and allowing prices to better reflect system costs. In parallel, the National Electric Power Company (NEPCO) has a generation and transmission master plan that identifies where new capacity and grid reinforcements are needed.[9]

Despite this progress, some obstacles must be addressed to ensure the Jordanian energy transition remains credible and just. The next phase of Jordan's energy transition is no longer primarily a technical challenge; the electrical grid can host more renewables, and key technologies are available. The main constraints are now institutional, as specific regulations and procedures shape investment incentives and risks for the private sector and end-users. Primarily, Connection Regulation No. 58 of 2024[10] (amended in Regulation No. 110 of 2024)[11] and the network services fee[12] directly limit the size and economics of rooftop and commercial and industrial (C&I) solar installations, even where the electrical grid could technically accommodate more renewable energy sources. The EMV Second Implementation Phase Plan points to this, highlighting limited electricity and gas network absorptive capacity, especially because storage solutions are missing, financial constraints from debt accumulation at NEPCO and weak sector financing, a need to study tariff and support structure design to better incentivise economic sectors, and the absence of clear studies for transitioning from the single-buyer model toward a more liberalised market. It also flags changing demand patterns from new loads such as electric vehicles, data centres, and hydrogen, which strengthens the case for flexibility, storage, and transparent planning as immediate priorities.

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[1] Ministry of Energy and Mineral Resources, Annual Report 2024.
[2] UNDP, Arab Future Energy Index, 2023.
[3] Hashemite Kingdom of Jordan, Economic Modernisation Vision, 2022.
[4] Hashemite Kingdom of Jordan, General Electricity Law No. 10 of 2025.
[5] Ministry of Energy and Mineral Resources, Third National Energy Efficiency Action Plan, 2024.
[6] The Jordan Times, EMRC to Replace All Electric Meters with Smart Ones by 2025, 2024.
[7] ToU means electricity costs more at busy peak times and less at quieter times, so users and businesses have a clear incentive to shift flexible uses into cheaper, often cleaner hours, which eases pressure on the grid and helps lower overall system costs.
[8] IMF, Country Report No. 25/155, 2025, p. 11.
[9] NEPCO, Annual Report 2024.
[10] Hashemite Kingdom of Jordan, Regulation No. 58 of 2024.
[11] Hashemite Kingdom of Jordan, Regulation No. 110 of 2024.
[12] Hashemite Kingdom of Jordan, Regulation No. 58 of 2024.

These obstacles matter for three reasons. First, they slow private investment exactly when Jordan needs more clean energy capacity to meet demand and reduce its dependence on imported energy, as %74 of Jordan's total energy is imported.[13] Second, they risk keeping electricity costs high for households, firms, and the public budget, especially given NEPCO's accumulated losses.[14] Third, they limit the competitiveness of the water, industry, and services sectors by raising production costs.

With these developments in mind, the paper asks,

- "Which constraints bind Jordan's energy transition, and what policy package would solve them while protecting affordability and system adequacy?"

To answer this question, the paper uses the official Jordanian legal and regulatory documents as its main evidence base, classifying provisions according to whether they are binding, partially binding, or enabling for the energy transition. It then adopts a policy transfer approach, building on Germany's experiences as one of the most advanced countries when it comes to energy transitions,[15] and, where relevant, draws on EU-level directives that inform German practice. This approach examines how instruments from Germany fit Jordan's context and what adaptations and sequencing of solutions would be effective in Jordan. In doing so, this paper translates the EMV priorities into a sequenced, evidence-based policy package tailored to Jordan's institutions and political economy that would advance the energy transition.

The paper proceeds as follows: Section 2 presents the Methodology, Section 3 reports the Findings, Section 4 sets out the Recommendations, and Section 5 concludes.

2 Methodology

The study diagnoses the Jordanian energy sector and then employs a policy transfer approach from Germany to Jordan. First, it classifies each Jordanian rule according to its degree of constraint on the energy transition. The core evidence base is the official Jordanian set of laws and regulatory documents in force (laws, regulations, tariff booklets, interconnection guidelines, and NEPCO plans). Using a classification scheme that combines the strength of the evidence and its impact on the energy transition, the paper distinguishes three levels of rules:

- A **binding** rule is in force today and clearly limits the size, timing, or economics of the energy transition.
- A **partially binding** rule only applies in certain places, time periods, or under specific conditions, but does not directly block the energy transition.
- A **non-binding (enabling)** rule is either enabling or neutral for the energy transition.

Second, to move from diagnosis to solutions, the paper then matches each Jordanian constraint with a German instrument that serves a similar function. For every match, the research records: (i) what the instrument does in Germany, (ii) the specific Jordanian constraint it can solve, (iii)

[13] Ministry of Energy and Mineral Resources, Energy Balance Data 2024.
[14] NEPCO, Financial Statements, 2025.
[15] World Economic Forum, Fostering Effective Energy Transition, 2024.

a design-fit judgement (High/Medium/Low) based on institutional fit, incentive alignment, administrative capacity, legal feasibility, and political-economy viability, and (iv) pre-requisites, risks, and Jordanian implementing actor(s). The result is a set of concrete reforms sequenced into a three-phase roadmap (36-18 ,18-6 ,6-0 months) that removes the constraints on the Jordanian energy transition. To track progress, the paper proposes a KPI framework.

All constraint classifications are derived from operative legal and technical clauses, not from secondary commentary, and each binding constraint is tied to a specific, measurable rule or cost that affects the Jordanian energy transition. Limitations remain, as some operational data may be incomplete, institutional capacity and political priorities can shift over the reform horizon, and some instruments depend on robust IT and data systems. These risks are addressed through the recommendations and KPI design.

3 Findings

This section presents the results across the diagnosis. It identifies the main constraints, explains how they affect the energy transition, and flags the direction of fit with proven instruments from Germany and the EU adapted to Jordan's context. Binding constraints that directly affect the energy transition include: (i) the Connection Regulation No. 58 of 2024 (amended in Regulation No. 110 of 2024), which limits the size and economics of rooftop and C&I solar systems, and (ii) the network services fee, which adds a recurring cost that weakens project economics. A second group of partially binding constraints comprises: (i) the financial and structural limits of the single-buyer model that concentrates offtake risk in NEPCO, because almost all projects sell their power to a single, financially stressed utility, which makes investors cautious about new projects without governmental guarantees, as seen in 2014 when Jordan cancelled the third round of the renewables programme. At that time, the Ministry of Energy and Mineral Resources opened a third Direct Proposal round for utility-scale renewables (100 MW class PV projects, with roughly 400 MW expected), extended the submission deadline, and then cancelled the round,[16] (ii) the absence of a multi-year, calendarised auction schedule, which keeps the project pipeline uncertain, (iii) weak enforcement of energy efficiency obligations, and (iv) the underdevelopment of low-cost heat options such as clean process heat. By contrast, enabling measures include ToU, a legal framework that supports Independent Power Producers (IPPs), wheeling, storage, tax exemptions, and funds for renewables and efficiency. The following subsections unpack each constraint, trace its effects on the energy transition, and indicate the solutions.

3.1 Grid Access and Connection: Static Caps and Upgrade Rules

This section directly responds to the EMV Second Implementation Phase Plan diagnosis that Jordan's grid faces limited absorptive capacity for additional renewables, largely because storage solutions are absent. These challenges strengthen the case for moving from static caps to dynamic hosting capacity as a system reliability tool. Under the current framework, the binding constraint is Regulation No. 58 of 2024, which governs the four approved connection mechanisms: Wheeling (off-site solar PV systems), Net Billing (on-site), Zero-to-Grid,

[16] Addustour Newspaper, Cancellation of the "third round" of direct bids for renewable energy projects, 2014.

and Buy-all/Sell-all. It links system size to past consumption, caps small low-voltage (LV) systems at 16 A per phase with a %15 substation ceiling, and requires projects to use only one mechanism. For net billing, exports are netted within fixed time bands, and any monthly credit is zeroed at the end of each calendar year, with no cash-out of surplus value. Applicants must also pay for connection and any needed LV distribution upgrades, which increases upfront cost uncertainty and can block otherwise viable projects. While the guide introduces clearer procedures, service-level agreements (SLAs), and a useful zero-export option for constrained feeders, the combination of static caps, consumption-linked sizing, and annual credit reset limits the economic and technical scalability of rooftop and C&I solar systems, even where the grid could accommodate more. Overall, this regulation increases initial investment costs and lengthens payback periods for solar energy projects. Ultimately, this leads to slower adoption of renewable energy.

There is high potential in moving from static ceilings to managed and dynamic hosting. Drawing on Germany's approach[17] to power plants in LV networks that require smart inverter functions and remote feed-in management.[18] This enables higher PV densities with occasional controlled curtailment (curtailment means plants are asked to reduce output even when they could generate more, resulting in lost potential renewable generation). Recent European Bank for Reconstruction and Development (EBRD) transmission upgrades in Jordan complement this approach. The Northern Green Substation is expected to eliminate approximately 300 GWh/year of curtailment by 2028, easing locational limits while distribution flexibility scales.[19]

3.2 Tariffs, Prosumers, and Incentives: Network Services Fee and ToU Signals

The network services fee is a binding constraint because it directly weakens project economics. It is charged monthly per kilowatt (kW) and differentiated by sector up to JOD 14 per kW per month (e.g., ports 14, commercial 13, telecom 12, private hospitals 12, large industrial 8, EV charging 8, residential 1) with specific exemptions (small and medium industrial and agriculture).[20] This fee acts as a recurring operating cost that lengthens payback periods and discourages new projects. By contrast, the rollout of ToU tariffs is supportive. By making electricity cheaper in off-peak periods and more expensive at peak, ToU gives users a clear incentive to shift flexible demand into lower-cost, often more solar-rich hours, improving the use of existing capacity and easing peaks without raising tariffs. The second phase in Jordan extended ToU to banking, private hospitals, water pumping, and hotels, with three daily periods.[21] Putting it together, the reforms should now emphasise targeted subsidies, grid efficiency, and ToU activation over broad price rises.

Moreover, the EMV Second Implementation Phase Plan explicitly calls for studying the electricity tariff and support structure to better incentivise economic sectors and revisit support policies. This strengthens the rationale for reforming the network services fee as a targeted, cost-reflective instrument linked to cost-of-service studies, rather than a blunt charge that lengthens payback periods and undermines competitiveness.

[17] VDE Association, Power Generating Plants in the Low Voltage Network (VDE-AR-N 4105), 2019.
[18] Federal Republic of Germany, Renewable Energy Sources Act (EEG 2023), Section 9.
[19] EBRD, NEPCO Northern Green Substation, 2024.
[20] Hashemite Kingdom of Jordan, Regulation No. 58 of 2024.
[21] Ministry of Energy and Mineral Resources, MEMR and EMRC Grant an Incentivizing Off-Peak Electricity Tariff to Several Vital Productive Sectors, 2025.

3.3 Market Design and Offtaker Viability: Single-Buyer Path Dependence

General Electricity Law No. 10 of 2025 is an enabling measure that lays the groundwork for gradual competition, empowers EMRC on tariffs and wheeling, and provides a framework for energy storage.[22] However, the current reality is still dominated by NEPCO as the single-buyer. With accumulated losses of JOD 6.2 billion[23] (%14 of gross public debt; %16.4 of nominal GDP) and significant legacy contracts, NEPCO's financial position creates structural offtaker risk, meaning that the main buyer may not always be able to pay on time or sign new long-term Power Purchase Agreements (PPAs). This weighs on new utility-scale projects and is a partially binding constraint.

German balancing group accounting (MaBiS),[24] the rulebook for how balancing groups settle their energy positions, and standard balancing responsible party (BRP) contracts,[25] for entities that keep their customers' supply and demand in balance, provide a reference for piloting a simplified, corridor-based approach in Jordan, while maintaining NEPCO as the buyer of last resort. Over the longer term, the German Energy Industry Act (EnWG)[26] provides the trajectory towards non-discriminatory network access and third-party supply once institutions and data systems mature. These tools help Jordan move from a system in which one company carries all the risk to one in which that risk is shared more fairly. They also create clear rules so that more players can safely buy and sell electricity without destabilising the grid. Over time, this makes the energy sector more attractive to investors and less dependent on NEPCO alone. Critically, the EMV Second Implementation Phase Plan flags that no clear technical and financial studies currently evaluate the pathway from the single-buyer model to a more liberalised market, so controlled BRP and wheeling pilots are not ideological market opening; they are the most practical way to generate the evidence base for future reform decisions without destabilising the system.

3.4 Procurement and Pipeline: From Stop-Go to Rules-Based Auctions

Following the 2017 suspension on projects exceeding 1 megawatt (MW), the suspension has been lifted under updated mechanisms.[27] Procurement has restarted with an Expression of Interest for a 200 MW solar PV project.[28] However, the absence of a multi-year, calendarised auction schedule means the energy transition pathway remains unpredictable, rather than vision-driven, which constitutes a partially binding constraint on the scale of the renewables project pipeline.

Germany's Renewable Energy Act (EEG) auction model,[29] with clear volumes, standard documents, and a multi-year timetable, offers a ready template for Jordan to institutionalise

[22] Hashemite Kingdom of Jordan, General Electricity Law No. 10 of 2025.
[23] NEPCO, Financial Statements, 2025.
[24] Federal Republic of Germany, Market Rules for Electricity Balancing-Group Accounting, 2025.
[25] Federal Republic of Germany, Standard Balancing Responsible Party Contracts, 2023.
[26] Federal Republic of Germany, German Energy Industry Act, 2025.
[27] Ministry of Energy and Mineral Resources, Kharabsheh: Re-granting approvals for the installation of renewable energy systems equal to 1 MW or more, 2024.
[28] Ministry of Energy and Mineral Resources, Request for Submission of Expression of Interest under the Direct Proposal Submission Process, 2025.
[29] Federal Republic of Germany, EEG Auction Model, 2025.

regular, competitive auctions adapted to a single-buyer context and supported, where needed, by credit enhancements. Jordan can benefit from these templates by moving from episodic rounds to a published 5-3 year auction calendar with pre-announced annual volumes and technology-specific parameters, alongside transparent ceiling prices that create a reliable framework and keep support costs competitive.

3.5 Energy Efficiency: Enforcement, Data Gaps, and Investability

NEEAP 2026-2024 targets final energy savings of %4.33 by 2026 and %5.44 for electricity. It highlights the need for stronger audits and management systems for large energy users,[30] which are essential for enabling the energy transition. However, enforcement of audits, building codes, and data reporting is inconsistent.[31] The absence of mandatory energy audits for at least large users produces a partially binding constraint. Furthermore, low-cost heat options such as solar water heating (SWH) and clean process heat are also underdeveloped due to weak enforcement of existing mandates, uneven quality infrastructure, and limited finance, creating a partially binding constraint on the uptake of these least-cost efficiency options.

The German energy efficiency obligations,[32] enterprise audit or ISO 50001[33] requirements, and building energy codes[34] offer a ready template to generate actionable data and credible demand for financeable retrofits. Jordan's fit is high, provided mandates are phased and paired with audit subsidies and a green finance facility to absorb the initial compliance cost. Jordan can localise the German approach by turning energy efficiency from an encouraged activity into a mandatory, standardised process. This can be done by requiring large users to comply in phases (starting with the biggest consumers), measuring through standard energy audits or ISO 50001-style management systems, and submitting a short implementation plan that lists priority measures with costs and expected savings. The government can then make compliance affordable by co-funding early audits and establishing an accredited auditor system, while a dedicated green retrofit finance facility (with simple credit support where needed) converts verified plans into loans that companies and building owners can utilise. Finally, consistent inspections and basic penalties for non-compliance, especially in building codes and solar water heating, would improve data quality, strengthen investor confidence, and accelerate least-cost efficiency investments.

3.6 Delivery and Investment Readiness: Making EMV Phase II Implementable and Financeable

EMV Phase II is being run as an execution programme, tracked through defined priorities, liaison officers, and project reporting cards supported by routine monitoring and progress review. The implications of the constraints identified above are straightforward: Jordan's bottlenecks are now delivery ones, reforms succeed only if they become repeatable administrative routines with standard procedures, timelines, transparent outputs that reduce discretion and survive institutional turnover.

[30] Ministry of Energy and Mineral Resources, Third National Energy Efficiency Action Plan, 2024.
[31] Guidehouse, Regulatory Analysis Jordan, 2022.
[32] Federal Republic of Germany, Energy Services Act and Energy Efficiency Measures, 2025.
[33] International Organization for Standardization, ISO 50001 - Energy Management, 2023.
[34] Federal Republic of Germany, Building Energy Act, 2023.

Investment readiness in Jordan is inseparable from EMV's financing logic. The Vision anticipates roughly JD 41 billion in investment, with the majority driven by private investment and Public Private Partnerships (PPPs). In practice, this means the fastest way to unlock capital is to make the biggest investor unknowns priceable: (i) predictable grid, (ii) standardised exposure to upgrade costs, and (iii) rule-based operational risk treatment so investors can model cashflows.

Under a policy transfer lens, the lesson from Germany and the EU is not institutional imitation but functional equivalence. Standardise rules, publish system information, and treat system management actions as governed instruments rather than ad hoc discretion. Germany's regulatory practice makes this concrete. For example, when renewables are curtailed via feed-in management, the plant operator has a claim to compensation, which turns curtailment from political risk into a governed system tool. At the EU level, the same investability logic appears in rules that require prosumer charges to be non-discriminatory and proportionate, and that enable customers with smart meters to request dynamic price contracts, principles that reinforce the move toward cost-reflective charging, ToU, and dynamic pricing as system tools.

Finally, to match EMV Phase II's governance, the Recommendations in Section 4 should be managed as a small delivery portfolio. Accountable owners per reform, quarterly milestones, and a minimal public dashboard focused on what the market needs to trust implementation. Where the EMV Phase II highlights evidence gaps for future market decisions, Jordan should rely on controlled pilots to generate evidence and validate technical and financial pathways before scaling.

4 Recommendations

To enable Jordan's energy transition, the following recommendations address identified regulatory, institutional, and operational gaps that currently limit the development of renewables and energy efficiency. They are organised into three complementary parts. The first section outlines the steps to take first, next, and later. Phase 1 delivers rules and technology flips that unlock growth. Phase 2 stabilises grid operations and energy efficiency. Phase 3 pilots market enablers. The second section introduces KPIs that make delivery measurable and auditable with defined owners and formulas. The final section outlines risk mitigation and enabling measures to implement these recommendations.

4.1 Sequencing Roadmap: What to do First, Next, and Later

Phase 1 (0-6 months): Rules and Technology Changes that Unlock Capacity

1. Resolve Connection Regulation No. 58 of 2024

Amend this regulation to size connections based on published hosting capacity (i.e., the amount of extra generation each feeder can safely accept) on each feeder, rather than relying on past bills, and use inverters to cap exports where necessary. Authorise dynamic export limits where distribution system operators (DSOs) can support them. Create an optional PV-with-storage fast track that allows projects with certified batteries and export limits to exceed the 16 A per phase cap or historical consumption, while still protecting local network reliability.

2. Refine the Network Services Fee to Balance Cost Recovery and Investment Signals

Redesign the network services fee to be cost-reflective and size-sensitive, exempting small prosumers (customers who both consume and produce electricity) and preserving uptake. A temporary neutrality fund can backfill DSO and NEPCO revenue gaps. Transparent cost-of-service studies and stakeholder consultation should back the new fee model. This maintains revenue adequacy while removing a key investment hurdle.

3. Activate ToU Tariffs Across Jordan's Existing Smart Meter Base

Expand the activation of ToU tariffs and scale to other segments over time. ToU will incentivise solar-aligned usage, reduce curtailment, and improve system efficiency without raising tariffs. EMRC and DSOs should configure meters, publish ToU schedules, and monitor activation.

4. Publish a Transparent Auction Calendar and Standardise Procurement

Publish a rolling 3-2 year auction calendar with specific volumes tied to grid capacity, release standard documents, and maintain consistent timelines. Auctions should be backed by PPAs with financeable terms, including curtailment clauses, and credit enhancements where needed. This will help long-term planning and visionary actions.

5. Mandate Transparency Through Public Dashboards and SLAs

Maintain public dashboards that report connection SLAs, hosting capacity maps, curtailment statistics, and auction outcomes. All updates should be standardised and machine-readable.

Phase 2 (6-18 months): Lock in Operations, Auctions, Flexibility, and Efficiency

6. Institutionalise Redispatch with Compensation

Set out in the grid code how and when the system operator can turn plants down or up (redispatch), in what order, and how affected projects will be measured and compensated. Standardise these rules in PPAs. Publish statistics on curtailment and compensation (for example, MWh curtailed and JOD/MWh paid). This keeps the system flexible while making curtailment risk transparent and manageable.

7. Use Controllable Loads to Ease Grid Stress

Launch pilots with large flexible loads, such as water pumps and major cooling loads, on the most stressed feeders. DSOs should be able to briefly reduce demand under predefined conditions, with participating customers compensated, for example, through contractual payments. This is a cost-effective way to address grid bottlenecks and integrate more renewable energy sources, especially in areas where grid reinforcement is still underway.

8. Enforce Energy Efficiency Obligations for Buildings and Large Energy Users

Strengthen inspections of energy efficiency code compliance at occupancy, introduce audit mandates for industrial users, and encourage the adoption of ISO 50001. Enforcement teams must be adequately funded and their activities closely tracked. Energy efficiency audit data should feed into policy and finance design. This turns paper obligations into real and verifiable savings.

9. Expand Finance for Energy Efficiency, Low-cost Heat, and Rooftop Solutions.

Allocate further funds to the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) and link it with commercial banks' credit lines, supported by partial guarantees or blended finance. Offer simple co-financing programmes (for example, a grant plus a bank loan) for rooftop PV, storage, and efficiency retrofits in homes, businesses, and public buildings. Within these programmes, explicitly prioritise low-cost heat options such as SWH and clean process heat, supported by quality assurance schemes and clear rules for combined heat-and-power (CHP) connections and heat sales. This transforms audits and identified opportunities into financeable projects at scale, including the cheapest forms of heat decarbonisation.

Phase 3 (18-36 months): Market Opening Pilots and Broader ToU Expansion

10. Enable Structured Third-Party Supply Through BRP Pilots and Wheeling Templates

EMRC and NEPCO should issue a standard BRP contract and simplified settlement protocols for pilots. Initial projects may be limited to corridors with available capacity, with NEPCO serving as the buyer of last resort during the transition. This builds the basic conditions needed for gradual competition without destabilising the system or overloading institutions.

11. Deepen Dynamic Control and ToU-based Flexibility

Building on Phases 1 and 2, extend remote feed-in management, dynamic export limits, and ToU eligibility to more customer groups as smart meters and IT systems mature. This allows the system operator and DSOs to manage higher shares of renewables through a mix of price signals and technical control, rather than rigid caps.

4.2 KPIs Framework

To align delivery with EMV and make it measurable, the paper proposes a two-tier KPI framework with clear ownership. Tier A tracks delivery KPIs that operationalise the reforms, while Tier B tracks EMV Phase II energy impact indicators (system outcomes). Also, the KPIs track whether today's constraints are being turned into managed, rules-based parameters while investment in renewables and efficiency scales up. Headline indicators cover system and curtailment rates, hosting capacity coverage, ToU activation, the prosumer-fee impact on defined residential and C&I reference cases, PPA financeability share, BRP pilot load, energy efficiency, and finance mobilised, each with clear definitions, formulas, and owners to ensure transparency and accountability. The detailed KPIs table is provided in Appendix 1.

4.3 Risk Mitigation and Enabling Measures

Where Section 4.1 outlined the recommendations roadmap, this subsection highlights cross-cutting design and implementation measures that should accompany those reforms across all three phases, so that they are financially neutral and socially acceptable.

- Keeping NEPCO financially stable: When changing network fees or easing grid caps, build in a mechanism that protects NEPCO from sudden revenue losses.
- Projects Development: Build a calendarised auction programme and ensure standard PPAs include curtailment and settlement clauses. This will lower risk premia and attract a larger pool of bidders.
- ToU activation assurance: Implement a one-cycle shadow billing process before cut-over, publish simple bill examples, and protect vulnerable users.
- Energy efficiency and low-cost heat enablers: Subsidise audits, capitalise a green finance facility with partner banks, train auditors and inspectors, and tie building-code compliance to occupancy permits. Within this, emphasise low-cost heat options to realise them at scale.

5 Conclusion

This paper argues that Jordan's energy transition challenge is now institutional more than technical. Two constraints are clearly binding: the Connection Regulation No. 58 of 2024, which limits the adoption of rooftop and C&I solar, and the network services fee, which adds a recurring cost that lengthens payback periods and discourages new projects. A second group of partially binding constraints shapes the pace and risk profile of the transition, including the single-buyer model, the absence of a calendarised auction schedule, weak enforcement of energy efficiency, and the underdevelopment of low-cost heat solutions.

The evidence shows these frictions can be converted into managed, rules-based parameters. The paper recommends shifting from static caps and consumption ceilings towards rules that actively manage hosting capacity, price signals, curtailment, and offtaker risk. Transparency is important through dashboards covering curtailment, connections, auctions, transmission milestones, ToU, BRP pilots, and energy efficiency delivery. It is supported by a KPI framework that makes delivery measurable and auditable, as well as by cross-cutting measures to ensure the financial stability of NEPCO and DSOs during the implementation of reforms.

Sequenced over three phases, this package first removes the binding constraints, locks in predictable operations and scales investment next, then pilots gradual market opening. Together, these steps convert today's frictions into clear, predictable, and rules-based parameters for investors and consumers. In doing so, the paper advances EMV objectives by delivering more clean electricity, stronger system adequacy, and lower risk premia, while positioning Jordan as a regional benchmark for the rules-based integration of distributed and utility-scale renewables. This approach captures economic value and advances industry competitiveness through lower energy costs for citizens and the C&I sector, as well as from regional power exports. Ultimately, strengthening energy security through greater resilience to geopolitical shocks.

Appendix 1: Detailed KPIs Table

Tier A tracks delivery KPIs that operationalise the reforms in this paper. Tier B aligns with EMV Phase II energy impact indicators.

KPI	What it Verifies	Measurement	Owner(s)
A. Reform Delivery KPIs			
Curtailment rate - system	Effectiveness of redispatch and congestion management (system-level)	Curtailed MWh ÷ (curtailed MWh + delivered MWh) per month/quarter (system)	NEPCO
Curtailment rate - node and feeder	Local congestion management performance and visibility of bottlenecks	Curtailed MWh ÷ (curtailed MWh + delivered MWh) per node/feeder, publish top constrained locations	NEPCO, DSOs
Compensated - curtailment share	Whether curtailment is codified and compensated (bankability)	% of curtailed MWh compensated under published rules (by technology and size segment)	EMRC, NEPCO
Redispatch/curtailment compensation exposure	Transparency of system-management cost and incentives for least-cost dispatch	JOD paid for redispatch and curtailment per month, also JOD/MWh curtailed (system)	NEPCO, EMRC
Hosting-capacity coverage (LV/MV)	Shift from static caps to physics-based access, transparency for investors	% of LV/MV feeders with published hosting capacity maps and standard connection offers (by DSO)	DSOs, NEPCO, EMRC
Cap-substitution share	Replacement of consumption ceilings/16A and % caps by export-limited/dynamic connections	% of new LV/MV renewable energy connections approved via export-limited or dynamic export arrangements	EMRC, DSOs
Feeder export-limit control coverage	DSO capability to operate dynamic export limits and smart-inverter telemetry	% of constrained feeders with remote export-limit control plus verified telemetry and communications	DSOs
Connection lead time (LV/MV)	Process efficiency and predictability for rooftop and C&I projects	Median days from complete application to energisation, publish distribution by step	DSOs
Connection SLA adherence	Delivery against published service-level timelines (administrative discipline)	% of connections meeting each SLA milestone on time (application review, site visit, offer, energisation)	DSOs, EMRC
ToU and dynamic pricing activation (on AMI base)	Price-signal deployment (not just meters installed)	Eligible AMI accounts billed on ToU/dynamic tariff ÷ total eligible AMI accounts (by segment and feeder stress)	DSOs, EMRC

AMI functional readiness (constrained feeders)	Readiness for ToU and controllable-load pilots (data and remote configuration)	% AMI on priority feeders passing interval-data quality, remote-config, and settlement tests	DSOs
Prosumer-fee impact (reference cases)	Effect of network services fee redesign on uptake and bankability (cost-reflective, non-discriminatory)	% change in simple payback for defined residential and C&I reference cases vs current fee schedule	EMRC
Auction calendar adherence	Predictable, rules-based procurement (pipeline credibility)	MW scheduled in published calendar that are tendered and awarded on time (% and dates)	MEMR, EMRC
Project delivery (auctioned PPAs)	Execution and on-time COD, investor confidence in delivery chain	% of awarded MW achieving COD within contractual schedule, report slippage reasons	MEMR, NEPCO
PPA bankability share	Contract standardisation (curtailment, settlement, change-in-law, step-in rights as relevant)	% of new PPAs using the published standard and including codified curtailment and settlement clauses	EMRC, MEMR
Transmission Milestone Index	On-time delivery of grid reinforcements that unlock hosting capacity	MW weighted % of planned 400 kV and 132/33 kV works delivered on schedule (quarterly)	NEPCO
BRP and MaBiS-lite pilot load	Market plumbing progress for wheeling corridors and third-party supply pilots	MWh served under BRP and MaBiS-lite pilots on ring-fenced corridors, number of participants	EMRC, NEPCO
Controllable load participation	Flexibility available to DSOs (demand response) to ease feeder stress	Enrolled flexible load (MW) and number of of verified control events on priority feeders; MWh shifted	DSOs, EMRC
Energy efficiency audit compliance (large users)	Enforcement of energy efficiency obligations and data generation	% of obliged sites completing audits or ISO 50001-style systems (by threshold) and submitting action plans	MEMR, EMRC
Energy efficiency and rooftop and storage finance mobilised	Conversion of audits and demand into funded projects (crowding-in capital)	JOD committed and JOD disbursed via JREEEF-linked and partner-bank lines, number of projects financed	JREEEF, CBJ
Dashboard publication lag	Transparency and delivery discipline (public trust)	Median days from month-end to dashboard update (per KPI category)	EMRC
Dashboard completeness and data quality	Transparency and reliability of reporting	% of KPI fields populated and % passing basic validation rules; flag missing series	EMRC, MEMR

B. EMV Phase II Energy Impact Indicators (Outcome KPIs)			
Total exports from the energy sector (JOD)	Contribution of energy sector to the economy and value creation	Annual value of energy sector exports (e.g., electricity exports and other energy products) per official trade statistics	DOS, MEMR
Value reduction in electricity sector losses (JOD)	Whether reforms reduce system waste and cost	(Losses MWh baseline – Losses MWh current) × bulk supply cost (JOD/MWh), report alongside losses %	EMRC, NEPCO, DSOs
Electricity losses rate (technical and non-technical) (%)	Operational efficiency and theft and collection impact (companion indicator)	(Energy purchased by DSOs − energy billed) ÷ energy purchased (annual)	DSOs, EMRC
Absorptive capacity for electricity generation - conventional (MW)	System ability to integrate additional conventional generation within network and security constraints	MW of additional conventional generation connectable and dispatchable under published NEPCO grid studies and plans (annual)	NEPCO, MEMR
Absorptive capacity for electricity generation - renewables (MW)	System ability to integrate additional renewables (hosting capacity at transmission level)	MW of additional renewable generation connectable and dispatchable under published NEPCO grid studies and plans (annual)	NEPCO, MEMR
Average outage duration	Reliability improvement (service quality)	Total customer interruption minutes ÷ total customers (annual)	DSOs, EMRC; NEPCO (system)
Average cost of electricity generation and bulk supply cost	Cost competitiveness and dispatch efficiency	Total generation or bulk supply cost ÷ total supplied MWh (define series and publish)	NEPCO, MEMR
Energy self-sufficiency (%)	Energy security outcome	Domestic primary energy supply ÷ total primary energy supply (annual)	MEMR, DOS
Local sources share in electricity generation (%)	Shift toward local sources (renewables + domestic gas)	(Renewables + domestic-gas generation) ÷ total generation (annual)	NEPCO, MEMR
Energy intensity	Economy wide efficiency outcome	kg oil equivalent per 1,000 JOD (constant prices) (annual)	DOS, MEMR
CO2 emissions from energy sector	Decarbonisation outcome	tCO2e (energy sector) per year, optional intensity metric (tCO2e/GDP)	MoEnv, MEMR
Industrial clusters covered by gas network	Competitiveness and fuel switching enabler	Number of of industrial clusters connected, optional throughput and new connections per year	MEMR, gas operator

CO2 emissions from energy sector	Decarbonisation outcome	tCO2e (energy sector) per year, optional intensity metric (tCO2e/GDP)	MoEnv, MEMR
Industrial clusters covered by gas network	Competitiveness and fuel switching enabler	Number of of industrial clusters connected, optional throughput and new connections per year	MEMR, gas operator
Jordan rank in Energy Transition Index (ETI)	International benchmarking of transition performance and readiness	WEF ETI rank (annual) and score where available	MEMR, PMO
Jordan score in Regulatory Indicators for Sustainable Energy (RISE)	Regulatory readiness benchmark (renewables and energy efficiency pillars)	World Bank and ESMAP RISE score (latest) and pillar breakdown	EMRC, MEMR
Energy sector investment mobilised (domestic and foreign) (JOD)	Investment climate and pipeline conversion	JOD committed and JOD reaching financial close, split domestic, FDI, PPP (annual)	MOPIC, MEMR

West Asia-North Africa Institute
70 Ahmad Al-Tarawneh St.
P.O. Box: 1438
Amman 11941 - Jordan
info@wana.jo
www.wanainstitute.org

Konrad-Adenauer-Stiftung Jordan Office
23 Isma'eel Haqqi Abdoh St.
P.O. Box: 831025
Amman 11183 - Jordan
Info.Jordan@kas.de
www.kas.de/jordan