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# Policy Paper: Strategic Restructuring and Rebuilding of Syria's Power Sector

Created by Ghiath Bilal, on 30.12.2024, (Updated on April 27, ver. 05)

## Contents



### Overview of Key Changes

| | Revesion | Date | Update summary |
|---|---|---|---|
| | Rev. 00 | 15.03.2025 | First issue |
| | Rev.05 | 27.04.2025 | **Section 1 –** Corrected many figures as a result of the recent development and meetings with the new Energy minister after consolidation the Power, the Oil&Gas, and the water resources ministries under the Energy Ministry.<br><br>**Section 2** – Roadmap for Rebuilding and Restructuring, Revised the entire section to incorporate recent discussions with ministry officials and newly acquired information and insights.<br><br>The Executive Summary has been updated accordingly. |

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## Executive Summary

Syria's electricity sector stands at a critical crossroads, grappling with the compounded effects of prolonged conflict, outdated infrastructure, and chronic fuel shortages. Once boasting a total installed generation capacity of 9,344 MW with 99% national electrification, the system has deteriorated to the point where, as of April 2025, only 1.8 GW remains operational—despite technical availability approaching 4–5 GW. Electricity is supplied for merely 4–6 hours per day in major cities, while many rural areas remain completely disconnected from the grid.

Transmission infrastructure has similarly suffered, with nearly 50% of high-voltage towers damaged or destroyed, and 40% of the transmission and distribution network in need of full rehabilitation. Per capita electricity consumption has fallen to just 15% of pre-war levels. These conditions threaten not only domestic stability but also regional energy security, given Syria's strategic location at the heart of Middle Eastern power flows.

Recognizing the scale and urgency of the challenge, the newly consolidated **Ministry of Energy**—formed through the merger of the Ministries of Power, Oil & Gas, and Water—has initiated a comprehensive roadmap for sector recovery. Under the leadership of Minister Mohamed al-Bashir and Deputy Minister Omar Shaqrouq (Power Affairs), the Ministry has revised the estimated cost of electricity sector recovery to **USD 11 billion**, down from an earlier estimate of USD 40 billion.

To realize Syria's vision of becoming a regional electricity hub due to its unique geographical location, grid stabilization is a critical foundation. A modernized, responsive, and digitally managed network is essential for reliable domestic service, scalable renewable integration, and cross-border power exchange. This policy paper outlines a three-phase roadmap to rebuild, modernize, and future-proof the Syrian power sector:

1. **Phase 1: Foundational Stabilization (3–6 months):** Focuses on urgent repairs to critical infrastructure, restoring electricity access to essential public services, reorganizing the Ministry for operational efficiency, and creating a clear regulatory framework to attract local investment and development.
2. **Phase 2: Grid Assessment and Sector Activation (18 months):** Launches a nationwide technical and financial feasibility study as the cornerstone for smart grid implementation, while undertaking priority grid and plant repairs, enabling pilot renewable projects, reforming electricity pricing, and opening the market to private actors.
3. **Phase 3: Full Modernization and Integration (36 months):** Implements a national SCADA-based Grid Management System, scales up renewable and hybrid systems, introduces advanced metering, and upgrades grid infrastructure to support interconnection with Iraq, Jordan, and Turkey—positioning Syria as a regional electricity transit and trade hub.

The paper also provides actionable recommendations for the Power Ministry, emphasizing stakeholder engagement, international partnerships, and public communication. By adopting a phased approach and fostering collaboration between the public and private sectors, Syria can rebuild a resilient, efficient, and sustainable energy system, laying the groundwork for future economic growth and social development.

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Germany can play a critical role in supporting Syria's energy recovery efforts. Beyond providing technical assistance for overhauling damaged power plants, Germany can aid in restructuring the Ministry of Electricity by advising on governance frameworks, regulatory policies, and investor engagement strategies. Additionally, knowledge-sharing initiatives with leading German utilities, along with specialized training programs for Syrian engineers, can build local capacity and foster long-term sustainability. Appointing a senior German expert to coordinate these efforts and facilitate collaboration with German suppliers and OEMs could provide a much-needed boost to Syria's energy sector revitalization.

## 1. Current Status and Challenges[1]

Syria's electricity sector is at a critical juncture, facing severe challenges due to prolonged conflict, outdated infrastructure, and fuel shortages. Before the conflict, Syria maintained an extensive power grid with a total installed capacity of 9,344 MW, though only 7,200 MW was reliably available due to technical inefficiencies and aged infrastructure. Despite achieving 99% electrification prior to 2011, the system struggled with high transmission losses, averaging 26%, which have since worsened to 32% in 2023. Additionally, the sector was heavily reliant on fossil fuels, with 70% of electricity generated from natural gas, while renewable energy on utility level remained underutilized, contributing less than 1.5% of total generation.

The ongoing conflict has inflicted significant damage on Syria's power infrastructure, with key power plants such as Aleppo, Al-Zara, Maharda, Baniyas, and Tishreen sustaining partial or severe damage. Today, in April 2025, the electricity is available for only 4 – 6 hours per day in major cities, with many rural areas completely cut off from the grid. The available power Generation today is almost 4-5 GW, however only 1.8 GW are in operation due to critical fuel shortages.

Additionally, transmission infrastructure has been devastated, with nearly half of the high-voltage transmission towers either damaged or destroyed, resulting in a dramatic decline in electricity supply—from 41,772 GWh in 2011 to 8,529 GWh in 2016—before partially recovering to 26,755 GWh in 2019. Per capita electricity consumption has dropped to just 15% of pre-war levels, highlighting the extent of the crisis. 40% of the Transmission and distribution network are destroyed. The newly appointed Caretaker Government's Minister of Electricity, Omar Shaqrouq, has estimated the cost of rebuilding the electricity sector at USD 40 billion. The newly appointed Energy Minister, Mr. Mohamed al-Bashir, has revised the previous estimate to USD 11 billion, explaining that the initial calculation included lost opportunities. In early April, the Ministry of Power, the Ministry of Oil and Gas, and the ministry of Water resources were consolidated under the Ministry of Energy. Mr. Mohamed al-Bashir assumed his role as the Minister of Energy, with Mr. Omar Shaqrouq appointed as his Deputy for Power affairs.

[1] Source: The figures and statistic in this section are mainly referred to: "Syria's Electricity Sector After a Decade of War: A Comprehensive Assessment"by Sinan Hatahet and Karam Shaar. Research Project Report Wartime and Post-Conflict in Syria Issue 2021/13 - 30 July 2021 **and** Personal discussions with involved people on sites.

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Despite these daunting challenges, Syria possesses significant potential for recovery, particularly through renewable energy development. Since 2019, 73 renewable energy projects have been approved, though their contribution remains minimal. Accelerating the deployment of solar, wind, and hybrid renewable systems could significantly reduce Syria's dependence on fossil fuels, enhance energy sustainability, and attract local investment. However, unlocking this potential will require comprehensive policy reforms, including opening the sector to private investors and addressing regulatory bottlenecks.

The transmission infrastructure has suffered similarly, with nearly 50% of high-voltage transmission towers either damaged or destroyed. This has significantly reduced electricity supply, which fell from 41,772 GWh in 2011 to a mere 8,529 GWh in 2016, before partially recovering to 26,755 GWh in 2019. Consequently, per capita electricity consumption plummeted to only 15% of 2010 levels, highlighting the dramatic decline in energy availability.

The situation is further compounded by persistent fuel shortages caused by disrupted domestic production and reliance on imports, which are hindered by sanctions and logistical challenges. These factors, combined with geopolitical instability, have severely restricted Syria's access to international financing and advanced technology, further isolating the country's energy market and impeding recovery efforts.

Despite these overwhelming challenges, there are notable opportunities for recovery. Syria possesses significant untapped potential for renewable energy, particularly in solar and wind. Since 2019, a total of 73 renewable energy projects have been approved, although their current contribution remains marginal at less than 1.5% of total electricity generation. Accelerating the deployment of renewable energy could substantially reduce reliance on fossil fuels, enhance environmental sustainability, and attract private sector investment. However, the realization of these opportunities hinges on the implementation of comprehensive policy and governance reforms aimed at improving market efficiency, streamlining investment procedures, and fostering a more stable and transparent regulatory environment.

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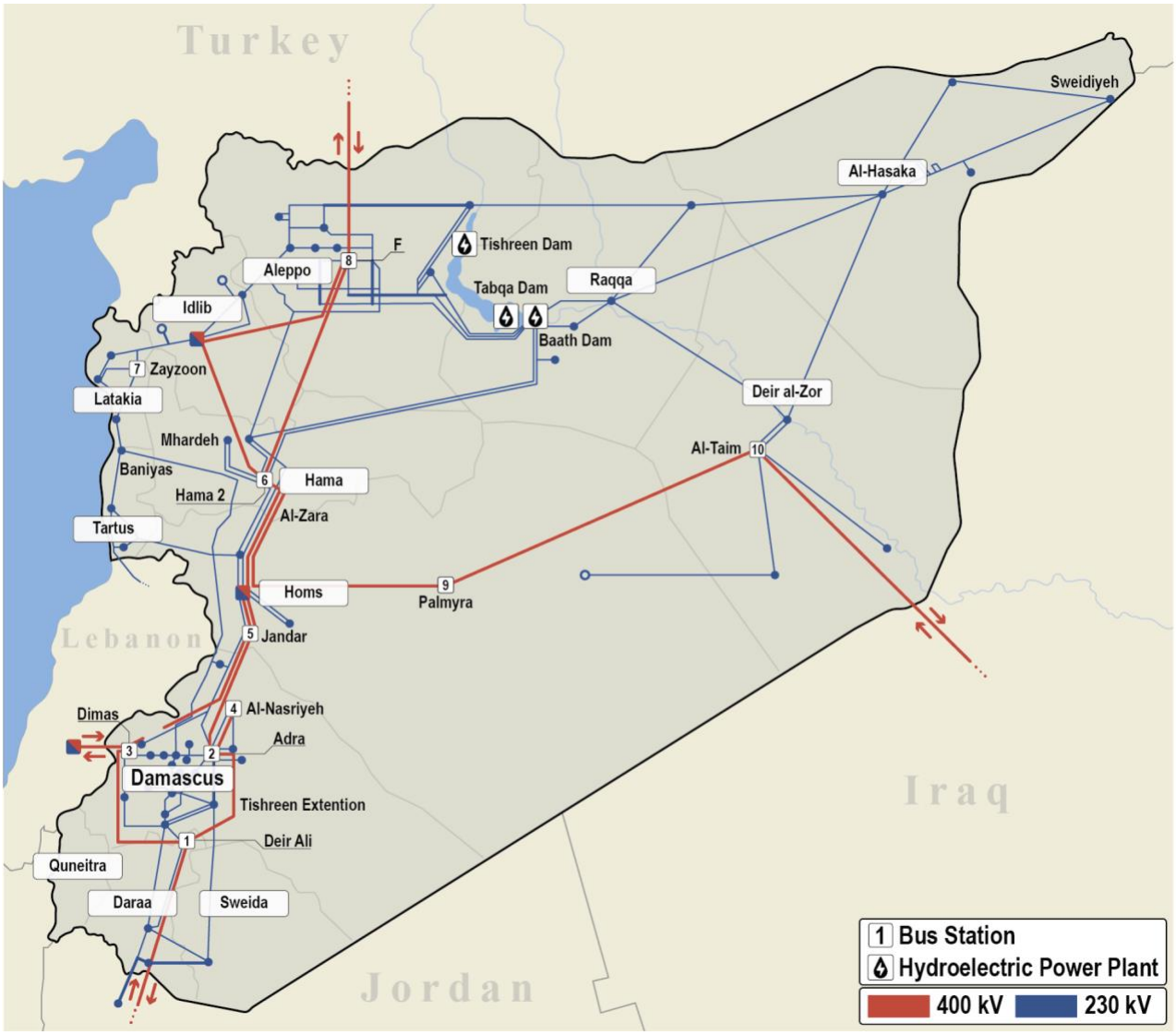

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***Tab 1: Power Plants in Syria***

| Power Plant | Building Date | Nameplate Capacity (MW) | Status | Status on 2025-03-18 at 10:08 AM | Share on 2025-03-18 at 10:08 AM |
|---|---|---|---|---|---|
| Aleppo Thermal Plant | 1997-2002 | 1065 | Unit 1 & 5 operational; Unit 2, 3 & 4 damaged | 184 MW | 10,3 % |
| Al-Zara Thermal Plant | 2001 | 660 | Operational | 190 MW | 10,7% |
| Banias Thermal Plant | 1981 | 680 | Partially operational | 98 MW | 5,5% |
| Deir Ali CCGT Plant | 2010 | 1500 | Partially operational | 862 MW | 48,7% |
| Jandar CCGT Plant | 1997 | 700 | Operational | 305 MW | 17,2% |
| Mehardeh Thermal Plant | 1979 | 630 | Partially operational | 0 MW | 0 MW |
| Swedieh OCGT Plant | 1981 | 150 | Partially operational (under SDF control) | ?? MW | ?? MW |
| Tishrin Power Plant | 1993/1995 | 656 | Operational | 0 MW | 0 MW |
| Zayzoun CCGT Plant | 1997 | 544 | damaged during conflict | 0 MW | 0 MW |
| Tishrin Dam Hydro Plant | 1990 | 630 | Partially operational (under SDF control) | ?? MW | ?? MW |
| Baath Hydro Plant | 1980 | 75 | Not in operation | 0 MW | 0 MW |
| Tabqa (Euphrates) Dam | 1975 | 800 | Not in operation | 0 MW | 0 MW |
| Al Nasseria CCGT Plant | 1993 | 300 | Operational | 133 MW | 7,5% |
| Deir Azzour CCGT Plant | 2010 | 813 | delayed due to conflict | 0 MW | 0 MW |
| **Total** | | | | **1772 MW** | **100 %** |

## 2. A Roadmap for Restructuring the Power Sector

Syria's national electricity grid is in urgent need of stabilization and strategic transformation. Without a centralized **Smart Grid Management System** and full digital control capabilities, the current network lacks the precision and responsiveness needed to balance fluctuating demand, manage load effectively, or integrate renewable energy sources. Stabilizing the grid is therefore the **prerequisite** for any serious recovery or modernization effort in the power sector.

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At the same time, Syria's **geographic position** — at the intersection of Gulf energy producers, the Levant, and Mediterranean access routes — gives it the potential to become a **regional power transit hub**. A modernized grid would not only restore domestic reliability, but also enable strategic **cross-border energy flows**, contributing to regional stability and economic integration. Specifically, grid rehabilitation and modernization will:

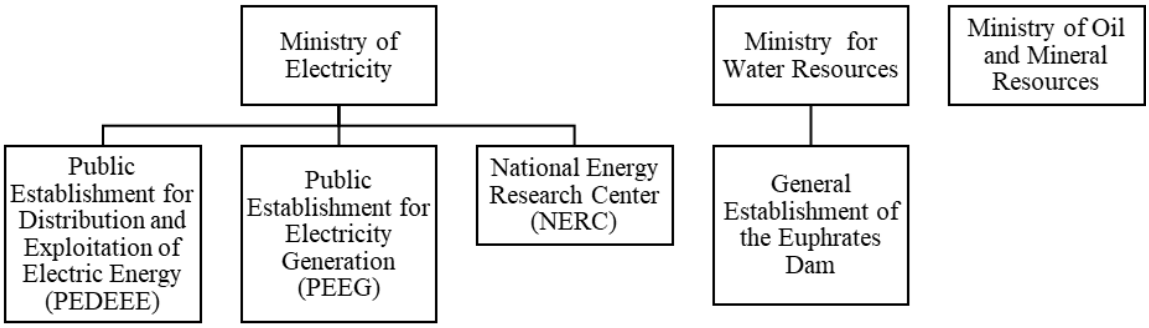
- Enable the **reconnection with Lebanon**, offering relief to its chronic energy crisis
- Support **integration into the Egypt-Jordan electricity corridor**
- Lay the groundwork for future interconnections with **Iraq and Turkey** — the latter part of the **European ENTSO-E grid**.

This vision requires a **phased approach**: beginning with a nationwide feasibility study and structural assessment, followed by the implementation of an advanced grid management system. It must be paired with institutional reforms, human capacity development, and infrastructure investment to fully restore Syria's energy sovereignty.

In doing so, Syria can transform its electricity sector from a source of national vulnerability into a **strategic asset**, supporting economic recovery, attracting private investment, and reestablishing the country's role in the regional energy architecture.

### Phase 1: Foundational Assessment and Stabilization (3–6 Months)

- Prioritize low-cost, high-impact repairs at critical facilities such as Jandar and Tishreen to restore up to 20% of lost capacity.
- Focus on substations and high-voltage lines that serve urban and industrial centers.
- Ensure uninterrupted power supply for essential services such as hospitals, schools, and water treatment plants.
- Redesign the Ministry of Electricity's organizational structure to create lean, high-performing teams.
- Develop a governance framework to ensure operational transparency and policy consistency.
- Simplify permitting processes and establish investor-friendly regulations to encourage private sector participation.




Source: Ministry of Electricity – Syria

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### Phase 2: Medium-Term Stabilization (18 Months)

- Modernize Syria's power infrastructure and implement a nationwide Smart Grid Management System (SGMS) — starting with a comprehensive technical and financial feasibility study, incl. technical condition assessment of 12 power plants, 450 substations, and transmission & distribution assets and developing of a modular execution roadmap
- Execute critical medium-term repairs, such as replacing gas turbine rotors and restoring damaged transmission lines.
- Initiate construction of new power plants to address immediate capacity deficits.
- Deploy 50–100 MW solar farms in regions like Homs and Tartus.
- Conduct detailed resource mapping for solar, wind, and small hydro projects, and develop a phased renewable deployment strategy.
- Gradually adjust electricity tariffs to reflect true costs while protecting vulnerable populations through targeted subsidies.
- Partner with multilateral agencies, such as the UNDP, IEA, KFW to secure funding for infrastructure rehabilitation and capacity building.

#### Challenges in phase 2:

1. **Regulations**: Currently, the government is owning the whole Power supply chain: Power Generation, Power Transmission, and Power distribution. Current policies allow developers to build solar fields up to 5 MW and sell the electricity to the government at a fixed Feed-in-tariff. This regulation needs to be reviewed and modified to open the doors for local investors and developers to invest in solar power generations, Biomass, Geothermal, and Wind Energy increasing the installed capacities and releasing the government from raising needed investments for these installations.
2. **Foreign investments**: Given that Syria remains under international sanctions, the possibilities for attracting foreign investments are severely constrained. As an alternative, the government is likely to rely on local investors and the issuance of bonds to generate funding for reconstruction and development efforts.
   To support this approach, an actionable recommendation is to establish a **stakeholders council** comprising key local players, including developers, investors, and operators. This council would ensure their involvement in any regulatory changes or decision-making processes, fostering collaboration and alignment across the sector.

### Phase 3: Long-Term Modernization (36 Months)

- Procurement and installation of a modern SCADA-based Grid Management System
- Digitalization of substation communication and control functions
- Retrofitting and integration of the National and Regional Coordination Centers (NECC + 5)
- Construct utility-scale solar, wind farms, biomass, and Geothermal to add > 1,000 MW of capacity within the phase 3 and further new capacities in the following years
- Develop hybrid systems and off-grid solutions for rural electrification.
- Implement advanced metering infrastructure (AMI) to reduce non-technical losses and improve revenue collection.

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- Upgrade transmission capacity to integrate new generation sources and improve reliability.
- Strengthen grid interconnections with Iraq, Jordan, and Turkey to enable power imports and exports.

## 3. Actionable Recommendations for the Ministry

- Establish a high-level governmental task force to coordinate reforms, oversee implementation, and engage with donors.
- Establish a stakeholder council to engage local developers, investors, and key players and consider their concerns and interests
- Secure funding and technical assistance from international organizations, prioritizing infrastructure rehabilitation.
- Establish a collaboration form with Academia and international research centers to upskill local resources and help attract new (yet proven) technologies.
- Target strategic partnership and knowledge transfer with industry leading utilities around the world in particular from the region.
- Educate the public on the benefits of reforms and renewable energy through nationwide campaigns.
- Launch pilot hybrid renewable systems in underserved areas to demonstrate feasibility and attract investment.
-

## 4. How Germany Can Support Syria

Germany can play a pivotal role in supporting Syria's power sector reconstruction through both administrative and technical avenues:

### a. Administrative Level Support within the Ministry of Electricity:

1. **Reorganization of Ministry Departments:** Germany can provide expertise to streamline and modernize the Ministry's structure, ensuring better coordination and operational efficiency.
2. **Establishing a Governance Framework:** Support in developing a governance framework that sets clear Key Performance Indicators (KPIs) and ensures accountability and transparency in decision-making.
3. **Policy Development:** Collaborating with Syrian officials to draft policies aimed at attracting both local and foreign investors. This would include regulatory incentives for infrastructure investments and measures to promote renewable energy deployment.
4. **Capacity Building:** Germany can assist in establishing institutional frameworks to empower local authorities and stakeholders through targeted capacity-building programs.

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### b. Technical Level Support:

1. **Overhaul of Damaged Power Plants:** Germany could offer financial assistance to cover required equipment, and specialized manpower for the rehabilitation of key power plants damaged during the conflict.
2. **Experience Exchange and Knowledge Transfer:** Creating a platform for collaboration with leading German utilities such as RWE and Uniper, enabling Syria to benefit from their best practices in operating and maintaining energy assets (Thermal, Renewable, Project development practices, etc.)
3. **Training Programs:** Launching training initiatives for Syrian engineers and technicians in Germany, focusing on areas like renewable energy, power plant maintenance, and grid management. These programs would target professionals interested in returning to Syria to contribute to the energy sector's recovery.

### c. Emergency Measures:

To expedite these efforts, Germany could appoint a senior energy leader to act as an advisor to the Syrian Ministry of Electricity. This expert would:

1. Provide immediate strategic guidance on the administrative and technical aspects mentioned above.
2. Serve as a liaison with German suppliers and Original Equipment Manufacturers (OEMs).
3. Coordinate with the German government and multilateral organizations to mobilize resources for the energy sector's reconstruction.

## 5. Conclusion

Syria's electricity sector faces immense challenges from years of conflict, fuel shortages, and outdated infrastructure. However, this crisis presents a unique opportunity to rebuild a resilient and sustainable energy system. With an estimated USD 40 billion needed for recovery, prioritizing phased stabilization, renewable energy integration, and long-term reforms is essential to reduce dependence on fossil fuels and improve energy security.

Achieving these goals requires bold policy actions, transparent regulations, and strategic partnerships with local and international stakeholders. By fostering investment and enhancing regional energy cooperation, Syria can transform its power sector into a modern, efficient, and market-driven system, laying the groundwork for future economic growth and sustainable development.

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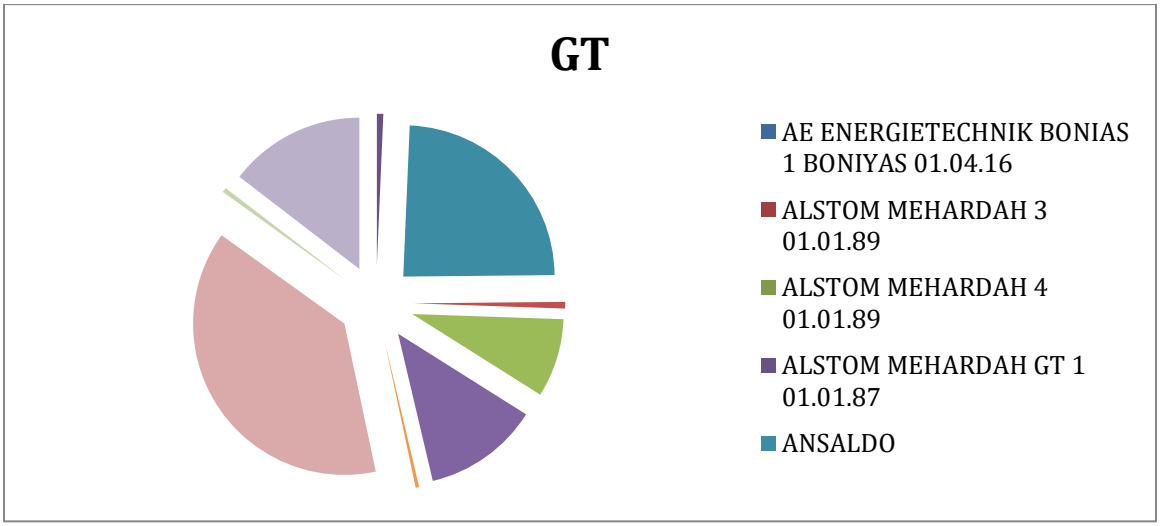
## Annex:

The OEMs for the installed Gas and Steam Turbines in Syria after capacity. **Siemens is the supplier number 1 for Gas and Steam turbines in Syria.**

| The OEMs for the installed Gas and Steam Turbines | | | |
|---|---|---|---|
| **Supplier** | **GT [MW]** | **ST [MW]** | **Sum [MW]** |
| AE ENERGIETECHNIK | | 48 | 48 |
| ALSTOM (ST Siemens) | 29 | 330 | 359 |
| ANSALDO | 1028 | 855 | 1883 |
| BHEL (Siemens Design) | | 400 | 400 |
| CHN HARBIN | | 840 | 840 |
| FIAT | 30 | | 30 |
| GE | 357,4 | | 357,4 |
| MHPS | 526 | 1194 | 1720 |
| POWER MACHINES | | 400 | 400 |
| ROLLS-ROYCE (Siemens Energy) | 15,5 | | 15,5 |
| RUSSIAN MANUFACTURER | | 300 | 300 |
| SIEMENS | 1627,4 | 895,5 | 2522,9 |
| SOLAR | 21,5 | | 21,5 |
| TUGA | 620 | 310 | 930 |
| Total Installed Capacities | 4254,8 | 5572,5 | 9827,3 |



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| Power Plant | Building Date | Nameplate Capacity (MW) | Gas Turbine OEM | ST OEM | Status |
|---|---|---|---|---|---|
| **Aleppo Thermal Plant** | 1997 | 1065 | Fiat | | Total damaged |
| **Al-Zara Thermal Plant** | 2001 | 660 | MHPS | Harbin | Operational |
| **Banias Thermal Plant** | 1981 | 680 | MHPS | Ansaldo & Siemens | Partially damaged |
| **Deir Ali CCGT Plant** | 2010 | 750 | Siemens & Ansaldo | Siemens & Ansaldo | Partially operational |
| **Jandar CCGT Plant** | 1997 | 700 | MHPS & Tuga | | Operational |
| **Mehardeh Thermal Plant** | 1979 | 630 | Siemens | Siemens | Partially Destroyed |
| **Swedieh OCGT Plant** | 1981 | 150 | GE | | Operational |
| **Tishrin Power Plant** | 1993/1995 | 656 | Siemens | Tuga & BHEL | Partially damaged |
| **Zayzoun CCGT Plant** | 1997 | 544 | Siemens | | Total damaged |
| **Al Nasserya** | 1995 | 487 | Siemens | | |
| **Tishrin Dam Hydro Plant** | 1990 | 630 | | | Operational |
| **Baath Hydro Plant** | 1980 | 75 | | | Not in operation |
| **Tabqa (Euphrates) Dam** | 1975 | 800 | | | Not in operation |

"*On 9 December it was announced that a committee of engineers had been formed to "manage [the Aleppo Thermal Plant] and work on returning it to full capacity in the coming days." Since then, Mr. Shaqrouq has held meetings with the UNDP and the International Red Cross Committee and undertaken various field visits to major power plants throughout the country to assess ongoing maintenance and operational improvements. At AI-Rasten the focus has been on completing the new 524 MW power plant; Baniyas as prioritized repairs on their fourth steam turbine unit. At Tishreen, discussions have revolved around boosting the plant's l ,000 MW capacity. The Tishreen plant-comprising three steam, gas, and combined-cycle gas turbines seems mostly capable of operating at its installed capacity, according to the Central Bureau of Statistics. However, actual output remains low due to the lock of fuel. The Baniyas Power Plant, out of service for more than a decade, restarted Operations in December 2023, though only three of four turbines are currently operational. Repairing the fourth would add an additional 170 MW to the grid.*

*Assad's government signed multiple contracts with Iran and Russia to rapier power plant, but funding shortages and equipment challenges led to mixed results. Iranian firms, particularly MAPNA, completed some repairs at the Aleppo Thermal Plant and Banias as, while Russian contracts for power plant projects appear to have never materialized. But reconstruction is only part of the problem; more urgently, fuel shortages risk collapsingthe*

*entire grid. Following the fall of the Assad regime, Syria lost its crude oil supply from Iran, leading the Banias oil refinery-Syria's largest-to cease Operations on 19 December 2024*."[2]

This policy paper was authored by Ghiath Bilal to provide strategic guidance to the Power Ministry in Syria following recent political developments. The paper presents an actionable plan to stabilize, modernize, and transition the Syrian power sector into a sustainable and market-driven system.

Ghiath Bilal is an engineering and business development leader with over two decades of experience at globally renowned organizations, including Siemens, Mitsubishi, Babcock & Wilcox, and Hatch Engineering Consulting. He leads transformative projects in the energy sector.

This policy paper reflects his understanding of the energy landscape and his vision for a resilient and future-ready energy system for Syria.

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[2] Source: Obstacles and Opportunity for Syria's Electricity Sector, The Fourth Issue of "Syria in Figures"January 4th, 2025; Karam Shaar Advisory Ltd.