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# **Reliable and safe electricity to respond to the immediate humanitarian needs in crisis-affected Syrian Communities: Emergency Rehabilitation of Jandar Power Plant Syria**



## **Progress Report**

**26 January 2015 – 31 January 2017**

**United Nations Development Programme Syria**



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<b>Project Title</b>	Reliable and safe electricity to respond to the immediate humanitarian needs in crisis-affected Syrian Communities
<b>Expected Output</b>	Emergency supply and installation of spare parts of the Jandar Power Plant to avoid the risk of eventual plant shutdown in 2015
<b>Report period</b>	From 26 January 2015 to 31 January 2017
<b>Fund Amount</b>	USD 18,250,000
<b>Target country</b>	Syria

## I. Country context

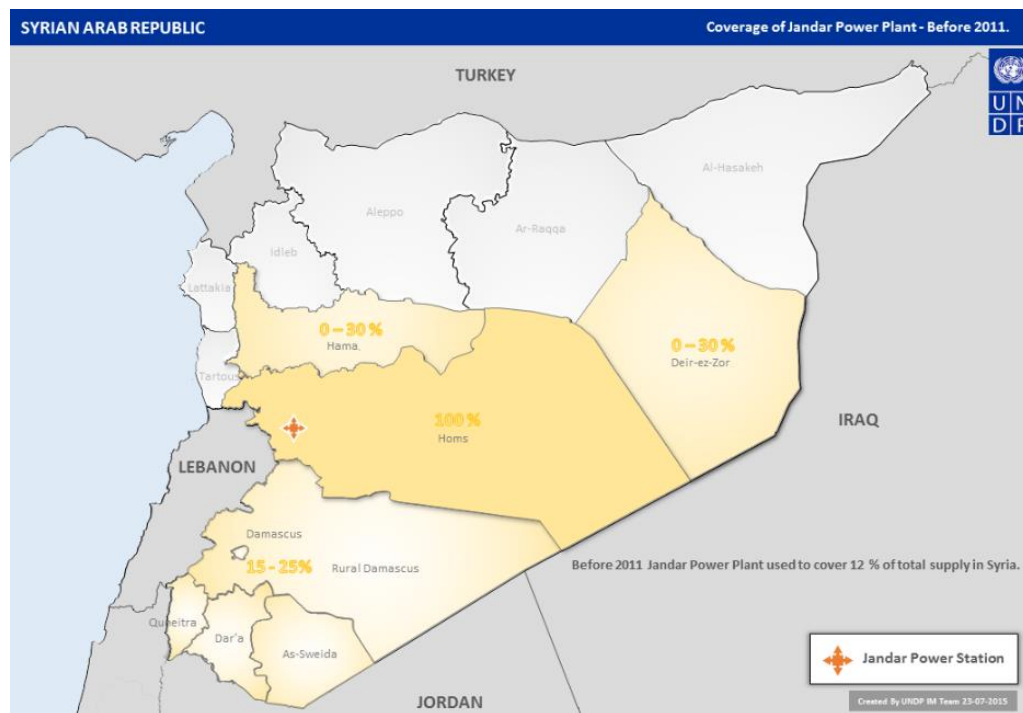
Since March 2011, the country has been witnessing a protracted conflict resulting in heavy human casualties, economic contraction and infrastructure damage. Electricity production and distribution were heavily affected by on-going hostilities (destruction, looting, sabotage, etc.). A number of power plants are suffering serious shortages of spare parts for adequate operations and maintenance to replace those that have already attained their design life or have been damaged during operations. The reliable and sustainable electricity supply is essential to respond to the immediate humanitarian needs of crisis affected communities, namely for the operation of essential humanitarian services such as water supply, hospitals, schools, sewerage treatment plants and other community services. Electricity supply is an essential service for socio-economic recovery that can contribute to facilitate the return of displaced people to their homes.

## II. Description of the project

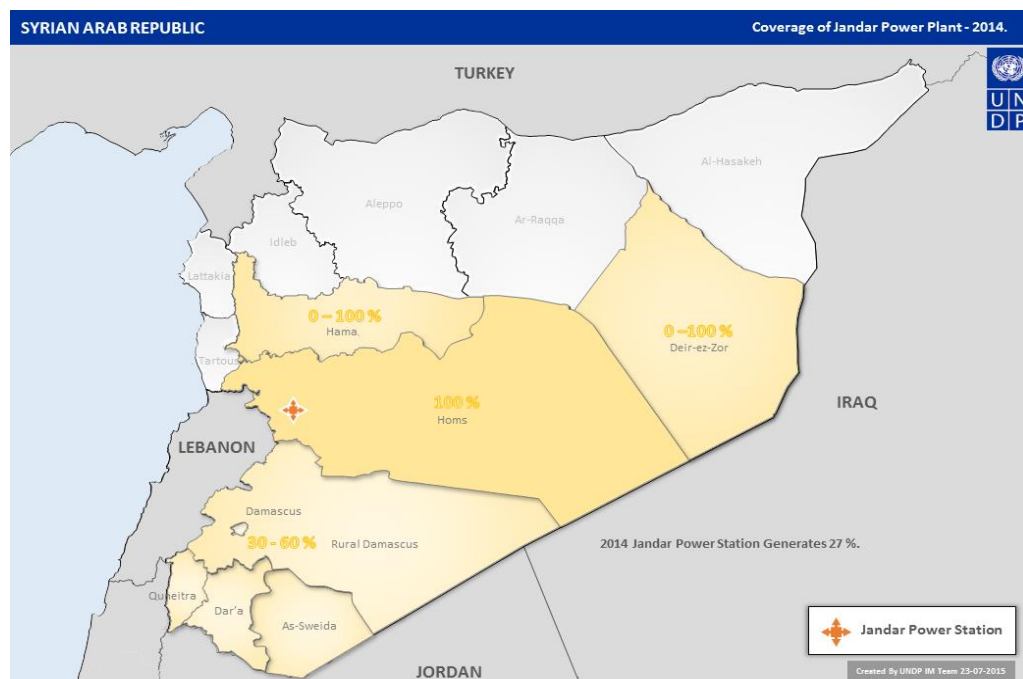
The project “Reliable and safe electricity to respond to the immediate humanitarian needs in crisis-affected Syrian Communities” is supported by the generous contribution of the Government of Japan with the total amount of USD 18,250,000 to ensure reliable and safe electricity to respond to the immediate humanitarian needs in crisis-affected Syrian communities. In addition to the contribution by the Government of Japan, the Japan International Cooperation Agency (JICA) also provided \$ 1,991,520 for the rehabilitation of the Jandar power plant. The project is implemented in cooperation with the Syrian Ministry of Electricity at the technical level.

Jandar power plant (730 MW total capacity) is one of the major power plants in the country, as it contributes to the national grid at full capacity. In 2011, the production of Jandar covered 12 % of the overall demand in Syria (4800 MW). It used to cover the needs of the whole Homs governorate, with a potential to cover up to 30% of Hama and Deir-ez-Zor's demand, as well as 15-25% of the demand in Damascus according to a distribution plan adjusted on a monthly basis depending on needs in these governorates.

In 2014, due to logistic, security and technical constraints (such as lack of spare parts or fuel, etc.) many power stations had to shut down or reduce their output capacity. Subsequently, Jandar is now covering around 25% of electricity generation in the country (2800MW). It now covers all electricity needs in Homs Governorate, in addition to the possibility to cover up to 100% of the demand in Hama and Deir-ez-Zor, and between 30- 60% of Damascus's demand according to a daily distribution plan adjusted based on the need in each governorate and the output capacity of other power plants linked to the national grid.



Coverage of Jandar Power Plant in 2011



Coverage of Jandar Power Plant in 2014



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The efficiency of the plant was dropping, as most of the units were overdue for a major overhaul due to shortage of spare parts. Subsequently, Jandar was in a critical situation which requires urgent maintenance through replacement of essential spare-parts, in order to minimize the high risk of plant shutdown.

In order to support the rehabilitation of the electricity sector, the project to rehabilitate Jandar Power plant was developed to respond to the immediate humanitarian needs of crisis-affected communities by ensuring the supply of reliable and safe electricity needed for the operation of essential humanitarian services such as water supply, hospitals, schools, sewage treatment plants and other community services. The project secures spareparts to enable the power station to operate for the next 4 years. Replacement of prioritized emergency spare parts and maintenance were facilitated through the project, based on a comprehensive study of its technical situation, to improve living conditions and human security in affected areas and ultimately avoiding the risk of the plant shutdown during the near future.

### III. Progress & achievements

Expected Output	Timeframe	Targets	Activities	Progress	Inputs
Damaged electrical and mechanical parts replaced in Jandar power plant to mitigate the risk of shut down due to the lack of essential spare parts.	First quarter of 2015	List of needed mechanical and electrical spare parts agreed	<p>Assessment of Jandar power plant to validate and verify needed equipment and spare parts:</p> <ul style="list-style-type: none"> <li>-Validate, in close liaison with relevant authorities, the list of spare-parts priorities: mechanical, electrical and control system parts) needed for carrying out maintenance.</li> <li>-Prioritize with relevant authorities the top urgent list of spare- parts to be delivered urgently to carry out maintenance of the power plant to ensure continuous and effective power operations.</li> <li>-Validate the human resource capacity of the Jandar power plant to carry out maintenance.</li> </ul>	Completed	<p>-An international technical expert to independently validate the draft rehabilitation plan of Jandar Power Plant, provided independent estimations and justified value for money</p> <p>-national personnel (technical consultant, procurement officer)</p>



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			-Prepare independent estimation of the cost of prioritized spare parts (mechanical, electrical and control system).		
	Second quarter of 2015	Procurement process(es) launched	Launch the procurement process:  -the original Japanese supplier MHPS submitted their offer on 9 June  -UNDP sent their technical and financial evaluation  -The case approved by the headquarter.  - Purchase order was signed with MHPS on 18 August.	Completed  Completed  Completed  Completed	
Damaged electrical and mechanical parts replaced in the Power Plants to mitigate the risk of shut down due to the lack of essential spare parts.	Third quarter of 2015	Delivered a part of top urgent spare parts	-A part of the top urgent list, from European original manufacturer to avoid the risk of the plant shutdown in the near future, was delivered to Jandar plant and installed	Completed	
	The fourth quarter of 2015	Delivered a part of top urgent spare parts and a part of List A	-Delivery of the last part of top urgent spare parts from European original manufacturer to ther avoid the risk of the plant shutdown in the near future (20 December) - Delivery of a part of the list A of spare parts (JICA) on 25 December	Completed	
	The first quarter of 2016	Delivered of the rest of the list A	-Delivery of the rest of the list A of spare parts (JICA) on 5 March	Completed	spare parts (\$ 996,315 )
	The second quarter of 2016	Installation plans implemented to replace	-Monitoring the installation of spare parts by the Jandar power plant engineers and	Completed	Technical expert (Third-party) to ensure functionality of replaced spare



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		damaged parts with proper functionality	ascertaining the functionality of replaced spare parts		parts and backstopping the engineers in Jandar if needed
	The third quarter of 2016		Assessment of additional needs for power plant rehabilitation	Completed	
	End of December 2016			The completion of the project funded by JICA	
Damaged electrical and mechanical parts replaced in the Power Plants to mitigate the risk of shut down due to the lack of essential spare parts	The fourth quarter of 2016		-Delivery of the list B of spare parts funded by JSB on December 2016	Completed	-spare parts (\$14,406,612)
	The second quarter of 2017 (upon approval of a NCE until the end of Dec 2017)	Installation plans implemented to replace damaged parts with proper functionality	-Monitoring the installation of some spare parts by the Jandar power plant engineers and ascertaining the functionality of replaced spare parts	Not started	Technical expert (Third-party) to ensure functionality of replaced spare parts and backstopping the engineers in Jandar if needed
	The fourth quarter of 2017 (upon approval of a NCE until the end of Dec 2017)	Overhaul maintenance plan implemented to replace all spare parts that have already attained their design life or have been damaged	-Monitoring the installation of some spare parts by the Jandar power plant engineers and ascertaining the functionality of replaced spare parts	Not started	Technical expert (Third-party) to ensure functionality of replaced spare parts and backstopping the engineers in Jandar if needed
	End of December 2017			The completion of JSB funding (phase 1)	





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**Spare parts delivery**



**Unit 1 Generator, Gas Turbine, Exhaust Bypass Stack and Boiler**



**Gas Turbine Maintenance**



**Gas Turbine Maintenance**

#### **IV. Project Monitoring**

The project is monitored through maintaining a log which is regularly updated to facilitate tracking and resolution of potential problems or required adjustments. In order to ensure transparency, accountability and effective management for results, progress reports were prepared based on a detailed work plan. Regular feedback by the Project Team and experts, and field visits allow UNDP to keep track of implemented activities against pre-agreed targets and indicators. Furthermore, a technical expert (third-party) was recruited to ensure functionality of replaced spare parts and backstopping the engineers in Jandar. In addition, a joint committee including representatives from UNDP and the Ministry of Electricity was established. The joint committee meet regularly to discuss the progress of the project among other electricity projects, and identify issues and solutions related to implementation of projects.





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## V. The impacts of the project

A disruption to electricity has forced many hospitals to operate on reduced capacity or to close, and the interruption of the power supply to water treatment plant was directly correlated with incidence of many disease, as it has increased the level of discharge of untreated wastewater leading to a tremendous impact on the environment. Furthermore, the power shortage is one of main causes for the economic decline, which has led to many businesses closure. The sustainable power supply is essential to restore and stabilize livelihoods and employment.

UNDP facilitated an emergency spare parts supply to the Jandar power plant aiming at improving living conditions and human security in affected areas and ultimately avoiding the risk of the plant shutdown in 2015, which would be reflected positively on the life of Syrian beneficiaries.

The replacement of urgently needed items avoided a sudden shutdown of the power plant, which could have resulted in a dramatic reduction of power supply to the national grid. The sudden shutdown of power plants would have caused a significant negative impact on the lives of people in Syria. Supplying necessary spare parts to the power plant to avoid its shutdown was a cost-efficient way to respond to the urgent needs of the affected Syrian people. The total number of beneficiaries of Jandar power plant in May 2016 was estimated at 4,500,000 Syrians (25% of 18,000,000, since the contribution of Jandar Power plant in the national grid is 25% of the total power generated).

The efficiency of Jandar power plant was 47% in 1996 when the power plant was installed. However, due to the stopping of many power plants during the crisis, the Jandar power plant needed to increase the production ratio (actual production/capacity). The support from the Government of Japan and JICA contributed to enhance the efficiency of the power plant from 36% to 43%, and it was expected to maintain this percentage in 2016 and 2017.

During the course of the project implementation, an inspection of the generator, which was carried out as part of the Jandar rehabilitation plan and the replacement of spare parts, and based on the manufacturer's request, found that the 'Rotor Cleat' and its 'fitting bolts' were broken and fell out near the generator. Consequently, manufacturer advised the power plant not to operate the generator without restoring the rotor and locate the remaining parts in order to avoid further malfunctions. Jandar power plant has been able to carry out any restoration works without experts' supervision.

The unexpected damaged to the rotor caused a reduction of 130 MW in the actual production of the power plant, and the damage in the rotor reduced the efficiency to 32%. The contribution of Jandar was consequently reduced to 22% of the total power generation. As a result, the total number of beneficiaries of Jandar power plant since June 2016 until now has been 3,960,000 (22% of 18,000,000).

Year	Capacity	Production ratio	Efficiency	Comments
1996 (year of installation)	703 MW	57 %	47 %	
2014	628 MW	72 %	40 %	Due to the damage of some spare parts



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June 2015	538 MW	88 %	36 %	Due to the fact that a number of fans were out of service
After the installation of part of the top urgent list on July 2015	600 MW	90 %	41 %	A number of fans are stable now and resumed functioning
After the installation of the remaining spare parts in November 2015 out of the top urgent list	628 MW	95 % (expected value)	43 %	The capacity will improve by around 4 %
After the installation of list A1 from MHPS (rehabilitaion of GT1 and GT4) on June and July 2016	628 MW (expected value)	95 % (expected value)	43 % (expected value)	In case of not receiving the mentioned spare parts, one or two of the gas turbine could shut down causing a reduction of 130 or 260 MW.
Due to damage in the chamber of the rotor, GT1 is to remain off until the issue is resolved	Current value 490 MW	Current value 72%	Current value 32%	As soon as the rotor is in service again, the capacity, the production and the efficiency will return to their expected values.
After the installation of list B from MHPS at November 2017 (funded by JSB)	628 MW (expected value) If the mentioned rotor gets repaired	95 % (expected value) If the mentioned rotor gets repaired	43 % (expected value) If the mentioned rotor gets repaired	In case of not receiving the mentioned spare parts the second gas turbine will shut down causing a reduction of additional 130 MW

### Effectiveness in making change at the institutional & capacity building level

During the installation of the spare parts that have been delivered to Jandar, a technical expert monitored the installation and ensured the functionality of replaced spare parts and backstopped the engineers in Jandar . UNDP will follow the same prosedure during the installation of all the remaining spare parts. Another expert is recruited to provide overall technical backstopping and policy advice to relevant counterparts, and to ensure better focus for the training and capacity building work within the work plan.

## VI.Lessons learned and way forward

Taking into consideration the urgent need for the equipment and short project life span, UNDP Syria procurement team, with the help of international procurement adviser, carried out the procurement process according to the procurement strategy in shortest period of time possible, ensuring the conformity to contract conditions, and timely procedures process including receiving quotations from MHPS, finalizing the evaluation processes, as well as submitting the direct contracting request for an approval by UNDP's Advisory Committee on Procurement. The



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method established during this project will be adopted as guideline for similar project in the near future. The replication of the actions will be ensured with minimal delays in the upcoming phase.

Know-how has been developed as a result of the work undertaken to establish this project, based on the lessons learned from this project and past projects in similar countries (under sanctions) to ensure smooth and sustainable operation and maintenance for the power plant.

The key lessons of building the effective partnership are summarized as follows:

- 1) Mutual understanding of partners' priorities and close communication among the stakeholders' needs contributed to smoother and more effective implementation.
- 2) Promoting pragmatic links between partners and strengthening their networks played a vital role in providing solutions.
- 3) Encouraging capacity strengthening of national partners to be mainstreamed in all projects.
- 4) Ensuring the existence of appropriate structures, organizations and rules and procedures which can be taken into consideration in all future interventions.

One critical lesson learned through the implementation of the project concerns the mitigation of the impact of exchange rate fluctuation on the project budget (exchange rate loss). Under the project, UNDP issued one purchase order to cover three shipments of spare parts from MHPS in August 2015 when the UN exchange rate was 1 USD=JPY124.33. The first and second shipments of the spare parts from MHPS were completed and these invoices were settled in early 2016. The invoice amount for the third (final) shipment dated 14 October 2016 was JPY 1,743,632,192. The USD amount converted applying the UN exchange rate of the time (1 USD=JPY 101.59) was USD 17,163,423.49, exceeding the original budget (USD14,024,227.39). UNDP decided to cover the deficit with UNDP's internal contingency funds. Learning from this experience, UNDP Syria successfully convinced MHPS to quote prices of the spare parts in US dollars for another Electricity Project for Banias and Al-Zara Power stations. Accordingly, the PO for the subject project was issued in US dollars.

The no-cost extension granted in February 2016 (until March 2017) has allowed UNDP to complete the procurement of all the agreed spare parts for the Power Plant. The final batch of the spare parts has been delivered to the Power Plant in December 2016. However, due to the inevitable need to continue the operation of the Power Plant in order to respond to the high electricity demands in winter and summer, the Plant is not able to conduct an overall maintenance and to install the delivered spare parts until Autumn 2017. Therefore, UNDP Syria is requesting the Government of Japan a no-cost extension of the project until the end of December 2017. This will enable UNDP to complete all the project activities including the monitoring of the installation of all the procured spare parts and ensure their functionality, as agreed in the project document.



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## VII.The financial report (interim)

Description	Total Original Budget (USD)	Expense (USD)	Project Budget Balance (USD)
Personnel	1,182,000	536,056	645,944
Assessment and Validation (technical backstopping)	120,000	10,275	109,725
Spare parts & Supplementary parts and supplies enabling full operationalization of the above spare parts	14,700,000	14,355,907	344,093
Transportation and insurance of spare parts to Power Plants Sites	220,000	30,563	189,437
Spare parts Importing Fees (Japanese consumption tax collected on the first and second shipments. UNDP Syria submitted a request for reimbursement to the Japanese tax authorities.)	-	1,227,504	(1,227,504)
Capacity Development	50,000	4,800	45,200
Travel and logistics (field visits, missions, meetings, logistics/support to operations)	70,000	30,808	39,192
Security	252,500	252,500	0
Communication	30,048	2,053	27,995
Partnerships and Reporting	273,600	273,750	(150)
F&A	1,351,852	1,345,235	6,617
Realized Exchange Rate Gain	-	(4,029)	4,029
<b>Project Total</b>	<b>18,250,000</b>	<b>18,065,421</b>	<b>184,579</b>