Pathways for Improved Response and Coordination: Enhancing Energy Access in Humanitarian Operations in Gaza

Supplement to the 2025 Report: *Restoring Dignity: The Urgent Need for Energy Access in Gaza – Energy Assessment for Gaza: Humanitarian Operations and Household Needs*. Shelter cluster (Palestine), NRC and NORCAP.

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Introduction

Energy access is fundamental to effective humanitarian responses, yet the ongoing crisis in Gaza has revealed significant gaps in both the availability and coordination of energy resources across sectors. Between 1 and 31 December 2024, Gaza received 370,849 litres of fuel - just 17 per cent of the daily minimum requirement of 70,000 litres required to safeguard public health. All deliveries occurred south of Wadi Gaza; no fuel reached the north. Persistent fuel shortages and infrastructure disruptions have severely hindered the ability of humanitarian actors to deliver life-saving assistance, particularly in humanitarian clusters with high energy demands such as water, sanitation and hygiene (WASH), food security, health and logistics. Cluster coordinators agree the energy crisis undermines operations, from safe water supply to the functioning of health facilities and distribution of essential goods.

This supplementary report is intended for humanitarian cluster coordinators and operational agencies in the Gaza response. It examines how energy shortages affect operations and underscores the need for stronger coordination and strategic planning. Based on key informant interviews and secondary data, the analysis outlines on-the-ground challenges and operational realities and identifies practical ways to better integrate energy considerations. It also proposes options for improved collaboration and alternative energy access to support more effective humanitarian operations in Gaza.

Water, sanitation and hygiene (WASH)

According to the WASH cluster, at the time of the assessment more than 84 per cent[1] of Gaza's water infrastructure, used for water production, treatment and distribution, has been damaged or destroyed. This includes all stormwater pumping stations, sewage pumping stations, wastewater treatment plants, water towers and supply connections. One of the three main desalination plants is also out of service, compounding the already severe water scarcity. As a result, key operational services are barely operational: no wastewater treatment plants are functioning, and solid waste management is severely constrained due to inaccessible landfills. The few remaining rely on backup generators, which face fuel shortages and a lack of essential spare parts.

[1] Since the completion of this assessment in December 2024, OCHA has reported that 89 per cent of WASH sector assets in Gaza have been either destroyed or partially damaged, and no wastewater treatment plants remain operational. OCHA (2025) 'Reported impact snapshot | Gaza Strip (11 June 2025)'.

The flash appeal calls for urgent energy solutions, including the import of generators, consumables, and roll-out of solar technologies. Ongoing hostilities and repeated displacements, affecting 90 per cent of the population, have left over one million people with access to less than the minimum 15 litres of water per person per day. Before the escalation, the average was 85 litres per person, sourced from municipal groundwater wells, Israel's Mekorot national water company and small-scale desalination plants. Drinking water was mainly provided through brackish water desalination units, small-scale seawater desalination plants and private tankers. Extensive infrastructure damage has drastically worsened the water crisis.

Below is a non-exhaustive list of key WASH facilities reliant on energy. All currently depend on diesel generators for power, except the South Gaza seawater desalination plant.

Table 1: Critical WASH facilities and energy dependency

Category	WASH Facility	Energy Dependency
Water production, treatment, and distribution	Groundwater wells with pumps utilising diesel-powered generators.	Dependent on diesel-powered generators.
	Brackish treatment plants	Dependent on diesel-powered generators.
	Seawater desalination plants	Insufficient to meet the needs of 66% of the population; some use solar power, though solar panels are often looted or destroyed.
	Municipal desalination plants, large-scale plants, and waste treatment systems (6 plants north of Wadi Gaza).	Likely destroyed and dependent on diesel-powered generators.
	Water trucks and tankers for distribution.	Dependent on diesel-powered generators.
	Water pump stations	Dependent on diesel-powered generators.
Sewage	Wastewater treatment plants	Dependent on diesel-powered generators.
	Sewage pumps	Dependent on diesel-powered generators.
	Desludge trucks	Dependent on diesel-powered generators.

In this challenging context, the WASH sector is grappling with major energy-related obstacles that severely hinder service delivery. The following points summarise the key issues identified in the assessment:

1. **Emergency backup mechanism**: Since October 2023, all WASH systems have been operating on emergency back-up mechanisms, primarily relying

on fuel. These systems were built for grid electricity, not on liquid fuel, making spares and consumables for generators—beyond just fuel—a critical issue.

2. **Energy shortages**: Persistent fuel and electricity shortages are crippling WASH services. Desalination, sewage systems, and water distribution trucks all depend on stable power. With the complete collapse of the grid and restricted private-sector energy contributions, the crisis continues to deepen.
3. **Fuel supply**: Fuel is essential for water pumping yet supplies remain critically low. Israeli restrictions also block solar alternatives by preventing imports of key components like converters and batteries.
4. **Access restrictions**: Israel's ban on importing solar panels, electronic parts, and batteries is creating significant service gaps across wells, reservoirs, pump stations and sewage facilities. Delivery is further hampered by Israeli denials and delays of movement restrictions and looting inside Gaza.
5. **Poor lighting**: Insufficient lighting within public latrines increases the risk of gender-based violence, especially for women.
6. **Generator reliance**: The reliance on generators persists due to inadequate fuel supplies. Diesel and generator parts remain critical for pumping and distributing water.

Given the scale of Gaza's WASH crisis, targeted action is needed. The following recommendations offer short- and medium-term solutions alongside long-term strategies to secure resilient energy access in WASH service:

Table 2: WASH sector recommendations

Timeframe	WASH Specific Recommendations
Short-term	• Improve volume and stability of fuel supply • Increase number of bulk storage points • Improve access to generators • Enhance access and distribution of spare parts and consumables
Medium-term	• Transition WASH facilities from fuel dependency to alternate technologies (e.g., solar) • Reconnect WASH facilities to mains electric supply
Long-term (Nexus)	• Complement reconnection to main electric supply • Understand and pilot longer-term solutions for greener and decentralized power in Gaza • Explore possibilities for sustainable and resilient power solutions

Health

Gaza's health system is facing critical energy shortages which directly threaten the delivery of essential medical services and patient care. These disruptions have severely hindered the healthcare sector's ability to function, particularly regarding the supply and use of energy. To better understand these challenges, a team assessed hospital generators, evaluating their capacity, fuel consumption, and operational lifespan to inform more effective energy planning and strengthen overall system resilience. Drawing on key informant interviews with the Health Cluster Coordinator, the table below summarises the primary energy-related challenges currently facing health facilities in Gaza:

Table 3: Critical energy usage for health facilities

Critical Aspects	Details
Current power situation	- Health facilities, especially hospitals, cut off from power grid - Relying on generators and limited solar energy
Essential equipment requiring energy	- Ventilators - Incubators - Kidney dialysis machines
Critical energy needs	- Cold chain storage for vaccines and temperature-sensitive medications - Fuel for ambulances and storage facilities
Power source preference	- Generators preferred over solar power - Solar installations fragile and vulnerable in conflict areas
Solar power challenges	- Many facilities reverted from solar to generators - Solar panel damage - Import restrictions on solar equipment
Reconnection priorities	- Key hospitals in Gaza's northern, middle, and southern areas identified

Gaza's health sector is facing significant energy challenges that hinder the delivery of critical services. Below is a summary of the key energy-related challenges facing health sector operations:

1. **Reliability concerns:** Solar energy offers a more sustainable alternative to fuel supplies, but concerns remain over generator reliability and the vulnerability of solar installations in conflict zones.
2. **Seasonal variability:** Winter's shorter, cloudier days reduce solar output, adding to energy challenges for health facilities, particularly during the colder months.

3. **Lack of alternative energy sources**: Currently, there are no alternative energy sources such as biomass, wind turbines or biogas being used in the health sector, limiting energy diversification.
4. **Infrastructure and space constraints**: Infrastructure limitations and space constraints hinder the implementation of energy solutions like solar power. This includes difficulties in finding suitable locations for solar installations and maintaining existing energy infrastructure.

Addressing these energy challenges is crucial to sustaining resilient healthcare services in Gaza. Table 4 presents targeted strategies to overcome and strengthen energy security of the health sector:

Table 4: Recommendations for health sector

Category	Recommendations
Plastic burning risks	• Develop guidance on health risks and effects of burning plastic • Suggest improvements such as: Positioning burning outside shelters, improving ventilation and using rocket stoves for more complete combustion and less hazardous smoke during cooking
Generator use	• Distribute electricity from generators to more beneficiaries where possible • Implement multi-socket plugs and extension cords to expand access
Energy infrastructure	Advocate for increased supply of: • Fuel • Generators • Solar systems • Batteries • Electric appliances • Focus on building mini grids off generators

Food security

For Palestinians in Gaza, access to energy is essential not just for movement and electricity, but for food security. The food security cluster relies on consistent energy to store, cook, and distribute food safely. Insights from informant interviews with the sector co-coordinator reveal critical energy dependencies and the operational challenges they face:

Energy use for food security

Energy is essential to food security in Gaza, underpinning the entire food supply chain—from transporting food assistance to preparing meals in bakeries and households. Key uses include:

- **Liquid fuels** for transporting food aid and supplies.
- **Cooking fuels** such as liquefied petroleum gas (LPG), diesel and firewood for bakeries and hot meal preparation.
- **Household cooking fuels**, with energy access closely monitored by the World Food Programme (WFP) market monitor.

Energy challenges and impact on food security

An acute shortage of food, drinking water, and cooking gas is intensifying food insecurity across Gaza, as families exhaust their coping strategies amid worsening conditions:

1. **Disrupted food assistance:** Due to supply shortages, WFP reached only half its targeted families in September, and with reduced rations[2]. By October 2024, food parcel distributions ceased entirely and supplies for hot meal kitchens and bakeries were nearly depleted[3].
2. **Lack of cooking fuels:** The scarcity of cooking fuel has forced actors to distribute only canned foods, as most families cannot cook fresh meals. In northern Gaza, a critical shortage of cooking gas has driven people to burn waste for fuel, creating serious health and environmental risks.
3. **Soaring prices:** Since the start of the conflict, the black market price of cooking gas has surged by 2,612 per cent, diesel by 1,315 per cent, and wood by 250 per cent[4]. In Deir al-Balah, wood prices rose by 325 per cent in October and cooking gas costs 663 per cent are higher than pre-crisis. In Khan Younis, wood prices increased by 300 per cent and diesel by 715 per cent compared to pre-conflict prices.
4. **Unstable supply:** Official LPG distributions are severely limited, with households receiving only 8 kg every 50 days or more—an amount that, before the conflict, would have lasted only 20–30 days.
5. **Changing consumption patterns:** Households have shifted to alternative and often unsafe energy sources as traditional fuels become scarce and unaffordable.

[2] World Food Programme (2024) 'State of Palestine Annual Country Report 2024: Country Strategic Plan 2023–2028'.
[3] World Food Programme (2024) 'WFP Palestine Emergency Response External Situation Report #36, 17 October 2024'.
[4] Anera (2024) 'November 2024 Palestine Situation Report'.

The collapse of Gaza's energy infrastructure has had a cascading effect on food security. The inability to transport, store, and prepare food due to fuel shortages has left the majority of the population dependent on limited, often nutritionally inadequate food aid. The dramatic rise in fuel prices and the shift to unsafe alternatives further undermine household resilience and public health. Without urgent restoration of reliable energy supplies and access to affordable cooking fuels, food insecurity will worsen, and the threat of famine will escalate.

The following are recommendations for the food security cluster for addressing Gaza's cooking fuel and stove crisis:

Table 5: Recommendations to the food security cluster

Recommendation	Action	Details/Partners
Expand the availability of clean and affordable cooking fuels	Quadruple the provision of LPG and other clean fuels	Mitigate severe shortages; prioritise LPG and clean fuel deliveries
	Advocate for the resumption of electricity and imports of firewood	Enable household cooking; support firewood imports
	Coordinate with COGAT, UNOPS and the logistics cluster	Expedite import permits and minimise logistical hurdles for fuel deliveries
	Advocate for the resumption of reliable electric power	Allow more households to cook with electricity
	Import firewood for household cooking	Supplement fuel needs for cooking
Increase access to improved cooking appliances	Distribute LPG stoves and improved wood stoves	Enhance efficiency and safety
	Collaborate with local producers and aid organisations	Support production and distribution of locally produced improved cookstoves
Promote low-cost, locally sourced cookstove designs	Provide training on constructing efficient stoves using local materials	Use clay, bricks, metal cans; see Annex 2 for examples
	Share technical knowledge through community workshops, guides, and digital resources	Build local capacity and awareness
	Encourage innovation by showcasing examples (e.g., rocket stoves from cans, clay-based efficient stoves)	See Annex 2 for practical examples

Logistics cluster

The list below offers insights into the energy use of the food security cluster per key informant interviews with the cluster coordinator.

1. Since 7 October 2023, the conflict in Gaza has resulted in acute shortages of electricity, food, water and fuel, while access to the Gaza Strip remains heavily restricted.
2. To address logistics constraints and support humanitarian operations, the Palestine logistics cluster has adopted a regional operational and coordination approach, with an active presence in Gaza, Jerusalem, Cairo, Al-Arish and Amman.
3. The food security cluster facilitates access to storage and transport, and augments logistics capacity for key relief actors by providing logistics assets and technical expertise, aiming to mitigate bottlenecks, avoid duplication and increase efficiency.
4. Temporary storage capacity includes two shared warehouses in Deir al-Balah (2,045 m^2) in Gaza, a 5,000 square metre warehouse in Amman for cargo consolidation[5] and augmented Egyptian Red Crescent storage in Al-Arish (including temperature-controlled storage)[6].
5. Road transport services are operational within the Gaza Strip, with information management capacity maintained in Jerusalem, Cairo and Amman.

Energy challenges

1. Severely low fuel supplies and the broader energy crisis are disrupting regular services and complicating humanitarian efforts, making operations unpredictable and unreliable for populations in need.
2. Frequent electricity blackouts, mobile network disruptions, and unstable energy supply have significantly hindered communication and the safe coordination and by humanitarian partners to safely deliver aid.
3. Transport capacity in Gaza is limited by fuel shortages, deteriorated road infrastructure and difficulties obtaining spare parts.

[5] World Food Programme (2024) 'WFP Palestine Emergency Response External Situation Report #36, 17 October 2024'.
[6] OCHA (2025) 'Reported impact snapshot | Gaza Strip (11 June 2025)'.

The following are recommendations specific to the Logistics Cluster:

Table 6: Recommendations for the logistics cluster

Recommendation	Action	Details/Implementation
Promote safe, thermally treated wood pallets	Advocate for the use of thermally treated pallets in aid deliveries as a safer interim fuel	Thermally treated pallets do not contain chemicals, reducing hazardous smoke when burned.
	Provide clear usage guidelines for thermally treated pallets	Optimise efficiency and reduce health risks until cleaner fuels and modern stoves are available
Advocate for increased fuel supply and border access	Advocate for additional fuel supply to support transportation of goods and services.	Additional fuel will enable the movement of essential goods, humanitarian aid, and critical services.
	Lobby for the lifting of bans on food trucks and supplies entering from neighbouring countries such as Jordan and Egypt.	Facilitating border access will improve the flow of food and essential supplies, addressing acute shortages and humanitarian needs.

Short term solutions and quick fixes by the clusters

Given the ongoing electricity grid restrictions and severe shortages of fuel and essential energy supplies in Gaza, urgent and practical interventions are essential to meet urgent energy needs. Humanitarian clusters should prioritise the following sector-specific actions while these constraints persist:

Food security

- Facilitate knowledge sharing on constructing rocket stoves using metal cans, with the aim of reducing exposure to hazardous smoke, enhancing fuel efficiency and improving safety.
- Provide guidance on building improved cookstoves made from bricks and clay, promoting safer and more efficient cooking methods.
- Organise practical training workshops covering the various types of improved cookstoves. These sessions should include step-by-step instruction on constructing stoves from cans, clay and bricks, as well as best practices for the safe use of cookstoves made from locally sourced materials (with a focus on clay, bricks and metal cans).

Shelter and NFIs

- Support “heating points”, larger tents that are heated for the most vulnerable
- Emphasise correct stove placement to mitigate fire risk in tightly packed sites.
- Promote messages on efficient use of limited fuel resources, prioritising meal preparation. Caution that in fuel-scarce environments, most resources should go toward cooking rather than heating.
- Support minimal heating solutions where fuel is available. Share guidance on assembling rocket mass heaters from common materials.
- Establish communal power and charging stations.
- Set up multipurpose charging hubs using existing generators or small-scale solar systems, equipped with multi-socket extensions.
- Provide instructions on maintaining low-voltage microgrids or mini-grids where feasible.
- Rocket-Mass Heater stoves can make use of solid heating fuels like wood.
- Promote establishment of heating points for the collective use of the most vulnerable.

Health

- Launch awareness campaigns on fuel safety.
- Increase awareness on the health risks of cooking and heating by burning municipal solid waste, plastics or chemically treated wood.
- Advocate for the safe and continuous passage of fuel and medical supplies to hospitals and clinics.
- Prioritise restoring and maintaining stable power supplies for critical health facilities, including support for generators and solar energy systems.
- Facilitate technical support and spare parts for repairing damaged solar installations in hospitals and clinics.

Logistics

- Advocate for thermally treated wood pallets for humanitarian aid to reduce harmful emissions.
- Advocate for expedited approval and entry of essential household energy items, such as solar panels, cook stoves and cooking fuels.
- Support the safe and unimpeded movement through all available border crossings of humanitarian aid, including food, fuel and medical supplies.
- Promote the use of multi-socket plugs and extension cords in shelters and facilities to expand safe access to electricity.

WASH

- Short term solutions:
  - Improve volume and stability of the fuel supply.
  - Increase the number of bulk storage points.
  - Improve access to generators, spare parts and consumables.
- Medium term solutions:
  - End WASH sector reliance on fuel and transition to alternative technologies (e.g. solar) or reconnection to main electric supply.
  - Nexus / longer term solutions: pilot alternatives that can result in greener and decentralised power solutions for Gaza.

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