Restoring Dignity: The Urgent Need for Energy Access in Gaza

2025 Energy Assessment for Gaza - Humanitarian Operations and Household Needs




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Cover photo: Frank Helbig / Palestine Shelter Cluster
Caption: From upper left to lower right: Solar system amidst a makeshift site. A clay built improved stove for baking bread with municipal solid waste as fuel. Baking bread oven with cook stove. Power distribution with multi-sockets.

Foreword

The findings of this energy assessment report paint a stark picture of life in Gaza. Energy, the invisible engine of modern existence, has become a rare and precious commodity, its absence keenly felt by every family, hospital, and humanitarian organisation struggling to survive in Gaza.

For too long, the people of Gaza have endured cycles of conflict, blockade, and deprivation. But the current crisis represents a new depth of despair, threatening their immediate survival and their long-term prospects for recovery and development. As this report makes clear, the absence of reliable energy is not just an inconvenience; it is a matter of life or death. It undermines essential healthcare, compromises access to clean water, sanitation and clean cooking, disrupts education, and destroys the delivery of humanitarian aid.

Our colleagues in Gaza witness daily the devastating consequences of this energy deficit. We see families forced to cook over open fires, using plastic and debris, risking their health and safety. We see hospitals struggling to keep life-saving equipment running, putting patients' lives at risk. And we see aid agencies struggling to reach those in need, their efforts obstructed by bombardment of critical and key infrastructure, fuel shortages, and power outages.

The complete destruction I have witnessed when visiting Gaza in 2024 is worse than anything I could imagine as a long-time aid worker. Families torn apart, men and boys detained and separated from their loved ones, and families unable to even bury their dead. Some have gone days without food, drinking water is nowhere to be found. It is scene after scene of absolute despair.

This report is a snapshot of the immense needs people in Gaza faced at the end of 2024. No one could have anticipated that the situation would deteriorate even further, but present conditions are beyond what most of us could ever have imagined.

This report is a call to action and a technical guide. It provides an analysis of the energy challenges facing Gaza and offers concrete recommendations for addressing them. But one thing is paramount, we cannot achieve any of these recommendations without the political powers enabling the entry of essential resources. It is imperative that the relevant authorities, the international community, and all stakeholders work together to ensure that the people of Gaza have access to the energy they need to live in dignity, to survive and rebuild their lives. We must act now to alleviate their suffering; it is our collective responsibility to work together to ensure the vital lifeline and energy access is supplied to Gaza.

Jan Egeland
Secretary General, Norwegian Refugee Council

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Abbreviations

ACTED	Agency for Technical Cooperation and Development
COGAT	Coordinator of Government Activities in the Territories
DC	Direct Current
EMAS	Eco-Management and Audit Scheme
ESMAP **GEDCO**	Energy Sector Management Assistance Program Gaza Electricity Distribution Company
GIS	Geographic Information System
GPP	Gaza Power Plant
GPS	Global Positioning System
HV	High Voltage
ICCG	Inter-Cluster Coordination Group
ICS	Improved Cook Stove
IDA	Interim Damage Assessment
kWh	Kilowatt Hour
LPG	Liquefied Petroleum Gas
LV	Low Voltage
MECS	Modern Energy Cooking Services
MTF	Multi-Tier Framework
MV	Medium Voltage
MW	Megawatt
NGO	Non-Government Organization
NRC	Norwegian Refugee Council
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
PENRA	Palestine Energy and Natural Resources Authority
PV	Photovoltaic
SMWG	Site Management Working Group
UNHCR **UNOSAT**	United Nations High Commission for Refugees United Nations Satellite Centre
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
USD	United States Dollar
WASH	Water, Sanitation and Hygiene
WFP	United Nations World Food Programme

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Executive Summary

Gaza faces a critical energy crisis, exacerbated by prolonged conflict and infrastructure damage, leaving 2.1 million Palestinians with severely limited access to power and an average of just four hours of electricity per day. The near-total collapse of Gaza's energy sector has severely disrupted essential services and escalated an already dire humanitarian disaster, demanding urgent, targeted interventions to prevent further loss of life.

This energy assessment highlights the critical role energy plays in the ongoing crisis in Gaza, a situation that is as shocking as it is avoidable. The lack of energy—whether in the form of electricity, cooking fuels, or sufficient generator capacity—is not a consequence of scarcity but a result of persistent and deliberate restrictions. For Palestinians striving to survive under these conditions, the basic energy services required to sustain life could be restored with relative ease, if access were allowed.

This report documents how the deliberate denial of energy access, particularly electricity, and cooking fuel, undermines fundamental human needs - including water, sanitation, healthcare, and food, leaving 70 per cent of Gazan households without reliable clean water access. The Israeli government and international community must confront the moral and ethical implications of policies that deepen an already dire humanitarian crisis.

The Gaza crisis is unlike other displacement settings, driven not by scarcity, but by deliberate and systemic restrictions on the entry and availability of essential resources. Energy technologies and fuels exist and could be deployed rapidly, yet policy barriers prevent their entry. Compiled 450 days into the conflict, this report presents clear evidence, both qualitative and quantitative, of the devastating impact of these restrictions, including potential war crimes.

Assessments such as those by the World Bank provide estimates for reconstruction costs—potentially exceeding $53 billion across all sectors—underscoring the urgent need for coordinated efforts to rebuild lifeline infrastructure. Without reliable energy access, recovery efforts will remain severely constrained.

To cook their meals, most households rely on firewood - purchased or gathered – while others burn wooden pallets originally used for aid deliveries or burn old furniture and municipal waste—including plastic. Alarmingly, the wooden pallets carrying aid is sometimes more sought after than the aid itself, an indicator of the extreme lengths' families must go to meet even their basic needs.

Summary of Recommendations

For Humanitarian Operations:

- Secure critical energy equipment and fuel reserves for humanitarian operations.
- Advocate for unrestricted access to fuels, cooking gas, firewood, and solar technologies to ensure energy reaches those in need.
- Strengthen inter-agency coordination to maintain vital installations and optimise the use of energy resources.
- Expand solar energy systems that operate independently of fuel supplies to enhance resilience.
- Develop localised mini grids integrating generators and solar power to deliver more stable and sustainable energy.

For Households and Affected Populations:

- Expand the availability of clean and affordable cooking fuels by quadrupling the provision of LPG and advocating for reliable electric power. Where necessary, and strictly as an emergency measure, consider the importation of sustainably sourced firewood.
- Increase access to improved cooking appliances by distributing LPG, rocket, and electric stoves in collaboration with local producers.
- Promote low-cost, locally sourced cookstove designs by sharing technical knowledge, providing training, and showcasing efficient stove examples.
- Resume electricity supply by ensuring that all feeder lines are operational.
- Ensure maintenance and repair of existing systems by having trained staff available for the upkeep of generators and solar systems.
- Secure immediate approval and importation of solar lamps, panels, and batteries for household use.

Implementing these recommendations would immediately improve Gaza's humanitarian conditions. Restoring access to electricity and cooking fuels would enable the resumption of essential services, including healthcare, water supply, and food production, thereby directly improving public health and safety. Expanding the use of solar and other renewable energy technologies would reduce reliance on scarce fuel imports, strengthen community resilience, and provide sustainable energy solutions for both the immediate crisis and long-term recovery. However, it must be emphasised that the most critical and urgent step to save lives and enable any sustainable recovery is an immediate ceasefire and a lasting end to the conflict. Without an end to hostilities and the restoration of peace, humanitarian interventions will remain severely constrained, and the suffering of Gaza's population will continue.

1. Introduction

The Gaza Strip is enduring one of the most acute humanitarian and energy crises of our time, driven by prolonged armed conflict and the widespread destruction of critical infrastructure. As Executive Director of NORCAP, I have witnessed firsthand how the collapse of critical systems, especially energy, undermines every aspect of civilian life, from access to water and healthcare to food security and basic safety.

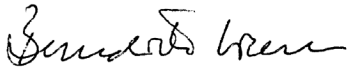
The devastation in Gaza is not only measured in damaged infrastructure, but in the daily hardships faced by Palestinians, most of whom are now displaced. The destruction of electricity networks, the shutdown of Gaza's sole power plant, and the targeting of solar systems have left families without light, heat, or the means to cook. These conditions have forced people into unsafe coping mechanisms and intensified the already dire levels of food insecurity and poverty.

The humanitarian community, including NORCAP and our partners, faces immense challenges delivering aid. Logistical barriers, restrictions on essential supplies, and the destruction of water and health facilities are compounding the crisis. More than half of Gaza's water infrastructure is destroyed, and hospitals are overwhelmed, operating far beyond capacity. Attacks on medical personnel and the loss of specialised health centres have left thousands without life-saving care.

This assessment, conducted by the NORCAP Energy and Environment team in collaboration with Shelter Cluster Palestine, aims to document these urgent challenges and propose actionable solutions. Our goal is to provide evidence-based recommendations that will inform humanitarian response, strengthen advocacy, and help build resilience for Gaza's most vulnerable communities.

While an immediate ceasefire and unrestricted humanitarian access remain the most effective solutions, our mandate compels us to focus on practical interventions that can alleviate suffering in the current context. By sharing the findings of this report, we aim to support coordinated, effective action among humanitarian actors and the international community.

Addressing the energy crisis in Gaza is not merely a technical challenge, it is a matter of dignity, protection, and survival. It is my hope that this report will contribute to a more effective, principled response and, ultimately, to a future where the people of Gaza can rebuild their lives in safety and hope.



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Background

The Gaza Strip is facing a humanitarian and energy crisis, driven by prolonged armed conflict and the widespread destruction of critical infrastructure. At the heart of this crisis is the near-total collapse of Gaza's energy sector, which has profoundly disrupted life for its 2.1 million residents. The Gaza Strip Interim Damage Assessment Summary Note (March 2024[1]), along with reporting by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) and the 2025 Flash Appeal for Humanitarian Aid[2], offers a comprehensive overview of Gaza's escalating energy needs and systemic challenges.

The crisis has been compounded by the destruction of over 510 kilometres of electricity distribution networks and widespread damage to rooftop solar systems. These attacks have plunged Gaza into a near-total blackout[3]. The Gaza Power Plant (GPP) has remained inoperative since October 2023 due to both fuel supply constraints and extensive structural damage. Today, roughly 90 per cent of Gaza's population[4] is displaced, with most families lacking access to electricity for lighting, heating, or preparing food.

Logistical challenges have further obstructed the delivery of vital supplies. Entry points such as Kerem Shalom are congested due to increased volumes of commodities, while restrictions on so-called "dual use" items, including essential energy components, continue to delay humanitarian aid. These obstacles have disrupted essential services like water, healthcare, sanitation, and food production, not to mention fuel[5][6]. OCHA reports that over 57 per cent of water infrastructure has been destroyed, leaving water production to less than 5 per cent of its pre-crisis capacity. The health sector has also suffered a catastrophic breakdown. Approximately two thirds of healthcare facilities have been damaged or destroyed, leaving hospitals overwhelmed and operating far beyond capacity. Attacks on hospitals and medical personnel have further undermined civilian survival. The destruction of specialised centres for cardiac care, dialysis, and oncology has left thousands without access to life-saving treatment[7].

This report highlights the specific energy challenges facing Gaza's households and presents actionable solutions to inform future humanitarian responses. It outlines feasible interventions aimed at informing humanitarian responses, strengthen advocacy efforts, and mitigate the devastating effects of energy deprivation

Methodology

The energy assessment followed a methodology similar to the United Nations High Commissioner for Refugees' (UNHCR) Multi-Sectoral Initial Rapid Needs Assessment[8], as shown in Figure 1, with a specific focus on all aspects of energy use. This approach is designed to enable rapid data collection and analysis in complex emergency settings. It is important to note that the assessment was conducted between

1. OCHA (2024) Gaza Strip Interim Damage Assessment Summary Note.
2. OCHA (2025) Flash Appeal for the Occupied Palestinian Territory 2025 | United Nations Office for the Coordination of Humanitarian Affairs - occupied Palestinian territory.
3. UNOSAT (2024) UNOSAT Gaza Strip Comprehensive Damage Assessment.
4. OCHA (2024) Gaza Strip Interim Damage Assessment Summary Note.
5. OCHA (2025) Gaza Humanitarian Response Update #2: 15 February 2025.
6. Schiffling, S. (2025). Gaza: Seven big issues affecting the delivery of humanitarian aid. The Conversation.
7. Abuelaish I, Musani A (2025). Reviving and rebuilding the health system in Gaza. East Mediterr Health J. 2025;31(2):56–58.
8. UNHCR (2024) Multi-cluster / sector Initial Rapid Needs Assessment (MIRA).

September and December 2024, and that the context has remained highly fluid and rapidly changing up to the publication of this report.

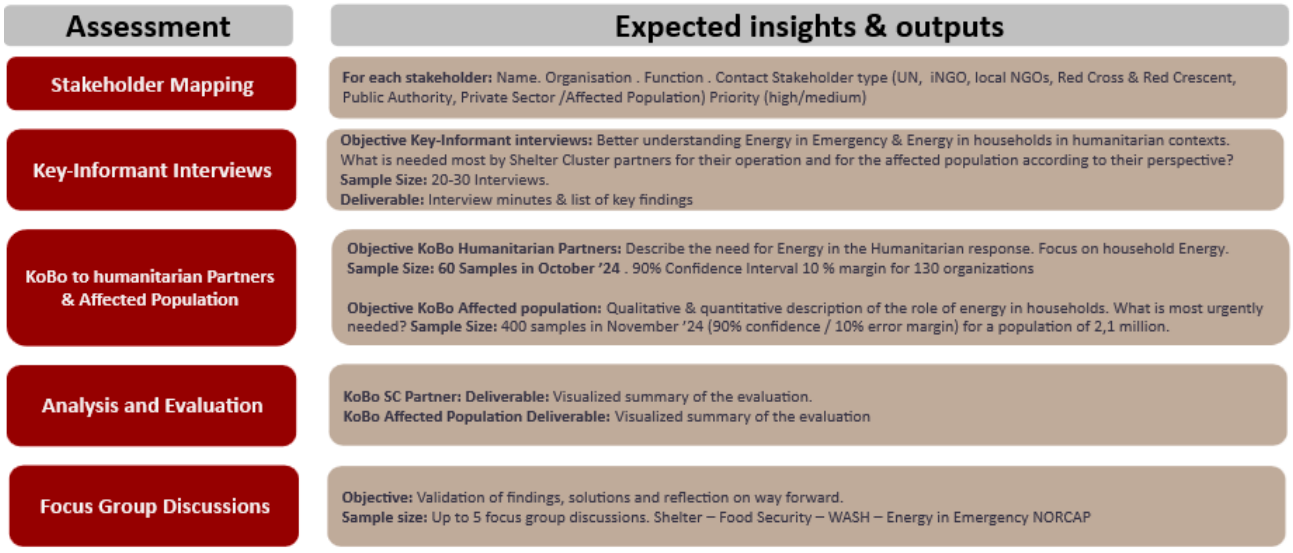

Figure 1: Energy assessment in reference to the multi-sector rapid assessment.

Following stakeholder mapping, the assessment drew on Key Informant Interviews[9] (KIIs) with representatives from local and international non-governmental organisations (NGOs), as well as various shelter cluster partners. A full list of participating organisations can be found in Annex I.

Sampling Framework

The sampling framework was designed to prioritise the inclusion of affected populations alongside humanitarian organisations. The assessment therefore targeted two primary groups, as outlined in Table 1 below:

Humanitarian organisations	Affected population
From the Shelter Cluster Palestine mailing list, which comprised 180 partner organisations, a sample size of 63 was calculated using a margin of error of 10 per cent and a confidence interval of 90 per cent. A total of 57 responses (90 per cent of the target sample) were collected via an online survey, providing robust insights into the activities and challenges faced by humanitarian partners.	Sampling for the affected population was based on the Gaza Sites Master List, provided by the Site Management Working Group (SMWG) on 17 October 2024. This list identified a total population of 2,029,460 individuals across 382,307 households.

Table 1: Sampling framework.

9. These interviews took place during September and October 2024, primarily via MS Teams. Despite significant efforts, access to Gaza was restricted due to challenging procedures, and the energy expert was unable to visit Gaza to validate the data.

The population was segmented into five distinct groups based on anticipated differences in energy needs (Table 2). Sampling[10] was conducted with support from shelter cluster partners[11]. REACH Initiatives supplied global positioning system (GPS) coordinates and assisted in mapping population groups using Geographic Information Systems (GIS). Their support was essential to carrying out the assessment under challenging operational conditions.

Population group	Population group	Details
UNRWA Shelters	Simple Random Sampling[12]	Three households selected from each of 15 collective sites in north Middle, south Middle, and Khan Younis Areas.
Non-UNRWA Shelters	Systematic Random Sampling[13]	Households chosen within accessible schools or shelters not managed by the United Nations Relief and Works Agency for Palestine (UNRWA).
Makeshift Sites South of Wadi Gaza	Random GPS Points	39 enumeration areas identified via satellite imagery; 12 GPS points per area; 3 closest households to each point interviewed.
Scattered Sites	Random GPS Sample Points	Small groupings of less than 10 households; 25 random GPS sample points provided to enumerators.
Urban Areas and Damaged Buildings	Targeted GPS Reference Points	Households in damaged buildings; 25 GPS reference points for targeted data collection.

Table 2: Population segmentation and sampling sethods for energy needs assessment.

Table 3 summarises the population distribution, estimated number of households, target and achieved sample sizes, and the percentage of target samples reached across the different types of shelter sites included in the study.

10. Sample sizes for each group were calculated with a confidence interval of 90 per cent and a margin of error of 10 per cent.
11. The sampling was carried out with the support of the Shelter Cluster partners. The following organisations provided crucial support to the assessment by facilitating the provision of enumerators and key informants: UNRWA, Agency for Technical Cooperation and Development (ACTED), Beit Lahia Development Association (BLDA) – a local organisation based in Gaza and Cooperative for Assistance and Relief Everywhere (CARE).
12. Each household has an equal chance of being selected from the population.
13. Households are selected at regular intervals from an ordered list, starting at a random point.

Population	Est. number of households	Target sample size	Achieved sample size	Percentage
UNRWA Collective site	51.511	96	76	79 per cent
Non-UNRWA Collective site	24.624	96	60	62 per cent
Makeshift	300.271	97	155	160 per cent
Damaged buildings	Unclear	50	50	100 per cent
Scattered Sites	5.302	95	74	77 per cent

Table 3: Gaza population subsets, number of households, target and achieved sample sizes.

Additionally, Figure 2 displays a heat map of the energy assessment among affected populations. This visual tool is key for understanding the geographic spread of energy needs, identifying priority areas for intervention, and supporting a representative approach to data collection and analysis.

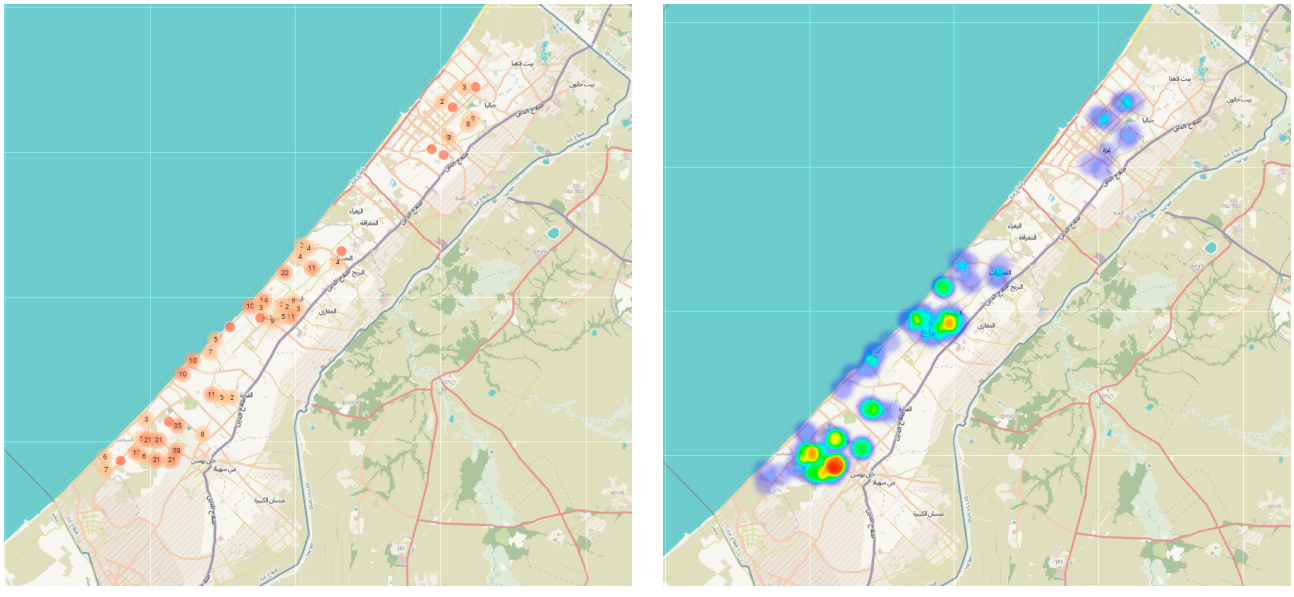

Figure 2: Heat map of the energy assessment amongst the affected population.

Focus Group Discussions

Following the survey data analysis, focus group discussions were held to present and validate preliminary findings. These sessions engaged key coordination bodies, including the Shelter, Food Security and WASH Clusters, as well as the National Inter-Cluster Coordination Group (ICCG). Participants reviewed the initial results, shared critical insights, and identified potential gaps. Their feedback was documented and integrated into the key findings to ensure the assessment accurately reflected on-the-ground realities and operational priorities identified by cluster partners and coordination mechanisms.

Assessment Limitations and Assumptions

- Due to access restrictions, direct entry into Gaza was not possible. As a result, data collection relied primarily on first hand inputs from local enumerators inside Gaza, rather than the project lead. The sampling techniques and established frameworks are considered to have yielded a reasonably accurate representation of conditions on the ground.
- Sampling methods were adapted to account for the ongoing siege and active hostilities, with adjustments made to prioritise enumerator safety and accessibility. A 10 per cent margin of error was factored in to reflect these constraints.
- Some households were unwilling to share information due to widespread disappointment, despair, and fatigue, a phenomenon known as 'assessment fatigue', which limited the ability to gather comprehensive data and fully capture the severity of conditions.
- Enumerators encountered significant operational challenges due to the volatile security environment, including ongoing shelling and movement restrictions. They often had to use their discretion to identify safe areas for data collection, which at times led to shorter interviews and limited the depth of information gathered.

Access to North Gaza and Rafah was considered too dangerous and insecure for direct assessment. As a result, it is assumed, based on secondary data, that household energy use for cooking and electricity in these areas does not differ significantly from that observed in other sampled governorates. This limitation has been accounted for in the final analysis and interpretation of results.

2. Gaza's Energy Infrastructure in Crisis

Gaza's current energy landscape is defined by severe challenges in electricity supply, persistent fuel shortages, and limited access to renewable energy solutions. Damaged infrastructure has critically affected daily life, disrupted humanitarian operations, and undermined essential services such as hospitals and water treatment plants. Secondary data highlights the far-reaching impacts of these constraints, revealing the urgent need for sustainable and resilient energy solutions in Gaza.

Supply and Demand: Gaza's Energy Gap

The Gaza Strip is facing an unprecedented energy crisis characterised by severe electricity and fuel shortages and limited renewable energy installations due the conflict. Damage to critical energy infrastructure, including the GPP and electricity feeder lines, has left nearly all of Gaza's 2.1 million residents without reliable access to power and energy resources.[14]

14. European Union, World Bank & United Nations (2025) Gaza and West Bank Interim Rapid Damage and Needs Assessment.

Before October 2023, Gaza's power supply was poor, relying on external sources for less than ten hours of electricity per day. Following the damage to the power plant and feeder lines in October 2023, no functional grid electricity exists in Gaza. Solar power, once emerging as an alternative, has been severely affected, with over 80 per cent of residential and commercial solar PV systems destroyed[15]. Currently, energy sources are limited to partially operational diesel generators, unreliable due to fuel shortages, and small-scale solar systems, mainly serving households and humanitarian organisations[16]. These constraints have led to acute disruptions in humanitarian efforts and daily life.

Fuel Shortages and Energy Demand

Fuel shortages constitute one of Gaza's most pressing challenges, with an estimated 120,000-150,000 litres of diesel required daily to power hospitals, water treatment plants, and emergency services[17]. The overall energy demand is substantial, with normal needs estimated at around 400–600 megawatts to provide 24-hour supply for all residents[18]. Most energy consumption is concentrated in the service and household sectors, which account for about 75 per cent of total demand[19]. Despite these needs, critical facilities struggle to remain operational as fuel imports are severely restricted and prices continue to rise, leaving many families without safe cooking fuel or heating[20].

Recent efforts have seen the delivery of millions of litres of fuel for humanitarian purposes, but these supplies are still insufficient to meet the ongoing high demand[21]. The persistent gap between supply and demand has led to frequent power outages, with blackouts lasting up to 18–20 hours per day in some periods[22].

Impact of Energy Shortages on Essential Services

The energy crisis in Gaza profoundly affects nearly every aspect of daily life, where energy is indispensable for lighting, cooking, heating[23], and communication. Limited access to safe cooking fuel and adequate heating forces many families to resort to cooking over open fires or using makeshift stoves, leading to elevated health risks due to indoor air pollution and potential burns. Heating, traditionally provided by gas or electricity, now primarily depends on scavenged firewood, which offers insufficient warmth during the cold winter months[24].

Critical services, such as healthcare, water and sanitation, education, and humanitarian aid delivery, are severely disrupted due to stringent fuel import restrictions and soaring fuel prices. These challenges are compounded by the deterioration of existing infrastructure that requires consistent energy supply to function optimally.

15. UNOSAT (2024) Gaza Damage Assessment.
16. UNOSAT (2024) Gaza Damage Assessment.
17. UN OCHA (2024) Gaza Response update 13-26 October 2024.
18. World Bank (2024) Gaza Interim Damage Assessment.
19. GEDCO (2025) Homepage. Gaza Electricity Distribution Company.
20. World Bank (2024) Gaza Interim Damage Assessment.
GEDCO (2025) Homepage. Gaza Electricity Distribution Company.
21. UN OCHA (2024) Gaza response update 13-26 October 2024.
22. UNRWA (2024) Flash Update Gaza External Situation Report 95.
23. World Bank (2024) Gaza Interim Damage Assessment.
GEDCO (2025) Homepage. Gaza Electricity Distribution Company.
24. UN OCHA (2024) Gaza response update 13-26 October 2024.

The few remaining healthcare facilities face dire conditions. Hospitals are rationing power, closing departments, and struggling to maintain life-support equipment. Vital equipment, including ventilators, incubators, and dialysis machines, frequently shut down, jeopardising patients care[25]. The need to store refrigerated vaccines and medications at safe temperatures adds additional strain, while the capacity to conduct emergency surgeries is significantly reduced. Access to maternal healthcare is also compromised, with reduced capacity for emergency obstetric interventions.

Water treatment plants and desalination facilities, essential for providing potable water, are struggling to remain operational, resulting in a severe shortage of clean drinking water. The near-complete cessation of sewage treatment due to power outages has led to the spread of waterborne diseases, significantly increasing public health risks[26]. Educational institutions, many of which have been repurposed as shelters for displaced families, are affected by the lack of lighting and heating, making them unsuitable learning environments. According to UNICEF, thousands of children are denied access to education, as the energy crisis disrupts essential educational activities, including online learning initiatives meant to offset the impact of school closures[27].

Fuel shortages have severely restricted the transport of essential supplies, including food, medical provisions, and emergency relief, hindering the delivery of humanitarian aid. Combined with disruptions to communication networks, these challenges impede the ability of aid agencies to coordinate and distribute resources effectively, compromising the timeliness and reach of humanitarian assistance[28].

The Human Cost of Blackouts

Energy consumption patterns have been dramatically altered due to the destruction of Gaza's grid infrastructure. Prior to the conflict, the average household consumed 200-300 kWh per month for lighting, cooking, and running appliances according to the Palestinian Central Bureau of Statistics in 2023[29]. Since then, consumption has dropped to less than 50 kWh per month, reflecting widespread dependence on limited, intermittent, and often unreliable alternative energy sources such as small solar home systems, car batteries, and shared generators, insufficient to meet even the most basic household needs[30].

For households, priorities now centre on essential needs such as mobile phone charging for communication, basic lighting to navigate darkness, and powering water pumps to access scarce water supplies. Solar-powered LED lights, battery packs, and small generators have become the primary, although inadequate, sources of electricity for most families.

The ongoing power crisis and security risks have forced the closure of most factories and businesses[31], triggering widespread economic disruption and unemployment[32]. Essential services, such as bakeries producing staple

25. WHO (2023). Gaza Emergency Reports
26. WASH Cluster Palestine (2023). Not enough water to Survive: Urgent appeal from WASH actors in the occupied Palestinian territory, WASH Cluster Palestine.
27. UNICEF (2024) State of Palestine Humanitarian SitRep No. 34 - 31 December 2024.
28. NRC (2024) Gaza crisis response plan 2024.
29. UN OCHA (2024) Gaza response update 13-26 October 2024.
30. PCBS (2024) Palestinian Central Bureau of Statistics) Homepage.
31. UNDP (2024) Impact of the Gaza War on Private Sector and Pathways for Recovery.
32. ILO (2024) 'Palestinian unemployment rate set to soar to 57 per cent during first quarter of 2024', International Labour Organization,.

foods and water purification plants addressing water scarcity, rely heavily on generators[33]. However, persistent fuel shortages have severely disrupted even these critical operations, causing frequent shutdowns and limiting their ability to meet the population's basic needs[34].

Medical facilities are the largest energy consumers and have been forced to downsize operations or shut down entirely, keeping only essential life-saving equipment running as fuel availability permits[35]. On the humanitarian side, small solar systems are being deployed by aid agencies, but these are not enough. Transportation and food distribution are given priority in relief operation and whatever fuel is available is used where possible[36].

33. UN OCHA (2024) 'Humanitarian Situation Update #243 | Gaza Strip', 6 October.
34. UN (2024) 'Fuel Crisis in Gaza: A Barrier to Essential Humanitarian Operations', Highlights of the Noon Briefing, 25 July. United Nations.
35. ReliefWeb (2024) 'Statement from Medical Aid for Palestinians (MAP) on Israel's decision to cut electricity supplies to Gaza', ReliefWeb.
36. WHO (n.d.) Emergency Situation Reports.
WHO (2024) occupied Palestinian territory Emergency Situation Report 57.

3. Energy Challenges for Humanitarian Operations

Humanitarian organisations operating in Gaza rely on a range of energy sources, including liquid fuels, solid fuels, and electricity, to sustain critical operations. A survey conducted in October 2024 with 57 humanitarian actors provided insights into the energy challenges they face. These findings complemented by additional reports, such as those by the Norwegian Refugee Council (NRC), highlight severe constraints and limited humanitarian access in Gaza. The following sections present key findings from the assessment and offer a deeper understanding of the operational realities shaping humanitarian energy use.

Fuel-Dependent Activities in Humanitarian Aid

The energy landscape of humanitarian operations is complex and multifaceted, with various activities heavily reliant on fuel. The survey of 57 humanitarian organisations identified four main categories of fuel-dependent activities, offering crucial insights into energy consumption patterns across the sector, as detailed in Table 4 below.

Category	Percentage	Description	Significance
Power Supply	37 per cent	Generating electricity, running generators, producing power for operations	More than a third of reported fuel use; essential for buildings, camps, field hospitals, equipment
Staff Mobility	25 per cent	Movement of personnel between worksites, field missions, administrative centres	A quarter of responses; crucial for safe and efficient staff mobility
Transportation of Goods and Aid	23 per cent	Movement of supplies, humanitarian aid, essential goods	Nearly a quarter of fuel use; vital for maintaining supply chains and delivering critical resources
Infrastructure Services	15 per cent	Maintenance and functioning of infrastructure, construction machinery, essential services, communication structures	Smaller proportion but crucial for broader organisational functions

Table 4: Fuel-dependent activities across sectors in Gaza.

The survey results reveal a clear hierarchy of fuel-dependent activities in humanitarian operations. Power supply dominates, accounting for over a third of fuel use, underscoring the critical need for reliable electricity across all aspects of humanitarian work. Mobility, including the transport of staff and goods, represents nearly half of total fuel consumption, highlighting the sector's heavy reliance on transportation for effective aid delivery. Infrastructure services, while consuming the least fuel, remain vital for operational continuity, covering construction, essential maintenance, and communication.

This distribution emphasises that energy security and efficient logistics are cornerstone requirements for humanitarian operations. The findings suggest that strategies to enhance energy efficiency, particularly in power generation and transportation, could significantly improve operational resilience and effectiveness. Moreover, the data points to potential areas where alternative or renewable energy sources could be integrated to reduce dependency on traditional fuels, potentially leading to more sustainable and cost-effective humanitarian operations. In summary, the categorisation shows a clear distribution of fuel-dependent activities, with a strong emphasis on generating power and enabling both the transportation of supplies and the movement of staff, while underlining the crucial supporting role of infrastructure services.

Sources of Electricity in Emergency Settings

Electricity is a critical component of humanitarian operations, supporting essential services such as healthcare, water supply, and communication systems. This section presents key insights and trends related to electricity sources in Gaza, revealing a complex and limited energy landscape shaped by a mix of traditional and renewable solutions. These patterns reflect both the challenges and adaptations required in a hostile, war-zone environment.

Figure 3 illustrates the distribution of electricity sources, providing a visual overview of the interplay between fossil fuel-based and renewable energy solutions, as identified in the assessment.

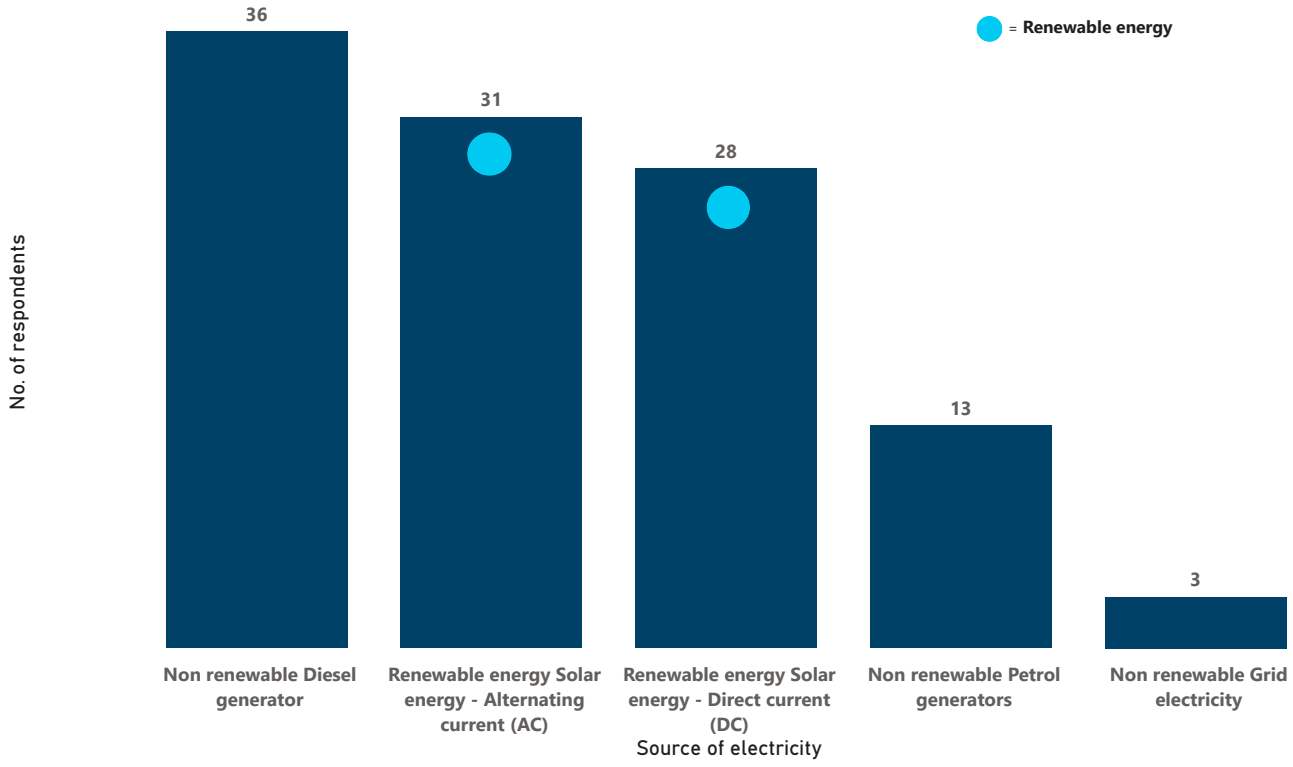

Figure 3: Sources of electricity for the humanitarian organisations.

The assessment highlights a persistent reliance on fossil fuel generators, particularly diesel, as the primary source of electricity for humanitarian operations, indicating the critical need for reliable and deployable power sources. This dependence stems from the lack of a reliable power grid in Gaza and the operational flexibility that diesel generators offer. The data reflects this trend, with 36 respondents mentioning diesel generators and 13 referencing petrol generators. Despite their environmental impact and high operational costs, these systems remain essential for sustaining humanitarian activities.

In contrast, the adoption of solar energy systems signals a significant shift towards more sustainable and self-sufficient power solutions. Solar energy was frequently cited, with a total of 58 references: 31 for alternating current (AC) systems and 28 for direct current (DC) systems. The nearly equal split between AC and DC solar systems suggests that organisations are tailoring their energy solutions to specific operational requirements, available technology, and local conditions. This trend reflects a gradual move towards renewable energy technologies that offer flexibility and sustainability.

In summary, the data highlights a dual approach to electricity generation in Gaza's emergency context: continued reliance on traditional fossil fuel generators for immediate needs, alongside a growing adoption of solar energy systems for long-term sustainability. This balance reflects both the operational constraints in hostile environments and the growing recognition of renewable energy's potential to enhance the resilience and effectiveness of humanitarian operations.

Challenges in Addressing Energy Needs for Humanitarian Aid

Humanitarian organisation respondents were asked to identify the most significant energy-related challenges impacting their work and, by extension, the support they provide Palestinians in need.

The survey revealed five primary energy-related challenges impacting humanitarian work:

- Fuel shortages (86 per cent): The most prevalent issue, highlighting the critical vulnerability of humanitarian operations to fuel supply disruptions. Without secure and consistent access to fuel, generators fail, logistical operations slow, and essential services are interrupted.
- Unreliable electricity (72 per cent): Frequent power cuts, unstable supply systems, and a lack of dependable backup options can disrupt critical functions, limit communications, and strain field teams.
- High fuel costs (63 per cent): Tight budgets and high procurement expenses limit the scope of humanitarian operations and complicate energy planning.
- Security concerns (58 per cent): Security risks further compound challenges, reflecting the dangers of transporting and protecting energy resources in fragile or volatile environments.
- Limited local suppliers (56 per cent): In remote areas with few reliable vendors, organisations often face delays, inflated prices, and uncertain delivery times.

These top five challenges, illustrated in Figure 4, reveal the daily operational hurdles that humanitarian workers must navigate.

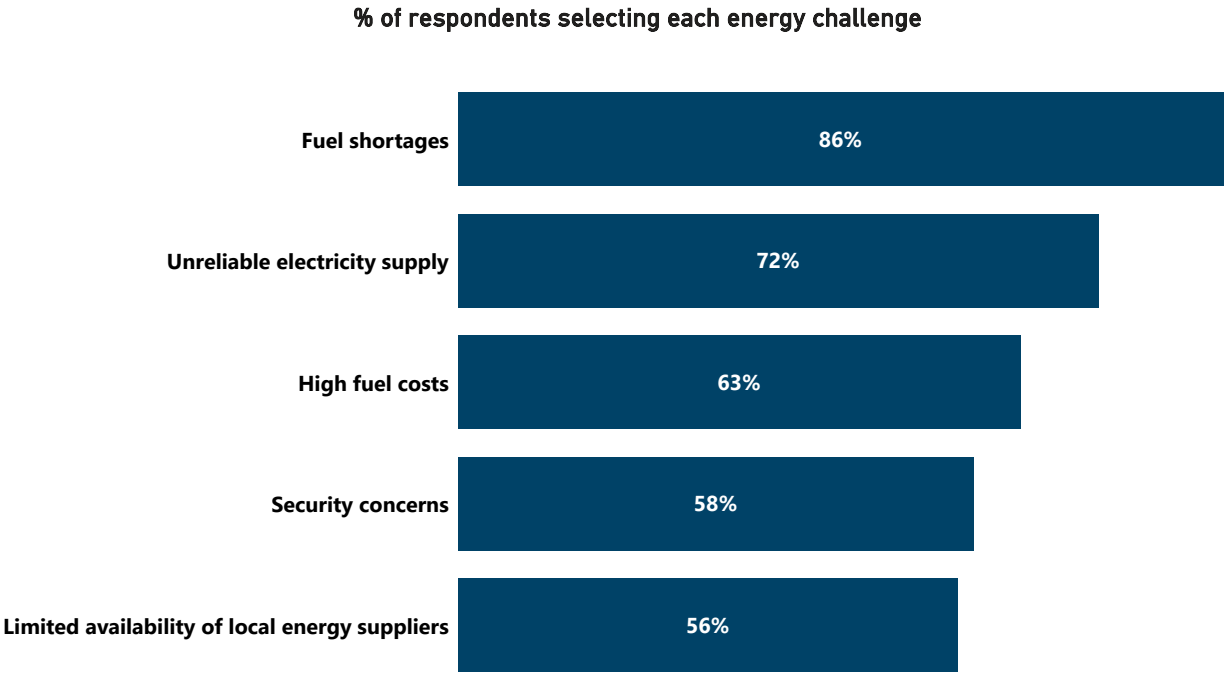

Figure 4: The top 5 energy challenges of humanitarian aid.

Average Expenses for Energy in Humanitarian Operations

Energy costs constitute a significant share of humanitarian organisations' operational expenses. A Chatham House report estimates that, on average, humanitarian operations allocate approximately 21 per cent of their budgets to electricity expenses, whether sourced from diesel generators or the power grid[37]. Understanding these costs is essential for optimising resource allocation and enhancing the efficiency of humanitarian aid delivery. This section examines average and median energy expenditures across different types of humanitarian operations, offering insight into the financial burden faced by organisations on the ground.

The analysis of energy expenses in humanitarian operations in Gaza reveals significant variations depending on the types of energy use and the nature of the organisation. On average, monthly expenditures of humanitarian operations are substantial, with electricity costs dominating at approximately $24,000, followed by transportation fuels at around $9,180, and cooking fuels at roughly $2,860. This amounts to a total of about $36,000 per month per organisation. These high averages are likely driven by a subset of organisations, such as those in the WASH (water, sanitation, and hygiene), Health, or logistics sectors, whose operations depend heavily on energy-intensive equipment and transport. Consequently, these outliers skew the overall figures (see Figure 5).

To gain a more precise understanding of energy expenses, examining the median values is crucial. The data reveals that median monthly costs are significantly lower: approximately $1,750 for electricity, $3,000 for transportation fuels, and $600 for cooking fuels. The disparity between average and median energy expenses highlights the diverse energy needs across humanitarian organisations. While some sectors require substantial energy resources, many operate with far lower energy demands. This analysis emphasizes the importance of tailored energy strategies to address these variations effectively. By recognising these differences, organisations can reduce costs significantly and improve operational efficiency. This approach enables humanitarian operations to optimise their energy use, ensuring resources are directed where they are most needed.

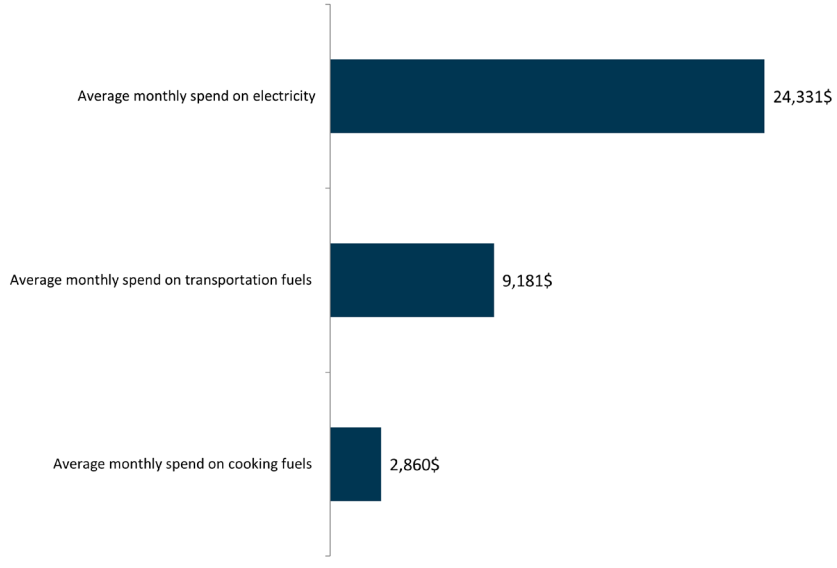

Figure 5: Average monthly expenses (in USD) for electricity, transportation, and cooking fuels.

37. Grafham, O. & Lahn, G. (2018) The Costs of Fuelling Humanitarian Aid. London: Chatham House.

Key Findings and Recommendations for Humanitarian Energy

Humanitarian operations in Gaza continue under the relentless strain of ongoing hostilities. A major barrier to accessing modern and sustainable energy is the restrictive policies enforced by the Coordination of Government Activities in the Territories (COGAT). These policies severely limit the entry of fuel, energy technologies, and spare parts, as well as renewable energy systems for household use, thereby compounding the challenges faced by aid agencies and the civilian population.

Key Findings

1. Primary obstacle - COGAT restrictions[38]: The single most critical factor in this energy crisis is the restricted access of humanitarian aid imposed by COGAT. Their current regulations limit the entry of fuel and essential technologies, compounding the shortage and forcing greater reliance on external advocacy and negotiations with the Israeli government.
2. Dependence on energy: All surveyed humanitarian organisations confirmed that energy scarcity hinders their operations. Without reliable access to fuel and electricity, the delivery of life-saving services including medical care, water and sanitation services, and communication is severely limited.
3. Reliance on fossil fuels: Most humanitarian services currently rely on fossil fuels — for both mobility and for electricity generation, which powers communication, coordination, and critical infrastructure. This dependence leaves organisations vulnerable to supply disruptions and rising costs.
4. Generator dependency: Since 7 October 2023, humanitarian organisations have had to rely on generators due to the inoperative electric grid. Their generator capacity has been reduced, and new imports of generating capacity are nearly non-existent. The remaining capacity is operating at close to full operational capacity.
5. Role of solar energy: Almost all respondents reported using solar photovoltaic systems, reflecting widespread awareness and acceptance of renewable energy solutions. The primary advantage of solar power, its independence from fuel imports, provides strategic resilience, especially in a context where fuel access is tightly controlled by the occupying power.
6. Risks and limitations of solar: While solar energy reduces dependence on imported fuels and lowers long-term operational costs, solar installations are more exposed, making them easier targets in a conflict setting or vulnerable to looting. Their capacity to support high-load, critical services remains limited.
7. Structural vulnerabilities and costs: Fuel shortages, high prices, security concerns, unreliable electricity, and limited local suppliers form a web of constraints that perpetuate the crisis.

Recommendations

To address the severe energy challenges in Gaza and optimise the use of limited resources, the following recommendations are proposed for humanitarian organisations:

38. Human Rights Watch (2025) 'Israel Again Blocks Gaza Aid, Further Risking Lives'.
Parker, A. (2025) 'Israel outlines plan to control all aid entering Gaza', The Washington Post.

Recommendation	Description	Objective
Advocate for Energy Equipment and Supplies	Focus advocacy on delivering essential energy equipment and fuel reserves for critical infrastructure.	Ensure availability of necessary energy resources.
Unconditional Entry of Critical Energy Supplies	Advocate for unrestricted entry of fuels, cooking gas, firewood, and solar technologies.	Enhance energy access despite restrictions.
Resource Coordination Among Agencies	Coordinate resource sharing to maintain critical installations and optimise energy use.	Maximise efficiency of limited resources.
Deploy Robust Energy Units	Prioritise easily deployable energy units for hospitals, WASH facilities, and communication centres.	Prevent service interruptions during emergencies.
Scale Solar Energy Systems	Expand solar systems independent of fuel supplies to ensure service continuity during conflict.	Reduce reliance on imported fuels and enhance resilience.
Establish Localised Mini-Grids	Develop mini grids integrating generators with solar power to reduce fuel dependency and enhance operational resilience.	Provide stable and sustainable energy supply in conflict settings.

Table 5: Recommendations for humanitarian organisations to address energy challenges in Gaza.

Securing reliable energy access for humanitarian activities in Gaza is a matter of life and death, making it imperative that all stakeholders prioritise the unhindered entry of energy resources and the rapid deployment of resilient and renewable energy systems. While solar power systems are critical for coping with chronic electricity shortages, they have also introduced new risks, individuals and institutions equipped with these systems have been targeted and attacked during the conflict. This vulnerability undermines efforts to build energy resilience and places additional strain on those responsible for maintaining essential services.

Addressing both security concerns and logistical barriers is crucial for humanitarian organisations striving to respond effectively to the acute energy crisis and ensure continuity of critical services in one of the world's most challenging environments. Ultimately, a coordinated approach involving all relevant actors, an end to bombardment and a careful balance between security measures and urgent energy needs is essential to saving lives and supporting sustainable recovery.

4. Household Energy Needs and Barriers

This chapter explores the two most critical forms of household energy use in Gaza – cooking energy and electricity. The findings are drawn from over 400 household surveys conducted in November 2024, offering a snapshot of the energy challenges faced by Gaza's residents.

Barriers Preventing Access to Energy for the Affected Population

The ongoing conflict in Gaza has severely disrupted access to essential energy resources, triggering an urgent humanitarian crisis. This section analyses the critical barriers preventing affected populations from securing the energy they desperately need, based on firsthand data collected from humanitarian aid workers on the ground.

The survey results clearly illustrate that Gaza's population faces an existential crisis which is further exacerbated by a lack of reliable energy access. According to responding humanitarian aid workers, the most significant barriers preventing Palestinians from securing necessary energy include:

1. Severely limited availability of fuels and alternative energy sources, such as renewable energy solutions and equipment like solar systems and solar lanterns.
2. Prohibitively high costs.
3. Dependency on external aid.
4. Unreliable energy infrastructure.

These factors combine to create a life-threatening environment for Gaza's residents, making daily life difficult and uncertain. Figure 6 illustrates the magnitude of these barriers, with five circles scaled to reflect the frequency of each distribution responses.

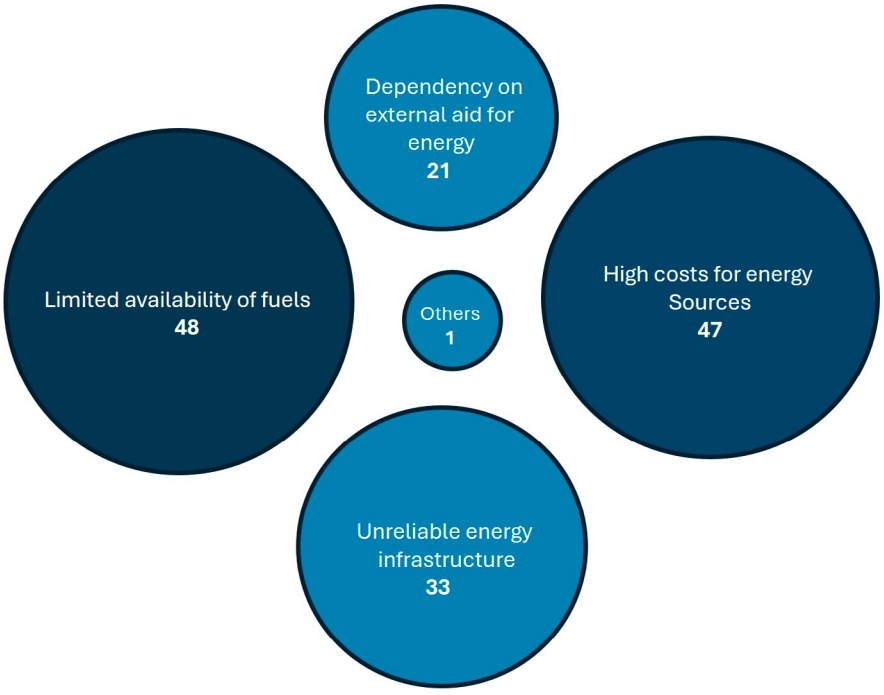

Figure 6: Barriers preventing the access to energy for the affected population.

Testimonies from the in-person survey highlight how strict regulations, combined with the absence of energy technologies and essential fuels, have deprived people of access to electricity, cooking gas, and other basic necessities required for dignified living conditions. Humanitarian actors are not merely passive observers of this crisis; their direct involvement and the data they collect reflect a shared understanding of how severely energy scarcity erodes the population's resilience and ability to meet fundamental needs.

The severity of this energy crisis is further shown by recent developments. As of 11 March 2025, Israel's decision to cut electricity to Gaza's main operational desalination plant has reduced its capacity to produce drinking water by 85 per cent[39]. This action, combined with the blockade on humanitarian aid entering Gaza since 2 March 2025, has exacerbated an already dire situation[40].

39. ReliefWeb (n.d.). Israel's Decision to Cut Electricity Supply to Gaza Desalination Plant: Cruel and Unlawful.
40. Human Rights Watch (2025). Israel Again Blocks Gaza Aid, Further Risking Lives.

Energy for Household Cooking

During emergencies, most household energy is dedicated to preparing meals, and in terms of kilowatt-hours (kWh) consumed, cooking far outweighs all other energy needs. While electricity is crucial for running lights, communication devices, or basic appliances—all of which are important for well-being—its role is modest compared to the immense energy demands of cooking. In Gaza, this challenge is exacerbated by heavy restrictions imposed by COGAT, the Israeli Defence Ministry unit responsible for coordinating civilian policy in the occupied Palestinian territories, on the import of firewood and LPG.

This section explores the harsh realities of cooking during conflict, examining fuel availability and affordability, the efficiency and convenience of technologies, whilst also taking account of exposure and safety risks faced, especially by vulnerable groups. Using the Multi-Tier Framework for Modern Energy Cooking Services (MECS)[41], we gain insight into how households manage with extremely limited resources, frequent relocations, and near-total dependence on imported humanitarian aid. The urgency of this assessment is shown by reports of households resorting to canned food due to the complete absence of reliable cooking options[42]. The following analysis provides an overview of the energy situation for household cooking in Gaza, highlighting the challenges faced by the population and the innovative coping mechanisms they have developed in response to severe energy shortages.

Cooking Locations and Associated Risks

Households were asked about their primary cooking location—indoors, outdoors, or elsewhere. This choice offers insight into exposure to smoke and fumes, as well as vulnerability to adverse weather conditions.

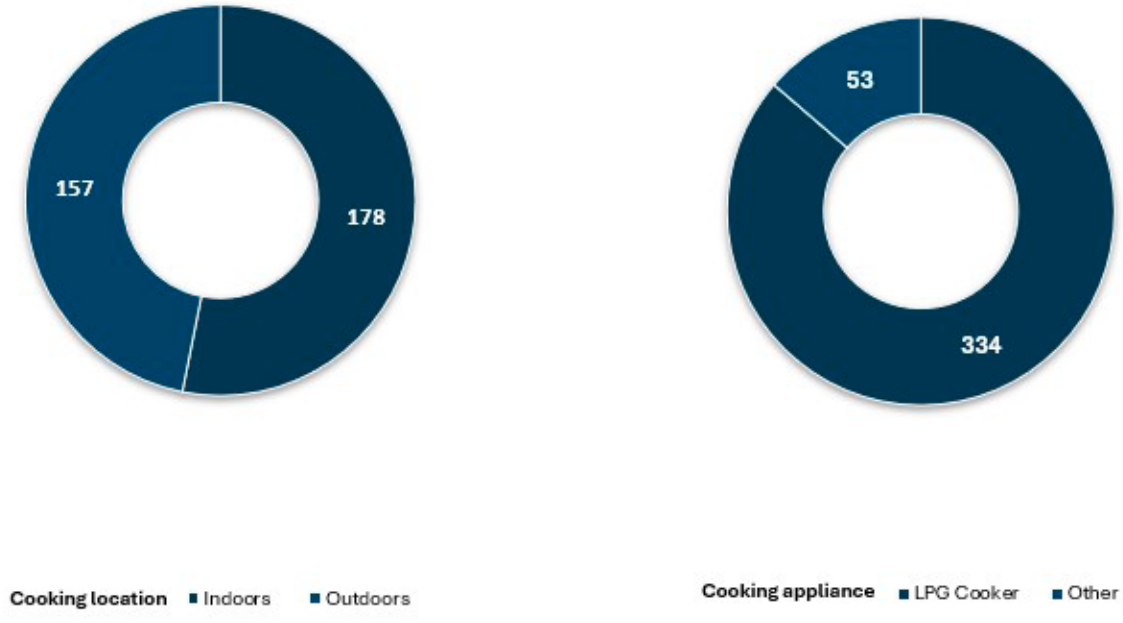

Figure 7: Exposure, safety, and convenience of Cooking.

41. World Bank (n.d.). Fact Sheet: Multi-Tier Framework for Cooking.
42. UN OCHA (2025) Gaza Humanitarian Response Update (16-29 March 2025).

Figure 7 provides critical insights into the cooking practices of Gaza households, highlighting associated health and safety risks. The left pie chart illustrates the distribution of primary cooking locations based on survey responses from 335 households:

- 52 per cent (174 households) cook indoors.
- 47 per cent (157 households) cook outdoors.
- 1 per cent (4 households) cook elsewhere.

Indoor cooking presents serious concerns, as many families live in makeshift shelters or tents with poor ventilation and limited structural protection. These conditions expose residents to harmful smoke, increase the risk of fires, and exacerbate health risks. While outdoor cooking can reduce indoor smoke exposure, it brings its own challenges – exposing families to harsh weather and lacking the safety and control of an enclosed environment. More critically, cooking outdoors increases their vulnerability to attacks, as it can attracts the attention of Israeli soldiers and heighten the risk of bombardment in an already volatile and dangerous environment.

The pie chart on the right assessed the type of cookstoves used, based on data from 387 households:

- 14 per cent (53 households) use LPG stoves, generally considered safer and cleaner.
- 86 per cent (334 households) rely on less efficient, less convenient, and potentially more hazardous stove types.

This stark contrast in cooking solutions highlights a critical issue: the overwhelming majority of households depend on stoves and cooking fuels that pose serious safety risks, degrade air quality and increase health hazards. Coupled with difficult living conditions and unsuitable cooking environments, these findings highlight the urgent need to expand access to cleaner, safer cooking solutions.

Cooking Methods in Gaza - Efficiency and Safety Concerns:

The survey reveals serious concerns around cooking practices in Gaza, particularly regarding efficiency and safety. Respondents were asked to identify their primary cooking method, with options including clay stoves, basic "2-3 stone" setups, improved cookstoves (e.g., rocket stoves[43]), LPG stoves, and brick-built stoves common in northern Gaza. Although most households rely on multiple cooking methods depending on the daily availability of fuel, this question focuses on their primary go-to option.

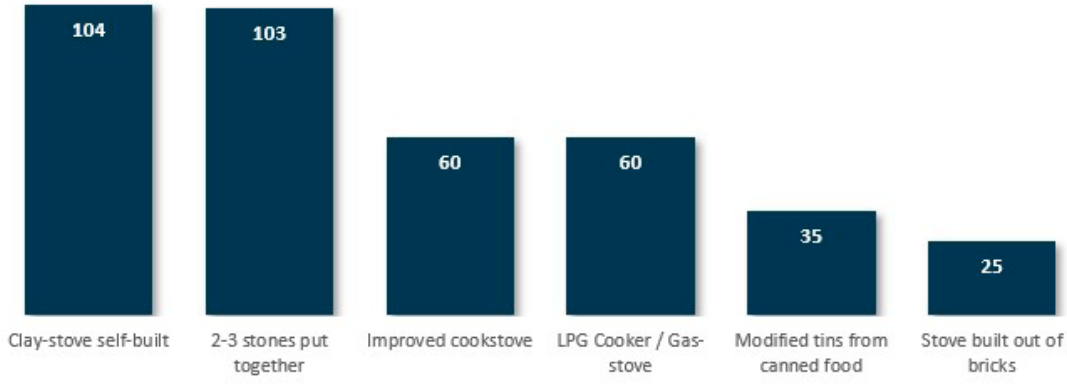

Figure 8: Most used cooking appliance.

43. Energypedia (n.d.). Firewood Cookstoves.

As shown above in Figure 8, the results indicate that clay stoves and 2-3 stone setups are the most common cooking methods, each used by 30 per cent of households (104 and 103 respectively). Improved cookstoves are used by 17 per cent (60 households), while LPG stoves are the primary option for 15 per cent (53 households), and brick-built stoves for seven per cent (25 households). This indicates a heavy reliance on inefficient and potentially hazardous cooking methods. Most of these methods likely have an efficiency below 20 per cent, except for some clay stoves and LPG stoves. Although many households own LPG stoves, limited fuel supplies restrict their use, forcing families to turn to less efficient alternatives for daily cooking.

In addition to this there are notable regional variations in the use of cooking practices in Gaza:

- Khan Yunis shows a higher prevalence of self-built/homemade stoves.
- Deir al-Balah has more formal cooking tools like LPG cookers and gas stoves.
- Informal shelters (tents, non-enclosed buildings) have more homemade cooking tools.
- Self-built clay stoves and LPG cookers are more common in collective shelters or finished houses, where IDPs tend to stay longer.

Sources of Primary Cooking Fuel (Convenience)

Households were asked about their primary cooking fuel sources over the previous week and the time spent daily acquiring them. Among the 427 households surveyed, responses fell into five categories: purchasing fuel, collecting it directly, obtaining it through a voucher system (commonly linked to LPG), receiving it through distributions from organisations, or relying on support from family and friends.

About 60 per cent (256 households) of households reported purchasing their cooking fuel, highlighting that most families dedicate part of their limited budgets to meet their energy needs. This reliance on purchased fuel underscores the financial burden associated with securing cooking energy. Another 20 per cent (58 households) reported collecting fuel themselves, which often involves significant physical effort and time investment.

Approximately 10–15 per cent (about 50 households) access fuel via voucher systems, often linked to subsidised LPG programmes. An additional 5–10 per cent (21–43 households) rely on fuel distributions from aid organisations and a similar share (about 15 households) depend on support from family or friends.

In addition to financial costs, households reported spending considerable time acquiring cooking fuel. Those who purchased fuel spent an average of nine hours per week on this task. Households that collected their own fuel spent significantly more time—approximately 17 hours per week—reflecting the labour-intensive nature of this method. Families using voucher systems reported an average of 11 hours per week, while those receiving distributions or relying on family and friends spent a comparable amount of time, averaging around 10–11 hours weekly.

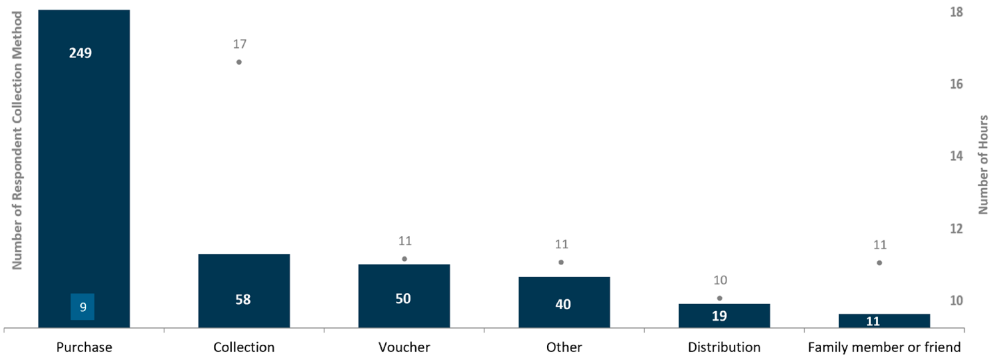

Figure 9: Methods (bars) and time spent on fuel procurement (dots)[44].

The data shows the significant challenges households face in securing cooking fuel, both in terms of financial costs and time investment. Regardless of the sourcing method, families spend more than one hour per day — amounting to between nine and 17 hours per week—obtaining the fuel necessary for cooking. This substantial time burden reflects the struggles of vulnerable households navigating a resource-scarce environment to meet their basic dietary needs under constant threat of bombardment. The labour-intensive nature of collecting fuel limits opportunities for income generation or other productive activities, compounding their vulnerability.

Regional differences further illustrate the complexity of these challenges. In Khan Yunis and Dei al-Balah, firewood and collected solid waste are the most common cooking fuels, reflecting reliance on readily available materials in areas with limited access to formal energy sources. In Gaza City, however, households frequently use biomass materials sourced from destroyed buildings or other debris, highlighting how conflict and infrastructure damage shape energy access in urban areas.

These findings highlight the need to address both financial and logistical barriers to fuel access, with attention to regional variations in resource availability and infrastructure. Expanding voucher systems, improving fuel distribution, and introducing alternative energy solutions could ease these burdens—reducing time demands, improving household welfare, and curbing harmful practices like scavenging for fuel.

Average Number of Warm Meals

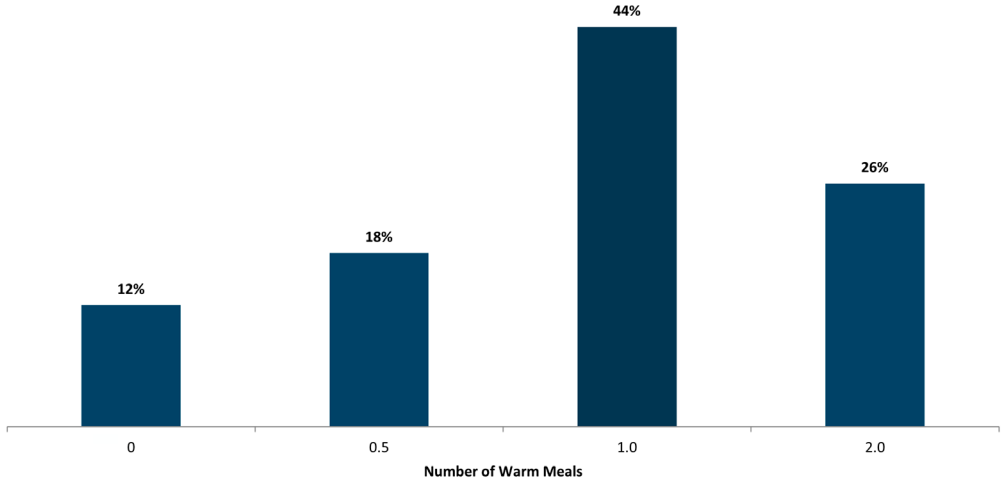

Figure 10: Average number of warm meals per day.

44. Dots refer to number of hours (average per week), bars refer to number of respondents per collection method.

The data (Figure 10) from late October to early November 2024 highlights the frequency of warm meals prepared daily by surveyed households. The column chart illustrates that a significant portion of respondents were unable to prepare any warm meals during this period, indicating severe constraints on their ability to cook. Among those who did manage to prepare warm meals, 44 per cent reported having just one warm meal per day, while 26 per cent managed two warm meals. Notably, almost no households reported preparing three warm meals per day, a figure that may include basic activities such as heating water for tea rather than full meals.

When compared to global averages in other emergency contexts—where at least one warm meal per day is often considered a minimum standard—these findings reveal a troubling situation. A substantial number of households fall below this benchmark, and even those who achieve it often do so with great difficulty, managing only one or two warm meals per day.

The limited frequency of warm meal preparation can be attributed to several factors, including food and fuel scarcity, restricted access to cooking facilities, and the very unstable living conditions. These constraints have hindered the ability to prepare food, specifically hot food and reflect broader issues of acute levels of vulnerability and food insecurity within the population. The data emphasise the urgent need for interventions that improve access to reliable cooking fuel and facilities, as well as broader support to address the underlying drivers of food insecurity (see Figure 10).

Coping With No Access to Modern Cooking Energy Services

Gaza's ongoing humanitarian crisis has led to severe LPG and electricity shortages, pushing households to adopt extreme and hazardous coping methods. Before 7 October 2024, LPG was widely used for cooking, but supplies have dwindled to critical levels. A single 8 kg LPG[45] canister, once enough for 20–30 days, must now stretch to 60 days. As shown in Figure 12[46], black market prices have surged to around ILS 400 ($113) per canister, making it unaffordable for many families. With electricity nearly unavailable due to prolonged outages, most residents have no safe or viable alternative for cooking.

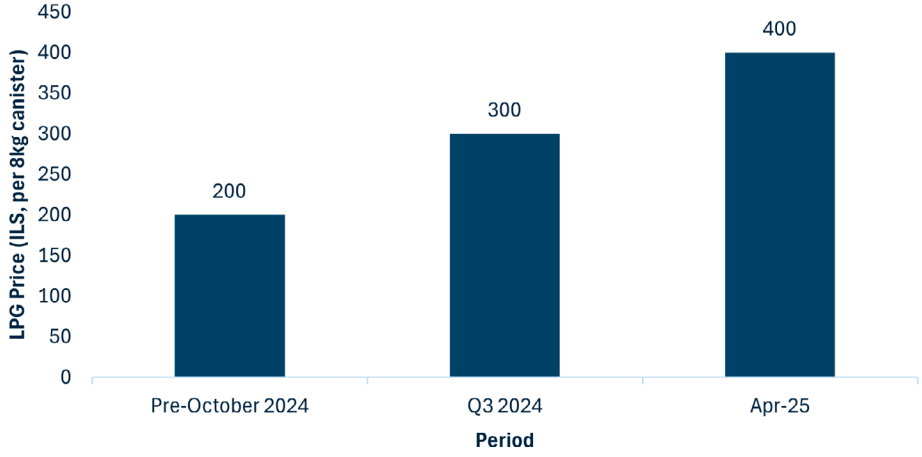

Figure 11: LPG Price Increase in Gaza (2024–2025).

45. PCBS (2025) Unprecedented increase in consumer prices levels during 2024. Palestinian Central Bureau of Statistics.
PMA (2025) Inflation Report: Fourth Quarter, 2024. Palestine Monetary Authority.
46. PMA (2025) Inflation Report: Fourth Quarter, 2024.

In response, households have resorted to any fuel they can find - purchasing or collecting firewood, scavenging wooden pallets from aid deliveries, or burning old furniture and municipal waste, including plastic, to cook their meals. Alarmingly, the demand for wooden pallets has sometimes surpassed that for the aid they transport. In addition to this, plastic is now being bought specifically for burning, exposing families to toxic fumes and increasing environmental hazards.

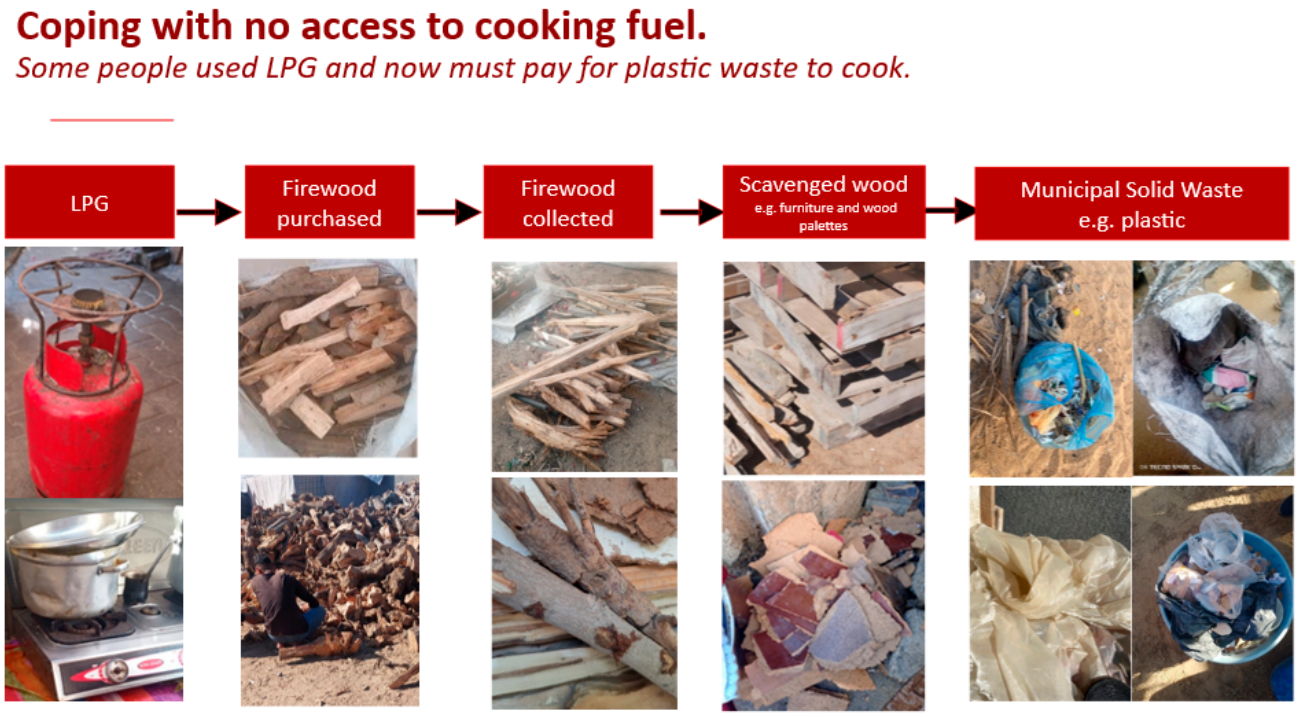

Figure 12: Coping with no access to clean cooking fuel.

Figure 13 illustrates the severity of the crisis, with households turning to hazardous alternatives such as burning plastic waste, in the absence of reliable LPG and electricity. As fuel supplies collapsed, families were forced to find any means available to cook.

Multi-Tier Framework to Measure Access to Modern Energy Cooking Services (MECS)[47]

Launched by the Energy Sector Management Assistance Program (ESMAP) in 2015, the MTF redefines energy access using a multidimensional approach. For cooking, it evaluates six attributes: exposure, efficiency, convenience, safety, affordability, and fuel availability, each scored from Tier 0 to Tier 5. A household must meet Tier 4 or above in all attributes to be considered as having access to modern energy cooking services. The MTF enables detailed assessments of energy access gaps and allows comparisons across time and across geographic areas[48].

47. World Bank. (n.d.). Fact Sheet: Multi-Tier Framework for Cooking.
48. ESMAP developed the Multi-Tier Framework (MTF) as part of its global initiative launched in 2015 to measure household-level energy access comprehensively.

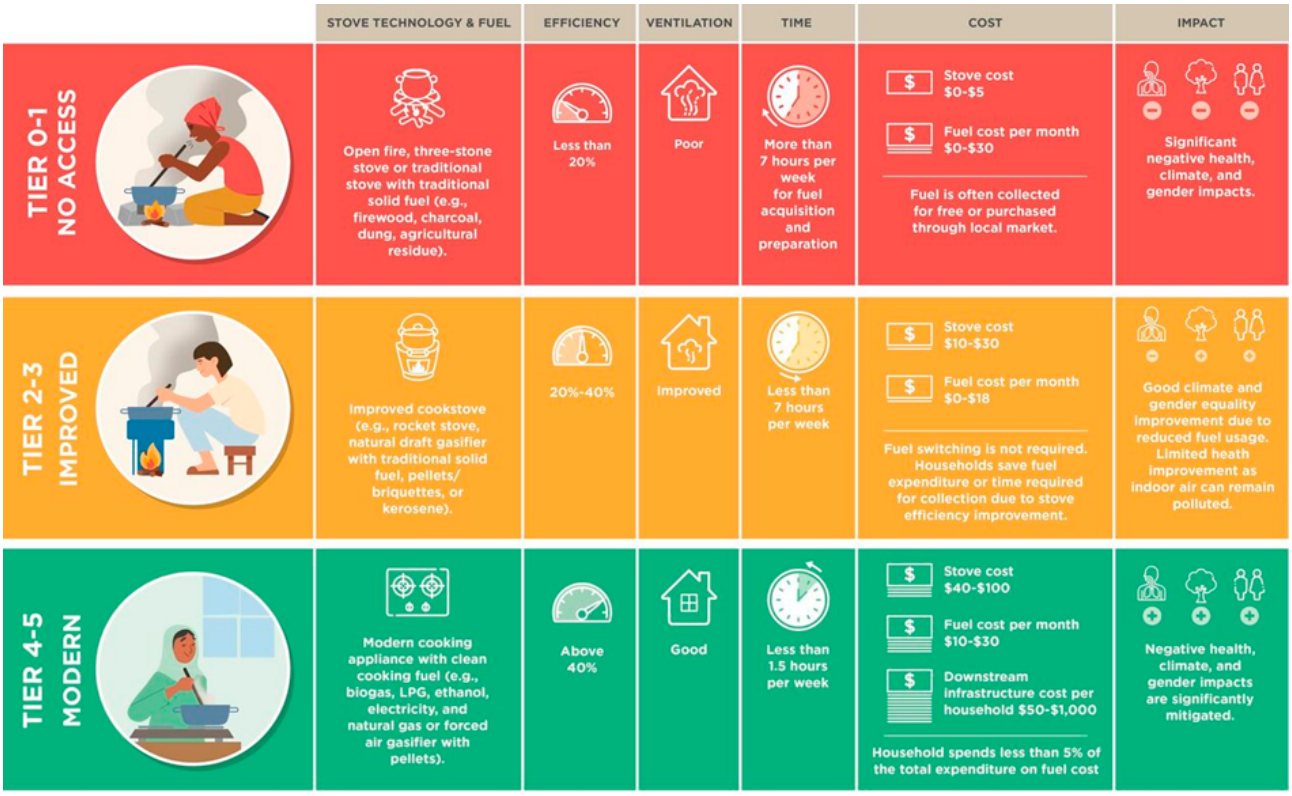

Figure 13: Multi-tier framework for access to modern energy cooking services.

In Gaza, the findings reveal that most households are severely constrained in accessing modern energy cooking services, with the majority falling into Tiers 0–2 across all six attributes. These challenges reflect acute vulnerabilities exacerbated by the ongoing humanitarian crisis:

- **Efficiency:** The widespread use of traditional stoves and unclean fuels, coupled with poor combustion efficiency, leaves most households in Tiers 0–1. These cooking methods are highly inefficient, wasting energy and increasing the burden on households.
- **Exposure:** Indoor cooking with unclean fuels and poor ventilation leads to high personal exposure to pollutants, placing households in Tiers 0–2. This poses significant health risks, including respiratory and cardiovascular issues.
- **Convenience:** Fuel collection requires over seven hours per week on average, while frequent fuel-switching highlights the lack of reliable cooking solutions. These inefficiencies place households in Tiers 0–1.
- **Fuel availability:** The unavailability of LPG and the limited supply of clean firewood force households to rely on inadequate and inconsistent fuel sources, resulting in Tier 0 for most households.
- **Safety:** While specific data on stove-related injuries was not collected due to the ongoing hostilities, the general conditions in Gaza suggest heightened risks to safety. This is especially concerning given the fragile infrastructure and lack of proper equipment.
- **Affordability:** Rising fuel costs, limited market availability for improved cookstoves, and the unmeasured but likely constrained household incomes point to significant affordability challenges. Households likely fall into Tier 0 for this attribute as well.

These findings show the gravity of the crisis in Gaza. Households are forced to adopt extreme coping strategies, such as burning municipal waste or scavenging wooden pallets originally used for aid deliveries. In some cases, plastic is purchased specifically for burning, exposing families to toxic fumes and severe health risks. The reliance on unsafe alternatives highlights both the immediate need for interventions to restore access to modern cooking energy services and the broader implications for health, safety, and environmental sustainability.

Electricity Use in Households

This section examines household electricity access in Gaza, highlighting how the ongoing humanitarian crisis has disrupted energy infrastructure and supply. While critical infrastructure remains heavily dependent on fuel imports, solar-powered electrical systems have become a widely used alternative for households amid severe shortages.

Gaza's Electricity Infrastructure

Gaza's electricity system has been pushed to the brink by ongoing hostilities and a prolonged blockade. As of 27 August 2024, representatives from the Palestine Energy and Natural Resources Authority (PENRA), Gaza Electricity Distribution Company (GEDCO) and Palestinian Electricity Transmission Company (PETL) confirmed extensive damage to the power network:

- In Rafah and Khan Younis, 75 per cent of medium-voltage lines and 60 per cent of low-voltage lines were inoperative. Nearly 100 per cent of large transformers (approximately 2,000 units) and 60 per cent of distribution transformers (around 120 units) were damaged or destroyed.
- Approximately 80 per cent of subscriber meters were rendered unusable[49].

Since October 2023, Gaza had endured 624 days without power following the shutdown of the GPP due fuel shortages and the disconnection of all 11 feeder lines from Israel. United Nations Satellite Centre (UNOSAT) satellite imagery shows extensive damage to northern Gaza's power infrastructure and even critical repairs such as to the F11/Kissufim feeder line serving the Khan Younis desalination plant, have been halted.

Before the crisis, Gaza relied on approximately 120 MW of electricity imported from the Israeli Electric Corporation (IEC) and 150,000 litres of daily fuel to operate a single turbine at the GPP, leaving the energy supply highly exposed to external vulnerabilities and disruptions.

The following challenges illustrate the severe strain on Gaza's energy system:

49. World Bank, United Nations & European Union (2024) Gaza Strip Interim Damage Assessment. 29 March.

Challenge	Details
Inadequate Distribution Infrastructure	Transformers, cables, switchgears, and poles were insufficient even before hostilities began. GEDCO could provide only eight hours of electricity per day to most households before the onset of hostilities.
Severe Demand-Supply Gaps	Total supply before hostilities was around 200–210 MW (85–90 MW from GPP, 120 MW from IEC, and 70 MW from solar), compared to an estimated demand of 600 MW. This shortfall led to persistent power shortages and rolling blackouts.
Vulnerability to Disruptions	Political instability, limited fuel imports, and restricted entry of essential materials created a fragile system prone to abrupt failures.
Development Deficits	The GPP's nominal capacity of 140 MW was never fully realised due to chronic fuel shortages and outdated infrastructure. This Inadequate electricity access strained households, businesses, and essential services alike.

Table 6: Challenges straining Gaza's energy system.

Impact of the Current Crisis on the Energy Infrastructure in Gaza

Ongoing hostilities have severely damaged Gaza's energy infrastructure, including power lines, substations, transformers, and solar PV systems. This destruction has deepened the humanitarian crisis by restricting access to basic necessities and hindering emergency response efforts.

Extent of Damage

According to the Interim Damage Assessment (IDA)[50] released in February 2024 and subsequent reports from PENRA and GEDCO, the damage to Gaza's energy sector is extensive:

Infrastructure component	Extent of damage	Estimated cost (USD)
Medium-Voltage (MV) Networks	80 per cent damaged (800 km)	~72 million
Low-Voltage (LV) Networks	60 per cent damaged (2,000 km)	~50 million
MV Transformers	80 per cent damaged (2,000 units)	~55 million
Subscriber Energy Metering Units	70 per cent damaged (225,000 units)	~26 million
Residential Sector Solar PV Plants	80 per cent damaged	~40 million
Commercial Sector Solar PV Plants	85 per cent damaged	~15 million
Water Pumping & Wastewater Solar PV Plants	90 per cent damaged	~27 million
Health & Education Facilities Solar PV Plants	80 per cent damaged	~20 million
Medium-Voltage Electricity Distribution Grid	86 per cent overall damage	N/A
Buildings, Stores, Warehouses, Vehicles, Heavy Machinery	Extensive damage	~28 million

Table 7: Summary of damage to Gaza's energy infrastructure and estimated costs.

50. World Bank, United Nations & European Union (2024) Gaza Strip Interim Damage Assessment.

The total estimated damage to the electricity sector amounts to approximately USD 278.5 million. This destruction has undermined essential services and created severe gaps in electricity supply across all sectors. This extensive destruction of energy infrastructure has had far-reaching and critical implications:

1. **Disruption of essential services:** Hospitals lack electricity for critical medical equipment, desalination plants cannot produce sufficient clean water, and wastewater systems have collapsed. These disruptions directly threaten public health and safety.
2. **Financial crisis:** GEDCO faces a financial crisis due to the inability to collect revenue amidst infrastructure destruction. This hampers efforts to fund repairs, cover operating costs, or pay salaries.
3. **Psychological impact:** The prolonged lack of electricity has inflicted considerable emotional and psychological stress on Gaza's population. Families are forced to endure unsafe living conditions while struggling to meet basic needs.
4. **Vulnerability to external controls:** The crisis highlights Gaza's reliance on external sources for energy supply. Israeli control over electricity imports has been used as a tool of domination, with deliberate cuts further exacerbating the humanitarian crisis

While assessments such as those by World Bank[51] provide estimates for reconstruction costs—potentially exceeding $53 billion across all sectors—the scale of damage underscores the urgent need for coordinated efforts to rebuild lifeline infrastructure. Without reliable energy access, recovery efforts will remain severely constrained.

Use and Sources of Electricity in Households

Survey data (Figure 14) from 400 households in Gaza highlights the limited and specific ways electricity is used under severe energy constraints in Gaza. Figure 15 illustrates the distribution of daily electricity usage across household appliances. The findings reveal:

- **Electric lighting:** A total of 74 households (54 per cent) reported relying on electric lighting for less than two hours per day, reflecting the widespread scarcity of electricity for basic needs.
- **Mobile phones:** Mobile phones are a critical resource, with 114 households (83 per cent) using them for less than two hours daily. In addition to communication, mobile phones are frequently used as a light source during power outages, underscoring their dual importance in daily life.
- **Cooking:** Electricity for cooking is extremely rare, with only three households (2 per cent) indicating they rely on it. This highlights the significant barriers to using electricity for essential tasks such as meal preparation.
- **Other uses:** Other reported uses of electricity include powering water kettles and laptops, though these are relatively uncommon due to the limited availability of power.

51. World Bank (2025) New report assesses damages, losses, and needs in Gaza and the West Bank.

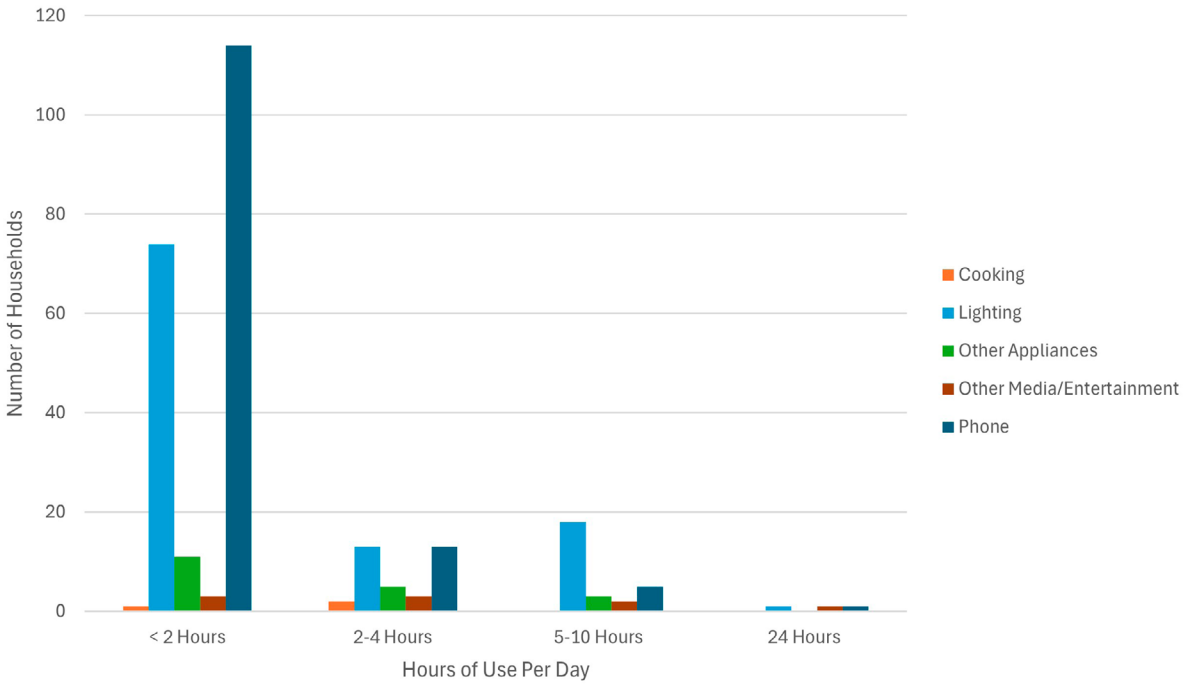

Figure 14: Distribution of daily electricity usage of HHs in Gaza.

The data illustrates the severe limitations on electricity access in Gaza, where most households are unable to rely on it for consistent lighting or cooking. The heavy reliance on mobile phones for both communication and lighting reflects the adaptability of households in coping with energy shortages. However, the negligible use of electricity for cooking and other appliances highlights the extent to which energy poverty impacts daily life.

Household Lighting Sources in Gaza

Faced with severe electricity shortages, households in Gaza rely on a patchwork of lighting solutions after dark. Figure 15 details the distribution of primary lighting sources reported by surveyed households.

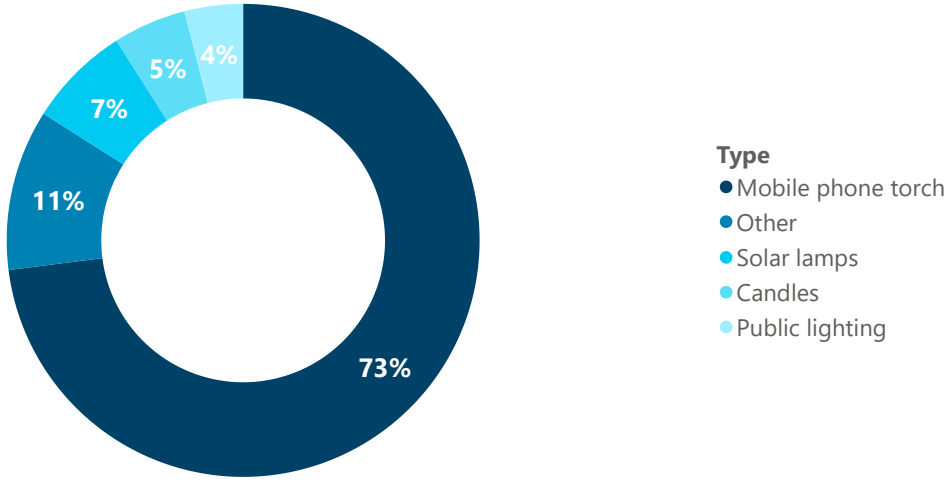

Figure 15: Type of Lighting Used by Households.

The data reveals a pronounced reliance on personal, often makeshift, lighting strategies. Mobile phone torches are by far the most frequently cited lighting method (73 per cent of responses), which points to two critical factors: the widespread ownership of mobile devices even within vulnerable populations, and the absence of reliable, grid-based electricity. Reliance on mobile phone torches however is not designed for prolonged use and gives minimal brightness. Beyond mobile devices, alternatives sources used for lighting include use of other lighting solutions, such as solar lamps, candles, and public lighting, this distribution shows the lack of and need for reliable public lighting. The minimal reliance on public lighting indicates significant gaps in public infrastructure.

Overall, the data highlight the challenges of electricity access. This improvisational approach underscores the urgent need for safe, sustainable, and affordable lighting solutions.

Figure 16 shows how households in Gaza access electricity. Although 3 per cent of respondents claimed to receive power from public infrastructure, this figure is likely misleading given that grid electricity is effectively non-existent. About 24 per cent of respondents rely on solar-based electricity—whether through neighbours' connections, solar home systems, or mini-grids linked to solar PV installations. Diesel generators account for another 30 per cent of the electricity supply: households typically use them for charging basic devices whenever fuel is available. According to UNRWA, only a limited number of these generators can operate at any given time, reflecting ongoing fuel shortages.

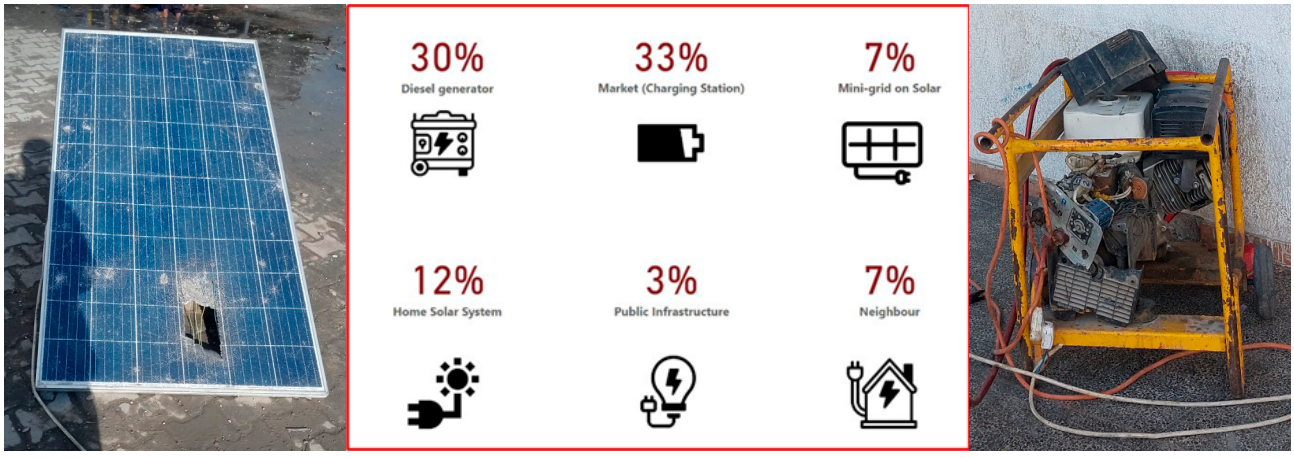

Figure 16: Sources of electricity for households: a damaged solar panel (left) and an improvised generator (right).

Multi-Tier Framework Regarding Access to Electricity

Since October 2023, Gaza has had no grid electricity, plunging the region into a severe energy crisis. Over half of the generators in Gaza are either destroyed, damaged, or non-operational, leaving **more than 90 per cent of households classified as Tier 0 or Tier 1** under the MTF for electricity access. These tiers represent minimal to no access to reliable electricity, severely impacting daily life and essential services.

Figure 17: Minimum requirements by Tier of electricity access.

Figure 17 outlines the minimum requirements for each tier of electricity access, underscoring how far Gaza's energy conditions have fallen below even the most basic standards. The reliance on Tier 0 or Tier 1 solutions reflects a population operating in survival mode, with no access to stable power for lighting, refrigeration, or essential appliances.

With no grid electricity available, households have been forced to adopt alternative solutions such as 7Ah 12V batteries—despite their limited capacity and unsuitability for sustained use. Figure 18 illustrates the range of coping mechanisms employed by residents to maintain access to electricity. These include small-scale solar panels, car batteries, and other improvised systems, many of which are often inefficient and unreliable.

While this widespread reliance on makeshift energy solutions demonstrates the resilience of Gaza's population, it also underscores the unsustainable nature of such methods. Batteries and small-scale systems offer only temporary relief and fail to meet the long-term energy needs of households or critical infrastructure. Furthermore, the financial burden of purchasing and maintaining these alternatives places an additional burden on already vulnerable communities, deepening existing poverty and inequality.

Figure 18: Distributing and storing the electricity at household level are the key challenges.

Key Findings and Recommendations: Household Energy Solutions

Clean Energy – Key Findings

1. **Severe lack of access to modern energy cooking services (MECS):** A cumulative analysis of all attributes indicates that households in Gaza face an acute lack of access to MECS. Hostilities, economic hardship, and limited availability of fuels and technologies have created major barriers to clean cooking. Most families now fall into the lowest tiers of the MTF for MECS, increasing health and safety risks, placing greater burdens to source cooking fuels , and adds significant financial strain.
2. **Dramatic shift in cooking practices since October 2023.** Prior to the escalation on 7 October 2023, most households relied on LPG and electricity[52] —placing them in higher tiers (Tier 4 or 5) of the MTF for MECS. Since then, widespread fuel shortages and power outages have forced a shift to basic, unsustainable cooking methods. Previously, a household would use 15–20 kg of LPG per month; now, 8 kg must last 40–60 days, meaning families are surviving on half the fuel for twice as long. The near-total absence of electricity has further worsened these dire conditions.

52. IPC (2023) 'Gaza Strip: Acute Food Insecurity Situation for September'.

3. **Abrupt transition to unsafe cooking methods:** As LPG supplies ran out, households had no time to adapt to the shock of conflict. Many were forced from relatively clean cooking solutions to some of the most hazardous and inefficient alternatives. Repeated displacement has left families with no opportunity to establish safe kitchens or stoves, resulting in widespread reliance on improvised shelters and makeshift cooking setups.
4. **Critical Shortage of Cooking Fuel:** UNRWA data[53] indicates that only 26,000 tonnes of LPG entered Gaza in 2024, a fraction of pre-conflict needs. Prior to the escalation, households typically consumed about 15 kg of LPG per month; now, they must stretch 8 kg over up to two months. Without viable alternative sources like electricity, LPG supplies would need to be quadrupled to meet basic cooking needs.

Aspect	Before 7 October 2023	After 7 October 2023
Main cooking fuels	LPG, electricity	Wood, cardboard, other biomass.
Average LPG use	15–20 kg/month	8 kg/40–60 days
MTF Tier	4–5	0–1
Kitchen facilities	Permanent, equipped	Improvised, unsafe
Health/safety risks	Moderate	Severe

Table 8: Summary of pre- and post-escalation cooking conditions.

Clean Cooking Recommendations

Urgent interventions are needed to improve access to modern energy cooking solutions in Gaza. The extreme levels of food insecurity and starvation[54] are worsened by the lack of fuels for preparing food and drinks. The table below summarises recommendations to address these urgent needs and support a transition to safer, more sustainable cooking practices.

53. UNRWA (2024) Gaza Supplies and Dispatch Tracking.
54. IPC (2024) 'Gaza Strip: Acute Food Insecurity Situation for September–October 2024 and Projection for November 2024–April 2025', Integrated Food Security Phase Classification.

Recommendation	Specific actions
Expand Availability of Clean and Affordable Cooking Fuels	- Quadruple LPG provision (from 26,000 tonnes in 2024 to 100,000 tonnes in 2025) as long as electricity is not restored. - Advocate for the resumption of reliable electric power for household cooking. - Import improved biomass and firewood for household use. - Coordinate with COGAT, UNOPS, and the Logistics Cluster to expedite import permits and minimise logistical hurdles for fuel deliveries.
Increase Access to Improved Cooking Appliances	- Distribute LPG stoves, rocket stoves, and electric stoves to improve efficiency and safety. - Collaborate with local producers and aid organisations to produce and distribute improved cookstoves.
Promote Low-Cost, Locally Sourced Cookstove Designs	- Share technical knowledge through community workshops, illustrated guides, and digital resources. - Provide training on constructing efficient stoves using locally available materials (e.g., clay, bricks, metal cans). - Showcase examples such as rocket stoves made from cans and clay-based efficient stoves. - Refer to Energypedia for more information on cooking technologies.
Introduce Affordability Measures	- Subsidise the cost of clean fuels and stoves. - Implement voucher schemes or direct cash assistance for the most vulnerable families.
Promote Use of Safe, Thermally Treated Wood Pallets	- Advocate for thermally treated pallets in aid deliveries as a safer interim fuel. - Provide clear usage guidelines to optimise efficiency and reduce health risks until cleaner fuels and modern stoves are widely available.

Table 9: Key recommendations to improve clean cooking access in Gaza.

Electricity Use Key Findings

When assessing household access to electricity, the following key findings could be made:

1. **No grid capacity:** The electricity grid is down, leaving an estimated demand of 600 MW unmet, as reported by GEDCO and PENRA, and Palestinians must use generators and solar power to use electric appliances.
2. **Critical infrastructure at risk:** Essential sectors—WASH and Health primarily depend on generators for power, supplemented by solar energy.
3. **Extremely limited access to electricity:** Only a minority of households has direct access to power sources (generators and solar systems).
4. **Reliance on lead-acid batteries:** Most households depend on small lead-acid batteries, charging them during the day at markets, neighbours' homes, or collective shelters, and using them for basic needs like lighting and communication.
5. **More than 90 per cent of households are Tiers 0 - 1 for access to electricity.** They have access for less than 4 hours per day and can merely operate lighting and charge their phones or radio.
6. **Power distribution challenge:** Even when power is available from generators or solar systems, getting it to scattered and diverse households remains a key obstacle, especially with the grid inoperable.

Electricity Use Recommendations

Table 10, the following recommendations should be implemented as a priority until feeder lines are restored.

Recommendation	Details
Advocate for resumption of electricity	Prioritise efforts to ensure all feeder lines are operational and electricity supply is restored.
Improve power distribution	Use available sources like generators or solar panel to supply electricity to as many devices as possible.
Provide guidance on multi-sockets & cables	Create and share illustrations or guides on building multi-sockets to maximise electricity use.
Maintain and repair existing systems	Ensure trained staff maintain generators and solar systems to keep them operational.
Advocate for solar lamps, panels, batteries	Push for immediate approval of these items for household use, as they are not on dual-use lists.
Advocate for charge & voltage controllers	Promote the use of controllers to improve efficiency, distribution, and system longevity.

Table 10: Immediate recommendations.

Figure 19: Repaired LEDs, a portable solar lamp and phones that are the most common source of lighting.

5. Pathways to Recovery: Strategic Recommendations for Gaza's Energy

The protracted crisis in Gaza has left the region's energy landscape in urgent need of support and transformation, with Palestinians desperately requiring energy to meet their most basic needs. As the humanitarian situation worsens, marked by chronic power shortages, deliberate obstruction of humanitarian relief and continued airstrikes in designated humanitarian zones, there is a pressing need to prioritise both emergency response and the pursuit of sustainable, long-term solutions for reconstruction.

This chapter presents practical pathways forward, offering targeted recommendations for donors, governments, and humanitarian partners to support urgent energy interventions in Gaza. Building on the evidence and insights presented throughout this report, the section consolidates key actions to address immediate needs while laying the foundation for longer-term energy resilience and stability. Through coordinated strategies, these recommendations aim to empower stakeholders to drive meaningful change and help restore essential services, with energy at the centre, for the people of Gaza.

First Steps: Immediate Actions for Energy Recovery

The ongoing, systematic denial of energy access in Gaza constitutes a grave violation of human rights, affecting both essential infrastructure and household energy supply. Advocacy efforts must prioritise securing firm guarantees to prevent further damage to any energy infrastructure, particularly during ceasefire periods and throughout the recovery and reconstruction phases.

Recommendations for Donors and Governments

1. **Restore and expand essential energy infrastructure**
   - Urge Israel and relevant authorities to urgently restore feeder lines to critical infrastructure such as health centres and water pumping stations.
   - Advocate for a fivefold increase in fuel imports vital to operate generators and power plants to meet critical energy demands.
   - Support increased imports of cooking fuels, including LPG, biomass, and firewood.
2. **Facilitate import of key energy items and fuels**
   - Call on Israel to allow increased imports of cooking gas, diesel, and petrol.
   - Call for the removal of barriers to importing small- and medium-scale solar systems (100 Wp to 10 kWp).
   - Urge permission for the import of batteries, inverters, charge controllers, and multipurpose electric sockets.
   - Advocate for access to LPG, diesel, generators (including 50 kW models), and improved cookstoves.
   - Promote for the import and distribution of solar lamps for personal lighting and protection.
3. **Promote renewable energy sources**
   - Promote solar as a crucial, sustainable technology for household energy. Advocate for small-scale solar solutions as the most practical, cost-effective, and sustainable energy option for households.
4. **Support winterisation measures**
   - Support efforts to secure funding for thermal blankets, sleeping bags, mats, and essential winter clothing.
   - Support efforts to secure funding for shelter materials such tents, plastic sheets, and any other essential materials to provide protection from weather elements
   - Support efforts to provide space heaters and the fuel required to operate them
   - Support sheltering facilities with repair and maintenance services for broken windows, doors, latrines etc.
   - Encourage the use of thermally treated wood pallets in humanitarian assistance to address fuel shortages where possible.

Recommendations for Humanitarian Partners

1. **Establish an inter-cluster working group on energy**
   - Ensure energy issues are systematically integrated across all humanitarian response clusters.
   - Document and communicate the pivotal role of energy in delivering basic services to strengthen advocacy efforts.
   - Incorporate energy capacity assessments into overall humanitarian appeals.
   - Coordinate closely with Inter-Cluster Coordination Groups and local authorities for a unified response.

2. **Standardise energy-related relief items**
    - Designate solar lamps, small solar panels, improved cookstoves, mylar blankets, and related energy products as standard relief items, regardless of “dual use” classification.

3. **Formalise energy capacity needs**
    - Make energy capacity requirements a formal component of all humanitarian response planning and appeals.

4. **Optimise and scale existing power sources and distribution**
    - Assess the potential of current generators and solar systems to support low voltage microgrids in makeshift settlements.
    - Provide technical and financial support to maintain and scale up local power generation systems.
    - Explore opportunities to expand power distribution by pooling or upgrading existing capacities.

5. **Promote knowledge transfer on safe, efficient cooking**
    - Provide guidance on constructing improved cookstoves (using clay, bricks, metal cans) and rocket stoves for cooking and heating.
    - Raise awareness of the hazards associated with using plastics, municipal solid waste, and chemically treated firewood as fuel.
    - Encourage the efficient use of LPG stoves and demonstrate practical methods for doing so.

6. **Coordinate winterisation and shelter improvements**
    - Develop and disseminate guidelines on structural design for makeshift sites, particularly those exposed to harsh coastal conditions.
    - Provide practical advice on reducing heat loss in buildings, such as sealing gaps and using makeshift insulating materials.
    - Emphasise prioritising cooking over heating when fuel is limited, unless households have a secure fuel supply.
    - Collaborate on shelter insulation for damaged or unfinished buildings.
    - Provide technical advice to families in partially damaged structures, acknowledging constraints on materials.
    - Promote basic, low-cost measures (e.g., sealing windows, insulating doors) to reduce heat loss.

Please refer to our supplementary report for further details: **Pathways for Improved Response and Coordination: Enhancing Energy Access in Humanitarian Operations in Gaza**.

Priority Needs: Energy Essentials for Post-Ceasefire Gaza

Following a ceasefire agreement on 19 January 2025[55] there was a brief period of hope for Gaza’s recovery. However, the commencement of the ceasefire was marred by continued hostilities and atrocities. Dozens of Palestinians were killed in Israeli attacks even after the agreement was reached[56].

55. The Phase 1 of a three-stage ceasefire process unfortunately saw limited improvements in security and access, and humanitarian needs remain acute. Despite the ceasefire and a modest increase in aid deliveries, the humanitarian situation remains dire, with ongoing risks to life and health.
56. ACAPS (2025) Gaza ceasefire: priority needs and risks.

The following prioritisation of energy-related non-food items is based on the energy assessment conducted from September to December 2024 and is designed to guide the upscaling of response in alignment with the evolving needs of households in the Gaza Strip. This prioritisation reflects (a) household energy demand per service (kWh), (b) availability of resources within Gaza, and (c) practicality for meeting household needs during the first year after the ceasefire.

Key Prioritised Energy Needs

- **Cooking energy:** Cooking energy remains the most urgent and highest-demand need for survival. LPG is the preferred modern cooking fuel, followed by firewood and, once the grid is partially restored, electricity. The acute scarcity of LPG and other fuels has forced many households to rely on unsafe alternatives, such as scavenged firewood and combustible waste.
- **Electricity for essential appliances:** Reliable access to electricity is critical for communication, lighting, protection, and productive household activities. In the immediate term, small-scale solar devices are essential; as stability improves, medium-scale solar systems should be prioritised for broader household and community use.
- **Batteries and storage:** Batteries are especially important in the initial months following a ceasefire, when electricity supply remains highly unreliable. They provide essential backup power for lighting, communication, and medical devices.
- **Fuel hierarchy**: The availability and practicality of fuels, in declining order, are: diesel, gasoline, LPG, firewood, scavenged firewood from debris, and combustible solid wastes. Diesel and gasoline are urgently required to power generators supporting critical infrastructure such as hospitals and water facilities.
- **Urgent winterisation and shelter:** With 92 per cent of housing units damaged or destroyed, access to energy for heating and insulation materials is a top priority, particularly as many displaced families return to uninhabitable or makeshift shelters.

Phased Approach to Energy Response in Emergencies

The following list (Table 17) is the result of the Energy Assessment focus on households, conducted from September to December 2024 and separated into three distinct phases:

- **Phase 1 (immediate relief):** Focus on distributing small-scale solar devices, batteries, LPG stoves and fuel, generator fuel, and basic winterisation materials to meet urgent survival needs.
- **Phase 2 (stabilisation):** Expand access to medium-scale solar systems, improved cookstoves, and initiate microgrid development to stabilise energy access.
- **Phase 3 (reconstruction):** Invest in large-scale grid restoration, sustainable energy infrastructure, and comprehensive rebuilding of energy services.

Phase	User group / site	Priority energy items	Description
Phase 1 (Immediate Relief) First 6 weeks	**Affected Population (Household use)**	Single-Pot LPG Stoves & Filled Canisters	Compact and clean option for meal preparation using LPG. Suitable for limited cooking spaces and commonly used in makeshift sites. Easy to transport multiple items on one truck.
		Two-Pot LPG Stoves & LPG Filled Canisters	Similar compact and clean cooking option with additional cooking capacity.
		Improved Cookstoves (e.g., Rocket Stoves) & Firewood	Reduces solid fuel consumption (wood/charcoal) and smoke emissions. Safer and more efficient than open fires, especially where LPG access is limited. Manuals for DIY rocket stoves from tins/cans should be provided in first few weeks (see image in Annex).
		LED Light Kits (DC-powered)	High-efficiency LED bulbs or strips running directly on DC, reducing the need for inverters. Simple to install and safe for indoor use.
		Portable Solar Power Packs (e.g.: 20–100 Wh)	Small solar panel (~50W), battery, and USB outputs combined in one package. Provides basic lighting and phone charging.
		Deep Cycle Batteries (e.g.: 12V, 7–30 Ah Lead-Acid or LiFePO4)	Stores solar energy for use at night or during cloudy weather. Sized according to load (lights, fans, radios, etc.).
	Collective Sites (Schools, hospitals, collective centres)	Multi-Pot LPG Stoves & Filled Canisters	Suitable for communal kitchens. Cleaner combustion compared to wood or charcoal. Requires reliable LPG supply (NB: subject to restrictions and supply challenges).
		Electric Cookers (1–2 kW)	For locations with reliable electricity near feeder lines and collective centres. Eliminates fuel storage and reduces indoor air pollution when powered by clean energy.
		LED Light Kits (DC-powered)	For safe and efficient communal lighting.
		Deep Cycle Batteries (e.g.: 12V, 7–30 Ah Lead-Acid or LiFePO4)	As above, also important backup power storage for critical facilities.
	Operational Organisations / Productive Use	Small Generators	Essential for powering critical infrastructure and emergency operations.
		LPG Canisters & Firewood	For operational cooking or heating needs.
		LED Light Kits & Deep Cycle Batteries	For lighting and backup power in field operations.
		Basic Winterisation Materials	Blankets, mats, and insulation for immediate protection against cold.
Phase 2 (Stabilisation) Negotiations for permanent end to hostilities	**Affected Population (Household use)**	Multi-Pot LPG Stoves & LPG Filled Canisters	Suitable for households that has the capacity for a less volatile/mobile kitchen.
		LED Light Kits (DC-powered)	Critically needed for protection, communication, and basic electric appliances.
		50W & 100W Solar Panel Kits	Includes charge controller, wiring, and mounting hardware. Powers LED lights, charges phones and batteries, runs small DC appliances. Critical for protection, communication, and basic needs.
		Deep Cycle Batteries (as above).	To store increased solar energy supply.

Phase	User group / site	Priority energy items	Description
	Collective Sites	Multi-Pot LPG Stoves & LPG filled canister	Suitable for communal spaces.
		Electric Cookers (1–2 kW)	For sites with improved grid access.
		LED Light Kits & Solar Panel Kits	For communal lighting and small appliances.
		Deep Cycle Batteries	For backup and energy storage.
	Operational Organisations / Productive Use	Small Generators, LPG Canisters, Firewood	Backup energy sources for unreliable supply areas.
		LED Light Kits & Deep Cycle Batteries (e.g., 12V, 30 Ah Lead-Acid or LiFePO4)	To store increased solar energy supply.
Phase 3 (Reconstruction) Large-scale rebuild-ing	**Affected Population (Household use)**	Electric Cookers (1–2 kW)	Transition to electric cooking as grid access is restored.
		Standalone Inverters (Modified or Pure Sine Wave, ~300–500W)	Converts DC from solar/batteries to AC for standard household devices. Useful for small medical or communication equipment requiring AC power.
	Collective Sites	Electric Cookers (1–2 kW)	For fully restored communal kitchens.
		300–500W Solar PV Inverter Systems	Combines 500–800W solar panels, 300–500W inverter, and batteries. Powers small to medium AC appliances, lighting, communications, and charges batteries. Powers larger communal services and appliances.
		Standalone Inverters (Modified or Pure Sine Wave, ~300–500W)	For flexible energy use in facilities. Converts DC from solar/batteries to AC for standard household devices. Useful for small medical or communication equipment requiring AC power.
	Operational Organisations / Productive Use	300–500W Solar PV Inverter Systems Standalone Inverters	As above
		Comprehensive Energy Services	Ensure dependable energy for healthcare, education, livelihoods, and humanitarian operations.
		Large-Scale Grid Restoration	Rebuild and expand sustainable energy infrastructure for reliable, clean energy.
		Sustainable Energy Infrastructure	Focus on long-term solutions including solar mini-grids and grid connections.

Table 11: Prioritised energy items for humanitarian response by phase.

Annex: Stakeholder Map

This annex provides a list of stakeholders involved in the Gaza humanitarian response and energy sector. This mapping includes international and local NGOs, UN agencies, governmental bodies coordination groups. These stakeholders play diverse roles, ranging from direct service provision to coordination, advocacy, and funding.

Type	Acronym	Full name
I. UN Agencies	OCHA Gaza	Office for the Coordination of Humanitarian Affairs (UN, Gaza)
	UNDP	United Nations Development Programme
	UNESCO	United Nations Educational, Scientific and Cultural Organization
	UN Habitat	United Nations Human Settlements Programme
	UNOPS	United Nations Office for Project Services
	UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
II. International NGOs	ACF	Action Contre la Faim (Action Against Hunger)
	ACTED	Agency for Technical Cooperation and Development
	ANERA	American Near East Refugee Aid
	CARE	Cooperative for Assistance and Relief Everywhere
	CRS	Catholic Relief Services
	DCA	Danish Church Aid
	DRC	Danish Refugee Council
	GEM	Global Empowerment Mission
	Global Communities	Formerly CHF International (Cooperative Housing Foundation)
	GVC	Gruppo di Volontariato Civile
	HEKS/EPER	Swiss Church Aid
	HI	Humanity & Inclusion
	Human Rights Watch	International NGO
	ICRC	International Committee of the Red Cross
	IFRC	International Federation of Red Cross and Red Crescent Societies
	IMC	International Medical Corps
	IOCC	International Orthodox Christian Charities
	IOM	International Organization for Migration

Type	Acronym	Full name
	IRC	International Rescue Committee
	MDM	Médecins du Monde (Doctors of the World)
	MedGlobal	-
	Mercy Corps	-
	MSF	Médecins Sans Frontières (Doctors Without Borders)
	Muslim Aid	-
	NPA	Norwegian People's Aid
	NRC	Norwegian Refugee Council
	OXFAM	Oxford Committee for Famine Relief
	PARC	Agricultural Development Association (commonly called PARC in Palestine)
	PCRF	Palestine Children's Relief Fund
	PEF	Palestine Exploration Fund
	Penny Appeal	-
	Première Urgence Internationale	-
	Rebuilding Alliance	-
	SAMARITAN'S PURSE	-
	Save The Children International	-
	Secours Islamique France (SIF)	-
	Shelter Box	-
	Terre des Hommes	-
	UPA	United Palestinian Appeal
	WeWorld	-
	World Vision	-
III. National NGOs	ADWAR	ADWAR Roles for Social Change Association
	AlRahma	-
	Bayader	-
	BLDA	Beit Lahia Development Association
	gazzedestek	-
	Gisha	-
	Impact	-
	International Charity Organisation UAE	-
	Jwelfare	-
	MA'AN centre	-

Type	Acronym	Full name
	PHC	Palestinian Housing Council
	PNGO	Palestinian NGO Network
	PRCS	Palestine Red Crescent Society
	Rebuilding Alliance	-
	SAMARITAN'S PURSE	-
	Saudi centre	-
	Tawwoun	-
	Zakher Association	-
IV. Governmental Bodies	AICS	Agenzia Italiana per la Cooperazione alloy Sviluppo
	EDA	Swiss Federal Department of Foreign Affairs
	FCDO	Foreign, Commonwealth & Development Office (UK government department)
	GFFO	German Federal Foreign Office
	Ministry of Public Works and Housing	Governmental/administrative body
	Ministry of Social Development	Governmental/administrative body
	National Office for Gaza Reconstruction	Governmental/administrative body
	Palestinian Energy and Natural Resource Authority	Government entity
	USAID	United States Agency for International Development
V. Coordination Groups/ Clusters	Cash Working Group	Inter-agency group focusing on cash-based programming
	Education Cluster	Inter-agency coordination group for education
	Food Security Cluster	Inter-agency coordination group for food security
	Gaza Inter Cluster Coordination Group	Inter-cluster coordination in Gaza
	Global Shelter Cluster	Worldwide inter-agency shelter coordination
	Health Cluster	Inter-agency coordination group for health
	Logistics Cluster	Inter-agency coordination group for logistics
	nICCG	National Inter-Cluster Coordination Group
	Protection Cluster & AORs	Areas of Responsibility
	Site Management Working Group	Inter-agency or sectoral working group

Key-Stakeholders & Key Informants

- **ACTED** – Agency for Technical Cooperation and Development
- **BLDA** - Beit Lahia Development Association
- **CARE / CARE Int.** – Cooperative for Assistance and Relief Everywhere

- **CRS** - Catholic Relief Service
- **Cash Working Group** – Inter-agency group focusing on cash-based programming
- **Food Security Cluster** – (Inter-agency coordination group for food security
- **Health Cluster** – Inter-agency coordination group for health
- **ICRC** – International Committee of the Red Cross
- **IOM** – International Organization for Migration
- **Logistics Cluster** – Inter-agency coordination group for logistics
- **nICCG** – National Inter-Cluster Coordination Group
- **NRC** - Norwegian Refugee Council
- **OCHA Gaza** – Office for the Coordination of Humanitarian Affairs (UN, Gaza)
- **PARC** – Agricultural Development Association (commonly called PARC in Palestine)
- **Site Management Working Group** – (Inter-agency or sectoral working group)
- **UNDP** – United Nations Development Programme
- **UNRWA** – United Nations Relief and Works Agency for Palestine Refugees
- Water, Sanitation, and Hygiene Cluster

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