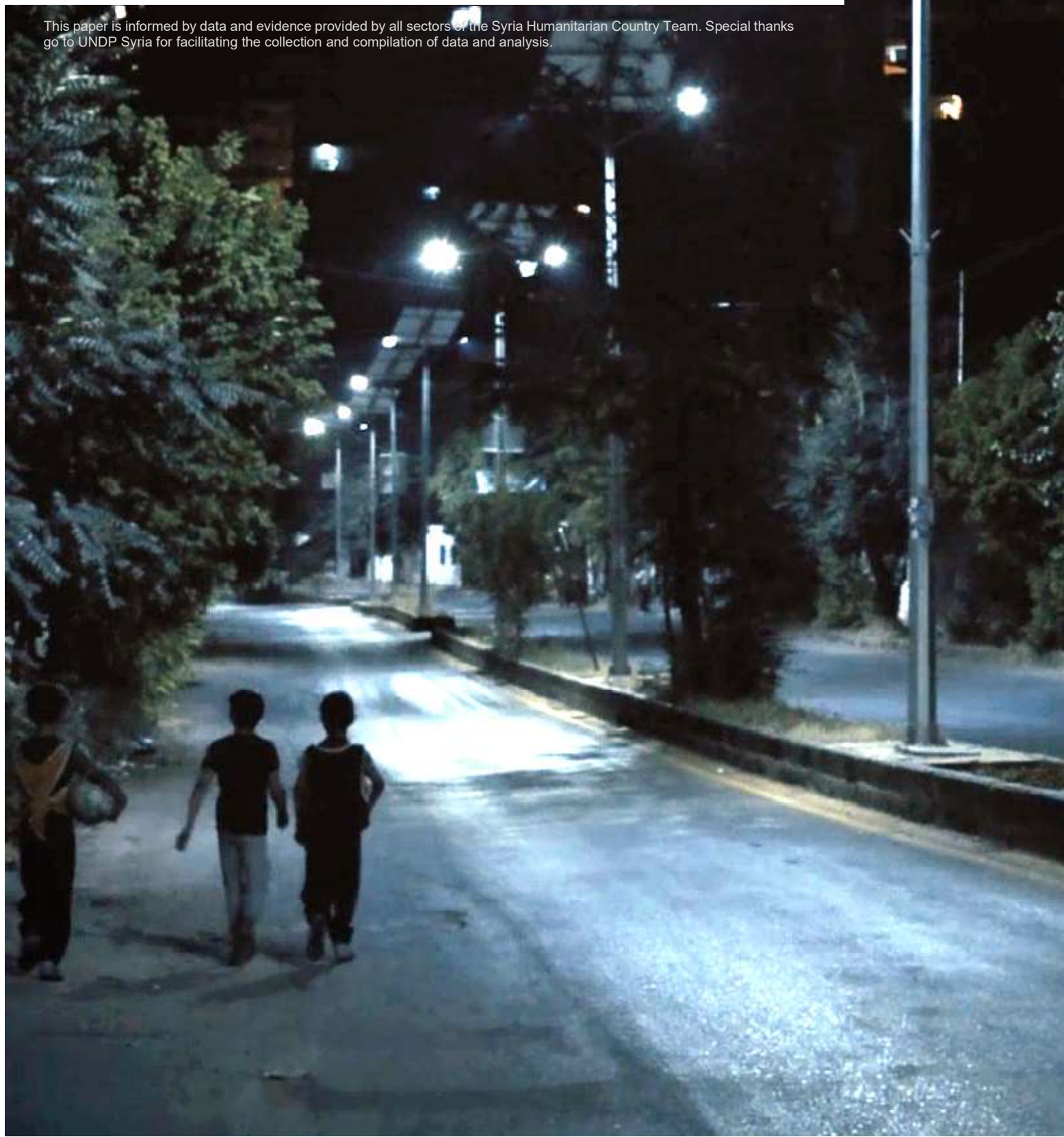


# SYRIAN ARAB REPUBLIC

## Access to Electricity and Humanitarian Needs

March 2022

This paper is informed by data and evidence provided by all sectors of the Syria Humanitarian Country Team. Special thanks go to UNDP Syria for facilitating the collection and compilation of data and analysis.



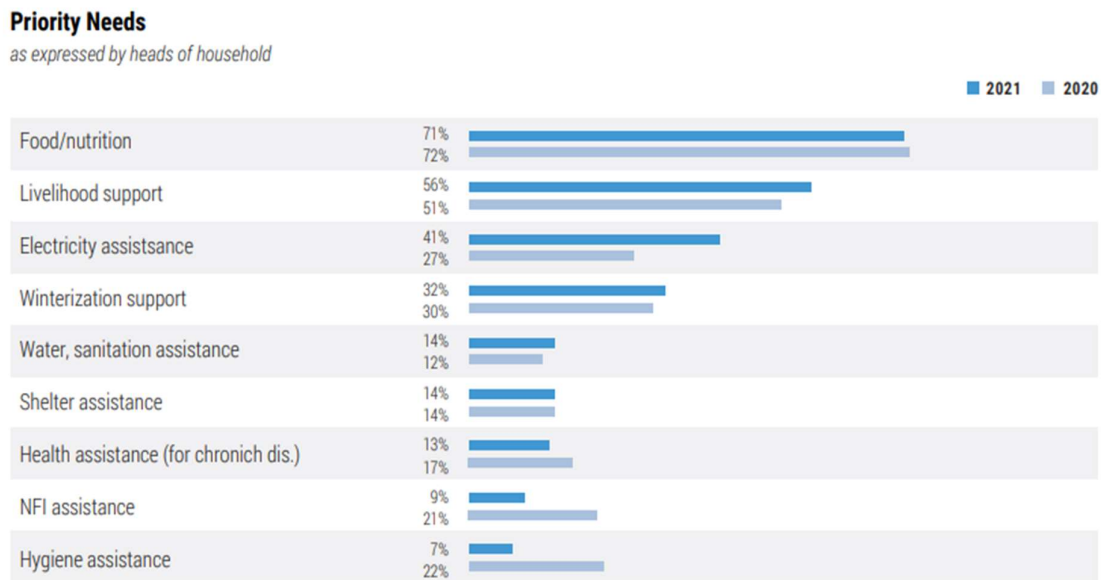


# I. Introduction

Based primarily on data gathered through Humanitarian Country Team (HCT) partners, this paper seeks to explain why electricity has become such an existential concern for vulnerable Syrians across the country. It also provides analysis of the multiple ways through which insufficient access to electricity, and energy more broadly is contributing to humanitarian needs and limiting humanitarian actors' response capacities.

Over the past three years, access to electricity has featured among the top ten priority needs raised by vulnerable Syrians in UN Multi-Sector Needs Assessments (MSNA). In 2021, however, access to electricity rose to the third-highest priority among surveyed households as illustrated in Figure 2 below. It ranked as the third-highest priority for 47% of residents, 39% of returnees, and 37% of IDPs residing outside of IDP camps in Syria.<sup>1</sup>

**Figure 1:**



Syria's state-owned electricity sector was already in need of strengthening before the crisis. Electricity demand was increasing steadily and at a faster rate than expansion in generation capacity, leading to outages and load shedding. Despite these mounting difficulties, in 2010 the electrification rate in the country was 93%.<sup>2</sup> Access to electricity was 100% in urban areas and 83% in rural areas.<sup>3</sup>

# II. The Impact of the Crisis on Access to Electricity in Syria

Ten years later, the situation is dramatically different. In 2021, per capita consumption of state electricity was approximately 15% of 2010 levels.<sup>4</sup> According to the 2021 MSNA, 59% of surveyed households indicated that their overall average daily availability of electricity was less than 8 hours per day, with 30% reporting that it was sometimes less than 2 hours per day. Likewise, the overall average daily availability of electricity for public services such as health facilities, schools, and street lighting

<sup>1</sup> 2021 Multi Sector Needs Assessment (MSNA)

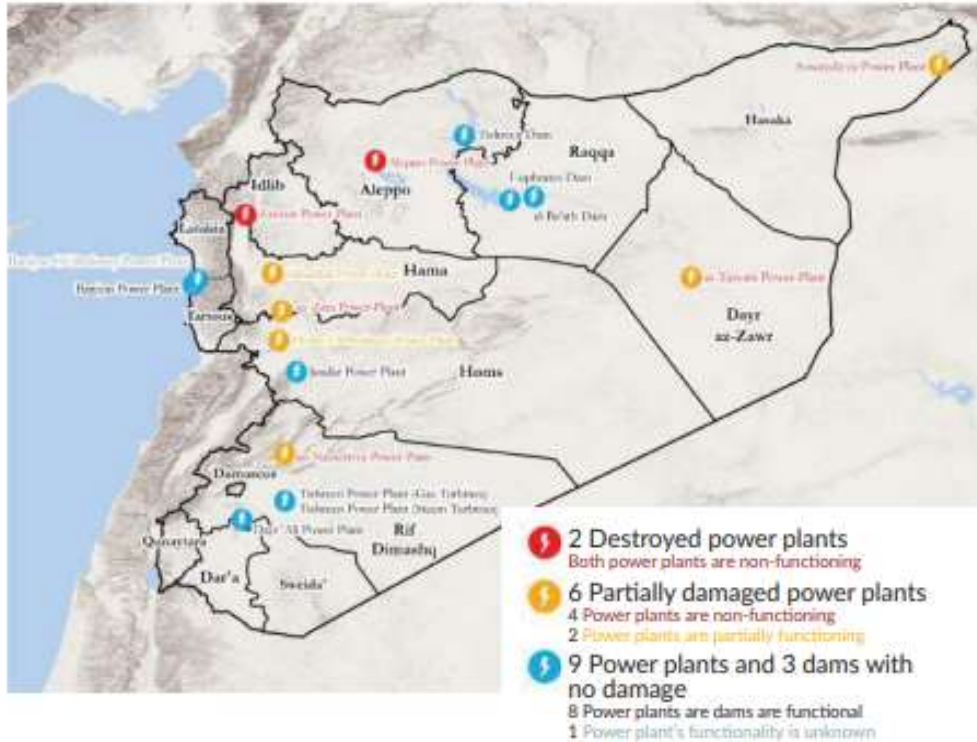
<sup>2</sup> World Bank Data, Access to Electricity, Syrian Arab Republic, accessible at: <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=SY>

<sup>3</sup> Ibid.

<sup>4</sup> European University Institute, "Syria's Electricity Sector After a Decade of War: A Comprehensive Assessment", 2021, accessible at: <https://cadmus.eui.eu/bitstream/handle/1814/72182/QM-02-21-984-EN-N.pdf?sequence=1>

were less than 8 hours per day for 51% of surveyed communities and less than 2 hours per day for 33% of surveyed communities.<sup>5</sup> The situation is particularly severe in rural areas, where access to electricity is at its worst since the beginning of the crisis.

Several factors contributed to this sharp decline in access to electricity. The crisis delivered a significant blow to the country's electricity generation capacity. According to ESCWA, the electricity sector was the sixth most affected sector in terms of damage to physical capital with damages estimated at approximately USD 7.3 billion in 2010 dollar terms.<sup>6</sup> Two of the country's 13 major power plants were fully destroyed: the Zeyzoun Power Plant in Idlib governorate (487 MW installed capacity) and Aleppo Thermal Power Station in Aleppo governorate (1,065 MW installed capacity).<sup>7</sup> The below World Bank map shows the extent of damage to the country's electricity generation infrastructure.<sup>8</sup>



Source: World Bank staff calculations.

As a result of this damage, the country's electricity generation capacity fell from 5,800 MW in 2010 (with a full capacity of 9,000 MW) to 4,000 MW in 2018. Financial precariousness and inability to import spare parts because of international sanctions have curtailed the state's ability to rehabilitate damaged infrastructures and maintain functioning or partially functioning plants. More recently and since 2020, recurrent and acute fuel shortages and steep fuel prices have delivered a further blow to the country's fossil-fuel-intensive generation capacity. Together, these various factors led to an additional drop in generation capacity, which in 2021 stood at 2,000 MW, a 50% fall from 2018.<sup>9</sup>

<sup>5</sup> 2021 MSNA

<sup>6</sup> UN ESCWA and University of St. Andrews, "Syria at War: Eight Years On", 2020, accessible at: <https://www.unescwa.org/publications/syria-war-eight-years>

<sup>7</sup> World Bank, "The Toll of War: The Economic and Social Consequences of the Conflict in Syria", 2017, accessible at: <https://www.worldbank.org/en/country/syria/publication/the-toll-of-war-the-economic-and-social-consequences-of-the-conflict-in-syria>

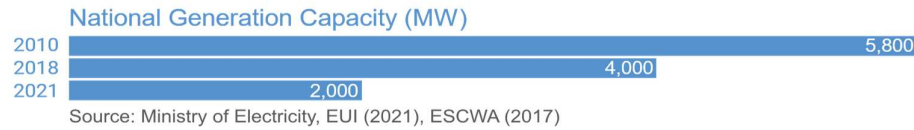
<sup>8</sup> Ibid.

<sup>9</sup> UNDP Syria, based on data collected from the Ministry of Electricity

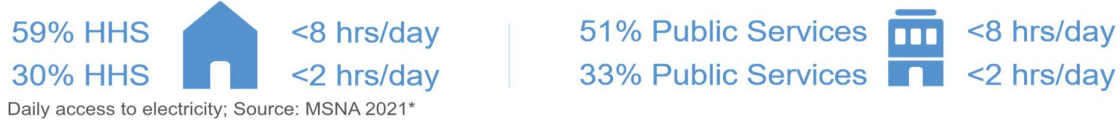




**Figure 2:**



Per capita consumption of state electricity in 2021 approx. 15% of 2010 levels (EUI 2021)



Throughout the crisis, vulnerable communities had found ways to adapt to the falling supply of state electricity by switching to private, non-grid alternatives, such as generators, batteries, and solar panels. The fast-deteriorating socio-economic situation, however, has made these alternatives prohibitively expensive for the average Syrian household. The rising price of fuel on which generators run has had a particularly negative effect on vulnerable households' access to electricity. In the city of Aleppo, for example, it is estimated that residents spend around USD 16.1 million<sup>10</sup> per month to source 240 MW of electricity from a network of 1,200 generators.<sup>11</sup>

Declining state supply combined with the unaffordability of private alternatives explains why access to energy has recently become such a major concern for vulnerable Syrians across the country. The section that follows explores how that access crunch is affecting humanitarian needs across different sectors, demonstrating that lack of access to electricity has today become an important driver of rising humanitarian needs in Syria.

### III. The Impact of Reduced Access to Electricity on Humanitarian Needs

Reduced access to electricity has negatively impacted needs across every sector of the Syrian Humanitarian Response Plan (HRP). HCT partners operate across the national territory assisting vulnerable communities in both urban and rural areas. They observe first-hand the effects of electricity shortages on humanitarian needs and resilience as well as on their own operations. Their observations and concerns are summarized below.

#### WASH

Before the crisis, access to safe drinking water in Syria was estimated at 92% in rural communities and 98% in urban centres.<sup>12</sup> Seven major water systems serve the country's eight largest cities and account for 80% of the country's total water supply, reaching about 9.5 million people.<sup>13</sup> Between 2011 to 2021, with the exception of the system servicing Syria's coastal area, all other essential water facilities suffered direct and severe damages.<sup>14</sup> These were compounded by ten years of inadequate maintenance which intensified their level of fragility.<sup>15</sup> By 2019, annual public water production in Syria had fallen by 40% relative to pre-crisis levels (from 1,700 million cubic metres in 2010 to 1,020 million cubic metres in

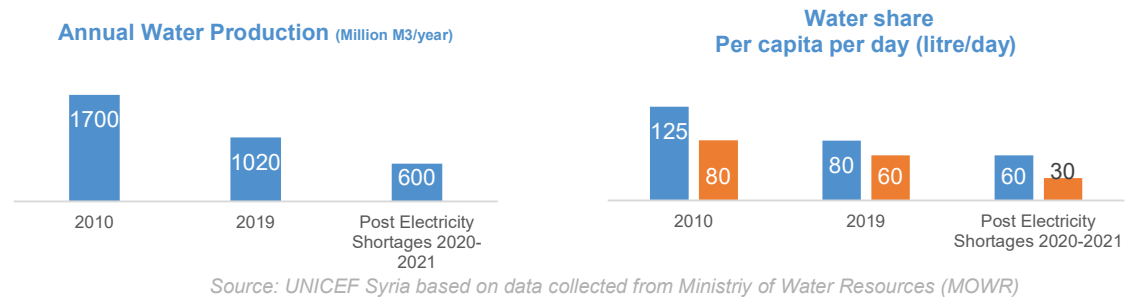
<sup>10</sup> As per the official exchange rate of the Central Bank of Syria.  
<sup>11</sup> UNDP Syria – Aleppo Office Data.  
<sup>12</sup> UNICEF Syria, based on data collected from the Ministry of Water Resources.  
<sup>13</sup> ICRC Syria  
<sup>14</sup> Ibid.  
<sup>15</sup> Ibid.



2019). Daily per capita water shares fell by 36% in urban areas and by 25% in rural areas, where the share had historically been lower.<sup>16</sup>

This already alarming situation significantly deteriorated from 2020 onwards, when electricity shortages in the country became acute. As shown in the graphs below, public production fell a further 40% and is now at almost a third of pre-crisis levels. Daily per capita drinking water shares are at 64% of pre-crisis levels in urban areas and at 38% of pre-crisis levels in rural areas. Levels in rural areas – at 30 litres per capita per day – are critically low.<sup>17</sup>

Figure 3:



Electricity shortages have impacted both the production and distribution of drinking water in the country with a dual negative impact on access. Water production or sourcing depends on diverse pumping mechanisms required to extract water from groundwater, rivers, or springs (see Box 1 below). Likewise, water distribution also largely depends on pumping systems able to carry water to different households. Severe electricity shortages, therefore, can render entire water networks inoperable. Throughout 2020 and 2021, electricity shortages led to severe drops in water pumping capacity across Syria's water networks, with many operating only a few hours per week. In some rural areas, where the living situation is at its worst, citizens are forced to buy drinking water at very high prices, where the cost per cubic meter reaches 12,000 SYP and water comes to homes once every 15 days.<sup>18</sup>

### Box 1. Drinking water sources and electricity in Syria

There are three main sources of drinking water in Syria all of which depend on electricity to be exploited.

**Groundwater:** Groundwater is extracted using submersible water pumps, which run on electricity. Suran subdistrict in rural Hama governorate is a case in point. Residents depend mainly on underground wells for drinking water. The wells are in good condition yet at least five hours of continuous electricity are required to pump water out of the wells and across 10 km of horizontal pipes. A further two hours are needed to fill the tanks in the local villages with a total population of more than 100,000 inhabitants. As electricity is currently only available one hour every five hours, water does not reach households.

**Rivers:** Communities tend to live at higher altitudes than rivers. To use river water at large scales, electrically powered water pumps are required to pump water upwards. In some instances, like with the Euphrates River in Aleppo governorate, a river can be at a higher altitude than communities. Gravity can be used to move water from the river to communities. Yet here too, additional pressure is required to distribute water to more distant households which requires electricity-powered pumps.

**Springs:** Some areas, including Damascus, Homs, Latakia and Tartous, rely on springs for drinking water. Here again, electrically run pumps are needed for distribution. For example, the water stations exploiting water from the Saleh springs in rural Latakia that service 307,000 people are currently not operating due to electricity shortages that impede extraction and distribution.

In the absence of grid energy, the most commonly used alternatives for operating pumping systems are generators. These are, however, a vastly inadequate alternative in view of their cost and the frequency of fuel shortages. They also seldom generate sufficient electricity to adequately run water

<sup>16</sup> Data collected by UNICEF Syria based on figures obtained from the Directorate of Drinking Water in the Ministry of Water Resources (MOWR).

<sup>17</sup> The international community adopts 50 litres per capita per day as a basic water requirement for domestic water supply. WHO defines domestic water supply as 'water used for all usual domestic purposes including consumption, bathing and food preparation'.

<sup>18</sup> UNICEF Syria data



systems. The Al-Ashara water station in rural Deir ez-Zor, for example, used to serve 24 hours a day the entire sub-district of Al-Ashara with a pre-crisis population of 118,385. Today, in the absence of grid electricity, the station operates with a diesel generator that allows it to reach 25% of its previous capacity. The station services 30% of Al-Ashara inhabitants supplying them with only two to four hours of water three times per week.<sup>19</sup>

Faced with these acute shortages in safe, public drinking water, vulnerable households must increasingly resort to water supplied by private suppliers who truck water to neighbourhoods and communities. These private sources, however, are costly. According to the 2021 MSNA, vulnerable households are spending up to 14% of their income on WASH services, leaving them with less money for other basic necessities. In Hama governorate, vulnerable households pay around USD 3 per cubic meter of water.<sup>20</sup> That amounts to roughly 15% of the average monthly salary of a public civil servant.

Many vulnerable households cannot afford these costs. As a result, they are forced to reduce their water intake, which negatively affects their health. Others are forced to drink unsafe water, which puts them at risk of water-borne diseases. Water sourced from unregulated, non-humanitarian water trucking is often also of poor quality, despite its high cost. This is leading to an increase in cases of diarrhoea and other gastrointestinal disorders. Prolonged reduction in household water availability is also undermining hygiene practices. This is of particular public health concern considering the continued spread of new variants of COVID-19 in the population.

Beyond the household, reduced water quantity in schools is further affecting girls and female teachers, especially during menstruation. Unhygienic and inappropriate facilities for teenage girls and women teachers may discourage them from going to school (see Education Sector below).<sup>21</sup>

Insufficient access to water because of non-functioning water systems is particularly critical in locations like Suran in Hama governorate, Al-Ashara in Deir ez-Zor, and Palmyra in Homs, where non-functioning water systems are undermining returns and leading to renewed displacement. In Palmyra, for example, around 1,000 displaced families returned in 2019. The main source for drinking water in Palmyra is a group of 18 deep wells in Alami, 40 km away from Palmyra city. Due to acute power shortages with an average of only four hours of electricity per day and with fuel shortages limiting the operation of generators, the returnee families are left without adequate and safe drinking water. It remains uncertain whether these families will stay.<sup>22</sup>

Finally, in its 2021 context sensitivity analysis conducted in eight communities across the country, the HCT found that unequal access to drinking (and irrigation) water due to non-functioning distribution systems was a key source of tensions within and between communities. Grievances over unequal access, which is often determined by geographic proximity to a natural water source, is undermining social cohesion in numerous communities.

Electricity shortages are also affecting the treatment of sewage water, which in turn affects water quality. Without electricity, many of the remaining wastewater treatment plants become inoperable and end up releasing contaminated water into surrounding areas, thereby polluting groundwater and surface wells. Water pollution from malfunctioning sewage systems is particularly severe in rural areas where the number of beneficiaries of wastewater centralized treatment plants had already dropped from 13.5% in 2010 to 3% in 2019, before any major power outages started affecting the country.<sup>23</sup>

Electricity shortages are also affecting solid waste management, which depends on heavy machinery for recycling and compression. According to the Ministry of Local Administration and Environment, on average 14,000 tons of waste is collected daily in Government-held areas; more than 433,000 tons per month. With many of the remaining solid waste management plants unable to function without electricity, a solid waste crisis is developing, which contributes to vector-borne and water-borne diseases.<sup>24</sup>

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<sup>19</sup> UNDP Syria – Deir ez-Zor Office Data.

<sup>20</sup> UNDP Syria – Hama Office Data.

<sup>21</sup> OXFAM Syria Data.

<sup>22</sup> UNDP Syria – Homs Office Data.

<sup>23</sup> Directorate of Services and Solid Waste in the Ministry of Local Administration and Environment.

<sup>24</sup> Directorate of Services and Solid Waste in the Ministry of Local Administration and Environment.



## Impact on the humanitarian response

Lack of electricity affects several of the water, water waste treatment and solid waste management services that humanitarian partners have rehabilitated. In so doing, it undermines the impact and effectiveness of the response and forces partners to rely on more costly, emergency solutions like water trucking. To mitigate these challenges, many partners are installing solar systems on small scale water schemes to ensure that they can provide water to their intended beneficiaries. This solution, however, drives up the price of interventions. Solar panels are also stolen in many areas.

## Education

Lack of electricity is having a direct, adverse effect on access to education for vulnerable children in Syria. It is doing so mainly by undermining the learning and protective environment in schools and households across the country, particularly in rural areas.

Widespread damage to education infrastructure during the crisis has led to a majority of public schools functioning in two shifts to maximize the number of children they can serve. A lack of electricity in schools means that students attending afternoon/ evening shifts do not have sufficient lighting to conduct their classes. Activities at Non-Formal Education centres too are affected as classes tend to start after school hours. Beyond lighting, lack of electricity negatively affects skill development of children and youths, as computers and other learning equipment do not function.

In the wintertime, the problem is further compounded by the lack of streetlighting, which poses protection challenges for children attending school in late shifts. Dark streets are a risk to children and girls, particularly those with long commutes back home. Children also stop going to school in the winter because there is no heating available in classrooms.

As described in the section above, electricity shortages are also limiting access to WASH facilities in schools, which poses a particular hurdle for female students and teachers. For example, the 63 schools currently operating in Al-Ashara subdistrict in rural Deir ez-Zor, which serve 31,000 male and female students, are unable to provide safe drinking water and sanitation facilities for their students. The schools are forced to use river water to fill tanks, which is not safe for drinking.<sup>25</sup>

Long-hour electricity rationing and unstable electricity supply at home is also affecting children's and youth's educational performance. In certain locations, electricity outages exceed 20 hours per day and, in many cases, the choice of using generators running on fuel is not available. This renders conditions for studying, doing homework, and preparing for exams very difficult. In many cases, students are forced to study by candlelight, which has an adverse effect on their eyes. These conditions reduce student motivation and is linked to increased dropout rates.

## Impact on the humanitarian response

Numerous schools rehabilitated by humanitarian partners since the start of the crisis are now unable to operate due to a lack of electricity. This undermines the impact and sustainability of invested humanitarian resources. It also undermines the credibility of humanitarian actors in the eyes of beneficiaries and the broader community as interventions are seen as ineffective and incomplete.

## Health

Due to electricity shortages, most public and private health facilities in the country currently rely on backup generators or on solar energy systems to operate. These energy sources provide the minimum power requirement to run medical facilities, posing a threat to the continuity of health services. An estimated 30% of functional public hospitals across eleven Syrian governorates<sup>26</sup> need electrical generators to operate. Primary health centres (PHC) face a similar situation. Any reduction in the medical service delivery of PHCs from the current 50,000 monthly inpatient and 60,000 outpatient consultations will result in increased morbidity and mortality. Fifty-one hospitals working in neonatal

<sup>25</sup> UNDP Syria - Deir ez-Zor Office Data.

<sup>26</sup> Damascus, Rural Damascus, Aleppo, Latakia, Homs, Hama, Al-Hasakeh, Deir-ez-Zor, Dar'a, As-Sweida, and Quneitra



resuscitation with 6,000 monthly new-borns and 500 referred to advanced medical care, are directly impacted by short- and long-term absence of electricity.<sup>27</sup>

Electricity fluctuations negatively impact medical equipment, particularly in laboratories, blood banks, and imaging/scanning services, as well as ventilators, incubators, renal dialysis machines, defibrillators, and other devices. Patients in intensive care units (ICUs) and COVID-19 treatment facilities who need oxygen and other life-supporting equipment are completely reliant on the availability of electricity. An estimated 5,000 to 6,000 patients a month are affected. Prolonged power outages can affect all 151 COVID-19 treatment facilities, including 850 intensive care unit (ICU) beds and 700 ventilators. There are 25 nutritional stabilization centres with 150 severe acute malnutrition (SAM) patients who are completely reliant on reliable access to electricity.<sup>28</sup>

Lack of electricity has a particularly negative impact on vaccine distribution campaigns requiring cold chain equipment. Refrigerators currently in use are unable to withstand continuous power outages and many have been put out of a service as a result.

Fuel shortages and high prices are also impacting access to healthcare, with a more limited number of ambulances in operation and a reduction in home visits by medical practitioners. The costs of these visits have also increased. Given that so many health facilities are running on fuel-powered generators, the rising cost of fuel has also led to falling budgets of health facilities to cover other, required expenses.

The proliferation of generators also impacts air quality, which in turn negatively affects public health. Pollution resulting from the two types of fuels used to operate generators (gasoline and diesel) can contribute to irritation of the respiratory system, exacerbate heart disease, allergies, and some eye diseases, and affect the physical and mental development of children. Diesel generators, for example, emit large quantities of gases such as carbon oxides, nitrogen, hydrocarbons, lead, cadmium, and zinc compounds, among others.<sup>29</sup> In March 2021, local authorities estimated that a total of 1,200 private generators were operating in Aleppo City.

**Figure 4:**

The approximate rate of gases released from one generator:

Type of Generator	CO2 kg/day	CO kg/day	Particle kg/day	SOx kg/day	NOx kg/day
Diesel generator 250 KVA	582	1.7	3.2	3.6	6.1

**Impact on the humanitarian response**

Without access to reliable sources of electricity, health facilities rehabilitated by humanitarian partners cease to operate or operate at partial capacity, impacting their ability to meet lifesaving needs in the sector. For example, the impact of rehabilitation interventions carried out by UNDP in Harasta National Hospital in Rural Damascus and Dummar National Hospital in Damascus, was deferred by more than six months as the hospitals sought to obtain generators and transformers to ensure 24/7 electrical supply.<sup>30</sup> Similarly, a health service centre in Souran sub-district in rural Hama governorate established by UNICEF has had its medical services curtailed due to lack of electricity.<sup>31</sup>

To avoid supported facilities being unable to deliver critical services, humanitarian partners have been installing alternative power supplies in health facilities. This raises delivery costs, which in turn reduces assistance reach.

<sup>27</sup> WHO Syria Data.

<sup>28</sup> WHO Syria Data.

<sup>29</sup> UNDP Syria – Aleppo Office Data.

<sup>30</sup> UNDP Syria – Southern Area Office Data.

<sup>31</sup> UNDP Syria – Hama Office Data.





## Food Security and Agriculture

Reduced access to electricity is having a direct, negative impact on food security and agriculture in the country. It does so primarily by reducing the quantity, quality, and diversity of food production and by driving up the prices of essential food items. By undermining livelihoods, it also decreases vulnerable households' ability to acquire the basic food basket (see Early Recovery and Livelihoods Sector below). The reduced access to reliable sources of electricity is affecting the entire food system from input supply, food production, food processing, storage, and consumption. Unreliable supply of electricity is also resulting in increased food waste at household level.<sup>32</sup>

Before 2011, about 1.4 million hectares of the country's 4.6 million hectares of farmland were irrigable. The destruction of irrigation structures and pumping stations coupled with unpredictable electricity outages and increased fuel prices have substantially reduced the area under irrigation.<sup>33</sup> This area is now estimated at around 1.1 million hectares, contributing 24 % of the total cultivated area in the country.<sup>34</sup> In Syria's Al-Hasakeh governorate, the country's former bread basket, irrigated wheat cultivation pre-crisis was estimated at 252,468 hectares, producing 974,403 tons of wheat per year. Today, wheat cultivation in the governorate does not exceed 120,500 hectares, producing 354,238 tons of wheat.<sup>35</sup> Although several factors contributed to this decline, the fact that most of the governorate's 1,500 agricultural wells are out of service due to electricity shortages has played a major role.

Similarly, in Hama governorate, inoperable agricultural wells have hurt production of key crops across several villages, as illustrated in the table below:<sup>36</sup>

**Figure 5:**

Village	Electricity-powered Wells	Covered Areas(acres)	Affected Productivity	Products
Al-Biyah	14	8000	50%	Wheat-Anise-Onion-Potato
Deir Elfardis	33	3500	75%	Wheat-Anise-Potato
Moah	18	2325	45%	Wheat-Anise-Potato
Jarjisa	117	1742	60%	Wheat-Anise-Potato
Kafr Qadah	5	150	70%	Wheat-Anise-Onion
Tizeen	330	16700	50%	Wheat-Vegetables
Kafr Biham	572	16426	50%	Wheat- Vegetables-Potato
Kalidiyeh	30	3000	50%	Wheat- Vegetable-Anise-Potato

Interruptions of crop irrigation can also spoil vegetable and fruit crops, making their production economically unviable.

Hurdles to irrigation systems, linked to groundwater or river water sources have led many farmers to stop farming for now. Less vulnerable farmers who can afford it are using diesel generators to power irrigation systems. Yet this substantially increases production costs, which in turn drives food prices up. For example, irrigating one dunam<sup>37</sup> of wheat in Deir ez-Zor governorate through national grid energy costs around 10,000 SYP. Doing so through diesel generators costs over 70,000 SYP, a seven-fold increase that ultimately lands on the consumer.<sup>38</sup>

<sup>32</sup> FAO Syria – Special Report, 2021.

<sup>33</sup> FAO Syria – Special Report, 2021

<sup>34</sup> FAO Syria – Special Report, 2021.

<sup>35</sup> UNDP Syria – Al-Hasakeh Office Data

<sup>36</sup> UNDP Syria – Hama Office Data

<sup>37</sup> Equivalent to 1,000m<sup>2</sup>

<sup>38</sup> OXFAM Syria



Power outages also affects farmers cultivating in greenhouses that need predictable heating and ventilation, especially in Coastal areas. Meanwhile, in places like Eastern Ghouta, a major agricultural zone before the crisis; farmers are cutting fruit trees to sell wood for heating purposes, given rising demand for alternative sources of heating in the absence of electricity (see Shelter Sector below). This same trend can be observed in many other parts of the country, further reducing the volume and diversity of produce reaching local markets.<sup>39</sup>

Lack of electricity also affects post-harvest food storage, processing, and distribution. Storage facilities for most agricultural products, including vegetables, fruits, milk, and meat depend entirely on electricity to operate the cooling systems to ensure an efficient cold chain that minimizes food losses and viability of the supply chains. With the prevailing scarcity of electricity, post-harvest handling, storage and processing of food products continues to suffer.

Grain and fodder centres; ginning; olive pressers and other food manufacturing and processing facilities, all depend on electricity. In Al-Hassakeh governorate, for example, an important wheat-producing area, five out of ten major silos are out of service due to power outages. Without electricity, their ventilation, sterilization, and wheat recycling systems cannot operate. As a result, wheat is being stored in open spaces, exposing the harvest to grain spoilage, resulting in significant economic losses to the farmers.<sup>40</sup>

When it comes to processing, wheat mills, critical for grinding the grain, are also experiencing repeated electricity outages. Outages not only reduce volumes of processed flour, but also affect flour quality and result in frequent and costly mill malfunctions. For example, the Sahel Mill in Latakia governorate – one of three main state-run mills in the Coastal area supplying flour to public bakeries on which low-income Syrians depend—substantially reduced flour production in 2021 due to frequent power outages. The mill's production capacity fell from 210-225 tons per day to 110-140 tons, affecting all residents of Latakia governorate. The fall in production had a negative effect on other governorates as well that sourced flour from the Sahel mill.<sup>41</sup>

Lack of electricity also negatively affects the irrigation of some fodder crops, as well as poultry production. Poultry facilities depend on electricity for lighting for egg laying, and for operation of ventilation systems, in addition to feeding and watering arrangements. It is noteworthy that the high prices of poultry production inputs (feeds) and the lack of availability of energy are the major reasons why most poultry farmers are discontinuing their production, further exacerbating the humanitarian needs, especially for families that rely on poultry production as a source of livelihoods.

Reliance on alternative energy sources such as generators or the need to invest in solar panels ultimately further increases prices for vulnerable consumers. Diesel is usually costly and not always available, and this has led to the degradation of agro processing-based livelihoods. Electricity shortages and the overall crisis are contributing to a significant reduction in fertilizer production with a knock-on impact on food production and productivity and further increasing humanitarian needs.

The food consumption segment of the food system has also been negatively impacted. Electricity shortages are generally affecting cooking practices and dietary choices, leading families to skip meals and switch to foods that are less energy demanding. Foods such as legumes, which are highly nutritious, require more energy to prepare. With the prevailing electricity shortages, consumption of plant-based proteins, especially legumes, may be lowered since vulnerable households end up relying more on faster-cooking foods, resulting in poorer nutritional balance.

## **Impact on the humanitarian response**

There is a general increase in demand for supplementary irrigation support driven by changing climate and subsequent erratic rainfall, as well as the so-called “water crisis” along the Euphrates. Yet electricity shortages and costs render meetings this demand more costly and complex for humanitarian partners.

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<sup>39</sup> UNDP Syria – Southern Area Office Data.

<sup>40</sup> UNDP Syria – Al -Hasakeh Office

<sup>41</sup> UNDP Syria – Coastal Area Office Data.



The sector has been promoting the use of solar-powered irrigation systems (SPIS) as an alternative for ground water extraction, but this has received limited funding.

As the price of essential food items continues to rise, the number of people in need that the sector can reach is reduced. Moreover, families struggle to cook nutritious foods delivered through food baskets, which limits the impact of General Food Assistance on nutrition and food security.

The impact of electricity on all aspects of agricultural production is making it increasingly difficult and costly to support the resilience of small, vulnerable farmers. Interventions risk having limited effect if not all key dimensions of the impact of electricity shortages on agricultural value chains are addressed.

## Shelter and NFIs

Lack of electricity had a heavy toll on Syrians' vulnerability related to shelter. It rendered many homes and shelters inhabitable during the winter because electricity is used as the preferable option for heating in the absence of alternative energy resources. This is particularly critical given that it is estimated that 5.92 million people in Syria will require shelter support in 2022.<sup>42</sup>

### **Impact on the humanitarian response**

The cost of shelter materials and non-food items has increased dramatically because of rising production costs. It has also led to the shortage of some components. The result is growing implementation problems. This is especially true in rural locations, where power outages might last several days and there are no available alternatives such as small generators or solar systems. This leads to a significant extension in the duration of projects.

Moreover, lack of electricity results in an inadequate and poorly functioning shelter after rehabilitation processes phase out, where electricity shortages impact lighting, utilization of appliances, heating, and water pumping.

Due to the high cost of fuel and the fact that not all persons of concern have access to it, electrical heaters were the first solution during the winter season, particularly in the higher elevation locations that are most affected by the harsh weather. This contributes to a shift in priorities within the partners' programs; partners are compensating for heating solutions with alternative items such as carpets and additional blankets that are more expensive than the standard winter kit price; as a result, a smaller number of HOUSEHOLDS are covered by the sector during the winter.<sup>43</sup>

Due to the lack of electricity, some markets and shops are closing or operating during irregular working hours, making it difficult for voucher recipients to access their entitlements.

## Early Recovery and Livelihoods

Lack of electricity has a substantial, negative impact on equitable access to essential services, livelihood opportunities and social cohesion. With more than 90 percent of the Syrian population estimated to be living below the poverty line, and 60 to 65 percent of the population estimated to live in extreme poverty, the impact of electricity scarcity on community resilience is severe.<sup>44</sup>

As documented in the WASH, Health, and Education sectors (see above), lack of electricity is undermining access to basic services. This impact is particularly acute in crisis-affected areas, where costly energy alternatives (e.g., generators, solar panels, batteries) are less available. Not only does lack of electricity diminish access to essential and often, lifesaving services, but it also drives up costs for vulnerable households seeking to acquire private alternatives. This includes private provision of energy, drinking water and health, which results in vulnerable households spending ever increasing portions of their limited incomes on services previously provided by the state. As a result, and according

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<sup>42</sup> 2021 MSNA

<sup>43</sup> UNHCR Syria Data.

<sup>44</sup> UN Socio-Economic Impact Assessment (SEIA) 2021



to the 2021 UN Socio-Economic Impact Assessment (SEIA), households with lower income are disproportionately affected by lack of electricity and higher fuel prices. Many find it difficult to meet their minimum energy needs.<sup>45</sup> Considering that the income-expenditure gap reported by vulnerable households in the 2021 MSNA more than doubled relative to 2020 (20% gap in 2020 vs 49% gap in 2021), growing expenditures on services and basic goods, in particular food, driven by lack of public grid electricity is greatly undermining households' ability to meet their basic needs.

Lack of electricity is also significantly undermining urban and rural livelihoods. The impact of lack of electricity and fuel on the entire agricultural production chain is documented in the Food and Agricultural Sector above. In the absence of irrigation and with increasing prices of essential inputs like fodder, a growing number of farmers are leaving or selling their lands. Since 2020, for example, no less than 12,000 greenhouses in the Coastal area - which provide livelihood resources for many households, stopped operating due to the lack of electricity.<sup>46</sup> Many livestock breeders are being forced to sell part of their flocks to secure fodder, thereby diminishing their assets or have gone out of business altogether.

The loss of rural livelihoods has a highly detrimental effect on the resilience of rural communities, which on average had lesser access to essential services and livelihood opportunities, even before electricity shortages started to affect the country. Compounded by drought and water shortages, the ability of vulnerable rural households to withstand additional stresses and shocks like those associated to electricity outages is particularly narrow. As a result, rural-urban migration continues, putting further pressure on limited services in urban areas and depleting human capital for recovery in rural areas. Lack of electricity is also a major factor preventing returns and reintegration in rural areas, which are completely cut off from power networks.

Energy, including the lack of electricity and fuel, also has a major, negative effect on private businesses outside of the agricultural sector. It was cited as the third most prominent challenge by the 2,138 micro, small and medium-sized enterprises (MSMEs) surveyed for the 2021 SEIA, following currency volatility and international sanctions.<sup>47</sup> This is because the production of nearly all commodities and services in a developed economy like Syria's depends on electricity, from the simplest manufacturing industries to the most complex technology-intensive ones. In the absence of electricity and fuel, several Syrian MSMEs are going out of business and, as they do, taking with them livelihood opportunities for vulnerable households. Carpenters, barbers, tailors, and small mechanical or industrial workshops are the most affected as they cannot afford alternative energy sources.

Many factory owners and service providers are reporting that insufficient power supply forces them to cut back the number of employees and the number of days and hours they work.<sup>48</sup> The industrial area in Al-Mayaden sub-district in rural Deir ez-Zor is a case in point. Lack of electricity has significantly impacted the more than 100 workshops that had restarted operations, leading to greatly restricted working hours and a dependence on equipment that runs on diesel when the latter is available and affordable.<sup>49</sup> Similarly, in Douma's once prominent industrial area, many workshop owners have had to stop operations as they cannot afford non-grid, alternative energy sources. Today, 50% of Douma's 1,800 small industrial workshops are closed, with lack of energy being a key contributing factor.<sup>50</sup>

Lack of electricity is also impacting social cohesion. Given how vital electricity is to every aspect of life, there are growing grievances over unequal access to electricity. In the neighbourhoods of Kadi Askar in eastern Aleppo City, for example, there are reports of resentment towards households on streets and neighbourhoods having benefited from energy interventions from humanitarian partners (e.g., solar lighting).<sup>51</sup> Residents in Al-Ashara subdistrict in rural Deir ez-Zor who receive two hours of electricity per day resent the eight hours per day received in Deir ez-Zor City.<sup>52</sup> Many communities also see a link between lack of electricity and rising crime. With greater socio-economic hardship, petty crime and

<sup>45</sup> UN Socio-Economic Impact Assessment 2021: An assessment of the socio-economic situation in Syria as a result of the COVID-19 pandemic, March 2021

<sup>46</sup> UNDP Syria – Coastal Area Office

<sup>47</sup> UN SEIA 2021

<sup>48</sup> OXFAM Syria

<sup>49</sup> UNDP Syria – Deir ez-Zour Office

<sup>50</sup> UNDP Southern Area Office

<sup>51</sup> Local Context Analysis, Kadi Askar, Eastern Aleppo City, UNDP, 2021.

<sup>52</sup> Local Context Analysis, Al-Ashara, Deir Ezzor Governorate, UNDP, 2021





other forms of criminal activity are becoming more prevalent, which undermines social trust and a sense of security (see Protection Sector below). Lack of streetlighting at night also contributes to a sense of insecurity, disproportionately affecting women, children and the elderly. Finally, in the absence of the national grid, local, crisis economies around the provision of electricity or “amperage businesses” are proliferating in urban centres. Electricity from generators is sold at exorbitant prices, generating resentment and a sense of inequality.

## Impact on the humanitarian response

Community services rehabilitated by humanitarian partners are unable to deliver services to beneficiaries due to lack of electricity. This requires additional costs to supplement service infrastructures with alternative energy sources. Lack of energy also undermines several livelihood interventions. For example, UNDP found that more than 50% of beneficiaries of small business grants and livelihood services in Hama Governorate were unable to increase their income and 10% had to stop their businesses due to energy shortages.<sup>53</sup>

Vocational training by humanitarian partners targeting vulnerable women and youth are also interrupted or constrained by lack of electricity, resulting in the suspension of practical training in areas like carpentry, welding, sewing, and car mechanics. An example is the vocational school in Douma, rehabilitated by UNDP in 2020. The school is only partially operating as it receives one hour of electricity every 10 to 12 hours.<sup>54</sup> Humanitarian partners are having to equip vocational centres with alternative and costly energy sources, which absorbs humanitarian funding.

Finally, the critical state of electricity provision is making it increasingly difficult for humanitarian partners to target localized energy solutions like solar lighting or the granting of small generators for workshops in a way that is perceived as fair. Too many vulnerable communities are affected by energy scarcity so individual- or neighbourhood-based solutions can generate social tensions. Solutions to target larger populations groups more equitably are increasingly urgent.

## Protection

The erosion of livelihoods and rising costs of living to which lack of electricity contributes is exacerbating protection risks among vulnerable populations. Negative coping mechanisms are on the rise including child labour and child marriage. There are also reports of increasing domestic violence as vulnerable households struggle to cope economically.

Lack of electricity also makes public environments less safe, especially for women and girls. Limited availability of electricity increases risks of exposure to violence in collective spaces during dark hours, including exposure to sexual and gender-based violence (SGBV).<sup>55</sup> In Souran sub-district in rural Hama governorate, for example, there were multiple incidents reported in 2021 of sexual harassment in WASH facilities during schools’ evening shifts. In nearby Hama City, women report feeling unsafe circulating at night, both within the city and between the city and rural areas for fear of being victims of theft and sexual abuse. Women and children, therefore, curtail their movements after dark.

Scarcity of electricity also impacts populations in camps and especially displaced populations living in collective shelters.

## Impact on the humanitarian response

Lack of electricity undermines protection services and safe spaces supported by humanitarian partners. For example, several civil status centres rehabilitated by humanitarian partners to expand and accelerate the provision of civil documentation are only partially functioning due to the prolonged hours of electricity outages. Similarly, community centres established by humanitarian partners to provide essential services such as psychosocial support, case management, children and women and girls’ safe

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<sup>53</sup> UNDP Syria – Hama Office Data.

<sup>54</sup> UNDP Syria – Southern Area Office Data.

<sup>55</sup> UNHCR Syria Data.



spaces increasingly rely on generators. Lack of fuel has resulted in frequent interruptions and obstacles to the delivery of protection activities, as well as unavailability of heating and water in facilities.

## Nutrition

The impact of electricity scarcity on the quality, diversity, and availability of food on the one hand, and on the ability of vulnerable Syrians to secure the basic food basket on the other, is documented in the Food Security and Agricultural sector and in the Early Recovery and Livelihoods sector above. These trends are driving up food insecurity and malnutrition in the population. According to the July 2021 SMART survey, the prevalence of acute wasting (mid-upper arm circumference (MUAC) < 125 mm and/or bilateral pitting oedema) increased from 0.9% to 4.7% since the 2019 SMART survey results.<sup>56</sup>

### **Impact on the humanitarian response**

The safety and quality of fresh food in the Pregnant and Lactating Women-Cash-Based Transfer program has been affected by lack of electricity. Long and repeated electricity outages resulted in partial thaw-freeze cycles that impacted the quality of the meat and the food safety. As a result, the program has replaced fresh meat with canned meat and chicken. Lack of electricity has also contributed to rising food prices, which is impacting the number of beneficiaries the program can support. In addition, increasing electrical outages have resulted in delays registering new beneficiaries and verifying pregnancies at clinics.

Electricity outages are also leading to a drop in the number of beneficiaries who attempt to visit Community Management of Acute Malnutrition (CMAM) clinics after 4 pm. Cooperating partners are facing difficulties in charging batteries needed to provide lighting in clinics and CMAM centres. Cooperating partners are also unable to charge laptops used for data entry and report generation, which leads to delays in the projects. In CMAM centres, children are screened in cold rooms due to power outages and a lack of fuel.<sup>57</sup>

## Emergency Telecommunications and Logistics

The emergency telecommunication sector relies on the stability and sustainability of the electric power supply to operate all the equipment that provides security telecommunication and internet connectivity services in all common operation areas (Hubs). In 2021, the emergency telecommunication cluster (ETC) witnessed further degradation of the quality and availability of power electricity from the national grid which is the main power source for the data centres in the Hubs and the security operation centres (SOCs) across Syria. This is exposing the emergency telecommunication sector to greater risk in providing and sustaining critical communication services for the security and safety of the humanitarian actors. As a result, and in 2021, the emergency telecommunication cluster (ETC) has implemented solar power systems in six UNDSS managed security operations centres.<sup>58</sup>

Many of the humanitarian partners' offices were affected by electricity outages. Relying on generators as an alternative caused increased pollution. Although solar systems were installed for many offices, it remains inadequate in some governorates with cloudy and rainy weather, where in winter solar systems are insufficient.

Additionally, a lack of access to electricity and energy more broadly results in delays in correspondence with official authorities, particularly in remote and rural areas where computers, fax machines, and printers cannot be used. Some partners reported delays of up to a week in receiving clearances or handing over certificates. Power outages can also result in a breakdown of communication between humanitarian and their beneficiaries, particularly regarding cash distributions, sharing information about distribution dates/times, and hotlines for complaints.

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<sup>56</sup> HRP 2022-2023

<sup>57</sup> Nutrition Sector Syria Data

<sup>58</sup> Emergency Telecommunication Sector Syria Data



## IV. Conclusions and Recommendations

This paper has shown the multiple and significant ways through which electricity shortages are negatively impacting humanitarian needs in Syria today. The number of people in need of humanitarian assistance has been on the rise since 2020. Further increases are expected considering the deteriorating socio-economic conditions in the country. As voiced by vulnerable Syrians themselves,<sup>59</sup> lack of electricity is playing a central role in these dynamics, both as a symptom and a driver of socio-economic deterioration.

Electricity shortages are also undermining the effectiveness and sustainability of humanitarian interventions and elevating delivery costs. In a restrictive funding climate, this is of tremendous concern for the humanitarian community's ability to meet growing needs.

The impact of electricity on the Syrian humanitarian crisis must be urgently addressed. This will require joint efforts by humanitarian partners to further understand, advocate and respond to this impact. Some recommendations are highlighted below:

- 1) **Deepen joint understanding and evidence collection on the impact of electricity on humanitarian needs:** This report presents an initial step from humanitarian partners to evidence the impact of electricity on humanitarian needs. Efforts must be maintained to monitor this impact, which is likely to increase as the country's energy sector continues to deteriorate.<sup>60</sup> Evidence and data collection on the impact of electricity must inform predictions on the evolution of humanitarian needs and plans to respond to them, including appropriate budgets that take into account higher operational costs.
- 2) **Increase advocacy and dialogue with donors on the need to address electricity shortages as a humanitarian imperative:** In the current Syrian context, access to electricity is a critical humanitarian issue. The 2022-2023 HRP foresees activities to increase community access to energy sources, namely through the distribution of solar systems and the rehabilitation of basic electricity networks. In addition, providing energy systems is now also becoming an integral part of early recovery and resilience operations across the HRP when essential services and community productive infrastructures are targeted (e.g., rehabilitation of health facilities, schools, irrigation systems, markets, etc.). It is critical that these activities are funded. Beyond these activities, donors and other humanitarian partners will need to further reflect on more ambitious measures to stem the impact of electricity scarcity on humanitarian needs. Currently planned HRP activities related to energy will not be enough to prevent a further increase in needs driven by energy scarcity.
- 3) **Identify opportunities for pooled energy resources across sectors and interventions through integrated, area-based programming:** Energy provision to ensure the sustainability and impact of humanitarian interventions is driving up costs, which in turn reduces the number of beneficiaries that can be targeted. To the extent possible, humanitarian partners should be thinking collectively of energy solutions for targeted areas, in order to pool resources and increase efficiencies. This is particularly important in rural areas where lower population density poses challenges to equitable reach. In this regard, area-based programming can help humanitarian partners jointly assess the energy needs required for the impact sustainability of their interventions and seek collective solutions to power these.

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<sup>59</sup> 2021 MSNA

<sup>60</sup> This report was drafted prior to the Ukraine crisis. Additional data collection is required to assess additional, possible impacts of the Ukraine crisis on electricity access in Syria as a result of rising fuel prices in global markets.