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Sustainable Energy Distribution Methods at the Azraq and Za'atari Refugee Camps in Jordan: A Refugee Perspective

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SUSTAINABLE ENERGY DISTRIBUTION METHODS AT THE AZRAQ AND ZA'ATARI REFUGEE CAMPS IN JORDAN: A REFUGEE PERSPECTIVE

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List of Abbreviations

CO_2 ..... Carbon dioxide

GHG ..... Greenhouse Gas

HSR ..... Human Subjects Review

IPCC ..... Intergovernmental Panel on Climate Change

IRB ..... Institutional Review Board

kWh ..... Kilowatt hours

LED ..... Light-emitting diode

MWp ..... Megawatt peak

NDC ..... Nationally Determined Contribution

NGO ..... Non-Governmental Organization

SARB ..... Study Abroad Review Board

SIT ..... School for International Training

SRAD ..... Syrian Refugee Affairs Directorate

UNFCCC ..... United Nations Framework Convention on Climate Change

UNHCR ..... United Nations High Commissioner for Refugees

USD ..... United States Dollar

Abstract

The looming climate change crisis requires research and development of mitigation strategies to protect those most vulnerable. This study uses semi-structured interviews to capture the refugee perspective of the successes and shortcomings of large-scale solar farm projects installed at the Azraq and Za'atari Syrian refugee camps in the west and north of Jordan, respectively. These perspectives may be utilized to improve each camp's current renewable energy distribution system. Results suggest that at both camps the current renewable energy systems are deeply flawed with limited hours with rampant distrust among camp residents in the management of the solar farms. Most refugees demand individual accountability through energy sensors on each caravan or personal home solar panel systems. Women, students, and those afflicted with illnesses are the most impacted by the energy limitations but all refugees face difficulties that are exacerbated by the region's increasing temperatures which are linked to climate change. The two camps are quite different, both in historical development and modern management. However, the results for each camp were similar. This suggests that individual accountability may be effective at refugee camps globally once adjusted to the context-specific challenges. Azraq and Za'atari serve as case studies to inform future research on solar energy systems in temporary settlements to prepare for the imminent climate refugee crisis.

There is no way to compare it. Electricity is life. We cannot compare darkness to lightness.

(Interviewee 6, July 5, 2023)

1.0 Introduction

The Middle East is a geographically significant area with complicated, multidimensional international relations. The following section includes a brief snapshot of the relevant modern history of the Middle East to this research topic. This includes an overview of the start of the Syrian Civil War and the subsequent Syrian refugee crisis and the path of these refugees in Jordan, a small, politically stable, water-scarce nation on the southern border of Syria. The Syrian refugee camps established in Jordan are some of the largest camps in the world, and the sustainable energy development of these camps located in north and west Jordan are the focus of this research paper.

1.1 Background

There is a long, tumultuous history within the Middle East. The ongoing conflict in the region, which spreads from Turkey and Morocco in the west through Iran and Pakistan in the east, is due to a multitude of reasons, many of which are rooted in the Arab-Israeli conflict (Fawcett, 2013). Located in the center of the Middle East is the Jordanian state, which was established in 1921 (Bani Salameh & Aladwan, 2016). The state has been integral to supporting peace in the Middle East, in part by welcoming refugees from surrounding nations. Citizen support for Israel remains low, attributed to the fact that around 60% of all Jordanians are of Palestinian origin (Schenker, 2014). Despite this, the Jordan-Israel Peace Treaty was signed in 1994, a time when over two million Palestinian refugees had fled to Jordan amid the Israeli-

Palestinian conflict (Bani Salameh & Aladwan, 2016). The peace agreement, known as the Wadi Araba Agreement, acknowledged the resettlement of Palestinian refugees within Jordanian territory (*Wadi Araba Agreement*, 1994). As a result, Palestinians residing in Jordan are not registered with the UNHCR as refugees nor are they granted refugee status by the government of Jordan.

This somewhat muddled definition of what a refugee is complicates the ability of researchers and aid organizations alike to classify population numbers of displaced persons. According to the UNHCR, Jordan hosted 89 refugees per every 1,000 inhabitants in 2017, making it the second largest host of refugees relative to population numbers (UNHCR, 2017). Currently, Jordan continues to host one of the largest refugee populations of any country in the world, which protects substantial numbers of refugees from Yemen, Sudan, Somalia, and Iraq (UNHCR, 2023b). A large percentage of refugees are estimated to remain unregistered with the UNHCR, with population estimates in Jordan ranging from 2.7 million refugees by Amnesty International to under 700,000 by UNHCR (Arar, 2017).

Despite varying totals, organizations agree that the largest refugee group is from Syria. 1.2 million Syrian refugees have entered Jordan in the last 15 years (Alshoubaki & Harris, 2018), and, according to the government of Jordan, an estimated 1.4 million Syrians live in Jordan (Sahin Mencutek & Nashwan, 2021). This number is much higher than the UNHCR, which claims a total of 672,952 Syrian refugees in Jordan as of 2021 (UNHCR, 2021b) because the Jordanian government, which does not consider Syrians as refugees, is estimating totals for unregistered Syrian refugees as well as Syrians who relocated to Jordan before the start of the Syrian war and crisis (Sahin Mencutek & Nashwan, 2021). Furthermore, scholars have found that the government has previously exaggerated Syrian inhabitant numbers to secure more

funding from external donors and organizations (Arar, 2017). While the total number of refugees currently residing in Jordan may remain foggy, the nation is still rightfully considered a world leader in refugee hosting and was the number one country for resettlement initiatives headed by the UNHCR in 2015 (Arar, 2017).

A major reason for this and the large percentage of Syrians within Jordan's borders is the result of the Syrian Civil War. The conflict was sparked by the Arab Spring, a wave of pro-democracy protests that spread across the Middle East. These protests reached Syria on January 26, 2011, and turned into an uprising on March 15, 2011 (Żuber & Moussa, 2018). The situation rapidly deteriorated and soon became the bloodiest response to the Arab Spring uprisings across the region (Ivanciu, 2016). The brutal crackdown from Syrian President Bashar al-Assad sparked the civil war, which remains ongoing to this day, with rebel groups battling government forces for control of large and small cities across the nation (Żuber & Moussa, 2018). After five years of fighting, the war had claimed over 200,000 lives (Berti, 2015), and an estimated 13.5 million Syrians, just over 71% of the total population, needed humanitarian assistance (Doganay & Demiraslan, 2016). This caused a forced migration of Syria's people, known as the Syrian refugee crisis, through the Middle East and into Europe (Berti, 2015). Turkey hosts the largest number of refugees, while many more have flooded further west into Europe and south through the middle east into Jordan and beyond (Doganay & Demiraslan, 2016). Jordan is relatively small in geographical size, with a population of just over 10.5 million people, and some scholars suggest that the migration influx at the start of the crisis means that Syrian refugees comprise more than 10% of the population of the entire country (Berti, 2015).

There are currently two refugee camps exclusively for Syrians in Jordan: Azraq and Za'atari. These camps were established in response to the crisis that has brought 120,000

refugees to Jordan (UNHCR Jordan, 2022c) and remains under the joint administration of UNHCR and SRAD. This is a minority of the Syrian refugees in Jordan, as the majority live in wider Jordanian society and not at the refugee camps within the country. Located 10 kilometers east of Mafraq, Jordan, the Za'atari refugee camp, housed 82,268 refugees in nearly 19,500 families as of September 2022 (UNHCR Jordan, 2022b) and is one of the largest refugee camps in the world (UNHCR, 2021c). At Za'atari, 55% of inhabitants are children and 18% are under five years old (UNHCR Jordan, 2022c). On the other hand, the Azraq refugee camp, which opened in 2014, is about half the size and houses 39,322 people (UNHCR Jordan, 2022c). There is no data published on the number of families. Unlike the Za'atari camp, which is located near the border of Jordan and Syria, the Azraq camp is located near Azraq, Jordan, about 80 kilometers east of Amman, Jordan's capital city and much more central in the country. Azraq has a slightly higher population of children, with 60% of all residents currently underage and 20% under five years old (UNHCR Jordan, 2022c).

Despite population differences, UNHCR boasts similar success rates among both camps, with around 70% of children in both locations enrolled in school and around 8% of the working-age population holding work permits with 10% of those permits held by women (UNHCR Jordan, 2022c). The major difference between the success of the two camps is that hygiene and sanitation conditions at Azraq remain a concern and priority for the UNHCR. As of last year, only 12% of latrines needed by people with disabilities and the elderly have been constructed (UNHCR Jordan, 2022c).

In addition to sanitation concerns, an ongoing problem at both camps since their establishment was access to energy. The lack of energy limited refugees' abilities to charge electronics, refrigerate food, cook, wash clothes, study, and more. Furthermore, the darkness

posed safety challenges to women and children walking to latrines after nightfall (UNHCR & IKEA Foundation, 2017). This all changed in 2017 when the IKEA Foundation's Brighter Lives for Refugees campaign funded just under $10 million U.S. dollars to bring renewable power to the camp. This marked a major milestone as on that day Azraq became the first refugee camp powered by renewable energy (UNHCR & IKEA Foundation, 2017). The installed solar photovoltaic plant has a total capacity of five MWp and is connected to a camp-wide electricity grid funded by the Saudi Fund for Development. Plugged into nearly 9,000 shelters as of 2022, the plant provides an average of four kWh/day. According to a press release by UNHCR, this is enough electricity for the average shelter to power lights and charge electronics as well as power a refrigerator, water filter, fans, and television (UNHCR Jordan, 2022a).

At Za'atari, the largest solar field ever built to power a refugee camp was established soon after Azraq (Hashem, 2017). At both camps, the solar plant is under the administration of UNHCR, and most employees are refugees that reside in the camp. Unlike Azraq, the UNHCR has published ongoing energy efficiency projects to extend electricity access among residents. This includes upgrading the current electrical grid to improve shelter power connections and replacing all streetlight bulbs with LEDs. Additionally, smart meters have been installed at the 12 transformers found at the camp to better monitor energy consumption (UNHCR Jordan, 2022b). Despite these updates, the plant has struggled to keep up with demand and the original 12 hours of energy provided to Za'atari has been reduced to nine hours a day (Lagodich, 2022). Currently, it is unclear if these energy shortages and initiatives to extend energy access are only present at Za'atari, or if this is the only camp where ongoing electrical improvement projects have been published.

This clear lack of information on energy initiatives and potential shortages demands academic insight into the issue. The number of refugees in the coming decades is predicted by scholars to skyrocket, largely due to the looming impacts of climate change (Docherty & Giannini, 2009). This implies the establishment of more refugee camps in the near future. As these solar fields are the first and largest ever installed in temporary settlements established in response to a crisis, their successes and failures need to be documented so future crisis scenarios can adopt the developments at the Azraq and Za'atari camps to improve the quality of life for future refugees globally.

1.2 Statement of Purpose

This paper aims to analyze the refugee perspectives on sustainable energy distribution methods at the Za'atari and Azraq refugee camps in Jordan. In 2017, the lights were turned on for nearly 20,000 Syrian refugees in Jordan's Azraq refugee camp (UNHCR & IKEA Foundation, 2017). Later that same year, the lights powered on for an additional 80,000 Syrian refugees at the larger Za'atari camp, which remains the largest solar photovoltaic plant ever installed in a refugee setting (Hashem, 2017). Spearheaded by the UNHCR, these advancements mark a promising future for improving the quality of life at refugee camps globally.

However, both these projects have had to cut back on power supply as severe electricity shortages across the nation persist and access to electricity at these two camps has decreased in recent years as the population grows and electrical usage increases (Lagodich, 2022). There are several pilot projects underway to monitor energy usage in individual accommodations with the potential to limit energy access based on the number of individuals in each accommodation. This initiative is known as "Equitable Energy for Refugees." No official documentation of this work

has been published. Additionally, to date, there is no published research on the refugee perspective on energy distribution methods. This project will be a first-of-its-kind study of reusable energy distribution in temporary refugee settlements. This exemplifies the need to study the shortcomings of the current energy distribution methods as results can be used to improve and extend equitable energy access to those currently residing in the Azraq and Za'atari camps.

1.3 Research Objectives

Information about the causes of this demand increase and the reactions of refugees will be collected and synthesized to produce a critical analysis of the solar panel energy system installed at the two camps and how they can be improved. Data gathered will be bolstered with background knowledge established through an ongoing literature review. This will be a core outcome unique to the project in Jordan based on refugees' perspectives.

In addition to direct applications to residents of these two camps in Jordan, the research conducted in this paper is timely and significant on a broader scale. The study has three core objectives. The first is to employ these locations and their residents as a case study to make informed suggestions to improve energy access at the Azraq and Za'atari camps from refugees' perspectives. The second is to apply these findings to suggest ways to introduce more efficient sustainable energy systems at other temporary settlements in Jordan and beyond, particularly for those fleeing climate change-induced crises. The third is to collect interview data from refugees on a critical energy topic in the era of climate change. In the coming decades, scholars anticipate a substantial uptick in climate refugees in Jordan and the wider region due to the climate crisis and forced resettlement (Docherty & Giannini, 2009). In such circumstances, the results of this

study could be applied to meaningfully address sustainable energy challenges at future temporary settlements in the Middle East and globally.

1.4 Research Questions

This study seeks to answer the following research questions to adequately address sustainable energy development and distribution in temporary settlements:

- How has the introduction of a renewable energy system to the camp changed the lives of its residents?
    - What are shortcomings and/or oversights refugees have found in access and energy distribution?
    - Regarding energy access, what would refugees like to see improved at the two camps?
- How can the findings of this study be applied to improve the current energy system employed at the two camps?
- How can the results be extrapolated to other refugee camps established in response to climate disasters?

2.0 Literature Review

The following section provides an in-depth literature review of relevant existing research and information regarding several relevant topics to this study. These topics include how climate change is impacting Jordan and the world, Jordan's climate change mitigation and adaption

goals, climate refugees globally and in Jordan, and energy systems in existing refugee camps in Jordan and beyond.

2.1 Climate Change in Jordan

Jordan is a small, water-scarce country in the Levant region of Asia. Located on the shores of the Dead Sea, this nation of over 10.5 million people (Ministry of Environment, 2021) is starting to face the challenges of a shifting climate in what is already an arid region of the world. This nation has long struggled to provide adequate water to support its citizens' (Abu-Allaban et al., 2015), and looking forward, current climate models predict rampant drought across the region in the coming years and decades (Rajsekhar & Gorelick, 2017). Jordan's other major climate-related challenges include concerns about agriculture and food security, protecting biodiversity and ecosystems, and the population's general health. Recent academic studies have found that as a nation already vulnerable to extreme weather events and conditions before climate change, the anticipated impacts from climate change may be drastic unless immediate action is taken (Abdulla, 2020).

In 2015, Jordan took part in the United Nations Climate Change Conference and was a signatory to the Paris Accords, in which they agreed to outline a national plan to curb their GHG emissions to keep the planet below 1.5 °C above pre-industrial levels (Bluwstein & Cavanagh, 2023). The nation’s plan on how to do so was published soon after and is known as their nationally determined contributions (NDC), published in response to article 4, paragraph 12 of the Paris Agreement (Ministry of Environment, 2021). The document was updated and resubmitted to the UNFCCC in 2021. According to the Jordan Ministry of Environment, this was done to address the nation’s recovery from the COVID-19 pandemic and skew recovery towards

a greener, low-carbon, and more climate-resistant pathway. This updated document provides more accurate and up-to-date information on the nation's goals and game plan moving forward. Within the document, they detail adaption techniques and ongoing mitigation initiatives pushing for a green economy and reducing their carbon footprint and overall GHG emissions by transitioning to renewable energy systems (Ministry of Environment, 2021).

Current climate predictions outline a potentially dire future for the nation (Abdulla, 2020) and the NDC outlines the necessary steps to prevent the most drastic consequences of the changing climate. However, experts are finding that Jordan's NDC is insufficient (Combaz, 2019), therefore, it is valuable to understand the anticipated impacts as understood by most recent data. The major climate change impacts of extreme temperatures, unpredictable weather, and water scarcity are described in the following sections.

2.1.1 Temperature

Over the last decade, climate scientists have begun to examine the impacts of climate change in Arab countries as recent and historical changes in weather patterns have begun to occur with increasing regularity (Lonergan & Kavanagh, 1991). Jordan is already a country dealing with limited precipitation, high temperatures, and drought, all factors exacerbated by climate change. These factors, particularly extreme heat, are driving up fossil fuel and energy demand and price (Ministry of Environment, 2021), meaning on Jordan's current path, as temperatures increase, the more fossil fuels are burned and the higher the nation's carbon footprint. Furthermore, the country has a heavy reliance on imported gas and fossil fuels as national supplies are highly limited (Ministry of Environment, 2021). This information,

published by the national government of Jordan, is corroborated by recent academic publications mapping current trends and providing predictions for what is to come.

While studies differ slightly in predicted values for future mean temperatures based on the pathway used, scholars unanimously agree that mean temperatures in Jordan are expected to rise. Different studies examine different projected pathways based on the extent to which GHG emissions are curbed. One study by Abdulla, (2020), suggested potential temperature range increases for both maximum and minimum values within scenarios A2 and B2, published in the IPCC Third Assessment Report in 2001. These scenarios can be broken down further and cover a wide range of predicted carbon dioxide emissions for the years 1990-2100. However, while there is some overlap in predicted emissions for each scenario, generally scenario A2 predicts a world with higher global carbon emissions than scenario B2 (Nakicenovic et al., 2000). Abdulla, 2020 found that from 2050-2065 under both scenarios, temperatures in Jordan are likely to rise. Under scenario A2, the average temperature range rises from less than 0.5 °C to about 2.7 °C, and from less than 1 °C to about 2.7 °C in scenario B2. Furthermore, monthly minimum mean temperatures are expected to increase for all months under both scenarios, and overall atmosphere warming is expected to be from 2.5 °C to 5°C by 2100 (Abdulla, 2020).

Samuels et al., 2011, found that from 1960-1990 temperature data the predicted annual mean temperature for 2031-2050 is 2.1 °C higher than the control period. Another study found that under a “business-as-usual” scenario, the average annual temperature will rise in Jordan by 4.5 °C by 2071-2100 (Rajsekhar & Gorelick, 2017). These papers, varying in dates of publication and study parameters, suggest similar findings which suggest that the extreme warming predicted for Jordan over the next century is likely.

Despite the in-depth studies on current and predicted temperature fluxes in the Middle East, there are limited studies on climate change's impact on Syrian refugee camps in Jordan, and even fewer examine the impact of heat on these camps. Albadra et al., (2017) claimed to be the first to study this and surveyed the Azraq and Za'atari refugee camps, analyzing caravan temperatures, clothing, and comfort levels of refugees by season. They found that at both camps the majority of families found the summer months unbearably hot and struggled to cope with the heat in addition to additional personal challenges (Albadra et al., 2017). Such intense upticks in mean temperature will likely have a major impact on refugees living in insufficient shelters and the nation, particularly through resulting climactic events such as extreme droughts resulting in water shortages. This so-called "snowball" effect of global warming in which one effect causes or exacerbates another is the future of the country.

2.1.2 Drought and Water Scarcity

Jordan is considered one of the water-poorest countries in the world, averaging 135 m^3/yr per capita (Rahman et al., 2015). The nation heavily relies on the already-uneven and unpredictable annual precipitation patterns as its main combatant against severe water scarcity (Abu-Allaban et al., 2015). Studies of meteorological data from the past 30 years including precipitation rates and temperatures have found that climate variability will continue to increase causing undue stress on native animals as well as loss of soil fertility and erosion (Matouq et al., 2013). A study by Rajsekhar & Gorelick, (2017) used historical data from 1981-2010 along with future climate variability predictions. They found that compared to the historical data analyzed, the predicted average values for the years 2070-2100 showed that rainfall will decrease by 30% and temperatures will rise by 4.5 °C. Furthermore, the average drought occurs at a rate of about

eight in 30 years and will increase to about 25 in 30 years (Rajsekhar & Gorelick, 2017). Based on the scenario in question, the decrease in annual precipitation rates in Jordan ranges from 10% to 37% (Abdulla, 2020), but all projection scenarios on GHG emissions over the next century indicate a reduction in precipitation. Furthermore, J. T. Al-Bakri et al., (2019) conducted an analysis of precipitation rates by region in Jordan and found that high rainfall zones are the most likely locations to experience extreme drought. This is due to their low capacity for adaptation to new water resources in relation to population estimates (J. T. Al-Bakri et al., 2019).

As studied by Hammouri et al., (2017), over the past two decades there has been a steadily increasing gap between water demand and water availability across the country. This is largely due to a population boom in which the nation's population doubled over the past 20 years. The growth rate was estimated at 2.5% in 2012 (Hammouri et al., 2017), but due to unexpected geopolitical circumstances in the region over the past ten years, Jordan saw an influx and mostly Syrian refugees that placed a major strain on water supplies (El-Naser, 2009; Hammouri et al., 2017; Rajsekhar & Gorelick, 2017). These authors suggest that the nation's water supplies were already heavily strained by the political instability in the region, leading Jordan to host over 1.5 million refugees who have crossed over the border from Syria due to the civil war (Hammouri et al., 2017). Rajsekhar & Gorelick, (2017) suggested that in addition to refugee communities and climate change, most of Jordan's freshwater resources originate from a river that flows from the Syrian territory in the north. This makes Jordan's supply reliant on Syrian agricultural land use and overall water depletion from Syria as well, and due to climate change and the predicted outcomes, the precarious situation will likely continue and lead to long-term consequences, particularly in agriculture.

As the amount of rainfall and overall water availability is very likely to decrease, the potential aftereffects, such as soil erosion and severe drought, have increasingly become the subject of academic studies. In Jordan, one sector, particularly at risk for these aftereffects, is agriculture, with a handful of literature corroborating this. Water consumption and agriculture are closely linked, with high levels of water consumption occurring in the agriculture sector, which has endangered their water supply by drying up sources as well as polluting them (Hadadin et al., 2010).

The challenge of maintaining crops in the coming decades falls to rainfed agriculture, and most significantly to grain crops such as wheat and barley (J. Al-Bakri et al., 2011; Gazal, 2021). J. Al-Bakri et al., (2011) found that rainfed agriculture has a high vulnerability to decreased precipitation paired with increased drought, both anticipated climate change impacts in the m-Middle East. They found that these factors significantly impacted crop yield in Jordan and are likely to be exacerbated in the coming years, suggesting that soil water conservation be practiced as an adaptation measure (J. Al-Bakri et al., 2011). Another study by Al Qudah et al., (2021) completed an assessment of a variety of adaption measures and their efficiency, suggesting that irrigation water-related adaptation measures must be the highest priority. This data portrays the grim future of Jordan if immediate steps are not taken to mitigate the impacts of climate change as well as adapt to the already looming climate crisis that cannot be reversed.

2.2 Syrian Refugee Camps in Jordan

Jordan has dedicated national and international parties addressing the quality of life at refugee camps (Francis, 2015). This includes successful projects not only to provide electricity to two of the largest refugee camps in the country but to power them sustainably. Since the start of the

Syrian refugee crisis, Jordan has made a name for itself by prioritizing development and humanitarian aid for refugee populations in a national plan (Francis, 2015). Today, the Azraq and Za'atari camps are two of the largest Syrian refugee camps and are no exception to quality-of-life concerns. As one of the most water-scarce countries in the world, making sanitation and clean water access two of the greatest challenges faced at Jordanian Syrian refugee camps (Dalal et al., 2018). Many current and historical refugee camps have poor conditions, and most have poor sanitation and little or no electricity and energy access, as was and continues to be the case in some Jordanian camps. The Jordanian case is exemplary of a global trend: of the 8.7 million refugees in camps, 80% have little to no access to electricity and only 11% have reliable energy access (Neves et al., 2021).

Azraq and Za'atari have become well-established in the past few years which has led to infrastructure upgrades led mainly by humanitarian groups. This includes the construction of more permanent structures at the camps for its residents. However, Dalal et al., (2018) critically examined the urbanization at these camps and identified the shortcomings of urbanization projects, and suggest pathways to improvement. The primary issue with previous urbanization attempts was the misidentification of variation within refugee populations, an error of sorts often made by humanitarian agencies more focused on immediate needs than longer-term development (Dalal et al., 2018). By viewing and treating refugees as a larger group and assuming their infrastructure needs, organizations may fail in their central goal. Refugees tend to develop their own social structure and urban design plans that do not necessarily align with the governing agencies overseeing camps. To address this concern, Dalal et al., (2018) suggested development projects be tackled as a structured master plan like any urban design program, rather than from a humanitarian approach. As solar panel installment and electricity distribution fall within the domain of infrastructural development, the work by Dalal et al., (2018) suggests that any plans to further improve energy efficiency should not be done through the lens of a humanitarian approach.

Dalal et al., (2018) and others, such as Lehne et al., (2016), agree that energy access should be improved in refugee settlements; however, there is limited reporting by organizations (such as UNHCR) and a lack of reliable data on energy usage and consumption rates at camps to make effective suggestions that might improve energy equity. despite such challenges, Neves et al., (2021) present a modeling approach for sustainable energy distribution at camps. These researchers found that the greatest use of energy at refugee camps is cooking appliances, most of which use diesel fuel or firewood. These practices are energy intensive and release GHGs into the atmosphere. Lahn & Grafham, (2015) found that 6.85 million tons of CO_2 per year would be saved by switching to electric energy at refugee camps globally. Furthermore, the widespread introduction of improved cooking stoves and solar energy-powered lights would save $323 million a year in fuel costs at the camps (Lahn & Grafham, 2015).

2.2.1 Azraq Syrian Refugee Camp

The Azraq Syrian refugee camp was originally opened in April 2014 to house Syrian refugees (Oddone, 2014). However, the camp was used two decades prior from 1990-1991 as a transit refugee camp housing refugees from Iraq and Kuwait during the Gulf War (Oddone, 2014). Today, the camp is run by the UNHCR and SRAD (Hoffmann, 2017), a branch of the Jordanian interior ministry, and is currently at about half its maximum capacity of 120,000 to 130,000 refugees (Knell, 2014). Unlike the Za'atari refugee camp which began hosting refugees in 2012, Azraq was opened out of need in response to overcrowding at Za'atari (Kader & Al-Rifaie, 2020). Unlike Za'atari, the Azraq camp is triple the size and was designed meticulously before construction. Taking a year to complete, the camp was built with caravans constructed out of metal sheets from the get-go. This differs from most refugee camps, which are typically plotted tents before more permanent structures are built (Kader & Al-Rifaie, 2020).

After its establishment, the Azraq camp was praised by policymakers and media channels for its high potential for sustainable development and as one of the world's best-designed refugee camps (Kader & Al-Rifaie, 2020; Tyrrell, 2021). This claim has created polarizing views within the academic community drawing confirmation and criticism alike. Kader & Al-Rifaie, (2020) agrees that the camp is well designed, organized, and planned, and can be developed further into an environmentally-friendly camp, and uses the construction of the solar farm as an example of how developers are seeing this vision through.

On the other hand, a handful of other studies view the development of the camp as one with security in mind over the well-being and quality of life of the refugees living within. Azraq is located in a highly militarized, desert landscape with careful development (Dalal et al., 2018), designed in such a way that allows security and police to quickly access any block in the event of a riot (Hoffmann, 2017). This design automatically criminalizes refugees, and Hoffmann, (2017) goes on to argue that the design of the camp was to protect aid workers rather than refugees. This inhibits the ability of humanitarians to provide successful assistance as security detail surrounding their work will prevent them from building meaningful relationships with the population they are trying to help (Gatter, 2023; Hoffmann, 2017). In another study, Tyrrell, (2021) suggested that the architecture of the camp with homogenous buildings fosters an environment that deprives refugees of political agency. Located in a desert landscape, Dalal et al., (2018) took a similar stance in their research on the security system design of the camp and found that the infrastructure and caravan design for the refugees is not conducive to a comfortable shelter or fulfilling cultural norms of the refugees. Rather, the caravans were designed as they were as a form of security that further criminalizes its inhabitants (Dalal et al., 2018).

The majority of publications on the security, history, and development of the Azraq Syrian refugee camp take a negative stance toward its militarized design despite being applauded by some as one of the best-designed camps in the world (Hoffmann, 2017). This suggests that there is a very different narrative being shared by the government of Jordan, UNHCR, and SRAD compared to the stories and experiences of refugees as collected by the scientific community.

2.2.1.a Renewable Energy Development at the Azraq Refugee Camp

As mentioned in previous sections, the solar farm at the Azraq Syrian refugee camp is the first in the world. The solar plant, funded entirely by the IKEA Foundation, cost 8.75 million euros, or about $9.89 million USD at the time of construction. Despite the large upfront cost, UNHCR estimates that this farm saves up to $2.75 million USD a year in electricity consumption costs (UNHCR & IKEA Foundation, 2017), meaning the high price tag attached to its installment will be repaid in savings in just under four years. Furthermore, this farm was estimated to reduce carbon emissions by an average of 6,300 tons per year (UNHCR & IKEA Foundation, 2017). The farm is a grid-connected solar plant with a total capacity of 5 MWp, which UNHCR estimates to cover about 65% of the electricity needs of the camp (UNHCR Jordan, 2022a). The system is connected to the camp with a grid-connected electricity network that supplies both low- and medium-voltage power and was funded by the Saudi Fund for Development (UNHCR Jordan, 2022a).

The establishment of the system and the technical details behind it are published by UNHCR, which oversaw its construction and continues to manage the system to this day. Press releases and updates by UNHCR detail the development of the system which was done in three

phases. The first press releases about the solar plant being switched on came in June 2017, but this was only the completion of the first phase, which connected Village 3 and Village 6 to the grid with 2 MWp. Phase 1 provided energy to 4,903 shelters, 22 organizations and operational facilities, and two marketplaces (UNHCR, 2020a). Phase two, completed over a year later, added 2 MWp +1.5 MWp and connected more areas to a total of 10,470 shelters, 22 organizations, and operational facilities, and four marketplaces, connecting Villages 2, 3, 5, and 6 to the grid. The third and final phase added 3.5 MWp on grid, and an additional 1.5 MWp in August 2019 and completed connecting Villages 2, 3, 5, and 6 to the solar farm (UNHCR, 2020a).

This long-term project was critically examined by Gatter, (2023), who argued that the way it was installed and the limited electricity provided is lacking. They found that the electricity provided only supports necessities such as devices for heating and cooling as well as limited access to technology. Gatter, (2023), who researched the politics and dynamics of refugees and the government to which they must adhere, suggested that solar farm fails to meet basic needs and the millions of dollars in savings UNHCR publicized from building the solar farm does not make its way back to the refugees. However, UNHCR claims that on average each shelter consumes 4 kWh per day which is enough power to run a refrigerator, water filter, fans, charge phones and laptops, and operate lights (UNHCR, 2020a). In the study, Gatter, (2023) drew a critical view of the camp's management using the solar farm as an example. They state that UNHCR publicizes the solar farm as an international success but as the solar farm fails to meet the basic needs of the refugees, it is far from that (Gatter, 2023). This perspective is unique among researchers and provides an interesting perspective of the economics behind the solar farm.

2.2.2 Za'atari Syrian Refugee Camp

The Za'atari Syrian Refugee camp had a very different start compared to Azraq. Unlike the Azraq camp, which was carefully planned before construction, Za'atari began as an informal and unofficial settlement. After the start of the Syrian civil war in 2011, the first refugees from Dar'a, Syria crossed over the Syrian-Jordanian border in early 2012 and quickly started a temporary settlement near the city of Mafraq, Jordan (Gatter, 2023). Soon after the first humanitarian organizations began to provide aid to the thousands of refugees in the area, which is now known as District 1 of the Za'atari camp (Gatter, 2023). A year later on July 28, 2012, the Mafraq Governate declared the official opening of the camp at the same location refugees were seeking refuge (Dalal, 2020; Ledwith, 2014). The original plan for the camp capped the number of inhabitants at 15,000 refugees, but by May 2013 the population was at 200,000 (Dalal, 2020). Informal development of mosques, shops, homes, and more, was quickly expanding, and was described by Kaddour et al., (2022) as "the birth of an instant city." Poor management and overcrowding led to an estimated 327 protests, sit-ins, roadblocks, demonstrations, and stone-throwing incidents from 2013-2014 (Clarke, 2018). Events that were often violently shut down by the Jordanian Gendarmes. Soon after there was a rapid drop in population as the government and UNHCR began to sponsor refugees to move to cities and transferred others to the newly opened Azraq camp in 2014 (Gatter, 2023).

At this time, Za'atari was still considered a short-term camp defined by the UNHCR and Jordanian government as a transit camp. However, in 2014, UNHCR replaced the much less permanent tents with thermally insulated caravans and added both sanitation and utilities (Seifert et al., 2023). The differences between each version of the Za'atari camp were found so immense that in an analysis by Seifert et al., (2023), each version was considered two different camps.

However, due to flawed planning by UNHCR, the camp continued to grow and expand messily, and the shape of the 12 districts designed and overseen by UNHCR continued to change daily (Dalal, 2020). Houses began to be constructed out of a host of materials, ranging from water tanks and Styrofoam to metal sheets (Dalal, 2020). Kaddour et al., (2022) suggested that the informal construction was the direct result of UNHCR providing each refugee family a single, small, one-space shelter which allowed for now privacy among its inhabitants. This created discomfort among family members as it went against common cultural norms and led to refugees constructing walls and additional rooms in their caravans (Kaddour et al., 2022). The entire process and design of the camp are largely considered a "failure" by humanitarian planners of Za'atari (Gatter, 2023).

2.2.2.a Renewable Energy Development at the Za'atari Refugee Camp

The original energy and electricity network of the Za'atari camp was as chaotic as the start of the camp. Unlike Azraq, there was power before the solar farm. However, this system was done illegally by rewiring the initial system put in place by UNHCR and the first aid organizations at the camps. This preliminary network was installed in 2012 by the Irbid District Electricity Company and powered streetlights and services considered essential by the UNHCR, such as aid organizations (Wardeh & Marques, 2021). This network was designed as a part of the short-term camp and thus not designed for private use by refugees (Seifert et al., 2023). However, camp inhabitants quickly begin to illegally wire their shelters and businesses into the official network (Alshoubaki & Harris, 2018; Seifert et al., 2023; Wardeh & Marques, 2021). Ledwith, (2014) estimated that over 300 kilometers of illegal wires were connected to the initial grid, covering an estimated 70% of all camp residents (Alshoubaki & Harris, 2018). This caused

a host of security, health, and safety concerns, in addition to dramatically increasing the costs of energy for the UNHCR (Kaddour et al., 2022; Seifert et al., 2023; Wardeh & Marques, 2021). In response, UNHCR dismantled and disabled the entire system in 2015 and replaced it with the solar farm system that can be seen today (Seifert et al., 2023).

This solar farm, which opened in November 2017, is the largest ever built at a refugee camp (Hashem, 2017). According to the UNHCR, the plant and grid were connected to every shelter at Za'atari in addition to 49 NGOs that operate at the camp. The 12.9MW solar plant has an anticipated lifespan of 25 years and was constructed with 40,100 solar photovoltaic panels. The plant is about the size of 33 football fields, covering over 20 hectares (UNHCR, 2020b). The project was funded by the Government of Germany and cost 15 million euros, or about $17.5 million USD to install (Hashem, 2017). With an average savings of $5.5 million USD annually, the anticipated return on investment for this project–as projected by the UNHCR– is within three years (UNHCR, 2020b). As a part of this project, UNHCR distributed 27,000 LEDs to shelters to improve energy efficiency. The estimated environmental impact of the project is a reduction of 15,600 tons of carbon emissions yearly, which is equivalent to about 30,000 barrels of oil (UNHCR, 2020b). The improvement in quality of life for refugees is high, but barriers remain for the current plant and grid. The most recent update on the Za'atari camp, published by UNHCR in 2022, stated that the plant only provides 30% of its built capacity due to many operation and maintenance challenges (UNHCR Jordan, 2022b).

2.2.3 Climate Change at Jordan's Syrian Refugee Camps

The literature on the impact of climate change on the Azraq and Za'atari Syrian refugee camps is highly limited. As apparent in the previous sections, there are many studies examining

the outcomes of climate change on the region and cite the population boom due to the Syrian civil war, such as the strain placed on water resources (Hashem, 2017). Data from the UNHCR on both camps provide broad outcomes of climate change at the camps, and a conference paper, Ashour et al., (2023), uses the Za'atari camp as a case study to understand climate change's impact on refugee camps. There are some studies on groundwater quality and water availability at the camps but no correlation between these issues and climate change is drawn within these papers as they focus on sanitation and wastewater issues rather than the lack of water availability (Saidan et al., 2017; van der Helm et al., 2017). No research on the climate change impacts at both camps together or individually could be located for this literature review.

Ashour et al., (2023) is the only available study on this matter. Published recently, the paper provides some information, but as it is the only study there is no alternate data or observations of this camp of Azraq to compare their results to. For the study, Ashour et al., (2023) conducted a literature review of research on groundwater resources, water availability and quality, average income, infrastructure, and health problems in the Za'atari camp and how these existing issues will likely be exacerbated by depletion and degradation of natural resources and desertification. Results suggest that several interventions to mitigate issues with safety, water availability, energy, and waste management be implemented to improve the poor quality of life refugees face as a result of current and worsening environmental conditions (Ashour et al., 2023).

The highly limited research that is available and none from studies on the ground at the Azraq and Za'atari camps serves as an emphasis on how these areas and populations are under-researched. Given their high vulnerability as refugees in a country anticipated to experience

severe direct impacts from climate change in the coming decades (Lister, 2014), further research and protections must be prioritized.

2.3 Climate Refugees

Environmental disasters, desertification, and rising seas displace millions of people every year. Studies have repeatedly and definitively proven that increased GHGs cause changes to Earth systems (i.e. global warming) and the resulting human displacements (Ni, 2015). Colloquially known as “climate change refugees” or “climate refugees, " displaced persons often cross international boundaries and spur debates and policies at the center of international environmental politics. This is an issue of growing concern, as studies predict that by 2050 the number of climate refugees will exceed traditional refugees (Docherty & Giannini, 2009). The concept of climate change refugees remains a relatively new one, with most academic literature on the subject published at or after the turn of the 21st century. Of this scholarship, most items appeared in or after 2010. In recent years, this has been a topic of interest among academics; however, the topic has been studied primarily in the fields of international politics and law because the nations that climate refugees turn to for aid cannot offer financial assistance or resettlement rights. In other words, there is a gap in international law and policies on this topic.

According to Ni, (2015), the above circumstances have led to vigorous academic debate within the field. Most researchers who employ the phrase “climate refugee” acknowledge that there is no internationally accepted definition of this relatively new concept (Bates, 2002; Black, 1994; Docherty & Giannini, 2009; Farbotko & Lazrus, 2012; Lister, 2014; Ni, 2015). According to the 1951 Convention relating to the Status of Refugees, the term “refugee” is officially defined as an individual who has crossed an international boundary due to “well-founded fear of being

persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion" (UNHCR, 2023a). UNHCR states that certain cases of climate disaster displacement can cause political instability in a region which allows climate refugees to qualify for general refugee status. However, to date, the UNHCR does not endorse the phrase "climate refugee." Displacement due solely to climate change-induced disasters does not qualify a person for general refugee status (Lister, 2014; UNHCR, 2023a). With refugee status, a person can receive aid and assistance from refugee-assisting organizations, such as UNHCR. This situation paints a dire picture for those being displaced by climate change, as there is limited aid available because they are not officially recognized as a vulnerable group.

With a well-researched and predicted influx of climate refugees over the next 30 years, more refugee camps will be established in climate change-impacted areas, both legally and informally. This dilemma depicts a future diplomatic and political battle over the definition of "refugee." While the outcome of a refugee's legal status remains foggy, the known impact of climate change and the resulting influx of displaced persons cements the need for a clear understanding of how temporary settlements such as refugee camps can be quickly and sustainably designed, developed, and established. As a part of this, providing energy to inhabitants is a must and electricity must be provided with methods such as solar panels, as they have limited GHG emissions.

3.0 Research Design and Methodology

To successfully design sustainable and renewable energy development and distribution systems in crisis scenarios and temporary settlements, it is of the utmost importance to recognize and document the successes and failures of the preliminary sites that have attempted to do so. These locations are highly limited, with the most developed and longest-running being the Syrian

camps in Jordan. This research aims to build an in-depth understanding of a vulnerable population's experiences with energy access and equity in a temporary settlement to suggest improvements to the current systems in Jordan that can then be extrapolated to other settlements. This research is timely as the impending climate refugee crisis will likely see an uptick in displaced people in the coming years and decades (Docherty & Giannini, 2009). The following sections will briefly describe the methodology, study sites, implications for participant selection, as well as an explanation of the methods of the data collection process, procedures, and analysis.

3.1 Study Sites and Methodological Rationale

Data were collected at the two major Syrian refugee camps in Jordan, which have a combined total population of 120,000 (UNHCR Jordan, 2022c). Many of the refugees at these camps have been inhabitants since they were founded. At Za'atari, there was an influx of refugees after the Syrian security forces began to heavily shell southern Syria in the first few months of 2013 and the camp saw a rise in population (Muna, 2013). The non-governmental humanitarian aid organization Relief International has been involved in education for Syrian refugee children residing at the camp in collaboration with UNHCR. By having a connection to Relief International which provided the necessary security clearance to enter the camps, interviews were able to be conducted without providing undue burden to study participants.

The core variable in this study was to understand the successes and failures of the current solar farm energy distribution system implemented under the oversight of UNHCR. Questions posed to the participants were solely of this nature, and all questions were approved by Relief International before the data collection process. Furthermore, for safety and security concerns for all members involved in the research process, Relief International played a major role in the

identification and selection process of all study participants. All interviewees had a pre-existing relationship with Relief International, but the exact nature of the relationship was not asked to protect the participant's privacy.

In the Azraq refugee camp, Relief International, where the residents of the Azraq camp were interviewed, is located on the northern edge and across the road from Village 6. Interviewees met there for the interview and were taken to a private room within the location marked in red (Relief International's field location) on the following March 2019 map of the camp. The solar panel field for Azraq is marked with a green outline and is located just outside the boundaries of the camp, south of the main highway connected to the camp (Highway 30).

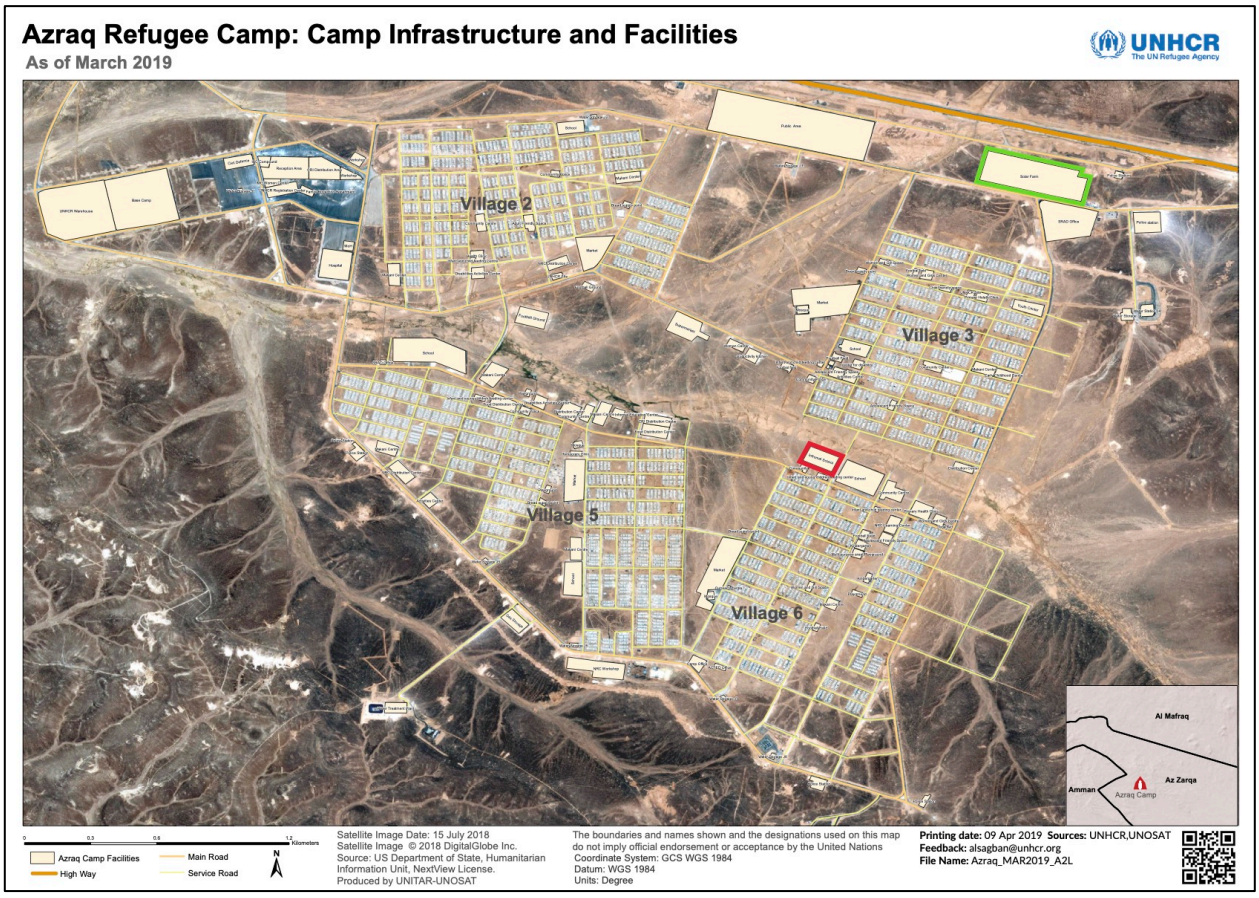

Figure 1. A map of the Azraq Syrian refugee camp as of March 2019. Relief International's field office is denoted in red. The solar panel farm is denoted in green. Image Credit: UNHCR.

In the Za'atari Syrian refugee camp, Relief International's field office is located within the residential areas of the camp on the northwestern quarter of the camp, about a five-minute drive south from the main entrance to the camp located on the northwestern edge. The office is just off the busy main market strip. The solar panel farm is located centrally just south of the Za'atari camp and is larger than Azraq's solar plant. The solar farm is not easily reachable and is located outside the boundaries of the camp. The location of interviews for this study is marked in red and the solar farm providing energy to the camp is marked in green on the following May 2019 map of the camp.

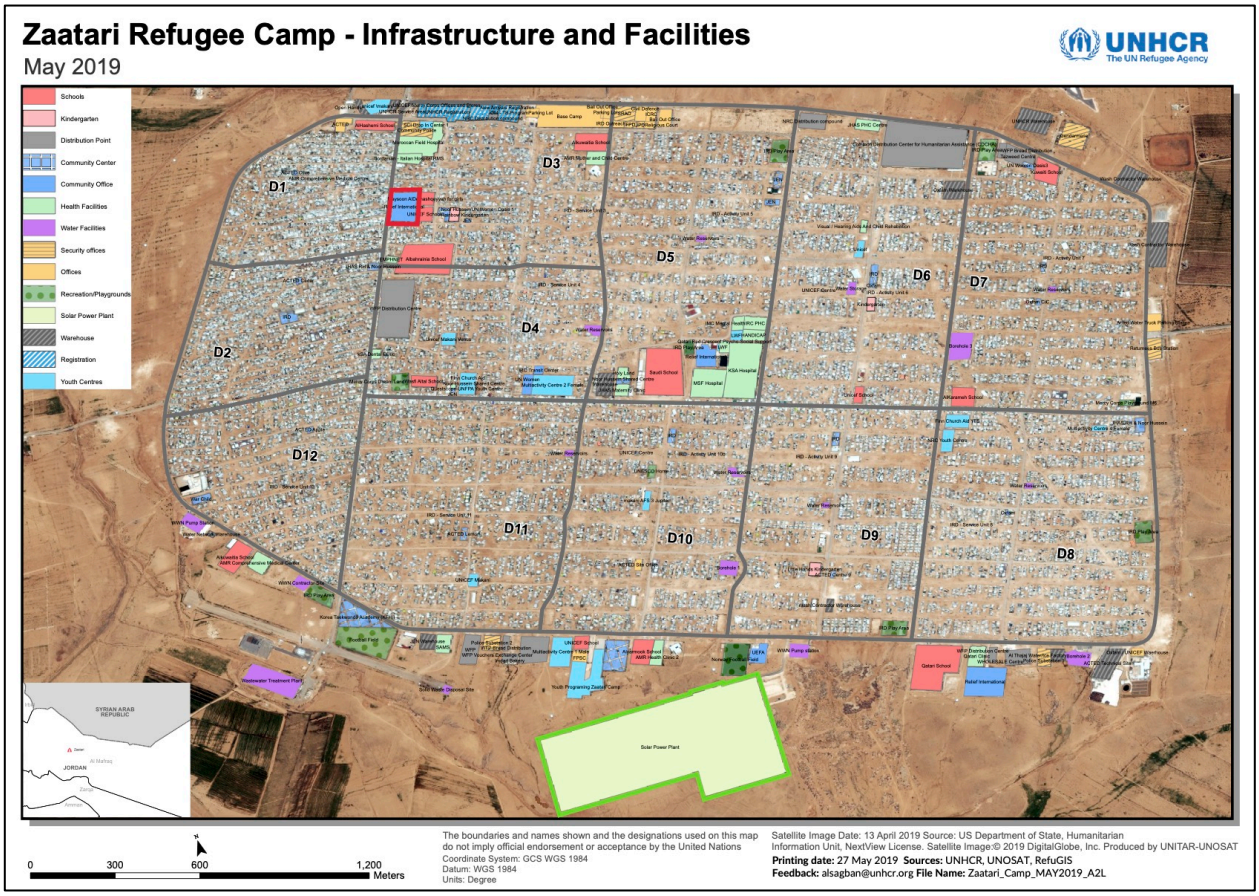

Figure 2. A map of the Za'atari Syrian refugee camp as of May 2019. Relief International's field office is denoted in red. The solar panel farm is denoted in green. Image Credit: UNHCR.

3.2 Method of Data Collection

The methods employed in this study consisted of semi-structured individual interviews that occurred within the Azraq and Za'atari camps. An average of 10 questions were prepared before the start of the interviews and translated into Arabic before being discussed with the translator assigned to the study by Relief International. Five prepared questions were asked to all participants in the study, regardless of their length at the camp or where the refugee resided. However, based on how long the refugee has been at their respective camp, the questions differed. The reasoning for this is the solar panel farms were installed several years after the founding of each camp and based on if the refugee had experienced life before electrification or not informed the remainder of the interview.

All refugee interviewees were asked how long they had lived at the camps, which one(s), and what aspects of living at the camps they found to be the most limiting, as well as several questions specific to electricity. These included: Do you ever discuss energy and electricity with other members of your family or community, why or why not? As well as: How would you have distributed energy across the camp to help those who live there? The interview then shifted based on the answers to these questions. If the interviewee was at the camp during or after the solar field was installed the remainder of the interview focused on what they know about the energy system, what changes they have noticed since the solar panel farm installment, and what they find to be the major successes and failures of the current system. If the interviewee is familiar with life at the camp prior to the introduction of electrification the interview focused on how life has changed since its installment and the biggest ways this changed their quality of life. The full interview guide for refugee participants can be found in Appendix A. Table 1 shows the breakdown of refugees interviewed for this study.

Table 1. Table of all study participants broken down by Interviewee ID, camp, number of years at the camp, gender, and if they were at the camp before the introduction of electricity.

Interviewee ID	**Camp**	**Number of Years**	**Gender**	**At the camp prior to electrification?**
Interviewee 1	Za'atari	9 Years (2014)	Male	Yes
Interviewee 2	Za'atari	10 Years (2013)	Male	Yes
Interviewee 3	Za'atari	10 Years (2013)	Female	Yes
Interviewee 4	Za'atari	10 Years (2013)	Female	Yes
Interviewee 5	Azraq	7 Years (2016)	Male	Yes
Interviewee 6	Azraq	7 Years (2016)	Male	Yes
Interviewee 7	Azraq	7 Years (2016)	Female	Yes
Interviewee 8	Azraq	7 Years (2016)	Male	Yes
Interviewee 9	Azraq	8 Years (2015)	Female	Yes
Interviewee 10	Azraq	8 Years (2015)	Female	Yes
Interviewee 11	Azraq	8 Years (2015)	Female	Yes
Interviewee 12	Azraq	9 Years (2014)	Male	Yes
Interviewee 13	Za'atari	10 Years (2013)	Male	Yes
Interviewee 14	Za'atari	9 Years (2014)	Male	Yes
Interviewee 15	Za'atari	11 Years (2012)	Female	Yes
Interviewee 16	Za'atari	10 Years (2013)	Male	Yes

3.2.1 Consent and Interview Question Development

All participants in this study were adults. Participants were read the Participant Informed Consent Form (Appendix B) in their native language and were then able to mark their consent to an interview. They were then asked or consent to quote from the interview and consent to the

researcher taking written notes during the interview. The participant reserved the right to agree or not agree to consent to any of these study elements. Names and identifying factors were kept confidential during and after the study, and no identifying factors were asked of the participants. Interviews did not stray into personal or family topics other than those directly relevant to core project questions, and if this information was voluntarily given by the participant, it was not recorded or used as a part of the study.

In interview question development, all questions were designed to be open-ended to ensure participants have the freedom to provide in-depth personal responses that pertain to their specific experience with sustainable energy development and distribution at the camps. Extensive research was done using published literature before interview question development in addition to professional discussions with Relief International, the organization overseeing the project, to best understand the political context and avoid sensitive subject matter to refugees. Questions began with a broader understanding of the amount of time the refugee had spent at the camp before flowing into their personal experiences, opinions, and preferences of the energy systems. The flow of the questions was developed to gain a robust understanding of the prior knowledge of the interviewee in the energy system before delving into their opinions. This allowed for analysis of how their personal experience and knowledge defined their opinion.

The questions were developed by the researcher and evaluated by multiple parties to ensure ample protections were in place to protect the vulnerable nature of the refugee community. Relief International's head office in Amman, Jordan reviewed all questions, concurred there was no risk to the refugee participants, and gave approval to conduct the study within their field locations. Furthermore, the questions were reviewed by the program coordinator at SIT and the capstone advisor to this study, a national of Jordan, to ensure they

were culturally appropriate and effective at addressing the goals outlined at the beginning of this paper. These questions were also approved by an external IRB committee for SIT in addition to the local IRB committee in Jordan. To limit pressure on participants in this study and prevent undue burden because of participation all interviews lasted a maximum of one hour.

3.3 Data Analysis

Data analysis involved reviewing notes from the interviews which included direct quotes from the participants in cases of consent to record notes and direct quotes. Universal themes were identified, and responses were sorted into a handful of categories and subcategories. First, responses were divided based on their camp of residence and if they were present at the camp before the installment of the solar farm. From here, responses were examined based on the participant's prior knowledge of the energy system and their personal experiences regarding electricity. Their personal opinions were then analyzed and synthesized with their personal experience in mind as this informed their resonating and decision-making process. Successes and failures of the system based on these responses were reviewed and extrapolated with additional context provided by a literature review and peer-reviewed studies. This was done to provide suggestions on how other refugee camps may potentially expand or introduce sustainable energy systems.

4.0 Ethical Considerations

Conducting research as an international visitor in a new nation and context raises a handful of ethical considerations and concerns that must be addressed. I entered an unfamiliar community and culture in a foreign country for a limited time which creates additional

challenges that must be considered. I studied Levantine Arabic with Jordanian nationals both summers and have a basic understanding of the language. I am familiar with the culture and context of the country as this is my second summer in Jordan.

Furthermore, the human subject participants are refugees, which is considered a vulnerable population as outlined by federal regulations placed on studies conducted by researchers operating under an academic institution in the United States. There are several ethical considerations to note and steps to take to minimize risk and protect interviewees and all camp residents.

One consideration is the citizenship status of the interviewee. Research participants may be reluctant to participate, as they may not want their identity made public to Jordanian and/or Syrian officials or other residents. Under the government of Jordan, a Syrian residing in Jordan is not considered a refugee (Sahin Mencutek & Nashwan, 2021). However, they may be registered as a refugee by the UNHCR. The complications in the status of national identity are important to be cognizant of. To address this item, safeguards were put in place. A clear and concise consent form was shared with each participant, or an oral reading was made in the participant's native language. Any potential identification parameters revealed through the course of the interviews remained confidential, in other words, known only to the researcher and translator. No names or photos were collected during the data collection process. Participants are identified as Interviewee 1, Interviewee 2, and so forth. I further assured the participant verbally that no identifiers would be collected, and they would remain anonymous.

A second consideration I was aware of before data collection was that participants in the study may have dealt with traumas. Interviews did not stray into personal or family topics other than those posed and were directly relevant to this project. Before conducting interviews, I had

several extended discussions with Relief International leaders, academics, and officials who have worked in these camps for many years which helped me to best understand the sensitive subject matter.

I served as a graduate intern for my practicum with SIT at the international humanitarian organization Relief International in which I worked at the field location in the Azraq and Za'atari camps. As a part of this internship, I have undergone training and preparation on how to handle difficult scenarios at the camps, and address and interact with refugees, among other orientation materials. This has further helped prepare me for the personal and political situations common among Syrian refugees residing in Jordan. I already have experience in Jordan and am familiar with refugee topics based on a previous program with SIT. Furthermore, at the beginning of an interview, I emphasized that the participant does not have to answer any question they do not feel comfortable with and there will be no pressure to do so.

Lastly, some research participants had busy schedules, revolving around irregular work schedules, family obligations, and religious activities. Men and women interviewees typically had different schedules, as patriarchal customs and norms remain common in Syria. However, studies have found that in a refugee setting, traditional Syrian gender roles are being negotiated and that many responsibilities have been redistributed (Yalim & Critelli, 2023). Therefore, the most convenient times for interviews were less patterned than anticipated. To address the issue of scheduling, I worked directly with potential interviewees to find a time convenient for them. There were several times when interviewees had to cancel last minute and reschedule due to an unanticipated conflicting task they had to attend to. All situations when this occurred were resolved and all participants were interviewed at a time convenient for them. Moreover, I remained mindful of the time a participant had to partake in an interview and thus keep

interviews to one hour or less at a time. Prior to beginning the interview, I asked the participant how much time they had to talk with me that day and double-checked that I was not impacting their scheduled activities, personal or professional. Some participants were under a strict time crunch with the shortest interview being 15 minutes. The longest interview lasted an hour, with the average length being about 30 to 40 minutes.

Throughout the process, I made a point to be an active listener and remain understanding to ensure the community members being interviewed felt comfortable and safe. I shared with the participant that can decide they no longer want to be included in the study at any time during the data collection process through the Participant Informed Consent Form.

4.1 Cultural Context and Addressing the Human Subjects Review

United States federal regulations require IRBs to give special consideration to studies involving members of vulnerable populations. Permissions for this study underwent extended review by SIT's IRB in the home office in Burlington, Vermont, as well as expedited external review by the IRB/SARB in SIT's Jordan office. The purpose of external review by the IRB/SARB in the country of study is to ensure HSR policy compliance is adhered to in the context of the local cultural and ethical norms of the country in question. Permission was given by both the SIT home office and the SIT Jordan office to conduct interviews and collect data for this study.

Given the context of this study and the potential for the questions to remind interviewees of a difficult time in their lives creating a safe space to conduct the interviews was of the utmost importance. During the onboarding process, after Relief International selected a potential participant, the interviewee was asked if they felt comfortable being interviewed within a Relief

International building and only continued if they said yes. Participants were also asked to provide a time for the interview to limit any potential burden to the interviewee because of participation. Interviews were all conducted in a private room at either the Azraq or Za'atari refugee camp based on the participants' location. Additionally, I explained my background as a student and researcher as well as the purpose of the study to the participants in Arabic.

As noted in the approved HSR form, there was a translator present for all interviews who was fluent in both English and Arabic. The translator is a volunteer with Relief International and is familiar with working with refugees in the sensitive context of refugee camps. The translator had no previous connection to the research topic. At Azraq, the translator was a male refugee who volunteered for Relief International. He spoke fluent Levantine Arabic and English. At Za'atari, the translator was a female Jordanian employee at Relief International who also spoke fluent Levantine Arabic and English.

Translator bias was further minimized by translating interview questions before use and the role and expectations were discussed in-depth with each translator involved in this research project to ensure proper training and ethical practices. Information on my study, expected outcomes, and all relevant information was shared with the translator prior to interviews to ensure they are adequately prepared. Some of the interviewees have knowledge of English but it was important that all participants feel as comfortable as possible during the process and encouraged to share answers in their native language of Arabic.

It is important to note that some of the research participants had children. This is not uncommon, and the participants were previously inhabitants of the Za'atari refugee camp. At Za'atari, 55% of all refugees are under the age of 18 (UNHCR Jordan, 2022c). No children were interviewed for this study, but the household size and if the participant had children were noted.

The interviewee retained the right to choose to share this information for the study. No identifiers for children were collected and no questions about minors were asked.

The participants were not asked to give more than an hour of their time to not create an undue burden on the interviewees or interrupt their day. The time and place of the interview were determined by the participant to ensure the study did not create an imposition. No personal identifiers were directly asked about and any personal identifiers revealed during the interview process were kept confidential with participants referred to by number to protect confidentiality. When asked about the purpose of the research I was transparent about the aim of my research as well as how the data collected was stored and protected. I explained that the final research paper would be available in SIT's capstone collection. I shared that my goal for this study was to use it as a baseline to improve sustainable energy development projects at both the Azraq and Za'atari refugee camps as well as other temporary settlements around the world.

4.2 Researcher Positionality

When I arrived at the Azraq and Za'atari refugee camps, I was a guest visiting the camp for the first time working with a well-known aid organization that has been a part of this community for years. As a result, I must reflect on my positionality as a visitor and volunteer in this community. I am conscious of my positionality as a foreign female researcher who is interviewing members of a vulnerable population.

I was one of the few individuals who was visibly a foreigner, specifically one of the few white people in an Arab community. There is a common culture of generosity within this community, but due to my skin color and clear appearance as a foreigner, I understand my positionality may create some apprehension toward community members and study participants.

This may be further emphasized by my role being a volunteer at an aid organization that the participant would not want to risk damaging. This may have made interviewees feel uncomfortable with being interviewed by me, feel like they cannot decline a request for an interview, or feel that they have made a mistake once they are asked to share their experiences with a foreigner new to the community. One question, concerning the installment of personal solar panels on a caravan, is illegal under the rules of the Azraq camp. Several interviewees expressed discomfort when questioned about this and were reminded that all raw data collected is private and confidential, and the participant does not need to answer the question if they do not feel comfortable. Given these scenarios, I was concerned that study participants would not share their experiences, fabricate their stories, or provide limited openness in an interview scenario. To mitigate these concerns, I strived to be generous, to be grateful, and make meaningful connections with employees and refugees involved with Relief International and the community overall. I also emphasized multiple times that their choice to contribute or not to my research would be kept confidential and not influence their relationship with Relief International. This appeared to be successful, and participants were generally open about their experiences regarding electricity at their respective camp.

5.0 Results

While conducting research for this study I worked as a graduate intern for an international aid organization that operates out of Amman, Jordan, with field offices at both the Azraq and Za'atari camps. The organization works closely with UNHCR, and I made regular visits to each camp every week before and during the data collection process. This allowed me to

better learn about each camp and its environment and observe the area as well as conduct interviews.

5.1 Ethnographic Observations

This section details general observations of each camp where interviews were conducted, the Azraq and the Za'atari camps. The purpose of doing so is to detail the vast differences between them. Both camps have a very different history behind how they were designed and developed and massive differences in how they continue to be run today. Therefore, the camps will be examined as two separate case studies that build into one discussion on the proper development of sustainable energy distribution for refugee camps globally. The following observations are general ethnographic observations of life in each camp from the perspective of the researcher who worked as an aid worker on the grounds of each camp while collecting qualitative data for the study.

5.1.1 Ethnographic Observations of the Azraq Refugee Camp

The Azraq refugee camp, often lauded as one of the best-designed camps in the world (Kader & Al-Rifaie, 2020; Tyrrell, 2021), has a very stark appearance. White caravans are plotted in neat rows, with uniform electrical poles connected to each caravan at identical intersects. Some paintings can be seen on the sides of these caravans, but most of these drawings are faded by the sun or written over in Arabic script. The occurrence of anything on the side of the caravan is not common. There is little greenery and no trees in the area, with the few exceptions of small gardens planted in front of a caravan or on an aid organization's property. There are larger expanses of desert in between the plots, known as villages. There are five

villages, all separated but connected with main paved service roads between them. Camp inhabitants, children, adults, men, and women can be seen walking around the camp within their village as well as across the desert on desire paths. However, the density of inhabitants walking around is low, with usually only a handful of refugees walking around on a path or road at any given time. The large Sameh Mall, built by the camp developers is the main and one of the only locations refugees can legally buy food. The markets here are visited out of necessity and appear unpopular.

The camp is visibly high security and located in a barren desert in all directions. There is one entrance and one exit to the camp, both located on opposite ends of its northern border. When entering and exiting the camp, the vehicle must pass through a closed gate where the identification of all persons in the vehicle is checked by the SRAD before being let in or out. The securitization of the camp is highly visible, potentially brought on by the flat and barren landscape. Militarized vehicles hoisting large guns dot the camp boundary, and police can occasionally be seen throughout the interior of the camp.

The camp is relatively clean with minimal litter present throughout. There are common water distribution pumps, where refugees can go to receive water. Children are often seen here, signifying that this chore is often delegated to the younger members of a family. The only cars are on paved roads, which are owned by the various security and aid organizations operating in the camp. Occasionally a refugee riding a bicycle can be seen. More commonly, an electric bicycle of sorts that was invented by camp inhabitants is visible. The bicycle almost always with a cart attached to the front and is overloaded with people or items being transported between villages. These electrical bicycles are commonly used due to their usefulness but are dangerous and accidents occur from time to time.

These observations are limited to the hours of 9 am to 3 pm on Sunday through Thursday, as these are the hours aid organizations are allowed to operate within the camp. Life in the camp late afternoon and night was not observed for this study.

5.1.2 Ethnographic Observations of the Za'atari Refugee Camp

The Za'atari camp has a very different appearance and general feel than the Azraq camp. Unlike Azraq, which is orderly and baren, the Za'atari camp has a feeling of a more developed culture, and is described by Gatter, (2023) as "lived-in." The camp is split into 12 areas, known as districts. The districts are close together and separated by a single road. Za'atari has minimal litter, but some trash can be seen around the marketplace, likely due to the populous and busy nature of the area.

The marketplace large strip of shops that run down a road cutting across the camp; a bustling area where camp inhabitants have built shops selling food and goods. The shops are colorful, with the metal sheets painted different colors and professionally made storefronts and signs. A handful of storefronts resemble ones that could be found in any standard Jordanian town, some with large glass storefronts. Refugees can be seen selling shawarma, soft-serve ice cream, home goods, and more. When the camp experiences electricity cuts during the designated hours of electricity, this strip, known to refugees as the market, stays lit. Donkeys pulling carts are seen from time to time pulling goods and people around the camp, and the blocks leading to residential areas from the main market strip are more jagged and narrower than the well-plotted Azraq. Refugees can also be seen moving throughout the camp on bicycles. The caravans are more scattered and show evidence of informal extensions constructed from a host of different materials. Satellite dishes are commonly seen mounted to the caravans across the camp. This

disorganized nature is likely due to the history of the Za'atari camp and the informal construction of homes, shops, and other miscellaneous buildings since its establishment (Kaddour et al., 2022). There is limited greenery except for the occasional garden or tree within an aid organization's plot, but painted walls and caravans are common throughout the camp.

Za'atari has one main entrance and exit where identification is checked by all vehicles passing in and out of the camp. Refugees are often seen around this area and walking outside the boundaries of the camp to the nearby city of Mafraq. Inhabitants of Za'atari can request two-week leaves from the camp, often without too much difficulty, compared to Azraq restrictions, to visit friends and family, or simply buy goods from Mafraq during these periods of leave.

The hours of operation for aid organizations in this camp are similar to that of Azraq. Therefore, these observations are also limited to weekdays (Sunday to Thursday) between the hours of 9 am to 3 pm.

5.2 Summary of Data

For this study, a total of 16 participants were interviewed at both the Azraq and Za'atari camps. At the Azraq camp, four men and four women were interviewed, totaling eight participants. At the Za'atari camp, five men and three women were interviewed, also totaling eight participants. The year of

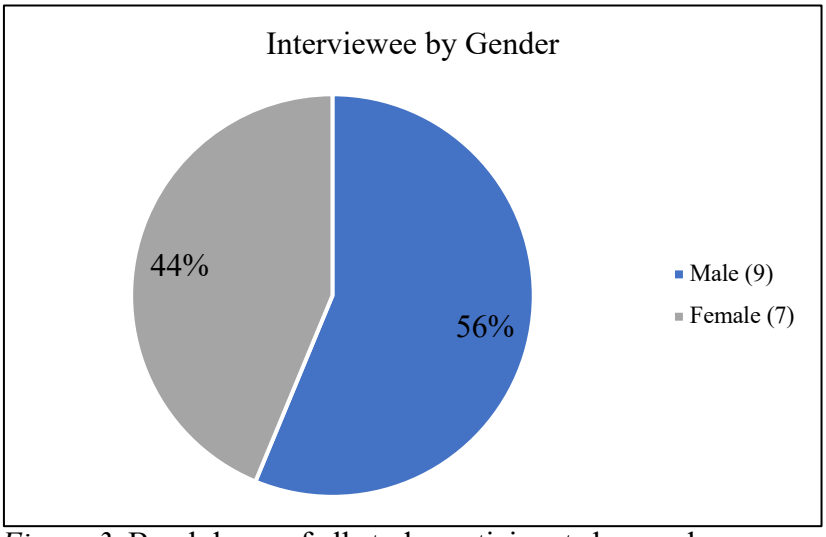

Figure 3. Breakdown of all study participants by gender.

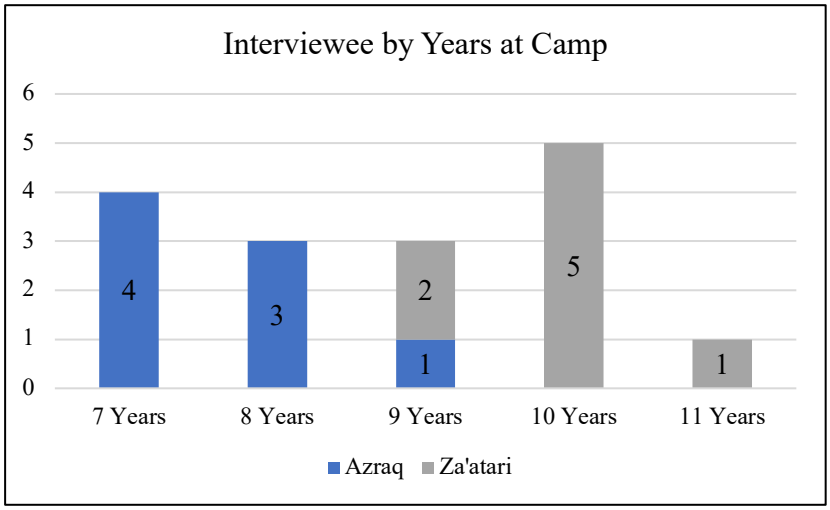

Figure 4. Breakdown of interviewee years at their respective camp.

arrival of the camp was also noted by everyone in the study. No participant had been at the camp for less than seven years or longer than eleven years.

There was a clear trend of interviewees from the Za'atari camp having been residents for a longer time, ranging from nine to 11 years, while interviewees residing in the Azraq camp had been at the camp for seven to nine years. This is likely because there have not been many new arrivals to these camps in recent years according to interviewees, and most residents have been at the camps long term. The trend of Za'atari inhabitants having lived in their camp longer is likely due to the Za'atari camp being older, with most of the Za'atari interviewees arriving in Jordan before the Azraq camp opened. No participant has lived in the other camp.

5.2.1 The Greatest Limitations of Living at the Azraq and Za'atari Camps

All interviewees were asked what the greatest limitation they faced at the camp was. These answers varied widely, and most refugees gave multiple answers. The number of responses per participant varied from two to eight, with no trend between camp or gender on how many answers the interviewee gave. All answers were recorded and divided into two larger categories: Electricity Unrelated and Electricity Related. Table 2 details every response and how

they were categorized. Issues that could be directly resolved by electricity such as food spoilage and temperature were considered Electricity Related. Education was classified as Energy Related as the reason cited by refugees was difficulty studying due to having no power for light or internet access for online classes. Items that could not be directly resolved by electricity were noted as Electricity Unrelated.

Results show that at Azraq, 48% of responses to what an interviewee finds to be the most limiting factor is related to electricity, and of that the majority found the environment to be the greatest struggle. At Za'atari, 64% of responses were Electricity Related, with the most common struggle being electricity in general, referring to the limited number of hours.

All participants were asked the follow-up question: What activities do you find to be the most significantly impacted by the lack of electricity? At both camps, there was no trend in what an interviewee cited as the biggest limitation with electricity by gender. However, the greatest limitation overall did vary slightly by camp.

Table 2. Breakdown of limitations at the camp by their relation to electricity.

Question: What do you find to be the most limiting factor about living at the camp?		
Electricity Unrelated		Electricity Related
• Medical services • Privacy • Scenery • Transportation • Unknown future • Dust	• Accommodation • Environment • Insects • Leaving camp • Limited opportunities for youth • Water	• Electricity • Food spoils • Environment ○ Hot/Cold Weather • Internet • Education

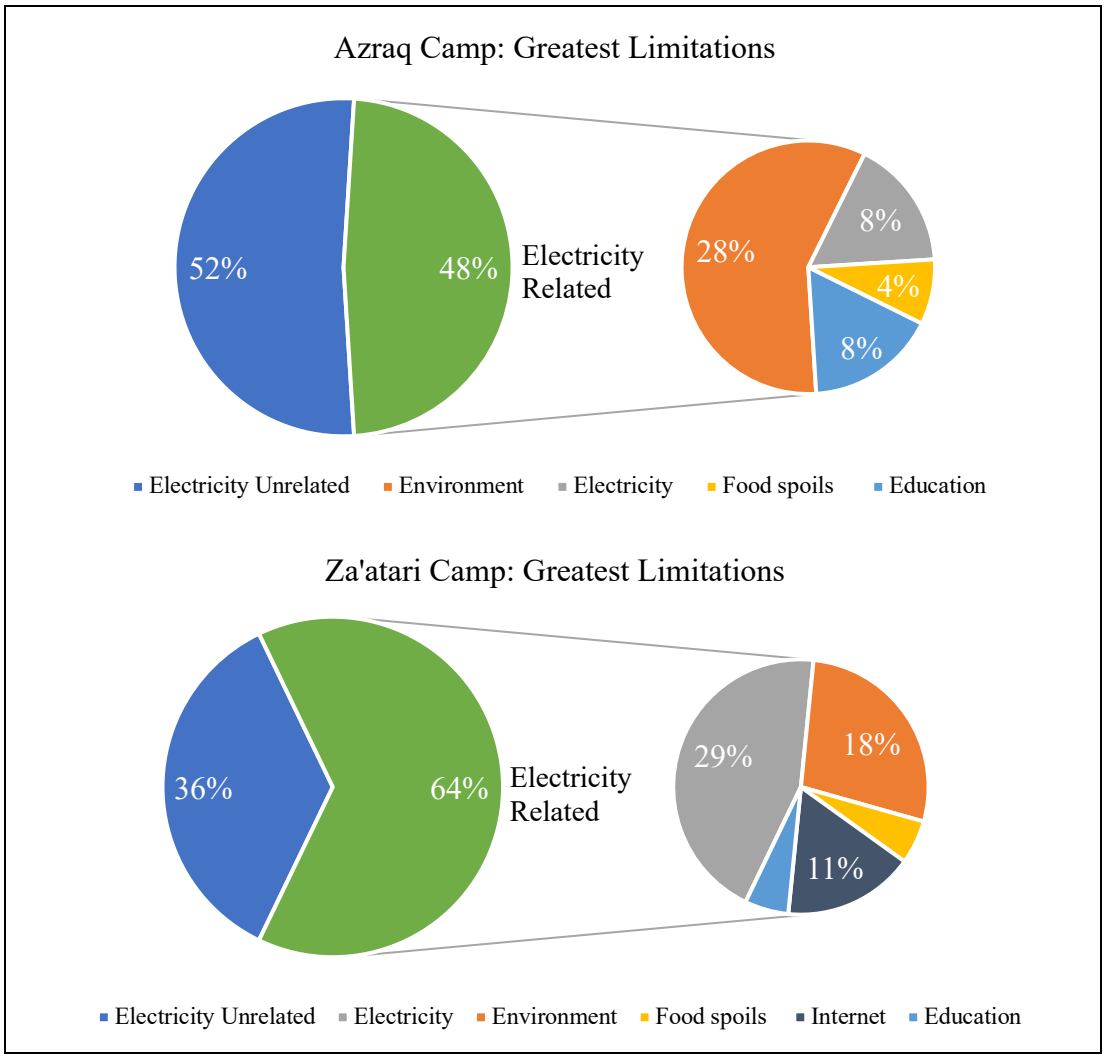

Figure 5. Greatest limitations as described by interviewees at the Azraq and Za'atari camps. Electricity Related limitations broken down by specific hindrances.

At Azraq, a total of 38 limitations were noted by eight interviewees; at Za'atari, 32 limitations were noted by eight interviewees. At Azraq, the most common struggle is cooling, with 24% of refugees citing the heat in the summer months. A woman residing in the Azraq camp since 2015 gave an example of the struggles with heat and the need for electricity, "We hope to get electricity in summer, especially at night. Yesterday we tried to sleep but it was very hot. We took mattresses and covers outside to have a cooler place to sleep, we couldn't decide where to go" (Interviewee 10, July 10, 2023). Another woman residing in the Azraq camp since

2016, also cited the heat at night as one of the most difficult parts of living at the camp, saying, "I have a small boy who is two years old. I use water to make him less hot so he can sleep. He feels hot. I cannot cover him. I need to take off his clothes and put him in water" (Interviewee 7, July 5, 2023).

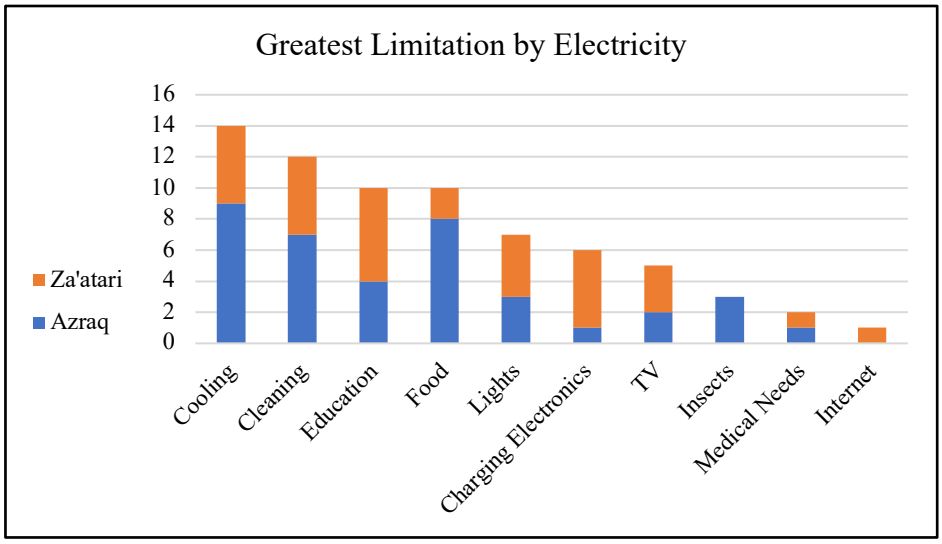

Figure 6. Greatest limitation by electricity at the Azraq and Za'atari camps.

At Za'atari, the most common struggle reported was education at 19% of all responses, and 75% of refugees at Za'atari cited education as one of the hardest activities with limited electricity, interviewees explained this was due to not being able to study at night with no lighting, unable to charge electronics for research and online education, and internet cutting out with the electricity. One interviewee who has lived at Za'atari since 2013, is currently in school online. He explains, "We don't need electricity just for light, we need it for the students. I study online and I need to charge my phone" (Interviewee 10, July 10, 2023).

In addition to education, cleaning (dishes and laundry) was commonly cited as a major challenge, particularly by the female interviewees at each camp. A woman who has lived at Za'atari since 2013 shared the challenges with cleaning clothes in particular, "As a woman, for

example, it's my responsibility to clean the home and clean the clothes. If people have the machine, they can use the electricity. If energy cuts off, we start over by hand and it can take a day to clean" (Interviewee 4, July 4, 2023).

This sentiment was similar to Interviewee 9, a woman who moved to Azraq in 2015, explaining that this is a challenge that women in particular deal with. She shared that women often look for workarounds, saying, "We try to think of a solution when we have a cutoff. Especially as women we try to think of laundry or cleaning solutions" (Interviewee 9, July 10, 2023).

5.3 Electrical System at the Syrian Refugee Camps

While both camps deal with electricity shortages, unscheduled cuts, and limited hours, according to interviewees they differ drastically. At the Azraq camp, interviewees report that when the system was first turned on, they had 24 hours of electricity for eight months before it was cut to 12 hours a day. When the first electricity was supplied to the camp, Interviewee 10 shared how happy of a moment it was, saying, "When electricity came, we felt it was normal life. Like we are back in Syria. We felt again at home. We went back to the point before 2011" (Interviewee 10, July 10, 2023). Similarly, a man living in Azraq since 2016 explained what life was like in Azraq before and after electricity, saying, "We didn't have a refrigerator, nor fan, nor washing machine, nothing related to normal life. It was a main changing point. It was 24 hours in the beginning. We were happy, especially the kids, they were happy the most. We didn't think a lot about food" (Interviewee 8, July 10, 2023).

Hours were then reduced to nine hours before being brought back up to 11 hours from 10 am to 9 pm as of July 2023. When asked about power outages interviewees reported that they

occur often and range from one day to a week. A man living at the Azraq camp since 2015 shared that his block was out for two months in the winter of 2022 (Interviewee 5, July 5, 2023). Refugees at Azraq had different experiences with the number of blackouts and their length. This appears to be due to the system for which electricity is distributed and managed, according to interviewees. Each block has a sensor that monitors electrical usage. If usage is high, there will be an outage that lasts for an unknown period. Interviewees commonly cited issues with this system. Interviewee 11, a man living in Azraq since 2015, addressed this, saying, "People are dealing with the irresponsible actions of others" (Interviewee 11, July 10, 2023). This was a common complaint, saying that one person in their block will manage power irresponsibly, and the whole block will be cut off as a "punishment." Interviewee 8 estimated that 80% of residents are responsible and this majority must deal with the 20% that are irresponsible and face no repercussions (Interviewee 8, July 10, 2023). To deal with this, all interviewees suggested that sensors should be placed on every shelter. A male refugee who has lived at the camp since 2016 explained that in doing so each family has increased accountability, saying, "You are responsible for your actions, your consumption of electricity" (Interviewee 6, July 5, 2023).

Of Azraq interviewees, 25% had a personal solar panel system on their shelter. Based on the size and age they provided a varying amount of electricity, ranging from two to six additional hours a day. Unless the interviewee had a board themselves, they did not know anyone who owned one, and most were unsure if there were any in the camp. An interviewee at Azraq explained that it is illegal to have their own board (Interviewee 8, July 10, 2023). Interviewees that have their own system reported paying on average a couple hundred Jordanian dinars for it and added that the system was more expensive because it must be smuggled into the camp.

At Za'atari, interviewees reported having fewer hours of electricity a day, but the schedule was more reliable with some number of hours of electricity typically being powered every day. The scheduled hours as of July 2023, are from 12 pm to 3 pm and 6 pm to 11 pm. However, refugees reported that power cuts during these times are common, typically lasting for 1.5 hours during each of the scheduled times. One participant explained that when the solar plant was first powered on, they received 24 hours of electricity a day for the first six months (Interviewee 4, July 4, 2023). After this, according to Interviewee 5, electricity was reduced to 12 hours a day and has been on its current schedule including power cuts for the past "three of four years" (Interviewee 5, July 5, 2023).

At the Za'atari camp, 63% of interviewees had a personal solar panel system on their house. While estimates on the number of camp residents that have the boards varied widely from near zero to almost all residents at Azraq, all Za'atari interviewees thought they were commonly found across the camp and explained that they are legal to own. Multiple interviewees shared that there are shops in the informal market at the camp where other refugees have small businesses selling these panels. While costs vary by the size of the solar system the interviewee owned, the prices interviewees reportedly paid were similar prices to what Azraq residents paid, a few hundred Jordanian dinars.

With the common use of personal solar panels, when interviewees at Za'atari were questioned on how the system can be improved, all stressed individual accountability. Multiple interviewees said that UNHCR's reasoning for the limited hours and power outages was due to over-usage within the camp. As a result, most interviewees suggested that UNHCR distribute individual solar panel systems to each camp. That way, even if the individual system cannot provide 24 hours of energy, the family can choose when they use it. Interviewee 2, a man who

has lived at Za'atari since 2013, suggested that in addition to providing each shelter a panel, the size and hours of the panel should vary based on the number of refugees that live there with larger families receiving a larger system to accommodate the increased needs (Interviewee 2, July 4, 2023).

5.4 Source of Energy at the Azraq and Za'atari Camps

An unexpected finding in this study was the frequent distrust in the electrical system, and by extension, the managerial efforts by UNHCR and the Jordanian government that run the solar farm. There were several perspectives on this with clear trends within each camp. At Azraq, most interviewees said that while aware of the solar plant and UNHCR's claim that this is their energy source, they often said that they did not know if this is where their electricity came from. When questioned if they had heard rumors that energy came from elsewhere or is siphoned by UNHCR elsewhere, most said yes but had no interest in engaging the topic. For example, Interviewee 8 said, "I don't know … I don't discuss it I don't follow rumors. I talk about what I see" (Interviewee 8, July 10, 2023). Another interviewee at Azraq displayed the highest level of trust in UNHCR out of all participants. While hesitant, he said that it is likely all possible energy from the plant was being provided and there is no electricity being siphoned to nearby cities, saying, "They are just rumors, we are not sure. I am not sure. I doubt it" (Interviewee 6, July 5, 2023).

On the other hand, while most refugees at Azraq did not have a definite opinion, all interviewees at Za'atari distrusted UNHCR's management and view the idea that energy is being siphoned from the solar plant as a fact, not a rumor. There were two common reasonings refugees came for this. The first, and most common, was simply by looking at the size of the solar plant. One male participant who has lived at Za'atari since 2013 was completely certain

that energy does not go to the camp, saying, “I don’t know why they send it outside” (Interviewee 16, July 11, 2023).

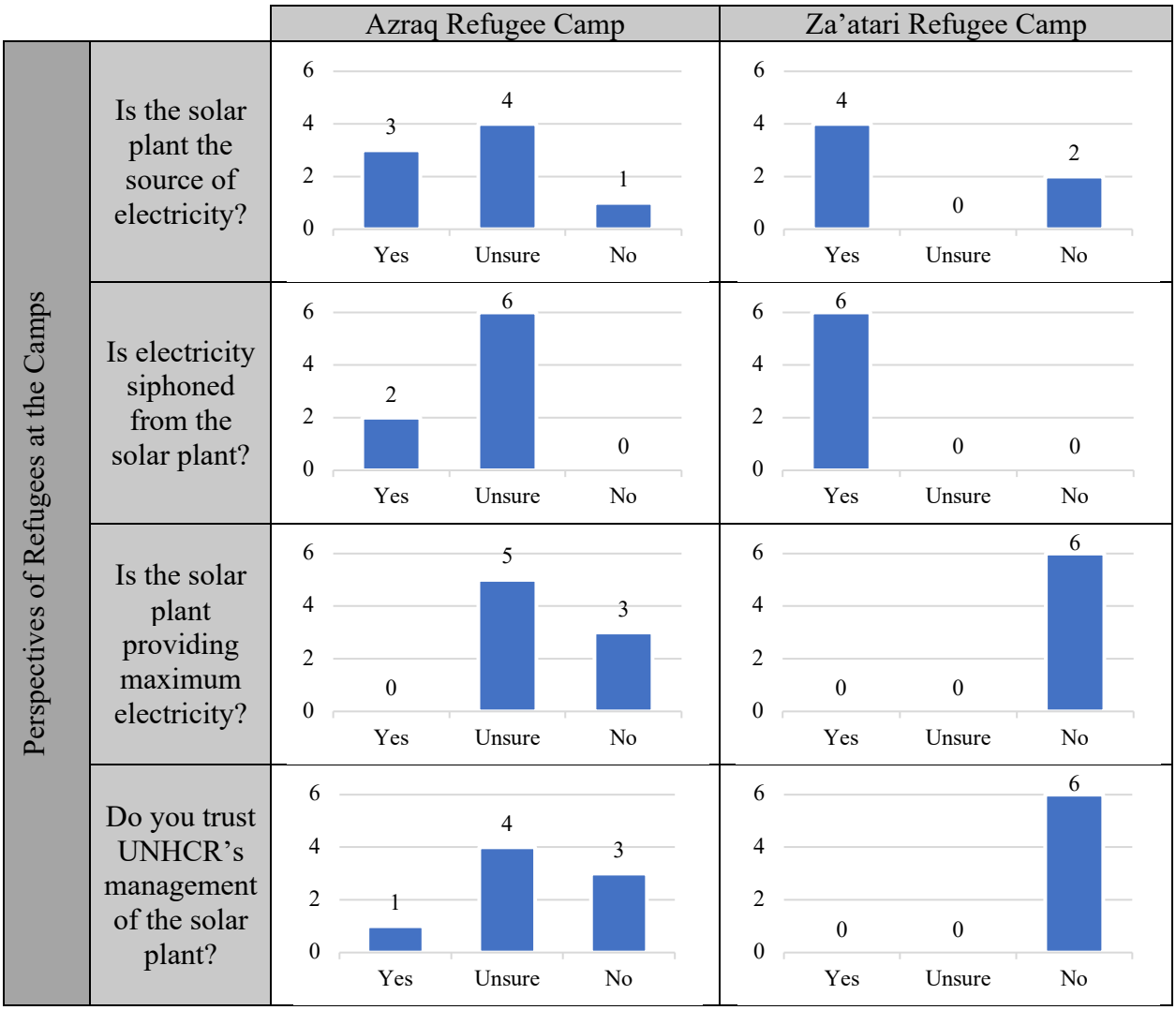

Figure 7. Source of energy according to interviewees at the Azraq and Za'atari camps broken down by interview questions.

Interviewee 16 claimed to have reliable sources backing up this information, like Interviewee 13, a man who has lived at Za’atari since 2013. He explained that the refugees who work on the solar panel farm give conflicting information, depending on whom you ask. He explained that some employees say that the energy comes from the Jordanian government and all

energy from the solar plant goes to the nearby city of Irbid; while others say that electricity comes from the solar plant. He noted he is certain that electricity does not come from the solar farm but added, “There is no one to tell us the truth” (Interviewee 13, July 11, 2023).

5.5 Key Informants

The following sections narrow in on two key informants from all participants in this study. While there are general trends between inhabitants of one or both camps and their experiences with the energy infrastructure, all interviewees had unique challenges and comments on the solar farm and overall energy management system at their respective camps. This subsection works to humanize the data presented in this paper and provide firsthand accounts of experiences shared during the data collection process. Two of the most notable perspectives and stories are detailed below. The first study participant chosen for this spotlight is Interviewee 3 due to her unique views and experiences related to medical issues and concerns within her family at the Azraq camp which have been complicated by energy limitations. The resulting vulnerabilities she has faced with her husband and children provide a unique perspective in this study but is not an uncommon scenario faced by refugees across the camps. The second spotlight is Interviewee 14, chosen due to their common perspective on energy siphoning at Za’atari and the clear and concise way in which they worded their distrust in the system which serves to represent the viewpoint shared by most study participants at Za’atari.

5.4.1 Interviewee 3

Interviewee 3 is a woman who has lived at the Azraq refugee camp since 2013 and was interviewed on July 4, 2023. After ten years at the camp, she stated unwaveringly that the most

difficult part of living in Azraq was the weather because of the lack of electricity. More specifically the heat in the summer. She went on to explain that while the heat is incredibly uncomfortable for her, the combination created major challenges, explaining, “We can't put anything in the fridge in this weather” (Interviewee 3, July 4, 2023). This complaint was common with participants, particularly those at the Azraq camp. Interviewee 3 expressed stress over food spoiling, especially meat. She explained that she cannot buy chicken or beef because her refrigerator will not stay cold for the 13 hours that electricity is turned off per day. She went on to explain that in addition to meat spoiling, she has had to deal with several ongoing medical issues as well as previous ones that created a lot of complications and stress in her life at Azraq. Medical concerns were reiterated by the participant in a handful of questions posed during the interview, which stressed the importance of this topic for the interviewee.

The first of these medical issues is ongoing. She explained that her husband has diabetes and severe migraines. Her husband needs medication for diabetes, which must be refrigerated. But when the power goes off at 11 pm, the medicine slowly warms up throughout the night and by morning it is ruined. Instead, she must store it in the nearest camp medical facility, which has power 24 hours a day. However, the nearest center to her shelter is still quite far from her. Interviewee 3 explained, “My husband is ill … I have injection medicine for my husband I can't put in the fridge … this is very bad. I put the injection in a far place from my house, this is very bad. In this weather, you don’t have much time to bring it before it is no longer useful” (Interviewee 3, July 4, 2023). She explained that there are many people in the camp with similar medical issues and that this is a common problem faced by refugees. According to UNCHR’s most recent public health report of the Azraq camp, about one in three refugees have reported

chronic health conditions. About 18% of these conditions, totaling 2,261 patients, are diabetes (UNHCR, 2021a).

Furthermore, Interviewee 3 added that her husband's severe headaches are exacerbated by the heat and lack of air conditioning or fans in her caravan, saying, "My husband has migraines, he says, 'my head is pumping from the hot weather'" (Interviewee 3, July 4, 2023). She stated that medical issues are common, and electricity should be prioritized in shelters with inhabitants facing afflictions such as her husband. One example she gave was the use of breathing machines powered by electricity, sharing that many people have lung diseases and require them.

In addition to medical concerns with her husband, she detailed how she gave birth in August 2015. Due to complications with her pregnancy, she had to have surgery upon delivery. Interviewee 3 explained that last summer was incredibly hot, and because of the heat, it took her a very long time to recover post-operation. Recalling this story, she shared, "When I remember that I am very sorry for my situation" (Interviewee 3, July 4, 2023). During her slow recovery, she was caring for her infants as well. Unprompted, Interviewee 3 took out her smartphone and showed a photo of her two infants, taken about a month after they were born. The photo showed two small infants lying on the floor, undressed, both bright red and visibly overheating. She explained that it was "too hot for clothes" and did not have a fan or air conditioning for her newborn children. She had to completely undress them and pour water on the concrete floor to place her children in an attempt to cool them down.

There was visible and understandable frustration felt by Interviewee 3 regarding how UNHCR handles the energy system at the camp. She shared a high confidence of distrust in the solar plant built by UNHCR, saying, "I know the solar system can cover the camp … all refugees

know that" (Interviewee 3, July 4, 2023). Her reasoning was her observation of the size of the camp. Simply by looking at the size, Interviewee 3 explained, "it's obvious" the solar plant can cover the whole camp 24 hours a day. She explained that while believes the energy she does receive does come from the solar plant, instead of powering the camp, much of the energy produced by the plant is sent to the nearby cities of either Irbid or Mafraq.

The extended and justifiable frustration over energy shortages worsening medical afflictions was exacerbated by her belief that the limited electricity she received was an active choice by UNHCR in collaboration with the Jordanian government. Interviewee 3 expressed hopelessness over the issue, and how while they have asked UNHCR to extend hours, the commission responded by saying they do not have enough power to do so.

Interviewee 3 discusses all these issues related to electricity with her family but feels that there is nothing they can do given UNHCR's explanation, saying, "We talk about this problem but there is no solution" (Interviewee 3, July 4, 2023).

5.4.2 Interviewee 14

Interviewee 14 is a man who has lived at the Za'atari refugee camp since 2014 and was interviewed on July 11, 2023. His view on the energy system is similar to the vast majority of Za'atari inhabitants, who distrust the Jordanian government and UNHCR's explanations that the solar farm is supplying electricity to the camp and was built for that purpose. He explained what he believes to be the general viewpoint of camp inhabitants, saying, "People don't trust UNHCR, especially in the electricity subject" (Interviewee 14, July 11, 2023). Interviewee 14, along with most other participants from Za'atari, expressed a high level of confidence that energy for the

camp is either supplied by a source other than the solar panels entirely, or that energy comes from the solar panels, but a large percentage of it is siphoned and sent to the nearby cities.

Interviewee 14 explained that the limited electricity hours and challenges that come with it "is the most difficult problem." As a result, it is a constant topic of conversation within his community. He stated that "It is the most popular subject to talk about with friends and family. It is hot weather, we are suffering" (Interviewee 14, July 11, 2023).

He voiced his reasoning and opinions on why he distrusts the energy system, despite wanting to believe UNHCR. He gave several reasons for this, many of which are based on what he has found as inconsistencies within UNHCR explanations for electricity shortages and cutoffs. The first example was the large market that runs across the camp. He explained that this strip has numerous shops with many refrigerators, and when there are daily cutoffs during the scheduled hours, he asked, "Why do you turn the electricity off in houses but not from the market?" (Interviewee 14, July 11, 2023). He said that this "makes no sense" because UNHCR claims that the cutoffs occur due to an overload of the system. Interviewee 14 expressed confusion over how this could be true, yet the market does not shut off, despite its size.

A second example Interviewee 14 provided was related to funding. He stated that UNHCR said that they do not have the funding to improve the electricity, but believes this is untrue, saying, "UNHCR is lying. Their justifications are making no sense. It is not our problem. There are sick people that need electricity all day" (Interviewee 14, July 11, 2023). He reasons that UNCHR pays its employees "huge salaries" and that countries globally announce, "Huge donations of millions of dollars for UNHCR to help refugees but refugees never see any of this money" (Interviewee 14, July 11, 2023). He added UNHCR can cut costs somewhere else, saying, "Electricity is a priority."

His views on the subject were well-developed and concise. When further questioned why distrust of the energy system at the Za'atari camp is common among all inhabitants, he responded, saying, "When people suffer, they say anything. When you need something, and you see these organizations such as UNHCR give justifications, but if you don't understand these justifications you will begin to distrust them" (Interviewee 14, July 11, 2023).

This distrust appears to manifest in the belief that energy is being siphoned from the solar farm and sent to the nearby city, with some refugees convinced that no energy for the camp comes from the solar system in the first place. Interviewee 14 is unsure of where he stands on this matter and wants to trust UNHCR. He explained that he thinks that there is an agreement between the UNHCR and the Jordanian government where energy from the solar plant is sold to the grid and used elsewhere, and in return UNHCR buys energy back from the government. The bought energy comes from traditional oil and gas sources and comes back to the camp because, according to Interviewee 14, this is the typical source of energy for the Middle East. As a result, he thinks that no electricity from the solar farm goes directly to the inhabitants.

Interviewee 14 had some conflicting views on this, first stating that he trusts UNHCR and that the commission receives back the same amount of energy they produce from the solar farm and sells it to the government. However, he explained his doubts that this is the case:

> I'm not convinced they built the solar panel farm outside the camp to provide electricity to the camp. Why did the government build this project at the camp–it costs millions of dollars–if it can't supply the camp? … I think there is missing information. The system is supposed to supply the camp 24 hours a day. Where is the remaining electricity going? No one will tell you.

Interviewee 14 alternated between trusting UNHCR and their energy endeavors and then reasoning through holes he found in their explanations. This struggle detailed the common mistrust among Za'atari residents as evidenced by participants in this study in addition to depicting the general confusion among refugees about how the energy system at the camp operates. Humanizing the common views of camp residents and their thoughts on the solar farm at the camp, such as with Interviewee 14, works to clarify the culminating analysis of interviews and conclusions drawn in this paper.

6.0 Discussion

The results of the semi-structured interviews conducted at the Azraq and Za'atari camps brought insights and perspectives that were not anticipated prior to the study. This is due to the evident distrust, particularly in the Za'atari camp. Furthermore, findings on how electricity shortages influence female refugees in the camp provide insight into how inequity is exacerbated by their situation. While the study revealed interesting insights into these two topics that are important to discuss, the outlined outcome of this study was to synthesize the refugee perspective of the renewable energy system to suggest improvements and alterations. This, in turn, can be used to improve the existing solar plants at the study sites and provide insight into how renewable energy systems can be developed at other and future refugee camps worldwide.

6.1 Gender Inequality and Unreliable Energy

The gender norms in the culture of any group in a study are important to acknowledge. According to refugees at both camps and all genders, it is common and expected for women to

do the cleaning and take care of children. However, results suggest that the time that women take to these tasks is significantly lengthened by the limited electricity. For example, Interviewee 4 explained that when laundry is in the machine, but the power goes off, she must start cleaning over by hand. This turns what should be a ten-minute task of placing clothes in the washing machine and then hanging them up to dry into an all-day chore that requires full attention.

Furthermore, interviews revealed that female interviewees tended to mention food and cooking as a task made more difficult by electricity issues. All women who mentioned food spoke specifically about food spoiling in a fridge that does not have power for 13 hours of the day. As a result, they buy and cook small portions of food for every meal to avoid leftovers. This method is required of the women as otherwise the food will be wasted but suggests that there is a significant addition to the amount of time that refugees, particularly women, must spend preparing meals instead of dedicating time to other activities.

The chores of cleaning and cooking, typically undertaken by women at the camp, take significantly longer due directly to electricity. When women are occupied with these activities for much of their day and week, there is less time and opportunity to study or work. Additionally, when women fall behind academically and economically, there will be less opportunity to find opportunities to leave the camp. This means that the limited electricity may mean women have a more difficult time gaining the economic freedom needed to migrate and improve their quality of life. In addition to these barriers, there is likely increased gender inequality within the camp where women do not have the economic freedom men do, due directly to energy shortages. This depicts how important electricity is, and how a more stable grid may work to promote gender equality and opportunities for women.

6.2 Refugee Distrust in Governing Bodies

The unanticipated outcome of this study is the clear and rampant distrust in the governing bodies at the camp. Interviewee 14 explained the common view of refugees at these camps well, saying, “People don’t trust UNHCR, especially in the electricity subject” (Interviewee 14, July 11, 2023). This shows that while distrust in the Jordanian government SRAD, and UNHCR are connected to overall camp management, issues with electricity remain one of the most contentious aspects of the fraught dynamic. Given the certainty many interviewees expressed in energy being siphoned from the solar plant to nearby cities under a joint agreement between UNHCR and the Jordanian government, the truth behind the source of electricity becomes irrelevant. These individuals understand and acknowledge their position as a vulnerable group living in a refugee camp with limited options. As a result, the discontinuities they have found in the information they are receiving from those controlling their situation have manifested in the form of distrust and belief that they are being taken advantage of.

UNHCR and the Jordanian government must address this issue to build a stronger foundation between refugees and camp management. This weariness of the governing system in the camp coupled with poor living conditions with refugees avidly expressed exist at both camps, particularly those linked to energy shortages, have the potential to spiral. While currently an underlying issue, a small spark may easily spark demonstrations or protests, like what was seen in the early years of the Za’atari camp (Clarke, 2018). Such an event can not only potentially mean harm to anyone involved in such a situation but would likely make national and international news. Jordan is an important refugee state, and its stability is vital to supporting instability across the Levant and Middle East. Protests within Jordan, particularly led by refugees

seeking asylum and help in camps co-run by the Jordanian government have the potential to have major consequences.

6.3 Improving the Development and Management of Solar Plants

From their beginnings, the Azraq and Za'atari camps are incredibly different. Their formation, layout, environment, and culture are unique to one another. Despite having little in common, refugees at both camps suggested the same solution to electricity issues at the camp: individual accountability.

At Azraq, where individual solar panel systems on caravans are both illegal and uncommon, the most common suggestion was to expand the current system involving one sensor monitoring energy usage per 44 caravans. According to interviewees, this system allows for the abuse of electricity without responsibility as there is no way for someone to identify who irresponsibly consumed electricity. Therefore, refugees suggested that every house have a sensor, and then families are required to monitor their energy usage. Then, barring a system error, each caravan is forced to be responsible for their actions and if they overuse electricity with power-consuming machines, they face the consequences of their actions and no one else does. This system, by requiring accountability, would also tangentially teach low energy consumption habits.

Za'atari interviewees, on the other hand, had minimal suggestions for improving the major solar farm and grid at their camp. Instead, most suggested an expansion of the individual solar panels, which are commonly seen across the camp and are legal to purchase and own under camp rules. The reasoning given was while these individual panels, unless quite large, also cannot provide power all day, there is autonomy on how and when it is utilized by a caravan.

Refugees would have the ability to choose what hours of the day they have electricity, which is particularly beneficial to those working during the day. Work hours are the current times that electricity is on across Za'atari, so refugees volunteering or working at organizations in the camp have no time for activities that require electricity as it is either already off or there are few hours left by the time they return to their shelter. Additionally, like Azraq, Za'atari interviewees cited times power has cut off for longer periods due to system overload. Such overloads place blame on UNHCR and the management of the solar farm, breeding anger and distrust. This would be instantly mitigated by an individual system.

The Azraq suggestion of sensors on each house and the Za'atari suggestion of individual solar panels on each caravan over a large system are, by nature, quite different. However, refugees at both camps are asking for the same thing: individual accountability. The large energy system will always create a sense of the unknown as it was built and is run by an organization that is disconnected from the refugees themselves. When the large system is overloaded by demand, all those plugged in must bear the consequences, regardless of how much energy they used. When this occurs frequently, distrust will begin to form, as is manifested particularly clearly in the Za'atari camp. However, by implementing a system that requires each shelter to understand and monitor their energy consumption, there will be less distrust in the greater electrical system and overall management.

The large difference between these camps works in favor of finding a far-reaching solution to providing solar energy at other refugee camps and temporary settlements. Given the analysis of views at each camp, individual solar panels installed on each caravan may be the better option compared to a large sensor system hooked up to a camp-wide grid powered by a solar farm. Such infrastructure takes a long time to build and is much more permanent than

individual systems that can be distributed and put on temporary homes quickly. Furthermore, a sensor system is still hooked up to one large plant so if electrical difficulties occur that cause power outages blame will still fall on the managerial body, similar to what is being seen now.

This makes individual solar panels ideal for the rapid sustainable development of current and future refugee camps. This is because, despite their massive differences in all aspects related to electricity, the general request and suggestions for improvement were identical. Therefore, individual accountability is key to developing a successful energy system to provide electricity to current and future refugee camps globally.

6.4 Importance of Sustainable Energy at Refugee Camps

Millions are displaced around the globe. With the impending climate crisis, many more are expected to be displaced, their homes pushed underwater, destroyed, or their land made unlivable by extreme temperatures and cataclysmic events linked to climate change. When a refugee crosses a border seeking asylum, they are at the mercy of the governing nation. The Syrian refugee crisis alone has displaced millions and has caused complex international diplomatic issues as a result. The intricate geopolitics involved in refugee movement is a global issue, and when a refugee crisis occurs there is typically a large political upset. What is anticipated in the coming decades is mass migration as never before seen, as nations around the world begin to feel the full effects of climate change. The displacement and vulnerability of these migratory groups require a strong and immediate aid response as there is a high potential for the influx of refugees to overwhelm a nation, leading to political instability and hostility towards refugees. Those seeking asylum should not have to fear hostility and should instead be offered

help, whether this is refugees from Syria into Jordan or from small island developing states going underwater.

A system to aid refugees around the world just as Jordan, as a refugee state, has attempted to do for nearly a century, needs to be studied and improved to prepare for the era of intense challenges to individuals, societies, nation-states, and the human community globally that are rapidly approaching. One way to prepare for the influx of climate refugees is to establish a plan based on anticipated areas of mass movement for rapid development of refugee camps that will serve as temporary settlements rather than permanent ones, as many refugees at Azraq and Za'atari view those camps as (Kaddour et al., 2022). The required research and development are a massive undertaking, and energy access for the displaced is a small, yet critical aspect of doing so. Given that the cause of the anticipated influx is the climate crisis and the need to cut down on GHG emissions will only grow, the electricity provided cannot come from nonrenewable resources. Renewable and alternative energy solutions are the only option.

A female refugee living in the Za'atari camp reflected on the difficulty of limited electricity during the data collection process, sharing that, "Electricity is a very important thing in life. We are one percent as alive as other people" (Interviewee 15, July 11, 2023). Her reflections on being deprived of electricity vividly establish the challenges faced daily as a result. The suffering described throughout the interviews by all refugees was not limited to one camp. A woman at Azraq shared how electricity was cut too early and how difficult it was to live a full life under such conditions, saying, "Whenever you enter the shelter and there is no light you feel like you are suffocating. When you turn on the light, you have life back" (Interviewee 10, July 10, 2023).

6.5 Recommendations for Future Research

The preliminary results of this study suggest that individual accountability in the energy distribution system is key at both Azraq and Za'atari to address the biggest shortcomings of the current design. The many differences between the two camps further suggest that the similarities in the best method of improvement may be able to be successfully applied to other camps in other areas of the world. While promising, two case studies are not sufficient proof to draw such a conclusion with absolute certainty. Several next steps in both research and development can be pursued to further this cause, this includes repeating similar research at other refugee camps where a solar farm is already established, identifying ideal current and future refugee camp locations based on solar energy potential, and installing a new system with individual accountability at a refugee camp where no electrical grid is currently in place and monitoring the successes and shortcomings of such a program.

While Azraq and Za'atari are two of the first camps to establish a large-scale solar farm and provide refugees with electricity via solar panels, they are no longer the only camps in the world that do so. For example, a study by Thomas et al., (2021) conducted an analysis of the potential of solar home systems at refugee camps in Rwanda with little to no electricity access and found that these individual systems will meet the energy needs of camp residents. These results mirror the ones of this study in which refugees at Za'atari support the installment of solar home systems over a large solar farm. Findings such as these can then be used for a following phase of experimentation in which the individual systems are developed, and the refugee response is studied long-term. Studies in different areas will allow for context-specific adaptations to the solar system to ensure the most efficient and helpful solar energy system at that specific camp. Following the method of studying the individual needs of a specific camp and

using those findings to implement a pilot energy system would not only benefit the millions currently living in refugee camps with little to no electricity access but also provide valuable insight into further improvements that can be made to the system. By continuing to perfect a sustainable method of electrical distribution in temporary settlements, as refugee numbers increase due to the climate crisis, aid can be quickly provided as management structures, prototypes of home solar systems, and other limitations will have been already studied and accounted for.

7.0 Conclusion

The core focus of this paper is to study the Azraq and Za'atari Syrian refugee camps in Jordan as they serve as both the first and two of the only refugee camps in the world that supply electricity to camp inhabitants via sustainable energy via solar farms. Both relatively new projects, there are few studies conducted on the successes and failures of the current system in place and no academic papers currently published on solely the refugee perspective of these energy systems.

The key takeaways of this paper further indicate the need for consistent and reliable electricity to ensure a high quality of life. Cutoffs and limited hours affect all refugees at both camps negatively, but are most adverse towards, women, students, and the sick. Results show that limited hours lead to limited opportunities for women and youth and can be life-threatening to those with illnesses that require refrigerated medicine or healthcare devices that require consistent electricity to function properly.

As the number of displaced people increases due to the climate crisis, there will be the inevitable quick establishment of new and many more informal settlements and refugee camps

around the globe. When this occurs, these vulnerable populations must be given sufficient aid to provide a decent quality of life. One factor required for doing so is access to electricity. To mitigate further GHG emissions in the face of climate change while providing electricity to these refugees, green energy systems must be developed. Azraq and Za'atari are the preliminary "tests" of such systems and will become the case study to which future sustainable electrical distribution systems for refugee camps are designed in developed, the precise topic explored in this paper.

As a result, the large differences between the Azraq and Za'atari camps work in favor of this objective as factors influencing the establishment of camps will vary drastically based on the cause of migration, including, climate, environment, and number of refugees, among many more variables. The similarities in ultimate suggestions for improvement and development of future systems at each camp suggest that even when camps have large differences, a similarly designed energy system can be used and modified to fit the specific situation. Findings suggest that after adjustment for context-specific situations, individual accountability regardless of the specifics of the energy system is key and can be applied to current and future refugee camps globally where solar energy is a viable source of electricity.

Innovations such as this are vital for successful climate change mitigation and adaptation. The climate crisis may still be culled, but some major effects of climate change are now irreversible (Abdulla, 2020). This means adaptation is an important aspect of fighting the climate crisis and we must learn to live with the impacts. Climate refugees are typically not those responsible for the majority of GHG emissions but remain the most affected by the resulting environmental changes. With the number of displaced people expected to skyrocket by 2050 (Docherty & Giannini, 2009), this paper is the first step toward lasting research and development

of mitigation tactics to improve the living conditions for those unfairly and unjustly impacted by climate change.

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Appendix A: Interview Guide

Below is an interview guide for refugees who live at either of the two camps:

- What camps have you lived at, and for what years have you lived there?

- What do you find to be the most limiting factor about living at the camp? Why?

- Do you ever discuss energy and electricity with other members of your family or community? Why or why not?
    - **If "yes":** What do you tend to talk about related to this subject?

- How would you have distributed energy across the camp to help those who live there?

- Is there anything else on this subject you would like to speak to that I may have not mentioned?

If the interviewee was at the camp during or after the solar field was installed:

- How did access to electricity change your life here? What are some examples of these changes?

- Are you familiar with the source of energy supplied to the camp? What do you know about the source of energy?

- Have you noticed changes to electricity access since it was first introduced?
    - **If "yes":** What changes have occurred and what are your thoughts about the changes?

- What do you find to be the greatest limitations in the current energy distribution methods established at this camp?

- Do you think electricity distribution and access are handled fairly and equitably?

- Concerning electricity distribution and access, what would you like to see changed?

If the interviewee was at the camp before the solar field was installed:

- Did the lack of electricity impact your day-to-day life?
    - **If "yes":** In what ways?

- What activities did you find to be the most significantly impacted by the lack of electricity? Why?

In your experience of living at the camp, where would you prioritize energy access to?

Appendix B: Participant Informed Consent Form

TITLE OF THE STUDY: Sustainable Energy Distribution Methods at the Azraq and Za'atari Refugee Camps in Jordan: A Refugee Perspective

RESEARCHER NAME: Lucie Lagodich

My name is Lucie Lagodich and I am a student at the School for International Training (SIT) and its Global Master of Arts in Climate Change and Global Sustainability program.
I would like to invite you to participate in a study I am conducting (for partial fulfillment of my Master of Arts degree in Climate Change and Global Sustainability). Your participation is voluntary.

Please read the information below and ask questions about anything you do not understand before deciding whether to participate. If you decide to participate, please sign this form and you will be given a printed or electronic copy.

OR

Please listen to the information presented and ask questions about anything you do not understand before deciding whether to participate. If you decide to participate, please give consent orally (e.g., "You may say "yes", if you consent.").

PURPOSE OF THE STUDY

The purpose of this study is to gather perspectives from refugees and managers on the energy distribution methods at the Azraq and Za'atari Syrian refugee camps provided by a solar panel field located on the outskirts of each camp in Jordan. The perspectives shared will address the current sustainable energy distribution system.

STUDY PROCEDURES

Your participation includes being asked questions about the number of people in your household, your family's electricity usage, and your perspective on the energy distribution system, among other related items. The interview will not exceed one hour and will occur only once. The interview will take place at your residence or a quiet space at the Relief International offices in the camp. With your consent, notes will be taken to ensure information is accurately noted. However, you can participate in the study even if you do not wish to have your information written down.

POTENTIAL RISKS AND DISCOMFORTS

There are no foreseeable risks to participating in this study and no penalties should you choose not to participate; participation is voluntary. During the interview, you have the right to not answer any questions or to discontinue participation at any time.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

There are no direct benefits for your participation. However, your knowledge and perspective may help to improve energy access to refugees at this and other refugee camps.

CONFIDENTIALITY

Any identifiable information obtained in connection with this study will remain confidential. Data collected from interviews will be kept on a password-protected external drive. This documented data will not be shared with anyone except for the researcher (me), the translator, and the interviewee (you). Interviews will be conducted in a private space. Notes taken during interviews will be destroyed a month after the paper is complete. In the final paper, you will be identified by "Interviewee 1", "Interviewee #2", etc. Your name and any other specific identifiers will be kept confidential.

FUTURE USE OF DATA

The data from this study and your personal information will not be used for future research studies or distribution.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Your participation is voluntary. If you decline to participate there will be no penalty or loss of benefits to which you are otherwise entitled. You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this study.

RESEARCHER'S CONTACT INFORMATION

If you have any questions or need more information about this study, please contact me at lucie.lagodich@mail.sit.edu or my advisor at jonathan.walz@sit.edu.

RIGHTS OF RESEARCH PARTICIPANT – IRB CONTACT INFORMATION

In an endeavor to uphold the ethical standards of all SIT proposals, this study has been reviewed and approved by the SARB or SIT IRB. If you have questions, concerns, or complaints about your rights as a research participant or the research in general and are unable to contact the researcher please contact the Institutional Review Board at: irb@sit.edu. School for International Training, Institutional Review Board, 1 Kipling Road, PO Box 676, Brattleboro, VT 05302-0676, USA irb@sit.edu, +001-802-258-3132.

"I have read the above and I understand its contents and I agree to participate in the study. I acknowledge that I am 18 years of age or older."

Participant's signature: _____ Date: _____

Researcher's signature: _____ Date: _____

OPTIONAL STUDY ELEMENTS

Consent to Quote from Interview

I may wish to quote from the interview with you either in presentations or articles that result from this work. If a pseudonym will be used, include this statement: A pseudonym (fake name) or number (e.g., Interviewee 1) will be used to protect your identity.

Initial one of the following to indicate your choice:

_____(initial) I agree to consent to quote from the interview

_____(initial) I do not agree to consent to quote from the interview

Consent to Written Notes at an Interview

Initial one of the following to indicate your choice:

_____(initial) I agree to consent to written notes taken at the interview

_____(initial) I do not agree to consent to written notes taken at the interview