



# Renewable Energy Market Assessment

in Kirkuk and Salah Al Din Governorates, Iraq

October 2020



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# 1 INTRODUCTION

According to the National Aeronautics and Space Administration (NASA) of the United States, “Scientific evidence for warming of the climate system is unequivocal.” The current warming trend of the climate has a 95 percent probability directly linking human activity as its primary cause, most notably in the form of polluting greenhouse gasses. Climate change, and its numerous effects on human health and the health of the planet, has become one of the world’s largest existential threats of our lifetime. Humanitarian aid programmes and government agencies have increasingly become cognisant of climate change as a security threat, especially in vulnerable contexts such as poverty-stricken, conflict-stricken, or reconstructing areas.

In Iraq, People in Need (PIN) is working to support livelihoods as people struggle to rebuild their lives upon a fragile social, economic, and political foundation after years of conflict. In doing so, PIN’s work is forward-focused; sensitive to the added layer of difficulties climate change will have on society, and looking to incorporate a larger aspect of sustainability in our activities in the region. From education to work placements to infrastructure rehabilitation, viable opportunities for beneficiaries should have a sense of longevity and sustainability – renewable energy could be a cross-cutting factor in achieving this goal.

For the purpose of better informing the design of future interventions, assisting people in the most needed, sustainable way possible, this assessment surveys a target population in the Kirkuk and Salah Al Din governorates of northern Iraq on current energy needs and how renewable energy could potentially fill in any gaps. This is the second assessment on the topic, after a previous survey conducted in July in the Nineveh governorate, also in northern Iraq.

## **What is renewable energy?**

Renewable energy is energy produced from sources that do not deplete or can be replenished within a human’s lifetime. The most common examples include wind, solar, geothermal, biomass, and hydropower.

## **What is global warming?**

Human activity is overloading our atmosphere with carbon dioxide and other global warming emissions. These gases act like a blanket, trapping heat. The result is a web of significant and harmful impacts, from stronger, more frequent storms, to drought, sea-level rise, and extinction. For example, in the United States, about 29% of global warming emissions come from the electricity sector. Most of those emissions come from fossil fuels like coal and natural gas.

## **What is CO2e?**

Carbon dioxide (CO<sub>2</sub>) is the most prevalent greenhouse gas, but other air pollutants—such as methane—also cause global warming. Different energy sources produce different amounts of these pollutants. To make comparisons easier, we use a carbon dioxide equivalent, or CO<sub>2</sub>e—the amount of carbon dioxide required to produce an equivalent amount of warming.

In contrast, most renewable energy sources produce little to no global warming emissions. Even when including “life cycle” emissions of clean energy (i.e., the emissions from each stage of a technology’s life—manufacturing, installation, operation, decommissioning), the global warming emissions associated with renewable energy are minimal.

## Impact on public health

The air and water pollution emitted by coal and natural gas plants are linked with breathing problems, neurological damage, heart attacks, cancer, premature death, and a host of other serious problems. The pollution affects everyone: one Harvard University study estimated the life cycle costs and public health effects of coal to be an estimated \$74.6 billion every year. That's equivalent to 4.36 cents per kilowatt-hour of electricity produced—about one-third of the average electricity rate for a typical US home.

## 2 METHODOLOGY

Using a survey administered via smartphone, with data recorded via Kobo Toolbox, PIN conducted data collection from the 12nd to 20th of October, 2020.

Surveys were collected from randomly selected households, the percentage of female household interviewees was 5% and male 95%.

171 surveys were conducted, the assessed villages are the most vulnerable villages in the area, the assessment team tried to assess between 3-10 HH and about 5 frames per villages, Data analysis and reporting were subsequently carried out by PIN MEAL independent unit. the interviewees were from Kirkuk and Salah Al Din governorates in the following areas:

Kirkuk Governorate	
Village:	Number of Households Surveyed:
Al-Ahnaf	3
Shameet	11
Al-Akoola	11
Al-Sa'adia	8
Al-Namisa	11
Al-Namla	11
Hawth Saba'a	10
Mistah Shaneen	6
Al-Mistah	3
Al-Hamdaniah	10
Arsa	10
Lower Asdira	10
Holwa Al-Wosta	5
Salah Al Din Governorate	
Village:	Number of Households Surveyed:
Al-Hoorya	9
Aitha	10
Shokra	10
Owayjila	10
Salman	10
Al-Khadraniah	10
<b>Grand Total</b>	<b>171</b>

Additionally, a survey was performed with the following groups of local government offices, farmers, and supplier of power systems:

Groups	Numbers Surveyed per Governorate	
	Kirkuk	Salah Al Din
Water Distribution Office	1	1
Irrigation Office	1	1
Health Office	1	1
Power System Suppliers	1	1
Farmers	73	12

Data collection, analysis and reporting were subsequently carried out by PIN MEAL independent unit.

This assessment was performed for the purpose of better understanding where people’s sources of energy are from and what average daily uses of electricity look like, in addition to inquiring the public’s knowledge of renewable energy in general.

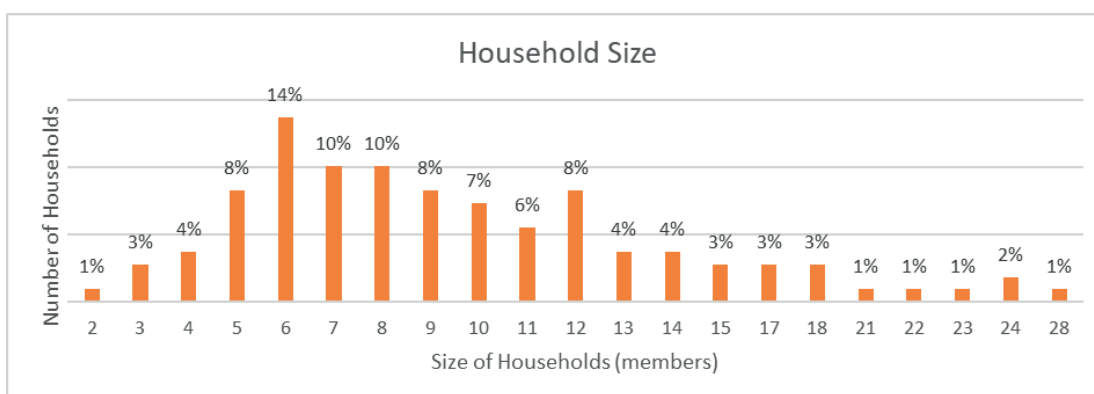
### 3. FINDINGS - Hawija District, Kirkuk Governorate

In this section, the first part of the findings of the assessed markets of **Hawija district** will be presented and elaborated.

#### 3.1. Households

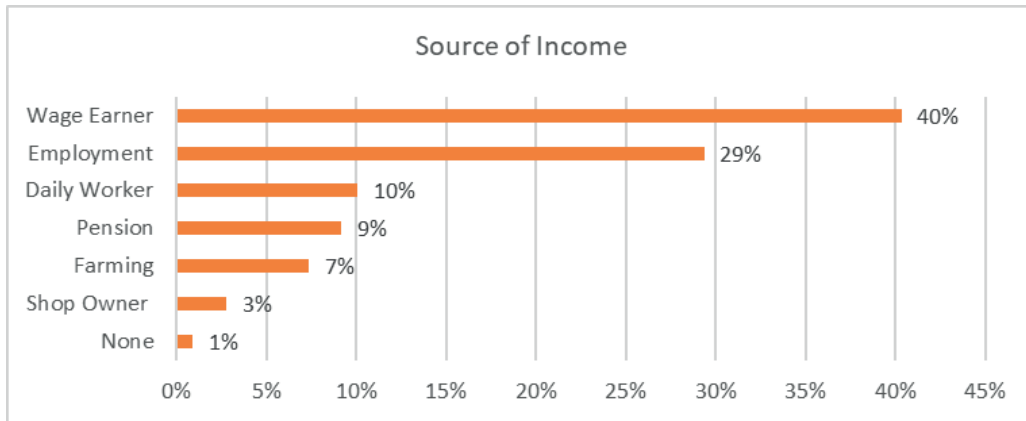
In total, the study was conducted with 109 households across different villages within Hawija District in Kirkuk Governorate. The gender breakdown of participants was 4 females and 105 males.

**Household Size:** The household size of families ranged across various amounts. The most common household size was that of 6 members, which was available for 14% of the participants. This was followed by 7 and 8 members, each totaling 10% of the total households surveyed.

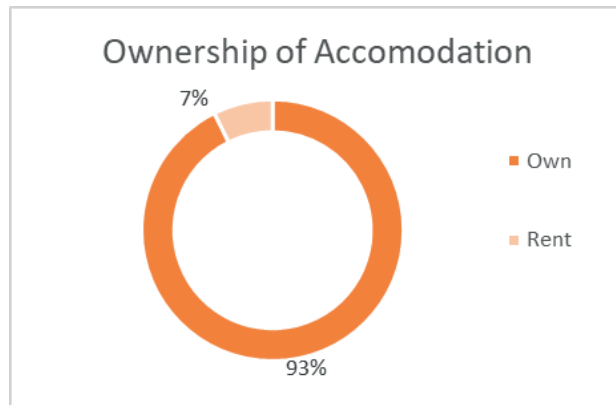


**Income:** For sources of income, 39% of households indicated that they have a stable source of income, while 61% depended on unstable, day-to-day, sources of income.

Regarding the type of income, 40% of families stated to be wage earners, 29% having a government income (employment or retirement salary), and other sources of income can be seen in the following figure:



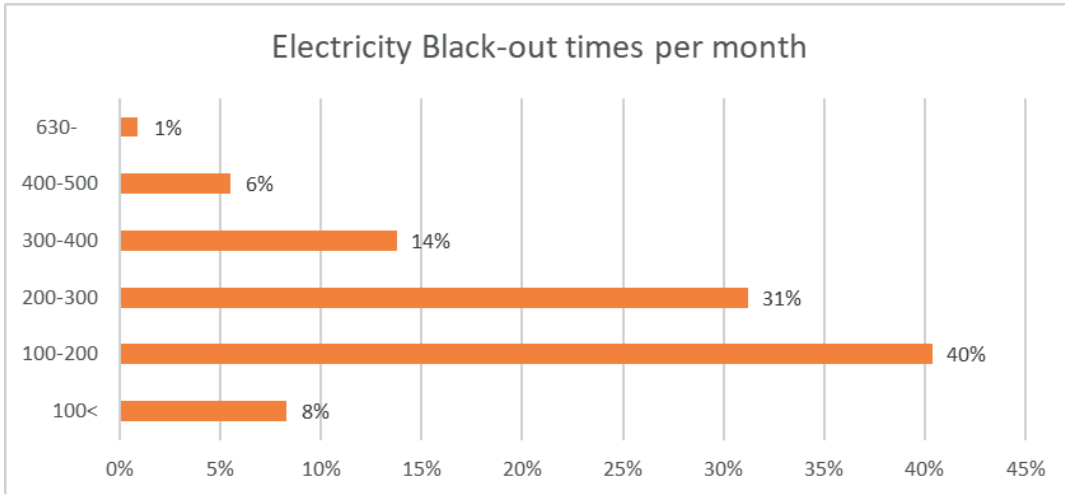
**Accommodation:** 93% of the surveyed households said they own their place of residence, while 7% live in rented ones.



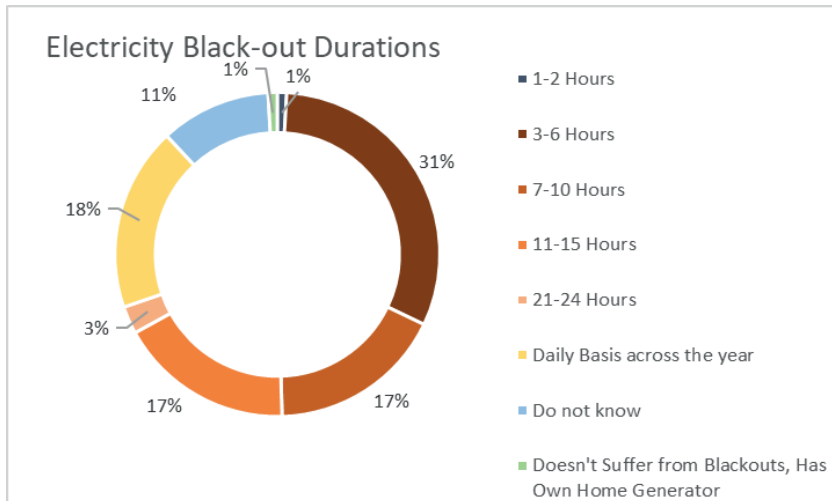
### 3.1.1. Household Electricity

**Electricity:** Around 98% of the surveyed household said they are not satisfied with the current supply of electricity in their place, while 2% stated their satisfaction.

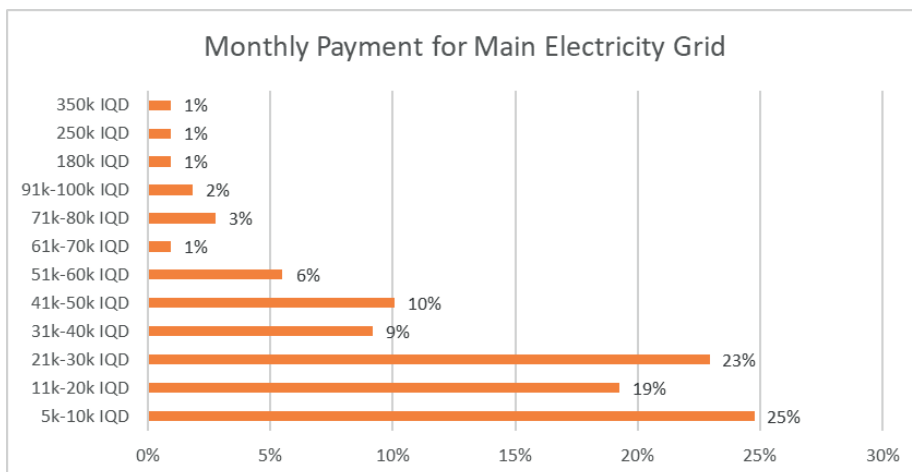
The main sources of this dissatisfaction are the numerous, daily electricity outages and the limited power capacity of local generators. About 40% of households report a 100-200 electricity black-outs per month on average. More details in the following figure.



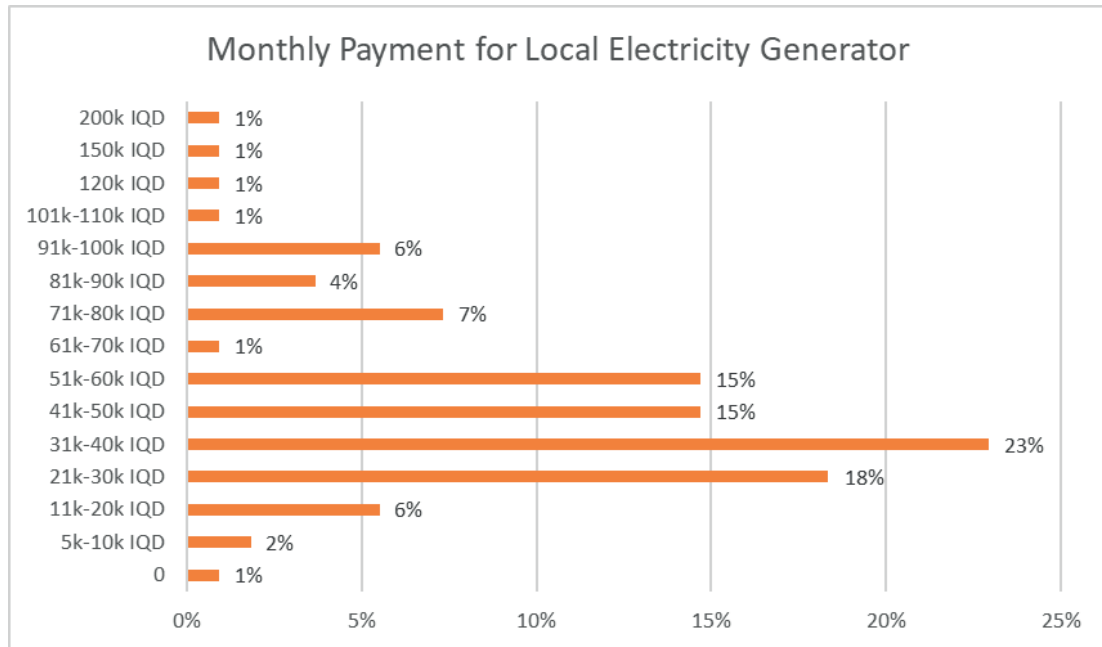
20% of these black-outs typically last from 3 to 6 hours, 12% last daily across the year, while 11% last for 7 to 10 hours.



**Cost of Electricity:** around 25% of the households pay from 5,000 to 10,000 Iraqi Dinars per month for the main grid electricity, while 23% said they pay between 21,000 to 30,000 IQD per month.



For the local electricity generator, around 23% of household pay monthly from 31,000 to 40,000 Iraqi Dinars for the local generators' electricity, 18% said they pay between 21,000 to 30,000 Iraqi Dinars per month.

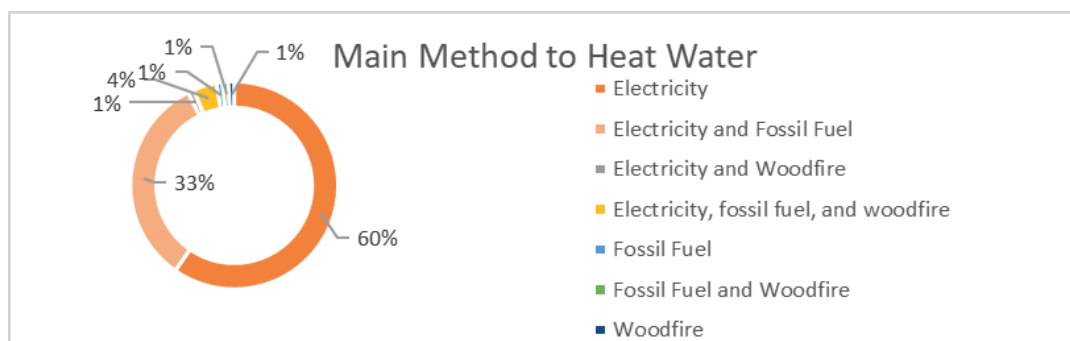


### 3.1.2. Energy Sources and Renewable Energy

**Energy Source of Electricity:** When households were asked about the source of electricity in Iraq, 6% of surveyed households said they do not know, while 94% said they know about the sources of electricity. For those who know the sources, 50% said it is from fossil fuel, while 50% said its from fossil fuel and hydropower sources.

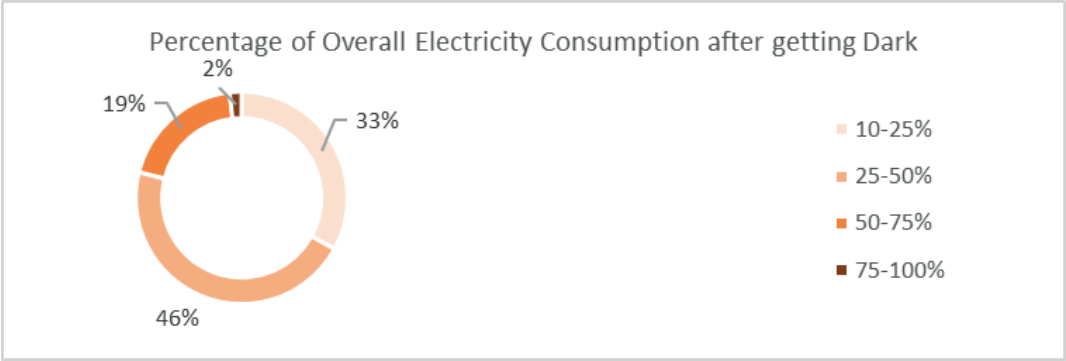
**Negative Impacts:** we asked surveyed households if they are aware of any negative impacts of energy sources of electricity and 95% said they do know; 89% of those said pollution is the negative impact, and 8% stated pollution and noise.

**Electricity Consumption:** 60% of surveyed households said they use electrical heaters as the main heating method for water in their places, and 35% said they use both electricity and fossil fuels.





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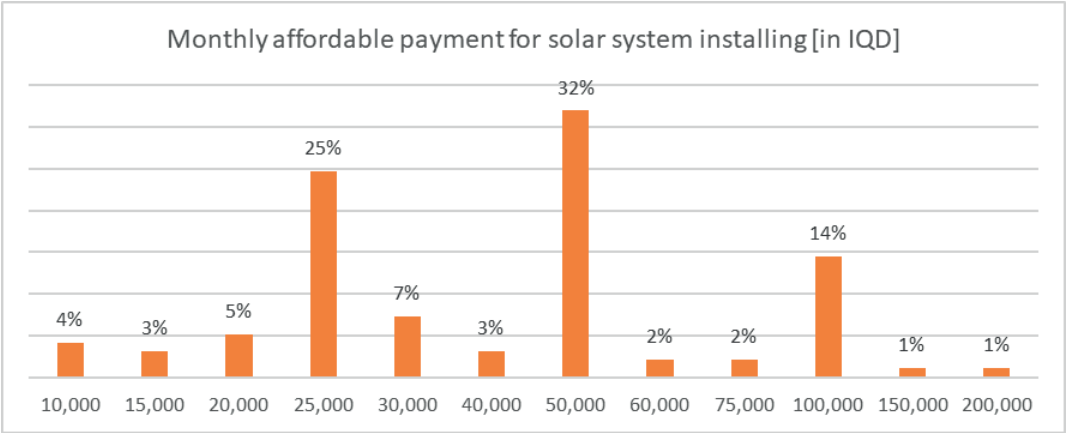


**Renewable Energy:** when we asked households if they have heard of any renewable energy sources, 9% said they do not know these sources and 91% said they do know. Our enumerator team was equipped with proper training and introduced renewable energy sources to those who lack the knowledge.

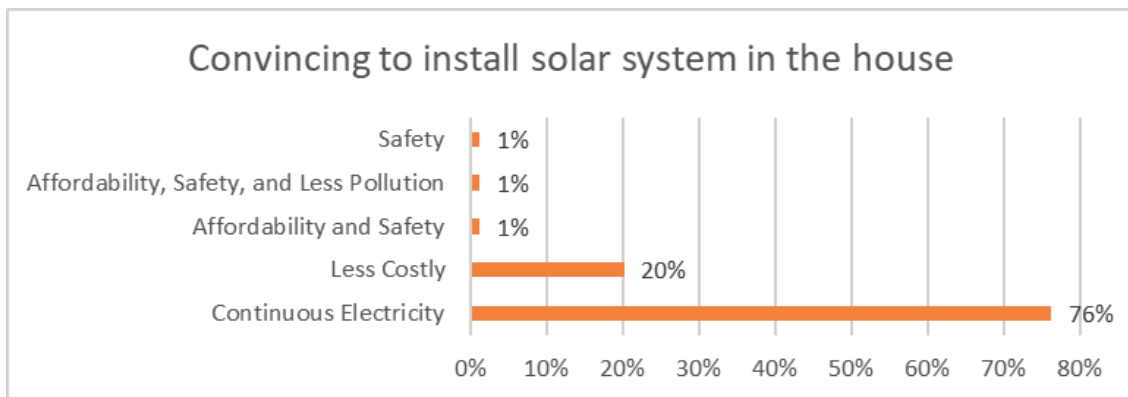
Then, 86% of households are aware of renewable energies, especially solar panels in the vicinity while 14% are not aware of it. Also, 100% with knowledge about renewable energy stated Solar energy as the only source they know.

Of the surveyed households, 95% of them said they would be interested in having a renewable energy installation / photovoltaic panels / solar collectors.

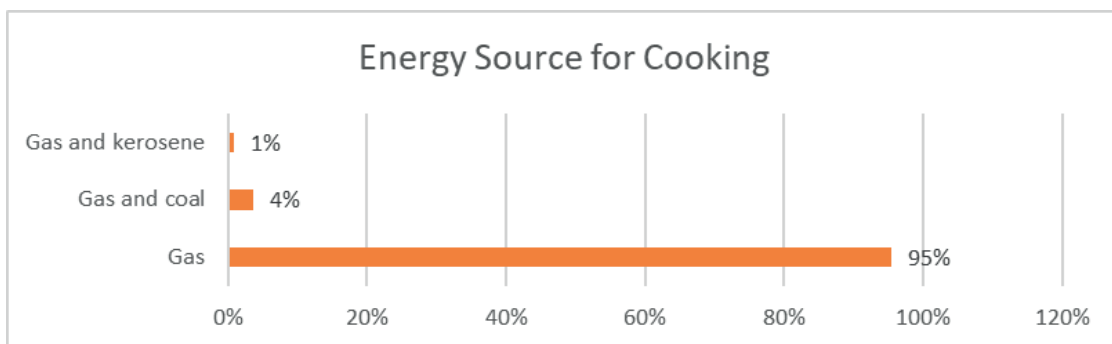
They were asked to give a rough amount of affordable monthly payment for solar system installing, the results were as follows:



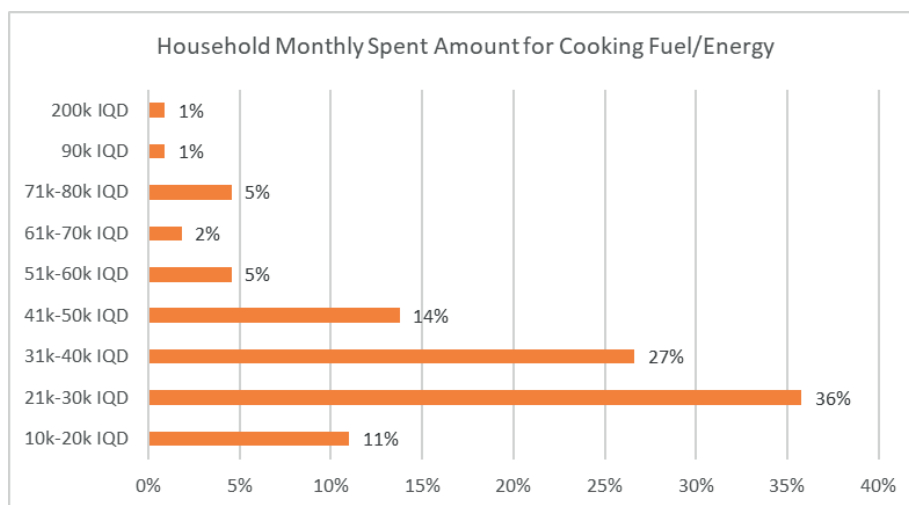
Majority of those interested in renewable energy said they would be convinced to install a solar system in their house if it is guaranteed they have continuous electricity (76%), while only 20% said if the solar system is a low cost, they would install it.



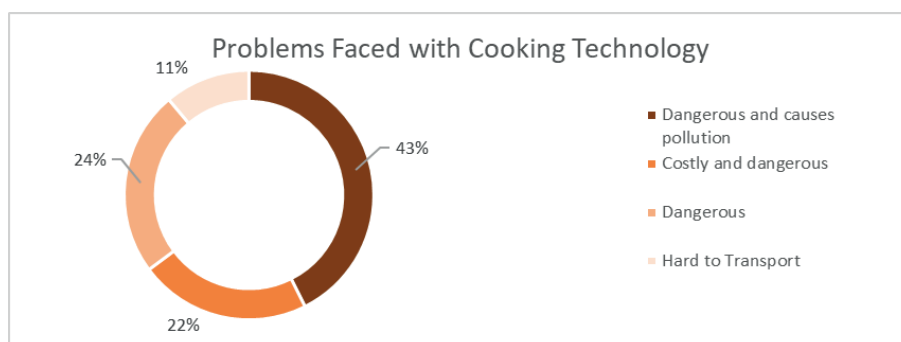
**Cooking:** 95% of households said they use gas as their main method of cooking, while 4% said they use gas and coal and 1% uses gas and kerosene.



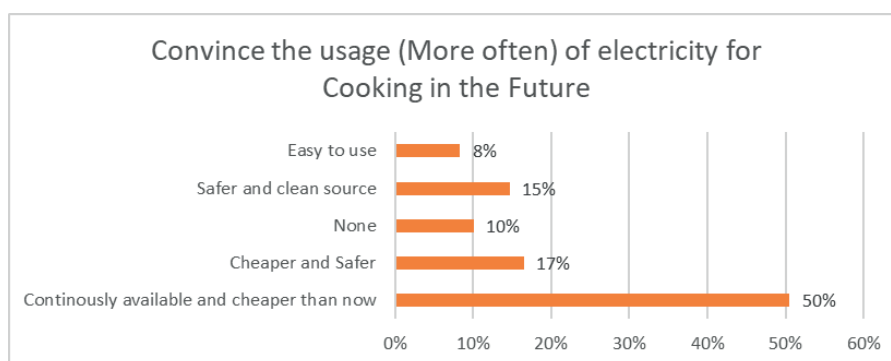
Around 36% of households spend 21,000 to 30,000 IQD per month for cooking fuel/energy, and others spend different amounts as follows:



50% of households expressed comfort in using their current cooking technology and fuel, 50% said they are not. Those not comfortable stated issues they faced with the current cooking technology they have as shown below:

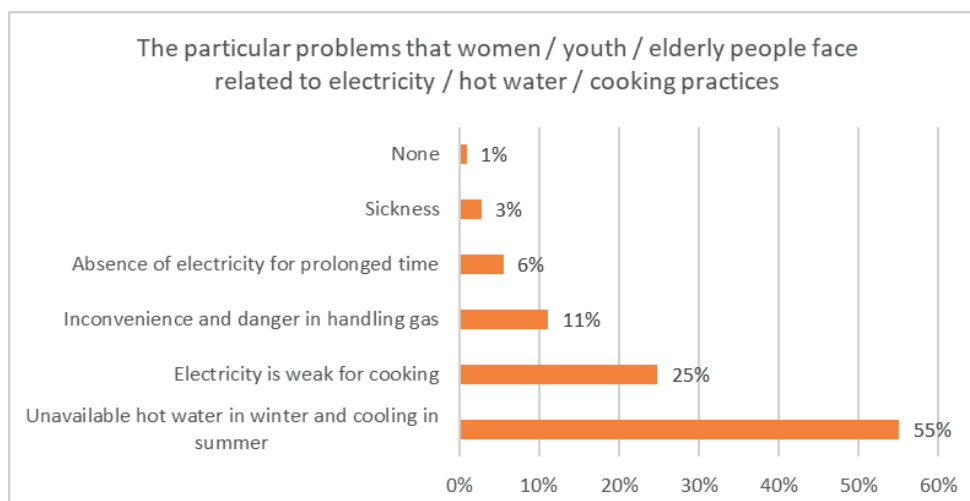


50% of households said they would use electricity more often for cooking if it offered continuous availability and were cheaper than now, 17% said they would use it if it were cheaper and safer, and 15% if it was safer and clean source.



When asked if they would like to use renewable energy (photovoltaic) also for cooking, 84% said they would.

We asked about what are the particular problems that women/youth / elderly people face related to electricity / hot water/cooking practices, and 55% stated there is unavailable hot water in winter and cool water in summer, 25% said electricity is weak for cooking.



When households were asked if there are any particular obstacles that they face when purchasing devices base on renewable energy, 91% stated that they do face obstacles while 9% do not face them. From those that face obstacles, 100% of them indicated the high cost of such devices as the main obstacle.

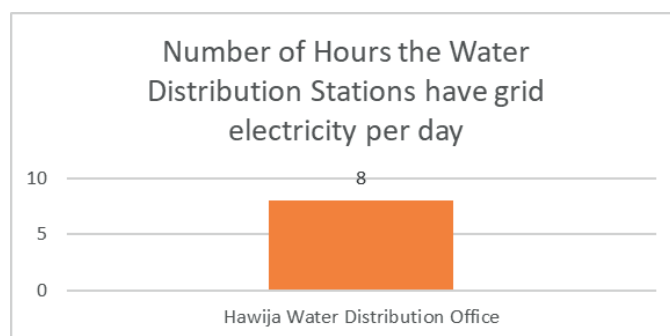
### 3.2. Local Government Offices

When households were asked if there are any particular obstacles that they face when purchasing devices base on renewable energy, 91% stated that they do face obstacles while 9% do not face them. From those that face obstacles, 100% of them indicated the high cost of such devices as the main obstacle.

#### 3.2.1. Water Distribution Offices

For this section, the water distribution offices in Hawija district and Kirkuk center were inquired, and were asked to give their views on the water distribution stations of their directorate with electricity. The office in Hawija said that their situation with electricity is not at the required level due to the many hours of electricity interruption.

Regarding the number of hours water distribution stations are equipped with national electricity needed for processing, the office in Hawija only received 8 hours per day.



The office was asked, if national electricity is available, if the station pumps water to each location at the same time, or divides the time to equip each place separately. In Hawija the electricity voltage is too low and the water pumps don't work until it resumes to the correct strength in order to pump water to the places which haven't received enough. In the end, it seems there is no constant schedule for water distribution most of the time due to inconsistent access to electricity necessary for the pumps to operate.

The water distribution office does contain generators; however, they do not pay for the monthly fuel expenses. Furthermore, the electricity cuts affect the functionality of the water distribution stations. The station in Hawija indicated that frequent electricity interruptions negatively affect the supply of water to neighborhoods and villages because supplying each with water would take about 5 hours, and this delay causes a water shortage that lasts for nearly 2 hours in these areas.

The office expressed its interest in renewable energy sources. They mentioned that the emission of toxic gases from power plants equipped with generators in some governorates affects human health and affects the environment in general, from carbon dioxide and other pollutants.

When asked about having any knowledge regarding the installation of solar panels, the Hawija station did have some knowledge. When asked about the possibility of the organization installing solar panels on some water distribution stations, the Hawija station indicated its readiness to participate.

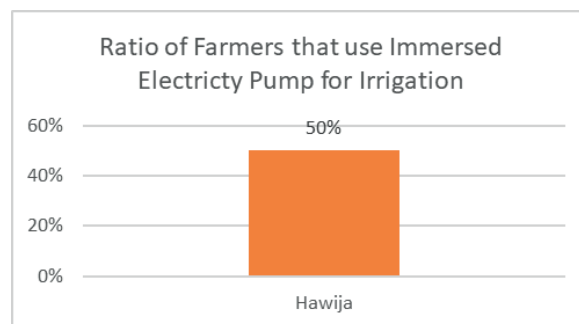
A final comment made by the Hawija office was that their position is good towards solar energy, and that they need it in their stations so that the water supply in the areas becomes more than 10 hours a day for each neighborhood and region.

### 3.2.2. Irrigation Offices

The location that was addressed within the following section was a water resources division in Hawija.

First of all, they were asked to indicate the percentage of farmers who need electricity for irrigation. In Hawija, they indicated that the ratio of farmers who use electricity is at 25% to 50% for their irrigation.

The percentage of farmers who use a submersible electric pump for irrigation for Hawija is at a rate of 25-50% since they use wells.



Community area/ City / Town / Village	Ratio of farmers that need electricity for irrigation
Hawija	25-50%%

When asked about the devices that run on electricity in farms, the division in Hawija stated its use of electric dynamo.

When asked about the idea of using solar power immersed irrigation pumps, the office said that it's a good idea to use them. They encourage the idea of working with renewable energy, due to the lack of energy consumption and it being a clean energy source.



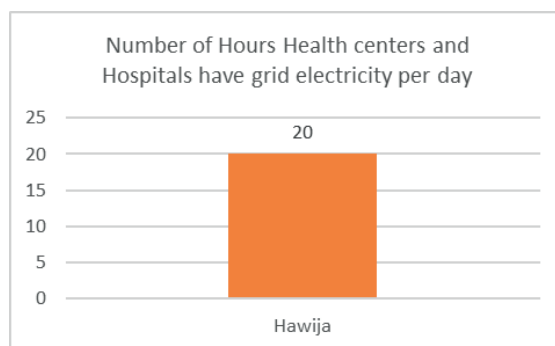
However, if the organization installs solar panels for some farmers, the office indicated that the farmers **cannot** participate in paying the cost of the system.

The division in Hawija commented that they encourage farmers to use renewable energy for one cost only, opposite to electric power, which will also help in paying the monthly wages for participation in the national electricity system.

### 3.2.3. Health Offices

In this section, Hawija General Hospital was inquired. They were asked how they view the health centers and hospitals of their directorate with the electricity situation, and they indicated the electricity situation to be good.

They were asked how many hours do health centers and hospitals equip with national electricity in one day. They indicated that they receive national electricity 20 hours per day.



Regarding private generators, the hospital has generators.

The hospital in Hawija receives fuel from government funding for the health sector.

They indicated that electricity blackouts do affect the functioning of the health centers and hospitals. The hospital in Hawija revealed some points relating to blackouts to be: 1- Spending fuel, 2- Increasing the load above the power efficiency of the generator, especially in the summer, 3- Loud sound noise, and 4- Engine generator consumption.

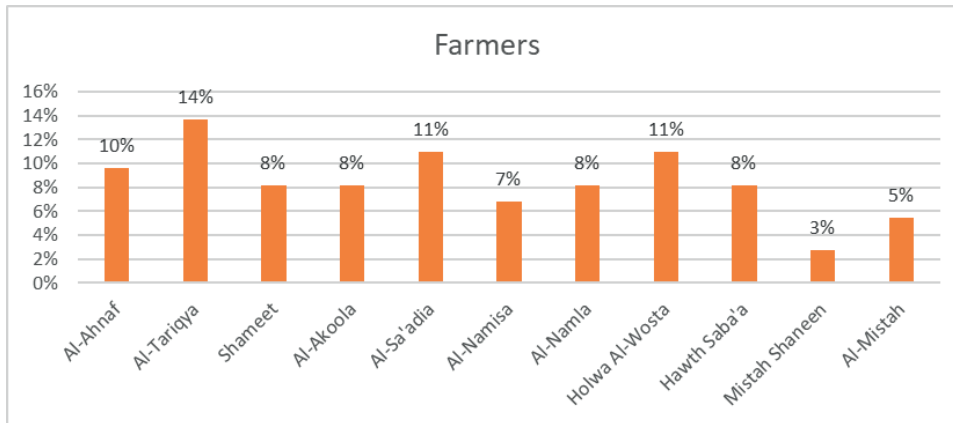
The hospital in Hawija denied interest in regarding renewable energy usage.

They were asked to explain how air pollution and bad gases affect human health. The hospital in Hawija revealed that renewable energy sources are a natural, clean energy free of CO<sub>2</sub> that helps in fighting global warming.

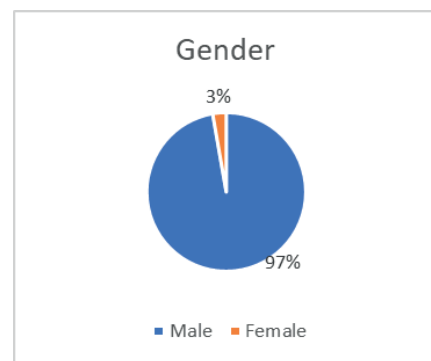
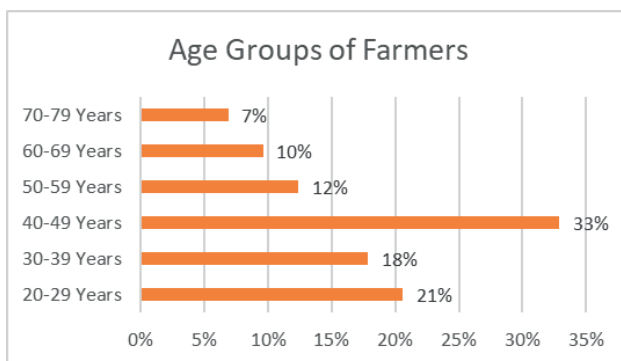
They **did not** have knowledge about installing solar panels. When asked about the possibility of the organization installing solar panels on some health centers or hospitals, they indicated that the directorate would not participate in paying the cost of the solar system. Overall, they did not have more information to share about their stance on renewable energy since they have not worked in that field before.

### 3.3. Farmers

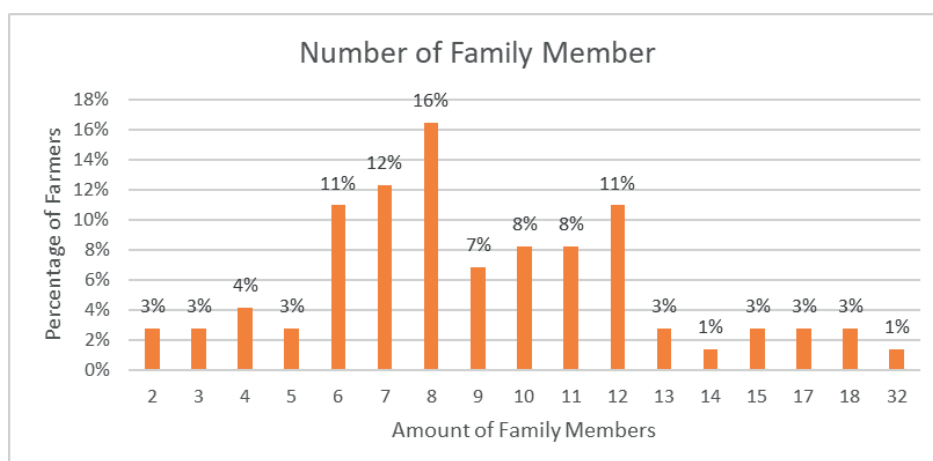
The following section considers the farmers located in various villages across the assessment area in Kirkuk Governorate. In total, 73 farmers took part in the assessment. Seen on the figure below, the farmers are from the following villages:



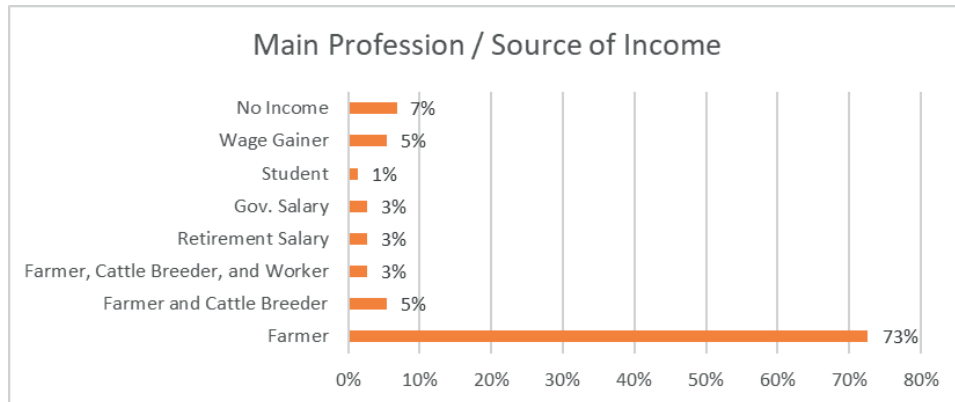
Also, the farmers were between different age groups from 20 to 78, while in terms of gender, 97% were male and only 3% were female.



The farmers were asked to indicate the number of family members each have. Accordingly, the highest reported number was 8 members belonging to 16% of the farmers inquired. This was followed by 6 members by 12% of the farmers.

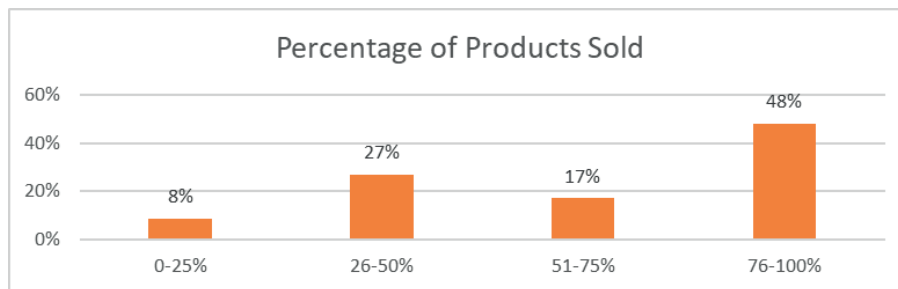


When asked about the main profession and source of income, the majority indicated that they are farmers full time (73%). In a lower degree, 7% indicated that they do not have any income source, while 5% indicated that they are wage gainers.



Regarding the ownership of agricultural land, 97% respondents indicated that they do own it, while 3% do not own the land. When asked about the size of the land (in Dunums), the responses varied between being 2 Dunums to 200 Dunums for some farmers. Those lands were home to various types of livestock being bred, ranging from cows, sheep, goats, and chicken.

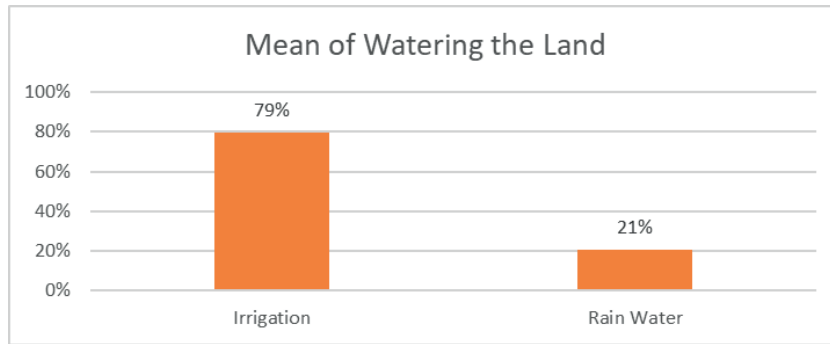
When asked whether they sell or consume their products, 86% of farmers indicated that they sell some products and consume the remaining, 7% of them sell the entire products, and the remaining 7% consume their entire products that is produced. Out of the farmers that sell their products, the majority (48%) sell them by a rate of 76-100%, followed by 27% of them who sell their products at a rate of 26-50%.



Also, when asked about the location where they sell their products, most, 49%, of them sell them to a middleman (dealer, marketer), 38% sell them in the market, while the rest are marketing it for state silo (10%) and consumed at home (3%).

Following that, regarding watering of their agricultural land, most of them (79%) do it through irrigation, while only 21% use rainwater for it. Those that use irrigation indicated that they consume un-determined water quantities per day. Also, regarding the type of crops being planted, almost all of the farmers plant barley crops, and in a lower degree, wheat. Some of them also planted corn, tomatoes, okra, eggplants and pepper.

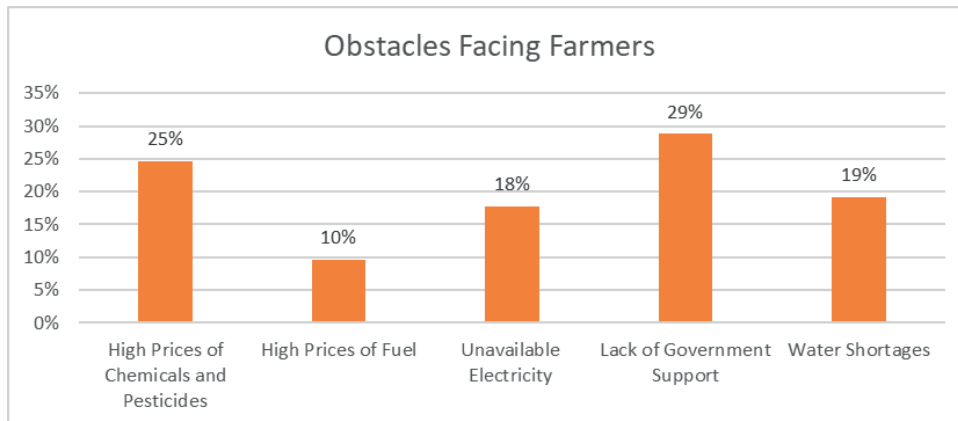




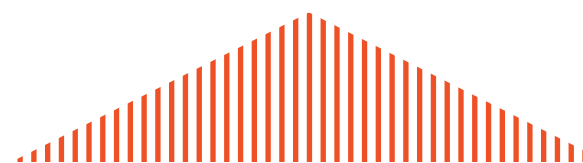
Next, 100% of them cultivate their own land. Regarding the time of cultivation, the majority (73%) do it at the start of every season. The remaining were distributed as 23% of them cultivate in a bi-season manner (every 6 months, summers and winters) while 4% do it annually.

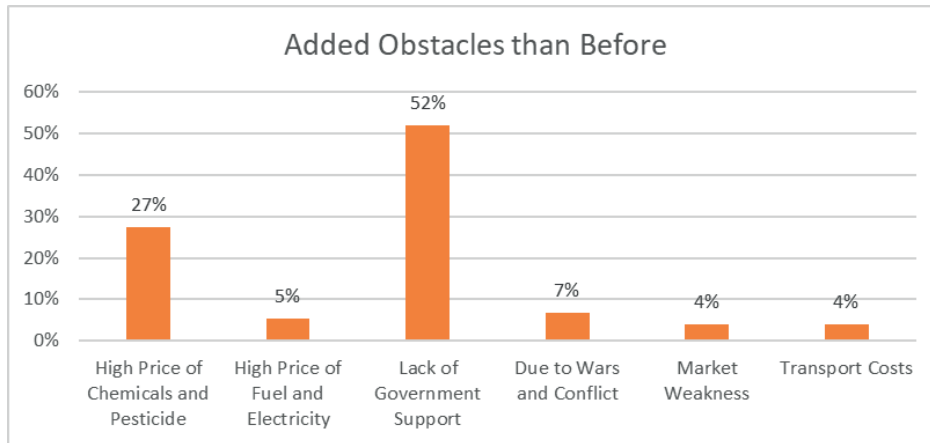
Following that, they were asked if they do intercropping (growing a specific crop between other crops). In response, 64% of them answered that they do not practice it, while 36% of them do. Regarding compost usage in their crops, 86% of them use it while the remaining 14% do not. For pesticides usage, 92% of them use it while 8% do not. Also, none of them cover their crops.

Next, they were asked if they grow in a rotating manner or do grow the same product every season. Most of them, 93%, grow the same crops every season, while only 7% of them grow different crops. Regarding the main obstacles faced by the farmers, almost all of them gave similar answers that there is lack of government support (29%) and chemical composts and agricultural pesticides are getting expensive (25%).



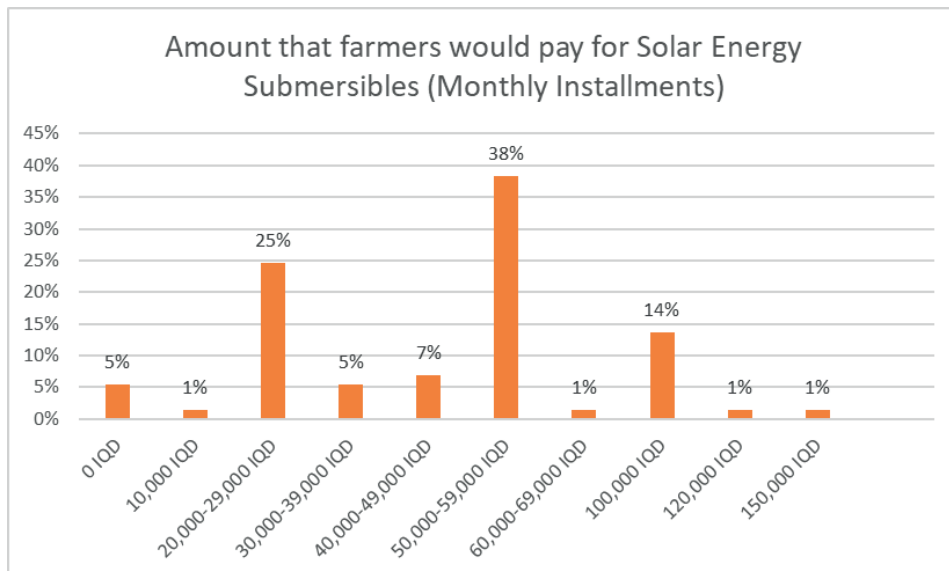
Also, 52% of them indicated that the obstacles have become more than before, while 48% think they are still the same. They were asked what were the new obstacles they are facing, 52% of them indicated that they face lack of government support.





The farmers were asked if they are interested in getting renewable energy. Almost all, 96% of them, are interested in it. The majority of them supported solar energy because it is easy to use and does not need fuel and is a clean and non-polluting energy source. Also, most of them indicated that they plan to use solar energy for agricultural purposes.

When asked if they have heard about submersibles that run on solar energy for irrigation, 63% of them answered yes, while 37% have not heard about it before. The farmers opinions on them were that they are high quality, continuous electric power, meets the need, and saves fuel. They mentioned that they are good, continuous pumps that contribute to high agricultural yield, and also lead to reduce environmental pollution. Then, when asked if they are willing to purchase them, 97% of them answered Yes. Regarding the amount that farmers would pay (in monthly installments) for the solar energy submersibles, the following were the results:



The farmers who responded that they are not interested in using solar energy submersibles gave some reasons, including: poor electricity and its inability to operate submersibles, not having enough money, not having enough knowledge about using it, and not needing it in their agricultural activities. Also, the farmers were asked if they are interested in using other machinery that work on renewable energy. Accordingly, 55% of them do not want to, while 45% are willing to use other machinery.

Some final remarks given by the farmers were that they want to obtain renewable energy because they most urgently need it. They referred it to be clean electric energy with no pollution to the atmosphere and the continuation of electricity, and are safer. Solar energy especially is a clean, continuous energy and less risk than the national electricity.

### 3.4. Power System Suppliers

A survey was made with a power system suppliers in Hawija. They have responded that they have participated in the renewable energy activities. The supplier from Hawija indicated that they have worked on installing solar energy systems for government departments, homes and wells.

When asked about the problems faced during the work on these systems, the supplier in Hawija indicated challenges in selecting quality panels, high cost, buying at low rates from the people, and the household's lack of knowledge of the system's work.

The suppliers were then asked to indicate the locations they get their materials from. The Hawija supplier received them from Sulaymaniyah Governorate locally as the main supplier is from Dubai, UAE.

The suppliers were then asked to indicate if they are facing any problems in providing these materials. The supplier from Hawija responded that transportation costs and ensuring the quality of the system are problems with providing the materials.

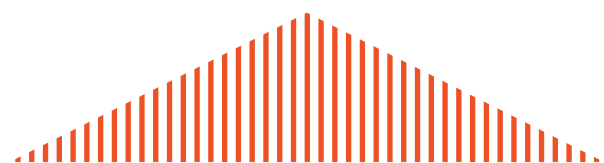
When asked if they are interested in creating (more) businesses related to renewable energies, they responded with "Yes."

Also, regarding the kind of renewable energies that interest them the most, they indicated it to be solar energy due to the suitability of it in the region.

Regarding the main obstacles that prevent them from growing their business into more renewable energies, the supplier in Hawija indicated the obstacles to be the household's lack of knowledge of the system's work and the cost of these systems to be high. Also, it is expensive to import while selling within this community is difficult. They were persistent on increasing awareness among the people regarding the usage of renewable energy sources.

Next, regarding the sales approaches that will be the most effective for reaching potential customers, the supplier in Hawija indicated that the methods can be advance payments of at least a quarter of the value, selling through installment, and selling by cash.

Finally, when asked about what they think of the system of costumers paying in installments, the supplier in Hawija indicated that the idea is acceptable if there is a sponsor and the sponsor has a salary, especially if the order is in a large quantity, in which case they believe it could be done.



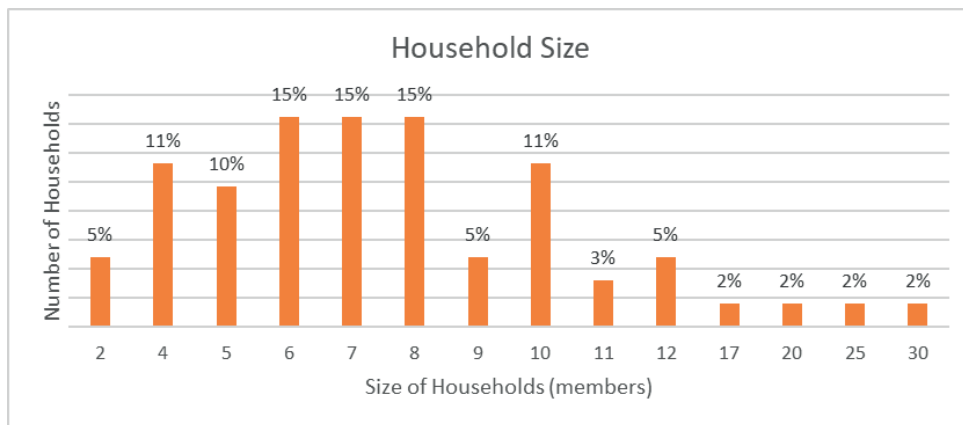
## 4. FINDINGS - Shirqat District, Salah Al Din Governorate

In this section, the first part of the findings of the assessed markets of **Shirqat district** will be presented and elaborated.

### 4.1. Households

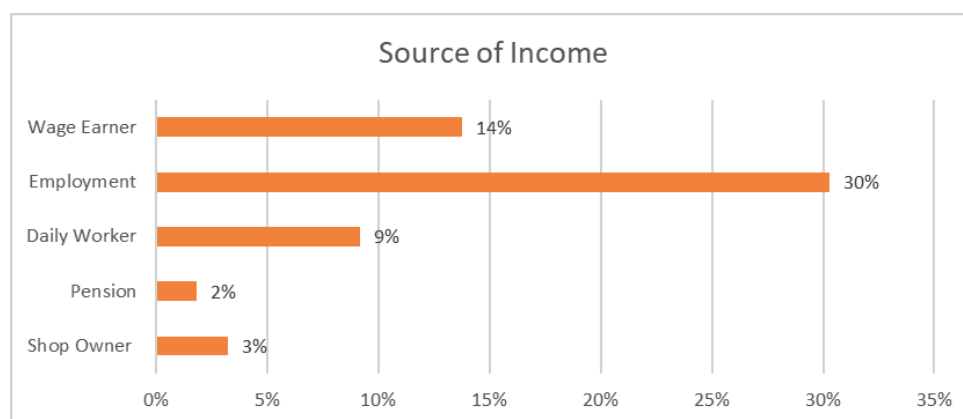
In total, the study was conducted with 62 households across different villages within Shirqat District in Salah Al Din Governorate. The gender distribution of participants was 4 females and 58 males.

**Household Size:** The household size for the families ranged across various amounts. The most common household size among them was 6, 7, and 8 members which were present for 15% of households each. This was followed by 4 members and 10 members, which were present in 11% of households.

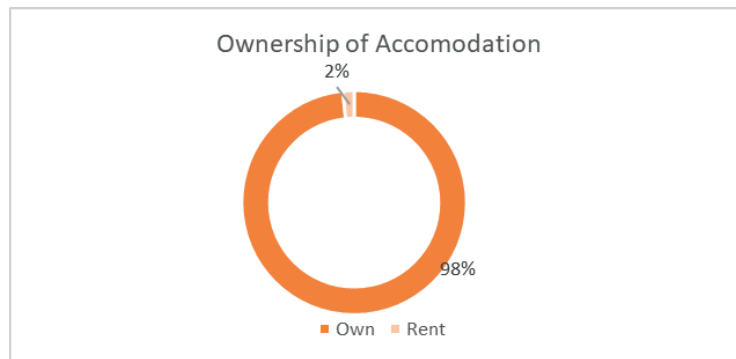


**Income:** For the source of income, 53% of them indicated that they have a stable source of income, while 47% of them depend on unstable, day by day, source of income.

Regarding the type of income, 30% of the families have a government income (employment or retirement salary), 14% of families stated to be wage earners, and other sources of income can be seen in the following figure:



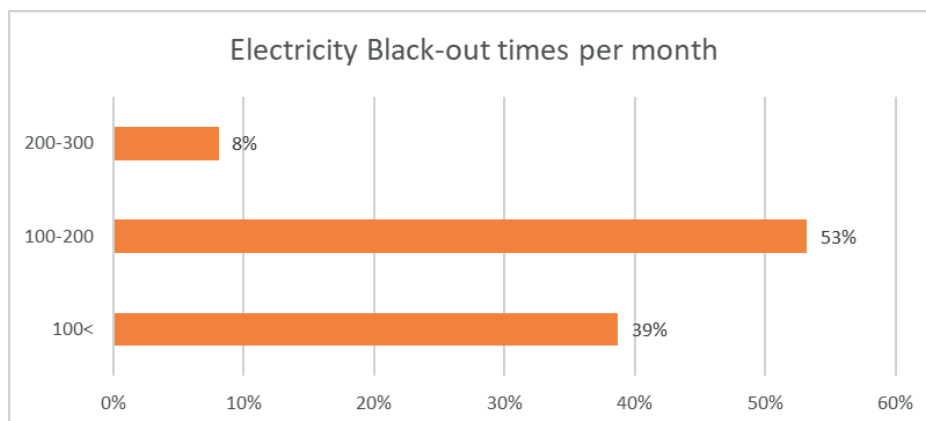
Accommodation: 98% of the surveyed households said they own their place of residence, while 2% live in rented ones.



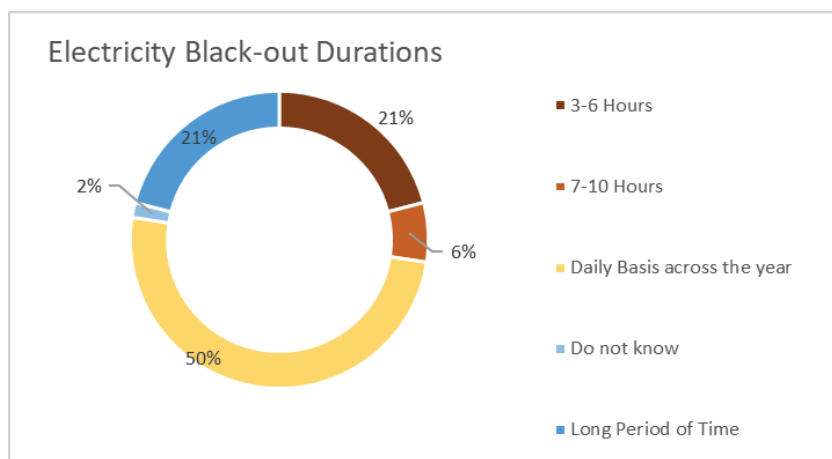
### 4.1.1. Household Electricity

**Electricity:** Around 79% of the surveyed household said they are not satisfied with the current supply of electricity in their place, while 21% stated their satisfaction.

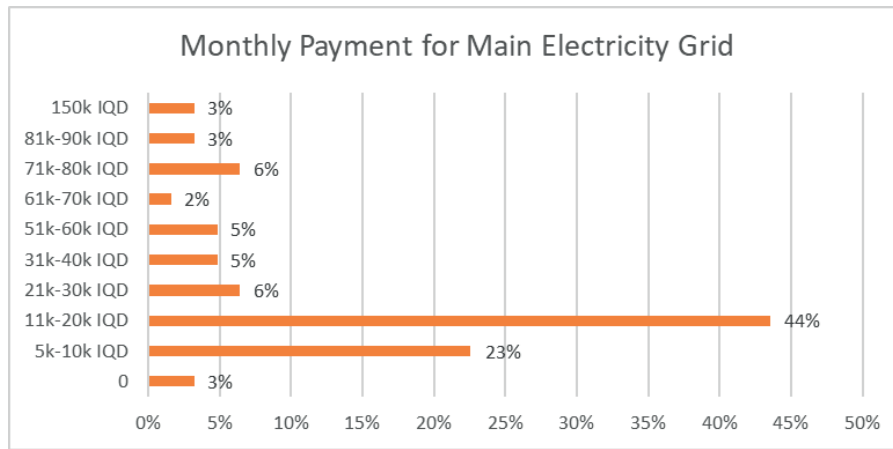
The main sources of this dissatisfaction are the numerous electricity outages daily and the limited power capacity of local generators. About 53% of households report a 100-200 electricity black-outs per month on average. More details in the following figure.



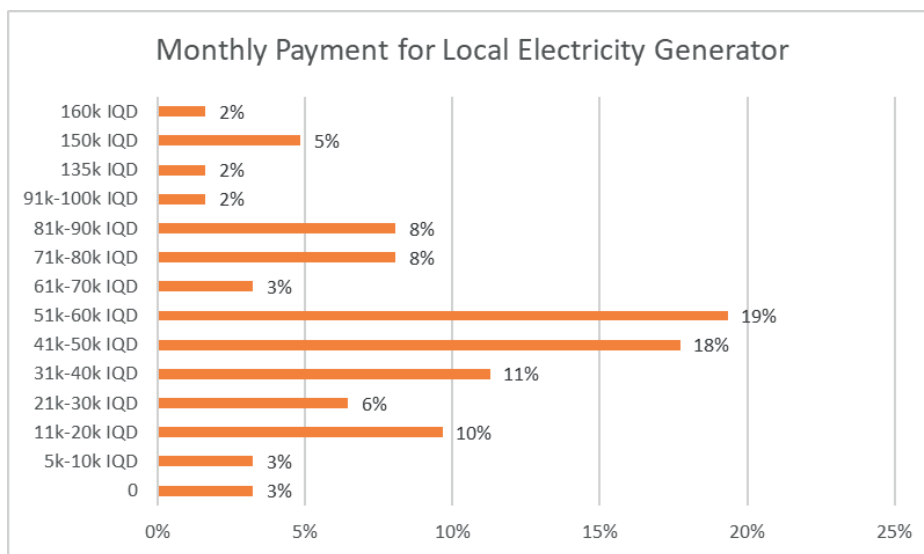
From the black-outs, 50% occur on a daily basis across the year, 21% of these black-outs last from 3 to 6 hours, while 6% last for 7 to 10 hours.



**Cost of Electricity:** Around 44% of the households pay from 11,000 to 20,000 Iraqi Dinars per month for the main grid electricity, while 23% said they pay between 5,000 to 10,000 IQD per month.



For the local electricity generator, around 19% of household pay monthly from 51,000 to 60,000 Iraqi Dinars for the local generators' electricity, 18% said they pay between 41,000 to 50,000 Iraqi Dinars per month. More seen below:

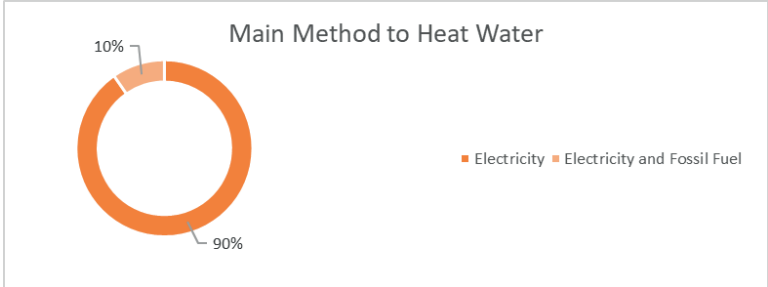


#### 4.1.2. Energy Sources and Renewable

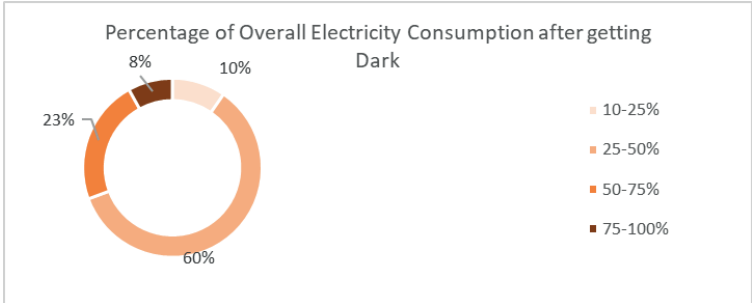
**Energy Source of Electricity:** When households were asked about the source of electricity in Iraq, 32% of surveyed households said they do not know, while 68% said they know about the sources of electricity. For those who know the sources, 88% said it is from fossil fuel, 7% said its from fossil fuel and hydropower sources, while 5% said it is from Hydropower sources.

**Negative Impacts:** we asked surveyed households if they are aware of any negative impacts of energy sources of electricity and 66% said they do know; 47% of those said pollution is the negative impact, 20% stated pollution and noise, and 15% said it causes sickness.

**Electricity Consumption:** 90% of surveyed households said they use electrical heaters as the main heating method for water in their places, and 10% said they use both electricity and fossil fuels.



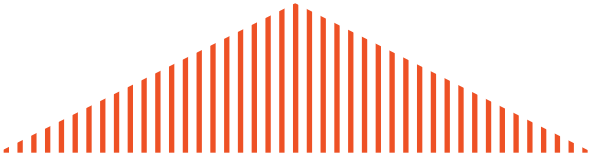
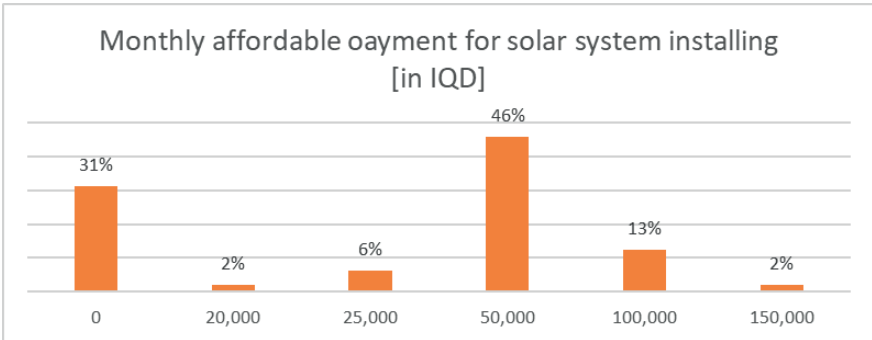
At night, the majority of household reduce their electricity consumption where 60% said they consume 25-50% of daytime rates when it gets dark, 23% said they consume 50-75% of daytime rates.



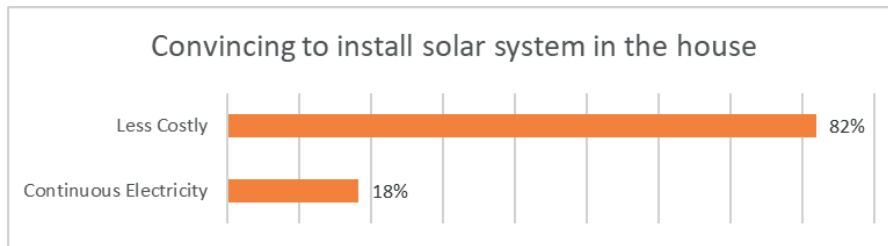
**Renewable Energy:** when we asked households if they have heard of any renewable energy sources, 42% said they do not know these sources and 58% said they do know. Our enumerator team was equipped with proper training and introduced renewable energy sources to those who lack the knowledge.

Then, 27% of households are aware of renewable energies, especially solar panels in the vicinity while 73% are not aware of it. Also, 83% with knowledge about renewable energy stated Solar energy as the only source they know, while 17% stated hydropower. Of the surveyed households, 77% of them said they would be interested in having a renewable energy installation / photovoltaic panels / solar collectors.

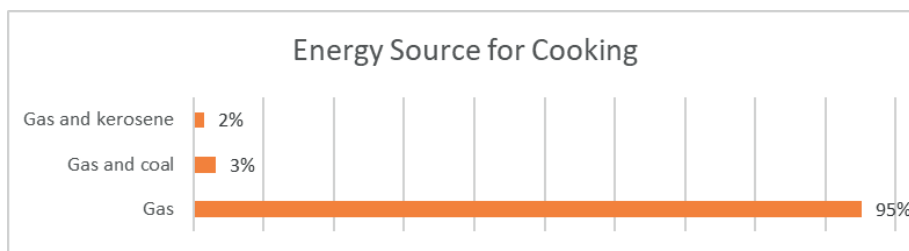
They were asked to give a rough amount of affordable monthly payment for solar system installing, the results were as follows:



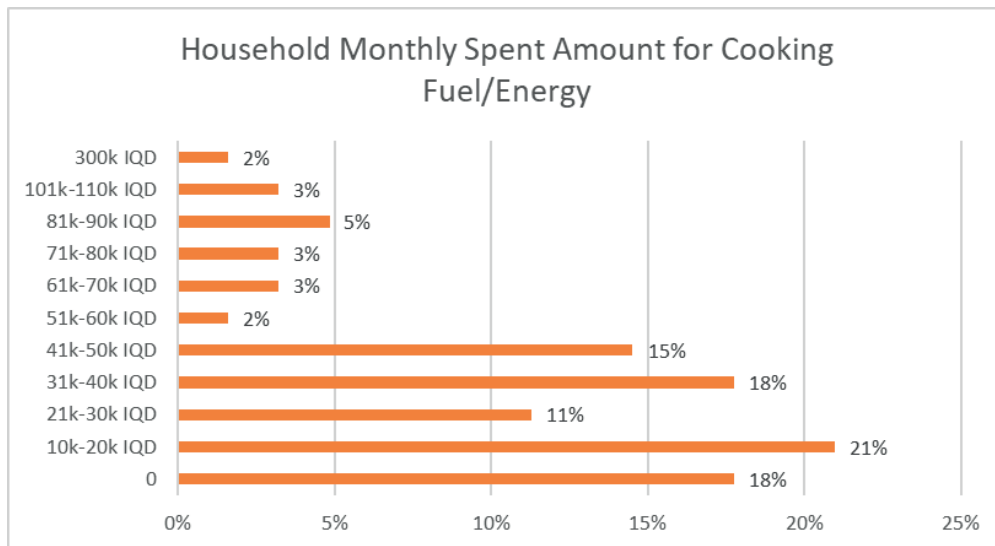
Majority of those interested in renewable energy said they would be convinced to install a solar system in their house if it is a low cost (82%), while 18% indicated that they would install it if it is guaranteed they have continuous electricity.



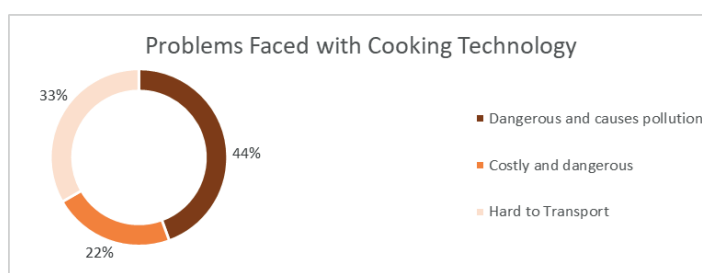
**Cooking:** 95% of households said they use gas as their main method of cooking, while 3% said they use gas and coal and 2% uses gas and kerosene.



Around 21% of households spend 10,000 to 21,000 IQD per month for cooking fuel/energy, and others spend different amounts as follows:

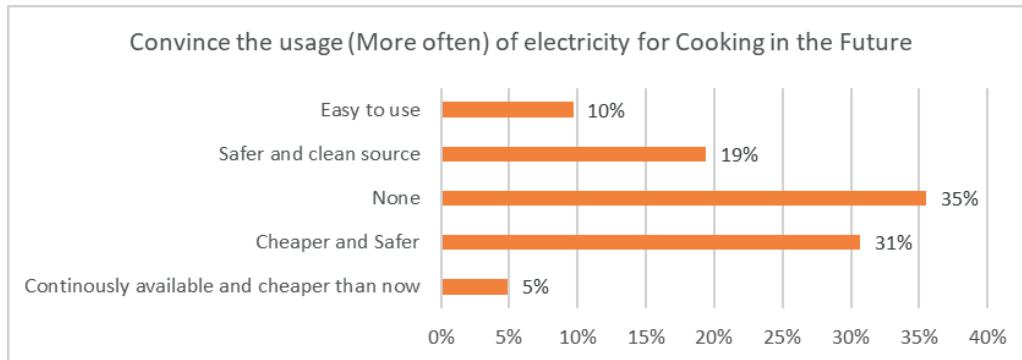


85% of household expressed comfort in using their current cooking technology and fuel, 15% said they are not. Those not comfortable stated issues they face with current cooking technology they as shown below:



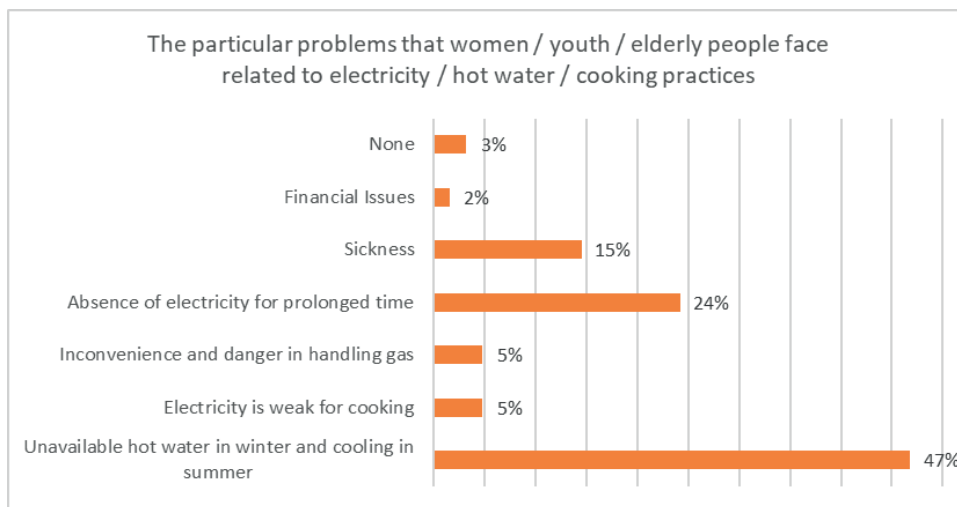


35% of households gave no reason to be convinced for using electricity for cooking, while 31% said they would use electricity more often for cooking if it is cheaper and safer, 19% said they would use it if it is safer and clean source, and 5% if it was continuously available and cheaper than now.



When asked if they would like to use renewable energy (photovoltaic) also for cooking, 84% said they would.

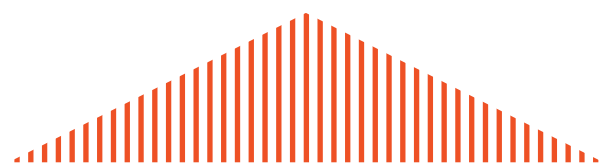
We asked about what are the particular problems that women/youth / elderly people face related to electricity / hot water/cooking practices, and 47% stated there is unavailable hot water in winter and cooling in summer, 24% said absence of electricity for prolonged time.



When households were asked if there are any particular obstacles that they face when purchasing devices base on renewable energy, 60% stated that they do face obstacles while 40% do not face them. From those that face obstacles, 100% of them indicated that the high cost of such devices as the main obstacle.

## 4.2. Local Government Offices

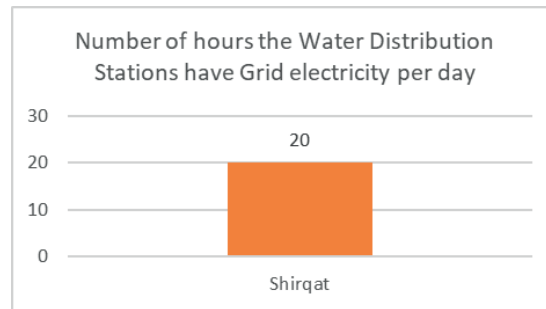
The department heads of several local government offices in Salah Al Din Governorate were interviewed and surveyed to assess the availability of electricity and the impacts of its insufficient availability. An assessment of solar power systems in these offices was performed with inquiries about the possible use of solar energy in the operation of the facilities of which these offices are running.



### 4.2.1. Water Distribution Offices

For this section, the water distribution offices in Shirqat was inquired, and were asked to give their views on the water distribution stations of their directorate with electricity. The office in Shirqat said that their situation is good with electricity.

Regarding the number of hours of processing for water distribution stations equipped with national electricity per day, the office in Shirqat receives 20 hours per day.



The offices were asked, if national electricity is available, whether the station pumps water to each location at the same time or if it divides the time to equip each place separately. In Shirqat they distribute the water in 2 stages: they divide the city into 2 parts, with one day to each part.

The water distribution station contains generators; however, they do not pay for the monthly fuel expenses. Also, the electricity cuts affect the activities of the water distribution stations. In Shirqat station, the time factor is an issue faced since each station needs more than two hours to deliver water to the farthest point.

The stations expressed their interest in renewable energy sources. Shirqat station mentioned that air pollution and harmful gases certainly have a great impact on the atmosphere and human health.

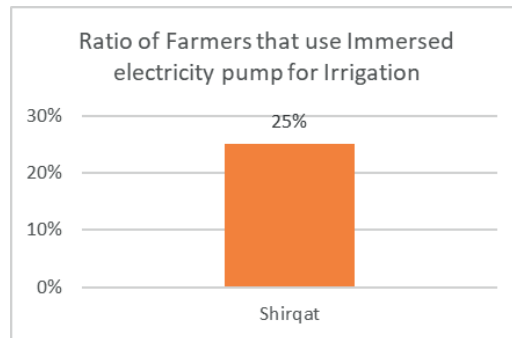
When asked if they have any knowledge about installing solar panels, the Shirqat station answered with "No." When asked about the possibility of the organization installing solar panels on some water distribution stations, the Shirqat station would not participate in paying the cost of the system.

### 4.2.2. Irrigation Offices

In the following section, an irrigation office in Shirqat was inquired.

First of all, they were asked to indicate the percentage of farmers who need electricity for irrigation. In Shirqat, they indicated that the ratio of farmers that use electricity is at 10% to 25% for their irrigation.

The percentage of farmers that use a submersible electric pump for irrigation for Shirqat is 15-25% of farmers.



Community area/ City / Town / Village	Ratio of farmers that need electricity for irrigation
Shirqat	10-25%

When asked about the devices that run on electricity in farms, except for pumps, the office in Shirqat indicated that they do not use other devices.

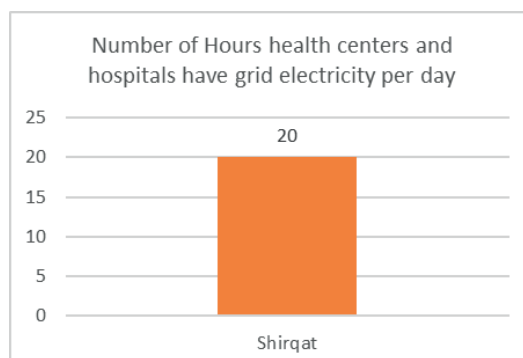
When asked about the idea of using solar power immersed irrigation pumps, the office said that it's a good idea to use them. They encourage the idea of working with renewable energy, due to the lack of energy consumption and it being a clean energy source.

However, if the organization installs solar panels for some farmers, they indicated that the farmers could not participate in paying the cost of the system.

### 4.2.3. Health Offices

In this section, a health center in Shirqat was interviewed. They were asked how they view the health centers and hospitals of their directorate with the electricity situation, and they indicated the electricity situation to be good.

They were asked how many hours do health centers and hospitals equip with national electricity in one day. They indicated that they receive national electricity 20 hours per day.



Regarding private generators, the health center has them. The health center in Shirqat consumes 5000 liters of fuel per month for their generators.

They indicated that electricity blackouts affect the functioning of the health centers and hospitals. The health center in Shirqat indicated that stopping of devices adversely affects the patients.

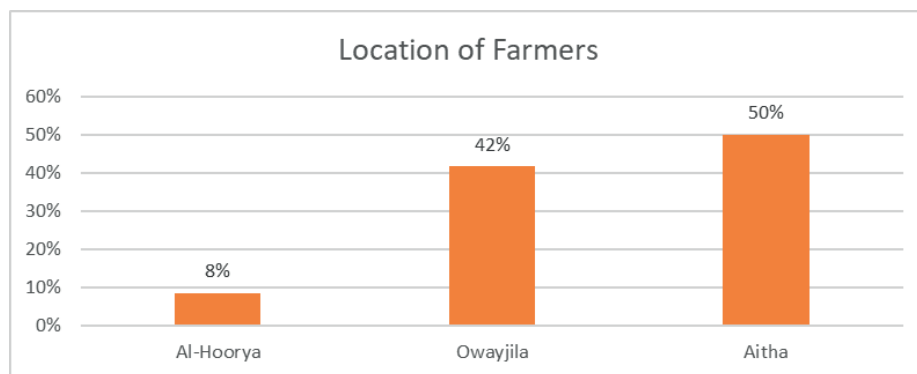
The health center in Shirqat showed interest regarding renewable energy usage.

They were asked to explain how air pollution and bad gases affect human health. The health center in Shirqat indicated that it leads to many diseases including asthma and chest disease with the spread of chronic diseases such as cancer and kidney failure.

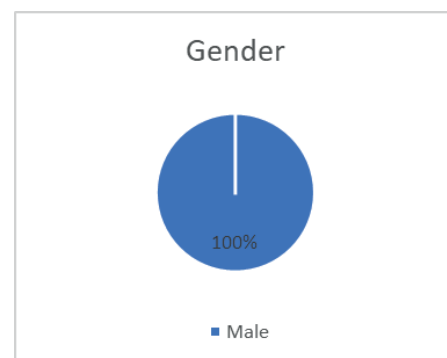
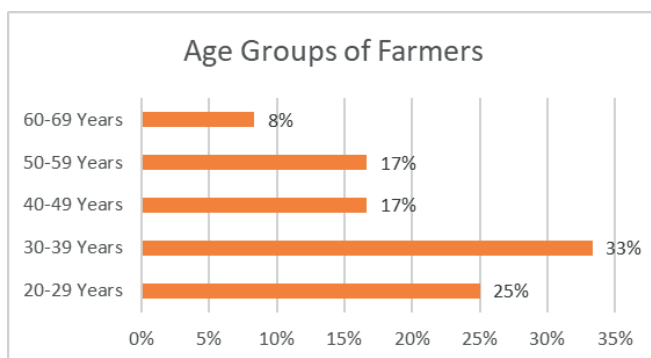
The health center does not have knowledge about installing solar panels. When asked about the possibility of the organization installing solar panels on some health centers or hospitals, they indicated that directorate will not participate in paying the cost of the solar system. Overall, they did not have more information to share about their stance on renewable energy since they have not worked in that field before.

### 4.3. Farmers

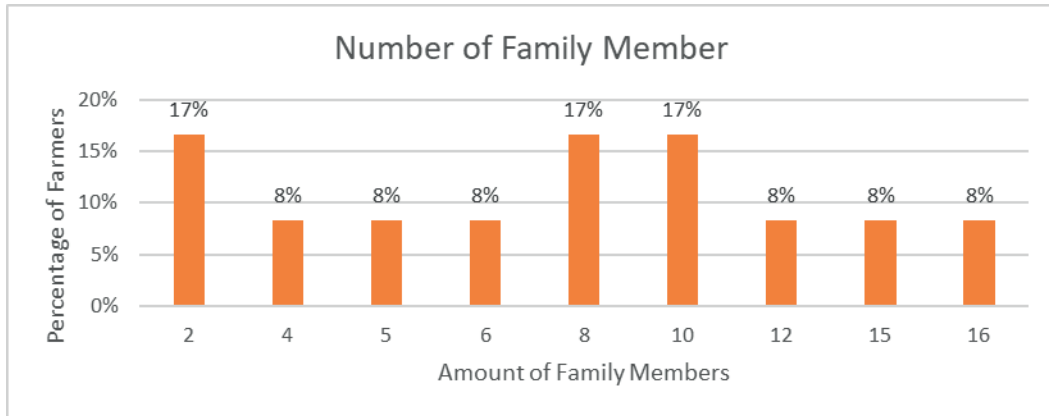
The following section considers the farmers located in various villages across the assessment area in Salahadeen Governorate. In total, 12 farmers took part within the assessment. Seen on the figure below, the farmers are from the following villages:



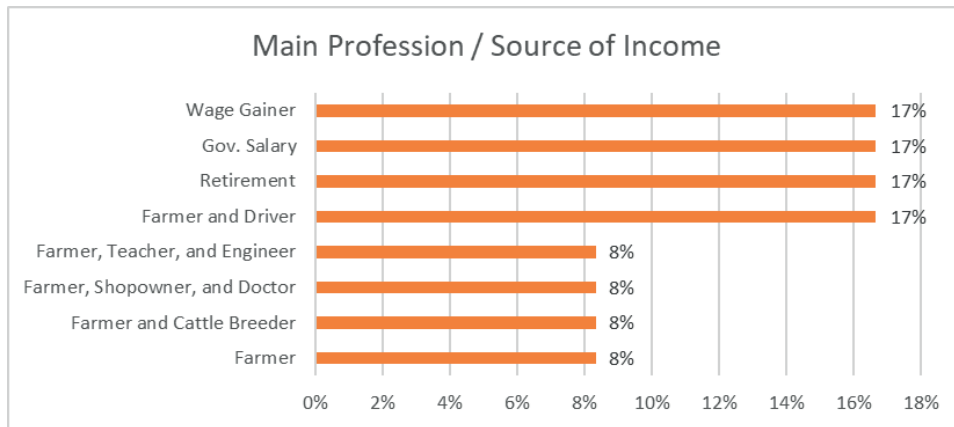
Also, the farmers were between different age groups from 20 to 66, while in terms of gender, 100% were male.



The farmers were asked to indicate the number of family members each have. Accordingly, the highest reported number were 2, 8 and 10 members each belonging to 17% of the farmers inquired respectively.

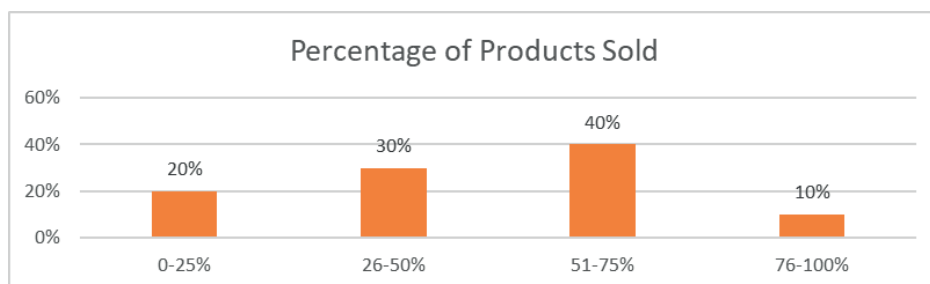


When asked about the main profession and source of income, the majority had similar percentages (17%) for Wage Gainers, government salary, retirement, and farmer and driver.



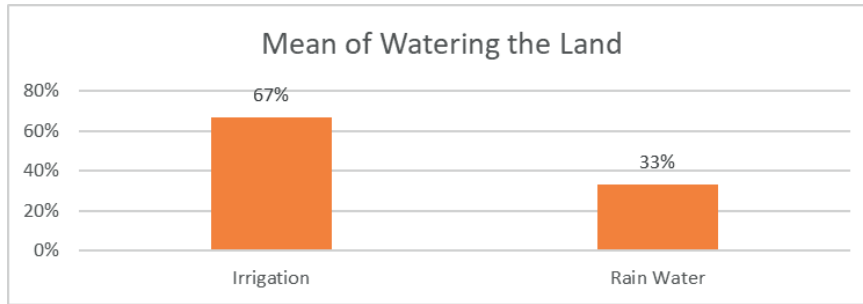
Regarding the ownership of agricultural land, 83% respondents indicated that they do own it, while 17% do not own the land. When asked about the size of the land (in Dunums), the responses varied between being 1 Dunums to 100 Dunums for some farmers. Those lands were home to various types of livestock being bred, ranging from cows, sheep, goats, and chicken.

When asked whether they sell or consume their products, 83% of farmers indicated that they sell some products and consume the remaining, 8% of them sell the entire products, and the remaining 8% consume their entire products that is produced. Out of the farmers that sell their products, the majority (40%) sell them by a rate of 50-75%, followed by 30% of them who sell their products at a rate of 26-50%.



Also, when asked about the location where they sell their products, 100% sell them in the market.

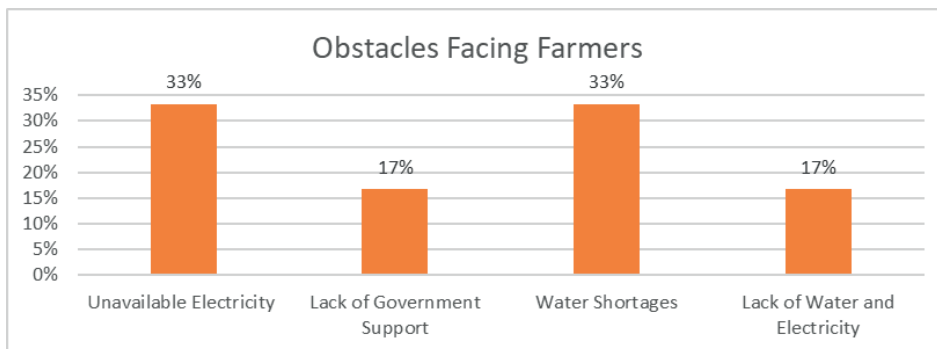
Following that, regarding watering of their agricultural land, most of them (67%) do it through irrigation, while only 33% use rainwater for it. Some of those that use irrigation indicated that they consume un-determined water quantities per day while some varied between 80 to 6000 m<sup>3</sup>/day. Also, regarding the type of crops being planted, almost all of the farmers plant barley crops, and in a lower degree, wheat. Some of them also planted, tomatoes, okra, eggplants and pepper.



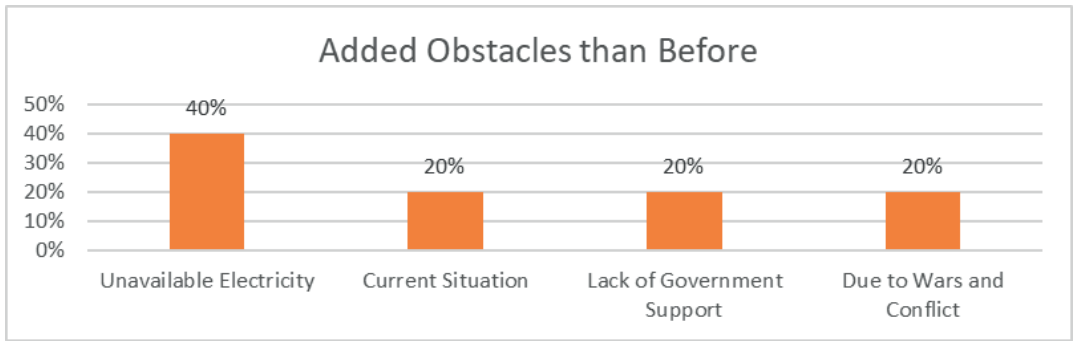
Next, 75% of them cultivate their own land. Regarding the time of cultivation, the majority (67%) do it at the start of every season. The remaining were distributed as 22% of them cultivate in a bi-season manner (every 6 months, summers and winters) while 11% do it annually.

Following that, they were asked if they do intercropping (growing a specific crop between other crops). In response, 42% of them answered that they do not practice it, while 58% of them do. Regarding compost usage in their crops, 75% of them use it while the remaining 25% do not. For pesticides usage, 58% of them use it while 42% do not. Also, none of them cover their crops.

Next, they were asked if they grow in a rotating manner or do grow the same product every season. Accordingly, 58% grow the same crops every season, while only 42% of them grow different crops. Regarding the main obstacles faced by the farmers, almost all of them gave similar answers that there is unavailable electricity (33%) and water shortages (33%).

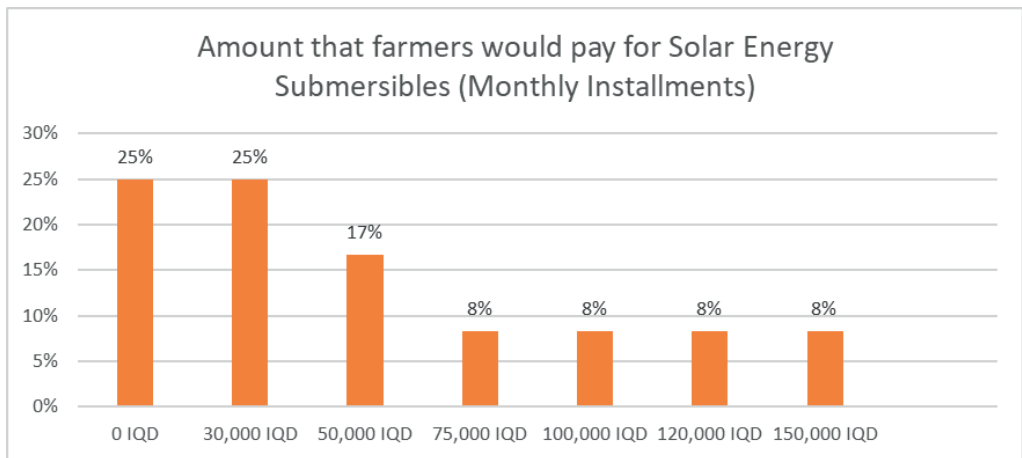


Also, 42% of them indicated that the obstacles have become more than before, while 58% think they are still the same. They were asked what were the new obstacles they are facing, 40% of them indicated that they face unavailable electricity.



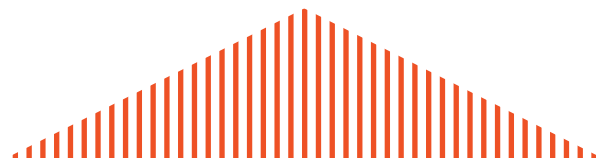
The farmers were asked if they are interested in getting renewable energy. All, 100% of them, are interested in it. The majority of them supported solar energy because it is easy to use and does not need fuel and is a clean and non-polluting energy source. Also, most of them indicated that they plan to use solar energy for agricultural purposes.

When asked if they have heard about submersibles that run on solar energy for irrigation, 92% of them answered yes, while 8% have not heard about it before. The farmers opinions on them were that they are high quality, continuous electric power, and reduce environmental pollution. Then, when asked if they are willing to purchase them, 100% of them answered Yes. Regarding the amount that farmers would pay (in monthly installments) for the solar energy submersibles, the following were the results:



Those farmers that responded that they are not interested in using solar energy submersibles gave some reasons, including: not having enough money, not having enough knowledge about using it, and not having government support. Also, the farmers were asked if they are interested in using other machinery that work on renewable energy. Accordingly, 83% of them do not want to, while 17% are willing to use other machinery.

Some final remarks given by the farmers were that they want to obtain renewable energy because they it is a clean electric energy with no pollution to the atmosphere and the continuation of electricity.





## 4.4. Power

A survey was made with a power system supplier in Shirqat. They have responded that they have participated in renewable energy activities previously.

Regarding the participation in Renewable Energy Activities, the supplier from Shirqat mentioned that they have worked on a solar energy system which consists of three sections: 1- Panels, 2- Battery, and 3- Reflector, that saves the citizen from using energy from a generator or the national electricity sources.

When asked about the problems faced during the work on these systems, the supplier in Shirqat indicated that there is difficulty for processing and transporting the system.

The suppliers were then asked to indicate the locations they get their materials from. The supplier from Shirqat indicate they receive materials from abroad through contracts with companies. The suppliers were then asked to indicate if they are facing any problems in providing these materials. The supplier from Shirqat indicated difficulty with transportation due to the COVID-19 pandemic and difficulties obtaining funds.

When asked if they are interested in creating (more) businesses related to renewable energies, they responded with “Yes.”

Also, regarding the kind of renewable energies that interest them the most, they indicated it to be solar energy due to the suitability of it in the region.

Regarding the main obstacles that prevent them from growing their business into more renewable energies, the supplier from Shirqat indicated it to be economic factors and transportation difficulties due to the travel ban.

Next, regarding the sales approaches that will be the most effective for reaching potential customers, the supplier in Shirqat indicated them to be Social Media platforms.

Finally, when asked about what they think of the system of costumers paying in installments, the supplier from Shirqat responded that it should keep up with the standards that they can bear with.



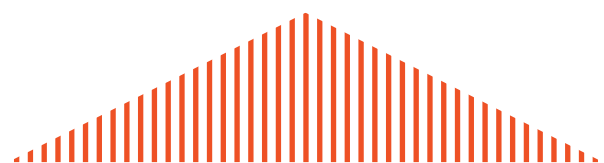
## 5. CONCLUSION

The international community affirms that the use of renewable energies (solar) reduces global warming and environmental pollution in line with fossil fuels. Most scientific studies indicate that in 2050, the world will completely dispense with fossil fuels and depend on solar energy. With each solar powered ampere saving 25 tons of greenhouse gas emissions per year, the move toward renewable, solar energy is widely accepted as a crucial adaptation we must make as a society to combat the effects of climate change.

The findings from this assessment indicate that there is an enormous need in these governorates in northern Iraq for sustainable energy – not only for the purpose of slowing down climate change but for people to have consistent access to electricity. It is clear that a vast majority of ordinary households surveyed struggle performing daily tasks due to constant black-outs. Moreover, a majority of households indicated their awareness of renewable energy and their willingness to adopt it if it meant a stable electricity source.

The findings from this assessment also shed a light on the cross-cutting sectors in society that are affected by inconsistent access to electricity, including the water and health sectors.

It is clear that there is an energy need in these target areas of northern Iraq, and with our knowledge of the threat of climate change and our forward-looking implementation of sustainable, needs-based projects, People in Need can reasonably advocate for the implementation of sustainable interventions in the renewable energy field in the Kirkuk and Salah Al Din governorates. A similar conclusion was drawn in our July report regarding the Nineveh governorate.



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