Sustainable Energy and Climate Action Plan for Jdaidet Al-Chouf Municipality

Jan 2020

This Sustainable Energy and Climate Action Plan has been developed by Royal Scientific Society (RSS) /National Energy Research Center (NERC) through The MENA Region Initiative As a Model of NEXUS Approach and Renewable Energy Technologies (MINARET) project.

الجَمعيّـة العِلميّـة المَلكيّـة
Royal Scientific Society
For Jordan, since 1970 • في خدمة الوطن منذ ١٩٧٠

RSS/NERC and MinaRET project would like to deeply thank the Municipality of Jdaideh Al-Chouf for their continuous support and contribution.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

BAU: Business as Usual

BEI: Baseline Emissions Inventory

CoM: Covenant of Mayors

EF: Emission Factor

HDD: Heating Degree Days

ICCS: Institute of Communications and Computer Systems

IEA: International Energy Agency

IPCC: Intergovernmental Panel on Climate Change

LPG: Liquefied Petroleum Gas

MEW: Ministry of Energy and Water

NERC: National Energy Research Center of Jordan

RSS: Royal Scientific Society.

SECAP: Sustainable Energy and Climate Action Plan

ME: Ministry of Environment.

Executive Summary

Jdaidet Al-Chouf lies 45 kilometers southeast of Beirut. Its altitude ranges between 800 m 1000 m high. Bordering towns include Symkanieh, Ain WaZein, and Mokhtara. Jdaidet Al-Chouf is one of the most important tourist attractions in the Chouf area is the Al-Chouf Cedar Reserve, which is managed by the Al-Chouf Cedar Society in cooperation with the Lebanese Ministry of Environment, UNDP and the World Conservation Union.

The municipality's main development challenges include limited natural resources and a stagnant economy. In addition, Jdaidet Al-Chouf faces problems in the escalating energy bill and thus is trying to secure sources of renewable energy.

Jdaidet A-Chouf municipality has committed to a 40% reduction of the municipality's GHG emissions as well as to an adaptation in climate change for 2030. The involvement of all citizens and stakeholders of the municipality is considered crucial for achieving the set targets. The citizens are the most important resource for the city, especially in the GHG saving targets. Within the framework of potential participation in the Covenant of Mayors for Climate and Energy Initiative, the scenario of mitigation actions has been developed for Jdaidet Al-Chouf, reaching up to 40% against the calculated 2030 emissions (71961.2 tn CO_2). The achievement of this scenario is conditional upon the funding availability from grants, international donors and financing institutions.

Regarding the total budget for the SECAP's implementation (40%) the total cost for the Municipality is calculated at 6.24 million USD, which it is, about 5.16 million EURO, while for the private sector has been estimated at 25.73 million USD approximately (21.3 million EURO), resulting in an overall budget of 31.9 million USD (26.24 Million EURO).

The energy balance for Jdaidet Al-Chouf Municipality (Baseline Emissions Inventory) has been developed for 2014, in line with the CoM guidelines and utilizing the IPCC emission factor approach, for all the compulsory sectors and one optional, namely:

A. Buildings, Equipment & Facilities
   - Municipal Buildings, Equipment and Facilities
   - Public lighting
   - Residential buildings
   - Tertiary buildings, equipment and facilities (non municipal)
   - Water and wastewater facilities.

B. Transport
   - Municipal fleet
   - Public transport
   - Private and Commercial transport

C. Solid waste management.

D. Livestock breeding.

Although the agricultural sector is a significant contributor in the municipality's economy, it wasn't possible to identify separately reliable data on its energy consumptions, so as to

include it in the Baseline Emission Inventory (BEI). To this end, it has been studied as part of the tertiary sector.

The highest energy consumer is the Residential sector, followed by the Tertiary sector and Private Transport, while the municipal sector consumptions are the lowest. The total energy consumption in Jdaidet Al-Chouf Municipality is presented in the following spider chart:

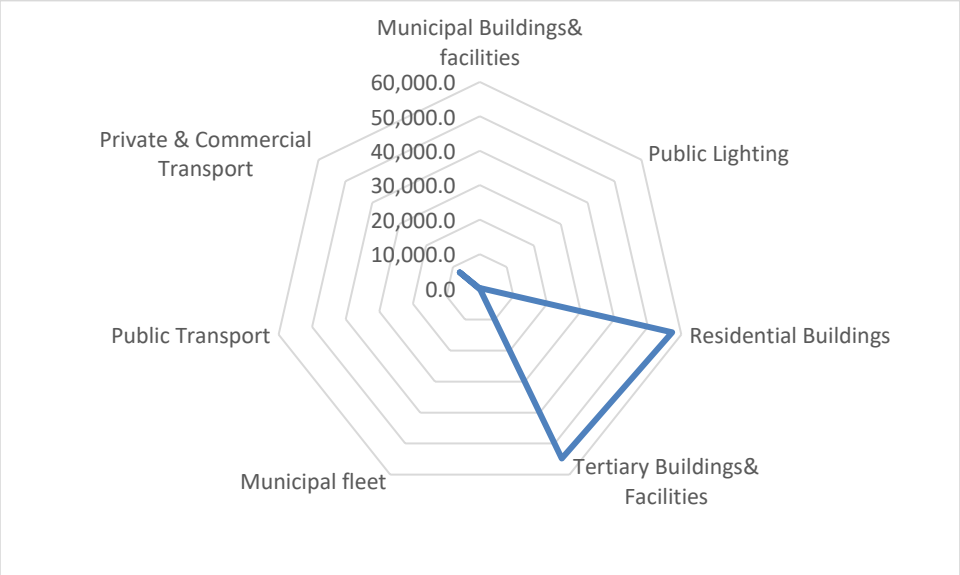


Figure 1: Energy consumption per sector in Jdaidet Al-Chouf Municipality

The Municipality, including the Municipal Buildings, the Public Lighting and the Municipal fleet consumes 294.5 MWh, while the fleet's consumption has the most significant contribution, as presented in the next figure.

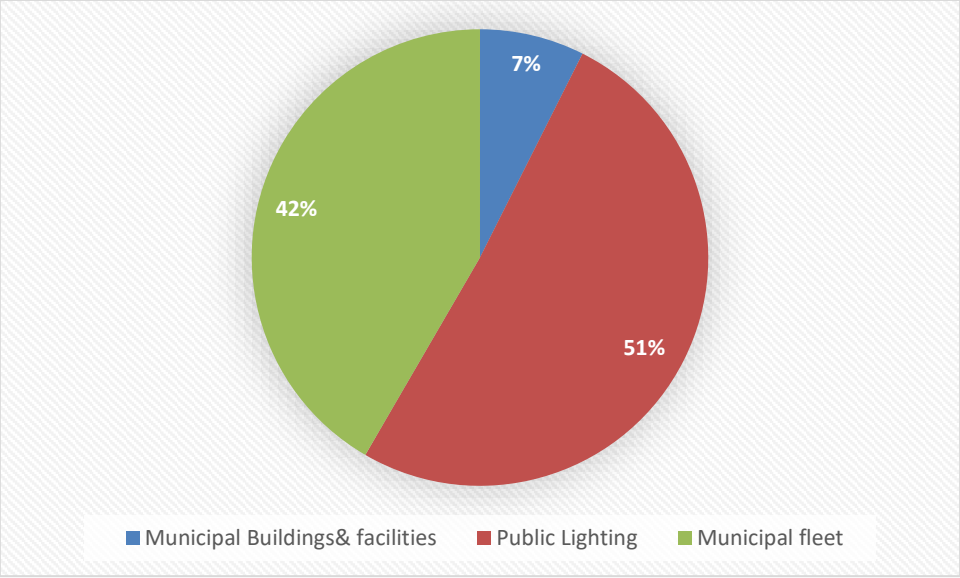


Figure 2: Energy consumption allocation of Jdaidet Al-Chouf Municipality's services

A more detailed allocation of the calculated energy consumption in Jdaidet Al-Chouf Municipality (All sectors) is presented in the next figure per sector and per fuel.

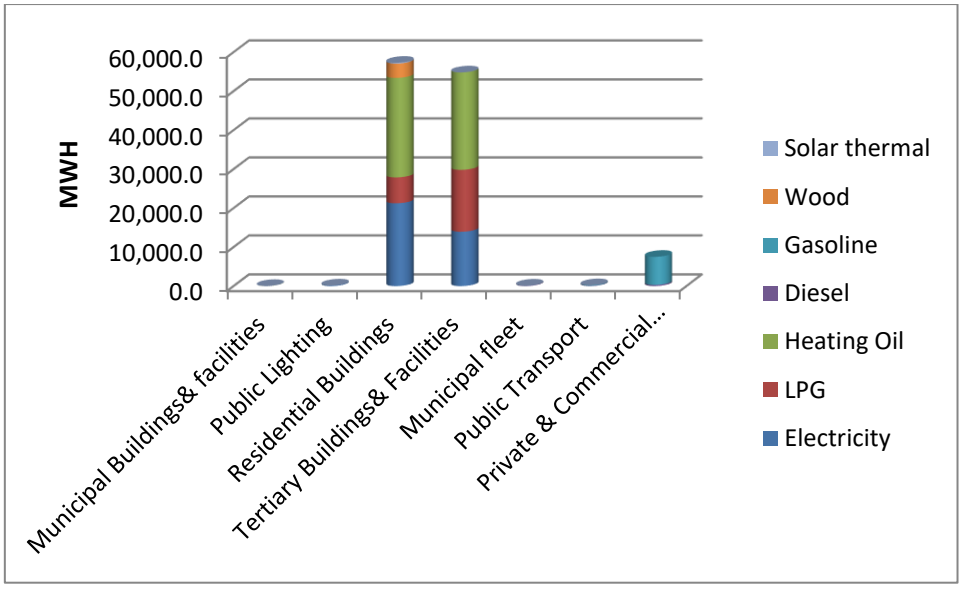


Figure 3: Energy consumption per sector and per fuel

The respective total emissions for the baseline year, including emissions from waste management, equal 47,033.44 tn CO_2 and they are presented in the following chart.

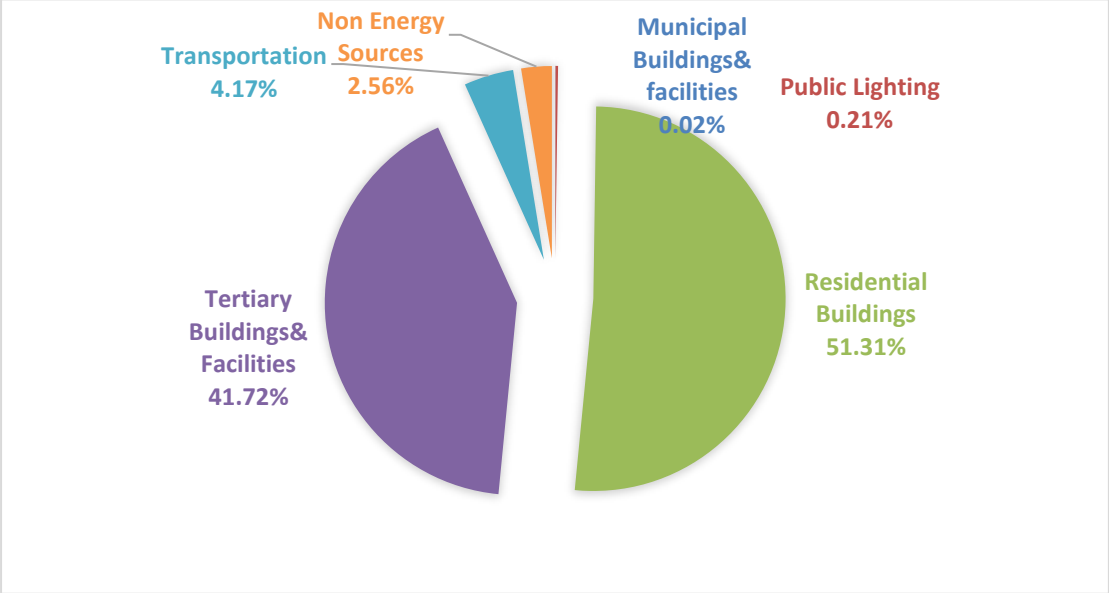


Figure 4: Total CO_2 emissions per sector

In order to set the emission reduction targets, they have to be calculated against the Business as Usual (BAU) scenario, in line with the JRC guidelines for South Municipalities, considering that Lebanon, as a country with developing economy, will face an increase in its energy demand due to the expected economic and population growth. Thus, the forecasted emissions under the BAU scenario for 2030 have been calculated to be 71,961.2 tn CO_2. As mentioned above.

An overview table of the actions per sector, as well as the calculated emission reductions per action for both scenarios, is presented below.

Table 1: summary of the mitigation actions

Action No.	Action	Emission Reductions (tn CO_2)
Municipal Buildings		
1.1	Green procurement procedures for municipal buildings	0.70
1.2	Replacing the existing non efficient lamps with LED Lamps Jdaidet Al-Chouf municipal buildings	5.60
1.5	Energy manager appointment in the municipality	0.10
1.6	Awareness raising activities for municipal employees	0.30
1.7	PVs in municipal building's roof	4.7
1.8	Establishment of Energy Saving Department	0.0
1.9	Social media portal creation portal creation	0.0
Sub-Total		11.4
Street lighting		
2.1	Street lighting upgrade	46
2.2	Astronomical timers	21.3
Sub-Total		67.3
Residential Buildings		
3.1	Awareness raising activities for the community about (RE &EE)	1,107.7
3.2	Promotion of Green Buildings' concept	2,880.0
3.3	Campaign for promoting and replacing high energy label equipment	3,024.0
3.4	3.6 MW Photovoltaics in residential rooftops	2,658.5
3.5	Replacing existing electric water heater with solar collectors	1218.5
3.6	Replacement of old diesel space heater with more efficient	4837.0
3.7	Use of insulation bricks in rooftops	184.6
3.8	Replacement of single glazing with double	738.5
3.9	Initiatives to support the citizens' actions (EE and RE)	369.2
3.10	Awareness raising activities for the Residents' Associations and NGOs	1,476.9
Sub-Total		18494.9
Tertiary Sector		
4.1	Promotion of using insulation for buildings	2,105.6
4.2	Photovoltaics on rooftops	1504
4.3	Replacement of existing lamps with LEDs	240.6
4.4	Replacement of single glazing with double	601.6
4.5	Replacement of existing air conditioners with more efficient ones	60.2
4.6	Installation of lighting motion sensors	30.1
4.7	Awareness raising activities about RE&EE	718.0

4.8	use of Solar Water Heaters	60.2
4.9	PV for WWTP	117.8
4.10	PV for water pumping station	25.4
4.11	The 100% commitment campaign for schools for PV	16.4
4.12	Upgrade water facilities	60.2
4.13	use the effeciant diesel space heater instead of traditional	3,008.1
Sub-Total		8,548.1
Transport sector		
5.1	Replacement of old municipal gasoline car with new efficient car	24
5.2	Municipal fleet maintenance	9
5.3	Eco-driving seminar for the municipal fleet drivers	2.7
5.4	Information events on the new vehicle technologies- Replacement of diesel vehicles with new more efficient	48
5.5	Traffic congestion reduction through the adoption of different timing of activities	15
5.6	Promotion of walking and car sharing and carpooling campaigns	120.1
5.7	Improvement / development of parking infrastructure	30
5.8	promotion of using schools buses rather than private cars	15
5.9	awareness campaign for preventive maintenance for cars	15
5.10	Eco-driving for puplic transportation	90.1
5.11	Cycling promotion and creation of related infrastructure	75.1
Sub-Total		444.1
Local Renewable Energy Production		
6.1	PV Farm 0.3 MW	353.3
Sub-Total		353.3
Waste Management		
7.1	Awareness raising campaigns to reduce the amounts of discarded food	60.9
Sub-Total		60.9
Agriculture sector		
8.1	Planting forest trees	1,085
Sub-Total		1,085
Total		29,065.1

The fourth Chapter of the SECAP concerns the Adaptation to climate change. The last 20 years significant changes in the global climate have occurred which negatively affect life in many aspects. This section presents the current situation in Jdaidet Al-Chouf and the expected problems due to the climate change impacts. Subsequently a set of actions are proposed towards the city protection against the forecasted extreme weather events. Lebanon has already launched the “Lebanon’s Third National Communication on Climate Change” report in 2016, which is dealing with the above mentioned topic. The national targets presented on this report are consistent with the SECAP actions. The total estimated

budget for this set of actions is more than 570,000.0 USD. An overview table of the actions per sector is presented below.

Table 2: Adaptation Actions

Public Health	Infrastructure	Built Environment	Economy	Biodiversity
Health action plan for the extreme events that Jdaidet Al-Chouf is facing e.g. heat etc. (heat health action plan) - Collaboration with the regional medical services to increase preparedness level	Water management plan	Enforcement of building codes for more energy efficient and heat tolerant structures	Elaboration of water and ground water management plan	Establishment of a fire management plan
Provide access to hated public buildings during heat waves or other extreme events, for those citizens that lack the infrastructure to protect themselves (people living in underground apartments during floods, or lacking AC during extreme temperatures etc.)	Modelling predicted supply changes in the electricity from the locally available RES	Integrated land use planning with zoning system depending on the different areas	Adoption of integrated land use planning for the tertiary sector	Educating the citizens
Developing an early warning system to alert citizens in the case of extreme weather events	Mapping of sites with landslides and flood risks	Educational campaigns on informing the citizens on the benefits of adopting the suggested actions in their premises		
Educational and awareness raising campaigns about health-related effects of extreme events	Developing guides and awareness raising campaigns for citizens on how to save water and energy, especially during crisis	Greening infrastructure such as buildings' roofs and walls		

Regular cleaning and maintenance of the sewage and drainage system	Support rainwater harvesting systems	Increasing the amount of shade and green areas in the city by planting trees and using green pavements to reduce the heat island effect		
Frequent monitoring of water and air quality		White roofs (cool colors), shading and bioclimatic design		Trees planting
		Rainwater collection and use		
		Adoption of methods to reduce water demand		
		Using water resistant construction materials		

Chapter 1: Introduction

1.1 Jdaideh Al Chouf 2030 Targets

The overall target that has been set for 2030 is 30% CO_2 emissions reduction (according to the Intended Nationally Determined Contributions - INDCs). The second scenario developed focuses on achieving an emission reduction of 40% according to CoM requirements. Under both scenarios, emphasis is placed on working closely with all community actors. The municipality will take all necessary measures on its facilities, establishing a good example for the community, while it will put efforts on collaborating with the public and achieving significant reductions from the residential, tertiary and transport sectors, with waste being also a priority for the local administration. The target of 40% is more challenging and there will be need of more intensive efforts from the Municipality and the Governmental Bodies while it is of utmost importance to attract more donors and funds.

1.2 Current status

1.2.1 Geographical location

Jdaidat (Baqaata) Al-Chouf is a town located in the Chouf District of the Mount Lebanon Governorate, about 45 kilometers (28 mi) southeast of Beirut. Its altitude ranges between 800 m (1,824 ft) – 1000 m (3,280 ft) high. Bordering towns include Symkanieh, Ain waZein, and Mokhtara.[1]

Figure 5: Jdaidat Al-Chouf map

One of the most important tourist attractions in the Chouf area is the Al-Chouf Cedar Reserve, which is managed by the Al-Chouf Cedar Society in cooperation with the Lebanese Ministry of Environment, UNDP and the World Conservation

Union. The reserve is located on the tops of the central part of the West Lebanon mountain range. It is one of the largest reserves in Lebanon, accounting for 80% of protected areas. It covers an area of 550 km2, 50 km long and 11 km wide, and its height ranges from 1200 meters to 1984 meters. 70% of which are located in the Chouf area and 30% in the western Bekaa. [2]

Figure 6:Al-Chouf Cedar Reserve

Jdaidat (Baqaata) Al-Chouf city is known by the National Park (Marytyrs' Cemetry, 1958's Revolution), which constitutes an important part of the architectural heritage in Chouf Region. The site has a spiritual and intellectual significance, in addition to its artistic, cultural, symbolic and architectural value. [3] A characteristic picture of the national park is presented in Figure 7.

Figure 7: National Park (Marytyrs' Cemetry) –Baqaata

1.2.1 Climate characteristics

Since there is a lack of weather data for Jdaidat Al-Chouf area, the weather data for the nearest available area “Beit ed Dine City” were taken to be representative for Jdaidat Al-Chouf.

In Al-Chouf, the summers are long, warm, arid, and clear and the winters are cold, wet, and partly cloudy. Over the course of the year, the temperature typically varies from 40°F to 81°F and is rarely below 34°F or above 85°F.

The warm season lasts for 4.0 months, from June 6 to October 7, with an average daily high temperature above 75°F. The hottest day of the year is August 9, with an average high of 81°F and low of 67°F.

The cool season lasts for 3.3 months, from December 6 to March 16, with an average daily high temperature below 57°F. The coldest day of the year is January 22, with an average low of 40°F and high of 51°F. [4]

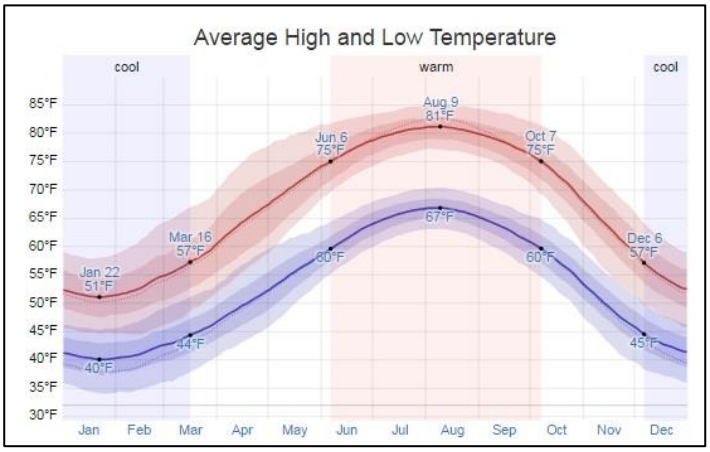


Figure 8:Temperature chart for Jdaidet Al-Chouf

The figure below shows you a compact characterization of the entire year of hourly average temperatures. The horizontal axis is the day of the year, the vertical axis is the hour of the day, and the color is the average temperature for that hour and day.

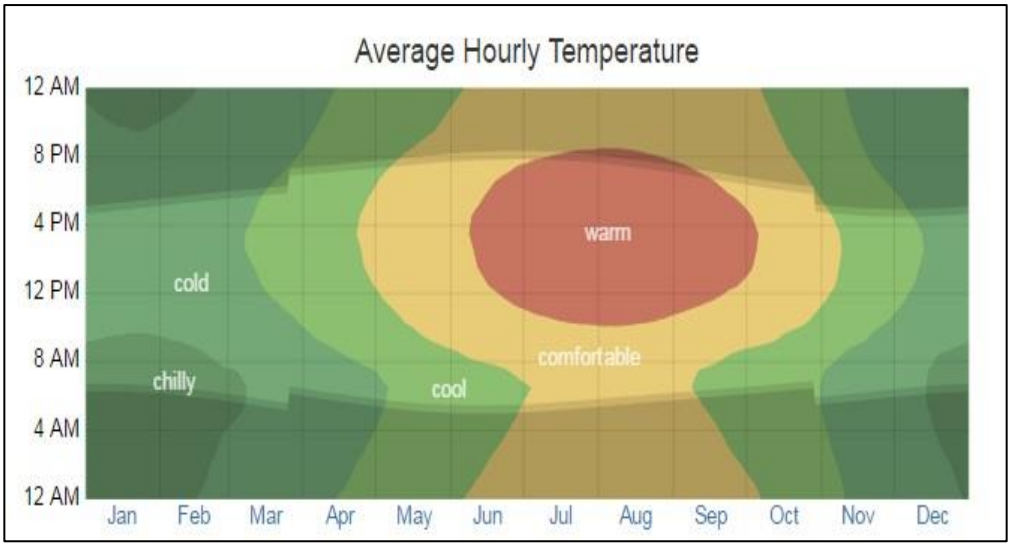


Figure 9: the compact characterization of the entire year of hourly average temperatures for Jdaidet Al-Chouf

Clouds

In Al-Chouf, the average percentage of the sky covered by clouds experiences significant seasonal variation over the course of the year.

The clearer part of the year in Al-Chouf begins around May 14 and lasts for 5.2 months, ending around October 19. On August 9, the clearest day of the year, the sky is clear, mostly clear, or partly cloudy 100% of the time, and overcast or mostly cloudy0% of the time.

The cloudier part of the year begins around October 19 and lasts for 6.8 months, ending around May 14. On January 18, the cloudiest day of the year, the sky is overcast or mostly cloudy 43% of the time, and clear, mostly clear, or partly cloudy 57% of the time. [4]

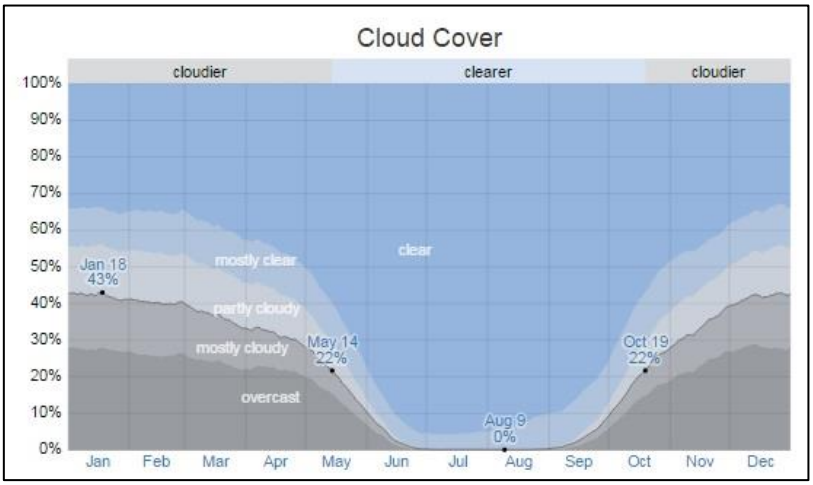


Figure 10: Cloud cover for Jdaidet Al-Chouf

Precipitation

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Al-Chouf varies significantly throughout the year.

The wetter season lasts 5.0 months, from October 29 to March 29, with a greater than 15% chance of a given day being a wet day. The chance of a wet day peaks at 31% on January 17.
The drier season lasts 7.0 months, from March 29 to October 29. The smallest chance of a wet day is 0% on July 19.
Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 30% on January 17. [4]

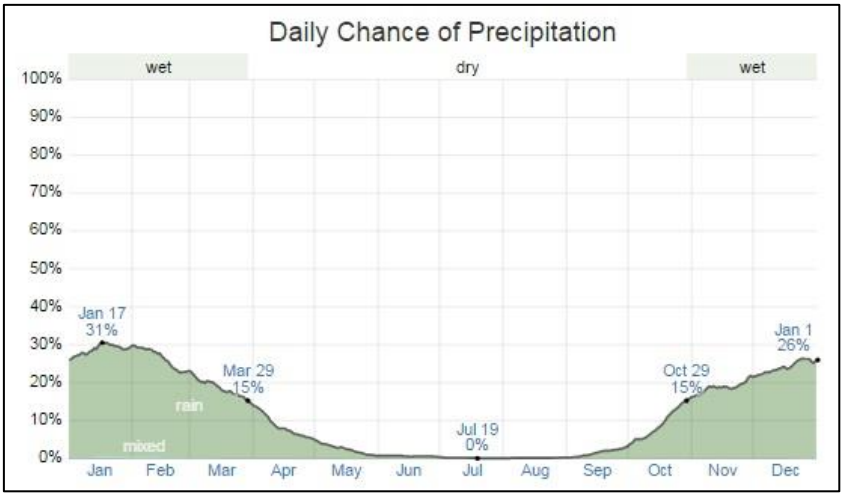


Figure 11: Daily chance of precipitation

Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered on each day of the year. Al-Chouf experiences significant seasonal variation in monthly rainfall.

The rainy period of the year lasts for 6.3 months, from October 11 to April 20, with a sliding 31-day rainfall of at least 0.5 inches. The most rain falls during the 31 days centered on January 26, with an average total accumulation of 2.9 inches.
The rainless period of the year lasts for 5.7 months, from April 20 to October 11. The least rain falls around August 4, with and average total accumulation of 0.0 inches.[4]

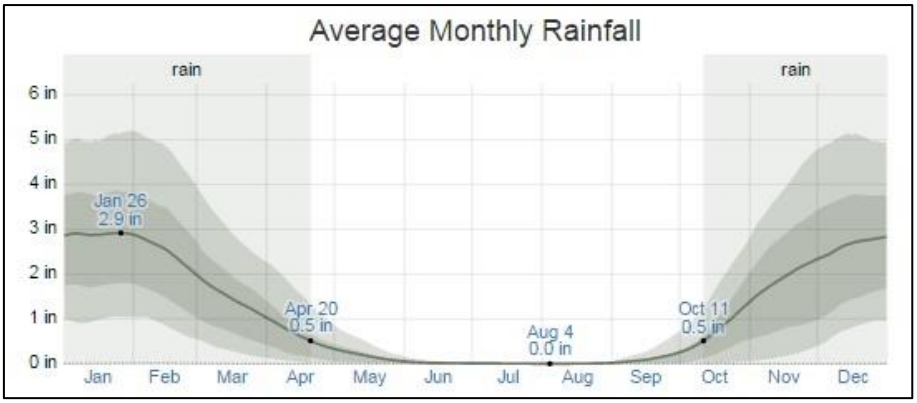


Figure 12: Average monthly rainfall.

Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

Al-Chouf experiences significant seasonal variation in the perceived humidity.

The muggier period of the year lasts for 2.6 months, from July 2 to September 19, during which time the comfort level is muggy, oppressive, or miserable at least 11% of the time. The muggiest day of the year is August 14, with muggy conditions 41% of the time.

The least muggy day of the year is December 9, when muggy conditions are essentially unheard of. [4]

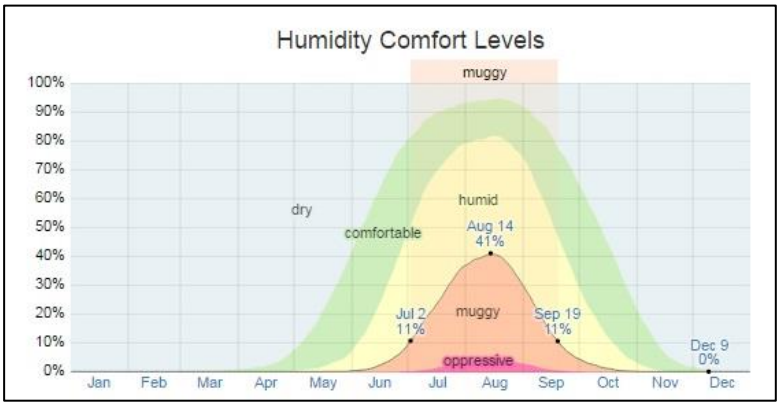


Figure 13: Humidity Comfort Levels

Wind

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Al-Chouf experiences mild seasonal variation over the course of the year.

The windier part of the year lasts for 3.7 months, from December 12 to April 4, with average wind speeds of more than 4.0 miles per hour. The windiest day of the year is February 7, with an average hourly wind speed of 4.7 miles per hour.

The calmer time of year lasts for 8.3 months, from April 4 to December 12. The calmest day of the year is October 14, with an average hourly wind speed of 3.4 miles per hour. [4]

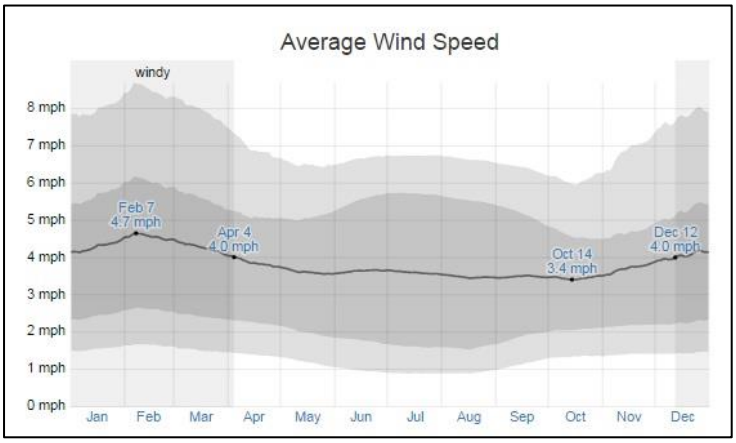


Figure 14: average wind speed for Jdaidet Al-Chouf

The predominant average hourly wind direction in Al-Chouf varies throughout the year. The wind is most often from the east for 2.6 weeks, from November 13 to December 1, with a peak percentage of 33% on November 18. The wind is most often from the west for 11 months, from December 1 to November 13, with a peak percentage of 31% on January 1. [4]

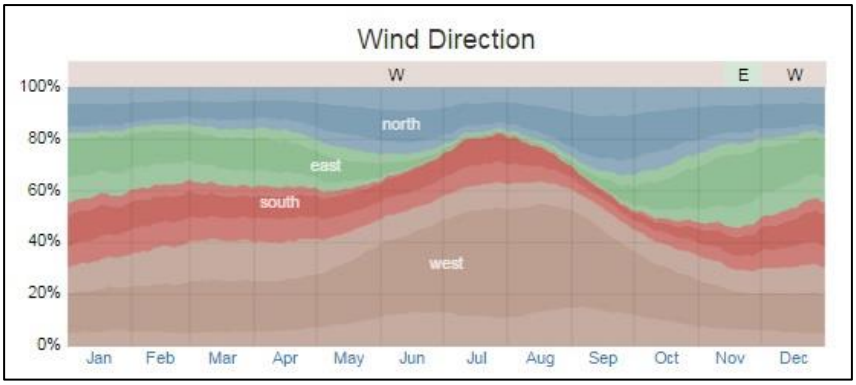


Figure 15: Wind direction for Jdaidet AlChouf.

Water Temperature

Al-Chouf is located near a large body of water (e.g., ocean, sea, or large lake). This section reports on the wide-area average surface temperature of that water. The average water temperature experiences significant seasonal variation over the course of the year.

The time of year with warmer water lasts for 3.4 months, from July 1 to October 12, with an average temperature above 79°F. The day of the year with the warmest water is August 21, with an average temperature of 83°F.

The time of year with cooler water lasts for 4.1 months, from December 28 to April 30, with an average temperature below 67°F. The day of the year with the coolest water is March 3, with an average temperature of 63°F.[4]

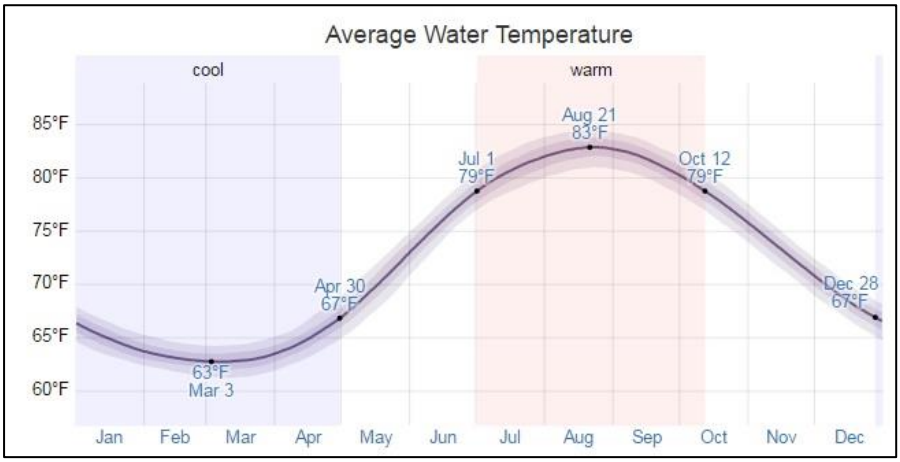


Figure 16: Average water temperature in Jdaidet Al-Chouf.

Solar Energy

This section discusses the total daily incident shortwave solar energy reaching the surface of the ground over a wide area, taking full account of seasonal variations in the length of the day, the elevation of the Sun above the horizon,

and absorption by clouds and other atmospheric constituents. Shortwave radiation includes visible light and ultraviolet radiation.

The average daily incident shortwave solar energy experiences extreme seasonal variation over the course of the year.

The brighter period of the year lasts for 3.6 months, from May 7 to August 26, with an average daily incident shortwave energy per square meter above 7.4 kWh. The brightest day of the year is June 22, with an average of 8.7 kWh.

The darker period of the year lasts for 3.5 months, from November 4 to February 17, with an average daily incident shortwave energy per square meter below 3.8 kWh. The darkest day of the year is December 25, with an average of 2.6 kWh. [4]

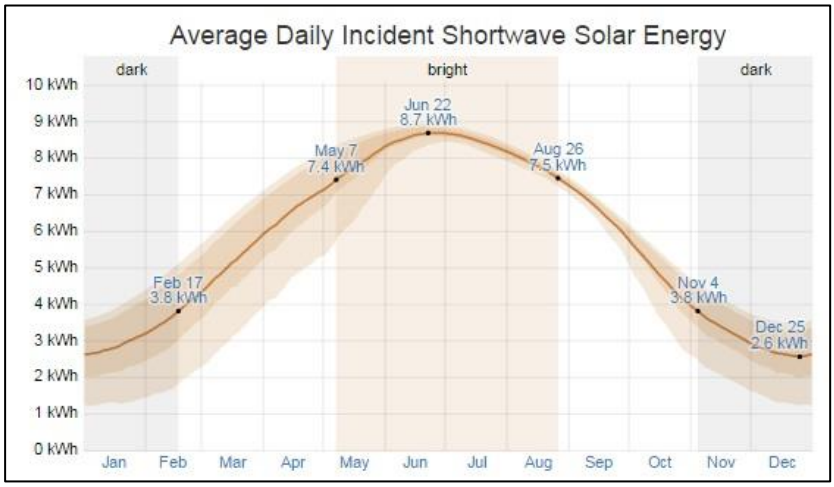


Figure 17: Avarage Daily Incident shortwave solar energy in Lebanon.

1.2.2 Demographic tendencies

According to the last population census of 1996, the population living in Al-Chouf Sweijani region (Jdaidet Al-Chouf is town in Al-Chouf Sweijani) was 8000. For the whole region, there is an annual increasing in population by a percentage of 1%.

The municipality estimated that the population for Jdaidet AlChouf in 2017 is 20,000 citizens.[5]

1.2.3 Employment

Based on the field statistics that was done in 2010, the employees who practice an economic activity in Al-Chouf Al-Sweijani region (Jdaidet Al-Chouf is town in Al-Chouf Sweijani) comprise 33.82% of its population over 15 years of age, according to the most recent population census.In the part of economics active citizens there is a 5.43% that is currently unemployed and looking for a job.[5]

1.2.4 Education

Regarding the educational status of Al-Chouf Al-Sweijani's citizens, a percentage of 27.15% of the total population was enrolled in the education in 1996, the majority of which (62.18%) was in primary education and only 22.76% in the highest education levels (Bachelor, Diplomas, Masters, PhD, etc.), The professionals were 7.01% and the illiterates were 6.64%.

Jdaidet AlChoufthere are two Schools; one for basic education and the other for secondary education, also a Technical Academy gives the Diploma certificate in various specializations.[5]

1.2.5 Infrastructures

Electricity sector:

All villages in Al-Chouf Al-Sweijaniregion is connectedwith a general electrical line 220 volt. The electricity is not available all the time, whereas the minimizing may reach up to 7 hours during the day. And it turned out that 20% of the region's population have special electric generators.[5]

Water sector:

Water resources in Jdaidet Al-Chouf are from water ponds, local springs and artesian wells.[5]

1.2.6 Economy

The agriculture and the tourism sectors are the most important economic sectors in Jdaidet Al-Chouf. The agricultural land areas are 605 Acres, the neglected land areas are 350 Acres, Arid lands areas are 300 Acres. However, there is a possible growth in the cultivated area up to 550 Acres. These statistics was done in 2005.

Al-Chouf Al-Sweijani region(Jdaidet Al-Chouf is town in Al-Chouf Sweijani)is one of the most important regions that produce Olive trees and the average of the Olive trees in one Acres range from 15 to 20 trees. The other agricultural primary crops are fruits (Grape, pear, apple, cherries, Peaches, peach, Figs).

In addition, Livestock is considered one of the weakest resources in Jdaidet Al-Chouf in comparison with other regions in Al-Chouf Al-Sweijani for many reasons;expense of the animal feed and the absence of its support, difficulty in discharging the agricultural and the animal production and lack of adequate veterinary medicine in the region.[5]

1.2.7 Complementarity with municipal and national plans and other related actions

Jdaidet Al-Chouf's decision for the implementation of a SECAP study is in line with national legal framework, targets, and priority actions set. Abiding with the 30% emission reduction target by 2030 is consistent with the national target for that period, as expressed through the Intended Nationally Determined Contributions (INDCs) submitted to the UNFCCC.

Under the current legal framework, the municipalities are entitled to the development of their energy policy plans, such as the current study on Sustainable Energy and Climate Action Plan for Jdaidet Al-Chouf. In addition, they can influence the energy consumptions related to their own use (buildings, vehicles, street lighting, solid waste and waste water management, water pumping etc.), as well as promote legislative measures for the adoption of the building codes in place, or the use of Solar Water Heaters (SWH).

Jdaidet Al-Chouf is also planning for a number of Renewable Energy projects, either in its facilities, or promoting such initiatives in the private sector. RE projects are endorsed by the Renewable Energy action plan for republic of Lebanon (2016- 2020).

The National Energy Efficiency Action Plan (NEEAP) is the umbrella regarding energy efficiency at the national level. Some of the most relevant actions for local authorities, as addressed in the NEEAP, include use of efficient equipment and replacement of compact fluorescent lamps (CFLs) with LED lighting.

1.3 Vision for the future

Jdaidet Al-Chouf is a growing city that has significantly increased its population over the past years. This trend is expected to continue in the future, even at a lower rate. This population increase trend poses significant pressures on the existing and future infrastructures and the further development of the city.

Jdaidet Al-Chouf municipal authority is deeply committed to a sustainable future for the city, in order to make it prosperous for its citizens and sophisticated. This objective is expressed through the actions selected in this SECAP, focusing not only in reducing the energy consumption through energy efficiency, or producing more clean energy, but also on improving the existing infrastructures at the municipal, as well as the city level.

1.4 Organizational and financial aspects

1.4.1 Coordination with national and local authorities

During the SECAP implementation, Jdaidet Al-Chouf Municipality is going to coordinate closely with the affiliated ministries, namely the Ministry of Environment, especially with regards to the Climate Adaptation actions, as well as the Ministry of Energy and Water, as relates to the energy efficiency and renewable energy projects and initiatives.

At the same time, Jdaidet Al-Chouf will exchange experience with the other two regional cities that have benefitted from Minaret for the development of their SECAPs, namely Monastir in Tunisia and Jdaidet Al-Chouf in Lebanon, while it will share best practices and experience gained with other municipalities interested in realizing similar activities.

1.4.2 Adaptation of administrative structures

The departments that will be engaged with the SECAP are the Task force committee, which will be responsible for the energy and climate issues in Municipality.

1.4.3 Involvement of stakeholders and citizens

Having conducted the analysis of the energy consumption patterns in the territory, it should be highlighted that the municipality is responsible for less than 1% of the consumptions realized at the city level. Thus, it is evident that the involvement of all citizens and stakeholders of the private sector is considered crucial for achieving the set targets, for either the 30% scenario, or more importantly the 40% reduction target scenario. A high level collaboration is expected with private investors interesting to realize small or larger scale RES investments in the city, while efforts for close contacts with associations from the tertiary and residential sector will be placed. Moreover, in all schools several programs for GHG emission reduction shall be incorporated.

1.4.4 Budget – SECAP financing sources

Regarding the total budget for the SECAP's implementation, For (40%) reduction the total cost for the Municipality is calculated at 6.24 million USD, while for the private sector has been estimated at 25.7 million USD approximately, resulting in an overall budget of 31.9 million USD.

Any action to be implemented will have a clear budget and implementation plan and will be executed pending the approval of the yearly budget, as required by the municipal regulations.

Chapter 2: Baseline Emission Inventory (BEI)

2.1 BEI Methodology

2.1.1 Baseline Year

According to the Covenant of Mayors Guidelines for South Signatories, in order to develop the energy balance sheet and consequently specify the CO2 emissions, the year 1990 should be considered as the baseline year. In case where there aren't adequate data for this year, as a baseline year should be considered the nearest year to 1990 for which there are complete and reliable data. Thus, for the Jdaidet Al-Chouf Municipality the baseline year has been set to 2016, since it was the year with the most sufficient and reliable data available. [6]

2.1.2 SECAP administrative body

Following a meeting of the consultant National energy Research Center (NERC) with the Jdaidat Al-Chouf representatives, it was made clear that their wish for the SECAP is to cover the administrative boundaries of Jdaidat Al-Chouf and Baqaata Al-Chouf, and not that of the whole Al-Chouf Area.

2.1.3 Sectors to be included in the BEI

The sectors for which the appropriate data were gathered and calculations for the total energy consumption and CO_2 emissions are presented below:

E. Buildings, Equipment & Facilities
   - Municipal Buildings, Equipment and Facilities
   - Public lighting
   - Residential buildings
   - Tertiary buildings, equipment and facilities (non municipal)
   - Water and wastewater facilities.

F. Transport
   - Municipal fleet
   - Public transport
   - Private and Commercial transport

G. Solid waste management.

H. Livestock breeding.

As regards agriculture, although there is agricultural activity in the region, it has not been possible to separate the consumptions for the specific sector from the tertiary one, and especially the water pumping facilities' for irrigation.

2.1.4 Emission factors and Conversion rates

The emission factors which are used in this SECAP were derived from the Covenant of Mayors Guidebook, with the only exception of the electricity emission factor, which is characteristic for the country. It was not possible to acquire the electricity emission factor for Lebanon for 2016 from the Ministry of Environment, or any of the utilities servicing the country, and from the International Energy Agency (IEA) and Ministry of Energy and Water, so that the BEI are used the last formal electrical emission factor for 2015 from the Ministry of Environment.

Emissions Factors for each source are gathered in the table below.

Table 3: Emission Factors & Conversion Rates

	Emission Factor (tn Co2/MWh) Factors (tn CO2/MWh)	Conversion Factors
Electricity	0.673	Not applicable
LPG	0.227	13,1 MWh/tn
Heating Oil (diesel)	0.267	10 KWh/lt
Diesel	0.267	10 KWh/lt
Gasoline	0.249	9,2 KWh/lt
Solar (thermal/ PV)	0	Not applicable
Wood	0.414	4.65 MWh/tone

Furthermore, emissions from the biomass were calculated according to the IPCC method. Waste separation process, Sewadge Sludge and livestock breeding create methane emissions (CH_4) which are converted to CO_2 emissions according to the equivalence "1 tn CH_4 = 25 tn CO_2".

2.2 Energy Consumption

The total amount of energy consumed in Jdaidet Al-Chouf Municipality is **120.171 GWh**. The allocation of this energy consumption among the different sectors, by fuel type, is presented in the next table. Further analysis of the consumptions per sector is provided in the following sections.

Table 4: Total Energy consumption per sector

MWh / Sector	Electricity	LPG	Heating Oil	Diesel	Gasoline	Wood	Solar thermal	Total
Municipal Buildings& facilities	9.85	0.0	14.8	0.0	0.0	0.0	0.0	**24.66**
Public Lighting	150.1	0.0	0.0	0.0	0.0	0.0	0.0	**150.1**
Residential Buildings	21,241	6,640	25,523	0	0	3,662	218	**57,283**
Tertiary Buildings& Facilities	13,946	15,878	24,984	0	0	0	0	**54,807.8**

Municipal fleet	0	0	0	95	27.6	0	0	**122.6**
Public Transport	0	0	0	80	136.8	0	0	**216.8**
Private & Commercial Transport	0	0	0	301	7,206			**7,508**
Total	**35,346.95**	**22,518**	**50,521.8**	**476**	**7,370.4**	**3,662**	**218**	**120,112.96**

2.2.1 Municipal Buildings & Facilities

Jdaidet Al-Chouf includes one municipal building in addition to one football playground, making minimal contributions to the energy consumption at the city. As for the Diesel consumption for heating, in line with the respective invoices, municipal building consumes 110 Lit per year, whereas the football playground consumes 385 Lit to generate electricity using small generator.

The numbers provided in the next table concern electricity and diesel for this sector in MWh.

Table 5: Energy consumption in Municipal Buildings & Facilities per fuel

Site Type	Electricity (Mwh/year)	Diesel for electricity generation (MWh/yr)	Diesel for heating (MWh/yr)	Total MWh
Main Municipal Building	4.72	0	14.8	19.53
Foot ball playground	1.28	3.85	0	5.13
Total	6.00	3.85	14.81	24.66

According to the above presented data, the diesel consumption in the municipal buildings' and facilities has double's share, which is about 75.67%, since it is predominantly being consumed for space heating and electricity generation.

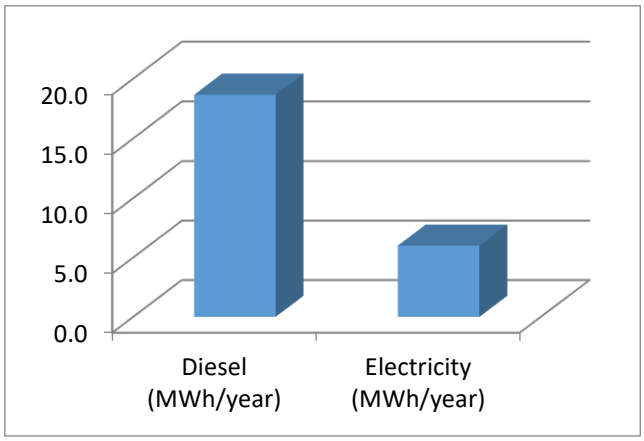


Figure 18: Energy consumption per fuel in Municipal Buildings

2.2.2 Municipal public lighting

As far as the municipal public lighting is concerned, this sector is related to the street lighting and public areas' lighting. The electricity consumption for this sector is **150.1 MWh**

according to the data from bills that were provided. A detailed table with an analysis of the consumptions per geographical area is provided in **Appendix A**.

2.2.3Residential Buildings

Electricity

Jdaidet Al-Chouf's households consume electricity for lighting and electrical appliances such as refrigerator, air conditions and others, as well as in water heating.

Accurate electricity consumption data from the utility servicing the area is not available. For this reason, approaches based on some questionnaires taken for representative samples were adapted in order to estimate the electricity consumptions (**See Appendix B**). More specifically, according to some interviews with houses and apartments owners, the average daily electricity consumption for apartments is 16.2 kWh, with average 4,4 persons per household and average annual electricity consumption of 1.34 MWh per capita, and specific annual energy of 32.8 kWh/m^2. On the other hand, the average daily electricity consumption for Villas is 33.3 kWh, with average 4.0 persons per household and average annual electricity consumption of 3.04 MWh per capita, with specific annual energy of 41.6 kWh/m^2. Whereas for the independent houses, the average daily electricity consumption is 16.8 kWh, with average 4.0 persons per household and average daily electricity consumption of 1.53 MWh per capita, with specific annual energy of 18.8 kWh/m^2. Finally, with considering the total amount of households in Jdaidet Al-Chouf which is 3300 for apartments, 70 for Villas and 150 for independent houses. Thus, the overall electricity consumption is calculated to be 21,241 MWh.

The initial assumptions for the specific consumption indicators used are also verified through the International Energy Agency (IEA)[7], according to which the annual electricity consumption in the residential sector is 3.56 MWh/capita in Lebanon in 2014, which is not close to the calculated average of 1.97 MWh/capita in Jdaidet Al-Chouf municipality, thus the first approach will be adopted.

Diesel (heating oil)

The main space-heating source in the houses in Jdaidet Al-Chouf is the diesel fuel. Diesel consumption was calculated based on several interviews with the households' owners. Therefore, the average annual diesel consumption for space heating per household for apartments, Villas and independent houses are 1300 Liters, 2250 liters and 1600 liters, respectively. Whereas the average annual diesel consumption per capita for the same households types are 295, 563 and 400 Liter/Capita, respectively. Considering the same amounts of household's types in Jdaidet Al-Chouf, the annual diesel consumption in residential sector is 4,687,500 Liter. Which equals to 46,875 MWh/year.

The initial assumptions for the specific consumption indicators used are also verified through the International Energy Agency (IEA). Since the diesel consumption in residential sector for 2014 is given (681ktoe) at a national level, this number will be adjusted per capita.

The rate used to convert tons of oil equivalents (toe) to MWh is: "1 toe=11.630 MWh", according to the SECAP guidelines [6]. Consequently, the annual diesel consumption in Jdaidet Al-Chouf per capita in the residential sector is as follows:

681,000toe∗11.630 (MWh/toe) = 7,920,000MWh Diesel at national level. (Equivalent to 792,000,000 Liters of diesel)

$$\frac{792{,}000{,}000 \text{ Liters}}{4550000 \text{ inhabitants (Lebanon 2014)}} = 174 \text{ Lit/Capita.}$$

Since the Heating Degree Days in Al-Chouf (1173HDD)[8] are not close to that of Lebanon in average (1600 HDD) [9], a correction factor of (0.733) on the above figure is considered, where the final annual diesel consumption in Jdaidet Al-Chouf per Capita is 127.5 Lit/Capita, which is very far from that average calculated based on the actual samples (419 Lit/Capita). Therefore, the calculated based on the second approach will be adopted, which the annual diesel consumption in Jdaidet Al-Chouf Municipality is as follows:

127.5 Lit/capita * 20,000 inhabitants = 2,552,251 Lit/year (Equivalent to 25,522.5 MWh/year).

Fire Wood

There is also an amount of fire wood which is consumed by the residents for space heating; the annual fire wood consumption at the national level was given through "Energy Statistics Database, 1990-2014"by UN Statistics Division [10], which is 449700 m^3/year, knowing that each briquette has a weight of 1.2 kg and volume of 0.00275 m^3 [11], then the annual fire wood consumption is 196,069.2 ton/year. Also when knowing that the average briquette consumption per house in Lebanon is 2.3 ton/year [11] according to a publication by Chouf Biosphere Reserve (SBR), then the total no. of households use fire wood is 85,247 households. Thus when taking the ratio of population for Jdaidet Al-Chouf with the overall population; then the total number of households that use firewood in Jdaidet Al-Chouf is 375 Households. Based on the same publication [11], the average firewood consumption in the areas with altitude between 800 and 1000 m is 2.1 ton/year per house, which as for Jdaidet – Al-Chouf area. Thus, the annual firewood consumption at the municipal level is 787.5 ton/year, which equivalent to 3,662 MWh/year (Based on 4.65 MWh/ton $_{\text{briquette}}$ [11]).

Liquefied Petroleum Gas

LPG is mainly used in cooking. According to the interviews with the household's owners, the households consume around 12 cylinders (12 kg/cylinder) during the whole year for cooking. According to the IPCC 2006 guidelines, the calorific value of Liquefied Petroleum Gas is 13,1 MWh/tn, and it is thus calculated that the residential sector consumes:

$$12cylinders * 3520 \text{ households} * 12kg = 506{,}880 kgrLPG/\text{year}$$

$$506.88\ ton * \frac{13.1\ MWh}{ton} = 6{,}640\ MWh/year$$

Solar thermal

After some interviews with solar systems' suppliers, there is around 10% of households in Jdaidet Al-Chouf own solar water heaters (SWHs) thus they consume solar power in order to heat water. Subsequently, the solar thermal energy produced per capita is 618 kWh/person based on a study conducted by Lebanon center of energy conservation (LCEC) for SWH in South Lebanon [12]. Based on the 10% percentage of SWHs users, thus the population with SWH is 352 at the municipal level.

Based on the above, the annual solar thermal consumption at the municipal level is calculated to be
217.5 MWh.

Summary

Gathering all the data of the residential sector, it seems that residents consume 5 distinct energy sources. In table 6 and figure 19 below, the final consumption per fuel type for this sector is presented.

Table 6: Total energy consumption in the residential sector

Residential Sector	MWh/Year
Electricity (MWh)	21,241
Diesel for heating (MWh)	25,523
Fire Wood for heating (MWh)	3,662
LPG (MWh)	6,640
Solar Thermal (MWh)	218
Total (MWh)	**57,283**

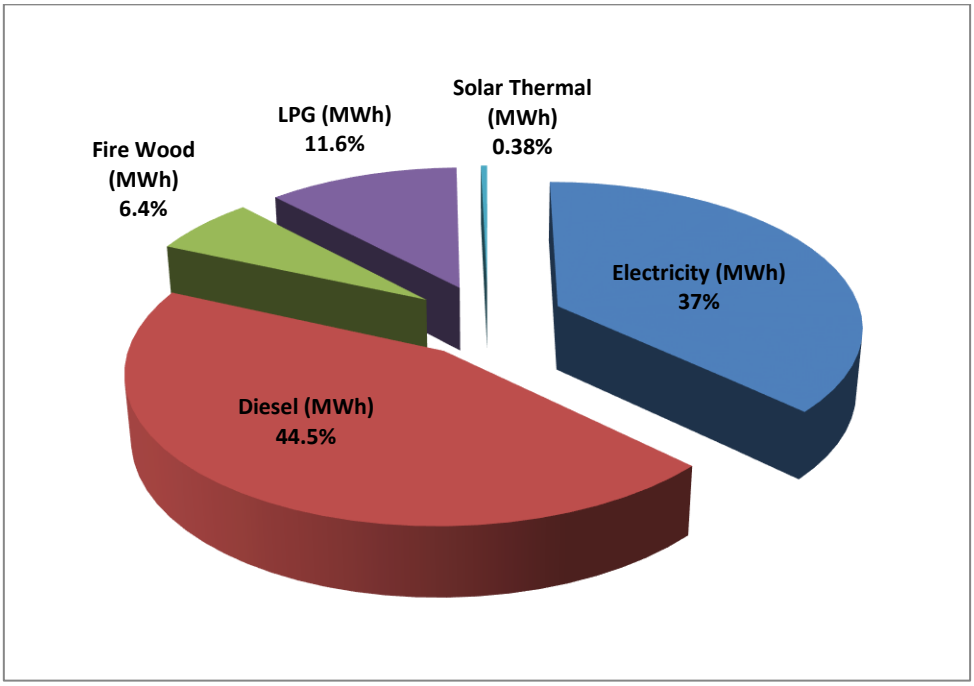


Figure 19: Energy consumption per fuel in Residential Sector

2.2.4Tertiary Buildings, Equipment & Facilities

Tertiary sector includes all buildings that not referred to the municipal and industrial sectors, which includes the commercial buildings such as shops, restaurants, hotels, offices, hospitals, and fuel stations. In addition, this sector includes the educational buildings (schools and Universities), public buildings and water management facilities as well, which provide services to Jdaidet Al-Chouf's citizens. It should be noted that water management facilities include facilities for water pumping and wastewater treatment for irrigation in addition to the solid waste plants. In case of commercial buildings, the approach used to calculate the annual energy is same one used for residential sector taking in consideration that the total commercial buildings number is 800 buildings (according to Municipality staff).(See Appendix C).

On the other hand, regarding the water pumping for irrigation; the annual energy consumption was estimated based an approach adopted in (NEEAP -Lebanon 2016), which estimates that the daily water consumption to irrigate 1 m^2 of the land is 5.44 Liters, whereas the specific energy consumption to lift 1 $m^3$of water from well with 100 m depth is 0.36 kWh/m^3. When considering the total area of the irrigated lands within Jdaidet Al-Chouf municipality is 240,000 m^2 (According to The Development Strategic Plan for the Chouf Suwaijani Region – 2016)[5], then the annual energy consumption for irrigation is 56.47 MWh considering the annual irrigation period from groundwater is 120 days[15].

The total energy consumption which refers to electricity, diesel, LPG was **54,807.8 MWh** in the tertiary sector. In the table, 7 below the collected data are presented.

Table 7: Energy consumption in tertiary sector per type of building

Types of Buildings in the Tertiary Sector	Electricity (from Grid)	Electricity (From local Generators)	Electricity (From Owned Generators)	Diesel (for heating)	LPG	Total
	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)
Public buildings & facilities	1.5	0.213	0.000	16.0	0.0	**17.7**
Commercial Buildings	5,265	3,699	4,559	24,838	15,876	**54,237.6**
Educational Buildings (Schools)	15.3	9.1	8.1	130.0	2.1	**164.6**
Irrigation Facilities	56.4	0.0	0.0	0.0	0.0	**56.4**
Water & Waste Management Facilities	196.3	0.0	135.1	0.0	0.0	**331.5**
Total(MWh)	**5534.5**	**3708.618**	**4702.6**	**24983.7**	**15878.3**	**54,807.8**

In the next charts, it is obvious that the consumption's allocation in the tertiary sector is dominated by commercial buildings.

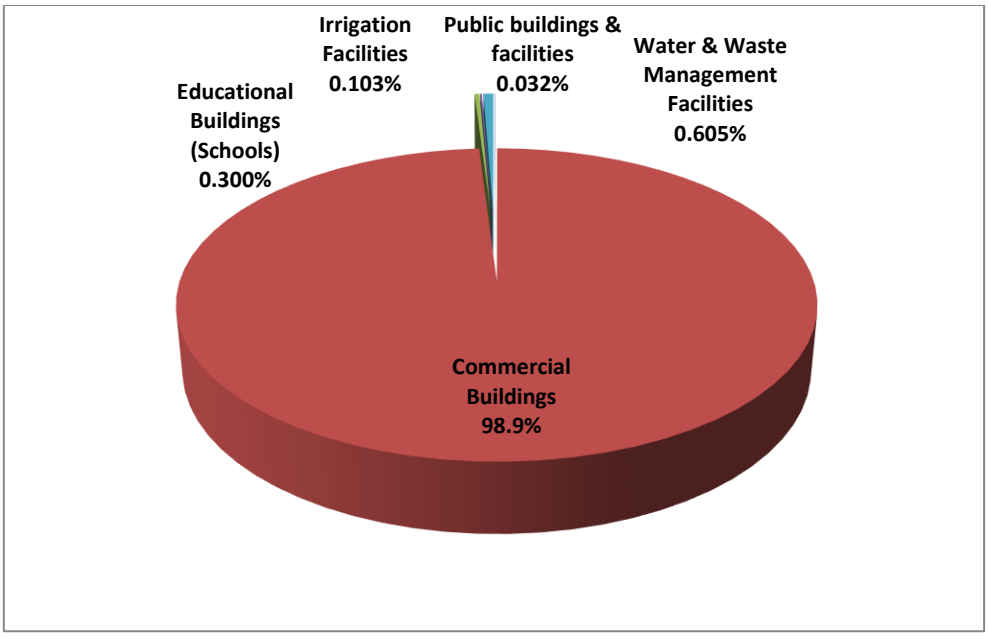


Figure 20: Energy consumption in tertiary sector per type of building

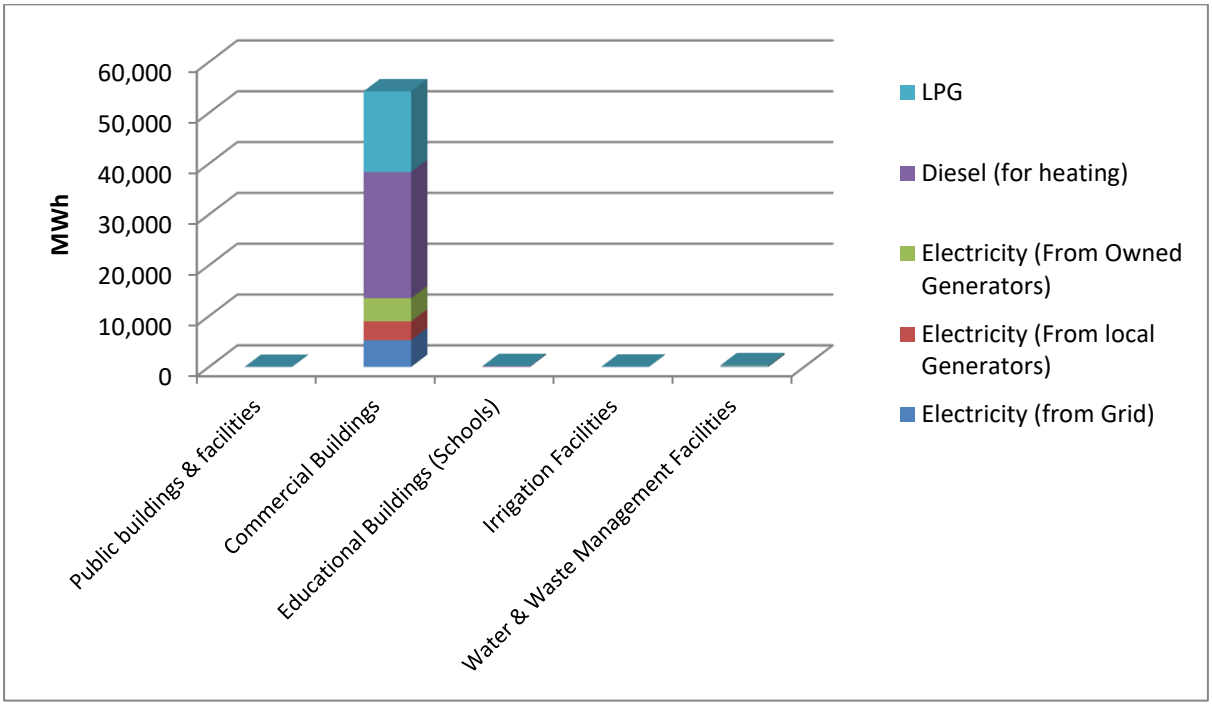


Figure 21: Energy consumption in tertiary sector per type of building and fuel

2.2.5Buildings' & facilities Synopsis

The consumed energy allocation for all the buildings and facilities in Jdaidet Al-Chouf Municipality is presented in the next figure.

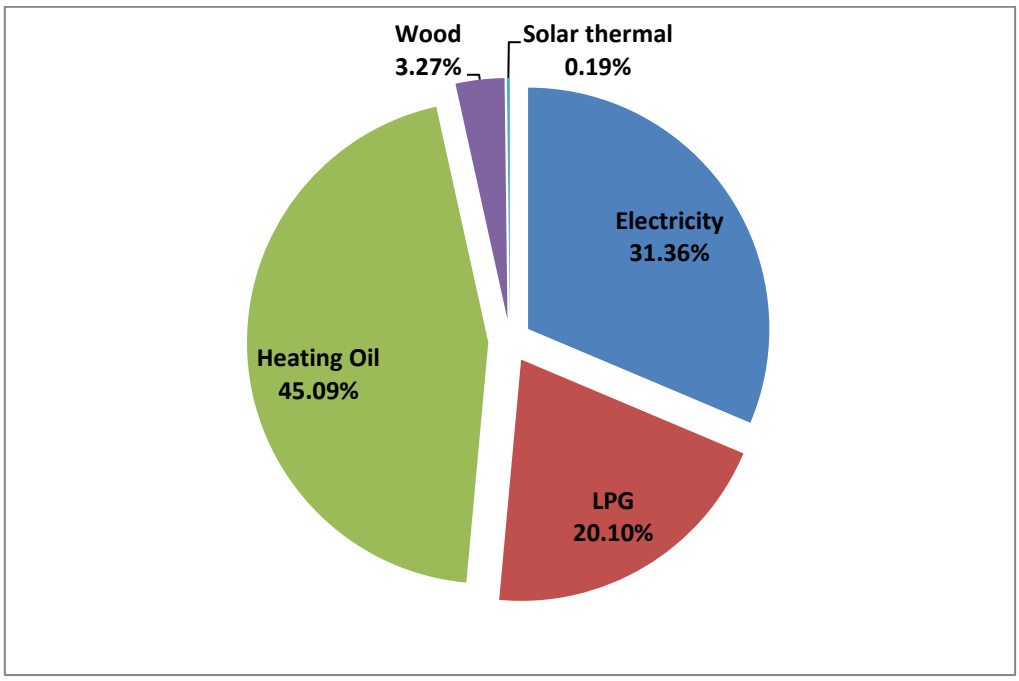


Figure 22: Energy consumption in buildings and facilities per fuel

2.2.6Transport Sector

2.2.6.1Municipal fleet

This category includes municipal cars and waste transportation. The municipality owns no vehicles for its own, but one car with SUV type is mainly used by board members, and another two cars for municipal police works and dead transportation.
As for waste transportation, the municipality has one truck and one pick-up car to transport the solid waste to a nearby waste sorting plant located in Kahlounieh. According to waste collection staff, the average daily trips for their vehicles are 3 trips for the pick-up car and two trips for the truck, with a total daily travel distance of 17 km for each of them. Based on fuel bills provided by the municipality, the annual diesel consumption for solid waste transportation is 7000 Lit (equivalent to 70.0 MWh/yr).

Table 8 presents the municipal vehicles types, numbers and the annual fuel consumptions in Jdaidet Al-Chouf municipality.

Table 8: Energy Consumption in Municipal fleet of Jdaidet Al-Chouf

Type of Municipal vehicles	Number of vehicles	Daily distance traveled (km/day)	Diesel (Lit/yr)	Gasoline (Lit/yr)	Diesel (MWh/yr)	Gasoline (MWh/yr)	Total (MWh/yr)
Passenger Vehicles	1	15	0	3,000	0.0	27.6	27.6
Pick-Up vehicles	1	10	2,000	0	20.0	0.0	20.0
Garbage vehicles	2	17	7,000	0	70.0	0.0	70.0
Dead transportation vehicles	1	2	500	0	5.0	0.0	5.0
Total	**5**	**------**	**9,500**	**3,000**	**95.0**	**27.6**	**122.6**

2.2.6.2 Public Transport

Public transport refers to buses and taxis that serve Jdaidet Al-Chouf's citizens. The data available for this sector included the average consumption per type of vehicle according to the total distance travelled within municipal limits. The results are summarized in the table 9. Further analysis is presented in **Appendix D**.

Table 9: Energy consumption in Public Transport within Jdaidet Al-Chouf borders

Public transport Vehicle Type	Number of vehicles	Gasoline (Lit/yr)	Diesel (Lit/yr)	Diesel (MWh/yr)	Gasoline (MWh/yr)	Total (MWh/yr)
Buses	21	0	8,005	80.0	0	**216.8**
Taxis	8	14,860	0	0	136.7	

2.2.6.3 Private and Commercial Transport

A detailed transportation survey for Jdaidet Al-Chouf Municipality was done by performing data collection by questionnaires for representative sample, which were identified as follows:

1. For residents (vehicles owners) living within the municipality boundaries: The samples were 33% of the total vehicle owners (appendix (D) summarizing the overall data for all vehicles).
2. For commercial facilities (shops, restaurants, offices….Etc.) for employees: The samples covered 33% of these facilities (appendix (D) summarizing the overall data for all vehicles).

Table 10 shows the survey results and outputs regarding the diesel and gasoline consumptions, which the annual diesel consumption reaches 30,147Lit (301 MWh/yr), while the annual gasoline consumption reaches 783,268 Lit (7,206 MWh/yr).

Table 10: Energy consumption in Private and Commercial Transport

Vehicle Type	Number of vehicles	Diesel (Lit/yr)	Gasoline (Lit/yr)	Diesel (MWh/yr)	Gasoline (MWh/yr)	Total (MWh)
Small Passenger cars	1,575	0	438,327	0	4,033	**7,508**
Medium Passenger Cars	1,338	0	344,941	0	3,173	
Pick -up vehicles	78	19,948	0	199	0	
Van	42	10,199	0	102	0	
Total	3,033	30,147	783,268	301	7,206	

Figure 23 below presents the proportion between Diesel and Gasoline consumption in the Private and Commercial vehicles.

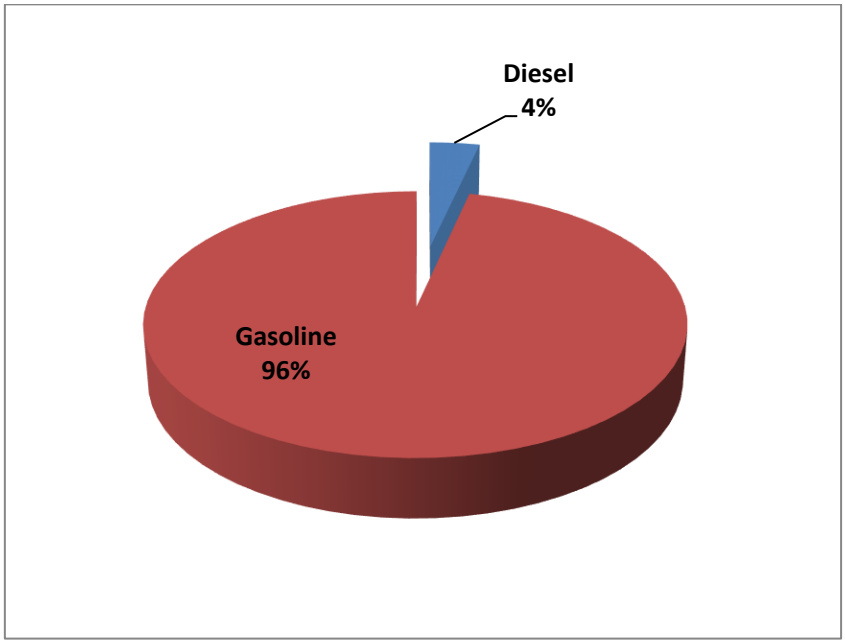


Figure 23: Energy consumption in Private and Commercial vehicles per fuel

Table 11 and figure 24 summarize the overall transportation sector consumptions for diesel and gasoline fuels

Table 11: Total energy consumption for transportation sector

Vehicle Type	Number of vehicles	Diesel (litre/year)	Gasoline (litre/year)	MWh Diesel	MWh Gasoline	Total MWh
Municipal Fleets	5	9500.0	3000.0	95.0	27.6	122.6
sub-total	**5**	**9500.0**	**3000.0**	**95.0**	**27.6**	**122.6**
Public Transportation						
taxes	8	0	14860.0	0.0	136.7	136.7
buses	21	8004.5	0	80.0	0	80.0
sub-total	**29**	**8004.5**	**14860.0**	**80.0**	**136.7**	**216.8**
Private and Commercial Transportation						
Residential cars	2526	22,315	691,697	223	6,364	6,587
Commercial sector cars	447	7,832	91,571	78	842	921
sub-total	**2,973**	**30,147**	**783,268**	**301**	**7,206**	**7,508**
Total	**3,007**	**47,652**	**801,128**	**477**	**7,370**	**7,847**

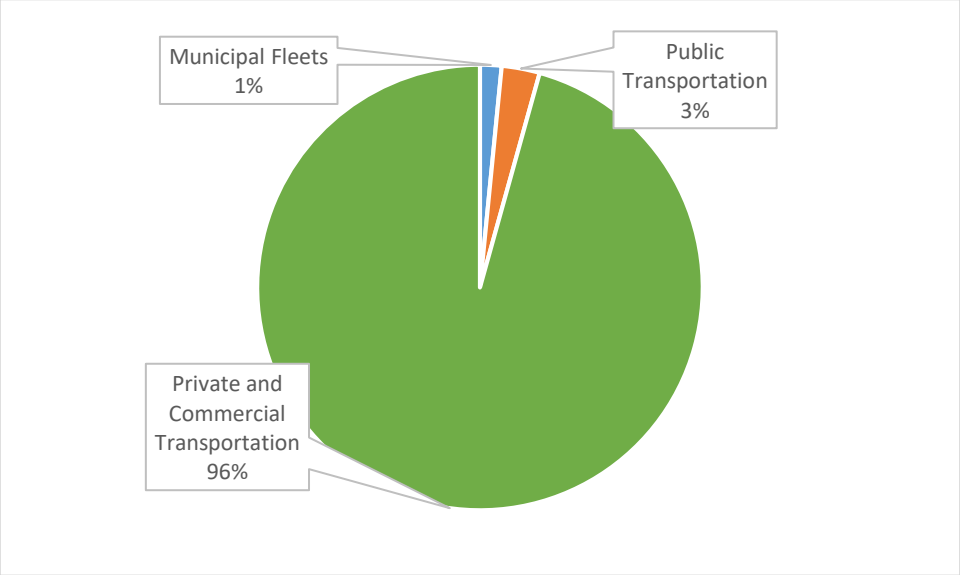


Figure 24: Energy consumption distribution in the transportation sector

2.2.7 Final Energy Consumption

In the next table 12 all, the energy consumptions within Jdaidet Al-Chouf municipality are presented, with total energy consumption of **120.1 GWh**.

Table 12: Total Energy Consumption in Jdaidet Al-Chouf municipality

Sector	FINAL ENERGY CONSUMPTION [MWh]															
	Electricity	Heat/ cold	Fossil fuels								Renewable energies					Total
			Natural gas	LPG	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Bio fuel	Fire Wood	Solar thermal	Geothermal	
Municipal buildings																
Main Municipal Building	9.85	0.0	0.0	0.0	14.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**24.66**
Public lights																
Public lights	150.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**150.1**
Residential sector																
Resedantial Building	21,240	0.0	0.0	6,640	25,522	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3,662.	217.5	0.0	**57,282**
Tartary sector																
Public buildings & facilities	1.71	0	0	0	16	0.00	0	0	0	0	0	0	0	0	0	**17.71**
Commercial Buildings	13523.73	0	0	15,876	24,838	0.00	0	0	0	0	0	0	0	0	0	**5,4237.64**
Educational Buildings (Schools)	32.49	0	0	2.1	130	0.00	0	0	0	0	0	0	0	0	0	**164.61**
Irrigation facilities	56.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**56.40**
Water & Waste Management Facilities	331.47	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	**331.47**
Sub-total	13945.7	0.00	0.00	15878.3	24983.7	0.00	0.00	0.00	0.0	0.00	0.0	0.0	0.00	0.00	0.00	**54,807.8**
Transportation																
Muncipal fleets	0.0	0.0	0.0	0.0	0.0	95.0	27.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**122.60**
Public Transport	0.0	0.0	0.0	0.0	0.0	80.05	136.712	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**216.76**
Private and Commercial Transport	0.0	0.0	0.0	0.0	0.0	301	7206.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**7507.54**
Total	**35,343.57**	**0.00**	**0.00**	**22,518.45**	**50,521.04**	**476.52**	**7,370.38**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3,662.14**	**217.54**	**0.00**	120,110

Chart below shows the energy consumption distribution for all Jdaidet Al-Chouf's sectors, which can be noted that Tertiary and residential sectors are the main energy consumers in Jdaidet Al-Chouf with 47.59% and 49.74% percentages respectively.

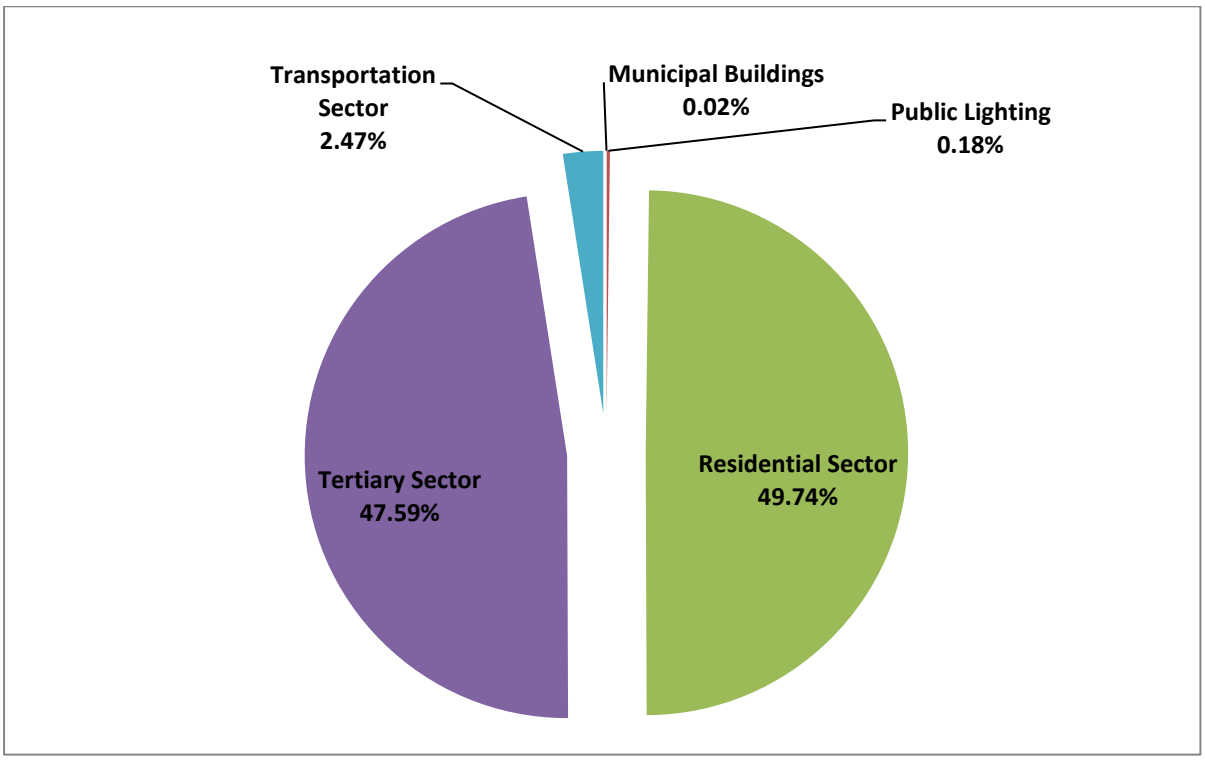


Figure 25: Energy consumption distribution for all sectors in Jdaidet Al-Chouf

2.3 Local electricity production

There is one type of electricity production in municipality of Jdaidet Al-Chouf; which is Diesel generators, whereas there is no any installed photovoltaic system tell this moment. The total installed capacity for the main diesel generators located within Jdaidet Al-Chouf reaches3765 kVA with estimated annual electricity generation of 11,928 MWh. On the other hand, there are some tertiary buildings have owned generators that consume 1,743 m^3 of diesel per year with estimated annual electricity generation of 4,708 MWh.

2.4 CO_2 emissions

2.4.1 Energy related emissions

In the previous sections the energy consumptions in Jdaidet Al-Chouf municipality were described, in line with which the CO_2 emissions will be calculated in this section, using the IPCC emission factors.[13]

Electricity

In order to calculate the local emission factor for electricity, the following equation is used:

$$EFE = \frac{(TCE - LPE - GEP) * NEEFE + CO_2 LPE + CO_2 GEP}{TCE}$$

Where:

EFE: Local emission factor for electricity (tn/MWh)
TCE: Total electricity consumption in the local authority (MWhe)
LPE: Local electricity production (MWhe)
GEP: Green electricity purchased by the local authority (MWhe)
NEEFE: National or European emission factor for electricity (tn/MWh_e)
CO2LPE: CO_2 emissions due to the local production of electricity (tn)
CO2GEP: CO_2 emissions due to production of certified green electricity purchased by the local authority (tn) [9]

$$EFE = \frac{(35{,}405 - 16{,}636 - 0) * 0.659 + 11462.2 + 0}{35{,}405} = 0.673 \text{ tn } CO_2/\text{MWh}$$

As calculated from the above, due to the large contribution of electricity production from local generators, the emission factor for electricity will be higher than the national/European emission factor, with value of 0.673 tn CO_2/MWh.

Heating Oil (Diesel)

According to the SECAP guidelines, the CO_2 emission factor for the diesel used in heating is 0.267 tn/MWh.

Diesel

According to the SECAP guidelines, the CO_2 emission factor for the diesel used in vehicles is 0.267 tn/MWh. No biodiesel is being blended.

Gasoline

According to the SECAP guidelines, the CO_2 emission factor for gasoline is 0.249 tn/MWh.

LPG

According to the SECAP guidelines, the CO_2 emission factor for liquefied petroleum gas is 0,226 tn/MWh.

Fire Wood

According to the SECAP guidelines, the CO_2emission factor for firewood is 0.41 tn/MWh.

Solar thermal

The solar thermal power has not emissions thus its emission factor is zero according to the guidelines.

2.4.2 Non energy related emissions

Apart from the CO_2 emissions released from the daily activities, also there is a significant amount of Greenhouse Gases derived from waste management, livestock breeding and wastewater treatment plants.
In the Jdaidet Al Chouf municipality, there is a wastewater treatment plant under direct supervising from the municipality, one cow's farm, in addition to the municipal solid waste production in the municipality.
Here is the Co2 emission contribution of the biomass in the municipality:

A- Municipal solid waste

In order to calculate the emissions from municipal solid waste, the IPCC default method was used as it appears below [14]:
Methane emissions (Gg/yr) = (MSWT ● MSWF ● MCF ● DOC ● DOCF ● F ● 16/12-R) ● (1-OX)... (1)
Where:

- MSWT : total MSW generated (Gg/yr)
- MSWF: fraction of MSW disposed to solid waste disposal sites
- MCF: methane correction factor (fraction)
- DOC: degradable organic carbon (fraction) (kg C/ kg SW)

- DOCF: fraction DOC dissimilated
- F: fraction of CH4 in landfill gas (IPCC default is 0.5)
- 16/12: conversion of C to CH4
- R: recovered CH4 (Gg/yr)
- OX: oxidation factor (fraction – IPCC default is 0)

The IPCC default method assumes that all the potential of CH4 emissions releases during the same year the waste is disposed of. The method introduces various specific default values and recommendations, for use in countries with lack of statistical data for Solid Waste.
The calculation of the degradable correction factor (DOC) is based on the following equations.

$$DOC=0,4*A+0,17*B+0,15*C+0,3*D.....(2)$$

Where:

- A Percentage of paper and textiles in SW
- By Percentage of garden and park waste and other organic putrescible in SW
- C Percentage of Food waste in SW
- D Percentage of wood and straw waste in SW

The form of this suggested equation wasn't followed directly because in the case of a Jdaidet Al-Chouf municipality there was a different composition of solid waste. New factors were found in order to calculate the DOC.
The total quantity of solid waste for 2016 was 2881.9tn. Some the amount is thrown in open dumps because there is a recycling. Waste composition, as well as the results from the calculations is presented in the next two tables.

Table 13: Solid waste composition in Jdaidet Al-Chouf, 2017

Solid waste composition	Percentage	Quantity(tn)
Paper and Cardboard	3%	86.5
Glass	3%	86.5
Metal	5%	144.1
Plastic	10%	288.2
Organic Waste	60%	1,729.2
Other	19%	547.6
Annual Quantity of Solid waste (tn)	100%	2,881.9

Table 14: Waste Emissions Calculation factors

Variables	Values
MSWt:	2.88
MSWf:	0.5764
MCF:	0.4
DOC:	16.67%
DOCf:	0.558483

F:	0.5
16/12:	1.3333
R:	0
OX:	0

Where DOCf=0,014*T+0,28 (T: average temperature in Al-Chouf, 19.89oC)
All things considered, 41.42 tn of methane are released due to the waste management. This quantity equals to 1031 tn of equivalent CO2. (According to the guidelines, the factor, which was used for the conversion, is 25)

B- Waste Water Treatment Plant (WWTP)

In order to calculate the emissions from WWTP, the IPCC default method was used as it appears below:
CH4 emissions = $(U_i*T_{i,j}*EF_j)*(TOW-S)-R$
Where:

- Ui : fraction of population in income in inventory year
- Ti,j : degree of utilization of treatment pathways or system
- EFi: emission factor
- R : amount of CH4 recovery in inventory year.
- S : organic component removed in inventory year as sludge
- TOW : total organics in waste water during inventory year

The calculation of the emission factor (EFi) is based on the following equation.

EFi =B◦*MCFj
Where:

- B◦ : Maximum CH_4 production Capacity
- MCFj : methane correction factor

In addition, to calculate of the total organics in wastewater in inventory year (TOW) is based on the following equation:
TOW= P*BOD*0.001*I*365
Where:

- P : country population
- BOD : country specific per capita BOD
- I : correction factor for additional industrial BOD discharged into sewers

The plant treat daily about 1656 m^3 of wastewater, and the total quantity of sewage sludge for 2016 was 75.55 tn, 80% are from the Jdaidet Al-Chouf municipality, on the other hand, the WWTP is operated under over load conditions. Waste composition, as well as the results from the calculations are presented in the next table:

Table 15: Sewage Emissions Calculation factors

Ui	0.34
Ti,j	0.34
EFi	0.18
R	0
S	201.79
TOW	292000
B◦	0.6
MCFj	0.3
P	20000
BOD	40

Overall, 6.07 tn of methane are released due to the waste management. This quantity equals to 151.79 tn of equivalent CO2. (According to the guidelines, the factor, which was used for the conversion, is 25).

c- Livestock breeding

based on the data from the municipality of Jdaidet Al-Chouf, there is one cows farm contains 20 cows. The cows emission factor from one head of cows was calculated (46 kgCH4/head/year) based on the IPCC guideline 2006.

About 0.92 tn of methane are released due to the farm. This quantity equals to 23 tn of equivalent CO2. (According to the guidelines, the factor, which was used for the conversion, is 25).

2.1.5 Final CO_2 emissions

The emissions of CO_2 for the sectors that have been described in the previous sections are available, in total, in the following table.

Table 16: Total CO_2 emissions for Jdaidat Al-Chouf Municipality

Sector	FINAL ENERGY CONSUMPTION [Tone CO2/year]															
	Electricity	Heat/ cold	Fossil fuels								Renewable energies					Total
			Natural gas	LPG	Heating oil	Diesel	Gasoline	Lignite	Coal	Other fossil fuels	Plant oil	Biofuel	Fire Wood	Solar thermal	Geothermal	
Municipal buildings																
Main Municipal Building	4.74	0.00	0.00	0.00	3.95	0	0	0	0	0	0.00	0.0	0.0	0.0	0.0	**8.69**
Public lights																
Public lights	101.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00	0.00	0.00	**101.01**
Residential sector																
Residential Building	14,295	0	0	1,507	6,815	0	0	0	0	0	0	0	1,516	0	0	**24,133**
Tartary sector																
Public buildings & facilities	1.15	0	0	0.00	4.272	0.00	0	0	0	0	0	0	0	0	0	**5.42**
Commercial Buildings	9,101	0	0	3,604	6,632	0	0	0	0	0	0	0	0	0	0	**19,337**
Educational Buildings (Schools)	21.86	0	0	0.48	34.71	0.00	0	0	0	0	0	0	0	0	0	**57.06**
Irrigation facilities	37.96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**37.96**
Water & Waste Management Facilities	223.08	0	0	0.00	0	0.00	0	0	0	0	0	0	0	0	0	**223.08**
Transportation																
Muncipal fleets	0	0	0	0	0	25.37	6.87	0	0	0	0	0	0	0	0	**32.24**
Public Transport	0	0	0	0	0	21.37	34.04 1288	0	0	0	0	0	0	0	0	**55.41**
Private and Commercial	0	0	0	0	0	80.49	1794. 31	0	0	0	0	0	0	0	0	**1874.8**

Transport																
Sub Total for energy sources	23,790	0	0	5,112	13,489	127	1,835	0	0	0	0	0	1,516	0	0	**45,907**
Non Energy Sources																
Waste Water treatment Plant	0	0	0	0	0	0	0	0	0	0	0	0	151.79	0	0	**151.79**
Live stock breeders	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	**23.0**
Solid waste Separation Plant	0	0	0	0	0	0	0	0	0	0	0	0	1,031	0	0	**1,031**
Sub Total for Non energy sources	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.0**	**0**	**0**	**0**	**0**	**1,206**	**0**	**0**	**1,206**
Total	**23,790**	**0.00**	**0.00**	**5,112**	**13,489**	**127**	**1,835**	**0.0**	**0**	**0**	**0**	**0**	2,721.91	**0**	**0**	**47,033.4**

2.2 Results' Graphical Analysis

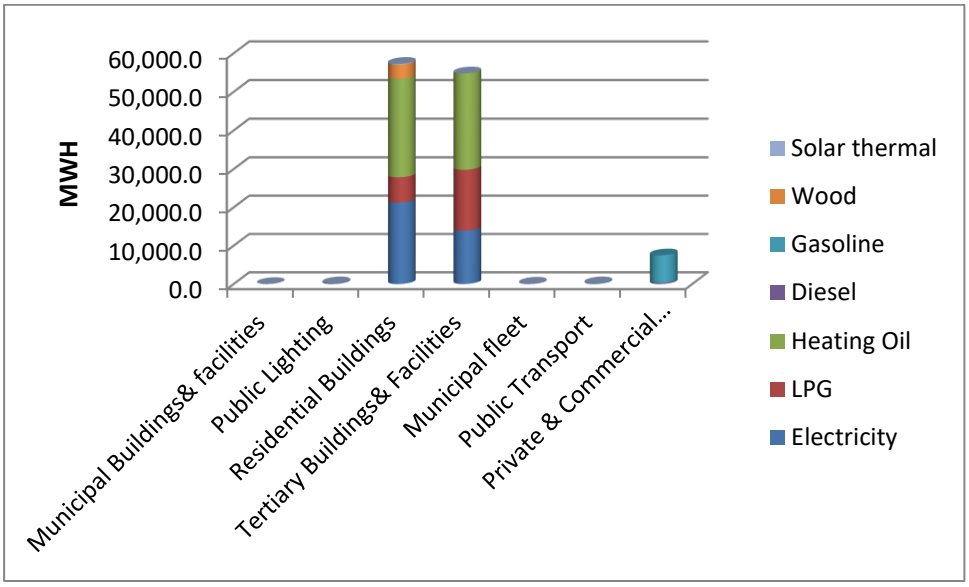


Figure 26: Final Energy consumption per sevtor and per fuel.

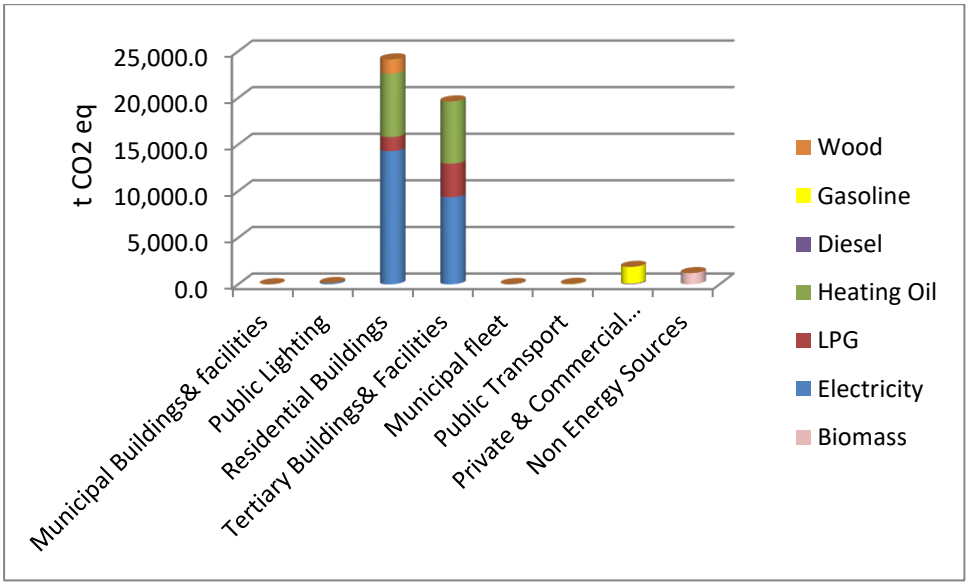


Figure 27: Total CO2 emissions per sector and per fuel.

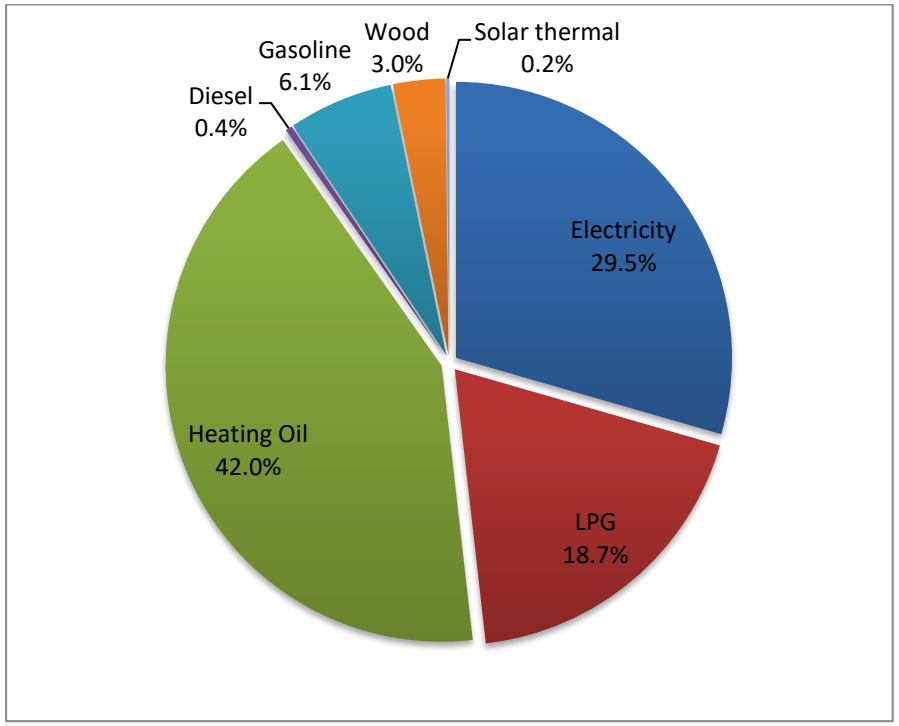


Figure 28: Final Energy Consumption per fuel.

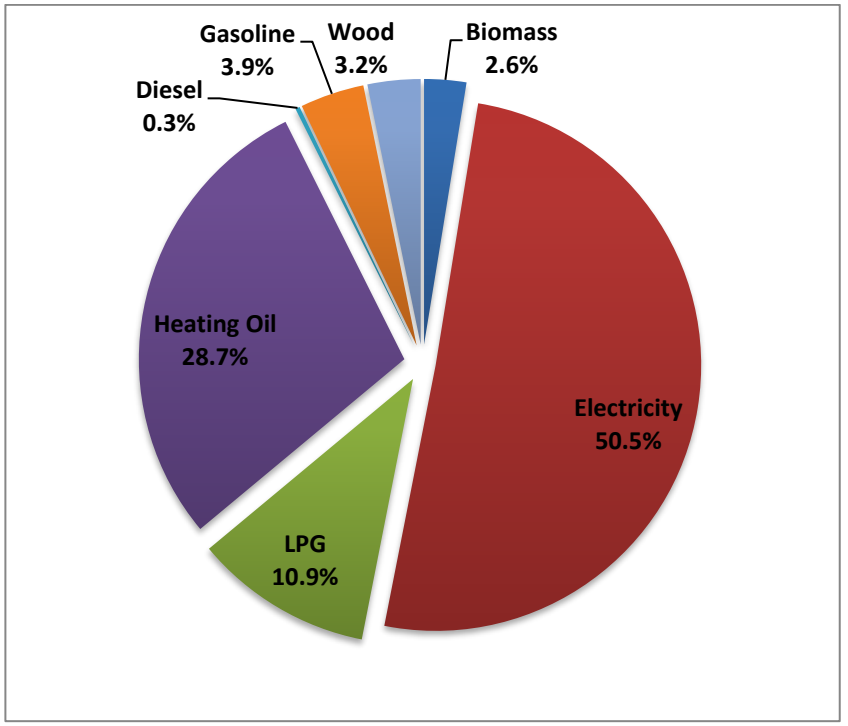


Figure 29: Total CO2 emissions per fuel.

Chapter 3: SECAP Actions

3.1 Target for 2030

The Municipality of Jdaidet Al-Chouf is called upon to take double role in the efforts towards CO_2 reduction, both as a demonstrator giving the good example to its citizens, as well as a triggering power and coordinator for all activities in the area. The first role, giving the good example, should be realized through the adoption of actions to reduce the emissions resulting from the buildings/ facilities / vehicles etc. under its direct responsibility. Emissions from waste are another sector under the direct responsibility of Jdaidet Al-Chouf Municipality. Nevertheless, the municipal direct related emissions are only a relatively low percentage of the total. Therefore, it should act as a triggering power and coordinator of the activities to be realized by the private sector in a series of activity fields. According to the BEI, the sectors contributing the most to the carbon footprint are the Residential (51.27%), the Tertiary (41.68%) and the Private & Commercial Transport (3.98%). Thus, the Municipality should focus on the actions through which the citizens will be encouraged and take the appropriate measures in order to reduce the CO_2 emissions from their activities. At the same time, actions in the other sectors will be suggested as well.

In this respect, the first step is the calculation of the Business as Usual (BAU) scenario, in line with the JRC guidelines for South Municipalities, considering that Lebanon, as a country with its economy under development, will face an increase in its energy demand due to the expected economic and population growth. Considering the use of the BAU scenario for the calculation of the 2030 emission levels and in turn the respective reduction target, the following calculations are realized according to the guidelines.

$$Emissions_{CO_2}^{2030} = Emissions_{CO_2}^{Baseline\ year} \times k$$

In Jdaidet Al-Chouf, the emissions for the baseline year, 2016, were 47,033.4 tn $CO_{2\ eq}$. The national coefficient k for the baseline year of 2016 in Lebanon is 1.53. Therefore, the forecasted emissions for 2030 are

$$Emissions_{CO_2}^{2030} = 47{,}033.4 \times 1.53 = 71961.2\ tn\ CO_{2\ eq}$$

The emission reduction target for Jdaidet Al-Chouf Municipality according to the Intended Nationally Determined Contribution (INDC) is 30% (21,588.36 tn $CO_{2\ eq}$) up to 2030 compared with the BAU scenario. However, according to Covenant of Mayors the target should be at least 40% against the calculated 2030 emissions, thus 28,784.48 tn $CO_{2\ eq}$.

On the other hand, in order for the 40% target to be achieved, strict measures are needed which should be enforced through the development and implementation of the respective legislative framework.

Calculations for 40% redaction have been realized based on the suggested actions. In the next sections a more detailed analysis per action for each sector is provided. It should be noted that for awareness raising activities conducted by the municipality, besides the

implementation cost born by the municipality and its potential funding sources, the amount of the private funds mobilized is reported as well where relevant. This cost doesn't participate in the calculation of the NPV value. Moreover, it should be clarified that externalities costs are not considered in the calculation of the NPV; this results sometimes in actions with a negative NPV from the strict economic calculation, although their overall impact could be considered positive if additional benefits were considered.

3.2 Municipal Buildings, Equipment/Facilities

This sector contributes in the carbon footprint less than 1%. Nevertheless the possible actions to be implemented in the Municipal Buildings could set an example for the citizens and the employees. Municipality acknowledged the measures, which best fit its needs so as to achieve energy savings and emission reductions. In the following sections, a comprehensive set of actions is being analyzed.

The suggested actions for this sector consist of energy conservation and green energy production measures. Focus has been placed on energy saving activities and PVs on building's roof, since these are considered to be easily implemented, unlike the bigger RES facilities requiring more time and more free spaces available.

Apart from these categories of actions, there are also some envisaged actions, which target the user through awareness raising activities. These actions aim to make the inhabitants' behavior environmental friendly, as well as to properly educate the new generations in environmental and energy related issues.

An overview of this sector's actions and achieved reductions is presented on the table below.

Table 17: Actions in Municipal Buildings, Equipment/Facilities

Action No.	Action	Emission Reductions (tn CO_2) 40% target
1.1	Green procurement procedures for municipal buildings	0.7
1.2	Replacing the existing non efficient lamps with LED Lamps Jdaidet Al-Chouf municipal buildings	5.6
1.3	Energy manager appointment in the municipality	0.1
1.4	Awareness raising activities for municipal employees	0.3
1.5	5kwp PVs in municipal building's roof	4.7
1.6	Establishment of Energy Saving Department	0
1.7	Social media portal creation portal creation	0
Total		**11.4**

3.2.1 Green procurement procedures for municipal buildings

Green procurement is the procedure where the municipality seeks to purchase goods and services with a reduced environmental impact throughout their life cycle. Selecting products of high efficiency that minimize the environmental impacts, it is possible to consume less energy thus reduce the CO_2 emissions and achieve monetary savings. The action is envisaged

to be applied in all new office equipment that the municipality plans to purchase for their increasing needs and for the gradual substitution of old, inefficient one. Especially for high energy consuming office equipment, high efficiency products will be targeted, while minimum efficiency standards and requirements will be set in all relevant municipal tenders.

In the next table, calculations regarding the cost, the savings and the financial viability of the action are presented.

Table 18: Action 1.1 in numbers

Green procurement procedures	
Duration	2020 – 2030
Total Implementation Cost (EURO)	24900
Annual Energy Savings (MWh)	1.1
Annual Emission Reduction (tn CO_2)	0.7
Funding Source	Own funds
Net Present Value (NPV)	<0

3.2.2 Replacing the existing non efficient lamps with LED Lamps

The current state of Jdaidet –AL-Chouf's existing municipal building includes Florescent lighting units. The municipality will replace all the fixtures and lamps with LED lighting lamps.

Table 19: Action 1.2 in numbers

Replacing the existing non efficient lamps with LED Lamps	
Duration	2019
Total Implementation Cost (EURO)	1137
Annual Energy Savings (MWh)	8.3
Annual Emission Reduction (tn CO_2)	5.6
Funding Source	Donor
Net Present Value (NPV)	>0

3.2.3 Energy manager appointment in the municipality

One of the prerequisites of the municipality's adhesion to the Covenant of Mayors is the creation of the municipal administrative structures, in order to establish the working team to implement and monitor the progress of the SECAP activities. In this respect, this action focuses not only on the satisfaction of the above mentioned prerequisite, but goes well beyond it.

The energy manager will not only be the responsible person to monitor the energy consumptions and provide the necessary solutions when a problem is identified, but will act proactively in order to ensure the good coordination of the whole municipal team for the proper implementation of the envisaged SECAP actions.

The benefits related to the energy manager's appointment are considered multi-dimensional since strong coordination of the overall initiative is required, although strictly economic

indicators are not encouraging. In case a member of the existing municipality staff is appointed to this position, this will have a positive NPV for the municipality.

Table 20: Action 1.3 in numbers

Energy manager appointment in the municipality	
Duration	2020 – 2030
Total Implementation Cost (EURO)	26145
Annual Energy Savings (MWh)	0.17
Annual Emission Reduction (tn CO_2)	0.1
Funding Source	Own funds
Net Present Value (NPV)	<0

3.2.4 Awareness raising activities for municipal employees

A significant step to achieve the planned targets is to have properly communicated the municipality's intentions to the people working within those building. In this respect, this action comprises of a set of targeted awareness raising activities towards the municipal employees. The aim of these activities is to encourage the municipal employees to change their behavior and habits in order to achieve the envisaged results.

The set of awareness raising and training actions to be realized for the municipal employees includes the following:

- Training workshops and seminars for the team members directly involved in the SECAP implementation and monitoring. This activity aims at the capacity building regarding SECAP development and project implementation of the employees directly involved in the SECAP implementation team. These workshops and seminars could be targeted on how to attract financing from international donors, to manage the project implementation or even focus on the exchange of best practices and ideas with other municipalities in Lebanon and abroad that face the same challenges. Workshops on the latest available know how in terms of energy efficiency and RES technologies are envisaged as well.
- Development and circulation of promotional material through the employees' e-mails on the benefits of energy efficiency and how simple behavior changes impact the total consumption.
- Municipal contest for the administrative building with the highest energy savings achieved (in terms of %) due to users' behavior change. This contest prize could be any incentive provided to the employees, such as two additional days off that year or the development of posters with the pictures and names of the employees that contributed to the goal. The aim would be to achieve energy savings through strictly behavioral change, such as turning off the lights, the diesel space heaters and office equipment when leaving the office, not leaving open windows with the A/C on etc. This measure could be used during the first couple of years, when the rest of the energy efficiency interventions will be gradually taking place.

Table 21: Action 1.4 in numbers

Awareness raising activities for municipal employees	
Duration	2020-2023
Total Implementation Cost (EURO)	6225
Annual Energy Savings (MWh)	0.7
Annual Emission Reduction (tn CO_2)	0.3
Funding Source	Own funds + external fund
Net Present Value (NPV)	<0

3.2.5 5 kW PV plant for municipal building

It is well known that Lebanon has a great solar potential. Municipality wants to take advantage of this benefit and install a PV plant of 5 KW to cover the electricity consumption municipal building. By doing so, its dependency on the grid will be reduced through a renewable source of energy, thus achieving CO_2 reductions as well.

The Key data on the investment are presented in the table 22 below.

Table 22: Action 1.5 in numbers

PV plant 5 KW	
Duration	2019
Total Implementation Cost (EURO)	22,410
Annual Energy Production (MWh)	6.9
Annual Emission Reduction (tn CO_2)	4.7
Funding Source	Donor
Net Present Value (NPV)	>0

3.2.6 Establishment of Energy Saving Department

The creation of an Energy Saving Department is proposed, to be staffed with 1 person according to the municipality's needs. These employees should be technically qualified on energy related issues, so as to promote appropriate activities related to energy savings and support citizens. Citizens will turn to this department in order to be informed for new practices and to receive techno-economic advices regarding their energy related investments. In addition to the above, this department can support the activities of the energy manager and undertake the responsibility for monitoring the SECAP actions' progress, in close collaboration with the employees directly involved with their implementation. The implementation of this action is not considered to derive direct energy savings and CO_2 reduction benefits, but it is seen as a supplementary one to the rest of the actions in the sector.

Table 23: Action 1.6 in numbers

Establishment of Energy Saving Department	
Duration	2012 – 2030
Total Implementation Cost (EURO)	26145

Funding Source	Own funds

3.2.7 Social media portal creation

The creation of a social media portal regarding energy savings could be a tool for the Energy Saving Department so as to interact with the citizens. The aim is to inform inhabitants about the municipality's actions and events related to the SECAP implementation, new measures for energy savings as well as funding sources. Moreover the social media will host a discussion forum where they could exchange their opinions, find out solutions to their questions and keep in touch with the Energy Saving Department's staff. No direct energy savings have been allocated to this action, but it is considered to be a significant contribution in encouraging citizens to adopt the "green" practices and as a major tool in the promotion of all related awareness raising activities by the municipality. This website can be a dedicated site linked to the municipal one, or be integrated within it.

Table 24: Action 1.7 in numbers

Web portal creation	
Duration	2020
Total Implementation Cost (EURO)	830
Funding Source	Own funds

3.3 Municipal Public Lighting

The municipal public lighting includes street lighting and public areas' lighting. It is estimated that with the appropriate upgrades of this system there will be significant energy savings and respective emission reductions.

An overview of this sector's actions is presented in table 25 below, while a detailed analysis with calculations for each action follows in the next paragraphs.

Table 25: Actions in Municipal Public Lighting

Action No.	Action	Emission Reductions (tn CO_2)
2.1	Street lighting upgrade	46.0
2.2	Astronomical timers	21.3
	Total	**67.4**

3.3.1 Street lighting upgrade

Various types of lamps are used for street lighting, more specifically the High Pressure Sodium. The Municipality wants to replace all of the existing lamps (with LEDs which are more efficient and provide great luminosity quality. This action will ensure great monetary savings for Jdaidet Al-Chouf and significant reduction in electricity consumption.

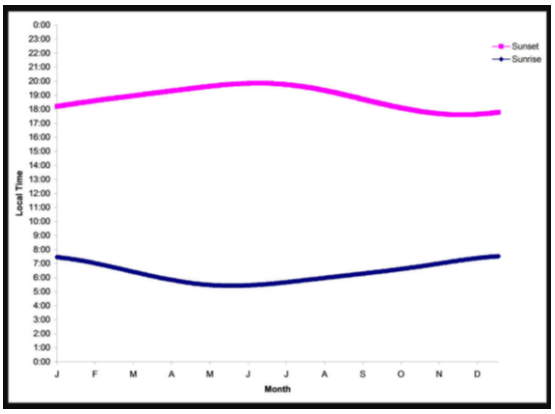
The key data on the action is presented in the below table.

Table 26: Action 2.1 in numbers

Street lighting upgrade	
Duration	2019 – 2025
Total Implementation Cost (EURO)	10375
Annual Energy Savings (MWh)	68.4
Annual Emission Reduction (tn CO_2)	46
Funding Source	Own and Sida fund
Net Present Value (NPV)	>0

3.3.2 Astronomical timers

The operation of street lighting is controlled by photocells. These devices could be replaced with astronomical timers which are more accurate and precise compared to photocells. This action will reduce the electricity consumption by 15%, as explained in the following figure which shows the sunrise and sunset timing where the photocell acts little before/after timing and counts for loss of around 365 hours of operation per year.



Source: http://file.scirp.org/Html/4-6401175_24420.htm

Figure 30: Timing for sunset and sunrise in Lebanon

The astronomical timers' use would also help in precise timing for switching and programming the actual operation after 20 min of sun set and almost 30 min before sun rise which is an acceptable trimming as light will be still there.

Key data on the investment are presented in the table below.

Table 27: Action 2.2 in numbers

Astronomical timers	
Duration	2026-2027
Total Implementation Cost (EURO)	830
Annual Energy Savings (MWh)	34.4
Annual Emission Reduction (tn CO_2)	32.6
Funding Source	Own funds

Net Present Value (NPV)	>>0

3.4 Residential Buildings

This sector includes the energy consumption of all the private residents regarding the activities in each household (lighting, heating, use of electric appliances etc.). This consumption constitutes 47.69% of the total consumption with 51.31% contribution to the CO_2 emissions.

The initial actions are informational and they will be realized by Jdaidet Al-Chouf Municipality. Since the Municipality does not have the possibility of direct interventions in terms of projects' realization, a series of actions will be planned aiming at encouraging the inhabitants to take the proposed measures in order to reduce their energy consumption and carbon emissions.

An overview of this sector's planned actions is presented in the next table.

Table 28: Actions in Residential Buildings

Action No.	Action	Emission Reductions (tn CO_2)
3.1	Awareness raising activities for the community about (RE &EE)	1,107.7
3.2	Promotion of Green Buildings' concept	2,880.0
3.3	Campaign for promoting and replacing high energy label equipment	3,024.0
3.4	3.6 MW Photovoltaics in residential rooftops	2,658.5
3.5	Replacing existing electric water heater with solar collectors	1,218.5
3.6	Replacement of old diesel space heater with more efficient	4,837.0
3.7	Use the insulation on rooftops	184.6
3.8	Replacement of single glazing with double	738.5
3.9	Initiatives to support the citizens' actions (EE and RE)	369.2
3.10	Awareness raising activities for the Residents' Associations and NGOs	1,476.9
	Total	**18,494.9**

3.4.1 Awareness raising activities for activities for the community about (RE &EE)

The initial step is that the municipality should organize frequently within the 2030 horizon, awareness raising campaigns for the residents of Jdaidet Al-Chouf. Citizens' engagement is of utmost importance since almost the 48% of the total energy consumption is due to the

residential sector. The aim is to enhance the environmental consciousness of the citizens through the following activities:

- Organization of "Energy days", in line with its participation in the Covenant of Mayors initiative. In these energy days the importance of energy saving and protecting the environment will be stressed, through simple actions such as modification of the energy behavior, changing incandescent lamps with fluorescent or LED lamps, importance of purchasing high energy class appliances, installation of solar panels for water heating in existing buildings etc.
- Projection of freely available environmental documentaries.
- Participation in "Earth hour" event by WWF, where people across the world turn their lights off for one hour on a designated day.

Related calculations on the action in terms of initial cost and emission savings are presented in Table 29 below. As an awareness raising activity, it is considered that the action is exponentially beneficial to the municipality against the related costs.

Table 29: Action 3.1 in numbers

Awareness raising activities for activities for the community about (RE &EE)	
Duration	2020 – 2030
Total Implementation Cost (EURO)	1107
Annual Energy Savings (MWh)	2,567.9
Annual Emission Reduction (tn CO_2)	1,107.7
Funding Source	Own funds, external funds
Net Present Value (NPV)	>>0

3.4.2 Promotion of Green Buildings' concept

The lack of mandatory application of the Energy Efficient Building Code in Lebanon is one of the key issues behind the moderate energy behavior of buildings in the country. This action is focusing new and old buildings.

The promotion of specific elements of the green buildings' concept that can be applied in around 10% of the buildings to be constructed. This 10% penetration level has been considered an average rate with which citizens adopt such types of measures, following the intensive awareness raising activities to be realized by Jdaidet Al-Chouf Municipality. Also, the Municipality will proceed in consultations with the building constructors and try to establish voluntary agreements with them in order that they apply some minimum energy efficiency standards in the new constructions, to be commonly agreed. Customized sets of potential interventions and actions will be suggested to the citizens through info days and awareness activities in the local media (local newspapers, TV and radio), as well as distribution of dissemination material (flyers, brochures etc.), in line with the action described above. These interventions will be mainly focusing on the need to install shadings in the southern glazing and roof insulation. Low cost efficient technologies will be promoted as well, such as the use of energy efficient lamps (e.g. LEDs). The green municipal building

will serve as a demonstration basis of these technologies and the existing potential for energy and cost reductions.

Related calculations on the action in terms of initial cost and emission savings are presented in the table below. As an awareness raising activity, it is considered that the action is exponentially beneficial to the municipality against the related costs.

Table 30: Action 3.2 in numbers

Promotion of Green Buildings' concept	
Duration	2020 – 2030
Total Implementation Cost (EURO)	24900
Private and Citizen Funds Mobilized (EURO)	763,600
Annual Energy Savings (MWh)	6,676.6
Annual Emission Reduction (tn CO_2)	2,880.0
Funding Source	Own funds, Governmental funds, Private funds
Net Present Value (NPV)	<<0

3.4.3 Campaign for promoting high energy label equipment

Another important activity the municipality should organize is the campaign for promoting among the residents the purchase and use of high-energy label equipment. The old equipment (refrigerators, stoves, vacuum cleaners etc.) consumes greater amounts of energy compared to new, more technologically advanced. The aim is to inform the residents about the benefits of goods with a reduced environmental impact throughout their life cycle, emphasizing also on the monetary benefits for the users themselves, since when selecting energy efficient products this leads in less energy consumption as well. As presented in the previous sections, dedicated awareness raising activities should also take place in order to disseminate the advantages of purchasing such electrical appliances. Indicative awareness raising campaigns include brief spots on the local TV and radio, posters, info days etc.

Key data on the action and its expected impact is presented in the table below.

Table 31: Action 3.3 in numbers

Campaign for promoting high energy label equipment	
Duration	2020 – 2027
Total Implementation Cost (EURO)	14,525
Private and Citizen Funds Mobilized (EURO)	381800
Annual Energy Savings (MWh)	7,010.5
Annual Emission Reduction (tn CO_2)	3,024.0
Funding Source	Own funds, external, Private and residential funds
Net Present Value (NPV)	>0

3.4.4 3.6 MW Photovoltaics in residential rooftops

As mentioned before, the solar energy potential is very high in the region. The households have the opportunity to install PV panels in the buildings' rooftops in order to substitute a part of the current electricity consumption with "green" energy from Renewable Energy Sources. Overall, 3.6 MW of PV panels respectively are expected to be installed within the 2030 horizon. In that way, and since electricity from solar energy has zero emission factor, the CO_2 emissions will be reduced. The municipality will conduct activates for the communities to ensure installing these target such as awareness activates on PV technology, Tax exemptions and others.

Key data on the action are presented in the table below.

Table 32: Action 3.4 in numbers

3.6 MW Photovoltaics in residential rooftops	
Duration	2020 – 2030
Private and Citizen Funds Mobilized (EURO)	10,126,000
Total Implementation Cost (EURO)	16,600
Annual Energy Production (MWh)	6372.1
Annual Emission Reduction (tn CO_2)	2658.5
Funding Source	Private funds, Loans
Net Present Value (NPV)	>>0

3.4.5 Replacing existing electric water heater with solar collectors

A standard permanent need in every household is the use of hot water for personal hygiene and house chores. Subsequently, currently a significant share of electricity consumption is consumed for this activity. At the same time, although the use of solar water heaters in the country is quite extensive, it is considered that it could be further strengthened in the future. In order to mitigate the emissions derived from this activity's electricity consumption the solution is to exploit the solar energy potential replacing the electric water heaters with solar water heaters.

A penetration level of the SWH in 50% respectively of the existing households currently using an electric water heater is envisaged, considering that Jdaidet Al-Chouf will work towards this direction with its citizens through awareness raising activities and dedicated events.

Table 33: Action 3.5 in numbers

Replacing Existing Electric Water Heaters with Solar Collectors	
Duration	2020 – 2030
Private and Citizen Funds Mobilized (EURO)	1,245,000
Total Implementation Cost (EURO)	14,525
Annual Energy Production (MWh)	2,824.7
Annual Emission Reduction (tn CO_2)	1,218.5
Funding Source	<Private funds

Net Present Value (NPV)	>>0

3.4.6 Using efficient diesel space heaters instead of traditional

Currently, the use of diesel space heaters in the residential sector is relatively limited. The use of diesel space heaters is suggested, since it can lead in energy and monetary savings on one hand. Their cost is approximately higher from the conventional ones, but they have long life expectancy and a quite positive cost benefit ratio.

There are two scenarios envisaged for this action, focusing on diesel space heaters in buildings. Under the 1st scenario, it is expected that through the awareness raising activities citizens will be encouraged to implement measures like this with a penetration level of 20%, thus contributing to the energy savings and CO_2 reduction in the region.

Under the 2nd scenario, it is considered that Jdaidet Al-Chouf will take upon legislative action to ban the use of traditional and old diesel space heaters in the area. Thus, the penetration level for high efficient diesel space heaters has been considered 50%.

Key data on the action are presented in the next table.

Table 34: Action 3.6 in numbers

Using efficient diesel space heaters instead of traditional	
Duration	2020 – 2030
Private and Citizen Funds Mobilized (EURO)	996,000
Total Implementation Cost (EURO)	20,750
Annual Energy Savings (MWh)	11,213.4
Annual Emission Reduction (tn CO_2)	4,837.0
Funding Source	Private funds
Net Present Value (NPV)	>0

3.4.7 Replacement of single glazing with double

The climate in the region evokes the intense use of windows with double glass in buildings and as a result a quite big percentage of electricity consumption is due to this need. In order to cut down the energy consumption the replacement of the existing single glass with double glass is suggested. Since double glass windows can reduce a significant part of the household's energy bill, it is considered that within the 2030 horizon and following intensive awareness raising activities by the Municipality, the residents who are going to install/replace an double glass. An overall penetration level of 10% of the action in existing households is assumed.

Related calculations on the action in terms of initial cost and emission savings are presented in the table below.

Table 35: Action 3.7 in numbers

Replacement of single glazing with double	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	429525

Total Implementation cost (EURO)	14,525
Annual Energy Savings (MWh)	1,712.0
Annual Emission Reduction (tn CO_2)	738.5
Funding Source	Private funds
Net Present Value (NPV)	>0

3.4.8 Use the insulation on rooftops

As mentioned above, the share of electricity consumption by heating systems in residences is very high due to the region's cold climate. Another measure to partially curtail the energy consumption for heating, besides the previous one, is the use of insulting bricks on rooftops in order to reflect a higher percentage of the insulation, thus maintaining the inner temperature at higher levels. Use of insulting bricks and/or materials is a technology easily applied on the building. The energy savings from such an action are usually allocated in the top building floor and reach 5% of the energy consumption for heating purposes. The penetration level of this action in existing buildings is considered to be 10%. The Municipality's role once again is to communicate to the citizens the benefits of this action, also utilizing the demonstrative projects and other awareness activities to be conducted.

Related calculations on the action in terms of initial cost and emission savings are presented in the table below. Additional financial benefits (tax deductions, small grants etc.) towards the citizens realizing an energy efficiency investment with a negative NPV at the local or national level could be considered, in order to motivate them.

Table 36: Action 3.8 in numbers

Use the insulation on rooftops	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	1556250
Total Implementation cost (EURO)	14525
Annual Energy Savings (MWh)	428.0
Annual Emission Reduction (tn CO_2)	184.6
Funding Source	Private funds
Net Present Value (NPV)	<<0

3.4.9 Initiative to support Citizens' actions on RE&EE

A supplementary action with limited but not negligible savings by support initiatives to use RE and EE technologies for local community. Support installing RE technologies and use of Energy efficient equipment will contribute in the reducing the energy consumption and GHG emissions

Related calculations on the action in terms of initial cost and emission savings are presented in the table below. Additional financial benefits (tax deductions, small grants etc.) towards the citizens realizing an energy efficiency investment with a negative NPV at the local or national level could be considered, in order to motivate them.

Table 37: Action 3.9 in numbers

Initiative to support Citizens' actions on RE&EE	
Duration	2020 – 2030
Total Implementation cost (EURO)	66,400
Annual Energy Savings (MWh)	856.0
Annual Emission Reduction (tn CO_2)	369.2
Funding Source	External funds
Net Present Value (NPV)	<<0

3.4.10 Awareness raising activities for the Residents' Associations and NGOs

The initial step is that the municipality should organize frequently within the 2030 horizon, awareness raising campaigns for the residents' associations and NGOs in Jdaidet Al-Chouf. Citizens' engagement is of utmost importance since almost the 48% of the total energy consumption is due to the residential sector. The aim is to enhance the environmental consciousness of the citizens through the following activities:

- Organization of "Energy days", in line with its participation in the Covenant of Mayors initiative. In these energy days the importance of energy saving and protecting the environment will be stressed, through simple actions such as modification of the energy behavior, changing incandescent lamps with fluorescent or LED lamps, importance of purchasing high energy class appliances, installation of solar panels for water heating in existing buildings etc.
- Organizing training days for the NGOs and Residents' Associations about the RE&EE technologies.

Table 38: Action 3-10 numbers

Awareness raising activities for the Residents' Associations and NGOs	
Duration	2020 – 2030
Total Implementation Cost (EURO)	8,300
Annual Energy Savings (MWh)	3423.9
Annual Emission Reduction (tn CO_2)	1476.9
Funding Source	External funds
Net Present Value (NPV)	<<0

3.5 Tertiary Sector

This sector includes the energy consumption of commercial buildings, stores, offices, companies, schools, Water management facilities etc. regarding the activities in each one (lighting, heating, use of electric appliances etc.). This consumption constitutes the 45.63% of the total consumption, with 41.72% contribution to the CO_2 emissions.

The initial actions are informational and they will be realized by Jdaidet Al-Chouf Municipality. Municipality does not have the possibility of direct interventions in terms of projects' realization, thus a series of actions will be planned aiming at encourage building

managers/owners to take the proposed measures in order to reduce their energy consumption and carbon emissions.

An overview of this sector's planned actions is presented in the next table.

Table 39: Actions in Tertiary Sector Buildings

Action No.	Action	Emission Reductions (tn CO_2)
4.1	Promotion of using insulation for buildings	2,105.6
4.2	Photovoltaics on rooftops	1,504.0
4.3	Replacement of existing lamps with LEDs	240.6
4.4	Replacement of single glazing with double	601.6
4.5	Replacement of existing air conditioners with more efficient ones	60.2
4.6	Installation of lighting motion sensors	30.1
4.7	Awareness raising activities about EE	718.0
4.8	use of Solar Water Heaters	60.2
4.9	PV for WWTP	117.8
4.10	PV for water pumping station	25.4
4.11	The 100% commitment campaign for schools for PV	16.2
4.12	Upgrade water facilities	60.2
4.13	use the effeciant diesel space heater instead of traditional	3,008.1
	Total	8,548.1

3.5.1Campaign to promote of using insulation for buildings

This campaign's aspiration is to establish environmental consciousness through the voluntary commitment of its citizens. It is designed in the form of a promotional campaign to increase the sense of responsibility towards the environment and the community among the citizens, while at the same time it will offer visibility benefits to those participating. The campaign will focus on the importance of using the insulation on the wools and rooftops.

Related calculations on the action in terms of initial cost and emission savings are presented in the table below. As an awareness raising activity, it is considered that the action is exponentially beneficial to the municipality against the related costs.

Table 40: Action 4.1 in numbers

The 10% voluntary campaign for energy reduction in tertiary buildings	
Duration	2020 - 2027
Total Implementation Cost (EURO)	14525
Share of private sector (EURO)	145250
Annual Energy Savings (MWh)	5,869.9

Annual Emission Reduction (tn CO_2)	2,105.6
Funding Source	Own funds & external funds

3.5.2 2.4 MWp Photovoltaics in rooftops

The solar energy potential for the country and Jdaidet Al-Chouf region is very high thus businesses will be encouraged to exploit this opportunity and install PVs in order to curtail a part of their electricity consumption. The utilization of rooftops is proposed for the installation of a total capacity of 2.4 MW of PVs. The produced electricity from Renewable Energy Sources like sun has zero emission factor. Consequently the substitution of electricity production source with alternative ones will contribute to the CO_2 reduction.

Table 41: Action 4.2 in numbers

Photovoltaics in rooftops 2.4 MWp	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	3311700
Total Implementation Cost (EURO)	20750
Annual Energy Production (MWh)	4,200
Annual Emission Reduction (tn CO_2)	1,504.0
Funding Source	Private funds
Net Present Value (NPV)	>>0

3.5.3 Replacement of existing lamps with LEDs

Another important activity the municipality should organize is a campaign for Replacement of sodium and lamps with LEDs. The old electrical lamps consume significant energy amounts compared to newer LED lamps available. The aim is to inform business owners/managers about the benefits of goods with a reduced environmental impact throughout their life cycle. As mentioned above, awareness raising activities should also take place in order to disseminate the advantages of purchasing LED lamps.

Table 42: Action 4.3 in numbers

Replacement of existing lamps with LEDs	
Duration	2020 - 2027
Total Implementation Cost (EURO)	14525
Private Funds Mobilized (EURO)	134460
Annual Energy Savings (MWh)	670.8
Annual Emission Reduction (tn CO_2)	240.6
Funding Source	Own, and Private funds
Net Present Value (NPV)	>0

3.5.4 Replacement of single glazing with double

Similarly to the respective action in the residential sector, there envisaged action, focusing on installing double glass windows rather than single glass in tertiary buildings. It is expected

that through the awareness raising activities business owners and building managers will be encouraged to implement measures like this with a penetration level of 10%, thus contributing to the energy savings and CO_2 reduction in the region.

Key data on the action are provided in the below table.

Table 43: Action 4.4 in numbers

Replacement of single glazing with double	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	104,580
Total Implementing cost (EURO)	20750
Annual Energy Savings (MWh)	1,677.1
Annual Emission Reduction (tn CO_2)	601.6
Funding Source	Private funds
Net Present Value (NPV)	>0

3.5.5 Replacement of existing air conditioners with more efficient ones

The climate in the region of Jdaidet Al-Chouf evokes the intense use of A/Cs systems in buildings and as a result, a very big percentage of electricity consumption especially in the tertiary sector is required in order to cover this need. In order to cut down the energy consumption, the replacement of the existing A/Cs with units of higher energy class until the 2030 horizon is suggested. This action leads to significant energy savings and CO_2 reduction. An overall penetration level of 25% of the action in existing tertiary sector businesses is assumed. Key data on the action are provided in the table below. The negative NPV for the replacement of an operational appliance means that this action is not viable. However, in case the appliance has to be replaced due to operational failure etc., and only the additional cost of a highly efficient unit against a conventional one is considered, then the NPV for the additional cost realized against the envisaged savings is positive.

Table 44: Action 4.5 in numbers

Replacement of existing air conditioners with more efficient ones	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	89640
Total Implementation cost (EURO)	12450
Annual Energy Savings (MWh)	167.7
Annual Emission Reduction (tn CO_2)	60.2
Funding Source	Private funds
Net Present Value (NPV)	<0

3.5.6 Installation of lighting Motion sensors

Light and heat automations are one of the most cost effective and simple options for the proper control and reduction of the energy related costs in the tertiary sector, as it is a very usual phenomenon for the users to leave cooling equipment/lights etc. turned on upon their

departure, or adjust the thermostat in improper temperatures, resulting in unnecessary consumptions. A solution to this is the installation of automations such thermostats, timers, movement sensors etc. In this way, the occupants are being monitored and consumptions outside the normal office working hours are being avoided. Since automations are considered a value for money investment, it has been assumed that the penetration of the action within the 2030 horizon will reach 25%.

Key data on the action are provided in the table below.

Table 45: Action 4.6 in numbers

Installation of lighting Motion sensors	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	2075
Annual Energy Savings (MWh)	83.9
Annual Emission Reduction (tn CO_2)	30.1
Funding Source	Private funds
Net Present Value (NPV)	>0

3.5.7 Awareness raising activities about EE

Lifelong learning activities are a key for the continuous evolvement of citizens and the society. Based on this fact, and taking into consideration the contribution of the tertiary sector on the municipality's carbon footprint, the municipality intends to organize a series of seminars to targeted professional groups in order to promote the concept of energy management and energy saving practices and provide advice on ways to improve the energy efficiency of the related buildings and facilities at low cost.

Jdaidet Al-Chouf is orientated towards the realization of a series of seminar rounds, where in each seminar a different group of interested stakeholders will participate. These seminars will be differentiated depending on the type of the group of stakeholders being represented, so different solutions will be suggested for small buildings/ shops/ companies, and alternative options will be provided for medium or large size ones.

Since key energy consumers in buildings of the tertiary sector are mainly HVAC and lighting, which consumption is highly determined by the energy behavior of the buildings' and facilities' users, suggested technical solutions per group of stakeholders may include simple modification of the users' energy behavior, installation of automations and thermostats, use of insulating bricks, replacement of lamps with LEDs etc.

An overall reach out level of 15% is considered for the above mentioned activities. Key data on the action is provided in the following table.

Table 46: Action 4.7 in numbers

Awareness raising activities about EE	
Duration	2020 - 2025
Total Implementation Cost (EURO)	10375
Annual Energy Savings (MWh)	4192.8

Annual Emission Reduction (tn CO_2)	718.0
Funding Source	Own funds, external funds

3.5.8 Using of Solar Water Heaters

Several businesses activated in the tertiary sector, such as schools and hotels, utilize extensively water heating for covering theirs and their customers' needs. Since the penetration of SWH in the sector in the baseline year was negligible, there is a significant potential for electricity savings through the adoption of SWH.

Key data on the action are presented in the following table.

Table 47: Action 4.8 in numbers

Using of Solar Water Heaters	
Duration	2020 - 2025
Private Funds Mobilized (EURO)	717120
Total Implementation cost (EURO)	20750
Annual Energy Production (MWh)	167.7
Annual Emission Reduction (tn CO_2)	60.2
Funding Source	Own and External
Net Present Value (NPV)	>0

3.5.9 Installing PV for WWTP

The solar energy potential for the country and Jdaidet Al-Chouf region is very high thus businesses will be encouraged to exploit this opportunity and install PVs in order to curtail a part of their electricity consumption. Installing of a PV system with total capacity of 100 kW for the WWTP. The produced electricity from Renewable Energy Sources like sun has zero emission factor. Consequently, the substitution of electricity production source with alternative ones will contribute to the CO2 reduction.

Table 48: Action 4.9 in numbers

Installing PV for WWTP	
Duration	2019
Private Funds Mobilized (EURO)	365200
Annual Energy Savings (MWh)	175
Annual Emission Reduction (tn CO_2)	117.8
Funding Source	Private funds
Net Present Value (NPV)	>0

3.5.10 Installing PV for Water Pumping Facility

The solar energy potential for the country and Jdaidet Al-Chouf region is very high thus businesses will be encouraged to exploit this opportunity and install PVs in order to curtail a part of their electricity consumption. Installing of a PV system with total capacity of 40 kW for the water pumping facility. The produced electricity from Renewable Energy Sources like sun has zero emission factor. Consequently the substitution of electricity production source with alternative ones will contribute to the CO2 reduction.

Table 49: Action 4.10 in numbers

Installing PV for Water Pumping Facility	
Duration	2019
Private Funds Mobilized (EURO)	166000
Annual Energy Savings (MWh)	70
Annual Emission Reduction (tn CO_2)	25.4
Funding Source	Private funds
Net Present Value (NPV)	>0

3.5.11 The 100% commitment campaign for schools for installing PV

The solar energy potential for the country and Jdaidet Al-Chouf region is very high thus businesses will be encouraged to exploit this opportunity and install PVs in order to curtail a part of their electricity consumption. Installing of a PV system with total capacity of 40 kW for the water pumping facility. The produced electricity from Renewable Energy Sources like sun has zero emission factor. Consequently the substitution of electricity production source with alternative ones will contribute to the CO2 reduction.

Table 50: Action 4.11 in numbers

The 100% commitment campaign for schools for installing PV	
Duration	2020-2030
Private Funds Mobilized (EURO)	99600
Annual Energy Savings (MWh)	24.4
Annual Emission Reduction (tn CO_2)	16.4
Funding Source	Private funds
Net Present Value (NPV)	>0

3.5.12 EE Measures for WWTP

The wastewater treatment plants for Jdaidet Al-Chouf needs to be upgraded and use energy efficient equipment to fulfill the requirements to treat the wastewater from Jdaidet Al-Chouf municipality.

Key data on the action are provided in the table below.

Table 51: Action 4.12 in numbers

Upgrade water facilities

Duration	2024
Total Implementation Cost (EURO)	124500
Annual Energy Savings (MWh)	419.3
Annual Emission Reduction (tn CO_2)	60.2
Funding Source	External Funds
Net Present Value (NPV)	>0

3.5.13 Use the efficient diesel space heater instead of traditional

Currently, the use of diesel space heaters in the tertiary sector is relatively limited. The use of diesel space heaters is suggested, since it can lead in energy and monetary savings on one hand. Their cost is approximately higher from the conventional ones, but they have long life expectancy and a quite positive cost benefit ratio.

Key data on the action are presented in the next table

Table 52: Action 4.13 in numbers

Use the efficient diesel space heater instead of traditional	
Duration	2020 - 2030
Private Funds Mobilized (EURO)	74700
Total Implementation cost (EURO)	12450
Annual Energy Savings (MWh)	8385.6
Annual Emission Reduction (tn CO_2)	3,008.1
Funding Source	Private funds
Net Present Value (NPV)	>0

3.6 Transport

The share of the Transportation sector, including the municipal fleet, private and commercial transport and public transport is 6.53% out of the total energy consumption in Jdaidet Al-Chouf Municipality, with 4.17% contribution in CO_2 emissions. The proposed actions are presented in the next table and a more detailed analysis for each one is following.

Table 53: Actions in Transport

Action No.	**Action**	**Emission Reductions (tn CO_2)**
5.1	Replacement of old municipal gasoline car with new efficient car	24.0
5.2	Municipal fleet maintenance	9.0
5.3	Eco-driving seminar for the municipal fleet drivers	2.7
5.4	Information events on the new vehicle technologies- Replacement of diesel vehicles with new more efficient	48.0
5.5	Traffic congestion reduction through the adoption of different timing of activities	15.0

5.6	Promotion of walking and car sharing and carpooling campaigns	120.1
5.7	Improvement / development of parking infrastructure	30.0
5.8	promotion of using schools buses rather than private cars	15.0
5.9	awareness campaign for preventive maintenance for cars	15.0
5.10	Eco-driving for puplic transportation	90.1
5.11	Cycling promotion and creation of related infrastructure	75.1
Total		**444.1**

3.6.1 Replacement of old municipal gasoline car with new efficient car

Municipal fleet consists of 2 cars of which 1 four wheels car and 1 car dedicated to transfer dead bodies are considered old (more than 10 years). The four wheels consume more Gasoline since their engine is old and of low efficiency and consequently they need to be replaced with new ones. This is a way to contribute to fuels savings and CO_2 reduction.

This action constitutes a priority for the municipality, and for this reason is developed in detail in the project fiche “Replacing the old Municipal diesel vehicles with new efficient vehicles”.

Table 54: Action 5.1 in numbers

Replacement of old municipal diesel vehicles with new efficient vehicles	
Duration	2022
Total Implementation Cost (EURO)	4150
Annual Energy Savings (MWh)	96.0
Annual Emission Reduction (tn CO_2)	24.0
Funding Source	Grant
Net Present Value (NPV)	<0

3.6.2 Municipal fleet maintenance

Regular and proper maintenance of the municipal fleet can yield significant energy savings, ensure the proper operation of the vehicles and prevent costly damages. The vehicles are already maintained but the target of this action is to create a plan so as to realize the maintenance in a better organized manner, giving priority to those that are in more frequent use, while ensuring that all related service works are conducted on time. Moreover these measures proposed to be implemented during the forthcoming years as well, for every new acquisition. Therefore, this action is focused on the existing fleet, as well as any new vehicles to be purchased.

Table 55: Action 5.2 in numbers

Municipal fleet maintenance (for the existing & the new ones)	
Duration	2020 - 2030
Total Implementation Cost (EURO)	4150
Annual Energy Savings (MWh)	36.0

Annual Emission Reduction (tn CO_2)	9.0
Funding Source	Own funds
Net Present Value (NPV)	>0

3.6.3 Eco-driving seminars for the municipal fleet drivers

Eco-driving comprises a set of actions, something like "behavioral changes", regarding the way someone drives. The adoption of these principles by the municipal fleet's drivers is considered a good way to decrease the fuel consumption. The effectiveness depends upon the seminars and trainings Municipality will organize, as well as their repeatability to ensure that every single driver will understand the tips and implement the advices.

Related calculations on the action in terms of initial cost and emission savings are presented in next table. As an awareness raising activity, it is considered that the action is exponentially beneficial to the municipality against the related costs.

Table 56: Action 5.3 in numbers

Eco-driving seminar for the drivers of the municipal fleet	
Duration	2021
Total Implementation Cost (EURO)	2075
Annual Energy Savings (MWh)	10.8
Annual Emission Reduction (tn CO_2)	2.7
Funding Source	Own funds
Net Present Value (NPV)	>>0

3.6.4 Information events on the new vehicle technologies

Private and commercial vehicles have the larger share in energy consumption between the other transports. It is proposed that the Municipality will organize awareness raising activities in order to inform the citizens about new technology's cars and the double fuel cars followed by their economic and environmental benefits. The next step will be citizens purchasing these cars instead of conventional ones, for instance replacing gasoline cars with new efficient or diesel vehicles with more efficient ones.

Table 57: Action 5.4 in numbers

Information events on the new vehicle technologies	
Duration	2021 – 2025
Total Implementation Cost (EURO)	8300
Private Funds Mobilized (EURO)	3759900
Annual Energy Savings (MWh)	192.1
Annual Emission Reduction (tn CO_2)	48.0
Funding Source	Own and external , Private funds
Net Present Value (NPV)	>0

3.6.5 Traffic congestion reduction through the adoption of different timing of activities

Traffic congestion is a problem within Jdaidet Al-Chouf Municipality. Therefore, in order to decrease the time and fuel spent by the drivers in their attempt to arrange the public activities in different time. More specifically, the plan is to adopt the activities in different times to reduce the traffic especially in the center.

Table 58: Action 5.5 in numbers

Traffic congestion reduction through the adoption of different timing of activities	
Duration	2024 - 2027
Total Implementation Cost (EURO)	0
Annual Energy Savings (MWh)	60
Annual Emission Reduction (tn CO_2)	15.0

3.6.6 Promotion of walking and car sharing and carpooling campaigns

This action is focused on a different series of activities that will promote walking across the municipality. Such activities include:

- Installation of walking signs throughout the city, informing the citizen on the distance and time required to reach the municipality's key sites. Optionally, the signs could also include info on the calories required to cross such a distance.
- Improvement of the pavements and making them friendlier for walking. This can be achieved with better maintenance (replacement of damaged or broken flagstone tiles), enlargement of the pavement where considered feasible or even planting of trees and flowers.
- Creation of pedestrian roads, especially in the commercial zone, or close to low circulation roads.
- Renovation of parks or other public areas (squares etc) which will offer shade and resting spots, making them more attractive to the citizens.
- Large scale awareness campaign on walking, presenting the benefits for the health and the environment.

The cost of the proposed actions is significant high and there will be need for funding, since it constitutes an infrastructure action. However it will contribute to the enhancement of living conditions. Additional indirect benefits should be considered for the project's profitability such as attraction of residents and tourists to the municipality and improvement of quality of life. Therefore, it is considered necessary for the city, even though it brings no economic profit directly to the municipal authorities. For more convenience, a mobile application could also be developed.

In other cases, where the distances are larger, for instance the commutes, it would be a great alternative way for people working together (or in nearby buildings) to arrange driving to work in groups, using one car. Here, it might be useful the municipal website which can serve to let people with same transport habits to communicate and organize their trips.

Table 59: Action 5.6 in numbers

Promotion of walking and car sharing and carpooling campaigns

Duration	2018 - 2025
Total Implementation Cost (EURO)	8300
Annual Energy Savings (MWh)	480.2
Annual Emission Reduction (tn CO_2)	120.1
Funding Source	external funds

3.6.7 Improvement / development of parking infrastructure

Traffic congestion is a problem within Jdaidet Al-Chouf Municipality. Therefore, in order to decrease the time and fuel spent by the drivers in their attempt to find a parking space, the Municipality intends to improve/extend the existing parking infrastructure and develop new ones where required. More specifically, the plan is to develop large parking lots in the outskirts of the center, and have municipal shuttles to the center and the industrial center.

Table 60: Action 5.7 in numbers

Improvement / development of parking infrastructure	
Duration	2024 - 2027
Total Implementation Cost (EURO)	290500
Annual Energy Savings (MWh)	120.1
Annual Emission Reduction (tn CO_2)	30.0
Funding Source	Own and external funds

3.6.8 Promotion of using schools buses rather than private cars

The principles of support using school's buses are a measure which can lead in significant decrease of fuel consumption. The role of the municipality here is to organize awareness raising activities and regular trainings for the citizens to be aware for its environmental and economic benefits.

Table 61: Action 5.8 in numbers

promotion of using schools buses rather than private cars	
Duration	2020-2026
Total Implementation Cost (USD)	12450
Annual Energy Savings (MWh)	60
Annual Emission Reduction (tn CO_2)	15.0
Funding Source	Own and external funds

3.6.9 Awareness campaign for preventive maintenance for cars

Private and commercial vehicles have the larger share in energy consumption between the other transports. It is proposed that the Municipality will organize awareness raising activities in order to inform the citizens about preventive maintenance for cars and vehicles followed by their economic and environmental benefits. The next step will be citizens conduct preventive maintenance for their cars.

Table 62: Action 5.9 in numbers

Awareness campaign for preventive maintenance for cars	
Duration	2021 – 2026
Total Implementation Cost (EURO)	10375
Annual Energy Savings (MWh)	60
Annual Emission Reduction (tn CO_2)	15.0
Funding Source	Own and external
Net Present Value (NPV)	>0

3.6.10 Promotion of eco-driving for public transport's drivers

Focusing now on the Public and private Transportation sector, the first proposed action is the promotion of eco driving. Similarly with the two previous sectors, public and private transport's drivers may be encouraged to adapt eco-driving principles in order to reduce fuel consumption and CO_2 emissions from the public and private fleet. This can be achieved through raising awareness activities and trainings realized by the municipality.

Table 63: Action 5.10 in numbers

Promotion of eco-driving for public and Private transport's drivers	
Duration	2022 – 2028
Total Implementation Cost (EURO)	2490
Annual Energy Savings (MWh)	360.2
Annual Emission Reduction (tn CO_2)	90.1
Funding Source	Own and external funds

3.6.11 Cycling promotion and creation of related infrastructure

Jdaidet Al-Chouf Municipality will install the required infrastructure for cycling, in order to promote as much as possible new transportation approach that are reducing the energy consumption for transportation.

This action has no cost for the municipality and is expected to contribute significantly in its carbon footprint's reduction.

Table 64: Action 5.11 in numbers

Cycling promotion and creation of related infrastructure	
Duration	2025-2027
Total Implementation Cost (EURO)	581000
Annual Energy Savings (MWh)	300.1
Annual Emission Reduction (tn CO_2)	75.1
Funding Source	Private funds
Net Present Value (NPV)	>0

3.7 Local Renewable Energy Production

Besides the above mentioned small scale RES projects by private investors and Jdaidet Al-Chouf Municipality, there are also plans for a big scale Renewable Energy Project which will significantly contribute to the region's CO_2 reduction. More specifically a PV Farm of 0.3MW is planned to be installed in Jdaidet Al-Chouf Municipality.

In the next table figures about the respective electricity production and CO_2 reduction are presented.

Table 65: Action 6.1

	Electricity Production (MWh)	Emission Reduction (tn CO_2)
PV Farm 0.3 MW (planned)	525	353.3

3.8 Waste Management

Waste management sector contribute ingenerating the CO_2 emission in the total CO_2 emissions in the municipality. The share of the waste generation sector, including the all types of waste is 2.56% contribution in CO_2 emissions.

3.8.1 Awareness raising campaigns to reduce the amounts of discarded food

The awareness activities will target all the sectors of in the Municipality; tertiary, commercial residential and municipal employees. The awareness aims at reducing the generation of the organic content in the solid waste by 20% through the horizon of 2030.

This action has no cost for the municipality and is expected to contribute significantly in its carbon footprint's reduction.

Table 66: Action 7.1 in numbers

Awareness raising campaigns to reduce the amounts of discarded food	
Duration	2020-2027
Total Implementation Cost (USD)	24,000
Annual Emission Reduction (tn CO_2)	60.9
Funding Source	Private funds
Net Present Value (NPV)	<0

3.9 Agriculture Sector

3.9.1 Planting forest trees w Planting Forest Trees

Planting forest trees will contribute in reducing the GHG through absorbing the CO2 emission. The forest trees absorb the co2 through the photosynthesis. The municipality will plant forest trees and support planting such trees by the local community to contribute in reducing the CO2 emissions.

Table 67 below illustrates the information that present the action.

Table 67: Action 8.1 in numbers

Planting Forest Trees	
Duration	2020-2030
Total Implementation Cost (EURO)	2075000
Number of Trees	50,000
CO2 reduced (Tn CO2)	1085
Funding Source	Own and external funds

3.10 Actions' Overview

In the next table, the complete list of the SECAP Actions is presented followed by the respective energy savings/production and the CO2 reduction.

Table 68: Summary of the mitigation actions

Action No.	Action	Emission Reductions (tn CO_2)
Municipal Buildings		
1.1	Green procurement procedures for municipal buildings	0.70
1.2	Replacing the existing non efficient lamps with LED Lamps Jdaidet Al-Chouf municipal buildings	5.60
1.5	Energy manager appointment in the municipality	0.10
1.6	Awareness raising activities for municipal employees	0.30
1.7	PVs in municipal building's roof	4.7
1.8	Establishment of Energy Saving Department	0.0
1.9	Social media portal creation portal creation	0.0
Sub-Total		11.4
Street lighting		
2.1	Street lighting upgrade	46
2.2	Astronomical timers	21.3
Sub-Total		67.3
Residential Buildings		
3.1	Awareness raising activities for the community about (RE &EE)	1,107.7
3.2	Promotion of Green Buildings' concept	2,880.0
3.3	Campaign for promoting and replacing high energy label equipment	3,024.0
3.4	3.6 MW Photovoltaics in residential rooftops	2,658.5
3.5	Replacing existing electric water heater with solar collectors	1218.5
3.6	Replacement of old diesel space heater with more efficient	4837.0
3.7	Use of insulation bricks in rooftops	184.6

3.8	Replacement of single glazing with double	738.5
3.9	Initiatives to support the citizens' actions (EE and RE)	369.2
3.10	Awareness raising activities for the Residents' Associations and NGOs	1,476.9
Sub-Total		18494.9
Tertiary Sector		
4.1	Promotion of using insulation for buildings	2,105.6
4.2	Photovoltaics on rooftops	1504
4.3	Replacement of existing lamps with LEDs	240.6
4.4	Replacement of single glazing with double	601.6
4.5	Replacement of existing air conditioners with more efficient ones	60.2
4.6	Installation of lighting motion sensors	30.1
4.7	Awareness raising activities about RE&EE	718.0
4.8	use of Solar Water Heaters	60.2
4.9	PV for WWTP	117.8
4.10	PV for water pumping station	25.4
4.11	The 100% commitment campaign for schools for PV	16.4
4.12	Upgrade water facilities	60.2
4.13	use the effeciant diesel space heater instead of traditional	3,008.1
Sub-Total		8,548.1
Transport sector		
5.1	Replacement of old municipal gasoline car with new efficient car	24
5.2	Municipal fleet maintenance	9
5.3	Eco-driving seminar for the municipal fleet drivers	2.7
5.4	Information events on the new vehicle technologies- Replacement of diesel vehicles with new more efficient	48
5.5	Traffic congestion reduction through the adoption of different timing of activities	15
5.6	Promotion of walking and car sharing and carpooling campaigns	120.1
5.7	Improvement / development of parking infrastructure	30
5.8	promotion of using schools buses rather than private cars	15
5.9	awareness campaign for preventive maintenance for cars	15
5.10	Eco-driving for puplic transportation	90.1
5.11	Cycling promotion and creation of related infrastructure	75.1
Sub-Total		444.1
Local Renewable Energy Production		
6.1	PV Farm 0.3 MW	353.3
Sub-Total		353.3

Waste Management		
7.1	Awareness raising campaigns to reduce the amounts of discarded food	60.9
Sub-Total		60.9
Agriculture sector		
8.1	Planting forest trees	1,085
Sub-Total		1,085
Total		29,065.1

Regarding the costs, for Jdaidet Al-Chouf Municipality will derives 5,008,942.1 million EURO approximately whereas for the private sector is 21,348,015 million EURO approximately.

In order to achieve the 40% target, the Jdaidet Al-Chouf Municipality and the Government should place intensive and consecutive efforts towards the strict implementation of the SECAP and seek for agreements and grants with national and international organizations.

3.11 Monitoring

Monitoring of the Municipality's progress against the set targets is very significant, especially since it has to be realized in a frequent basis. The following table includes the suggested indicators to monitor each action's progress against the initial objectives, in order any deviations from the target to be noticed quickly, and appropriate correction measures to be taken.

These indicators will be also utilized during the production of the actions' monitoring report in line with the Covenant of Mayors requirements, as well as common practice, in order to demonstrate the achieved progress and results.

Table 69: suggested indicators to monitor each action's progress

Action		Key Performance Indicators	Measurement units
Municipal buildings			
1.1	Green procurement procedures for municipal buildings	• Number of equipment bought with green procurement procedures	• Equipment number/year
1.2	Replacing the existing non efficient lamps with LED Lamps Jdaidet Al-Chouf municipal buildings	• Percentage of installed capacity compared to the initial target	• Number of LED units installed.
1.3	Energy manager appointment in the municipality	• Years that the Energy Manager is appointed and active • Quantity of municipal infrastructure under his supervision • Energy savings under his supervision	• Number of years • Number and % of municipal infrastructure being supervised • KWh
1.4	Awareness raising activities for municipal employees	• Number of training seminars that were implemented • Municipal employees that were trained	• Number of seminars • Number of employees
1.5	PV plant 5 KW (for municipal buildings)	• Installed PV capacity • Percentage of installed capacity against the initial target	• KWp • % out of 5 kWp
1.6	Establishment of an Energy Saving Department	• Number of people served by the Energy Department	• Number of people

		• Employees in the Energy Saving Department	• Number of employees
1.7	Social media portal creation	• Number of followers in the portal.	• Number of followers
Street Lighting			
2.1	Street lighting system upgrade	• Lamps that were replaced with energy efficient ones	• Number of lamps
2.2	Astronomical timers	• Percentage of astronomical timers against initial target	• %
Residential Sector			
3.1	Awareness raising activities for the community about (RE &EE)	• Number of seminars & information days • Attendants in each event	• Number of activities • Number of people attending each event
3.2	Promotion of Green Buildings' concept	• Number of promotion actions • Average attendance • Share of new Green buildings in total new buildings • Average energy savings of green building/m^2	• Number of seminars, leaflets etc. • People attended each action • % • KWh/m^2
3.3	Campaign for promoting high energy label equipment and other awareness activities	• Number of promotion actions • Average attendance	• Number of seminars, leaflets etc. • Number of people attending each event
3.4	3.6 MW Photovoltaics in residential rooftops	• Installed PV capacity on roofs • Percentage of installed capacity against the initial target	• MWp • % out of 3.6 MWp
3.5	Replacing existing electric water heater with solar collectors	• Increase of solar water heaters installation	• Number of solar water heaters
3.6	Replacement of old diesel space heater with more efficient	• Number of diesel heaters replaced with efficient	• Number of diesel heaters replaced each year
3.7	Use of insulation bricks on rooftops	• Surface that insulation bricks have been applied • Number of buildings using insulation bricks	• m^2 • Number of buildings
3.8	Replacement of single glazing with double	• Surface of double glazing	• m^2
3.9	Initiatives to support the citizens' actions (EE and RE)	• Number of initiatives were launched	• Number of Initiatives
3.10	Awareness raising activities for the Residents' Associations and NGOs	• Number of awareness seminars were held. • Number of audience.	• Number of seminars, flayers. • Number of trainees.

Tertiary			
4.1	Promotion of insulation for buildings	• Number of building installed insulations. • Number of promotion actions • Average attendance	• Number of buildings • Number of seminars, leaflets etc. • Number of people attending each action
4.2	1.6 MW Photovoltaics in residential rooftops	• Installed PV capacity on roofs • Percentage of installed capacity against the initial target	• MWp • % out of 1.6 MWp
4.3	Replacement of existing lamps with LEDs	• Number of lamps replaced with LEDs	• Number of lamps replaced each year
4.4	Replacing single glace windows with double glass.	• Number of windows heaters replaced. • area of double glass were installed.	• Number of windows • m^2 of double glass
4.5	Replacement of existing air conditioners with more efficient ones	• Number of A/Cs replaced with new ones	• Number of A/Cs
4.6	Installation of lighting motion sensors	• Number of motions sensors were installed	• Number of motions sensors
4.7	Awareness raising campaign about RE&EE	• Number of implemented campaigns • Number of audiance attended	• Number of campaigns • Number of audiance
4.8	use and replacement of Solar Water Heaters	• Number installed SWHs	• Number of SWHs.
4.9	Installing PV for Waste water treatment plant	• Installed PV capacity in WWTP	• MWp
4.10	installing PV for water pumping station	• Installed PV capacity in WWTP	• MWp
4.11	100% commitment campaign for schools to install PV.	• Installed PV capacity on schools' roofs • Percentage of installed capacity against the initial target	• MWp • % out of 100%.
4.12	Energy efficiency measures for Wastewater treatment plant.	• Number of EE systems installed. • Electrical energy reduced	• Number of systems • KWh.

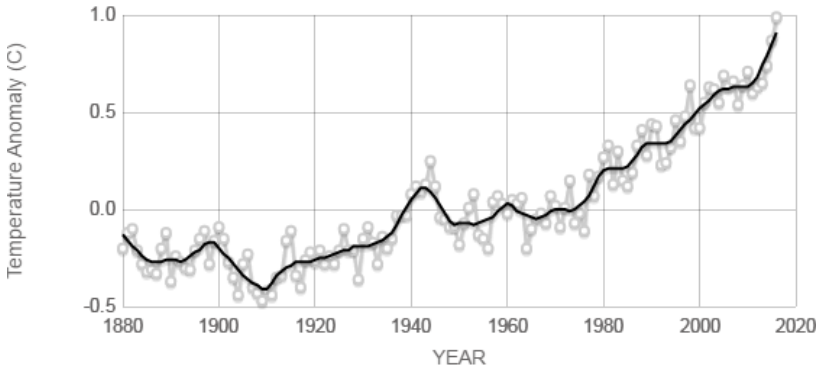
4.13	Use the efficient diesel space heater instead of inefficient.	• Number of diesel heaters replaced with efficient	• Number of diesel heaters replaced each year
Transport			
5.1	Replacement of old municipal gasoline car with new efficient car	• Number of cars replaced • Fuel saved at an annual basis	• Number of cars • MWh and liter of Gasoline
5.2	Municipal fleet maintenance	• Number of cars maintained • Maintenance coverage percentage	• Number of cars • % of maintained cars against the total
5.3	Eco-driving seminars for the drivers of the municipal fleet	• Number of seminars implemented • Percentage of municipal drivers that attended the seminars	• Number of seminars • % out of total number of drivers
5.4	Information events on the new vehicle technologies	• Number of events • Attendants in each event	• Number of events • Number of people attending each activity
5.5	Traffic congestion reduction through the adoption of different timing of activities	• Appointment of each event arranged.	• Date and time
5.6	Promotion of walking and car sharing and carpooling campaigns	• Length/surface of pavements constructed/refurbished • Number of walking signs installed • Number of parks etc. renovated • Number of awareness raising activities	• km/ km^2 • Number of signs • Number of public areas • Number of activities
5.7	Improvement / development of parking infrastructure	• Number of parking lots constructed	• Number of parking lots
5.8	promotion of using schools buses rather than private cars	• Number of student that are use schools buses.	• Number of student
5.9	awareness campaign for preventive maintenance for cars	• Number of seminars were held. • Number of attendance	• Number of seminars • Number of people attending each action
5.10	Promotion of eco-driving for public transportation	• Number of seminars implemented • Number of drivers attending the seminars	• Number of seminars • Number of drivers

5.11	Cycling promotion and creation of related infrastructure	• Number of bicycles were bought	• Number of bicycles
Local Renewable Energy Production			
6.1	0.3 MW PV Farm	• Installed PV capacity • Percentage of installed capacity against the initial target	• MWp • % out of 0.3 MWp
Waste Management			
7.1	Awareness raising campaigns to reduce the amounts of discarded food	• Number of seminars implemented • number of audience that attended the seminars	• Number of Seminars. • Number of audience
Agricultural			
8.1	Planting trees	• Number of planted trees	• Number of trees

Chapter 4: Adaptation to climate change

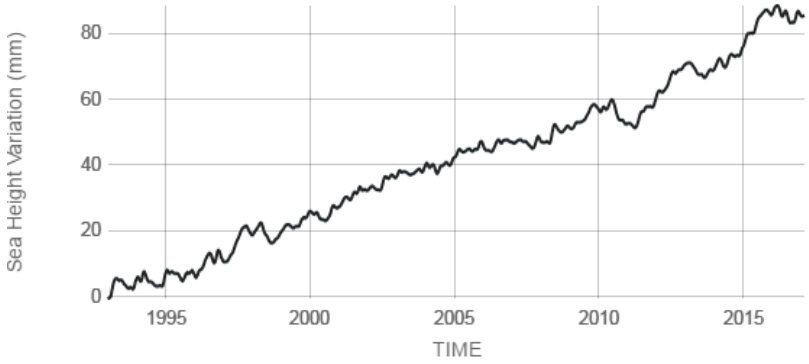
4.1 Introduction on climate change impact

During the last 20 years studies and observations have shown significant changes in the global climate which negatively affect life in many aspects. Indicatively in the next two figures the rise in the temperature and sea level are presented.



Source: climate.nasa.gov

Figure 31: Land-ocean temperature variation



Source: climate.nasa.gov

Figure 32: See level variation

In addition in the next figure the global temperature variation is presented from 1884 to 2018 in a worldwide map. [16]

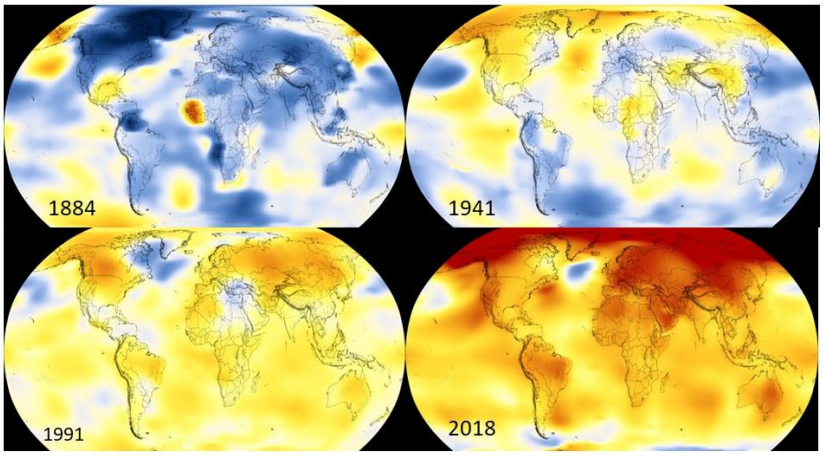


Figure 33: Global temperature variation

More specifically, the Mediterranean region is rich in a large variety of complex climatic phenomena, caused by its morphology and its geographical location. The location of the Mediterranean Sea in a transitional band between subtropical and multitude regimes produces a large climate variability at multiple timescales and a strong seasonal variability of precipitation in many areas [17]. The Mediterranean has been identified as one of the most prominent “Hot-Spots” in future climate change projections [18]. The water cycle and its extremes are one of the major concerns, since there are many countries that are over exploiting the water resources, a problem that is expected to deteriorate in the future. Episodes of extreme precipitation are also taking place and disastrous floods are a major threat for the region and especially the coastal areas. In addition to the above, phenomena taking place especially in the Southern Mediterranean Countries, such as cultivation of marginal land, overgrazing and firewood harvesting, put more pressure on the environment [17].

The Mediterranean region has experienced drastic changes in its climate over the years and according to Luterbacher et al. [19], has shown large climate shifts in the past. Twenty thousand years ago, cold steppes (with sparse forests) extended from the south of Spain to Caucasus. In the northern part of the Mediterranean basin, the temperature of the coldest month was 15°C lower than it is today (Peyron et al., 1998). Less water was available for vegetation. Over the last 2000 years, the climate over the Mediterranean has experienced a sequence of humid/dry and warm/cold periods that have produced effects on environmental conditions.

In the Figure 34 presented below, the seasonal mean temperature for the period 1961-1990 is being depicted in panels A-D, while the total precipitation maps for the same period are depicted in panels E-H.

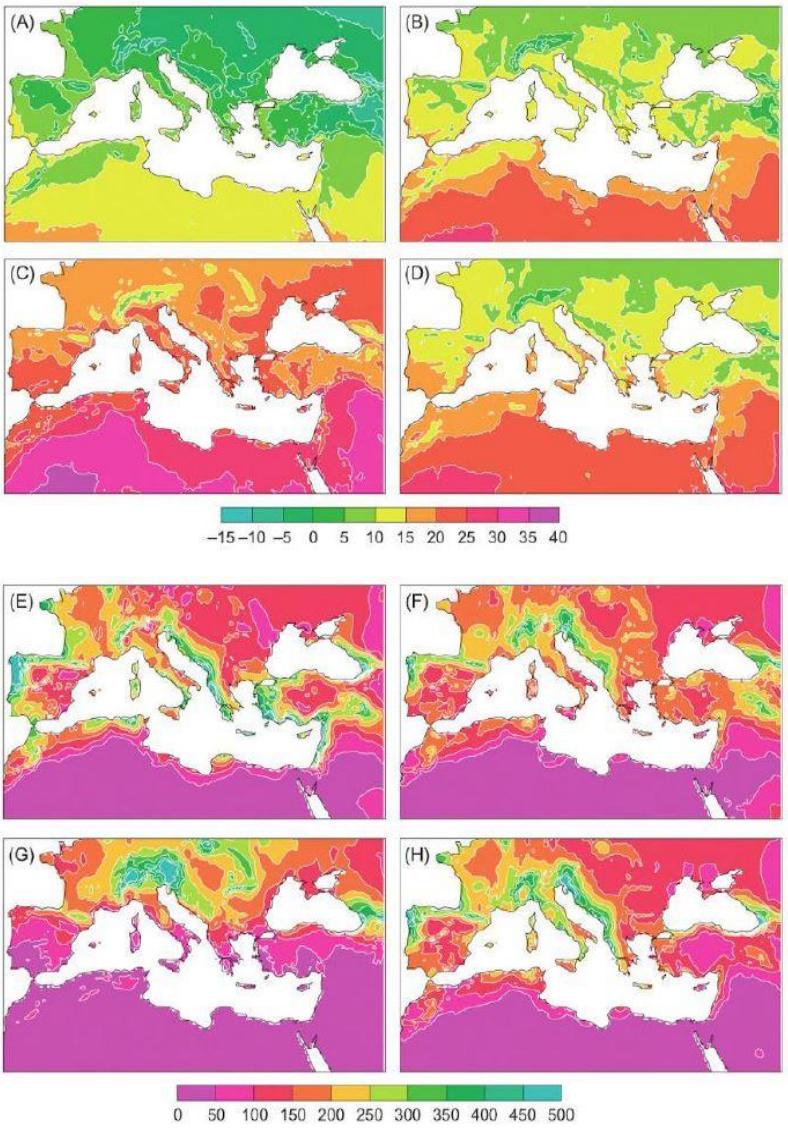


Figure 34: Seasonal (winter: December – January – February; sping: March – April – May; summer: June – July – August; autumn: September – Octomber – November) mean temperature (oC, panels A-D) and total precipitation (mm per season, panels E-H) maps for the period 1961 -1990 based on CRU data

Source: Lionello, 2012

The increase of the projected temperatures in the Mediterranean region in the period 2071 - 2100 compared to 1961-1990 is at least 3 degrees in the South countries and could be even higher, depending the season, as presented in the figure 35 below [17].

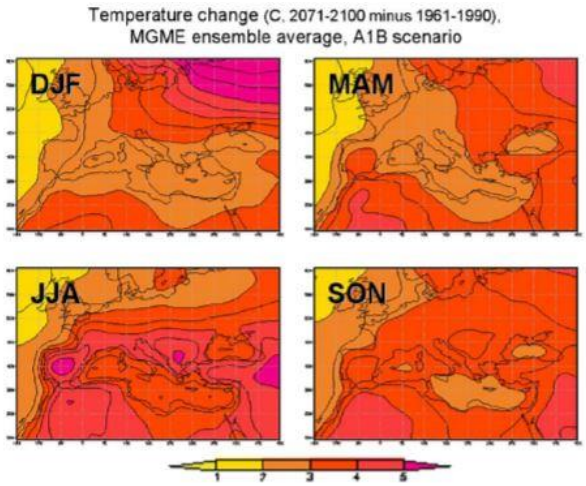


Figure 35: Multi Global Model Ensemble (MGME) average change in surface air temperature for the four seasons, 2071–2100 minus 1961–1990. Units are °C. DJF is December–January–February, MAM is March–April–May, JJA is June–July–August, SON is September–October–November

According to an EIB report of 2008, for the Mediterranean region, climate experts anticipate during the 21st century:

- An increase in air temperature in the range of 2.2 C° to 5.1 C° for the countries of Southern Europe and the Mediterranean region over the period 2080 – 2099 with respect to the period 1980 – 1999;
- A significant decrease in rainfall, ranging between -4 and -27 % for the countries of Southern Europe and the Mediterranean region (while the countries of Northern Europe will report a rise between 0 and 16 %);
- Increase in drought periods manifested by a high frequency of days during which the temperature would exceed 30 °C. Extreme events, such as heat waves, droughts or floods, are likely to be more frequent and violent.
- An increase of the sea level which, according to some specific studies, could be around 35 cm up to the end of the century.

Giannakopoulos et al. (2005) underlines that in line with the results of the projection scenarios, the most significant temperature increases in the 21st century are expected in Eastern Egypt and especially the Nile Delta, Lebanon and the Maghreb. It is therefore evident that the more vulnerable Mediterranean areas will be those of North Africa adjacent to desert areas, the major deltas (such the Nile one), the coastal areas (Northern rim and Southern rim of the Mediterranean basin), as well as the high-demographic growth and socially vulnerable areas (Southern and Eastern rim, densely populated cities and suburbs).

In the Mediterranean region, 50% of the urban population lives in an altitude of less than 10 meters from the sea level, in areas which are vulnerable to sea level rise. In addition to the above, tourist destinations in these areas are vulnerable not only due to the sea level rise, but also due to the temperature increase encountered [20].

The impacts of climate change on the Mediterranean environment will relate particularly to [21]:

- Water, via a change of its cycle due to a rise in evaporation and a decrease in rainfall. This water problem will be of crucial importance with regard to the issue of sustainable development in the region;
- Soil, via the acceleration of already existing desertification phenomena;
- Land and marine biological diversity (animal and plant), via a displacement northward and in altitude of certain species, extinction of less mobile or more climate sensitive species, and emergence of new species;
- Forests, via a rise in fire hazards and parasite risks.

These impacts will exacerbate already existing pressures on the natural environment connected with anthropogenic activities, such as agriculture and fishery (reduction of yields), tourism attractiveness (heat waves, water scarcity), coastal areas and infrastructures (significant exposure to the action of waves, coastal storms and other extreme weather events, rise in sea level), human health (heat waves), the energy sector (water needs for power plants, hydropower and increased consumption).

In line to the above, the Southern and Eastern Mediterranean Countries (SEMCs) appear to be more vulnerable to climate change than the Northern Mediterranean Countries (NMCs).

Indeed, they are, on the one hand, more exposed to accelerated desertification, soil aridity and water scarcity and, on the other hand, presenting economic structures that are more strongly dependent on natural resources, as well as technical and financial capacities that are too limited to help implement large-scale adaptation options [21].

The Mediterranean, and more especially the Southern and Eastern rim, is and will be more affected by climate change than most other regions of the world in the course of the 21st century. The impacts of the rise in temperatures, the decrease in rainfall, the multiplication of the number and intensity of extreme events and the possible rise in sea level overlap and amplify the already existing pressures of anthropogenic origin on the natural environment.

Through the crucial issue of scarcity of water resources, their impacts are fraught with consequences in the 21st century for human activities, in particular agriculture, fishery, tourism, infrastructures, urbanized coastal areas and hydropower production. In order to minimize as much as possible the economic losses and damages, several adaptation options must be thought out and implemented.

Energy lies at the heart of the climate change issue. On the one hand, it is the main GHG emitting sector, and CO2 emissions in the future are likely to increase much more rapidly than the global average. On the other hand, hydropower production—relatively significant in certain countries (13% of power production in the SEMCs)—is affected by the climate as well as by the plant cooling constraints. Lastly, the energy demand (in particular, electricity) which is growing at a very high pace in the region, is likely to be further accelerated by the additional demand necessary to lessen the impacts of climate change (water desalination, air-conditioning of buildings, etc).

4.2 Climate data for Lebanon

Current situation

Lebanon's climate is characterized by long, hot summers and short, cool winters. Temperature records extrapolated from Askaniia-Nova show a linear increase of 0.7°C from 1951-2000. However, seasonal variability is high.

Table 70: Climate data for Beirut, Lebanon.

Month	Average Max temperature(°C)	Mean total rainfall (mm)
January	16	125
February	16	99
March	18	59
April	21	42
May	26	9
June	28	0
July	30	0
August	31	0
September	30	0
October	28	51
November	22	42
December	18	123

As far as the wind is concerned, the average daily wind speed in January has been around 11 km/h, that's the equivalent to about 7 mph, or 6 knots. In recent years the maximum sustained wind speed has reached 69 km/h, that's the equivalent of around 43 mph, or 37 knots.

Table 71: Beirut – Lebanon region - Average wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Wind speed (Km/h)	66	56	78	63	93	74	74	37	39	48	78	74

Source: http://www.myweather2.com/City-Town/Lebanon/Beirut/climate-profile.aspx?month=1

4.3 Expected Climate Changes for Lebanon

According to the third communication report for FCCU the projected climatic changes in the Arab region and their impacts on natural resources were assessed through the Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources in the Arab Region (RICCAR) which was led by the United Nations Economic and Social commission for Western Asia (ESCWA).

In Lebanon, the results of an ensemble of projections show an increase of 1.2°C and 1.7°C by mid-century (2046-2065) and up to 3.2°C by 2100 compared to the baseline period of 1986-2005. A decrease in precipitation of 4 to 11% is projected, with drier conditions by the end of the century (up to 5.8 mm decrease in average monthly precipitation).

Temperature and precipitation extremes will also intensify by the end of the century, causing the seasonal prolongation and geographical expansion of drought periods. RICCAR results show increasing trends of warming, reaching up to 43 additional days with maximum daily temperature higher than 35°C. The projections also trends towards drier conditions with an increase in number of consecutive dry days (maximum annual number of consecutive dry days when precipitation < 1.0 mm) by the end of the century. This indicated that the dry summer season will extend in length, projected by an additional maximum number of 6 consecutive drought days. This combination of significantly less wet and substantially warmer conditions will result in hotter and drier climate. [22]

4.4 Adaptation Scoreboard

The adaptation scoreboard is part of the SECAP template developed by the JRC. The municipality is intended to realize a self-assessment of its adaptation status, putting a grade from A to D, in line with its progress.

More specifically:

- “A”, corresponds to completion level of 75 - 100%.
- “B”, corresponds to completion level of 50-75%.
- “C”, corresponds to completion level of 25-50%. Finally,
- “D”, corresponds to completion level of 0-25%.

The municipality will put one of these four grades to each one of the adaptation cycle specific steps, as presented in the following table.

Table 72: Municipality’s score in the Adaptation Cycle Specific Steps (SECAP template)

Adaptation Cycle Steps	Actions	Grade
Step 1: Preparing the ground for Adaptation	Adaptation commitments defined/integrated into the local climate policy	C
	Human, technical and financial resources identified	C
	Adaptation team (officer) appointed within the municipal administration and clear responsibilities assigned	B
	Horizontal (e.g. across departments) coordination mechanisms in place	D
	Vertical (e.g. across governance levels) coordination mechanisms in place	D
	Consultative and participatory mechanisms set up, fostering the multi stakeholder engagement in the adaptation process	A

	Continuous communication process in place	C
Step 2: Assessing risks and vulnerabilities to climate change	Mapping of the possible methods and data sources for carrying out a Risk &Vulnerability Assessment conducted	C
	Assessment of climate risks and vulnerabilities undertaken	B
	Possible sectors of actions identified and prioritized	A
	Available knowledge periodically reviewed and new finding integrated	A
Steps 3 and 4 – Identifying, assessing and selecting adaptation options	Full portfolio of adaptation actions compiled, documented and assessed	C
	Possibilities of mainstreaming adaptation in existing policies and plans assessed, possible synergies and conflicts identified	C
	Adaptation actions developed and adopted	D
Step 5: Implementing	Implementation framework set with clear milestones	B
	Adaptation actions implemented and mainstreamed as defined in the SECAP document	B
	Coordinated action between adaptation and mitigation set	C
Step 6: Monitoring and evaluation	Monitoring framework in place for adaptation actions	D
	Appropriate monitoring and evaluation indicators identified	D
	Regular monitoring of the progress and reporting to the relevant decision makers	D
	Adaptation strategy and/or Action Plan updated, revised and readjusted according to the findings of the monitoring and evaluation procedure	D

4.5 Risk Assessment and Vulnerability Analysis

In order to conduct a risk assessment and vulnerability analysis, as a first step, the climate hazard types should be identified. These hazard types in general and for the Maghreb and Mashreq countries in particular, are presented in the Table below, while those applicable for Jdaidet Al-Chouf have been identified.

Table 73: Climate Hazard Types

General Climate Hazard Types	Applicable for Jdaidet Al-Chouf region
Extreme heat	√
Extreme cold	
Landslides	√

Storms	
Droughts	√
Sea level rise	
Floods	
Extreme precipitation	√
Forest fires	√
Ice and snow	

The municipalities are called in to assess the impact that each climate hazard type has on a series of Vulnerable/ Impacted sectors, such as:

- Health
- Infrastructure (Energy, Water, Transport)
- Built environment
- Economy (Tourism, Agriculture and Forestry)
- Biodiversity (Coastal areas, Green zones/ forests)

These sectors have been identified as the most relevant for the Maghreb / Mashreq region, utilizing info from Future Cities Adaptation Compass Tool, Mayors' Adapt, as well as the European Climate Adaptation Platform website.

Jdaidet Al-Chouf Municipality has filled in Table 74 below, in order to conduct the vulnerability analysis, based on sources such as the Future Cities Adaptation Compass Tool and UNFCCC.

Table 74: Suggested template for the Vulnerability analysis (based on the Future Cities Adaptation Compass tool)

	Receptors	Extreme weather event	Potential effects	Who/What is affected
Population	Public Health	Extreme heat	- Deaths due to cardiovascular diseases, hyperthermia, and indirectly, through respiratory or cardiovascular. - Spread of vector born and infectious diseases - Altered allergic pattern - Heat stress.	Everyone, but especially elderly people, babies, children, workers in outdoor environments and sensitive groups of people
		Landslides	- Injuries and deaths	All people living or working in the area
		Droughts	- Asthma and cardiovascular diseases - Accumulation of trace elements	All people living or working in the area
		Extreme precipitation	- The spread of insects and diseases such as malaria.	All people living or working in the area
		Forest fires	- Choking occurrence and poisoning. - Death.	All people living or working in the area
Infrastructure	Transport	Extreme heat	- Rail and road network damages - Change in behavior patterns - Air quality problems - Higher maintenance costs	Roads, rail roads, public transport, people mobility
		Landslides	- Damages - Mobility difficulties in afflicted areas	Roads, rail roads, public transport, people mobility
		Droughts	- Difficult transport of bulk material	Waterways, water management
		Extreme precipitation	- Damages. - Road sliding.	Roads, rail roads, public transport,
		Forest fires	- No effect	- No effect
	Energy	Extreme heat	- Altered electricity peaks/demand - Damages	Conventional power plants, electricity providers and consumers

			- Cooling problems - Reduction of efficiency yield from conventional power plants and distribution grid - Higher maintenance costs	
		Landslides	- Damages - Operational difficulties	All facilities in the electricity generation (including RES such as PVs), as well as the electricity transmission and distribution grid
		Droughts	- No/lower production from hydro power plants - Energy supply and demand patterns' shift - Higher maintenance costs - Cooling problems	Conventional and renewable energy facilities (hydro, PVs, etc)
		Extreme precipitation	- Higher maintenance costs. - Network outage.	Electrical network.
		Forest fires	- Network outage.	Electrical network.
	Water	Extreme heat	- Higher water demand - Water quality issues - Higher maintenance costs	Public health, water infrastructures
		Landslides	- Damages - Water quality issues	Public health, water infrastructures
		Droughts	- Water scarcity - Water quality issues - Higher maintenance costs	Public health, water infrastructures
		Extreme precipitation	- Extreme mismatches between water supply and demand. - Reduce the groundwater supply.	Water resources.
		Forest fires	- No effect.	No effect.
	Social	Extreme heat	- Higher electricity demand to cover cooling needs - Changes in behavior patterns, e.g. living outdoors - Burdening of the health care facilities due to the increased number of patients in hospitals	Hospitals, schools, public places, municipal facilities/infrastructure, athletic facilities
		Landslides	- Damages in social facilities	Hospitals, schools, public places, municipal

				facilities/infrastructure, athletic facilities
		Droughts	- Difficulties in meeting water demand for athletic facilities (e.g. swimming pools) and green public spaces	Hospitals, schools, public places, municipal facilities/infrastructure, athletic facilities
		Extreme precipitation	- Damages in social facilities	Hospitals, schools, public places, municipal facilities/infrastructure, athletic facilities
		Forest fires	- Damages in social facilities	Hospitals, schools, public places, municipal facilities/infrastructure, athletic facilities
Built Environment	Building stock and material	Extreme heat	- Concrete's damages - Increased cooling demands - Higher maintenance costs - Urban heat island effect	All building infrastructure
		Landslides	- Extensive damages	All building infrastructure in afflicted areas
		Droughts	- Higher water demand	All building infrastructure
		Extreme precipitation	- Partial destruction of infrastructures	All building infrastructure
		Forest fires	- Fire in buildings.	All building infrastructure
Economy	Tourist	Extreme heat	- Increased demand for cooling - Lower touristic flows during the impacted seasons - Higher water demand	Tourists, tourist infrastructure, tourist related economy
		Landslides	- Lower touristic flows - Damages in touristic infrastructure	Tourists, tourist infrastructure, tourist related economy
		Droughts	- Increased pressure on water resources, escalating water scarcity issues - Increased water supply costs	Tourists, tourist infrastructure
		Extreme precipitation	- Reduced the length of tourist season	Tourists, tourist infrastructure, tourist related economy
		Forest fires	- Destruction of tourist facilities. - Lower touristic flows	Tourists, tourist infrastructure, tourist related economy

	Agriculture	Extreme heat	- Changes in growth cycle - Damages / loss of harvest - Livestock loss and impacts on health - Lower crop yields	Farmers, food industry, consumers
		Landslides	- Damages / loss of harvest in afflicted areas / loss of livestock - Potential property loss in afflicted areas - Loss of soil resources	Farmers, food industry, consumers
		Droughts	- Damages / loss of harvest - Lower crop yields - Livestock loss and impacts on health - Land degradation	Farmers, food industry, consumers
		Extreme precipitation	- Destruction of food crops.	Food industry
		Forest fires	- Lower crop yields.	Farmers, food industry
Biodiversity	Green zones/ Forests	Extreme heat	- Decrease of green zones. - Forest fires. - Change the types of crops.	Forest and private trees, agriculture areas.
		Landslides	- cut down trees	Forest and private trees
		Droughts	- Decrease of green zones. - Change the types of crops.	Forest and private trees, agriculture areas.
		Extreme precipitation	- Cut down trees	Forest and private trees
		Forest fires	- Reduce the green and forest areas.	Forest and private trees

Table 75: Suggested template for the risk assessment

	Receptors	Weather Sensitivity	Future Risk	Impact
Population	Public Health	Extreme heat	- Increased number of deaths - Reinforcement of heat stress - Increased infectious diseases - Altered allergic patterns - Chronic respiratory diseases - Vector Born Diseases (VBD) - Skin diseases Melanoma and sunburn	High
		Landslides	- Increased number of injuries and deaths - More respiratory problems	Medium
		Droughts	- Increased allergic incidents - Decreased air quality - More respiratory problems - Consumption and use of unsafe (contaminated) water for drinking due to water scarcity - Malnutrition - Food shortages	High
		Extreme precipitation	- Increased number of deaths - Reinforcement of heat stress - Increased infectious diseases - Altered allergic patterns - Chronic respiratory diseases - Vector Born Diseases (VBD)	Low
		Forest fires	- Increased number of injuries and deaths - More respiratory problems.	High
Infrastructure	Transport	Extreme heat	- Damages on road and rail network - Modification of transport frequency and means - Air quality problems - Higher maintenance costs	Low
		Landslides	- Damages on road and rail network - Modification of transport frequency and means - Higher maintenance costs	High
		Droughts	- Difficult transport of bulk material	Low
		Extreme precipitation	- Damages on road and rail network - Modification of transport frequency and means - Higher maintenance costs	Medium
		Forest fires	- Difficult transport of bulk material.	Low
	Energy	Extreme heat	- Blackouts and inability to cover demand load	High

			- Damages, especially in the thermal power plants	
		Landslides	- Damages in the transmission and distribution grid - Damages in any power generating plants, including RES (PVs) in afflicted areas	High
		Droughts	- Blackouts and inability to cover demand load - Higher maintenance costs - Cooling problems in power plants	High
		Extreme precipitation	- Damages in the transmission and distribution grid - Damages in any power.	Low
		Forest fires	- Damages in the transmission and distribution grid - Damages in any power generating plants, including RES (PVs) in afflicted areas	High
	Water	Extreme heat	- Water scarcity - Water quality issues	Medium
		Landslides	- Water scarcity due to infrastructure damages - Water quality issues due to infrastructure damages	Medium
		Droughts	- Water scarcity - Water quality issues	High
		Extreme precipitation	- Water scarcity - Water quality issues	Low
		Forest fires	- No expected risks	-----
	Social	Extreme heat	- Increased needs for air conditioned public spaces	Medium
		Landslides	- Damages - Mobility problems - Increase in the numbers of people burdening the health care facilities	Medium
		Droughts	- Increased numbers of people presenting respiratory problems and burdening the health care facilities - Inability to cover the water demand - Difficulties in the operation of certain facilities due to lack of water (e.g. swimming pools)	Medium
		Extreme precipitation	- Damages.	Medium
		Forest fires	- Increased needs for protected places.	Medium
Built Environment	Building stock and material	Extreme heat	- Concrete's damages - Increased cooling demands - Higher maintenance costs	Low

			- Urban heat island effect	
		Landslides	- Damages	Low
		Droughts	- Higher water demand	Medium
		Extreme precipitation	- Concrete's damages. - Infrastructure Damages.	Medium
		Forest fires	- Damages	High
Economy	Tourist	Extreme heat	- Change of the tourism season – lower touristic flows - Reduction of the tourism related economy	Medium
		Landslides	- Potential damage to touristic infrastructures and sites	Low
		Droughts	- Increased water supply costs - Potential increase of indirect costs for the tourists (infrastructure related) and reduction of touristic flows	Low
		Extreme precipitation	- Change of the tourism season – lower touristic flows - Reduction of the tourism related economy	Medium
		Forest fires	- Reduce the touristic flows	High
	Agriculture	Extreme heat	- Changes in growth cycle - Damages / loss of harvest - Livestock loss and impacts on health - Lower crop yields - Increased fire risks	High
		Landslides	- Damages/ loss of harvest - Loss of soil and reduction of cultivated lands	Medium
		Droughts	- Damages / loss of harvest - Lower crop yields - Livestock loss and impacts on health - Land degradation - Increased fire risks	High
		Extreme precipitation	- Damages/ loss of harvest. - Loss of soil and reduction of cultivated lands	High
		Forest fires	- Damages/ loss of harvest.	High
Biodiversity	Green zones/ Forests	Extreme heat	- Change in types of plant/corps.	Medium
		Landslides	- Destruction of agricultural lands	Medium
		Droughts	- Change in types of plant/corps.	Medium
		Extreme precipitation	- Destruction of agricultural lands	Medium
		Forest fires	- Reduce the green zones	High

4.6 Adaptation Actions

The municipality, having compiled the vulnerability analysis and risk assessment, needs to identify a specific set of actions that will allow it to adapt to the situation it faces. A list of adaptation actions, identified from the international literature and best practices available, are presented in the following tables, for each one of the five sectors studied above. Of course, these lists are not exhaustive and the consultants can look for additional measures, depending also on the local needs and situation; however, they are considered a good starting point.

For each one of the five sectors, a further distinction of the adaptation actions in four categories is realized:

- Strategic actions. Actions regarding the formulation of action plans, or strategic policy planning documents, that set the basis for all the actions to come in the specific sector.
- Alert /Communication actions. These are focusing on alerting the citizens on a situation, such as an extreme climate event or hazard (high temperatures, floods, tsunamis etc.).
- Educational actions. The focus in this case is given on increasing the awareness raising level of the citizens on a specific threat or situation that the municipality is faced and requires the citizens' collaboration in one way or another.
- Technical actions. Activities that are directly addressing in a technical the specific climate hazard.

4.6.1 Public Health

The first sector to be examined, Public Health is of utmost importance since it has direct impacts on population and their living. Table 76 below focuses on a set of suggested adaptation actions on the population and public health.

Table 76: Suggested adaptation actions for population and public health

Actions' characteristic	Adaptation Actions
Strategic	Health action plan for the extreme events that Jdaidet Al-Chouf is facing e.g. heat etc. (heat health action plan) - Collaboration with the regional medical services to increase preparedness level
	Provide access to hated public buildings during heat waves or other extreme events, for those citizens that lack the infrastructure to protect themselves (people living in underground apartments during floods, or lacking AC during extreme temperatures etc.)
Alert / Communication	Developing an early warning system to alert citizens in the case of extreme weather events
Educational	Educational and awareness raising campaigns about health-related effects of extreme events
Technical	Regular cleaning and maintenance of the sewage and drainage system
	Frequent monitoring of water and air quality

Health action plan for the extreme events

Estimated Coat (EURO)	91300
Implementing	2021

Year/Period	

The health action plan should include the framework for the implementation, coordination and evaluation of extreme events response activities in order to reduce the health impacts. It aims to provide measures for a successful coordination between government departments, health care professionals such as emergency medical personnel, health center staff, and hospital staff, and community groups. The proposed effective actions will ensure that health care and social systems are ready to act and strengthen the health and well-being. Preventive measures for those high-risk target groups will be also considered, such as not working outside in high temperatures for workers/technicians, or modification of their working hours during heat waves etc.

Provide access to public buildings during extreme events

Estimated Coat (EURO)	12450
Implementing Year/Period	2020-2030

There is a part of the population which lacks the infrastructure to protect themselves during extreme weather events. The Municipality may provide air-conditioned spaces in public buildings for those who have not ACs in their residences so as to eliminate the health impacts due to high temperatures. Moreover, public buildings may be provided as well, to citizens living in underground apartments, in case of floods.

Developing an early warning system to alert citizens in the case of extreme weather events

Following the forecasting of an extreme event, immediate notification of the public and all those participating in the response is critical to ensure safety. The warning system should include early meteorological announcements followed by protection and medical advices. The aim is to alert those citizens who are most at risk so as to take the appropriate precautions. These extreme weather events take into account heat waves, floods, droughts, as well as landslides in specific areas. This action should be realized in coordination to a national action at this level, or cooperation with other municipalities, as it is a high cost and difficulty activity for Jdaidet Al-Chouf municipality.

Implementing Year/Period	2021-2030

Educational and awareness raising campaigns about health-related effects of extreme events

Estimated Coat (EURO)	12,450
Implementing Year/Period	2021-2022

Campaigns should include information and advices for citizens on how they can protect themselves in case of extreme heats, floods, forest fires, landslides, vector born diseases etc. so as to prevent impacts and infections. The aim is to communicate the risks disseminating public messages through media, informational material and social media. Special efforts should be made to reach vulnerable population such as elderly people, children, citizens with chronic diseases and employees working outdoors.

Regular cleaning and maintenance of the sewage and drainage system

Estimated Coat (EURO)	12450
Implementing Year/Period	2020-2030

A rise in temperature due to climate change will increase microorganisms' growth. In addition, floods as a result of extreme rainfall leads to disruption of water purification and contamination with sewage disposal systems, leading to increase the probability of epidemics. Subsequently the regular cleaning and maintenance of the sewage and drainage system is vital in order to mitigate the health risks.

4.6.2 Infrastructure

The next section regards infrastructure and actions to mitigate the climate impacts on them are presented.

Table 77: Suggested adaptation actions for infrastructure

Actions' characteristic	Adaptation Actions
Strategic	Water management plan
	Modelling predicted supply changes in the electricity from the locally available RES
	Mapping of sites with landslides and flood risks
Educational	Developing guides and awareness raising campaigns for citizens on how to save water and energy, especially during crisis
Technical	Support rainwater harvesting systems

Water management plan

Estimated Coat (EURO)	16600
Implementing Year/Period	2020

The expected reduced precipitation, the temperature increase and the evaporation will result in less recharge and less replenishment of surface water and groundwater reserves. In addition the water demand is increased and contributes in reducing per capita shares. An important action is to develop a plan so as to manage the water supply systems in order for instance to detect leakages, organize regular maintenance and notify the Municipality when such incidents take place.

Modelling predicted supply changes in the electricity from the locally available RES

Estimated Coat (EURO)	4150
Implementing Year/Period	2021

A certain part of electricity consumption in Jdaidet Al-Chouf, but also in all Lebanon, will depend on Renewable Energy Sources. The extreme weather events may cause malfunctions in the energy supply leading in major problems in the city (e.g. patients who lives in their homes under technical assistance). Subsequently, problems should be predicted via prediction models in order for Municipality to plan what actions should take to face the situation in each case.

Mapping of sites with landslides and flood risks

Estimated Coat (EURO)	4150
Implementing Year/Period	2020

Another strategic action is the systematic mapping of sites that face landslide or flood risk. Since prevention is the basic tool to avoid future destructions, Jdaidet Al-Chouf Municipality will invest on the mapping of its whole territory, determining the areas with low, medium and high risk for phenomena such as the above. Basic aim of this exercise, depending on the extent of the afflicted areas, is potentially to ban the establishment of infrastructures in areas with high risk, or to require specific permits for building in these areas and only if certain high standards are to be followed in the construction.

Developing guides and awareness raising campaigns for citizens on how to save water and energy, especially during crisis

Implementing Year/Period	2020 -2030
Cost (EURO)	24900

As part of the mitigation actions envisaged in the previous chapter, Municipality is going to implement numerous awareness raising activities and campaigns for the citizens, in order to make them more aware on how to save energy. These actions could be further enhanced with water saving advice, especially during heat waves, droughts or other extreme weather events that require savings in these resources. The cost for this action can be covered through the dedicated amount in the mitigation actions, and is expected to have the same duration.

Support rainwater harvesting systems

Estimated Coat (EURO)	30000
Implementing Year/Period	2020 - 2030

The municipality will work on supporting store of rainwater for reuse on-site, rather than allowing it to run off. Rainwater can be collected from roads or roofs, and in many places,

the water collected is redirected to a deep pit (well, shaft, or borehole), aquifer, a reservoir with percolation, or collected from dew or fog with nets or other tools. Its uses include water for gardens, livestock, irrigation, domestic use with proper treatment, indoor heating for houses, etc. The harvested water can also be used as drinking water, longer-term storage, and for other purposes such as groundwater recharge.

4.6.3 Built Environment

The next section is about the actions to be implemented in order to enhance the built environment and protect it from the future climate repercussions.

Table 78: Suggested adaptation actions for built environment

Actions' characteristic	Adaptation Actions
Strategic	Enforcement of building codes for more energy efficient and heat tolerant structures
	Integrated land use planning with zoning system depending on the different areas
Educational	Educational campaigns on informing the citizens on the benefits of adopting the suggested actions in their premises
Technical	Greening infrastructure such as buildings' roofs and walls
	Increasing the amount of shade and green areas in the city by planting trees and using green pavements to reduce the heat island effect
	Insolated bricks on roofs (insulators)
	Rainwater collection and use
	Adoption of methods to reduce water demand
	Using water resistant construction materials

Enforcement of building codes for more energy efficient and heat tolerant structures

Implementing Year/Period	2020 - 2030

In Jdaidet Al-Chouf Municipality, as well as Lebanon in general, building codes are applicable for new structures; however, these codes are not strictly enforced, since their implementation remains somehow optional. Therefore, the legislative framework is there, and Municipality should work towards promoting its use or decide its strict enforcement. Moreover, techniques on how to protect infrastructure from floods (e.g. minimum floor heights, water proofing etc.) are also required. This action has been suggested as part of the mitigation actions across all building infrastructure in the territory. The estimated cost and duration for this action has been considered in the mitigation actions.

Integrated land use planning with zoning system depending on the different areas

Estimated Coat (EURO)	249000
Implementing Year/Period	2020 - 2024

This action is basically the integration in the land use planning of the mapping of the region conducted before, depending the high, medium and low risk for phenomena such as flooding and landslides for characterizing certain zones.

Educational campaigns on informing the citizens on the benefits of adopting the suggested actions in their premises

Implementing Year/Period	2020 - 2030

Jdaidet Al-Chouf Municipality should organize educational campaigns in order to inform inhabitants about the risks and climate hazards on the region and propose the appropriate measures via guidebooks or other material. Thus citizens will be able to modify their residences and businesses and convert them to more safe places which could resist floods and heat. Since Jdaidet Al-Chouf Municipality is going to implement a series of awareness activities in the mitigation and adaptation thematic fields, it is the Municipality's intention to group where possible these activities for better coordination.

Greening infrastructure such as buildings' roofs and walls

Estimated Coat (EURO)	8300
Implementing Year/Period	2023 - 2030

A green roof is covered with vegetation and between other purposes it serves to provide insulation and help to lower air temperatures. It also contributes in mitigating the heat island effect and in cleaning the air in parallel with decreasing stress of the inhabitants.

Increasing the amount of shade and green areas in the city by planting trees and using green pavements to reduce the heat island effect

In order to adapt to the high temperatures, the Municipality could create shade and green areas in places where a lot of people gather or pass through their day. Trees and parks can contribute in reducing the heat island effect and provide outdoor thermal comfort as well as a shaded and breezy place for the people passing to rest. In addition, the chosen material for the construction of sidewalks should be heat absorbing so as to prevent the extra heating from the ground to be reflected. In that way, citizens will feel euphoria and will be partially protected by a heat stroke. This project is similar to the mitigation action section above.

Insolated bricks on roofs (insulators)

The main measures to adapt for a building are those which can prevent temperature increase. Insolated bricks on rooftops or even the external walls reflect a percentage of the absorbed heat, thus maintaining the inner temperature at lower levels. Insolated bricks can also contribute to the preservation of indoor thermal comfort since they block the sunlight to pass through glazing. Taking also into consideration the general bioclimatic designs, such as building orientation, construction materials etc. is also a way to maintain the desirable temperature inside the building. This action has already been suggested as a measure for the mitigation of energy consumption and related emissions.

Rainwater collection and use

Collecting rainwater is an excellent way to conserve the fresh water. Using rain barrels, rainwater collection systems with big tanks underground (to avoid evaporations) can lead to significant water savings. This water could be used for domestic purposes like gardening, washing vehicles and equipment, flushing toilets etc. This action envisages rainwater collection in selected municipal buildings at first, as a pilot study. This action repeated in section (4.6.2).

Adoption of methods to reduce water demand

Estimated Coat (EURO)	8,300
Implementing Year/Period	2022 - 2024

Since water scarcity is a major problem for Lebanon in general, and Jdaidet Al-Chouf especially, a solution is to adopt methods to reduce its use. Using proper showerheads, toilet flushes with adjustable flow, wash machines only when they are full are easy activities to follow in order to save water and adapt to the increasing problem of water scarcity.

Using Water Resistance Constriction Material

Estimated Coat (EURO)	8,300
Implementing Year/Period	2022 - 2026

The municipality will support using water resistance material in the construction phase. The support will be through awareness campaign to present the importance of using water resistance material in the building.

4.6.4 Economy

Climate changes and extreme events affect the economy sector and create problems that have to be addressed promptly.

Table 79: Suggested adaptation actions for economy

Actions' characteristic	Adaptation Actions
Strategic	Elaboration of water and ground water management plan
	Adoption of integrated land use planning for the tertiary sector

Elaboration of water and ground water management plan

This action has been also considered above, in the infrastructure section. The water management plan to be developed should target the economic sectors in the region as well.

Adoption of integrated land use planning for the tertiary sector

Integrated land use planning is a strategy to prevent climate impacts such as flooding, drought, water scarcity and heat stress, as well as to avoid exposure of valuable elements to risks. The planning for the tertiary sector proposes that construction in flood areas should be

avoided if possible, urban development should be planned in low hazard areas, development of buildings, housing, economical values etc. in flood risk areas should be restricted and storm water services should be planned. This action is illustrated in section (4.6.3)

4.6.5 Biodiversity

Biodiversity – the variety of life on the planet – is essential for the economy and for people well-being, but one of the main environmental challenges facing the planet is the loss of it. Conserving biodiversity and maintaining nature's capacity to deliver the related goods and services is became a priority at global scale.

Table 80: Suggested adaptation actions for biodiversity

Actions' characteristic	Adaptation Actions
Strategic	Establishment of a fire management plan
Educational	Educating the citizens
Technical	Trees planting

Establishment of a fire management plan

Estimated Coat (EURO)	8300
Implementing Year/Period	2022

The municipality will adapt a firefighting plan in order to prevent the negative effect of the fire and conduct a quick control on the fire.

Educating the citizens

A significant measure is citizens' education regarding the importance of biodiversity for their wellbeing. People have to realize that their actions and activities are connected directly with the state of the environment thus effecting their own living conditions. Campaigns should be organized so as to inform inhabitants how they can adopt an environmental friendly behavior and protect their natural habitat. The estimated cost for this action is considered as part of other awareness raising activities to be conducted by the Municipality.

Trees planting

An important action towards the protection of biodiversity is the tree planting and the expansion of green areas with friendly drought-tolerant plants. Trees not only contribute to the preservation of the natural habitat of fauna but they can also prevent floods and soil erosion. Moreover, they are significant actors in air cleaning which means that more trees and plants will reduce more the greenhouse gasses. This action illustrated as an action in mitigation section.

Chapter 5: Appendices

5.1 Appendix A (Public Lighting sheet)

Station Name	Average measured Ampere (A)	Average measured Power (kW)	Average daily operating hours	Dailay energy consumption (kWh)	Monthly energy Consumption (kWh)	Annual Energy Consumption (kWh)
Al-shuhada' 1	22	3.872	12	46.46	1,393.92	16,727.04
Al-shuhada' 2	19	3.344	12	40.13	1,203.84	14,446.08
Al-shuhada' Ghaith	18	3.168	12	38.02	1,140.48	13,685.76
Al-mustaqbal -Ain Wa Zain Road	41	7.216	12	86.59	2,597.76	31,173.12
Al-khazanat -Ain Wa Zain Road	32	5.632	12	67.58	2,027.52	24,330.24
Nassrallah	25	4.4	12	52.80	1,584.00	19,008.00
Hai Nasrallah	20	3.52	12	42.24	1,267.20	15,206.40
Dohour Al-Hareeq	11	1.936	12	23.23	696.96	8,363.52
Al-Majlis	8	1.408	12	16.90	506.88	6,082.56
Baddi	15	2.64	12	31.68	950.40	11,404.80
Jdaidah1	26	4.576	12	54.91	1,647.36	19,768.32
Jdaidah2	41	7.216	12	86.59	2,597.76	31,173.12
Total	**278**	**48.928**	**12**	**587.14**	**17,614.08**	**211,368.96**

5.2 Appendix B (Residential sector questionnaires results)

No.	Sample	Type of housing	No. of family members	Total area (m^2)	Annual energy consumption from grid (Kwh)	Annual energy consumption from generators (Kwh)	Annual total kWh	Annual fuel consumption (Kg \liter)	Heating system (Central,Heater,Fireplace,split units)	
									Type	**Consumption**
1	**Responsible : Samer Mhaisen** **Job Title : The Owner** **Phone No. : 03493413**	Apartment	3	165	1,583	930	2,513	Diesel (1400 Liter)	Heater (Diesel)	1400 (Liter)
2	**Responsible : Rowaida Abdelsamad Ghaith/Salah Ghaith** **Job Title : Housewife** **Phone No. : 03200672**	Apartment	5	250	6,839	1,530	8,369	1,600	Heater (Diesel) +Fireplace (wood)	
3	**Responsible : Nora Sa'b** **Job Title : Housewife** **Phone No. : 03440728**	Apartment	6	160	648	630	1,278	Diesel(1000 Liter), gas (144 KG)		
4	**Responsible : Raja' Abu Al-Hasan** **Job Title :** **Phone No. : 05501580**	Apartment	3	180	3,864	1,680	5,544	Diesel (1600 Liter)	Heater (Diesel)	1600 (Liter)
5	**Responsible : Reyad Al-Batlony** **Job Title :**	Apartment	5	145	8,315	3,480	11,795	Diesel (1200 Liter)	Split Units, Heater (Diesel)	2 (Ton), 1200 (Liter)

	The Owner **Phone No. : 03607375**									
	Average	**Apartment**	**4.4**	**180**	**4249.9906**	**1650**	**5899.990555**	**1300**		
6	**Responsible : Jameelah Nasr Allah / Khaldoun Nasr Allah** **Job Title : Housewife** **Phone No. : 05506472 / 76426525**	Villa	6	220	6,839	1,380	8,219	Diesel (800 Liter green)	Fireplace (Wood), Central Heating (Diesel)	800 (Liter)
7	**Responsible : Sarah Al-Fataery** **Job Title : Housewife** **Phone No. : 70882472**	Villa	4	300	8,315	1,980	10,295	Diesel (3000 Liter)	Heater (orbit :Diesel), Split Units (Heating, Cooling)	3000 (Liter)
8	**Responsible : Rania Fataery / Naji Fataery** **Job Title : Housewife** **Phone No. : 71410038**	Villa	4	350	9,679	2,880	12,559	Diesel (3200 Liter)	Heater (Diesel)	3200 (Liter)
9	**Responsible : Wahib Abu Ayyash** **Job Title : The Owner** **Phone No. : 05310181**	Villa	2	300	13,770	3,780	17,550	Diesel (2000 Liter)	Heater (Diesel)	2000 (Liter)
	Average	**Villa**	**4**	**292.5**	**9650.8884**	**2505**	**12155.88843**	**2250**		
10	**Responsible : Malik Al-**	Independent House	2	400	4,800	1,800	6,600	Diesel (2400 Liter)	Central Heating,	2400 (Liter)

	Fataery / wa'el Al-Fataery **Job Title : The Owner** **Phone No. : 0096170965340**								Heater (Diesel)	
11	**Responsible : Nada Abu Hamdan / Marwan Abu Hamdan** **Job Title : Housewife** **Phone No. :**	Independent House	6	250	3,864	1,800	5,664	Diesel (800 Liter Green)	Central Heating, Heater (Diesel)	800 (Liter)
	Average	**Independent House**	**4**	**325**	**4331.9008**	**1800**	**6131.900826**	**1600**		

5.3 Appendix C (Tertiary sector questionnaires results)

Public buildings & Facilities					
Facility name	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Social Affairs Center	180.0	33.0	1706.5	1600.0	0.0
Commercial Buildings					
Offices					
Facility name	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Engineering office	80.0	4.0	1548.0	600.0	0.0
Shops					
Shop type	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Library	330.0	8.0	11333.1	2400.0	0.0
Bank	1050.0	20.0	6202.0	19875 (for electricity generation)	0.0
Shoes shop	400.0	3.0	9078.0	1200.0	0.0
Exchange center	50.0	3.0	3513.9	0.0	900.0
Cars electric	120.0	2.0	243.0	0.0	288.0
Cooperative society	3500.0	60.0	202400.0	92341 (for electricity generation)	0.0
Resturants					
Resturant type	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Resturant and cafeih	600.0	6.0	7380.0	24900.0	3900.0
Checken resturant	100.0	12.0	13111.0	0.0	8400.0
Sweets and ice cream	550.0	8.0	30612.0	1986.0	1680.0

Total					
Handcraft Shops					
Type	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Sample (Metal works workshop)	300.0	9.0	25663.1	0.0	0.0
Fuel Filling Stations					
Station name	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Khattar Station			26322.0	7680 (for elect. generation)	
Nasrallah Station			4700.0	0.0	
Fatairy Station			36958.0	0.0	
Al-Jdaidet Station			6937.0	640 (for elect. generation)	
Ain Wa Zain Station			3133.3	0.0	
Schools					
Schools name	Area (m2)	No. of studens	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Chouf High School	490.0	150.0	1292.0	1000.0	112.5
Mokhtara Secondary School	4900.0	300.0	6415.0	12000 (300 lit for electricity generation & 9000 for heating)	0.0
Lyceih Technic School	1228.0	180.0	16678.0	3000.0	50.0
Total			24385.0	16000.0	162.5
Water & Waste Management facilities					

Facility	Area (m2)	No. of employees	Electricity (kWh/yr)	Diesel (Lit/yr)	LPG (kg/yr)
Water Pumping station			117467.0	0.0	
Waste Water Treatment plant			3504.0	1050 (for elect. generation)	
Solid waste Plant			0.0	25045 (for elect. generation)	

5.4 Appendix D (Transportation Sector survey results sheets for Municipal and public transportation)

Municipal Fleet						
Vehicle type	Numbers	Daily traveled distance with municipality borders (km/day)	Annual Gasoline consumption (Lit/yr)	Annual Diesel consumption (Lit/yr)	Model date	Fuel rate (km/20 lit)
Pick-Up vehicles	1	10		2,000	2006	110
Passengers vehicles	1	15	3,000		2005	130
Dead transport vehicles	1	2		500	1999	140
Garbage vehicles	2	17		3,500	2007	100

Public Transportation- Taxi cars				
No.	daily traveled distance with municipality borders (km/day)	Fuel rate (km/20 lit)	Daily fuel consumption (Lit/day)	Annual fuel consumption (Lit/year)
1	30	150	4.00	1,460
2	50	140	7.14	2,607
3	27	160	3.38	1,232
4	40	180	4.44	1,622
5	30	160	3.75	1,369
6	50	150	6.67	2,433
7	60	150	8.00	2,920
8	25	150	3.33	1,217
		Total	40.71	14,860

Public Transportation- Buses				
No.	Daily traveled distance within municipality borders (km/day)	Fuel rate (km/20 lit)	Daily fuel consumption (Lit/day)	Annual fuel consumption (Lit/year)
1	4	70	1.14	417
2	4	70	1.14	417
3	6	90	1.33	487
4	4	70	1.14	417
5	4	70	1.14	417
6	4	85	0.94	344
7	4	70	1.14	417
8	4	85	0.94	344
9	4	65	1.23	449
10	4	70	1.14	417
11	4	80	1.00	365
12	4	90	0.89	324
13	4	85	0.94	344
14	4	85	0.94	344
15	4	80	1.00	365
16	4	85	0.94	344
17	4	85	0.94	344
18	4	80	1.00	365
19	4	70	1.14	417
20	4	85	0.94	344
21	4	90	0.89	324
		Total	21.93	8,004

5.5 Appendix D (Transportation Sector survey results sheets for Private and Commercial transport)

Private Transportation												
No.	Vehicle Type	Vehicle Model	Fuel Type	Fuel rate (km/20 lit)	Place of owner's work (in/out of the municipality)	Inlet name to municipality	Otlet name from municipality	Distance between the houshold and municipality inlet/outlet	Theplace of the most fuel station used (inside/outside) the municipality	Ddaily traveled distance within municipality borders (km/day)	Daily fuel consumption (Lit/day)	Annual fuel consumption (Lit/year)
1	Meduim Passenger vehicle	ب ا. 2013	Gasoline	160	In	Ain Wa Zain	Ain Wa Zain	4.0	Inside	1	0	46
2	Small Passenger vehicle	تويوتا 1989	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	10.0	Inside	10	1	365
3	Small Passenger vehicle	نيسان 2006	Gasoline	140	In	Ain Wa Zain	Ain Wa Zain	1.5	Inside	5	1	261
4	Small Passenger vehicle	ب ا. 1998	Gasoline	200	In	Sumqanyya	Sumqanyya	2.0	Inside	4	0	146
5	Small Passenger vehicle	تويوتا 1975	Gasoline	250	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	58
6	Small Passenger vehicle	رسيدس . 1993	Gasoline	140	Out	Sumqanyya	Mokhtara	1.0	Inside	5	1	261

7	Small Passenger vehicle	يا 2013.	Gasoline	300	In	Sumqanyya	Sumqanyya	0.7	Inside	2	0	49
8	Small Passenger vehicle	. رسيدس 2005	Gasoline	170	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	86
9	Small Passenger vehicle	ب ا. 1982	Gasoline	90	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	162
10	Meduim Passenger vehicle	رابيد 1993	Gasoline	120	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	304
11	Meduim Passenger vehicle	Rav4 - 2002	Gasoline	150	In	Sumqanyya	Sumqanyya	1.0	Inside	3	0	146
12	Small Passenger vehicle	. رسيدس 2001	Gasoline	130	In	Sumqanyya	Sumqanyya	2.0	Inside	1	0	56
13	Small Passenger vehicle	غولف 2003	Gasoline	180	Out	Sumqanyya	Sumqanyya	2.0	Outside	14	2	568
14	Small Passenger vehicle	داتسون 2012	Gasoline	180	In	Sumqanyya	Sumqanyya	2.0	Inside	1	0	41
15	Meduim Passenger vehicle	Infinity 2000	Gasoline	130	In	Kahlounyya	Kahlounyya	2.0	Inside	5	1	281
16	Small Passenger vehicle	تويوتا 1986	Gasoline	240	In	Ain Wa Zain	Ain Wa Zain	5.0	Inside	5	0	152
17	Meduim Passenger vehicle	ب أ. 2000	Gasoline	150	In	Ain Wa Zain	Ain Wa Zain	5.0	Inside	5	1	243
18	Small Passenger	تويوتا 2009	Gasoline	220	In	Sumqanyya	Ain Wa Zain	2.0	Inside	5	0	166

	vehicle											
19	Meduim Passenger vehicle	range rover 1980	Gasoline	100	In	Sumqanyya	Ain Wa Zain	2.0	Inside	5	1	365
20	Meduim Passenger vehicle	range rover 1989	Gasoline	90	In	Sumqanyya	Ain Wa Zain	2.0	Inside	5	1	406
21	Small Passenger vehicle	رسيدس . 2008	Gasoline	120	Out	Sumqanyya	Sumqanyya	2.0	Inside	2	0	122
22	Meduim Passenger vehicle	range rover 2003	Gasoline	90	In	Mokhtara	Mokhtara	3.0	Inside	5	1	406
23	Meduim Passenger vehicle	شيرو.ي 2000	Gasoline	140	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	1	0	52
24	Small Passenger vehicle	تي.و 1995	Gasoline	270	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	4	0	108
25	Meduim Passenger vehicle	ب ا. 1995	Gasoline	120	In	Mokhtara	Sumqanyya	0.5	Inside	2	0	122
26	Small Passenger vehicle	رابيد 1990	Gasoline	200	In	Mokhtara	Sumqanyya	0.5	Inside	2	0	73
27	Meduim Passenger vehicle	هيونداي 2002	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Outside	1	0	37
28	Meduim Passenger vehicle	تويوتا 2000	Gasoline	150	In	Ain Wa Zain	Ain Wa Zain	0.7	Inside	2	0	97
29	Meduim Passenger vehicle	شيرو.ي 2005	Gasoline	100	In	Mokhtara	Mokhtara	0.5	Inside	5	1	365
30	Meduim	رسيدس .	Gasoli	160	In	Ain Wa	Ain Wa	1.0	Outside	2	0	91

	Passenger vehicle	2000	ne			Zain	Zain					
31	Meduim Passenger vehicle	رسيدس . 1984	Gasoline	150	In	Sumqanyya	Sumqanyya	2.0	Inside	2	0	97
32	Small Passenger vehicle	رسيدس . 1992	Gasoline	140	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	1	0	52
33	Meduim Passenger vehicle	رابيد 1997	Gasoline	240	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	1	0	30
34	Small Passenger vehicle	يا 2010.	Gasoline	200	In	Sumqanyya	Sumqanyya	1.0	Outside	4	0	146
35	Meduim Passenger vehicle	Infinity 2000	Gasoline	90	In	Sumqanyya	Sumqanyya	1.0	Inside	3	1	243
36	Small Passenger vehicle	داتسون 1978	Gasoline	160	In	Sumqanyya	Sumqanyya	3.0	Inside	3	0	137
37	Small Passenger vehicle	بيجو 1994	Gasoline	170	In	Mokhtara	Mokhtara	3.0	Inside	7	1	301
38	Small Passenger vehicle	رسيدس . 1987	Gasoline	10	Out	Sumqanyya	Sumqanyya	3.0	Inside	5	10	3,650
39	Small Passenger vehicle	رسيدس . 2012	Gasoline	100	In	Sumqanyya	Sumqanyya	0.2	Inside	3	1	219
40	Meduim Passenger vehicle	infinity 2003	Gasoline	150	Out	Ain Wa Zain	Ain Wa Zain	3.0	Inside	5	1	243
41	Meduim Passenger vehicle	infinity 2004	Gasoline	150	Out	Sumqanyya	Sumqanyya	3.0	Outside	1	0	49

42	Meduim Passenger vehicle	Rav4 - 2002	Gasoline	180	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	203
43	Meduim Passenger vehicle	بلايزر 1996	Gasoline	90	In	Ain Wa Zain	Ain Wa Zain	4.0	Outside	2	0	162
44	Meduim Passenger vehicle	rav4 - 1995	Gasoline	200	In	Sumqanyya	Sumqanyya	4.0	Outside	2	0	73
45	Meduim Passenger vehicle	Infinity 1990	Gasoline	90	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	406
46	Meduim Passenger vehicle	رابيد 1992	Gasoline	220	In	Sumqanyya	Sumqanyya	0.5	Inside	3	0	100
47	Meduim Passenger vehicle	سوزو.س 1995	Gasoline	110	Out	Sumqanyya	Sumqanyya	2.0	Outside	5	1	332
48	Meduim Passenger vehicle	تويوتا 1995	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	1	0	61
49	Meduim Passenger vehicle	ب ا. 2004	Gasoline	180	Out	Sumqanyya	Sumqanyya	2.0	Inside	2	0	61
50	Small Passenger vehicle	هوندا 1988	Gasoline	200	Out	Sumqanyya	Sumqanyya	2.0	Inside	2	0	55
51	Meduim Passenger vehicle	rav 4 - 1996	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	15	2	608
52	Meduim Passenger vehicle	infinity 1998	Gasoline	110	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	15	3	995
53	Small Passenger	Suhana 1998	Gasoline	130	Out	Ain Wa Zain	Ain Wa Zain	1.5.	Inside	2	0	112

	vehicle											
54	Meduim Passenger vehicle	جيب 2000	Gasoline	110	Out	Sumqanyya	Sumqanyya	2.0	Outside	8	1	531
55	Small Passenger vehicle	نيسان 1998	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	9	1	365
56	Small Passenger vehicle	يا 2010.	Gasoline	220	Out	Sumqanyya	Sumqanyya	2.0	Inside	2	0	66
57	Small Passenger vehicle	رسيدس . 1992	Gasoline	120	In	Sumqanyya	Sumqanyya	0.1	Inside	5	1	304
58	Small Passenger vehicle	رسيدس . 1996	Gasoline	160	Out	Mokhtara	Mokhtara	0.3	Outside	2	0	91
59	Meduim Passenger vehicle	رابيد 1998	Gasoline	200	Out	Mokhtara	Mokhtara	0.3	Inside	2	0	73
60	Small Passenger vehicle	بيجو 2006	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.1	Inside	5	1	183
61	Meduim Passenger vehicle	لاند روفر 2008	Gasoline	110	In	Ain Wa Zain	Ain Wa Zain	0.1	Inside	2	0	133
62	Small Passenger vehicle	ب ا. 1989	Gasoline	180	In	Ain Wa Zain	Sumqanyya	0.1	Inside	5	1	203
63	Small Passenger vehicle	تويوتا 1985	Gasoline	180	In	Sumqanyya	Sumqanyya	0.1	Inside	2	0	81
64	Small Passenger vehicle	يا 1998.	Gasoline	200	Out	Sumqanyya	Sumqanyya	2.0	Outside	1	0	37
65	Small	نيسان	Gasoli	180	Out	Sumqanyya	Sumqanyya	0.7	Inside	5	1	203

	Passenger vehicle	2003	ne									
66	Small Passenger vehicle	يا 1995.	Gasoline	220	In	Mokhtara	Mokhtara	1.0	Inside	1	0	33
67	Small Passenger vehicle	تويوتا 1982	Gasoline	180	Out	Sumqanyya	Sumqanyya	3.0	Inside	1	0	41
68	Small Passenger vehicle	تويوتا 2009	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	10.0	Inside	3	0	91
69	Meduim Passenger vehicle	لاند روفر 2009	Gasoline	100	In	Kahlounyya	Kahlounyya	5.0	Inside	10	2	730
70	Small Passenger vehicle	هوندا 1991	Gasoline	180	In	Sumqanyya	Sumqanyya	3.0	Inside	3	0	122
71	Meduim Passenger vehicle	نيسان 1997	Gasoline	80	In	Ain Wa Zain	Ain Wa Zain	3.0	Inside	3	1	274
72	Small Passenger vehicle	يا 2008.	Gasoline	160	In	Sumqanyya	Sumqanyya	0.0	Inside	20	3	913
73	Small Passenger vehicle	يا 2014.	Gasoline	200	Out	Sumqanyya	Sumqanyya	2.0	Outside	20	2	730
74	Meduim Passenger vehicle	infinity 2004	Gasoline	110	In	Mokhtara	Mokhtara	0.0	Inside	3	1	199
75	Small Passenger vehicle	نيسان 2012	Gasoline	200	In	Sumqanyya	Sumqanyya	0.2	Inside	2	0	73
76	Meduim Passenger vehicle	شيرو.ي 2002	Gasoline	90	In	Sumqanyya	Sumqanyya	0.2	Inside	2	0	162

77	Small Passenger vehicle	هوندا 1987	Gasoline	250	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	2	0	58
78	Small Passenger vehicle	ي.را . 2017	Gasoline	300	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	2	0	49
79	Small Passenger vehicle	هوندا 2007	Gasoline	200	Out	Sumqanyya	Mokhtara	1.5	Inside	2	0	73
80	Meduim Passenger vehicle	هوندا 2007	Gasoline	150	Out	Sumqanyya	Mokhtara	1.5	Inside	3	0	146
81	Small Passenger vehicle	ب ا. 1995	Gasoline	160	In	Ain Wa Zain	Ain Wa Zain	1.0	Outside	2	0	91
82	Meduim Passenger vehicle	هوندا 2003	Gasoline	140	In	Mokhtara	Mokhtara	2.0	Inside	10	1	521
83	Meduim Passenger vehicle	volvo 1980	Gasoline	120	In	Sumqanyya	Sumqanyya	2.0	Inside	10	2	608
84	Bus	نيسان 1981	Diesel	80	Out	Sumqanyya	Sumqanyya	2.0	Inside	2	1	183
85	Meduim Passenger vehicle	ب ا. 2005	Gasoline	100	Out	Sumqanyya	Sumqanyya	2.0	Inside	8	2	584
86	Small Passenger vehicle	هيونداي 2010	Gasoline	2	Out	Mokhtara	Mokhtara	1.0	Outside	1	9	3,318
87	Small Passenger vehicle	هيونداي 2010	Gasoline	240	In	Sumqanyya	Sumqanyya	1.0	Inside	14	1	426
88	Small Passenger vehicle	رسيدس . 1987	Gasoline	130	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	168

89	Small Passenger vehicle	هيونداي 1997	Gasoline	140	Out	Sumqanyya	Sumqanyya	1.0	Inside	3	0	156
90	Small Passenger vehicle	نيسان 2011	Gasoline	200	In	Sumqanyya	Sumqanyya	2.0	Inside	10	1	365
91	Small Passenger vehicle	ب ا. 2003	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.1	Inside	2	0	97
92	Small Passenger vehicle	هوندا 1990	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.2	Inside	3	0	122
93	Small Passenger vehicle	تويوتا 2003	Gasoline	150	In	Sumqanyya	Ain Wa Zain	1.0	Inside	2	0	97
94	Meduim Passenger vehicle	شيفرولي 2000	Gasoline	180	In	Sumqanyya	Ain Wa Zain	2.0	Inside	1	0	41
95	Meduim Passenger vehicle	تويوتا 1985	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	1	0	41
96	Meduim Passenger vehicle	range rover 2009	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	304
97	Meduim Passenger vehicle	range rover 2012	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	304
98	Meduim Passenger vehicle	تويوتا 2002	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	81
99	Meduim Passenger vehicle	هوندا 2000	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	81
100	Meduim Passenger	رسيدس . 2015	Gasoline	180	Out	Ain Wa Zain	Mokhtara	1.0	Inside	3	0	122

	vehicle											
101	Meduim Passenger vehicle	هيونداي 2010	Gasoline	180	Out	Ain Wa Zain	Mokhtara	1.0	Inside	3	0	122
102	Meduim Passenger vehicle	تويوتا 2005	Gasoline	180	Out	Ain Wa Zain	Mokhtara	1.0	Inside	1	0	41
103	Meduim Passenger vehicle	نيسان 2012	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	1	0	41
104	Meduim Passenger vehicle	infinity 2009	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	1	0	41
105	Meduim Passenger vehicle	تويوتا 2005	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	1	0	41
106	Meduim Passenger vehicle	سوزوكي 2004	Gasoline	120	Out	Sumqanyya	Sumqanyya	0.5	Inside	1	0	61
107	Meduim Passenger vehicle	american ola 95	Gasoline	180	In	Sumqanyya	Sumqanyya	2.0	Inside	2	0	81
108	Meduim Passenger vehicle	infinity 2010	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
109	Meduim Passenger vehicle	infinity 1999	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	10	1	406
110	Meduim Passenger vehicle	نيسان 2010	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
111	Meduim Passenger vehicle	ب ا. 1995	Gasoline	180	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
112	Meduim	volvo	Gasoli	180	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81

	Passenger vehicle	1980	ne									
113	Small Passenger vehicle	دايهاتسو 2010	Gasoline	180	Out	Sumqanyya	Sumqanyya	1.0	Inside	3	0	122
114	Small Passenger vehicle	بيجو 2005	Gasoline	170	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	86
115	Small Passenger vehicle	بيجو 2006	Gasoline	160	Out	Sumqanyya	Mokhtara	0.5	Inside	5	1	228
116	Small Passenger vehicle	تويوتا 1995	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	3	0	122
117	Small Passenger vehicle	يا 2015.	Gasoline	250	In	Sumqanyya	Sumqanyya	1.0	Inside	3	0	88
118	Small Passenger vehicle	هيونداي 2010	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.5	Inside	6	1	219
119	Meduim Passenger vehicle	ب ا. 1998	Gasoline	120	In	Sumqanyya	Sumqanyya	0.5	Inside	4	1	243
120	Meduim Passenger vehicle	دايو 1990	Gasoline	160	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	91
121	Meduim Passenger vehicle	باجيرو 2002	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	4	1	243
122	Small Passenger vehicle	نيسان 2012	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	183
123	Bus	نيسان 1985	Diesel	80	In	Sumqanyya	Sumqanyya	0.7	Inside	5	1	456
124	Meduim	شيفروليه	Gasoli	120	In	Sumqanyya	Sumqanyya	0.2	Inside	1	0	61

	Passenger vehicle	2005	ne									
125	Small Passenger vehicle	يا 2014.	Gasoline	250	In	Sumqanyya	Sumqanyya	0.2	Inside	1	0	29
126	Meduim Passenger vehicle	نيسان 2012	Gasoline	200	In	Sumqanyya	Sumqanyya	0.2	Inside	1	0	37
127	Meduim Passenger vehicle	. يتسوبيشي 2006	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	4	1	243
128	Bus	تويوتا 1986	Diesel	70	Out	Sumqanyya	Sumqanyya	2.0	Outside	2	1	209
129	Small Passenger vehicle	. يتسوبيشي 2017	Gasoline	220	Out	Ain Wa Zain	Ain Wa Zain	0.4	Inside	2	0	66
130	Meduim Passenger vehicle	. رسيدس 2003	Gasoline	150	In	Mokhtara	Mokhtara	1.0	Inside	3	0	146
131	Meduim Passenger vehicle	range rover 2008	Gasoline	90	In	Mokhtara	Mokhtara	1.0	Inside	4	1	324
132	Small Passenger vehicle	دايهاتسو 2007	Gasoline	200	In	Mokhtara	Mokhtara	0.2	Inside	1	0	37
133	Meduim Passenger vehicle	سوزو.ي 1980	Gasoline	150	In	Mokhtara	Mokhtara	0.2	Inside	1	0	49
134	Small Passenger vehicle	. رسيدس 1995	Gasoline	180	In	Mokhtara	Mokhtara	0.2	Outside	10	1	406
135	Meduim Passenger vehicle	Infinity 20005	Gasoline	80	In	Mokhtara	Mokhtara	0.2	Outside	10	3	913
136	Small	يا 2008.	Gasoli	200	In	Sumqanyya	Sumqanyya	0.2	Inside	5	1	183

	Passenger vehicle		ne									
137	Small Passenger vehicle	volvo 1990	Gasoline	170	Out	Sumqanyya	Sumqanyya	0.5	Inside	3	0	129
138	Small Passenger vehicle	ب ا. 2003	Gasoline	140	Out	Ain Wa Zain	Ain Wa Zain	0.6	Inside	1	0	52
139	Small Passenger vehicle	هيونداي 2013	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.6	Inside	1	0	37
140	Small Passenger vehicle	فورد 1998	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.6	Inside	3	0	110
141	Meduim Passenger vehicle	رسيدس . 1999	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	81
142	Meduim Passenger vehicle	تويوتا 1989	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	81
143	Meduim Passenger vehicle	رسيدس . 1985	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	81
144	Meduim Passenger vehicle	رسيدس . 2005	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
145	Meduim Passenger vehicle	ب ا. 2003	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
146	Meduim Passenger vehicle	رسيدس . 2001	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
147	Meduim Passenger vehicle	هيونداي 2005	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81

148	Meduim Passenger vehicle	تويوتا 2003	Gasoline	200	Out	Sumqanyya	Mokhtara	0.7	Inside	6	1	219
149	Meduim Passenger vehicle	رسيدس . 2010	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
150	Meduim Passenger vehicle	هوندا 1994	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
151	Meduim Passenger vehicle	لادا 2000	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	1	0	61
152	Meduim Passenger vehicle	داتسون 1986	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5	Inside	5	1	203
153	Meduim Passenger vehicle	شيفروليه 2000	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
154	Meduim Passenger vehicle	جاوار 2000	Gasoline	120	In	Mokhtara	Mokhtara	6.0	Inside	8	1	487
155	Meduim Passenger vehicle	rangr rover 2015	Gasoline	120	In	Mokhtara	Mokhtara	6.0	Inside	8	1	487
156	Meduim Passenger vehicle	rangr rover 2005	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	3	1	183
157	Small Passenger vehicle	يا 2010.	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
158	Meduim Passenger vehicle	سوبارو 2005	Gasoline	120	In	Sumqanyya	Sumqanyya	0.5.	Inside	3	1	183
159	Meduim Passenger	رينو 2001	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81

	vehicle											
160	Meduim Passenger vehicle	نيسان 2012	Gasoline	120	In	Sumqanyya	Sumqanyya	0.5.	Inside	3	1	183
161	Small Passenger vehicle	نيسان 2015	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
162	Meduim Passenger vehicle	ب ا. 1999	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	1	0	41
163	Meduim Passenger vehicle	هيونداي 1985	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
164	Meduim Passenger vehicle	رسيدس . 1995	Gasoline	180	Out	Sumqanyya	Sumqanyya	2.0	Inside	3	0	122
165	Meduim Passenger vehicle	سوزوكي 1985	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	3	0	122
166	Meduim Passenger vehicle	هوندا 1995	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	5	1	203
167	Meduim Passenger vehicle	سوزوكي 1975	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	3	1	219
168	Meduim Passenger vehicle	تويوتا 1990	Gasoline	180	In	Kahlounyya	Kahlounyya	1.0	Inside	2	0	81
169	Meduim Passenger vehicle	داتسون 1980	Gasoline	180	In	Kahlounyya	Kahlounyya	1.0	Inside	2	0	81
170	Meduim Passenger vehicle	. يتسوبيشي	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	4.0	Inside	4	0	162
171	Meduim	سوزوكي	Gasoli	180	In	Ain Wa	Ain Wa	4.0	Inside	4	0	162

	Passenger vehicle	2000	ne			Zain	Zain					
172	Meduim Passenger vehicle	نيسان 2004	Gasoline	180	Out	Mokhtara	Ain Wa Zain	4.0	Inside	4	0	162
173	Meduim Passenger vehicle	ب ا. 2002	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
174	Meduim Passenger vehicle	رسيدس . 2015	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	3	0	122
175	Meduim Passenger vehicle	رسيدس . 2010	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	3	0	122
176	Meduim Passenger vehicle	رسيدس . 2005	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	3	0	122
177	Meduim Passenger vehicle	رسيدس . 1998	Gasoline	180	Out	Sumqanyya	Kahlounyya	3.0	Inside	5	1	203
178	Meduim Passenger vehicle	تويوتا 1972	Gasoline	180	In	Sumqanyya	Kahlounyya	3.0	Inside	5	1	203
179	Small Passenger vehicle	يا 2002.	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.5.	Inside	2	0	81
180	Meduim Passenger vehicle	هيونداي 1999	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.5.	Inside	2	0	81
181	Meduim Passenger vehicle	range rover 1999	Gasoline	120	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	122
182	Bus	نيسان 2004	Diesel	180	In	Mokhtara	Ain Wa Zain	1.0	Inside	4	0	162
183	Meduim	ب ا.	Gasoli	120	Out	Mokhtara	Sumqanyya	2.0	Inside	3	1	183

	Passenger vehicle	2015	ne									
184	Meduim Passenger vehicle	رسيدس . 2009	Gasoline	180	In	Mokhtara	Sumqanyya	2.0	Inside	3	0	122
185	Meduim Passenger vehicle	ب ا. 2010	Gasoline	180	In	Mokhtara	Sumqanyya	2.0	Inside	3	0	122
186	Meduim Passenger vehicle	ب ا. 1999	Gasoline	180	In	Kahlounyya	Kahlounyya	3.0	Inside	3	0	122
187	Meduim Passenger vehicle	. يتسوبيشي 1995	Gasoline	120	In	Kahlounyya	Kahlounyya	3.0	Inside	3	1	183
188	Meduim Passenger vehicle	رينو 1999	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	3	0	122
189	Meduim Passenger vehicle	هيونداي 2010	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	2	0	81
190	Small Passenger vehicle	ب ا. 1996	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.5	Inside	5	1	203
191	Meduim Passenger vehicle	infinity 2008	Gasoline	100	In	Ain Wa Zain	Sumqanyya	0.5	Inside	4	1	292
192	Small Passenger vehicle	سوبارو 1995	Gasoline	62	In	Ain Wa Zain	Sumqanyya	0.4	Inside	3	1	353
193	Small Passenger vehicle	هوندا 1999	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Outside	2	0	61
194	Small Passenger vehicle	ب ا. 2000	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	122

195	Small Passenger vehicle	تويوتا 2000	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.4	Inside	2	0	73
196	Small Passenger vehicle	دايو 1998	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Outside	1	0	41
197	Meduim Passenger vehicle	هوندا 2007	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	110
198	Small Passenger vehicle	نيسان 1993	Gasoline	180	In	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	122
199	Small Passenger vehicle	هوندا 1998	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.5	Inside	1	0	41
200	Small Passenger vehicle	رسيدس . 2002	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.5	Inside	1	0	61
201	Small Passenger vehicle	رسيدس . 2002	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	0.4	Inside	3	0	122
202	Small Passenger vehicle	داتسون 1986	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	3	0	110
203	Small Passenger vehicle	ب ا. 2000	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	122
204	Meduim Passenger vehicle	سوزوكي 1986	Gasoline	250	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	88
205	Meduim Passenger vehicle	تويوتا 2004	Gasoline	80	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	1	0	91
206	Small Passenger	هوندا 1998	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.4	Inside	1	0	37

	vehicle											
207	Meduim Passenger vehicle	هوندا 2001	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	122
208	Small Passenger vehicle	هوندا 2001	Gasoline	140	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	156
209	Small Passenger vehicle	رسيدس . 1998	Gasoline	100	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	1	219
210	Small Passenger vehicle	هوندا 2009	Gasoline	120	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	1	183
211	Small Passenger vehicle	هيونداي 2012	Gasoline	250	In	Ain Wa Zain	Sumqanyya	0.4	Inside	4	0	117
212	Small Passenger vehicle	يا 2015.	Gasoline	250	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	4	0	117
213	Small Passenger vehicle	سيراتو 2014	Gasoline	200	In	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	110
214	Small Passenger vehicle	يا 2009.	Gasoline	200	In	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	110
215	Small Passenger vehicle	نيسان 2005	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	4	0	162
216	Small Passenger vehicle	يا 2007.	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	3	0	110
217	Meduim Passenger vehicle	جيب 1999	Gasoline	90	Out	Ain Wa Zain	Sumqanyya	0.3	Inside	3	1	243
218	Meduim	جيب	Gasoli	110	In	Ain Wa	Sumqanyya	0.3	Inside	3	1	199

	Passenger vehicle	2004	ne			Zain						
219	Small Passenger vehicle	رسيدس . 2001	Gasoline	130	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	2	0	112
220	Small Passenger vehicle	يا 2006.	Gasoline	200	In	Ain Wa Zain	Sumqanyya	0.2	Inside	1	0	37
221	Meduim Passenger vehicle	range rover 1990	Gasoline	90	In	Ain Wa Zain	Sumqanyya	0.2	Inside	5	1	406
222	Small Passenger vehicle	رسيدس . 1985	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.2	Inside	1	0	61
223	Small Passenger vehicle	يا 2013.	Gasoline	180	In	Ain Wa Zain	Sumqanyya	0.2	Inside	1	0	41
224	Small Passenger vehicle	يا 2017.	Gasoline	220	In	Ain Wa Zain	Sumqanyya	0.2	Inside	1	0	33
225	Meduim Passenger vehicle	يا 2003.	Gasoline	120	Out	Ain Wa Zain	Sumqanyya	0.2	Inside	2	0	91
226	Small Passenger vehicle	رسيدس . 2005	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.2	Inside	5	1	304
227	Small Passenger vehicle	رسيدس . 2010	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.2	Inside	5	1	304
228	Small Passenger vehicle	يا 2005.	Gasoline	240	Out	Ain Wa Zain	Sumqanyya	0.6	Outside	2	0	61
229	Meduim Passenger vehicle	. يتسوبيشي 1998	Gasoline	120	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	122

230	Small Passenger vehicle	ازدا . 2014	Gasoline	220	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	66
231	Small Passenger vehicle	نيسان 1981	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.6	Outside	2	0	73
232	Small Passenger vehicle	دايو 1994	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	73
233	Meduim Passenger vehicle	هوندا 2004	Gasoline	140	Out	Ain Wa Zain	Sumqanyya	0.5	Inside	1	0	52
234	Small Passenger vehicle	ب ا. 1989	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.3	Inside	2	0	73
235	Small Passenger vehicle	دايو 2000	Gasoline	200	In	Ain Wa Zain	Sumqanyya	0.3	Inside	2	0	73
236	Small Passenger vehicle	نيسان 2000	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.3	Inside	2	0	73
237	Small Passenger vehicle	نيسان 2006	Gasoline	180	In	Sumqanyya	Sumqanyya	0.2	Inside	8	1	324
238	Small Passenger vehicle	يا 2010.	Gasoline	280	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	8	1	209
239	Small Passenger vehicle	. يتسوبيشي 2015	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	8	1	292
240	Small Passenger vehicle	رسيدس . 2006	Gasoline	160	Out	Ain Wa Zain	Ain Wa Zain	0.4	Inside	5	1	228
241	Small Passenger	رينو 1994	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.2	Inside	1	0	37

	vehicle											
242	Small Passenger vehicle	داتسون 1994	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.2	Inside	2	0	81
243	Small Passenger vehicle	رسيدس . 2006	Gasoline	160	In	Sumqanyya	Sumqanyya	0.1	Inside	2	0	91
244	Meduim Passenger vehicle	رسيدس . 2004	Gasoline	120	Out	Mokhtara	Sumqanyya	0.2	Inside	1	0	61
245	Small Passenger vehicle	ب ا. 1987	Gasoline	200	In	Mokhtara	Sumqanyya	0.2	Inside	1	0	37
246	Bus	شن.اهاي 2007	Diesel	120	In	Ain Wa Zain	Sumqanyya	0.1	Inside	5	1	304
247	Small Passenger vehicle	رينو 2000	Gasoline	200	Out	Mokhtara	Sumqanyya	3.0	Inside	3	0	110
248	Meduim Passenger vehicle	باجيرو 2000	Gasoline	120	Out	Mokhtara	Sumqanyya	3.0	Inside	3	1	183
249	Small Passenger vehicle	تويوتا 1992	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.1	Inside	10	1	406
250	Meduim Passenger vehicle	infinity 2001	Gasoline	120	Out	Sumqanyya	Sumqanyya	0.1	Inside	10	2	608
251	Small Passenger vehicle	نيسان 2014	Gasoline	220	Out	Ain Wa Zain	Sumqanyya	1.0	Inside	2	0	66
252	Meduim Passenger vehicle	infinity 1995	Gasoline	110	In	Ain Wa Zain	Ain Wa Zain	0.1	Inside	15	3	995
253	Meduim Passenger	تويوتا 2000	Gasoline	120	Out	Ain Wa Zain	Sumqanyya	1.0	Inside	1	0	61

	vehicle											
254	Small Passenger vehicle	تويوتا 1980	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	1.0	Inside	1	0	37
255	Small Passenger vehicle	رسيدس . 2000	Gasoline	160	Out	Sumqanyya	Sumqanyya	0.1	Inside	3	0	137
256	Small Passenger vehicle	رسيدس . 2005	Gasoline	160	Out	Sumqanyya	Sumqanyya	0.1	Inside	5	1	228
257	Small Passenger vehicle	رسيدس . 2008	Gasoline	140	Out	Sumqanyya	Sumqanyya	0.2	Inside	4	1	209
258	Small Passenger vehicle	االتي.ا 2014	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.2	Inside	4	0	162
259	Small Passenger vehicle	تويوتا 1990	Gasoline	200	In	Sumqanyya	Sumqanyya	0.1	Inside	2	0	73
260	Small Passenger vehicle	تويوتا 2010	Gasoline	220	In	Sumqanyya	Sumqanyya	0.1	Inside	2	0	66
261	Small Passenger vehicle	تويوتا 1989	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	4	0	162
262	Meduim Passenger vehicle	جي ا. سي 2000	Gasoline	100	In	Sumqanyya	Sumqanyya	0.1	Inside	5	1	365
263	Small Passenger vehicle	تويوتا 1998	Gasoline	240	Out	Ain Wa Zain	Sumqanyya	0.4	Inside	4	0	122
264	Small Passenger vehicle	ازدا . 2016	Gasoline	220	In	Ain Wa Zain	Sumqanyya	0.4	Inside	4	0	133
265	Small	ب ا.	Gasoli	180	Out	Ain Wa	Sumqanyya	0.1	Inside	1	0	41

	Passenger vehicle	1986	ne			Zain						
266	Meduim Passenger vehicle	سوزو.ي 1998	Gasoline	80	Out	Ain Wa Zain	Sumqanyya	0.1	Inside	1	0	91
267	Meduim Passenger vehicle	شفروليه 1991	Gasoline	100	Out	Ain Wa Zain	Sumqanyya	0.1	Inside	3	1	219
268	Small Passenger vehicle	ب ا. 1985	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.1	Inside	1	0	41
269	Meduim Passenger vehicle	. يتسوبيشي 2000	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.1	Inside	1	0	73
270	Small Passenger vehicle	شفروليه 2000	Gasoline	250	In	Sumqanyya	Sumqanyya	0.1	Inside	5	0	146
271	Small Passenger vehicle	نيسان 2014	Gasoline	220	Out	Sumqanyya	Sumqanyya	0.1	Inside	5	0	166
272	Small Passenger vehicle	سوبارو 2004	Gasoline	120	Out	Sumqanyya	Sumqanyya	0.1	Inside	5	1	304
273	Meduim Passenger vehicle	شيرو.ي 1998	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.1	Inside	5	1	365
274	Small Passenger vehicle	ب ا. 2006	Gasoline	160	In	Sumqanyya	Sumqanyya	0.1	Inside	2	0	91
275	Bus	تويوتا 1998	Diesel	150	In	Sumqanyya	Sumqanyya	0.1	Inside	2	0	97
276	Small Passenger vehicle	ب ا. 1994	Gasoline	130	Out	Sumqanyya	Sumqanyya	1.0	Outside	2	0	112
277	Small	. رسيدس	Gasoli	110	Out	Sumqanyya	Sumqanyya	0.9	Inside	2	0	133

	Passenger vehicle	1996	ne									
278	Small Passenger vehicle	تويوتا 1980	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.9	Inside	5	1	183
279	Meduim Passenger vehicle	نيسان 1998	Gasoline	110	Out	Sumqanyya	Sumqanyya	0.9	Inside	5	1	332
280	Small Passenger vehicle	هوندا 2007	Gasoline	180	In	Sumqanyya	Sumqanyya	0.6	Inside	13	1	527
281	Meduim Passenger vehicle	infinity 2002	Gasoline	130	In	Sumqanyya	Sumqanyya	0.6	Inside	13	2	730
282	Meduim Passenger vehicle	نيسان 2003	Gasoline	110	Out	Sumqanyya	Sumqanyya	0.9	Inside	2	0	133
283	Small Passenger vehicle	تويوتا 2003	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.9	Inside	2	0	73
284	Small Passenger vehicle	نيسان 1980	Gasoline	200	In	Sumqanyya	Sumqanyya	0.9	Inside	5	1	183
285	Small Passenger vehicle	هوندا 1980	Gasoline	200	In	Sumqanyya	Sumqanyya	0.9	Inside	5	1	183
286	Small Passenger vehicle	داتسون 1980	Gasoline	200	In	Sumqanyya	Sumqanyya	0.9	Inside	5	1	183
287	Meduim Passenger vehicle	لاند روفر 1991	Gasoline	130	In	Sumqanyya	Sumqanyya	0.9	Inside	10	2	562
288	Meduim Passenger vehicle	سوزو.س 2002	Gasoline	140	In	Sumqanyya	Sumqanyya	0.9	Inside	10	1	521

289	Small Passenger vehicle	ب ا. 1987	Gasoline	160	In	Sumqanyya	Sumqanyya	0.9	Inside	10	1	456
290	Small Passenger vehicle	تويوتا 1992	Gasoline	170	In	Sumqanyya	Sumqanyya	0.9	Inside	10	1	429
291	Meduim Passenger vehicle	rav 4 - 2006	Gasoline	160	In	Sumqanyya	Sumqanyya	0.9	Outside	10	1	456
292	Small Passenger vehicle	تويوتا 1995	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.8	Inside	2	0	81
293	Small Passenger vehicle	تويوتا 2009	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.8	Inside	2	0	73
294	Meduim Passenger vehicle	range rover 1995	Gasoline	100	Out	Ain Wa Zain	Ain Wa Zain	0.8	Inside	10	2	730
295	Small Passenger vehicle	بيجو 1995	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	0.8	Inside	10	1	406
296	Small Passenger vehicle	يا 2002.	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.8	Inside	2	0	73
297	Meduim Passenger vehicle	تويوتا 2007	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.8	Outside	2	0	81
298	Small Passenger vehicle	يا 1998.	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	81
299	Small Passenger vehicle	رسيدس . 1990	Gasoline	150	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	97
300	Small Passenger	رسيدس . 1994	Gasoline	150	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	97

	vehicle											
301	Small Passenger vehicle	هوندا 1995	Gasoline	180	In	Mokhtara	Mokhtara	0.4	Outside	2	0	81
302	Meduim Passenger vehicle	نيسان 2002	Gasoline	120	Out	Ain Wa Zain	Ain Wa Zain	0.8	Inside	2	0	122
303	Meduim Passenger vehicle	شيرو.ي 1999	Gasoline	120	Out	Sumqanyya	Sumqanyya	0.8	Inside	3	1	183
304	Small Passenger vehicle	تويوتا 2002	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.8	Inside	3	0	110
305	Small Passenger vehicle	رسيدس . 2005	Gasoline	150	In	Sumqanyya	Sumqanyya	0.8	Inside	2	0	97
306	Meduim Passenger vehicle	. يتسوبيشي 1999	Gasoline	160	In	Sumqanyya	Sumqanyya	1.0	Outside	5	1	228
307	Small Passenger vehicle	رينو 1994	Gasoline	170	In	Sumqanyya	Sumqanyya	1.0	Outside	2	0	86
308	Meduim Passenger vehicle	ب ا. 2000	Gasoline	110	Out	Sumqanyya	Mokhtara	0.7	Inside	3	1	199
309	Meduim Passenger vehicle	ب ا. 2015	Gasoline	100	Out	Sumqanyya	Kahlounyya	2.0	Outside	5	1	365
310	Meduim Passenger vehicle	نيسان 2005	Gasoline	120	In	Sumqanyya	Mokhtara	1.0	Inside	6	1	365
311	Small Passenger vehicle	رسيدس . 1990	Gasoline	110	In	Sumqanyya	Ain Wa Zain	1.0	Inside	7	1	465
312	Small	تويوتا	Gasoli	180	Out	Sumqanyya	Sumqanyya	1.0	Outside	2	0	81

	Passenger vehicle	1987	ne									
313	Small Passenger vehicle	فولز 1985	Gasoline	150	Out	Mokhtara	Mokhtara	1.0	Inside	5	1	243
314	Small Passenger vehicle	يا 2014.	Gasoline	250	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	58
315	Small Passenger vehicle	نيسان 2013	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.5	Outside	3	0	110
316	Small Passenger vehicle	تويوتا 1985	Gasoline	170	Out	Mokhtara	Sumqanyya	1.0	Inside	5	1	215
317	Meduim Passenger vehicle	ب ا. 2005	Gasoline	100	In	Mokhtara	Sumqanyya	1.0	Inside	3	1	219
318	Meduim Passenger vehicle	باجيرو 2000	Gasoline	110	In	Ain Wa Zain	Sumqanyya	1.0	Inside	4	1	265
319	Meduim Passenger vehicle	نيسان 2012	Gasoline	180	In	Mokhtara	Ain Wa Zain	1.0	Inside	3	0	122
320	Bus	نيسان 1985	Diesel	100	In	Kahlounyya	Kahlounyya	2.0	Inside	5	1	365
321	Small Passenger vehicle	تويوتا 1983	Gasoline	160	Out	Ain Wa Zain	Sumqanyya	1.0	Inside	2	0	91
322	Meduim Passenger vehicle	جي ا. سي 2005	Gasoline	100	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	5	1	365
323	Small Passenger vehicle	ب ا. 1989	Gasoline	130	Out	Sumqanyya	Sumqanyya	1.0	Inside	4	1	225
324	Small	دايو	Gasoli	200	Out	Sumqanyya	Sumqanyya	1.0	Inside	8	1	292

	Passenger vehicle	1990	ne									
325	Small Passenger vehicle	رسيدس . 1988	Gasoline	150	In	Sumqanyya	Mokhtara	1.0	Inside	5	1	243
326	Small Passenger vehicle	بيجو 2005	Gasoline	170	Out	Sumqanyya	Sumqanyya	1.0	Inside	3	0	129
327	Meduim Passenger vehicle	range rover 2013	Gasoline	70	In	Ain Wa Zain	Sumqanyya	1.0	Inside	5	1	521
328	Meduim Passenger vehicle	نيسان 2004	Gasoline	110	In	Sumqanyya	Mokhtara	1.0	Outside	3	1	199
329	Small Passenger vehicle	هيونداي 2014	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.8	Inside	3	0	88
330	Bus	نيسان 1985	Diesel	100	Out	Sumqanyya	Kahlounyya	1.0	Inside	3	1	219
331	Small Passenger vehicle	هوندا 1998	Gasoline	170	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	86
332	Small Passenger vehicle	هوندا 1998	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
333	Small Passenger vehicle	رسيدس . 1998	Gasoline	130	Out	Sumqanyya	Mokhtara	2.0	Inside	4	1	225
334	Meduim Passenger vehicle	infinity 2010	Gasoline	100	Out	Sumqanyya	Ain Wa Zain	2.0	Outside	5	1	365
335	Small Passenger vehicle	نيسان 2013	Gasoline	180	Out	Sumqanyya	Sumqanyya	2.0	Outside	4	0	162
336	Small	بيجو	Gasoli	180	In	Sumqanyya	Sumqanyya	1.0	Inside	4	0	162

	Passenger vehicle	2005	ne									
337	Small Passenger vehicle	ب ا. 1987	Gasoline	160	Out	Sumqanyya	Sumqanyya	2.0	Outside	2	0	91
338	Meduim Passenger vehicle	نيسان 2015	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Outside	3	0	110
339	Meduim Passenger vehicle	تويوتا 2010	Gasoline	180	Out	Sumqanyya	Ain Wa Zain	0.5	Inside	5	1	203
340	Meduim Passenger vehicle	جي ا. سي 2005	Gasoline	100	In	Sumqanyya	Mokhtara	1.0	Inside	4	1	292
341	Meduim Passenger vehicle	فولفو 1995	Gasoline	130	Out	Sumqanyya	Ain Wa Zain	1.0	Inside	3	0	168
342	Meduim Passenger vehicle	هيونداي 1998	Gasoline	150	In	Sumqanyya	Kahlounyya	2.0	Inside	5	1	243
343	Meduim Passenger vehicle	جي ا. سي 2005	Gasoline	120	Out	Sumqanyya	Sumqanyya	0.7	Inside	5	1	304
344	Small Passenger vehicle	هيونداي 2013	Gasoline	230	Out	Sumqanyya	Mokhtara	0.7	Inside	3	0	95
345	Meduim Passenger vehicle	ب ا. 2007	Gasoline	100	Out	Sumqanyya	Mokhtara	2.0	Outside	4	1	292
346	Meduim Passenger vehicle	جي ا. سي 2005	Gasoline	130	Out	Sumqanyya	Sumqanyya	2.0	Outside	3	0	168
347	Small Passenger vehicle	يا 2014.	Gasoline	250	Out	Sumqanyya	Sumqanyya	2.0	Outside	3	0	88

348	Meduim Passenger vehicle	ب ا. 1998	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	122
349	Small Passenger vehicle	رسيدس . 2001	Gasoline	210	Out	Mokhtara	Mokhtara	3.0	Inside	3	0	104
350	Meduim Passenger vehicle	rav 4 - 2000	Gasoline	160	Out	Sumqanyya	Sumqanyya	3.0	Inside	20	3	913
351	Meduim Passenger vehicle	داتسون 1987	Gasoline	170	In	Sumqanyya	Sumqanyya	3.0	Inside	12	1	515
352	Small Passenger vehicle	داتسون 1980	Gasoline	200	Out	Sumqanyya	Kahlounyya	3.0	Inside	15	2	548
353	Small Passenger vehicle	هوندا 1989	Gasoline	180	Out	Sumqanyya	Sumqanyya	3.0	Inside	5	1	203
354	Meduim Passenger vehicle	رسيدس . 1991	Gasoline	130	In	Sumqanyya	Sumqanyya	2.0	Inside	5	1	281
355	Meduim Passenger vehicle	شيفروليه 2011	Gasoline	100	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	365
356	Meduim Passenger vehicle	جي ا. سي 2017	Gasoline	130	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	281
357	Meduim Passenger vehicle	شيفروليه 2008	Gasoline	130	Out	Sumqanyya	Sumqanyya	1.0	Outside	8	1	449
358	Small Passenger vehicle	تويوتا 1981	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Outside	5	1	183
359	Meduim Passenger	ب ا. 2005	Gasoline	140	In	Sumqanyya	Sumqanyya	1.0	Outside	5	1	261

	vehicle											
360	Small Passenger vehicle	نيسان 2013	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.2	Inside	5	1	365
361	Meduim Passenger vehicle	هوندا 2003	Gasoline	140	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	104
362	Small Passenger vehicle	تويوتا 1980	Gasoline	200	In	Sumqanyya	Mokhtara	0.5	Inside	5	1	183
363	Small Passenger vehicle	داتسون 1990	Gasoline	200	In	Sumqanyya	Mokhtara	0.5	Inside	5	1	183
364	Small Passenger vehicle	رينو 2008	Gasoline	190	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	77
365	Meduim Passenger vehicle	هوندا 2012	Gasoline	170	Out	Mokhtara	Mokhtara	3.0	Inside	5	1	215
366	Meduim Passenger vehicle	سوزوكي 1999	Gasoline	200	Out	Mokhtara	Mokhtara	3.0	Inside	10	1	365
367	Meduim Passenger vehicle	شيروكي 1993	Gasoline	90	In	Sumqanyya	Sumqanyya	3.0	Inside	20	4	1,622
368	Meduim Passenger vehicle	هوندا 2003	Gasoline	180	In	Sumqanyya	Sumqanyya	3.0	Inside	20	2	811
369	Meduim Passenger vehicle	ب ا. 2009	Gasoline	100	Out	Sumqanyya	Sumqanyya	1.0	Outside	8	2	584
370	Meduim Passenger vehicle	فولز 2014	Gasoline	160	Out	Sumqanyya	Sumqanyya	1.0	Inside	25	3	1,141
371	Small	رسيدس .	Gasoli	100	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	365

	Passenger vehicle	1968	ne									
372	Meduim Passenger vehicle	رسيدس . 2006	Gasoline	150	Out	Mokhtara	Mokhtara	1.0	Inside	10	1	487
373	Small Passenger vehicle	سوزو.ي 1997	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.1	Outside	10	1	406
374	Meduim Passenger vehicle	باجيرو 1999	Gasoline	100	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	4	1	256
375	Small Passenger vehicle	رسيدس . 1989	Gasoline	120	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	304
376	Meduim Passenger vehicle	infinity 2002	Gasoline	90	In	Sumqanyya	Sumqanyya	1.0	Inside	10	2	811
377	Small Passenger vehicle	.2012 يا	Gasoline	220	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	0	166
378	Meduim Passenger vehicle	هوندا 2015	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	183
379	Meduim Passenger vehicle	ب ا. 1987	Gasoline	100	In	Sumqanyya	Sumqanyya	3.0	Inside	20	4	1,460
380	Meduim Passenger vehicle	هيونداي 2006	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	203
381	Meduim Passenger vehicle	سوزو.سـ 1990 ي	Gasoline	130	In	Sumqanyya	Ain Wa Zain	1.0	Outside	5	1	281
382	Small Passenger vehicle	نيسان 2009	Gasoline	170	In	Sumqanyya	Sumqanyya	1.0	Outside	15	2	644

383	Meduim Passenger vehicle	جي ا. سي 1998	Gasoline	100	Out	Sumqanyya	Sumqanyya	2.0	Inside	12	2	876
384	Meduim Passenger vehicle	ب ا. 2000	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	15	3	1,095
385	Meduim Passenger vehicle	هوندا 1985	Gasoline	150	In	Sumqanyya	Sumqanyya	1.0	Inside	15	2	730
386	Meduim Passenger vehicle	ب ا. 2003	Gasoline	120	Out	Sumqanyya	Sumqanyya	1.0	Inside	15	3	913
387	Meduim Passenger vehicle	هوندا 2009	Gasoline	160	Out	Sumqanyya	Mokhtara	0.6	Inside	3	0	137
388	Meduim Passenger vehicle	هوندا 2006	Gasoline	200	Out	Sumqanyya	Mokhtara	0.6	Inside	3	0	110
389	Meduim Passenger vehicle	سوزو.ي 2007	Gasoline	160	Out	Sumqanyya	Mokhtara	0.6	Inside	3	0	137
390	Meduim Passenger vehicle	ب ا. 2002	Gasoline	170	Out	Sumqanyya	Sumqanyya	0.6	Inside	2	0	86
391	Meduim Passenger vehicle	. يتسوبيشي 1986	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.6	Inside	2	0	97
392	Meduim Passenger vehicle	volvo 1982	Gasoline	150	In	Sumqanyya	Sumqanyya	0.6	Inside	2	0	97
393	Small Passenger vehicle	هيونداي 2009	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.6	Inside	5	0	146
394	Meduim Passenger	سوزو.ي 2003	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.6	Inside	5	1	183

	vehicle											
395	Small Passenger vehicle	نيسان 2001	Gasoline	220	Out	Sumqanyya	Sumqanyya	0.6	Inside	5	0	166
396	Meduim Passenger vehicle	ب ا. 2006	Gasoline	100	In	Ain Wa Zain	Sumqanyya	0.6	Inside	1	0	73
397	Meduim Passenger vehicle	. يتسوبيشي 2013	Gasoline	160	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	91
398	Meduim Passenger vehicle	volvo 1977	Gasoline	150	Out	Sumqanyya	Kahlounyya	0.5	Inside	2	0	97
399	Meduim Passenger vehicle	ب ا. 1992	Gasoline	140	Out	Sumqanyya	Kahlounyya	0.5	Inside	2	0	104
400	Meduim Passenger vehicle	هيونداي 2000	Gasoline	150	Out	Sumqanyya	Kahlounyya	0.5	Inside	2	0	97
401	Meduim Passenger vehicle	range rover 2000	Gasoline	100	In	Sumqanyya	Kahlounyya	0.3	Outside	10	2	730
402	Meduim Passenger vehicle	سوزو.ي 2002	Gasoline	120	In	Sumqanyya	Mokhtara	0.3	Outside	5	1	304
403	Small Passenger vehicle	سوزو.ي 2011	Gasoline	240	Out	Sumqanyya	Ain Wa Zain	0.2	Inside	10	1	304
404	Meduim Passenger vehicle	جيب 2008	Gasoline	150	Out	Sumqanyya	Ain Wa Zain	0.2	Inside	10	1	487
405	Meduim Passenger vehicle	جيب 1995	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.1	Outside	10	2	730
406	Small	هيونداي	Gasoli	180	Out	Ain Wa	Ain Wa	0.1	Inside	20	2	811

	Passenger vehicle	2011	ne			Zain	Zain					
407	Meduim Passenger vehicle	جيب 2007	Gasoline	140	Out	Ain Wa Zain	Ain Wa Zain	0.1	Inside	5	1	261
408	Meduim Passenger vehicle	رسيدس . 1998	Gasoline	130	Out	Ain Wa Zain	Ain Wa Zain	0.1	Inside	5	1	281
409	Meduim Passenger vehicle	جيب 1993	Gasoline	100	Out	Mokhtara	Mokhtara	0.1	Inside	15	3	1,095
410	Meduim Passenger vehicle	سوزو.ي 2002	Gasoline	120	Out	Kahlounyya	Kahlounyya	2.0	Inside	15	3	913
411	Small Passenger vehicle	يغرا . 2016	Gasoline	200	Out	Kahlounyya	Kahlounyya	2.0	Inside	15	2	548
412	Meduim Passenger vehicle	range rover 2012	Gasoline	100	Out	Sumqanyya	Sumqanyya	2.0	Outside	10	2	730
413	Meduim Passenger vehicle	ب ا. 2006	Gasoline	120	Out	Sumqanyya	Sumqanyya	2.0	Outside	10	2	608
414	Meduim Passenger vehicle	لادا 2017	Gasoline	140	In	Sumqanyya	Mokhtara	2.0	Inside	20	3	1,043
415	Meduim Passenger vehicle	جي ا. سي 2017	Gasoline	110	In	Sumqanyya	Mokhtara	2.0	Inside	20	4	1,327
416	Meduim Passenger vehicle	داتسون 2011	Gasoline	140	In	Sumqanyya	Mokhtara	2.0	Inside	20	3	1,043
417	Small Passenger vehicle	هيونداي 2014	Gasoline	200	Out	Sumqanyya	Sumqanyya	4.0	Inside	20	2	730

418	Meduim Passenger vehicle	نيسان 2001	Gasoline	100	Out	Sumqanyya	Sumqanyya	4.0	Inside	20	4	1,460
419	Small Passenger vehicle	نيسان 1990	Gasoline	200	Out	Sumqanyya	Sumqanyya	3.0	Inside	20	2	730
420	Meduim Passenger vehicle	تويوتا 1992	Gasoline	200	Out	Sumqanyya	Sumqanyya	3.0	Inside	20	2	730
421	Meduim Passenger vehicle	داتسون 2016	Gasoline	180	Out	Sumqanyya	Sumqanyya	3.0	Inside	20	2	811
422	Meduim Passenger vehicle	جيب 2001	Gasoline	120	Out	Sumqanyya	Sumqanyya	3.0	Inside	20	3	1,217
423	Meduim Passenger vehicle	شيفروليه 2007	Gasoline	140	In	Sumqanyya	Sumqanyya	0.6	Inside	10	1	521
424	Small Passenger vehicle	نيسان 2007	Gasoline	200	In	Sumqanyya	Sumqanyya	0.6	Inside	10	1	365
425	Small Passenger vehicle	نيسان 2014	Gasoline	230	Out	Sumqanyya	Sumqanyya	0.5	Inside	6	1	190
426	Small Passenger vehicle	رسيدس . 2002	Gasoline	110	Out	Sumqanyya	Sumqanyya	1.0	Outside	1	0	66
427	Small Passenger vehicle	هيونداي 2012	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Outside	4	0	146
428	Small Passenger vehicle	يا 2011.	Gasoline	220	In	Mokhtara	Mokhtara	2.0	Inside	5	0	166
429	Meduim Passenger	جيب 2003	Gasoline	100	In	Sumqanyya	Mokhtara	0.5	Inside	5	1	365

	vehicle											
430	Small Passenger vehicle	تويوتا 1984	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	4	0	162
431	Small Passenger vehicle	رسيدس . 2005	Gasoline	180	Out	Sumqanyya	Sumqanyya	1.0	Outside	2	0	81
432	Small Passenger vehicle	نيسان 2003	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.2	Inside	5	1	183
433	Small Passenger vehicle	هيونداي 2006	Gasoline	200	In	Kahlounyya	Kahlounyya	0.2	Inside	2	0	73
434	Small Passenger vehicle	رسيدس . 1980	Gasoline	150	In	Ain Wa Zain	Ain Wa Zain	0.2	Inside	1	0	49
435	Small Passenger vehicle	نيسان 1988	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	1	0	41
436	Small Passenger vehicle	دايو 1995	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	3.0	Inside	6	1	219
437	Meduim Passenger vehicle	رينو 2000	Gasoline	170	Out	Sumqanyya	Sumqanyya	0.5	Outside	10	1	429
438	Small Passenger vehicle	رسيدس . 2004	Gasoline	165	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	1	0	44
439	Small Passenger vehicle	تويوتا 2012	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.4	Inside	10	1	365
440	Meduim Passenger vehicle	نيسان 2005	Gasoline	170	In	Sumqanyya	Sumqanyya	0.4	Inside	2	0	86
441	Meduim	نيسان	Gasoli	170	In	Sumqanyya	Sumqanyya	0.4	Inside	4	0	172

	Passenger vehicle	2011	ne									
442	Meduim Passenger vehicle	. يتسوبيشي 1998	Gasoline	120	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	3	1	183
443	Meduim Passenger vehicle	لاند .روز 2009	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.4	Inside	1	0	73
444	Meduim Passenger vehicle	. يتسوبيشي 2001	Gasoline	90	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	406
445	Small Passenger vehicle	يا 2013.	Gasoline	250	In	Sumqanyya	Sumqanyya	0.5	Inside	1	0	29
446	Small Passenger vehicle	نيسان 2016	Gasoline	250	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	58
447	Small Passenger vehicle	هوندا 1998	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	73
448	Meduim Passenger vehicle	شيرو.ي 2013	Gasoline	110	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	133
449	Meduim Passenger vehicle	هيونداي 2010	Gasoline	200	In	Kahlounyya	Kahlounyya	0.6	Inside	20	2	730
450	Small Passenger vehicle	volvo 1970	Gasoline	110	In	Kahlounyya	Kahlounyya	0.6	Inside	20	4	1,327
451	Small Passenger vehicle	ب ا. 1996	Gasoline	110	In	Kahlounyya	Kahlounyya	0.6	Inside	20	4	1,327
452	Small Passenger vehicle	سوبرا 1998	Gasoline	80	In	Kahlounyya	Kahlounyya	0.6	Inside	20	5	1,825

453	Small Passenger vehicle	ب ا. 2003	Gasoline	150	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	243
454	Meduim Passenger vehicle	تويوتا 2010	Gasoline	110	Out	Ain Wa Zain	Ain Wa Zain	0.5	Inside	2	0	133
455	Small Passenger vehicle	ب ا. 2005	Gasoline	170	In	Sumqanyya	Sumqanyya	0.5	Outside	2	0	86
456	Small Passenger vehicle	يا 2007.	Gasoline	200	In	Sumqanyya	Sumqanyya	0.5	Outside	3	0	110
457	Small Passenger vehicle	داتسون 2017	Gasoline	250	Out	Mokhtara	Mokhtara	0.5	Inside	6	0	175
458	Small Passenger vehicle	تويوتا 1997	Gasoline	200	In	Sumqanyya	Sumqanyya	0.2	Inside	1	0	37
459	Bus	تويوتا 2004	Diesel	140	In	Sumqanyya	Sumqanyya	0.2	Inside	1	0	52
460	Meduim Passenger vehicle	جي ا. سي 2002	Gasoline	140	In	Sumqanyya	Sumqanyya	0.2	Outside	3	0	156
461	Small Passenger vehicle	هيونداي 2014	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.2	Outside	2	0	58
462	Small Passenger vehicle	رسيدس . 2010	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.2	Outside	2	0	81
463	Small Passenger vehicle	يا 2014.	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.2	Inside	5	1	183
464	Small Passenger vehicle	يا 2015.	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.2	Inside	5	1	183

465	Meduim Passenger vehicle	جيب 2008	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.2	Inside	5	1	203
466	Small Passenger vehicle	نيسان 1995	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.2	Outside	1	0	41
467	Meduim Passenger vehicle	جيب 1998	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.2	Inside	2	0	81
468	Small Passenger vehicle	ب ا. 2006	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.2	Inside	2	0	97
469	Small Passenger vehicle	نيسان 2013	Gasoline	200	Out	Mokhtara	Mokhtara	0.4	Inside	2	0	73
470	Meduim Passenger vehicle	infinity 2008	Gasoline	120	Out	Mokhtara	Mokhtara	0.4	Inside	2	0	122
471	Small Passenger vehicle	ب. اب	Gasoline	90	Out	Mokhtara	Mokhtara	0.4	Inside	2	0	162
472	Small Passenger vehicle	رسيدس . 2000	Gasoline	140	Out	Sumqanyya	Sumqanyya	1.0	Inside	1	0	52
473	Small Passenger vehicle	شيفروليه 2014	Gasoline	120	Out	Kahlounyya	Kahlounyya	1.0	Inside	5	1	304
474	Small Passenger vehicle	رسيدس . 1999	Gasoline	160	Out	Sumqanyya	Sumqanyya	5.0	Inside	12	2	548
475	Small Passenger vehicle	نيسان 2013	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.2	Inside	2	0	73
476	Small Passenger	نيسان ساني	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.2	Inside	2	0	73

	vehicle	2013										
477	Meduim Passenger vehicle	جيب 1996	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.5	Outside	2	0	97
478	Small Passenger vehicle	هيونداي 2016	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	1	0	37
479	Small Passenger vehicle	بيجو 2001	Gasoline	150	Out	Mokhtara	Mokhtara	3.0	Outside	6	1	292
480	Meduim Passenger vehicle	range rover 1995	Gasoline	110	In	Ain Wa Zain	Ain Wa Zain	0.3	Inside	3	1	199
481	Small Passenger vehicle	رسيدس . 1992	Gasoline	140	In	Ain Wa Zain	Ain Wa Zain	0.3	Inside	3	0	156
482	Meduim Passenger vehicle	باجيرو 2003	Gasoline	140	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	104
483	Meduim Passenger vehicle	هوندا 2000	Gasoline	190	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	77
484	Small Passenger vehicle	يا 1999.	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	58
485	Meduim Passenger vehicle	هوندا 1999	Gasoline	200	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	73
486	Small Passenger vehicle	هوندا 1997	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	81
487	Small Passenger vehicle	رسيدس . 1978	Gasoline	130	In	Ain Wa Zain	Ain Wa Zain	1.0	Outside	20	3	1,123
488	Meduim	نيسان	Gasoli	200	Out	Ain Wa	Ain Wa	2.0	Inside	4	0	146

	Passenger vehicle	2005	ne			Zain	Zain					
489	Meduim Passenger vehicle	رينو 2000	Gasoline	130	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	4	1	225
490	Small Passenger vehicle	رسيدس . 1994	Gasoline	180	In	Sumqanyya	Sumqanyya	2.0	Inside	5	1	203
491	Small Passenger vehicle	نيسان 1997	Gasoline	180	In	Sumqanyya	Sumqanyya	2.0	Inside	2	0	81
492	Small Passenger vehicle	نيسان 2014	Gasoline	250	In	Sumqanyya	Sumqanyya	2.0	Inside	2	0	58
493	Small Passenger vehicle	تويوتا 1982	Gasoline	180	Out	Kahlounyya	Kahlounyya	2.0	Outside	5	1	203
494	Small Passenger vehicle	يا 2012.	Gasoline	150	Out	Mokhtara	Mokhtara	0.8	Inside	1	0	49
495	Meduim Passenger vehicle	شيرو.ي 1993	Gasoline	100	Out	Mokhtara	Mokhtara	0.8	Inside	1	0	73
496	Small Passenger vehicle	يا 2014.	Gasoline	260	In	Sumqanyya	Sumqanyya	0.2	Inside	10	1	281
497	Meduim Passenger vehicle	شيرو.ي 2001	Gasoline	130	In	Sumqanyya	Sumqanyya	0.2	Inside	10	2	562
498	Small Passenger vehicle	رسيدس . 1980	Gasoline	140	Out	Mokhtara	Mokhtara	2.0	Inside	5	1	261
499	Small Passenger vehicle	نيسان 2013	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.5	Inside	2	0	73

500	Small Passenger vehicle	يا 2013.	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	1	183
501	Small Passenger vehicle	هوندا 1981	Gasoline	180	Out	Kahlounyya	Kahlounyya	2.0	Inside	4	0	162
502	Meduim Passenger vehicle	رينو 2000	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.2	Inside	3	0	146
503	Small Passenger vehicle	تويوتا 2003	Gasoline	200	In	Sumqanyya	Sumqanyya	2.0	Inside	5	1	183
504	Small Passenger vehicle	نيسان 2010	Gasoline	170	Out	Kahlounyya	Kahlounyya	0.3	Inside	20	2	859
505	Small Passenger vehicle	رسيدس . 1993	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.2	Inside	2	0	97
506	Small Passenger vehicle	رينو 2001	Gasoline	160	In	Ain Wa Zain	Ain Wa Zain	5.0	Inside	10	1	456
507	Small Passenger vehicle	تويوتا 1989	Gasoline	250	Out	Sumqanyya	Sumqanyya	3.0	Inside	3	0	88
508	Small Passenger vehicle	نيسان 2012	Gasoline	200	Out	Mokhtara	Mokhtara	0.1	Inside	2	0	73
509	Small Passenger vehicle	فولز 1997	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	6	1	219
510	Meduim Passenger vehicle	هيونداي 2011	Gasoline	230	In	Sumqanyya	Sumqanyya	1.0	Inside	8	1	254
511	Small Passenger	نيسان 2012	Gasoline	200	Out	Mokhtara	Mokhtara	0.5	Inside	2	0	73

	vehicle											
512	Small Passenger vehicle	ب ا. 2002	Gasoline	150	Out	Mokhtara	Mokhtara	1.0	Inside	10	1	487
513	Small Passenger vehicle	يا 2015.	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Outside	2	0	73
514	Small Passenger vehicle	نيسان 1999	Gasoline	200	In	Sumqanyya	Sumqanyya	1.0	Outside	5	1	183
515	Small Passenger vehicle	يا 2016.	Gasoline	250	In	Sumqanyya	Sumqanyya	0.5	Inside	10	1	292
516	Small Passenger vehicle	تويوتا 1986	Gasoline	60	In	Sumqanyya	Sumqanyya	0.4	Inside	1	0	122
517	Small Passenger vehicle	رسيدس . 2005	Gasoline	140	Out	Sumqanyya	Sumqanyya	0.4	Inside	1	0	52
518	Small Passenger vehicle	رسيدس . 1979	Gasoline	100	Out	Mokhtara	Mokhtara	0.5	Inside	2	0	146
519	Meduim Passenger vehicle	جيب 2002	Gasoline	120	In	Sumqanyya	Sumqanyya	1.0	Inside	1	0	61
520	Meduim Passenger vehicle	. يتسوبيشي 2002	Gasoline	145	In	Ain Wa Zain	Ain Wa Zain	4.0	Inside	20	3	1,007
521	Small Passenger vehicle	داتسون 1982	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	4.0	Inside	20	2	730
522	Small Passenger vehicle	هوندا 1985	Gasoline	200	In	Sumqanyya	Sumqanyya	1.0	Inside	10	1	365
523	Small	هوندا	Gasoli	120	In	Sumqanyya	Sumqanyya	1.0	Inside	7	1	426

	Passenger vehicle	2005	ne									
524	Meduim Passenger vehicle	range rover 2005	Gasoline	120	In	Sumqanyya	Sumqanyya	1.0	Inside	10	2	608
525	Bus	يا 2014.	Diesel	170	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	215
526	Small Passenger vehicle	نيسان 2000	Gasoline	200	In	Mokhtara	Sumqanyya	0.7	Inside	10	1	365
527	Meduim Passenger vehicle	تويوتا 2009	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.5	Inside	5	1	243
528	Small Passenger vehicle	دايو 1995	Gasoline	190	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	192
529	Small Passenger vehicle	ب ا. 1999	Gasoline	150	In	Kahlounyya	Kahlounyya	0.1	Inside	20	3	973
530	Small Passenger vehicle	هيونداي 2010	Gasoline	210	In	Sumqanyya	Sumqanyya	0.2	Outside	2	0	70
531	Small Passenger vehicle	بيجو 2003	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.3	Inside	2	0	73
532	Small Passenger vehicle	هيونداي 2014	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.3	Inside	2	0	73
533	Small Passenger vehicle	يا 2016.	Gasoline	250	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	6	0	175
534	Meduim Passenger vehicle	ب ا. 2001	Gasoline	100	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	5	1	365
535	Small Passenger	نيسان 2007	Gasoline	200	In	Sumqanyya	Sumqanyya	1.0	Outside	5	1	183

	vehicle											
536	Meduim Passenger vehicle	INFINITY 1999	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	1	0	73
537	Meduim Passenger vehicle	. رسيدسس 1989	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	1	0	73
538	Meduim Passenger vehicle	روفر 1982	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	1	0	73
539	Meduim Passenger vehicle	روفر 1984	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	1	0	73
540	Small Passenger vehicle	يا 2013.	Gasoline	200	In	Kahlounyya	Kahlounyya	3.0	Inside	5	1	183
541	Meduim Passenger vehicle	روفر 2002	Gasoline	80	In	Sumqanyya	Sumqanyya	0.5.	Inside	5	1	456
542	Small Passenger vehicle	. رسيدس 1994	Gasoline	130	In	Sumqanyya	Sumqanyya	2.0	Inside	5	1	281
543	Meduim Passenger vehicle	روفر 1995	Gasoline	130	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	5	1	281
544	Meduim Passenger vehicle	هوندا 2007	Gasoline	160	In	Sumqanyya	Sumqanyya	0.7	Inside	10	1	456
545	Meduim Passenger vehicle	روفر 1992	Gasoline	80	In	Sumqanyya	Sumqanyya	0.7	Inside	10	3	913
546	Small Passenger vehicle	تويوتا 2007	Gasoline	95	In	Sumqanyya	Sumqanyya	0.7	Inside	10	2	768
547	Meduim	تويوتا	Gasoli	140	In	Kahlounyy	Ain Wa	1.0	Inside	4	1	209

	Passenger vehicle	2007	ne			a	Zain					
548	Meduim Passenger vehicle	روفر 1988	Gasoline	100	In	Kahlounyya	Ain Wa Zain	1.0	Inside	4	1	292
549	Small Passenger vehicle	يا 2013.	Gasoline	250	In	Ain Wa Zain	Sumqanyya	1.0	Inside	5	0	146
550	Meduim Passenger vehicle	روفر 2002	Gasoline	100	In	Mokhtara	Mokhtara	3.0	Inside	2	0	146
551	Small Passenger vehicle	داتسون 2017	Gasoline	250	In	Mokhtara	Mokhtara	3.0	Inside	2	0	58
552	Small Passenger vehicle	اوبيل 1998	Gasoline	170	In	Mokhtara	Mokhtara	3.0	Inside	2	0	86
553	Meduim Passenger vehicle	اوبيل 1997	Gasoline	160	Out	Sumqanyya	Sumqanyya	2.0	Outside	10	1	456
554	Small Passenger vehicle	تويوتا 1990	Gasoline	180	Out	Kahlounyya	Kahlounyya	0.2	Outside	1	0	41
555	Small Passenger vehicle	رسيدس . 2001	Gasoline	130	In	Kahlounyya	Kahlounyya	0.2	Outside	5	1	281
556	Small Passenger vehicle	ب ا. 2002	Gasoline	100	In	Sumqanyya	Sumqanyya	0.1	Inside	1	0	73
557	Meduim Passenger vehicle	دايهاتسو 2000	Gasoline	180	In	Sumqanyya	Sumqanyya	0.1	Inside	1	0	41
558	Small Passenger vehicle	ديو 1998	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.2	Inside	3	0	110

559	Small Passenger vehicle	نيسان 1999	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	0.2	Inside	5	1	203
560	Meduim Passenger vehicle	هوندا 2008	Gasoline	140	Out	Mokhtara	Mokhtara	0.3	Outside	2	0	104
561	Meduim Passenger vehicle	شيرو.ي 2007	Gasoline	110	In	Mokhtara	Mokhtara	0.3	Outside	5	1	332
562	Meduim Passenger vehicle	نيسان 1997	Gasoline	180	In	Mokhtara	Mokhtara	1.0	Outside	2	0	81
563	Small Passenger vehicle	هيونداي 2013	Gasoline	200	In	Kahlounyya	Kahlounyya	0.3	Inside	1	0	37
564	Small Passenger vehicle	ب ا. 1994	Gasoline	1	Out	Sumqanyya	Sumqanyya	1.0	Inside	5	91	33,182
565	Small Passenger vehicle	رسيدس . 2008	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Outside	10	1	406
566	Small Passenger vehicle	رينو 2008	Gasoline	240	In	Sumqanyya	Sumqanyya	1.0	Outside	10	1	304
567	Meduim Passenger vehicle	باجيرو 2005	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Outside	10	2	730
568	Meduim Passenger vehicle	فورد 1997	Gasoline	150	Out	Ain Wa Zain	Ain Wa Zain	0.6	Inside	15	2	730
569	Meduim Passenger vehicle	رسيدس . 2002	Gasoline	100	Out	Mokhtara	Mokhtara	0.7	Inside	3	1	219
570	Meduim Passenger	تويوتا 1990	Gasoline	90	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	162

	vehicle											
571	Small Passenger vehicle	تويوتا 1992	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.4	Inside	1	0	37
572	Meduim Passenger vehicle	هوندا 1996	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.4	Inside	2	0	97
573	Small Passenger vehicle	نيسان 1987	Gasoline	200	Out	Mokhtara	Mokhtara	0.3	Inside	2	0	73
574	Small Passenger vehicle	نيسان 2010	Gasoline	200	Out	Sumqanyya	Sumqanyya	1.0	Outside	5	1	183
575	Meduim Passenger vehicle	نيسان 2000	Gasoline	110	Out	Sumqanyya	Sumqanyya	1.0	Outside	5	1	332
576	Small Passenger vehicle	فورد 2007	Gasoline	200	In	Ain Wa Zain	Sumqanyya	0.8	Inside	3	0	110
577	Small Passenger vehicle	هوندا 1983	Gasoline	300	In	Ain Wa Zain	Sumqanyya	0.8	Inside	3	0	73
578	Bus	. يتسوبيشي 1992	Diesel	170	In	Ain Wa Zain	Sumqanyya	0.8	Inside	3	0	129
579	Small Passenger vehicle	. رسيدس 2000	Gasoline	110	Out	Sumqanyya	Ain Wa Zain	0.5	Inside	1	0	66
580	Small Passenger vehicle	.2005 يا	Gasoline	210	In	Ain Wa Zain	Ain Wa Zain	0.6	Inside	2	0	70
581	Small Passenger vehicle	. رسيدس 1998	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.6	Inside	1	0	41
582	Small	نيسان	Gasoli	200	Out	Sumqanyya	Sumqanyya	0.1	Inside	1	0	37

	Passenger vehicle	1992	ne									
583	Meduim Passenger vehicle	شيرو.ي 2002	Gasoline	60	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	1	0	122
584	Small Passenger vehicle	هوندا 1993	Gasoline	150	In	Ain Wa Zain	Sumqanyya	0.5	Inside	3	0	146
585	Small Passenger vehicle	هوندا 1993	Gasoline	150	In	Ain Wa Zain	Sumqanyya	0.6	Inside	4	1	195
586	Small Passenger vehicle	نيسان 1998	Gasoline	200	Out	Sumqanyya	Ain Wa Zain	0.6	Inside	10	1	365
587	Small Passenger vehicle	سيراتو 2012	Gasoline	220	In	Mokhtara	Sumqanyya	0.7	Outside	15	1	498
588	Meduim Passenger vehicle	رينو 2002	Gasoline	180	Out	Mokhtara	Sumqanyya	0.7	Outside	15	2	608
589	Meduim Passenger vehicle	هوندا 2008	Gasoline	120	Out	Sumqanyya	Ain Wa Zain	0.6	Inside	1	0	61
590	Small Passenger vehicle	ب ا. 1986	Gasoline	170	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	10	1	429
591	Small Passenger vehicle	رينو 2010	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	20	2	730
592	Small Passenger vehicle	سوزو.ي 1986	Gasoline	220	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	7	1	232
593	Meduim Passenger vehicle	بلايزر 1994	Gasoline	100	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	5	1	365

594	Small Passenger vehicle	فورد 1991	Gasoline	160	In	Ain Wa Zain	Sumqanyya	0.5	Inside	15	2	684
595	Small Passenger vehicle	ب ا. 1997	Gasoline	180	In	Ain Wa Zain	Sumqanyya	0.5	Inside	5	1	203
596	Meduim Passenger vehicle	جيب 2002	Gasoline	100	Out	Ain Wa Zain	Sumqanyya	0.7	Inside	5	1	365
597	Small Passenger vehicle	هيونداي 2012	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.6	Inside	10	2	608
598	Small Passenger vehicle	ب ا. 2004	Gasoline	170	Out	Ain Wa Zain	Sumqanyya	0.7	Inside	12	1	515
599	Meduim Passenger vehicle	فورد 1997	Gasoline	100	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	6	1	438
600	Small Passenger vehicle	يا 2005.	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	15	2	548
601	Meduim Passenger vehicle	جيب 2002	Gasoline	100	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	146
602	Small Passenger vehicle	ازدا . 2006	Gasoline	140	Out	Mokhtara	Sumqanyya	0.7	Inside	8	1	417
603	Small Passenger vehicle	رسيدس. 2010	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.5	Inside	3	1	183
604	Small Passenger vehicle	نيسان 2017	Gasoline	220	In	Ain Wa Zain	Sumqanyya	0.5	Inside	5	0	166
605	Meduim Passenger	روفر 2010	Gasoline	80	In	Ain Wa Zain	Sumqanyya	0.5	Inside	3	1	274

	vehicle											
606	Small Passenger vehicle	نيسان 1997	Gasoline	180	In	Ain Wa Zain	Sumqanyya	0.6	Inside	6	1	243
607	Small Passenger vehicle	هوندا 1996	Gasoline	160	In	Ain Wa Zain	Sumqanyya	0.7	Inside	5	1	228
608	Small Passenger vehicle	هوندا 1992	Gasoline	160	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	15	2	684
609	Meduim Passenger vehicle	روفر 2004	Gasoline	100	In	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	146
610	Small Passenger vehicle	رسيدس . 2006	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	122
611	Small Passenger vehicle	رسيدس . 2006	Gasoline	120	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	122
612	Meduim Passenger vehicle	روفر 1998	Gasoline	100	In	Ain Wa Zain	Sumqanyya	0.6	Inside	8	2	584
613	Small Passenger vehicle	ب ا. 2004	Gasoline	200	Out	Ain Wa Zain	Sumqanyya	0.6	Inside	3	0	110
614	Small Passenger vehicle	ب ا. 2000	Gasoline	180	Out	Ain Wa Zain	Mokhtara	0.6	Inside	2	0	81
615	Small Passenger vehicle	سيراتو 2013	Gasoline	220	In	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	66
616	Small Passenger vehicle	بيجو 1986	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.6	Inside	2	0	91
617	Small	نيسان	Gasoli	180	In	Ain Wa	Sumqanyya	0.6	Inside	7	1	284

	Passenger vehicle	1986	ne			Zain						
618	Meduim Passenger vehicle	ب ا. 2004	Gasoline	120	In	Ain Wa Zain	Sumqanyya	0.6	Inside	9	2	548
619	Meduim Passenger vehicle	هوندا 2003	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.7	Inside	3	0	146
620	Meduim Passenger vehicle	هوندا 1998	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.8	Inside	2	0	81
621	Small Passenger vehicle	تويوتا 1988	Gasoline	200	In	Ain Wa Zain	Sumqanyya	0.8	Inside	2	0	73
622	Small Passenger vehicle	يا 2001.	Gasoline	220	Out	Ain Wa Zain	Ain Wa Zain	0.1	Inside	3	0	100
623	Meduim Passenger vehicle	هوندا 2002	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.4	Inside	4	0	162
624	Small Passenger vehicle	ب ا. 2004	Gasoline	140	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	104
625	Meduim Passenger vehicle	infinity 2002	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	10	2	730
626	Small Passenger vehicle	يا 2002.	Gasoline	190	Out	Sumqanyya	Sumqanyya	1.5.	Inside	3	0	115
627	Small Passenger vehicle	رسيدس . 1988	Gasoline	130	In	Sumqanyya	Sumqanyya	200.0	Inside	10	2	562
628	Small Passenger vehicle	volvo 1978	Gasoline	130	In	Sumqanyya	Sumqanyya	50.0	Inside	2	0	112

629	Small Passenger vehicle	تويوتا 2000	Gasoline	160	Out	Sumqanyya	Sumqanyya	1.5	Outside	2	0	91
630	Meduim Passenger vehicle	هوندا 1998	Gasoline	170	Out	Sumqanyya	Sumqanyya	1.5	Outside	2	0	86
631	Small Passenger vehicle	يا 2004.	Gasoline	200	In	Sumqanyya	Sumqanyya	0.5	Inside	6	1	219
632	Small Passenger vehicle	هوندا 2003	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.7	Inside	2	0	61
633	Meduim Passenger vehicle	هوندا 2003	Gasoline	150	In	Sumqanyya	Sumqanyya	0.2	Inside	5	1	243
634	Meduim Passenger vehicle	روفر 2010	Gasoline	110	In	Sumqanyya	Sumqanyya	1.5	Inside	6	1	398
635	Small Passenger vehicle	هيونداي 2001	Gasoline	180	In	Sumqanyya	Sumqanyya	0.7	Inside	15	2	608
636	Small Passenger vehicle	غولف 1995	Gasoline	140	In	Ain Wa Zain	Ain Wa Zain	0.6	Inside	1	0	52
637	Meduim Passenger vehicle	infinity 2005	Gasoline	110	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	10	2	664
638	Meduim Passenger vehicle	infinity 2000	Gasoline	110	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	332
639	Small Passenger vehicle	رسيدس . 1998	Gasoline	140	Out	Sumqanyya	Mokhtara	0.5	Inside	1	0	52
640	Small Passenger	تويوتا 1998	Gasoline	160	In	Ain Wa Zain	Ain Wa Zain	0.7	Inside	8	1	365

	vehicle											
641	Small Passenger vehicle	يا 2002.	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.1	Inside	5	1	183
642	Small Passenger vehicle	داتسون 1982	Gasoline	160	Out	Sumqanyya	Sumqanyya	0.1	Inside	15	2	684
643	Small Passenger vehicle	داتسون 1982	Gasoline	160	In	Sumqanyya	Sumqanyya	0.1	Inside	10	1	456
644	Small Passenger vehicle	ب ا. 1988	Gasoline	160	Out	Sumqanyya	Sumqanyya	0.1	Inside	5	1	228
645	Small Passenger vehicle	نيسان 1998	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.1	Inside	1	0	41
646	Small Passenger vehicle	هيونداي 2003	Gasoline	160	In	Mokhtara	Mokhtara	0.5	Inside	2	0	91
647	Meduim Passenger vehicle	شيرو.ي 2002	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
648	Meduim Passenger vehicle	نيسان 2008	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	3	0	122
649	Meduim Passenger vehicle	داتسون 1998	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	3	0	122
650	Meduim Passenger vehicle	فولز 1999	Gasoline	180	Out	Kahlounyya	Kahlounyya	3.0	Inside	4	0	162
651	Meduim Passenger vehicle	رسيدس . 2010	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	4	0	162
652	Meduim	نيسان	Gasoli	180	Out	Mokhtara	Mokhtara	2.0	Inside	5	1	203

	Passenger vehicle	1998	ne									
653	Meduim Passenger vehicle	نيسان 2009	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	4	0	162
654	Meduim Passenger vehicle	volvo 1975	Gasoline	160	Out	Sumqanyya	Sumqanyya	0.5	Inside	1	0	23
655	Meduim Passenger vehicle	هيونداي 2014	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	1	0	20
656	Meduim Passenger vehicle	تويوتا 2000	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	203
657	Meduim Passenger vehicle	رسيدس . 2002	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	4	0	162
658	Meduim Passenger vehicle	رسيدس . 2006	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	4	0	162
659	Meduim Passenger vehicle	تويوتا 2005	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	2	0	81
660	Meduim Passenger vehicle	رسيدس . 2004	Gasoline	180	Out	Sumqanyya	Sumqanyya	2.0	Inside	4	0	162
661	Meduim Passenger vehicle	تويوتا 1985	Gasoline	180	Out	Kahlounyya	Kahlounyya	3.0	Inside	6	1	243
662	Meduim Passenger vehicle	نيسان 2000	Gasoline	180	In	Mokhtara	Mokhtara	3.0	Inside	5	1	203
663	Meduim Passenger vehicle	رسيدس . 0995	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	2.0	Inside	7	1	284

664	Meduim Passenger vehicle	هيونداي 2010	Gasoline	180	In	Sumqanyya	Mokhtara	1.0	Inside	3	0	122
665	Meduim Passenger vehicle	داتسون 2007	Gasoline	180	In	Sumqanyya	Mokhtara	1.0	Inside	5	1	203
666	Meduim Passenger vehicle	تويوتا 1984	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	6	1	243
667	Meduim Passenger vehicle	تويوتا 1989	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	5	1	203
668	Meduim Passenger vehicle	تويوتا 1989	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	4	0	162
669	Meduim Passenger vehicle	. يتسوبيشي 1992	Gasoline	120	In	Kahlounyya	Kahlounyya	2.0	Inside	10	2	608
670	Meduim Passenger vehicle	تويوتا 1984	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	4	0	162
671	Meduim Passenger vehicle	. يتسوبيشي 2008	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	4	0	162
672	Meduim Passenger vehicle	ب ا. 2009	Gasoline	120	Out	Kahlounyya	Kahlounyya	2.0	Inside	4	1	243
673	Meduim Passenger vehicle	رينو 1978	Gasoline	180	Out	Kahlounyya	Kahlounyya	2.0	Inside	4	0	162
674	Meduim Passenger vehicle	تويوتا 1985	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	4	0	162
675	Meduim Passenger	هوندا 1999	Gasoline	180	Out	Mokhtara	Mokhtara	2.0	Inside	4	0	162

	vehicle											
676	Meduim Passenger vehicle	. يتسوبيشي 1999	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	81
677	Meduim Passenger vehicle	. رسيدس 1994	Gasoline	180	In	Kahlounyya	Kahlounyya	0.5	Inside	3	0	122
678	Meduim Passenger vehicle	تويوتا 1989	Gasoline	180	In	Kahlounyya	Kahlounyya	0.5	Inside	3	0	122
679	Meduim Passenger vehicle	فيات 1995	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	4	0	162
680	Meduim Passenger vehicle	INFINITY 2005	Gasoline	180	In	Ain Wa Zain	Sumqanyya	3.0	Inside	6	1	243
681	Meduim Passenger vehicle	. رسيدس 2002	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	4	0	162
682	Meduim Passenger vehicle	ب ا. 1993	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
683	Small Passenger vehicle	دايهاتسو 0990	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	3.0	Inside	6	1	243
684	Meduim Passenger vehicle	ب ا. 2004	Gasoline	120	Out	Ain Wa Zain	Ain Wa Zain	0.5.	Inside	3	1	183
685	Meduim Passenger vehicle	روفر 2014	Gasoline	120	Out	Mokhtara	Mokhtara	1.0	Inside	4	1	243
686	Meduim Passenger vehicle	. رسيدس 1964	Gasoline	150	Out	Mokhtara	Mokhtara	0.5	Inside	4	1	195
687	Meduim	. رسيدس	Gasoli	180	Out	Sumqanyya	Sumqanyya	2.0	Inside	3	0	122

	Passenger vehicle	1999	ne									
688	Meduim Passenger vehicle	تويوتا 1995	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	81
689	Meduim Passenger vehicle	نيسان 1995	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.5.	Inside	3	0	122
690	Meduim Passenger vehicle	بيجو 2007	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
691	Meduim Passenger vehicle	هيونداي 2016	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5.	Inside	4	0	162
692	Meduim Passenger vehicle	ب ا. 1994	Gasoline	180	Out	Mokhtara	Mokhtara	1.0	Inside	4	0	162
693	Meduim Passenger vehicle	INFINITY 2000	Gasoline	180	Out	Sumqanyya	Sumqanyya	1.0	Inside	3	0	122
694	Meduim Passenger vehicle	هوندا 1995	Gasoline	180	Out	Sumqanyya	Sumqanyya	1.0	Inside	3	0	122
695	Small Passenger vehicle	رسيدس . 2002	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
696	Small Passenger vehicle	هوندا 1985	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	0	122
697	Meduim Passenger vehicle	. يتسوبيشي 2002	Gasoline	120	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	1	183
698	Meduim Passenger vehicle	سوزو.ي 2007	Gasoline	120	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	3	1	183

699	Meduim Passenger vehicle	رابيد ونغو. 2000	Gasoline	120	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	4	1	243
700	Meduim Passenger vehicle	تويوتا 1985	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	4	0	162
701	Meduim Passenger vehicle	رسيدس . 1995	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	4	0	162
702	Meduim Passenger vehicle	جيب 2004	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	2	0	81
703	Meduim Passenger vehicle	ب ا. 2006	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	2	0	81
704	Meduim Passenger vehicle	تويوتا 2002	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
705	Meduim Passenger vehicle	رابيد 1982	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
706	Meduim Passenger vehicle	رسيدس . 2004	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	3	0	122
707	Meduim Passenger vehicle	. رسيدس 1986	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	3	0	122
708	Meduim Passenger vehicle	هيونداي 2004	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	2	0	81
709	Meduim Passenger vehicle	. رسيدس 2006	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81
710	Meduim Passenger	. يتسوبيشي	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5.	Inside	2	0	81

	vehicle	1998										
711	Meduim Passenger vehicle	تويوتا 2002	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	81
712	Meduim Passenger vehicle	نيسان 2000	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	81
713	Meduim Passenger vehicle	رانج 2008	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	2	0	81
714	Meduim Passenger vehicle	جيب تويوتا 2008	Gasoline	180	In	Kahlounyya	Mokhtara	2.0	Inside	2	0	81
715	Meduim Passenger vehicle	ب ا. 2003	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	2	0	81
716	Meduim Passenger vehicle	تويوتا 2005	Gasoline	180	In	Kahlounyya	Kahlounyya	2.0	Inside	2	0	81
717	Meduim Passenger vehicle	جيب 1995	Gasoline	120	Out	Mokhtara	Mokhtara	2.0	Inside	2	0	122
718	Meduim Passenger vehicle	رسيدس . 2015	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	2	0	81
719	Meduim Passenger vehicle	رسيدس . 1980	Gasoline	180	In	Mokhtara	Mokhtara	2.0	Inside	2	0	81
720	Meduim Passenger vehicle	نيسان 2002	Gasoline	120	In	Sumqanyya	Sumqanyya	1.0	Inside	5	1	304
721	Small Passenger vehicle	هوندا 2005	Gasoline	150	In	Sumqanyya	Sumqanyya	2.0	Inside	2	0	97
722	Small	رينو	Gasoli	200	In	Sumqanyya	Ain Wa	2.0	Inside	6	1	219

	Passenger vehicle	2004	ne				Zain					
723	Meduim Passenger vehicle	نيسان 2007	Gasoline	110	In	Sumqanyya	Sumqanyya	2.0	Inside	5	1	332
724	Small Passenger vehicle	رسيدس . 1995	Gasoline	130	Out	Sumqanyya	Sumqanyya	2.0	Outside	4	1	225
725	Meduim Passenger vehicle	نيسان 2005	Gasoline	110	In	Sumqanyya	Sumqanyya	2.0	Inside	4	1	265
726	Meduim Passenger vehicle	نيسان 2004	Gasoline	120	In	Sumqanyya	Ain Wa Zain	2.0	Inside	3	1	183
727	Meduim Passenger vehicle	هوندا 2004	Gasoline	160	In	Sumqanyya	Ain Wa Zain	2.0	Inside	5	1	228
728	Small Passenger vehicle	رسيدس . 2002	Gasoline	130	Out	Mokhtara	Kahlounyya	2.0	Inside	5	1	281
729	Small Passenger vehicle	تويوتا 1988	Gasoline	200	In	Sumqanyya	Mokhtara	1.0	Inside	3	0	110
730	Small Passenger vehicle	نيسان 2009	Gasoline	100	In	Sumqanyya	Kahlounyya	1.0	Inside	3	1	219
731	Meduim Passenger vehicle	تويوتا 2005	Gasoline	180	In	Sumqanyya	Sumqanyya	2.0	Inside	2	0	81
732	Small Passenger vehicle	volvo 1987	Gasoline	150	In	Sumqanyya	Ain Wa Zain	2.0	Inside	5	1	243
733	Meduim Passenger vehicle	تويوتا 2006	Gasoline	170	In	Sumqanyya	Kahlounyya	2.0	Inside	5	1	215

734	Small Passenger vehicle	رسيدس . 1995	Gasoline	130	In	Sumqanyya	Mokhtara	2.0	Inside	3	0	168
735	Meduim Passenger vehicle	رسيدس . 2003	Gasoline	110	Out	Sumqanyya	Sumqanyya	2.0	Inside	4	1	265
736	Small Passenger vehicle	هوندا 1985	Gasoline	180	In	Sumqanyya	Kahlounyya	2.0	Inside	3	0	122
737	Small Passenger vehicle	نيسان 2005	Gasoline	200	In	Kahlounyya	Sumqanyya	2.0	Inside	2	0	73
738	Small Passenger vehicle	رسيدس . 2006	Gasoline	180	In	Ain Wa Zain	Sumqanyya	2.0	Inside	2	0	81
739	Small Passenger vehicle	هوندا 1986	Gasoline	200	In	Ain Wa Zain	Sumqanyya	2.0	Inside	3	0	110
740	Small Passenger vehicle	نيسان 2005	Gasoline	200	Out	Sumqanyya	Sumqanyya	2.0	Outside	2	0	73
741	Small Passenger vehicle	تويوتا 2000	Gasoline	180	Out	Ain Wa Zain	Sumqanyya	2.0	Inside	4	0	162
742	Small Passenger vehicle	رسيدس . 1990	Gasoline	150	Out	Sumqanyya	Sumqanyya	1.0	Inside	2	0	97
743	Meduim Passenger vehicle	نيسان 2003	Gasoline	120	Out	Sumqanyya	Ain Wa Zain	2.0	Inside	2	0	122
744	Small Passenger vehicle	رسيدس . 2005	Gasoline	170	In	Ain Wa Zain	Ain Wa Zain	2.0	Inside	3	0	129
745	Small Passenger	ب ا. 1998	Gasoline	140	In	Sumqanyya	Ain Wa Zain	1.0	Inside	4	1	209

	vehicle											
746	Small Passenger vehicle	تويوتا 2007	Gasoline	200	In	Sumqanyya	Sumqanyya	2.0	Inside	3	0	91
747	Small Passenger vehicle	نيسان 2005	Gasoline	190	In	Ain Wa Zain	Sumqanyya	2.0	Inside	3	0	115
748	Meduim Passenger vehicle	جي ا. سي 2004	Gasoline	100	In	Sumqanyya	Sumqanyya	3.0	Inside	3	1	219
749	Small Passenger vehicle	هوندا 1985	Gasoline	200	In	Ain Wa Zain	Sumqanyya	2.0	Inside	5	1	183
750	Meduim Passenger vehicle	ها.ر 2008	Gasoline	80	In	Sumqanyya	Mokhtara	2.0	Inside	2	1	183
751	Meduim Passenger vehicle	نيسان 2002	Gasoline	110	Out	Sumqanyya	Sumqanyya	2.0	Outside	4	1	265
752	Small Passenger vehicle	رسيدس . 1998	Gasoline	150	In	Sumqanyya	Sumqanyya	3.0	Inside	5	1	243
753	Small Passenger vehicle	رينو رابيد 2005	Gasoline	200	In	Kahlounyya	Mokhtara	2.0	Inside	3	0	110
754	Small Passenger vehicle	هيونداي 1998	Gasoline	150	In	Sumqanyya	Ain Wa Zain	2.0	Inside	2	0	97
755	Small Passenger vehicle	رسيدس . 1998	Gasoline	170	Out	Kahlounyya	Sumqanyya	3.0	Inside	4	0	172
756	Small Passenger vehicle	هوندا 1989	Gasoline	180	In	Sumqanyya	Ain Wa Zain	2.0	Inside	3	0	122
757	Small	رسيدس .	Gasoli	150	Out	Sumqanyya	Sumqanyya	2.0	Outside	5	1	243

	Passenger vehicle	2005	ne									
758	Small Passenger vehicle	نيسان 2003	Gasoline	110	Out	Sumqanyya	Ain Wa Zain	2.0	Inside	3	1	199
759	Small Passenger vehicle	هوندا 1985	Gasoline	160	Out	Ain Wa Zain	Mokhtara	2.0	Inside	5	1	228
760	Meduim Passenger vehicle	نيسان 2002	Gasoline	110	Out	Ain Wa Zain	Ain Wa Zain	3.0	Outside	6	1	398
761	Small Passenger vehicle	ب ا. 1995	Gasoline	130	Out	Mokhtara	Sumqanyya	2.0	Outside	3	0	168
762	Small Passenger vehicle	نيسان 2010	Gasoline	180	Out	Sumqanyya	Ain Wa Zain	3.0	Inside	5	1	203
763	Small Passenger vehicle	رسيدس . 2005	Gasoline	150	Out	Ain Wa Zain	Sumqanyya	3.0	Inside	6	1	292
764	Small Passenger vehicle	فولز 2005	Gasoline	180	In	Sumqanyya	Sumqanyya	1.0	Inside	2	0	81
765	Meduim Passenger vehicle	نيسان 2004	Gasoline	100	In	Sumqanyya	Sumqanyya	1.0	Inside	3	1	219
766	Small Passenger vehicle	ب ا. 1995	Gasoline	150	In	Kahlounyya	Kahlounyya	0.9	Outside	1	0	49
767	Meduim Passenger vehicle	هوندا 2007	Gasoline	140	In	Mokhtara	Mokhtara	0.9	Outside	2	0	104
768	Small Passenger vehicle	نيسان 2014	Gasoline	250	In	Mokhtara	Mokhtara	0.9	Outside	2	0	58

769	Small Passenger vehicle	هوندا 2000	Gasoline	140	Out	Kahlounyya	Kahlounyya	0.3	Inside	5	1	261
770	Meduim Passenger vehicle	شيفروليه 2010	Gasoline	100	In	Sumqanyya	Sumqanyya	0.6	Inside	1	0	73
771	Meduim Passenger vehicle	جيب 2005	Gasoline	120	In	Sumqanyya	Sumqanyya	0.6	Inside	1	0	61
772	Small Passenger vehicle	نيسان 2008	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.8	Inside	4	0	162
773	Meduim Passenger vehicle	تويوتا 2002	Gasoline	150	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	97
774	Small Passenger vehicle	رسيدس . 2005	Gasoline	140	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	261
775	Meduim Passenger vehicle	رابيد 1998	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	203
776	Small Passenger vehicle	ب ا. 1981	Gasoline	150	In	Sumqanyya	Sumqanyya	0.5	Inside	5	1	243
777	Small Passenger vehicle	رسيدس . 2000	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5	Inside	1	0	41
778	Small Passenger vehicle	نيسان 1981	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.2	Inside	2	0	81
779	Small Passenger vehicle	يا 2011.	Gasoline	200	In	Sumqanyya	Sumqanyya	0.5.	Inside	1	0	37
780	Meduim Passenger	تويوتا 2018	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	58

	vehicle											
781	Small Passenger vehicle	تويوتا 2018	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.5	Inside	2	0	58
782	Small Passenger vehicle	رسيدس . 2007	Gasoline	180	In	Sumqanyya	Sumqanyya	0.5	Inside	2	0	81
783	Small Passenger vehicle	داتسون 1981	Gasoline	220	Out	Sumqanyya	Sumqanyya	0.8	Outside	5	0	166
784	Small Passenger vehicle	ب ا. 1993	Gasoline	170	Out	Sumqanyya	Sumqanyya	0.8	Inside	2	0	86
785	Small Passenger vehicle	تويوتا 1996	Gasoline	200	Out	Mokhtara	Mokhtara	0.3	Inside	1	0	37
786	Small Passenger vehicle	هيونداي 2009	Gasoline	220	In	Sumqanyya	Sumqanyya	0.3	Inside	5	0	166
787	Small Passenger vehicle	هيونداي 2015	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.3	Outside	1	0	37
788	Meduim Passenger vehicle	شيرو.ي 1999	Gasoline	100	Out	Ain Wa Zain	Ain Wa Zain	0.3	Inside	1	0	73
789	Meduim Passenger vehicle	هوندا 2005	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.3	Outside	2	0	73
790	Small Passenger vehicle	رسيدس . 1986	Gasoline	120	In	Mokhtara	Mokhtara	0.3	Inside	5	1	304
791	Small Passenger vehicle	هيونداي 2013	Gasoline	200	Out	Mokhtara	Mokhtara	1.0	Inside	2	0	73
792	Small	هيونداي	Gasoli	200	Out	Mokhtara	Mokhtara	1.0	Inside	4	0	146

	Passenger vehicle	2012	ne									
793	Small Passenger vehicle	يا 2013.	Gasoline	200	In	Sumqanyya	Sumqanyya	0.9	Inside	2	0	73
794	Meduim Passenger vehicle	. يتسوبيشي 2001	Gasoline	150	In	Sumqanyya	Sumqanyya	0.9	Inside	10	1	487
795	Small Passenger vehicle	هيونداي 2011	Gasoline	180	In	Sumqanyya	Sumqanyya	0.9	Inside	10	1	406
796	Meduim Passenger vehicle	روفر 1986	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.6	Inside	2	0	146
797	Small Passenger vehicle	ب ا. 1998	Gasoline	130	Out	Sumqanyya	Sumqanyya	0.6	Inside	2	0	112
798	Small Passenger vehicle	يا 2013.	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.8	Outside	1	0	37
799	Meduim Passenger vehicle	ب ا. 2010	Gasoline	110	Out	Sumqanyya	Sumqanyya	0.6	Outside	1	0	66
800	Small Passenger vehicle	ازدا . 2014	Gasoline	170	In	Sumqanyya	Sumqanyya	0.6	Outside	1	0	43
801	Small Passenger vehicle	نيسان 2009	Gasoline	180	Out	Ain Wa Zain	Ain Wa Zain	0.7	Inside	5	1	203
802	Small Passenger vehicle	نيسان 2014	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.7	Inside	2	0	73
803	Meduim Passenger vehicle	فولز 2009	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.7	Outside	1	0	49

804	Small Passenger vehicle	ب ا. 2001	Gasoline	200	In	Mokhtara	Mokhtara	0.3	Inside	1	0	37
805	Small Passenger vehicle	هوندا 2004	Gasoline	150	Out	Ain Wa Zain	Ain Wa Zain	0.7	Inside	3	0	146
806	Small Passenger vehicle	هيونداي 2012	Gasoline	250	Out	Sumqanyya	Sumqanyya	0.7	Inside	10	1	292
807	Small Passenger vehicle	هيونداي 2013	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.6	Outside	1	0	37
808	Small Passenger vehicle	بيجو 2006	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	1	0	37
809	Small Passenger vehicle	ب ا. 1998	Gasoline	160	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	1	0	46
810	Small Passenger vehicle	يا 2005.	Gasoline	200	In	Sumqanyya	Sumqanyya	0.5	Inside	8	1	292
811	Meduim Passenger vehicle	. يتسوبيشي 2001	Gasoline	150	In	Sumqanyya	Sumqanyya	0.5	Inside	8	1	389
812	Small Passenger vehicle	هيونداي 2016	Gasoline	250	Out	Ain Wa Zain	Ain Wa Zain	0.6	Inside	20	2	584
813	Small Passenger vehicle	بيجو 2004	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.6	Inside	20	2	730
814	Small Passenger vehicle	هوندا 1990	Gasoline	120	Out	Ain Wa Zain	Ain Wa Zain	0.7	Inside	5	1	304
815	Small Passenger	volvo 1976	Gasoline	140	In	Ain Wa Zain	Ain Wa Zain	0.7	Inside	5	1	261

	vehicle											
816	Small Passenger vehicle	ب ا. 1986	Gasoline	140	In	Ain Wa Zain	Ain Wa Zain	0.7	Inside	5	1	261
817	Small Passenger vehicle	نيسان 2010	Gasoline	160	In	Kahlounyya	Kahlounyya	0.6	Inside	1	0	46
818	Small Passenger vehicle	هوندا 1973	Gasoline	170	In	Mokhtara	Mokhtara	0.6	Inside	5	1	215
819	Small Passenger vehicle	بوي. 1987	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	0.6	Inside	20	2	811
820	Small Passenger vehicle	نيسان 2004	Gasoline	130	In	Ain Wa Zain	Ain Wa Zain	0.5	Inside	3	0	168
821	Small Passenger vehicle	رسيدس . 2003	Gasoline	200	In	Mokhtara	Mokhtara	0.3	Inside	3	0	110
822	Meduim Passenger vehicle	سوزو.ي 2006	Gasoline	75	In	Sumqanyya	Sumqanyya	2.0	Inside	15	4	1,460
823	Small Passenger vehicle	يا 2016.	Gasoline	250	In	Sumqanyya	Sumqanyya	2.0	Inside	8	1	234
824	Small Passenger vehicle	يا 1996.	Gasoline	170	Out	Kahlounyya	Kahlounyya	0.5	Inside	2	0	86
825	Small Passenger vehicle	هوندا 2006	Gasoline	100	Out	Sumqanyya	Sumqanyya	0.6	Inside	5	1	365
826	Meduim Passenger vehicle	هوندا 2001	Gasoline	170	In	Sumqanyya	Sumqanyya	0.6	Inside	5	1	215
827	Small	تويوتا	Gasoli	180	Out	Sumqanyya	Sumqanyya	0.5	Inside	1	0	41

	Passenger vehicle	2000	ne									
828	Meduim Passenger vehicle	تويوتا 2000	Gasoline	180	Out	Sumqanyya	Sumqanyya	0.5	Inside	1	0	41
829	Small Passenger vehicle	يا 2017.	Gasoline	200	In	Kahlounyya	Kahlounyya	0.1	Inside	1	0	37
830	Small Passenger vehicle	volvo 1990	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.5	Outside	1	0	49
831	Small Passenger vehicle	تويوتا 2008	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.4	Inside	1	0	37
832	Small Passenger vehicle	تويوتا 1981	Gasoline	160	Out	Sumqanyya	Kahlounyya	0.3	Inside	1	0	46
833	Small Passenger vehicle	تويوتا 1990	Gasoline	170	Out	Sumqanyya	Sumqanyya	0.7	Outside	10	1	429
834	Small Passenger vehicle	ب ا. 2007	Gasoline	150	Out	Sumqanyya	Sumqanyya	0.7	Outside	10	1	487
835	Meduim Passenger vehicle	سوزو.ي 2000	Gasoline	130	Out	Sumqanyya	Sumqanyya	0.5	Inside	1	0	56
836	Meduim Passenger vehicle	هيونداي 2005	Gasoline	150	In	Ain Wa Zain	Ain Wa Zain	0.3	Inside	2	0	97
837	Small Passenger vehicle	يا 2000.	Gasoline	200	Out	Ain Wa Zain	Ain Wa Zain	0.3	Inside	2	0	73
838	Small Passenger vehicle	تويوتا 2010	Gasoline	190	Out	Sumqanyya	Sumqanyya	1.0	Inside	14	1	538

839	Small Passenger vehicle	هوندا 1998	Gasoline	200	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	20	2	730
840	Small Passenger vehicle	هوندا 1987	Gasoline	200	Out	Sumqanyya	Sumqanyya	0.3	Outside	1	0	37
841	Small Passenger vehicle	تويوتا 1991	Gasoline	180	In	Ain Wa Zain	Ain Wa Zain	1.0	Inside	10	1	406
842	Small Passenger vehicle	تويوتا 1989	Gasoline	160	In	Ain Wa Zain	Ain Wa Zain	0.6	Inside	15	2	684

Commercial Transportation											
No.	Vehicle Type	Vehicle Model	Fuel Type	household place of the owner (inside/outside) of the municipality	Fuel rate (km/20 lit)	Inlet name to municipality	Otlet name from municipality	Distance between the houshold and municipality inlet/outlet (m)	Ddaily traveled distance within municipality borders (km/day)	Daily fuel consumption (Lit/day)	Annual fuel consumption (Lit/year)
1	Pick-Up	هيونداي 1997	Diesel	Inside	120	Mokhtara	Mokhtara	120	3.00	0.50	183
2	Small Passenger vehicle	كيا 2008	Gasoline	Outside	240	Sumqanyya	Mokhtara	240	3.00	0.25	91
3	Small Passenger vehicle	كيا 2013	Gasoline	Inside	250	Ain Wa Zain	Sumqanyya	250	4.00	0.32	117
4	Small Passenger vehicle	كيا 2013	Gasoline	Inside	210	Sumqanyya	Ain Wa Zain	210	2.00	0.19	70

5	Small Passenger vehicle	مرسيدس 2008	Gasoline	Outside	180	Ain Wa Zain	Sumqanyya	180	10.00	1.11	406
6	Small Passenger vehicle	كيا 2009	Gasoline	Inside	200	Sumqanyya	Sumqanyya	200	3.00	0.30	110
7	Small Passenger vehicle	مرسيدس 2008	Gasoline	Outside	120	Sumqanyya	Sumqanyya	120	5.00	0.83	304
8	Small Passenger vehicle	هيونداي 2010	Gasoline	Outside	200	Ain Wa Zain	Ain Wa Zain	200	4.00	0.40	146
9	Small Passenger vehicle	بيجو 2012	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	1.00	0.10	37
10	Meduim Passenger vehicle	نيسان 2005	Gasoline	Outside	120	Sumqanyya	Sumqanyya	120	10.00	1.67	608
11	Meduim Passenger vehicle	نيسان 2002	Gasoline	Outside	100	Sumqanyya	Sumqanyya	100	2.00	0.40	146
12	Small Passenger vehicle	نيسان 1997	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	10.00	1.00	365
13	Small Passenger vehicle	مرسيدس 1994	Gasoline	Outside	170	Sumqanyya	Sumqanyya	170	1.00	0.12	43
14	Small Passenger vehicle	ب ام 2000	Gasoline	Outside	160	Ain Wa Zain	Ain Wa Zain	160	1.00	0.13	46
15	Bus	نيسان 1990	Diesel	Inside	140	Mokhtara	Mokhtara	140	3.00	0.43	156
16	Small Passenger vehicle	ب ام 1998	Gasoline	Outside	150	Sumqanyya	Sumqanyya	150	1.00	0.13	49
17	Small Passenger vehicle	مرسيدس 2007	Gasoline	Inside	120	Kahlounyya	Kahlounyya	120	5.00	0.83	304
18	Small Passenger vehicle	ب ام 2005	Gasoline	Inside	120	Kahlounyya	Kahlounyya	120	0.50	0.08	30
19	Small Passenger vehicle	هيونداي 2010	Gasoline	Inside	240	Mokhtara	Mokhtara	240	1.00	0.08	30
20	Small Passenger vehicle	هوندا 1991	Gasoline	Inside	170	Sumqanyya	Sumqanyya	170	1.00	0.12	43
21	Small Passenger vehicle	ميتسوبيشي 2004	Gasoline	Inside	200	Kahlounyya	Kahlounyya	200	20.00	2.00	730
22	Small Passenger	مرسيدس	Gasolin	Outside	170	Ain Wa Zain	Ain Wa Zain	170	5.00	0.59	215

	vehicle	1999	e								
23	Small Passenger vehicle	مازدا 2017	Gasoline	Inside	200	Ain Wa Zain	Ain Wa Zain	200	10.00	1.00	365
24	Small Passenger vehicle	تويوتا 2003	Gasoline	Inside	200	Ain Wa Zain	Ain Wa Zain	200	1.00	0.10	37
25	Meduim Passenger vehicle	مرسيدس 2005	Gasoline	Outside	100	Sumqanyya	Ain Wa Zain	100	1.00	0.20	73
26	Meduim Passenger vehicle	نيسان 1998	Gasoline	Outside	100	Kahlounyya	Kahlounyya	100	1.00	0.20	73
27	Small Passenger vehicle	رينو 2007	Gasoline	Inside	150	Sumqanyya	Sumqanyya	150	1.00	0.13	49
28	Small Passenger vehicle	هوندا 1997	Gasoline	Outside	180	Sumqanyya	Sumqanyya	180	1.00	0.11	41
29	Small Passenger vehicle	فولز 2005	Gasoline	Inside	180	Ain Wa Zain	Sumqanyya	180	4.00	0.44	162
30	Small Passenger vehicle	مرسيدس 2000	Gasoline	Outside	150	Mokhtara	Mokhtara	150	2.00	0.27	97
31	Meduim Passenger vehicle	تويوتا 1997	Gasoline	Outside	120	Ain Wa Zain	Ain Wa Zain	120	5.00	0.83	304
32	Small Passenger vehicle	رينو 1982	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	5.00	0.56	203
33	Small Passenger vehicle	هيونداي 2013	Gasoline	Inside	200	Ain Wa Zain	Ain Wa Zain	200	5.00	0.50	183
34	Small Passenger vehicle	دايو 1998	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	20.00	2.00	730
35	Small Passenger vehicle	مرسيدس 2006	Gasoline	Outside	140	Sumqanyya	Sumqanyya	140	1.00	0.14	52
36	Small Passenger vehicle	ب ام 2004	Gasoline	Inside	150	Mokhtara	Mokhtara	150	5.00	0.67	243
37	Small Passenger vehicle	مازدا 1986	Gasoline	Outside	180	Sumqanyya	Sumqanyya	180	10.00	1.11	406
38	Meduim Passenger vehicle	نيسان 2000	Gasoline	Inside	110	Sumqanyya	Sumqanyya	110	5.00	0.91	332
39	Meduim Passenger vehicle	رينو 1991	Gasoline	Outside	190	Sumqanyya	Mokhtara	190	4.00	0.42	154

40	Small Passenger vehicle	مرسيدس 2010	Gasoline	Inside	120	Mokhtara	Mokhtara	120	0.50	0.08	30
41	Small Passenger vehicle	نيسان 2017	Gasoline	Inside	200	Sumqanyya	Sumqanyya	200	10.00	1.00	365
42	Pick-Up	تويوتا 1980	Diesel	Inside	170	Kahlounyya	Kahlounyya	170	10.00	1.18	429
43	Small Passenger vehicle	ب ام 2001	Gasoline	Outside	200	Ain Wa Zain	Ain Wa Zain	200	5.00	0.50	183
44	Small Passenger vehicle	رينو رابيد 1999	Gasoline	Inside	200	Ain Wa Zain	Ain Wa Zain	200	10.00	1.00	365
45	Meduim Passenger vehicle	فيتارا 1989	Gasoline	Outside	200	Ain Wa Zain	Ain Wa Zain	200	2.00	0.20	73
46	Small Passenger vehicle	مرسيدس 1986	Gasoline	Outside	120	Kahlounyya	Kahlounyya	120	2.00	0.33	122
47	Small Passenger vehicle	ب ام 2009	Gasoline	Inside	120	Kahlounyya	Kahlounyya	120	1.00	0.17	61
48	Meduim Passenger vehicle	رينو راابيد 2006	Gasoline	Inside	200	Ain Wa Zain	Ain Wa Zain	200	5.00	0.50	183
49	Meduim Passenger vehicle	مرسيدس 2006	Gasoline	Inside	180	Sumqanyya	Sumqanyya	180	1.00	0.11	41
50	Meduim Passenger vehicle	جيب 2002	Gasoline	Inside	180	Mokhtara	Mokhtara	180	4.00	0.44	162
51	Meduim Passenger vehicle	ب ام 2006	Gasoline	Inside	180	Kahlounyya	Kahlounyya	180	2.00	0.22	81
52	Meduim Passenger vehicle	تويوتا 2002	Gasoline	Inside	180	Sumqanyya	Sumqanyya	180	1.00	0.11	41
53	Meduim Passenger vehicle	روفر 2005	Gasoline	Inside	180	Mokhtara	Mokhtara	180	3.00	0.33	122
54	Meduim Passenger vehicle	رينو 1999	Gasoline	Inside	180	Mokhtara	Mokhtara	180	2.00	0.22	81
55	Meduim Passenger vehicle	نيسان 1995	Diesel	Inside	120	Mokhtara	Mokhtara	120	3.00	0.50	183
56	Meduim Passenger vehicle	روفر 2002	Gasoline	Inside	120	Ain Wa Zain	Ain Wa Zain	120	2.00	0.33	122
57	Meduim	كيا 2002	Gasolin	Inside	180	Mokhtara	Mokhtara	180	2.00	0.22	81

	Passenger vehicle		e								
58	Meduim Passenger vehicle	ميتسوبيشي 2004	Gasoline	Inside	180	Mokhtara	Mokhtara	180	2.00	0.22	81
59	Meduim Passenger vehicle	هيونداي 2006	Gasoline	Inside	180	Kahlounyya	Kahlounyya	180	2.00	0.22	81
60	Meduim Passenger vehicle	مرسيدس 1994	Gasoline	Inside	180	Kahlounyya	Kahlounyya	180	2.00	0.22	81
61	Meduim Passenger vehicle	فيات 1995	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	2.00	0.22	81
62	Meduim Passenger vehicle	مرسيدس 2015	Gasoline	Inside	110	Mokhtara	Mokhtara	110	6.00	1.09	398
63	Meduim Passenger vehicle	مرسيدس 1995	Gasoline	Inside	180	Kahlounyya	Kahlounyya	180	5.00	0.56	203
64	Meduim Passenger vehicle	نيسان 2005	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	2.00	0.22	81
65	Meduim Passenger vehicle	هيونداي 2010	Gasoline	Inside	180	Sumqanyya	Sumqanyya	180	3.00	0.33	122
66	Meduim Passenger vehicle	تويوتا 1994	Gasoline	Inside	180	Mokhtara	Mokhtara	180	5.00	0.56	203
67	Meduim Passenger vehicle	تويوتا 1984	Gasoline	Inside	180	Kahlounyya	Kahlounyya	180	6.00	0.67	243
68	Meduim Passenger vehicle	جيب 2008	Gasoline	Inside	180	Mokhtara	Mokhtara	180	6.00	0.67	243
69	Meduim Passenger vehicle	تويوتا 2000	Gasoline	Inside	180	Sumqanyya	Sumqanyya	180	2.00	0.22	81
70	Meduim Passenger vehicle	تويوتا 1985	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	5.00	0.56	203
71	Meduim Passenger vehicle	تويوتا 1985	Gasoline	Inside	180	Mokhtara	Mokhtara	180	7.00	0.78	284
72	Pick-Up	نيسان 1975	Diesel	Inside	110	Sumqanyya	Sumqanyya	110	3.00	0.55	199
73	Meduim Passenger vehicle	سوزوكي 1995	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	3.00	0.33	122
74	Meduim Passenger vehicle	تويوتا 1995	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	3.00	0.33	122

75	Pick-Up	شيفروليه 2000	Diesel	Inside	180	Ain Wa Zain	Ain Wa Zain	180	6.00	0.67	243
76	Meduim Passenger vehicle	مرسيدس 2000	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	3.00	0.33	122
77	Meduim Passenger vehicle	سوزوكي 2000	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	1.00	0.11	41
78	Meduim Passenger vehicle	روفر 2006	Gasoline	Inside	120	Sumqanyya	Sumqanyya	120	10.00	1.67	608
79	Small Passenger vehicle	ب ام 2000	Gasoline	Inside	130	Mokhtara	Mokhtara	130	4.00	0.62	225
80	Meduim Passenger vehicle	رينو 2006	Gasoline	Outside	180	Ain Wa Zain	Ain Wa Zain	180	6.00	0.67	243
81	Small Passenger vehicle	ب ام 2000	Gasoline	Outside	180	Kahlounyya	Kahlounyya	180	1.00	0.11	41
82	Small Passenger vehicle	لادا 2016	Gasoline	Outside	200	Kahlounyya	Kahlounyya	200	2.00	0.20	73
83	Small Passenger vehicle	تويوتا 2012	Gasoline	Outside	270	Ain Wa Zain	Ain Wa Zain	270	5.00	0.37	135
84	Small Passenger vehicle	بيجو 2002	Gasoline	Outside	200	Mokhtara	Mokhtara	200	6.00	0.60	219
85	Small Passenger vehicle	مرسيدس 2005	Gasoline	Outside	130	Kahlounyya	Kahlounyya	130	7.00	1.08	393
86	Small Passenger vehicle	مرسيدس 2002	Gasoline	Inside	130	Sumqanyya	Ain Wa Zain	130	1.00	0.15	56
87	Small Passenger vehicle	مرسيدس 2002	Gasoline	Inside	140	Sumqanyya	Sumqanyya	140	1.00	0.14	52
88	Small Passenger vehicle	هيونداي 1990	Gasoline	Inside	250	Sumqanyya	Sumqanyya	250	3.00	0.24	88
89	Small Passenger vehicle	هيونداي 2009	Gasoline	Outside	250	Kahlounyya	Kahlounyya	250	10.00	0.80	292
90	Small Passenger vehicle	ب ام 1997	Gasoline	Inside	150	Kahlounyya	Kahlounyya	150	5.00	0.67	243
91	Small Passenger vehicle	نيسان 1998	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	1.00	0.10	37
92	Small Passenger	كيا 2008	Gasolin	Inside	250	Sumqanyya	Sumqanyya	250	6.00	0.48	175

	vehicle		e								
93	Meduim Passenger vehicle	نيسان 2003	Gasoline	Outside	120	Ain Wa Zain	Ain Wa Zain	120	5.00	0.83	304
94	Meduim Passenger vehicle	روفر 2002	Gasoline	Inside	100	Kahlounyya	Kahlounyya	100	5.00	1.00	365
95	Pick-Up	نيسان 1997	Diesel	Outside	120	Kahlounyya	Kahlounyya	120	5.00	0.83	304
96	Small Passenger vehicle	كيا 2013	Gasoline	Inside	250	Sumqanyya	Sumqanyya	250	5.00	0.40	146
97	Meduim Passenger vehicle	ميتسوبيشي 2001	Gasoline	Inside	150	Ain Wa Zain	Ain Wa Zain	150	0.80	0.11	39
98	Small Passenger vehicle	كيا 2004	Gasoline	Outside	200	Ain Wa Zain	Ain Wa Zain	200	2.00	0.20	73
99	Small Passenger vehicle	شاري 2001	Gasoline	Inside	250	Sumqanyya	Sumqanyya	250	6.00	0.48	175
100	Small Passenger vehicle	رينو 1999	Gasoline	Outside	200	Mokhtara	Mokhtara	200	6.00	0.60	219
101	Meduim Passenger vehicle	نيسان 2002	Gasoline	Inside	100	Mokhtara	Mokhtara	100	7.00	1.40	511
102	Small Passenger vehicle	ب ام 2003	Gasoline	Inside	180	Ain Wa Zain	Ain Wa Zain	180	5.00	0.56	203
103	Small Passenger vehicle	تويوتا 1987	Gasoline	Outside	180	Kahlounyya	Kahlounyya	180	5.00	0.56	203
104	Meduim Passenger vehicle	نيسان 2000	Gasoline	Inside	100	Ain Wa Zain	Ain Wa Zain	100	4.00	0.80	292
105	Small Passenger vehicle	نيسان 1985	Gasoline	Inside	200	Ain Wa Zain	Ain Wa Zain	200	10.00	1.00	365
106	Meduim Passenger vehicle	شيروكي 2003	Gasoline	Outside	125	Ain Wa Zain	Ain Wa Zain	125	5.00	0.80	292
107	Small Passenger vehicle	مرسيدس 2000	Gasoline	Outside	110	Mokhtara	Mokhtara	110	5.00	0.91	332
108	Small Passenger vehicle	نيسان 1983	Gasoline	Inside	200	Kahlounyya	Kahlounyya	200	10.00	1.00	365
109	Small Passenger vehicle	تويوتا 1985	Gasoline	Outside	170	Kahlounyya	Kahlounyya	170	1.00	0.12	43

110	Small Passenger vehicle	هيونداي	Gasoline	Outside	200	Ain Wa Zain	Ain Wa Zain	200	1.00	0.10	37
111	Small Passenger vehicle	نيسان 2009	Gasoline	Outside	250	Ain Wa Zain	Ain Wa Zain	250	10.00	0.80	292
112	Bus	تويوتا 1997	Diesel	Outside	130	Sumqanyya	Sumqanyya	130	1.00	0.15	56
113	Small Passenger vehicle	مرسيدس 2004	Gasoline	Outside	170	Sumqanyya	Sumqanyya	170	1.00	0.12	43
114	Small Passenger vehicle	نيسان 2004	Gasoline	Outside	150	Mokhtara	Mokhtara	150	2.00	0.27	97
115	Small Passenger vehicle	نيسان 2013	Gasoline	Inside	200	Sumqanyya	Sumqanyya	200	0.15	0.02	5
116	Small Passenger vehicle	دايو 1978	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	1.00	0.10	37
117	Meduim Passenger vehicle	ميتسوبيشي 1997	Gasoline	Inside	120	Sumqanyya	Sumqanyya	120	2.00	0.33	122
118	Small Passenger vehicle	تويوتا 2010	Gasoline	Outside	210	Kahlounyya	Kahlounyya	210	0.80	0.08	28
119	Small Passenger vehicle	مرسيدس 2006	Gasoline	Outside	130	Sumqanyya	Sumqanyya	130	10.00	1.54	562
120	Small Passenger vehicle	هوندا 1985	Gasoline	Inside	200	Sumqanyya	Sumqanyya	200	0.30	0.03	11
121	Small Passenger vehicle	مرسيدس 1991	Gasoline	Outside	130	Sumqanyya	Sumqanyya	130	1.00	0.15	56
122	Small Passenger vehicle	شاري 2004	Gasoline	Inside	120	Sumqanyya	Sumqanyya	120	10.00	1.67	608
123	Small Passenger vehicle	شاري 2004	Gasoline	Inside	120	Sumqanyya	Sumqanyya	120	10.00	1.67	608
124	Small Passenger vehicle	هيونداي 2013	Gasoline	Inside	200	Kahlounyya	Kahlounyya	200	5.00	0.50	183
125	Small Passenger vehicle	تويوتا 1982	Gasoline	Outside	160	Kahlounyya	Kahlounyya	160	3.00	0.38	137
126	Meduim Passenger vehicle	شيروكي 2002	Gasoline	Outside	100	Sumqanyya	Sumqanyya	100	2.00	0.40	146
127	Small Passenger	ب ام	Gasolin	Outside	160	Ain Wa Zain	Ain Wa Zain	160	5.00	0.63	228

	vehicle	1986	e								
128	Meduim Passenger vehicle	نيسان 2000	Gasoline	Outside	110	Mokhtara	Mokhtara	110	5.00	0.91	332
129	Meduim Passenger vehicle	ب ام 2004	Gasoline	Outside	110	Sumqanyya	Sumqanyya	110	10.00	1.82	664
130	Meduim Passenger vehicle	جي ام سي 2001	Gasoline	Outside	130	Sumqanyya	Sumqanyya	130	1.00	0.15	56
131	Small Passenger vehicle	هيونداي 2014	Gasoline	Outside	250	Kahlounyya	Kahlounyya	250	5.00	0.40	146
132	Meduim Passenger vehicle	نيسان 2002	Gasoline	Outside	120	Sumqanyya	Sumqanyya	120	7.00	1.17	426
133	Small Passenger vehicle	هوندا 2005	Gasoline	Outside	170	Kahlounyya	Kahlounyya	170	4.00	0.47	172
134	Meduim Passenger vehicle	هوندا 2006	Gasoline	Outside	150	Sumqanyya	Sumqanyya	150	6.00	0.80	292
135	Meduim Passenger vehicle	نيسان 2001	Gasoline	Outside	110	Ain Wa Zain	Ain Wa Zain	110	8.00	1.45	531
136	Bus	ميتسوبيشي 1992	Diesel	Inside	110	Sumqanyya	Sumqanyya	110	12.00	2.18	796
137	Small Passenger vehicle	هوندا 1998	Gasoline	Outside	150	Kahlounyya	Kahlounyya	150	6.00	0.80	292
138	Small Passenger vehicle	نيسان 2010	Gasoline	Outside	150	Mokhtara	Mokhtara	150	8.00	1.07	389
139	Small Passenger vehicle	بيجو 2004	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	3.00	0.30	110
140	Small Passenger vehicle	كيا 2008	Gasoline	Outside	200	Sumqanyya	Sumqanyya	200	5.00	0.50	183
141	Meduim Passenger vehicle	ب ام 2002	Gasoline	Inside	130	Ain Wa Zain	Ain Wa Zain	130	9.00	1.38	505
142	Small Passenger vehicle	نيسان 2005	Gasoline	Inside	200	Sumqanyya	Sumqanyya	200	7.00	0.70	256
143	Small Passenger vehicle	تويوتا 1989	Gasoline	Outside	180	Sumqanyya	Sumqanyya	180	5.00	0.56	203
144	Pick-Up	تويوتا 1999	Diesel	Outside	120	Sumqanyya	Sumqanyya	120	4.00	0.67	243

145	Small Passenger vehicle	ب ام 2005	Gasoline	Outside	180	Ain Wa Zain	Ain Wa Zain	180	20.00	2.22	811
146	Small Passenger vehicle	ب ام 2003	Gasoline	Outside	120	Mokhtara	Mokhtara	120	5.00	0.83	304
147	Small Passenger vehicle	غولف 1994	Gasoline	Inside	120	Ain Wa Zain	Ain Wa Zain	120	30.00	5.00	1,825
148	Small Passenger vehicle	تويوتا 150ك	Gasoline	Inside	150	Sumqanyya	Sumqanyya	150	8.00	1.07	389
149	Small Passenger vehicle	مازدا 2015	Gasoline	Inside	150	Mokhtara	Mokhtara	150	7.00	0.93	341
									Total	42.52	33,317

References

[1] Wikepedia, https://en.wikipedia.org/wiki/Bakaata

[2]Wikepedia, https://ar.wikipedia.org/wiki/%D9%85%D8%AD%D9%85%D9%8A%D8%A9_%D8%A3%D8%B1%D8%B2_%D8%A7%D9%84%D8%B4%D9%88%D9%81

[3]Published work by SBHCP"Chouf Built Heritage Conservation Project" 1st edition 2013 Page4.

[4]Weather Spark, https://weatherspark.com/y/99216/Average-Weather-in-Be%C3%AFt-ed-D%C3%AEne-Lebanon

[5]Development Strategic Plan for the Chouf Suwaijani Region – 2016.

[6]How to develop a Sustainable Energy Action Plan (SEAP)-Guidebook, European Union,

2010, http://www.eumayors.eu/IMG/pdf/seap_guidelines_en.pdf.

[7] IEA, http://www.iea.org/statistics/statisticssearch/report/?year=2014&country=LEBANON&product=Indicators

[8] Climatic Zoning for Buildings in Lebanon 2005 / UNDP/GEF and MPWT/DGU – 2005.

[9] www.degreedays.com

[10] knoema, UN Statistics Division: Energy Statistics Database, 1990-2014.

[11] Thermal Biomass for Lebanon/Mediterranean Mosaics Project (MM)/ Chouf Biosphere Reserve (SBR) -2015.

[12] LCEC, Assessment of Energy and financial performance of a solar hot water system in a single famely dwelling: case study from Marjeyoun-South Lebanon.

[13] The emission factors, http://www.eumayors.eu/IMG/pdf/technical_annex_en.pdf

[14] CH4 Emissions from solid waste disposal, http://www.ipcc-nggip.iges.or.jp/public/gp/bgp/5_1_CH4_Solid_Waste.pdf

[15] The Second National Energy Efficiency Action Plan for the Republic of Lebanon NEEAP -Lebanon 2016-2020.

[16] Global Climate Change, NASA, https://climate.nasa.gov/vital-signs/global-temperature/

[17] Lionello P. (2012), The Climate of the Mediterranean region, from the past to the future, Elsevier Books, ISBN: 978-0-12-416042-2

[18] Giorgi F., Lionello P. (2008). Climate Change Projections for the Mediterranean Region.

[19] Luterbacher, J., et al., 2006. Mediterranean climate variability over the last centuries. A review. In: Lionello, P., Malanotte-Rizzoli, P., Boscolo, R. (Eds.), Mediterranean Climate Variability. Elsevier, Amsterdam, pp. 27–148.

[20] Plan Bleu, 2009, State of the Environment and Development, UNEP /MAP- Plan Bleu, Athens

[21] EIB, 2008, European Investment Bank (2008). Study on Climate Change and Energy in the Mediterranean, July 2008

[22] Lebanon third national communication on climate change, 2016