The MENA Region Initiative as a Model of NEXUS Approach and Renewable Energy Technologies Project (MINARET)

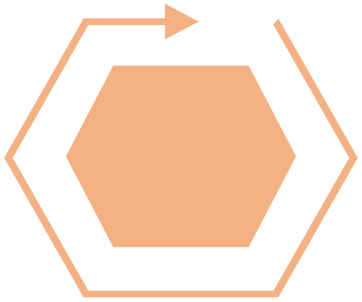
Year 1: Situational Analysis & Assessments

Al-Monastir, Tunisia

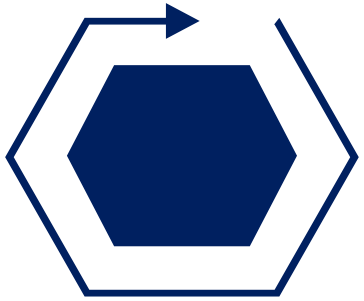
17– 20/10/2017

Acknowledgement

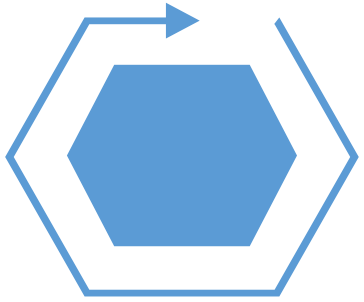
Presentation Outline



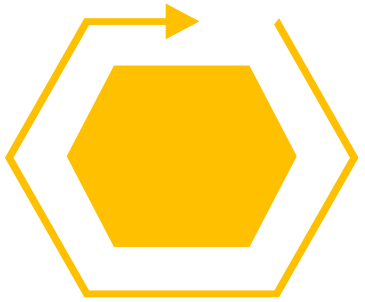
Introduction



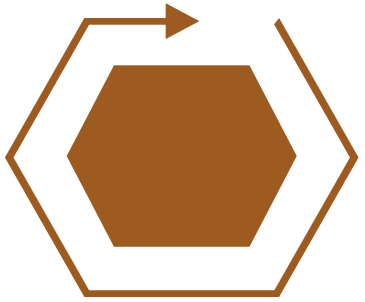
Stakeholders Identification & Policy Assessment



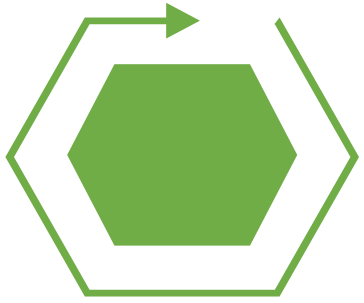
Water Assessment



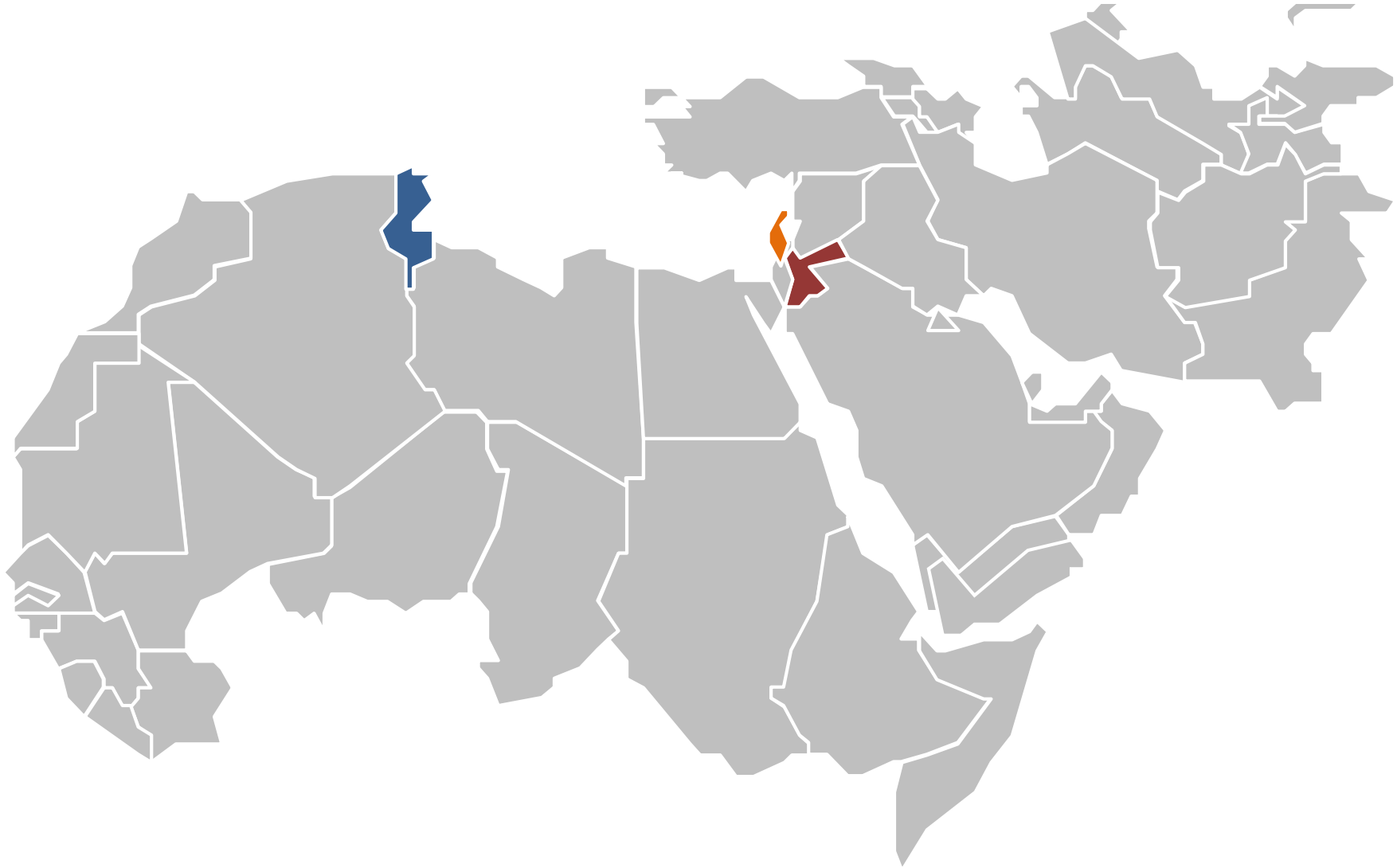
Energy Assessment



Socioeconomic Assessment



Gender Assessment



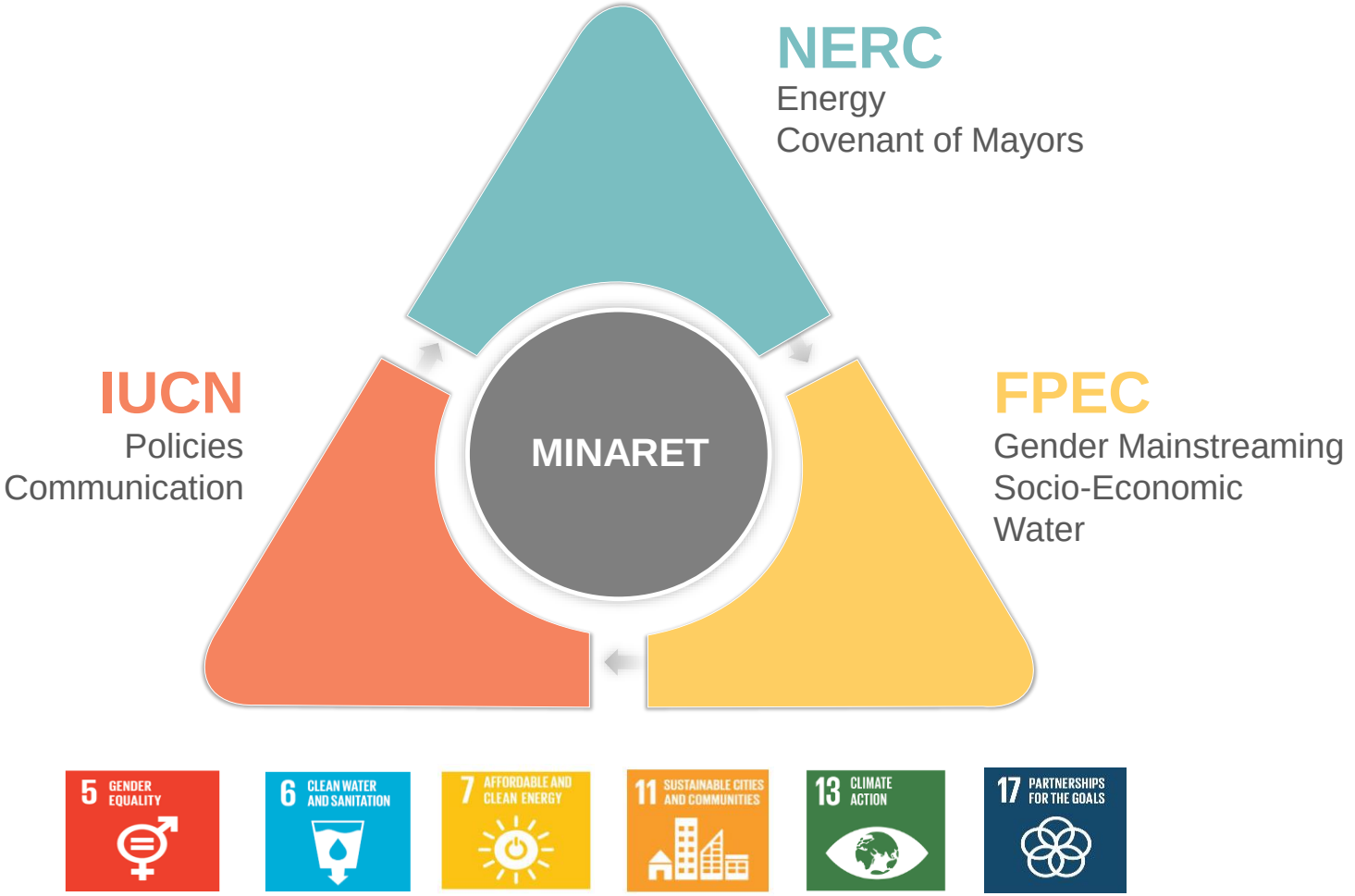
Tunisia

Lebanon

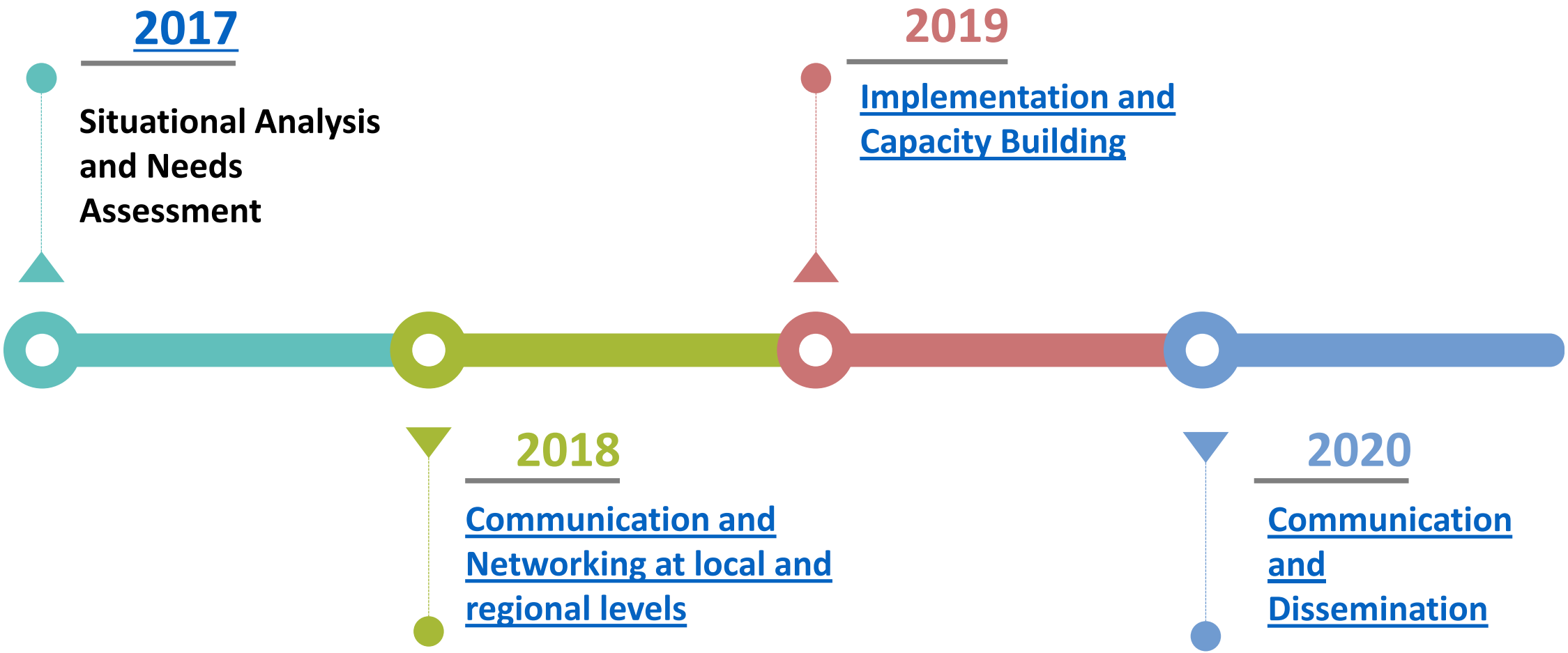
Jordan

Introduction

- Review of Year 1 Activities
- Highlights of Year 1 Accomplishments and alignments with SDGs
- Project Timeframe



MINARET Project Timeline Overview



Activities Overview

	Project's Activities	
Year 1	Component 1	Baseline Study & Covenant of Mayors Requirements
Year 2	Component 2	Capacity building Programs (1 basic, 2 Advanced),
Year 3	Component 3	• Implement Pilot project. • Continue with Capacity building programs • Toolkit (jointly with energy)
Year 4	Component 4	Communication& Dissemination

Back to Outline

Stakeholder Analysis at Monastir Level

- **A project stakeholder** in general is defined as ‘an individual, group, or organization, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of the project.

- **MINARET stakeholders at Monastir level** are individuals/entities that have an interest, who are involved or whose work or interest affects or is affected by the sectors of water, food, and energy

(Project Management Institute, 2013 and ISO 21500).

Stakeholder Analysis Task Objective

- The **overall objective** of the detailed stakeholders' analysis is to draw up each actor or group of actors' profile in relation to specific criteria which allows targeting Monastir stakeholders potentially to involve in following project design, amendments, developments, activities and monitoring.

- The **Specific objective** is to Clearly identify Monastir area actors who affect and are affected by the project, with a special focus on those involved in different NEXUS sectors and renewable energy technologies

Approach and Methodology

Methodology of data collection

01 Rapid Appraisal

02 Interviews with relevant actors in Monastir (24^{th} – 25^{th} April 2017)

03 Meetings with relative Stakeholders

Stakeholders Profile

Stakeholder	Importance	ROLE & RESPONSIBILITIES
Municipality of Monastir	Primary	- Providing the services for local citizens - Achieve best environmental protection and services
Governorate of Monastir **Unit of economics and investment**	Primary	- Coordinate between local development actors - Suggest local interventions and priorities - improve local investment environment
SONEDE **National Company for Water Exploitation and Distribution**	Primary	- Water utility services - Develop and monitor drinking water systems - Provide tariffing and billing services - Suggest and implement water conservation strategies - Raise public awareness
STEG **Tunisian Company for Electricity and Gas**	Primary	- Provide electricity with modernized techniques - Achieve energy sector planning - Suggest energy investment regulatory framework - Develop renewable energy alternatives

Stakeholders Profile

CRDA Regional administration of Agricultural Development Service of Vegetable productions	Primary	- Achieve the integrated crops development in terms of production and productivity increasing both quantities and quality - Raise awareness and assist farmers in updated farming techniques
Notre Grand Bleu Association	Primary	- Main ecosystem conservation actors. - MINARET focal point to achieve needed tasks and activities.
Regional Administration of Education	Primary	- Implement national education strategy and directives - Enhance skills and knowledge through adequate quality curricula
UTAP Tunisian Union of Agriculture and Fishing (URAP- Regional)	Primary	- Represent farmers and fishermen and defend their interests - Monitor agricultural sector and report to public authorities - Suggest and interact on policies and regulations - Provide technical assistance - Raise awareness and assist farmers in updated farming techniques - Empower and promote rural women participation

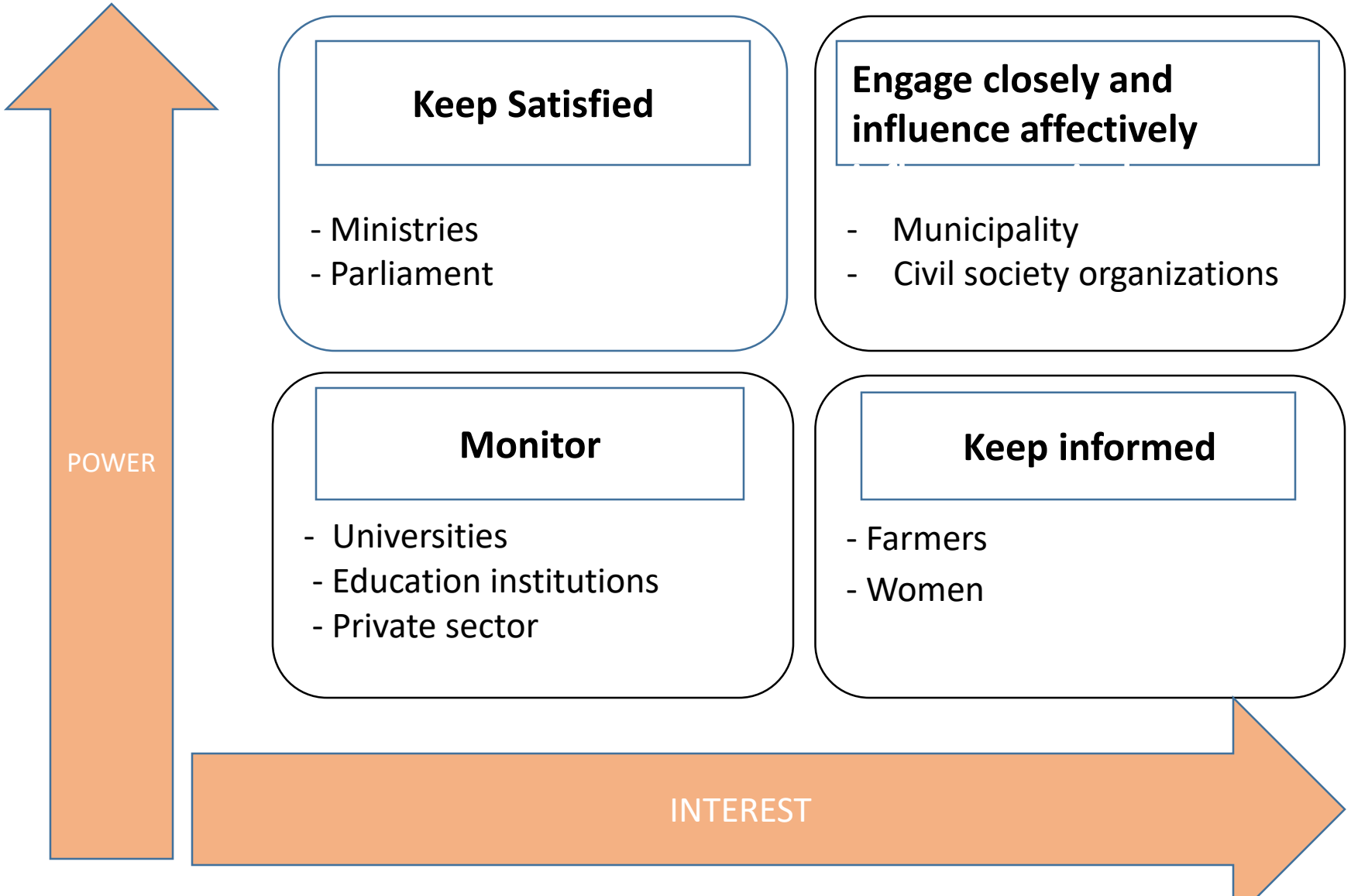
Stakeholders Profile

Farmers	Primary	- farming, crops and cattle breading - Provide affordable and quality food to dwellers - Help achieve food security - Collectively manage water resources
Women & Youth	Primary	- Farming, handicraft and cattle breading activities in rural areas - Actively contribute to the economic activities - Disseminate local knowledge - Educate and replicate good practices
Centre Affairs de Monastir	Primary	-Provides support and assistance for young entrepreneurs
The Voice of Children	Secondary	- Provide technical and social assistance to disadvantaged mothers - Improve livelihood conditions to less fortunate kids

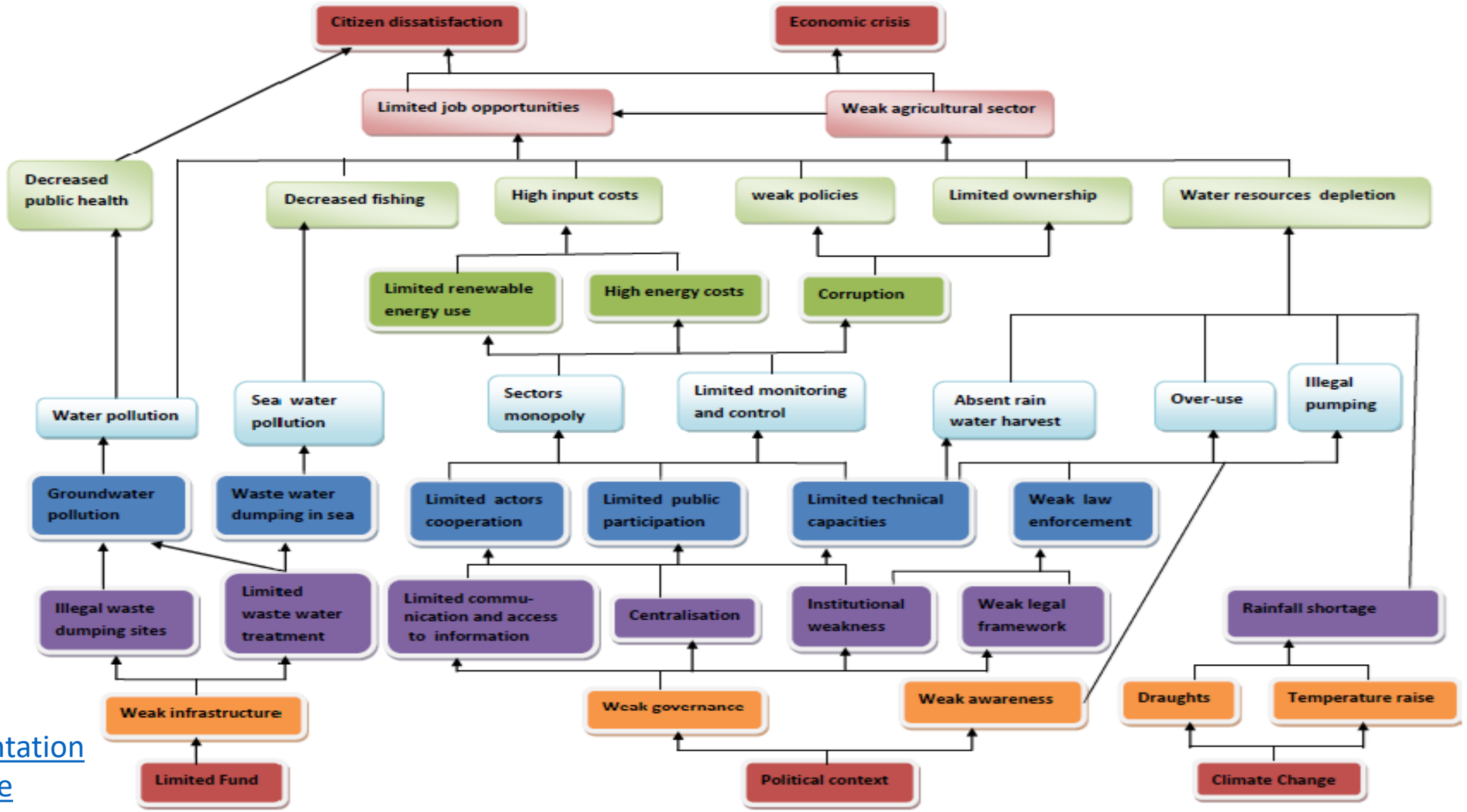
Stakeholders Profile

Ribat FM radio	secondary	Provide reliable and updated information to citizens - Investigate on critical situations
ANPE **National Agency of Environment Protection**	Secondary	- Protect the environment and natural resources by law enforcement and monitoring - Suggest environmental regulations and policies and mainstreaming environmental concepts into all national development plans.
Entrepreneurs in water and sanitation sectors	Secondary	- Achieve requested hardware
Potential young entrepreneurs in WEF	Secondary	- Invest in NEXUS related economic opportunities - Scale up best practices and success stories

Stakeholders' Power/Interest Grid



Problems Tree Analysis



[Presentation Outline]

Policy Assessment

General Remarks

Long before the Bonn 2011 Nexus Conference and the "Water, Energy and Food Security Nexus – Solutions for the Green Economy" conference, which was launched by the German Government to contribute to the United Nations Conference on Sustainable Development (Rio +20), Jordan, Lebanon and Tunisia had identified the important linkages between water, energy and food (WEF), climate change and sustainable development.

Since then, Jordan has made tremendous efforts (research, workshops, projects and other related activities) related the new NEXUS concept and its connection to climate change and sustainable development. These efforts were led and greatly supported by governmental bodies (i.e. line ministries and institutions), research centers and universities. Lebanon, while to a lesser extent, has contributed to this concept. Unfortunately, Tunisia has not tackled this concept adequately.

This could be ascribed to the political unrest that began in Tunisia in 2011, which was the same year the Nexus concept was launched. Additionally, the preferred literature published in French language in both Tunisia and Lebanon.

Policy Assessment

General Remarks

There is a strong need for institutional and budget reforms in the energy sector since the current situation drastically differs from 20 years ago. Some of its aspects such as subsidies have become a burden hindering further development of the whole sector.

In Tunisia, the water governance has four main interdependent dimensions:

- **Social Dimension,** which aims at an equitable use of the resource,
- **Environmental Dimension** that allows sustainable use of the resource and ecosystem integrity,
- **Economic Dimension** efficient use of the resource and the role of water in economic growth,…
- **Political Dimension** ensuring equal opportunities for all stakeholders, users and citizens access to water.

The Main Elements of Agricultural Policy is to strengthen coherence at different levels (articulation between sub-sectors, coherence of agricultural policy with other cross-sectorial and sectorial policies on economic and social development), through a redefined role of the State and the producer-consumer relationship and an institutional framework conducive to consultation and participation of all stakeholders.

Policy Assessment

Recommendations for Improvements - Vulnerable Groups and Gender

- Introducing inclusive and fair rules, institutions and practices governing social interactions to ***improve outreach to the vulnerable, such as poor men and women, and the younger and older generations***.
- Gender equity and women's empowerment are declared goals for all Arab countries. ***Women should play effective roles in identifying water-energy-food governance options at all levels.***
- ***Gender issues and participatory approaches*** must be integrated into local and regional businesses.
- Ensuring that women are ***equal partners with men in decision-making*** over development, technology choice, financing and other aspects of water management, food and energy security, and climate change change adaptation.
- Focusing ***water development policies towards eradicating poverty and improving the livelihoods of women and men.***
- Reforms are also needed at the local level to ***effectively integrate gender-aware and participatory approaches into local and regional businesses, especially to empower women.***

Policy Assessment

Recommendations for Improvements – Policies and Strategies

- Adopt a WEF nexus approach policy making to increase policy coherence among the three sectors and climate change policies to provide integrated solutions and to mitigate nexus-related risks ***(integrated policies, non-siloed thinking, linking up across sectors and ministries).***

- Governance and institutional structures in the Arab region can be enhanced and strengthened for more effective and integrated resources management through ***Analyze current national institutional arrangement for better understanding of the weaknesses and gaps that hinder implementing the WEF nexus approach in each Arab country.***

- Adopt a WEF nexus approach policy making to increase policy coherence among the three sectors and climate change policies to provide integrated solutions and to mitigate nexus-related risks ***(integrated policies, non-siloed thinking, linking up across sectors and ministries).***

- Governance and institutional structures can be enhanced and strengthened for more effective and integrated resources management through ***Analyze current national institutional arrangement for better understanding of the weaknesses and gaps that hinder implementing the WEF nexus approach.***

Policy Assessment

Recommendations for Improvements – Partnership and Coordination

- ***Harness existing multi-stakeholder platforms to improve policy coherence, institutional and social learning and leadership*** (Multi-stakeholder platforms are needed in order to develop and explore science-policy-society linkages and opportunities to share knowledge, including public sector (legislators, politicians, utilities, among others), private sector (utilities, supply chain, agricultural and industrial sector, etc.), civil society and foreign aid agencies).

- The ***involvement of civil society*** in the nexus governance can be an important asset in generating better dialogues and bringing legitimacy and accountability to governing institutions.

- Support and provide ***incentives for strategic partnerships and cooperation between research centres and the private sector.***

- The ***establishment of a network of leading experts in the region*** is encouraged to create more synergy in the technical knowledge as well as in transboundary issues, international conventions and legal and institutional aspects.

- ***Enhance coordinating and collaborating mechanisms*** amongst institutions as a key for mainstreaming the WEF nexus approach at local, national and Arab regional levels, and not necessarily establishing new institutions for the WEF nexus.

Policy Assessment

Recommendations for Improvements – Development

- *Apply appropriate policy, legislative and economic tools to ensure that basic human needs for the three resources are met* at a low, subsidized price, while excessive use is priced at a tariff that reflects cost.

- *Mainstream the nexus mental models, concepts, and tools in policy and development plans.*

- Ensuring that the *environmental and social needs of future generations are reflected in current policies and practices.*

Policy Assessment

Recommendations for Improvements – Others Dimensions

- ***Empower and strengthen existing institutions already active*** in developing and implementing strategies/policies-related to WEF sectors to develop a comprehensive WEF nexus national strategy; a key element of which is data homogenization and sharing.
- Implement ***integrated planning and management*** that reduces trade-offs and builds synergies across the three sectors.
- Improve resources efficiency towards the transition to sustainable economy ***through reforming economic policy and market incentives.***
- ***Promote sustainable consumption and production patterns*** to achieve SDGs and mitigate and adapt to climate change mandate and targets as agreed upon in Paris climate summit in 2015.
- Create training programs across the various sectors to build capacity on the analytics as well as the negotiation aspects of the implementation of nexus solutions at different levels ***(Develop specific institutional and individual capacity building programs across the three sectors).***
- ***Scale up, replicate and fund on-going projects related to the nexus*** including integrated seawater energy and agricultural system, renewable energy for wastewater treatment and reuse, and solar desalination.

Selection Criteria for pilot projects

- Should be owned by the municipality;
- Approved by the municipality for other local governmental departments;
- Should be within the allocated budget of the project; and
- In line with the objectives of the MINARET project.

MINARET Project: WATER

- The purpose of the baseline study was to carry out a situational analysis for water and agriculture at the municipality level.
- The boundaries of the study included:
- Monastir Municipality in Tunisia.
- The following points were addressed for each municipality:

- Identification of the existing policy related to the water and agricultural sector
- Carry out data collection and analysis of water situation to identify relevant benchmarks for water consumption, resources, treatment and reuse.
- Carry out data collection and analysis of current agricultural situation and investigate new and modern agricultural technologies that consume less water and energy.
- Recommendation of Pilot projects and Capacity Building programs at the municipality Level.

MINARET Project

Bottom- up Approach

Methodology of data collection

01 Literature Review from online sources, governmental institutions, and previous projects.

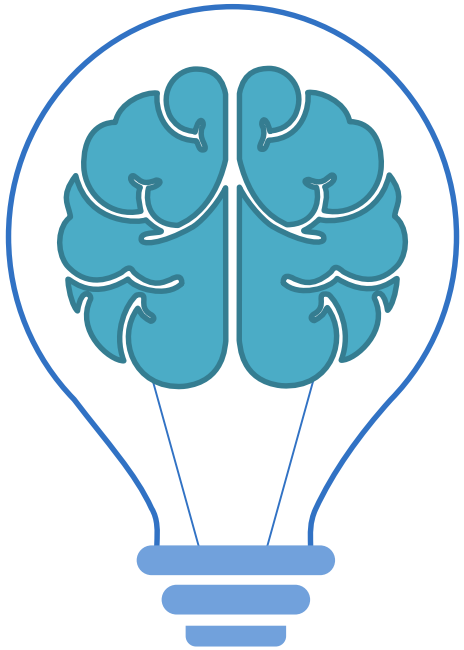
02 Meetings with relative Stakeholders

03 Field Surveys and Questionnaires

04 Focus Groups Discussions with the Community and Local NGO's

MINARET Proposed Water Projects

Recommendations for Pilot Projects



Intervention 1

Intervention 2

Intervention 3

Intervention 4

Discussion

MINARET Proposed Water Projects #1

- **Project's Name: Implementation of pilot project for soilless culture and training center.**
- **Location: Pilot farm to be chosen once agreed on the project.**

Administration

Managed and Implemented by URAP. Assistance from CRDA is required.

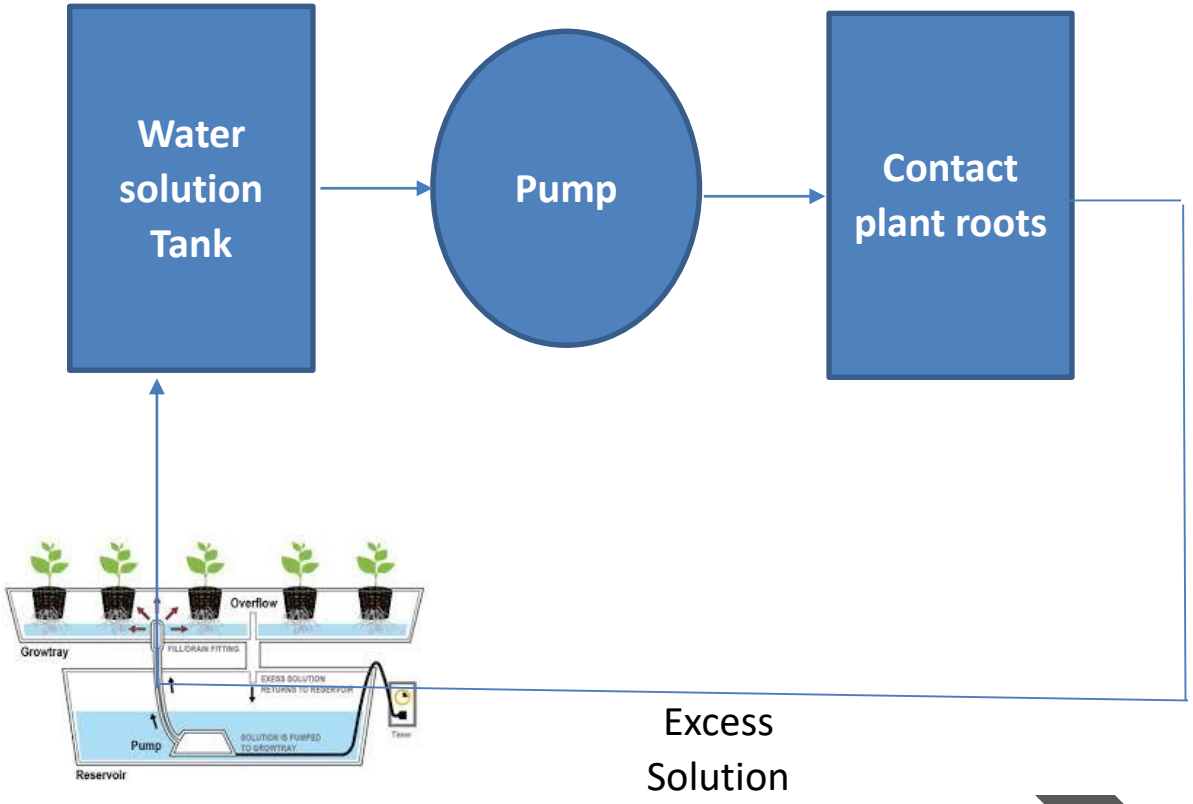
Water is used for agricultural production with the possibility of running the pump using solar panels

Estimated Cost

Estimated cost of the project on 100m2 is 15000 USD

Synergies

Nexus
Gender
Socio-economic
Policies



Source of Water???

MINARET Proposed Water Projects #2

- **Project's Name: Greenhouse rain water catchment system**
- **Location: Pilot farm to be chosen once agreed on the project.**

Administration

Managed and Implemented by Municipality, URAP.

Water is used for agricultural production with pumping using solar panels

Estimated Cost

The estimated cost is 75,000USD for 5000m2 area

Synergies

Nexus
Gender
Socio-economic
Policies

Sahara Forest Project

Potential Locations ???

MINARET Proposed Water Projects #3

- **Project's Name: Rainwater Harvesting tanks for use in municipal gardens and farmers.**
- **Location: Near sea port of Monastir.**

Administration

Managed and Implemented by Municipality.

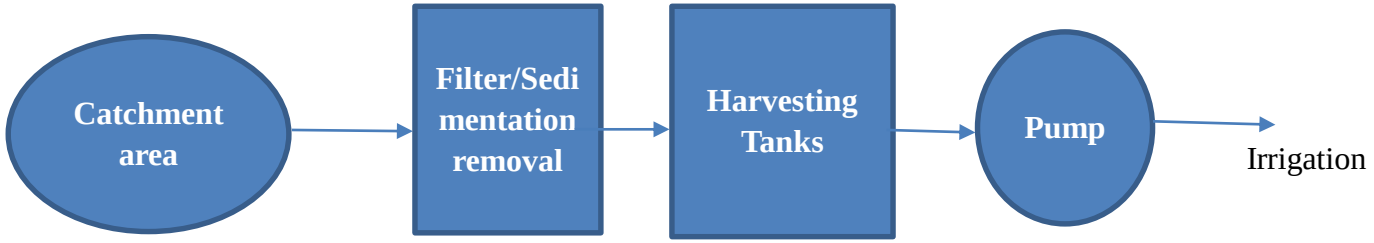
Water harvesting for irrigation purposes for the municipality

Estimated Cost

Costs vary depending on the size and ,material of the tanks installed

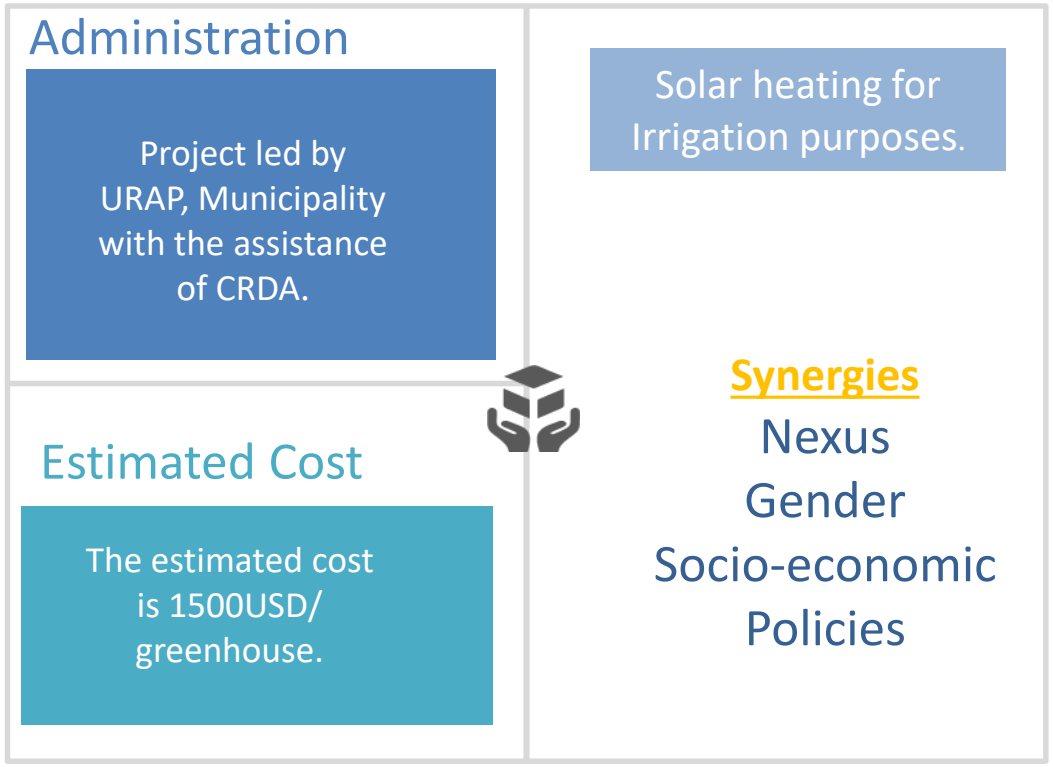
Synergies

Nexus
Gender
Socio-economic
Policies



MINARET Proposed Water Projects #4

- **Project's Name: Thermal solar systems for Greenhouses heating and agriculture**
- **Location: New or already existing greenhouses.**



This project will enhance the production and the profitability of greenhouses agriculture.

- The idea of the project is to collect solar heat through evacuated tubes thermal collectors,
- Then the energy can be stored for heating in the winter
- Finally it can be released when needed.

Back to Outline

MINARET Project: Socio-Economic

- The purpose of the baseline study was to carry out a situational analysis for the socio-economic environment in each municipality.
- The boundaries of the study included:
- Monastir Municipality in Tunisia.
- The following points were addressed for each municipality:

- Analyze and understand the demographics and socio-economic atmosphere of the municipalities
- Determine the usage and utilization of energy technology and water management and how they are connected to food security
- Gain better understanding of the community's knowledge, attitude and practice towards energy technology, water management and food security
- Recommendations for potential small initiatives

MINARET Project

Methodology of data collection

01 Literature Review from online sources, governmental institutions, and previous projects.

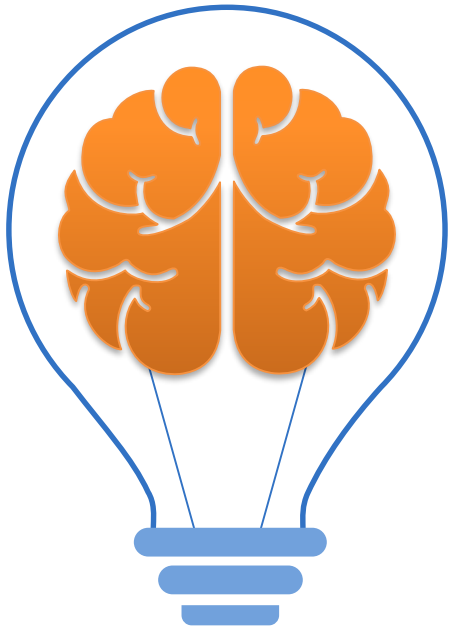
02 Meetings with relative Stakeholders

03 Field Surveys and Questionnaires

04 Focus Groups Discussions with the Community and Local NGO's

MINARET Project

Recommendations for small initiatives



Intervention 1

Intervention 2

MINARET Proposed Small Initiative #1

- **Project's Name: Establishment of an Eco-Tourism and Knowledge Hub**
- **Location: Monastir Coast and Kuriat Island**

In cooperation with Voice of Children, Center d'affaire de Monastir and ANPE*, Grand bleu will manage and operate two hubs to satisfy the NEXUS model from a socio-economic perspective.

1. The Monastir Hub will provide capacity building sessions on climate change, socio-economic skills, biology, vocational trainings for women (i.e. reuse of fish nets), and will include a natural dukkana for the sale of handmade and local goods produced by local women

2. The Kuriat Hub will be a furnished research center for on-site training. The Hub will assist rangers and other interested parties in the protection of the eco-system and other wildlife.

MINARET Proposed Small Initiative #2

- **Project's Name: Revolving Fund (household level)**
- **Location: Multiple households**

The Revolving Fund program provides no-interest loans to households that seek to undertake solar energy/green initiatives.

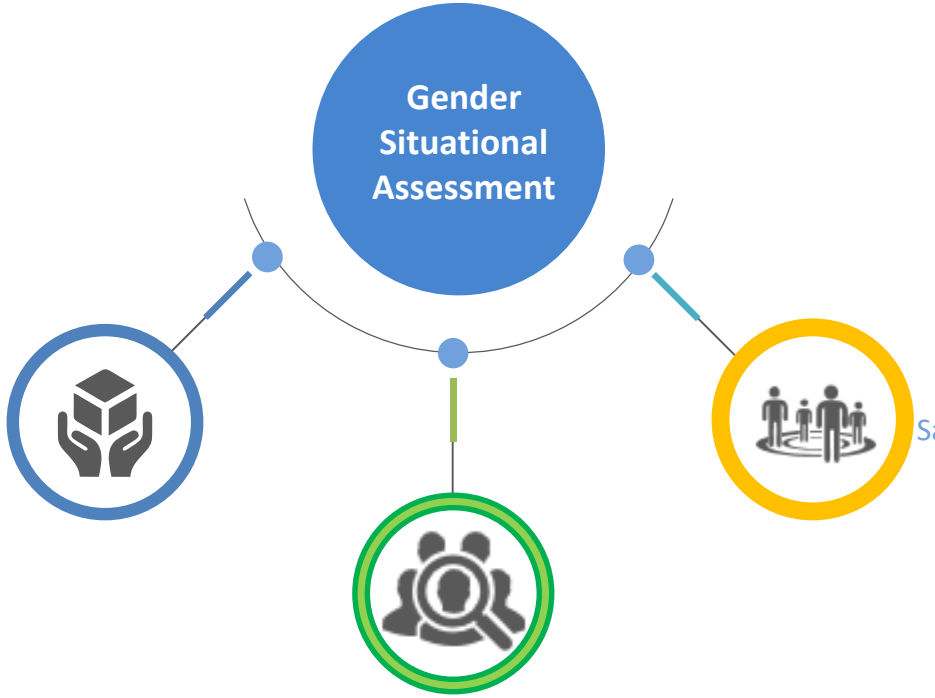
The available types of initiatives are:

1. Grey Water Recycling and Reuse
2. Drip Irrigation
3. Photovoltaic Pumping
4. Thermal Panels
5. Water Harvesting Wells/Tanks

MINARET Project: Gender Assessment

Gender Situational Assessment Coverage

Ensuring 3 levels are covered



Project Partners

NERC, IUCN, FPEC .

Community

Sahab, Karak, Monastir, Jdeidet El-Chouf

Municipality as Institution

Jordan: Sahab Municipality, Karak Municipality, Tunisia: Monastir Municipality
Lebanon: Jdeidet El-Chouf Municipality

Methodology of data collection

Applied Tools

01

Project Partner Level

- Interviews
- 1st Level - Self-Assessment Questionnaire
- 2nd Level Self-Assessment Questionnaire

02

Municipality Level

- Literature review
- Direct Interviews
- 1st Level - Self-Assessment Questionnaire
- Focus groups discussions

03

Community Level

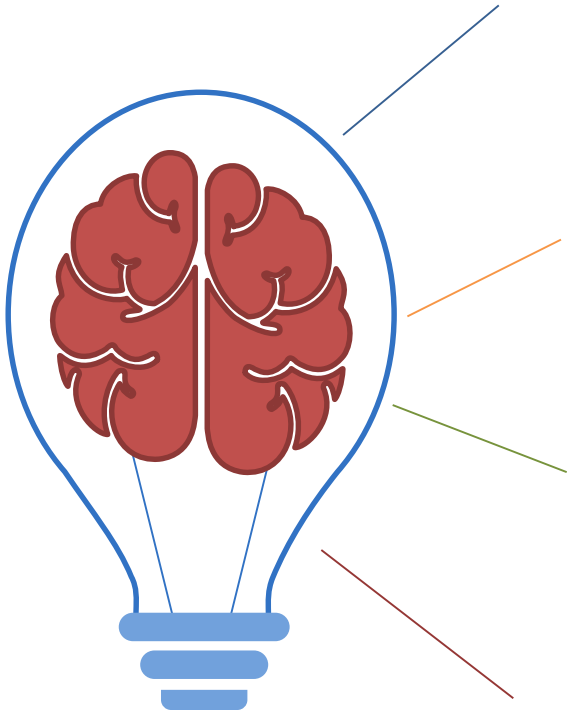
- Variety of Gender Assessment Tools and Techniques
- Review of Existing Studies/Documents
- Focus Groups discussion
- Site Observation

MINARET Project

Methodology of data collection

MINARET Project

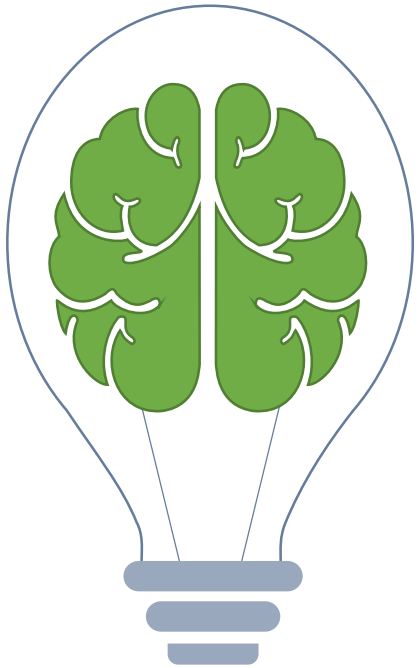
Recommendations



- Access to credit for energy has to improve women's poverty status in any significant way. So improving access to credit through small initiatives should be done in an integrated approach.
- In Tunisia the typical enterprises women invest in are food-processing, sewing, traditional jewelry and most of them lack access to external markets.
- Create opportunities for women to enhance their technical competencies around energy, water and food management by conducting vocational trainings in partnership with national and local vocational centers (CREFOC training and development center, Monastir Sciences Palace).
- Work with organizations such as Grand Blue and the municipality to promote and support income generation opportunities for small, women-owned business promoting water and energy saving technologies.

Back to Outline

MINARET Project



1. Main Municipality Building

2.Mustapha Ben Jannet Monastir Stadium

3.Warehouse

4. Central Market

5.Improvement of Public Lighting Grid

6. Monastir Municipality Pumping station

7. Municipal Slaughter House – Lighting Retrofit

8.Waste Water Treatment planet (Onas frina)

9.Higher Institute Of Biotechnology De Monastir

10.Dabeebi Hospital and Monastir Hotel Centre

11.Al-Basatin School

12.Salle Olympic Mohammad Mzali Monastir

13. Energy Car

1. Municipality Main Building

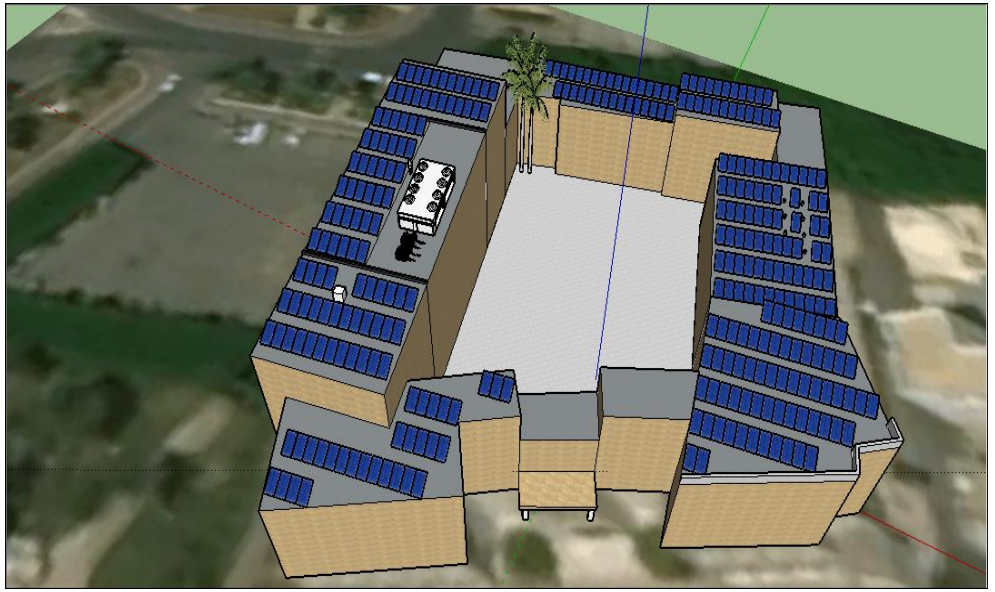
PV system

Energy Efficiency

1. Municipality Main Building

01

The available spaces on the rooftop can fit approximately 90-kWp on-grid system



Obstacles:

- No access to the rooftops
- Civil study is essential to estimate the building level of tolerance due the additional weight of installing PV panels.

1.Main Municipality Building – Energy Saving

1. Replacing existed spilt units with more efficient spilt units (Inverter Technology).
2. For VRF system, it is recommended to clean the filters, cover the external fans to improve efficiency and increase life operation and insulate the ducting system.
3. Replacing all the windows from single glass to double glass to reduce the energy loss.

Energy Saving:

Energy saving for applying the above recommended as the following below table:

Main Municipality Building	Annual Electrical Energy Consumption (kWh/yr.)	Annual Energy Saving (kWh/yr.)	Annual Energy Saving (TD)	Investment Cost (TD)	Payback Period (yr.)
Split Unit	161,925.12	71,966.72	14,393.34	60,000	4.14

In additional, after applying the above recommended for VRF system, the efficiency of the system will be increased about of 2 % to 3 % and decreased the electricity by 1 % to 1.5 %. (According to practical experience).

Expected Saving: 71,967 kWh Annually Saving: 44%

2.Mustapha Ben Jannet Monastir Stadium

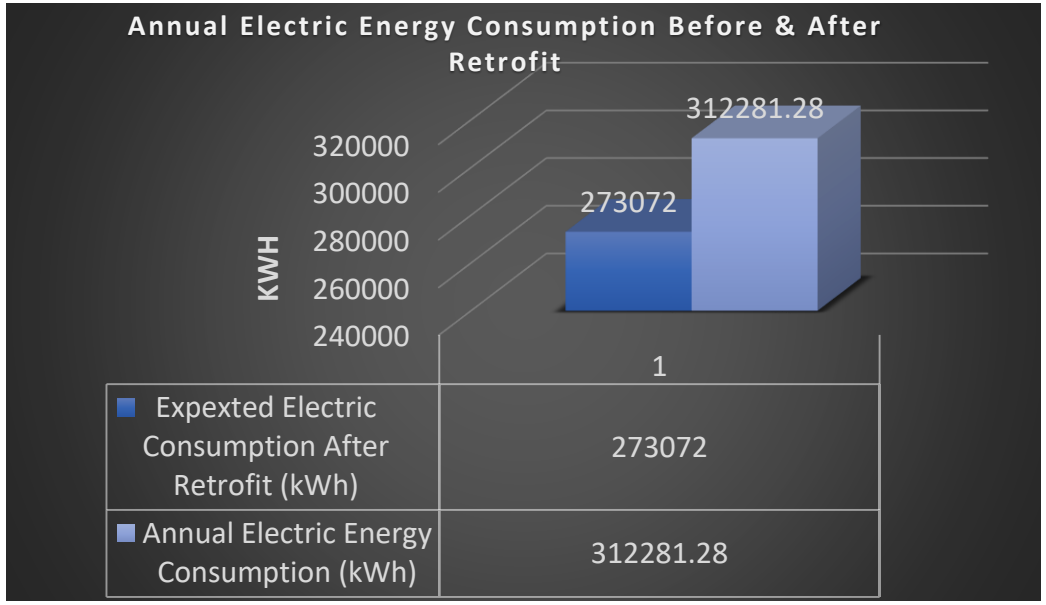
Football stadium –EE system

Swimming pool

Basketball Stadium –EE system

Football Stadium

LIGHTING SYSTEM LOAD PROFILE AFTER RETROFIT							
ECMS	No. of lamps to be replaced	Total connected Load (kW)	Annual electric energy saving (kWh)	Annual cost saving (TD)	Investment (TD)	Expected lifetime (yr.)	Simple payback period (yr.)
REPLACE FL 36W WITH LED 20 W	124	2.48	17856.0	3571.2	3100	25	0.9
REPLACE FL 18W WITH LED 10 W	32	0.32	864.0	172.8	480	25	2.8
REPLACE HALOGEN 15W WITH LED 5W	100	0.5	1800.0	360.0	1000	25	2.8
REPLACE HPS 250W WITH LED 100W	36	3.6	6566.4	1313.3	18000	25	13.7
REPLACE HPS 400W WITH LED 150 W	41	6.15	12122.9	2424.6	28700	25	11.8
TOTAL		13.05	39209.3	7841.9	51280		6.5

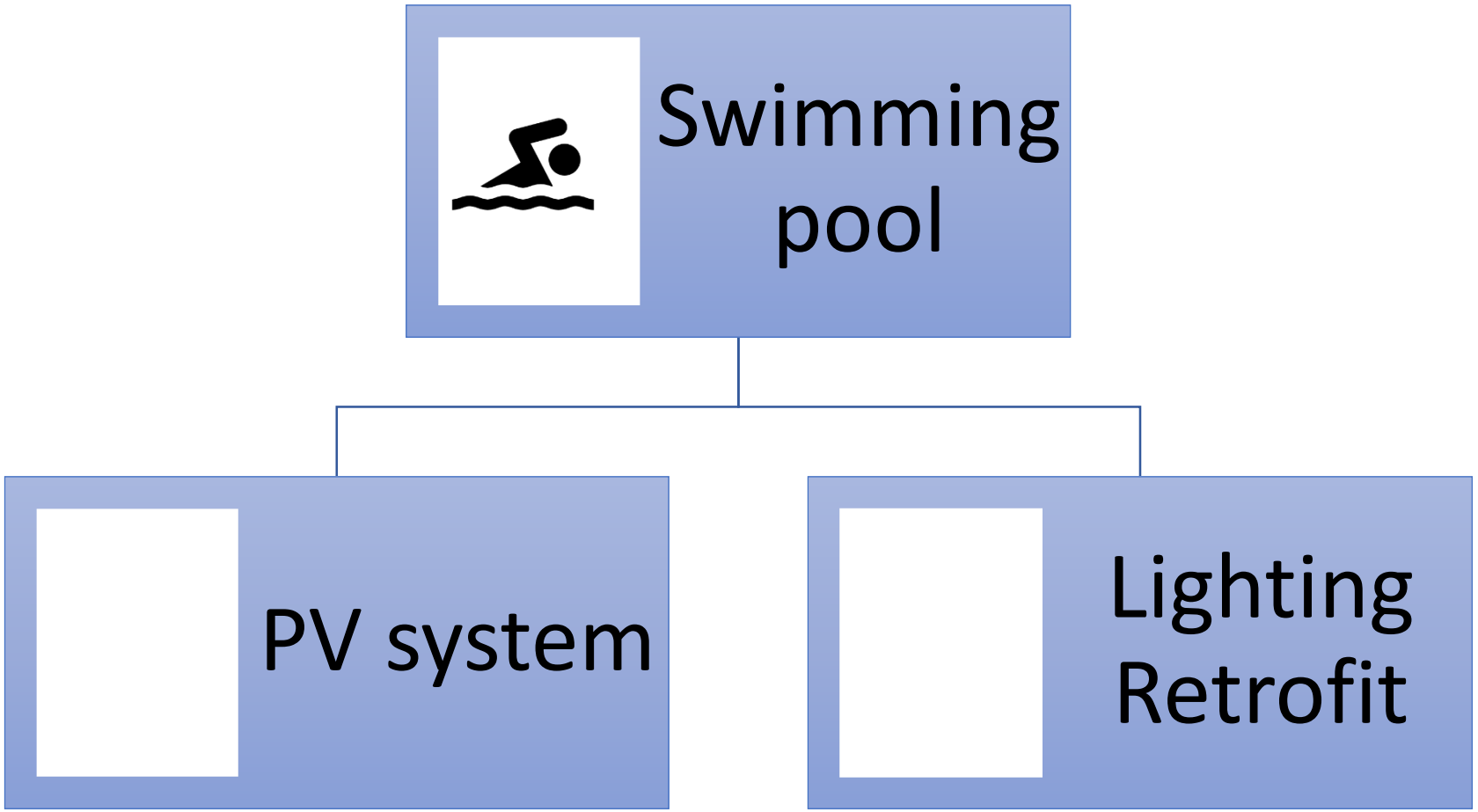


Expected Saving:

39,210 kWh Annually

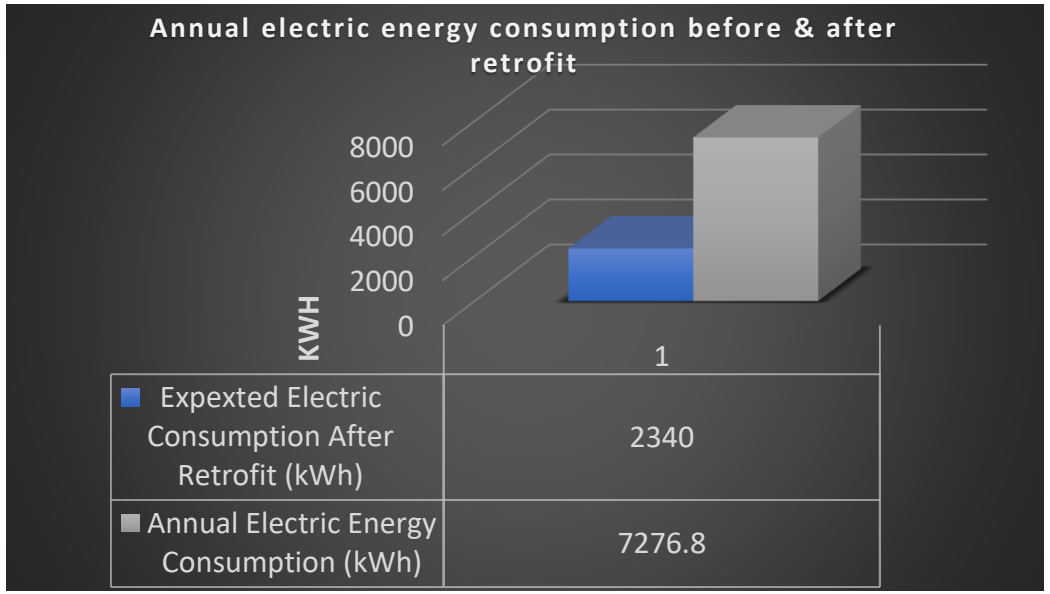
Saving:

13%


Swimming pool
PV system
Lighting Retrofit

Swimming pool –Lighting Retrofit

LIGHTING SYSTEM LOAD PROFILE AFTER RETROFIT							
ECMS	No. of lamps to be replaced	Total connected Load (kW)	Annual electric energy saving (kWh)	Annual cost saving (TD)	Investment (TD)	Expected lifetime (yr.)	Simple payback period (yr.)
REPLACE FL 36W WITH LED 20 W	20	0.4	1080.0	216.0	500	25	2.3
REPLACE FL 18W WITH LED 10 W	10	0.1	900.0	180.0	150	25	0.8
REPLACE HPS 400W WITH LED 150 W	10	1.5	2956.8	591.4	7000	25	11.8
TOTAL		2	4936.8	987.4	7650		7.7



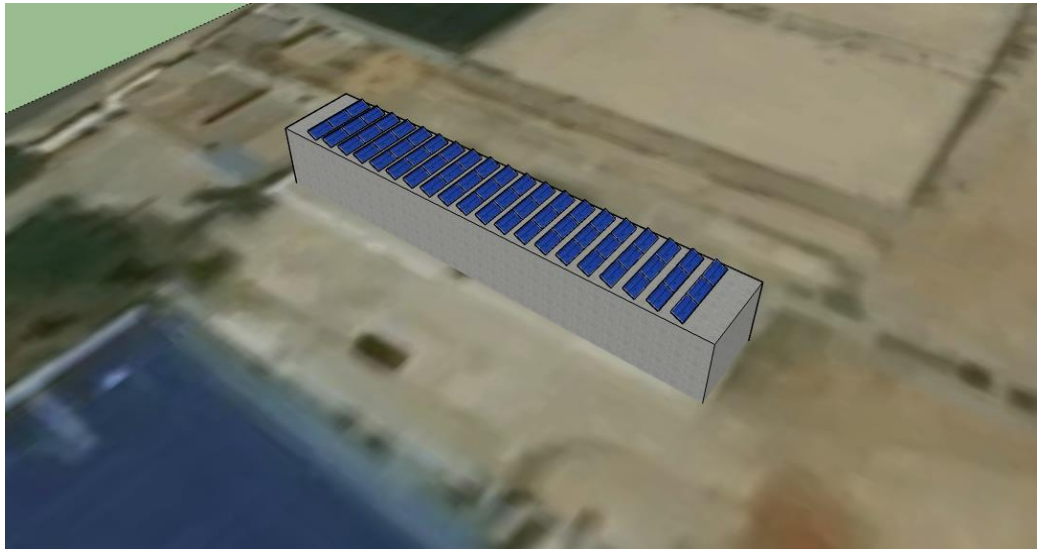
Expected Saving:
4,937 kWh Annually

Saving:
68%

Swimming Pool –PV system

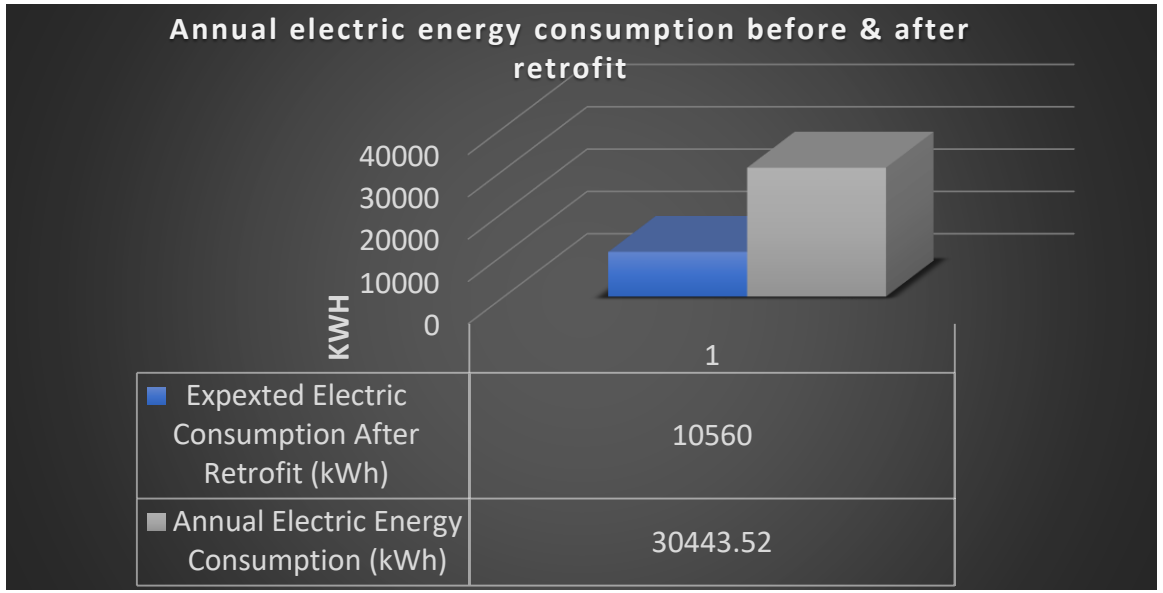
The available space on the building next to the swimming pool can fit approxmielty 20 kWp.

However, Civil study for the building level of tolerance is required as well.



Basketball stadium

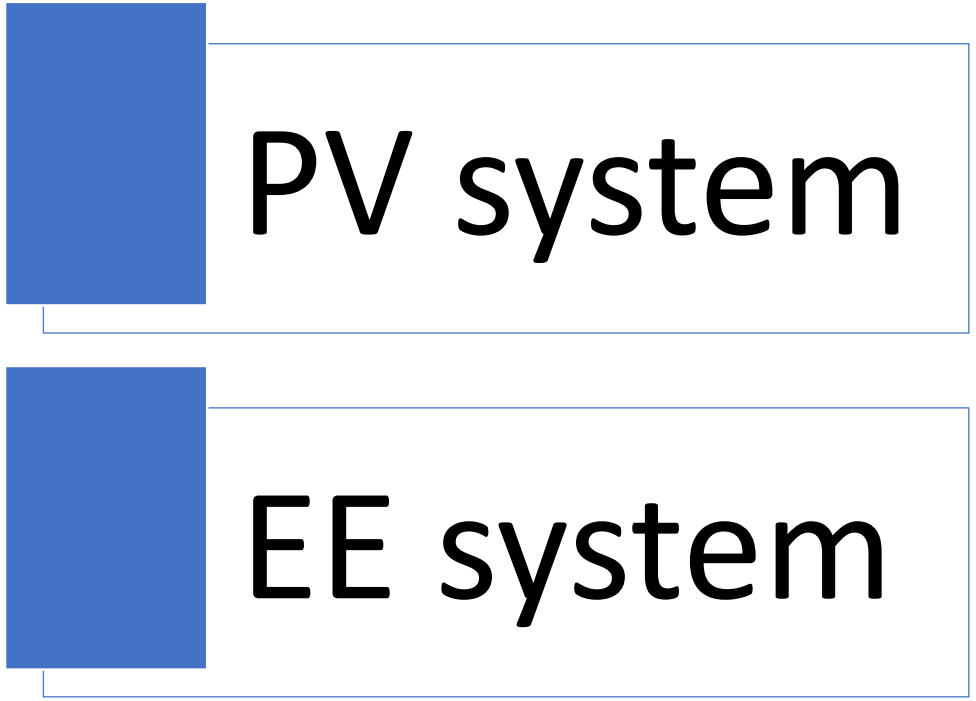
LIGHTING SYSTEM LOAD PROFILE AFTER RETROFIT							
ECMS	No. of lamps to be replaced	Total connected Load (kW)	Annual electric energy saving (kWh)	Annual cost saving (TD)	Investment (TD)	Expected lifetime (yr.)	Simple payback period (yr.)
REPLACE FL 36W WITH LED 20 W	20	0.4	1080.0	216.0	500	25	2.3
REPLACE FL 18W WITH LED 10 W	120	1.2	3240.0	648.0	1800	25	2.8
REPLACE HPS 250W WITH LED 100W	14	1.4	2553.6	510.7	7000	25	13.7
REPLACE HPS 400W WITH LED 150 W	44	6.6	13009.9	2602.0	30800	25	11.8
TOTAL		9.6	19883.5	3976.7	40100		10.1



Expected Saving:
19,884 kWh Annually

Saving:
65%

Salle Olympic Mohammad Mzali Monastir

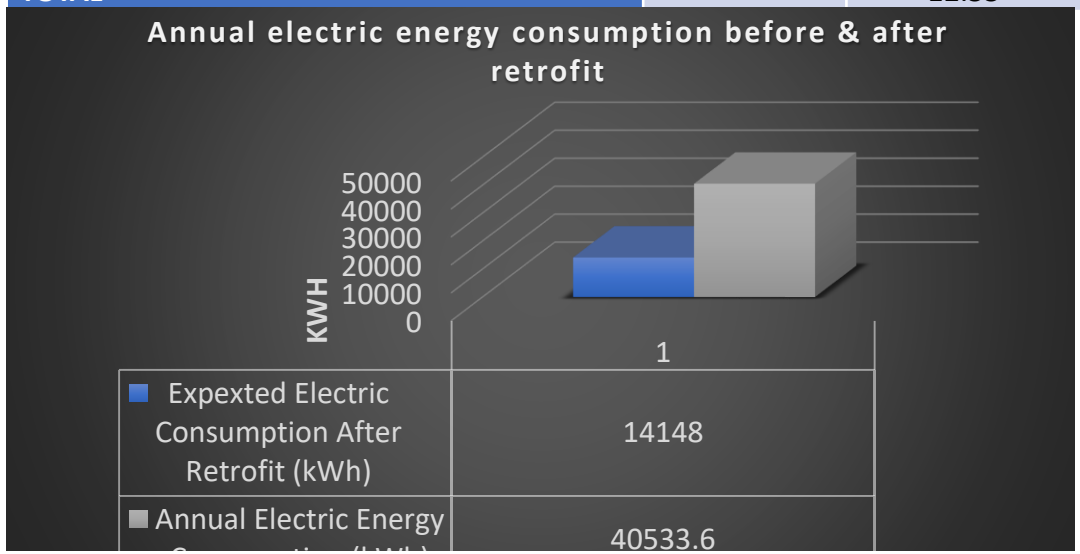


Salle Olympic Mohammad Mzali Monastir –PV systen

There was no available space on the top of the stadium nor the area surrounding it.

Salle Olympic Mohammad Mzali Monastir –EE system

LIGHTING SYSTEM LOAD PROFILE AFTER RETROFIT							
ECMS	No. of lamps to be replaced	Total connected Load (kW)	Annual electric energy saving (kWh)	Annual cost saving (TD)	Investment (TD)	Expected lifetime (yr.)	Simple payback period (yr.)
REPLACE FL 36W WITH LED 20 W	40	0.8	2160.0	432.0	1000	25	2.3
REPLACE FL 18W WITH LED 10 W	160	1.6	4320.0	864.0	2400	25	2.8
REPLACE HALOGEN 15W WITH LED 5W	20	0.1	360.0	72.0	200	25	2.8
REPLACE HPS 250W WITH LED 100W	18	1.8	3283.2	656.6	9000	25	13.7
REPLACE HPS 400W WITH LED 150 W	55	8.25	16262.4	3252.5	38500	25	11.8
TOTAL		12.55	26385.6	5277.1	51100		9.7



Expected Saving:

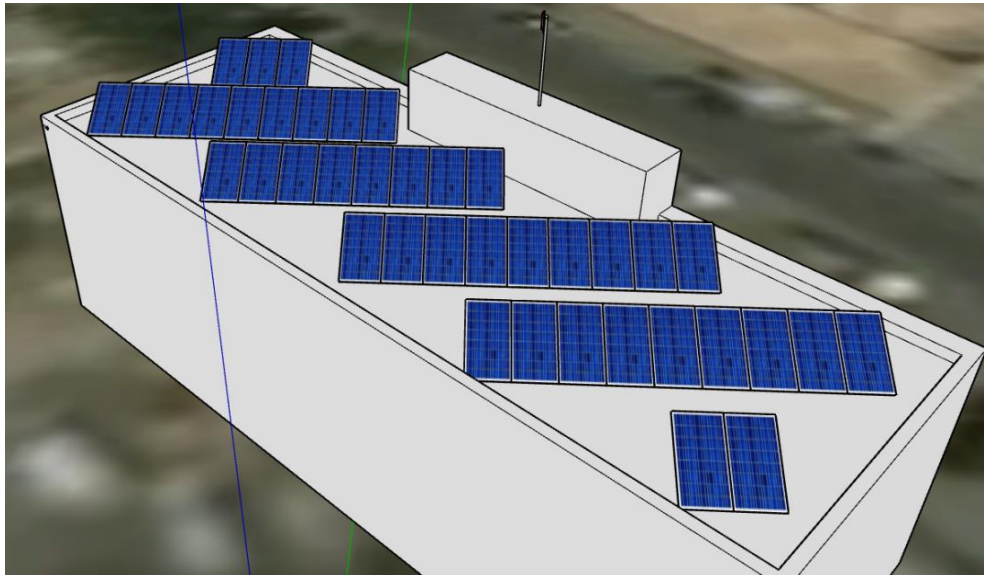
26,386 kWh Annually

Saving: 64%

3. Warehouse

01

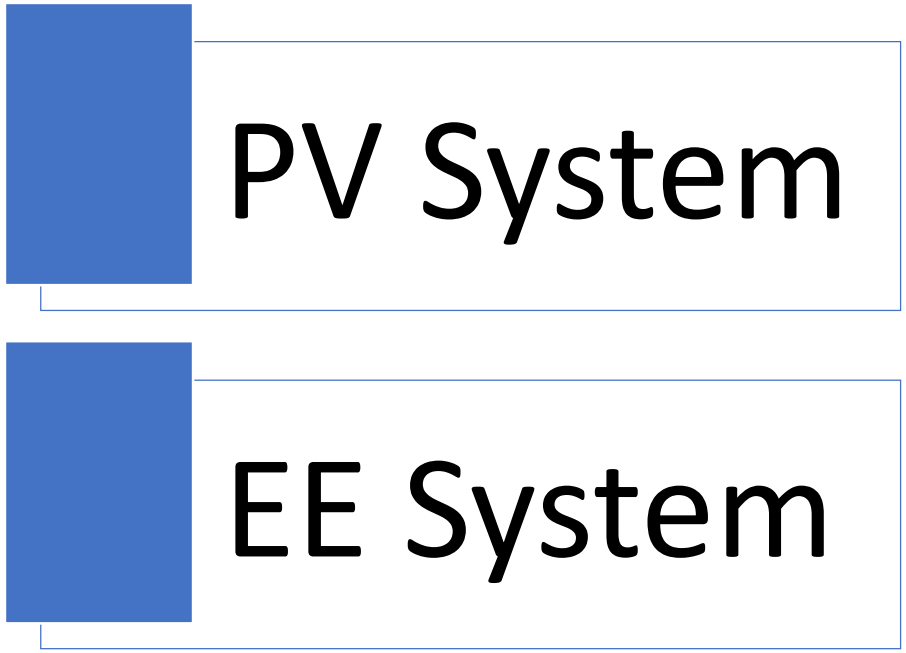
The warehouse contains of one building and many hangars. The hangars are very old as it is very risky to install PV modules upon them



02

The available space on the building can fit approxmielty 12 kWp

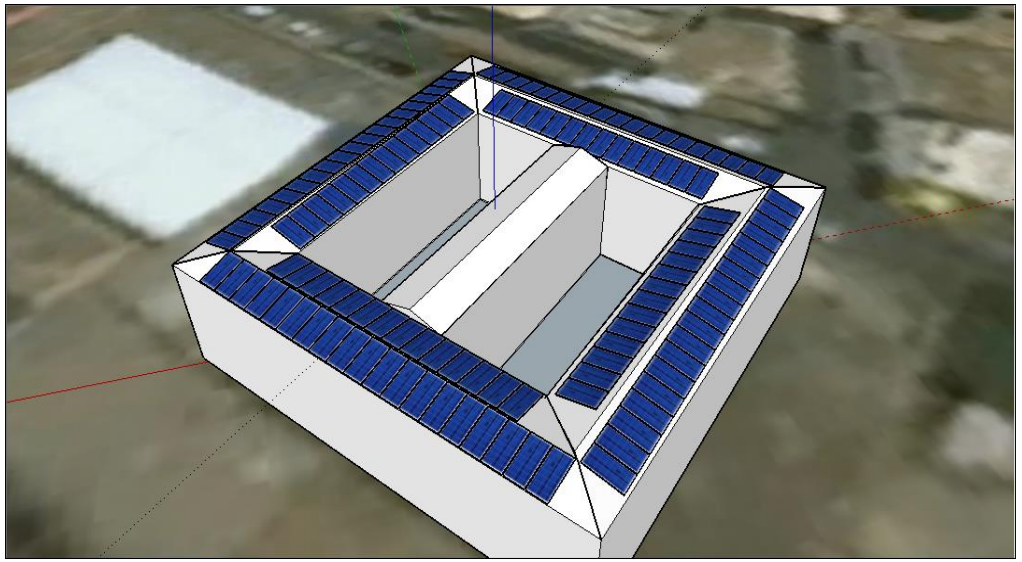
4. Central Market



4. Central Market –PV system

01

The available spaces on the rooftop can fit approximately 40-kWp on-grid system



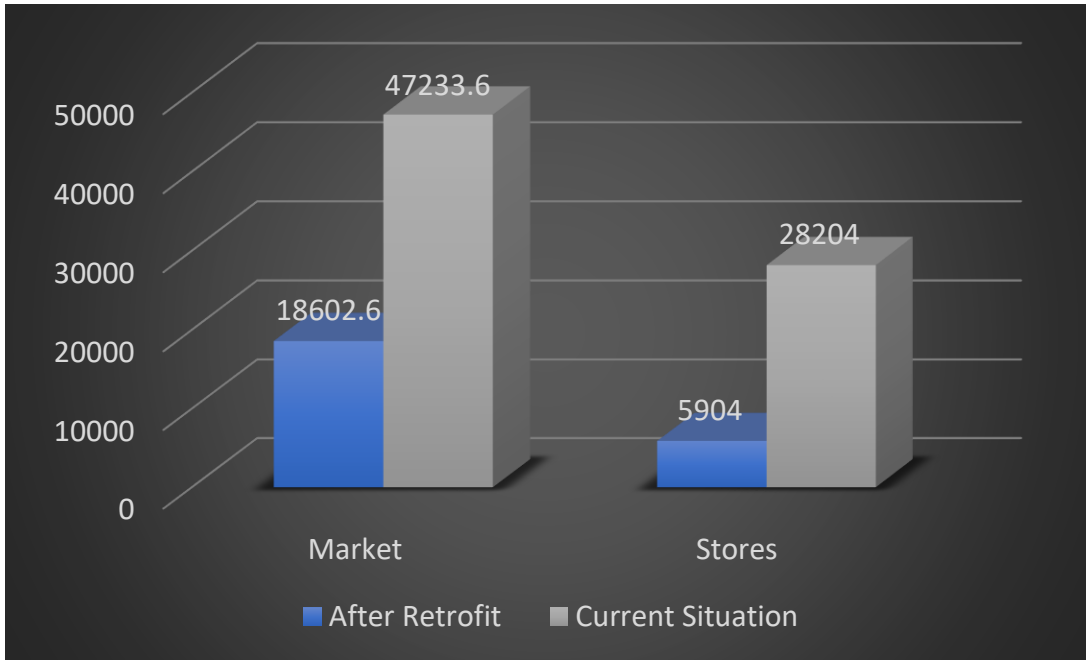
02

Obstacles:

- Civil Study is a prerequisite in order to determine building's tolerance level for the weight of the PV system.

4.Central Market- Lighting Retrofit

ECM	CURRENT ENERGY CONSUMPTION (KWH)	ENERGY SAVING (KWH)	COST SAVING (TD)	INVESTMENT (TD)	PBP (YR.)
THE STORE					
REPLACING INCANDESCENT 60 W WITH LED BULB 10 W	954.0	795	159.00	140.0	0.88
REPLACING MERC 400W WITH LED FLOOD 180 W	25,652.0	15,158	3,031.60	6600.0	2.18
REPLACING FLUORESCENT 36 W WITH LED TUBE 18 W	5,300.0	3,392	678.40	1200.0	1.77
REPLACING FLUORESCENT 18 W WITH LED TUBE 9 W	4,240.0	2,714	542.72	1493.3	2.75
REPLACING HPS-STREET LIGHTING 400W WITH LED-STREET 180 W	10,494.0	6,201	1,240.20	2700.0	2.18
REPLACING CFL 16 W WITH LED BULB 6 W	593.6	371	74.20	233.3	3.14
TOTAL	47,233.6	28,631	5,726.12	12,366.6	4.32
THE MARKET					
REPLACING INCANDESCENT 60 W WITH LED BULB 10 W	21,024	17,520	3,154	2,800	0.9
REPLACING FLUORESCENT 36 W WITH LED TUBE 18 W	5,840	3,738	673	1,200	1.8
REPLACING CFL 27 W WITH LED BULB 6 W	1,340	1,042	188	283	1.5
TOTAL	28,204	22,300	4,014	4,283	1.1



Market: Expected Saving:
22,300 kWh Annually
Saving: 79%

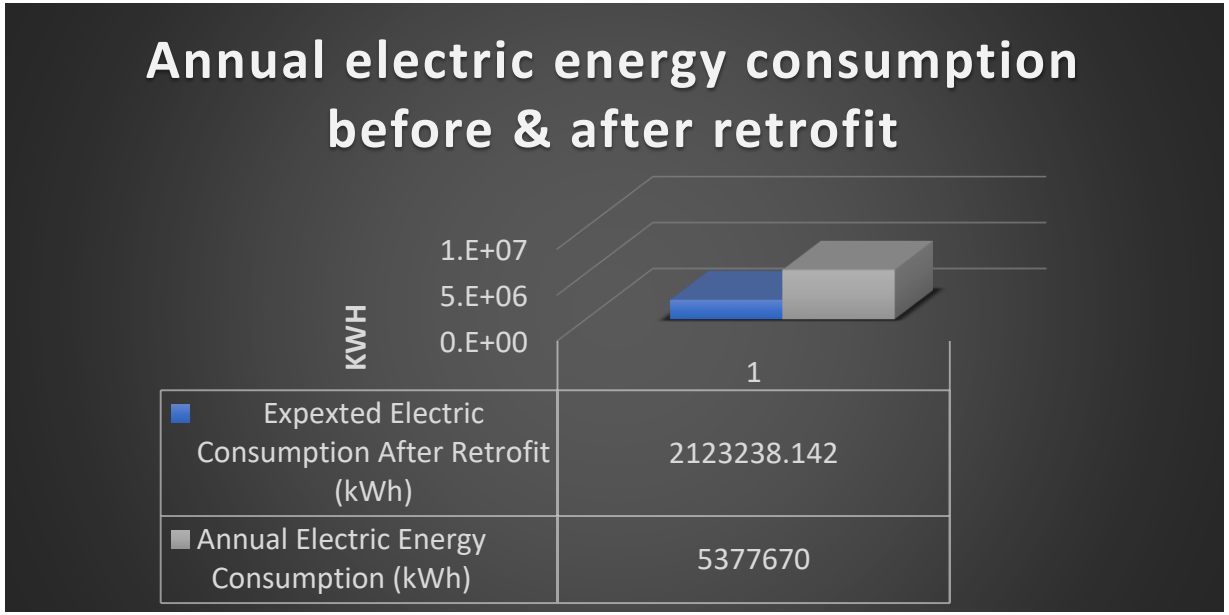
Stores: Expected Saving:

28,631 kWh Annually

Saving: 64%

5.Improvement of Public Lighting Grid

LIGHTING SYSTEM LOAD PROFILE AFTER RETROFIT							
ECMS	No. of lamps to be replaced	Total connected Load (kW)	Annual electric energy saving (kWh)	Annual cost saving (TD)	Investment (TD)	Expected lifetime (yr.)	Simple payback period (yr.)
REPLACE MV 125W WITH LED 75W	3100	232.5	549674	126425	1395000	25	11.0
REPLACE MV 250W WITH LED 100 W	1900	190	999660	229922	950000	25	4.1
REPLACE HPS 70W WITH LED 40W	100	4	11077	2548	25000	25	9.8
REPLACE HPS 150W WITH LED 75W	750	56.25	198686	45698	337500	25	7.4
REPLACE HPS 250W WITH LED 100W	2840	284	1495336	343927	1420000	25	4.1
TOTAL		766.75	3254432	748519	4127500		5.5



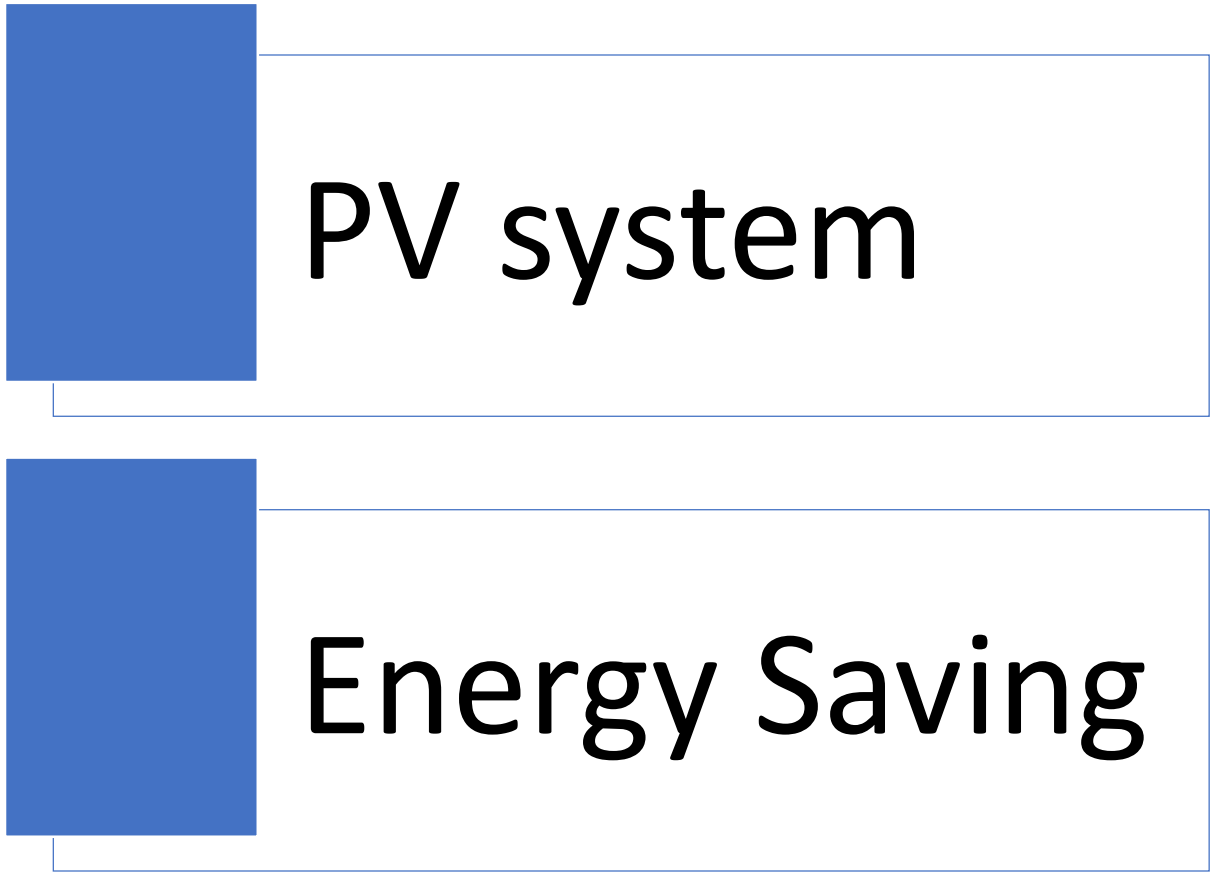
Expected Saving:

3,254,432 kWh Annually

Saving:

61%

6. Monastir Municipality Pumping station

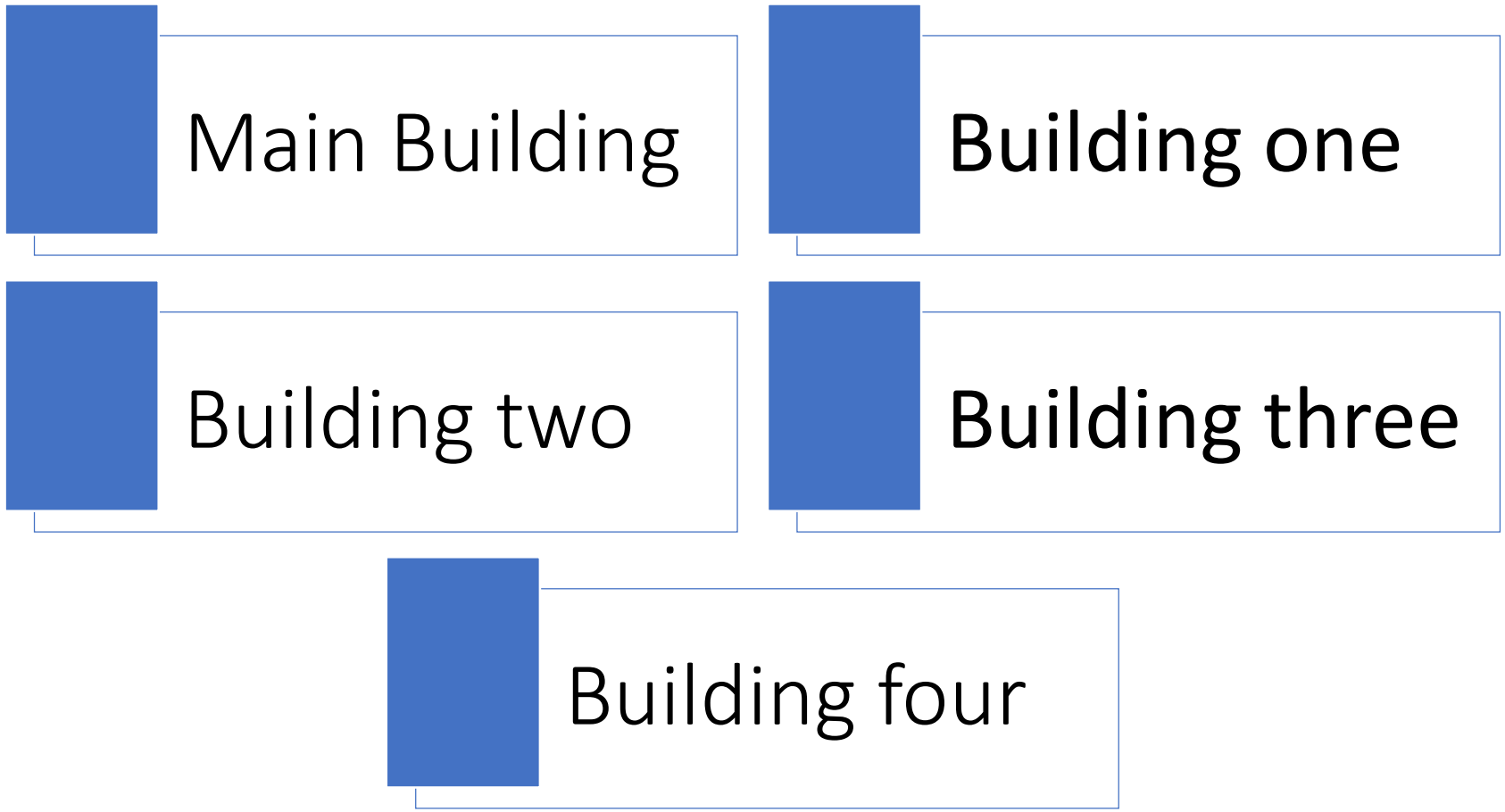


6. Monastir Municipality Pumping station –PV system

- This location consists of 5 small buildings, 2 tanks and free space of ground.
- Obstacles:
  - Approval required in case of installation on ground.
  - Approval required for the installation over the tanks.
  - Civil study for all buildings
  - Some shading due trees for building number 4.
  - No access for all rooftops

The buildings

6. Monastir Municipality Pumping station –PV system

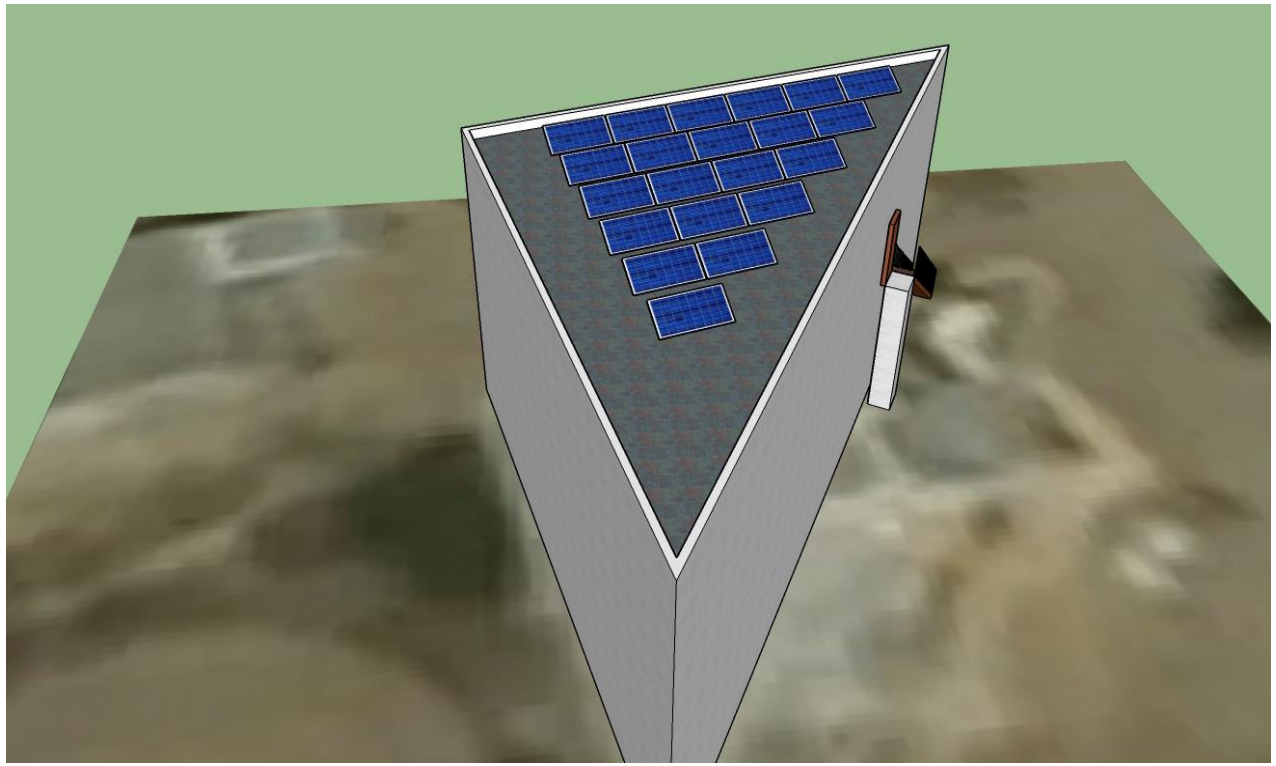


Monastir Municipality Pumping station

Main building

01

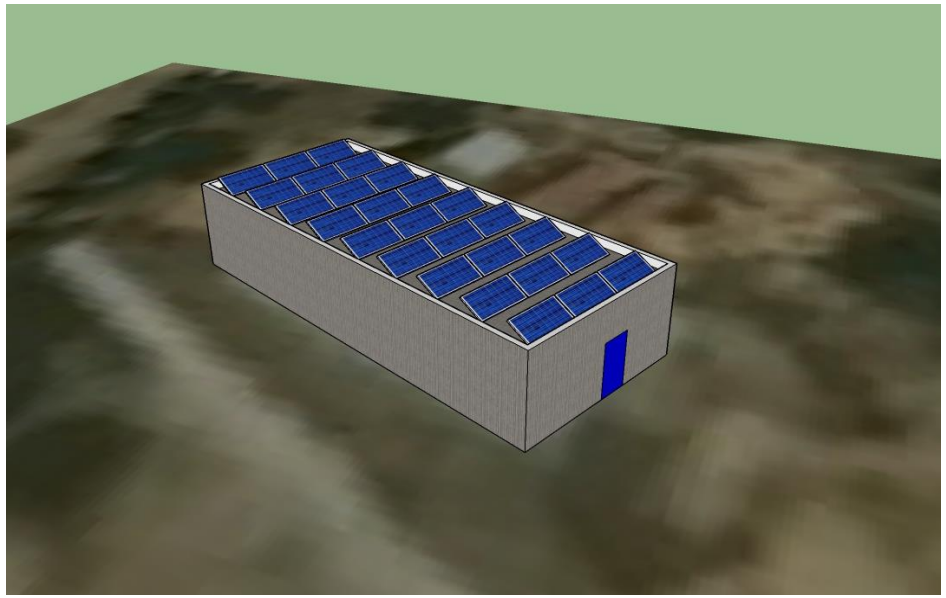
The available spaces on the rooftop can fit approximately 8 kWp



Monastir Municipality Pumping station

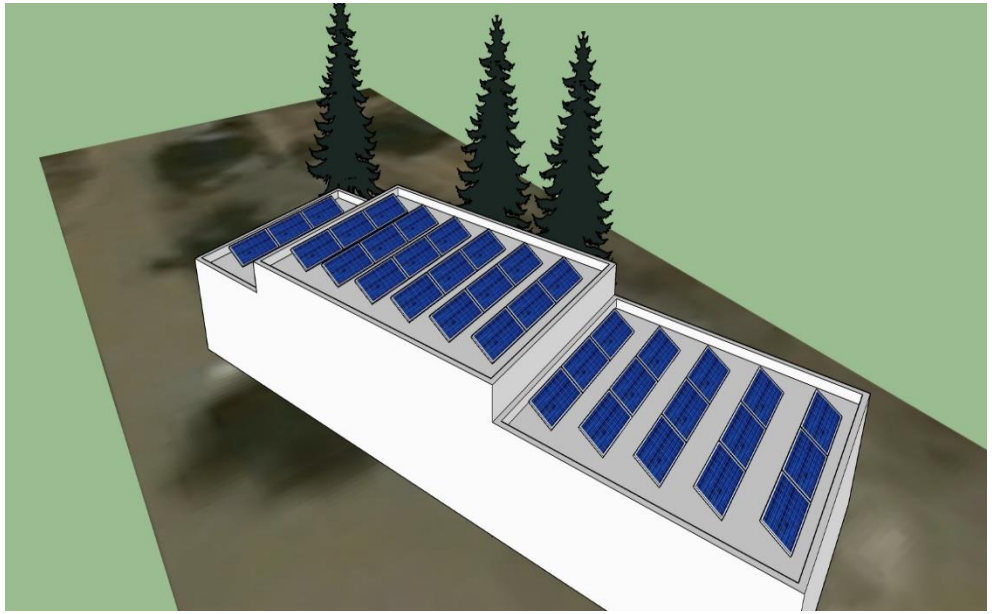
Building One

01 The available spaces on the rooftop can fit approximately 8.4 kWp



Monastir Municipality Pumping Station
Building Two

01 The available spaces on the rooftop can fit approximately 10.8 kWp

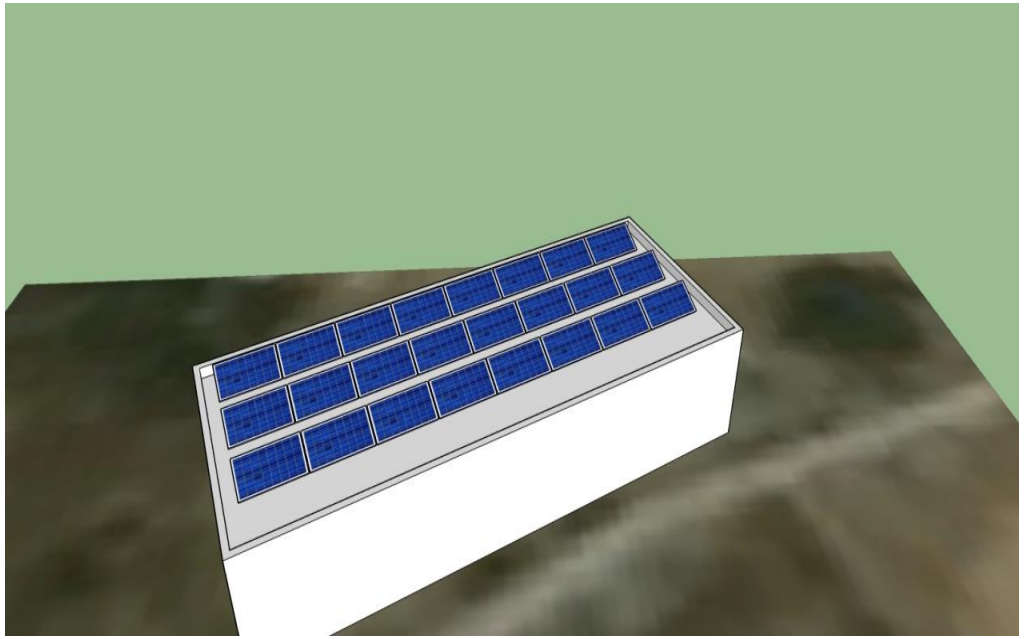


Monastir Municipality Pumping Station

Building Three

01

The available spaces on the rooftop can fit approximately 11 kWp

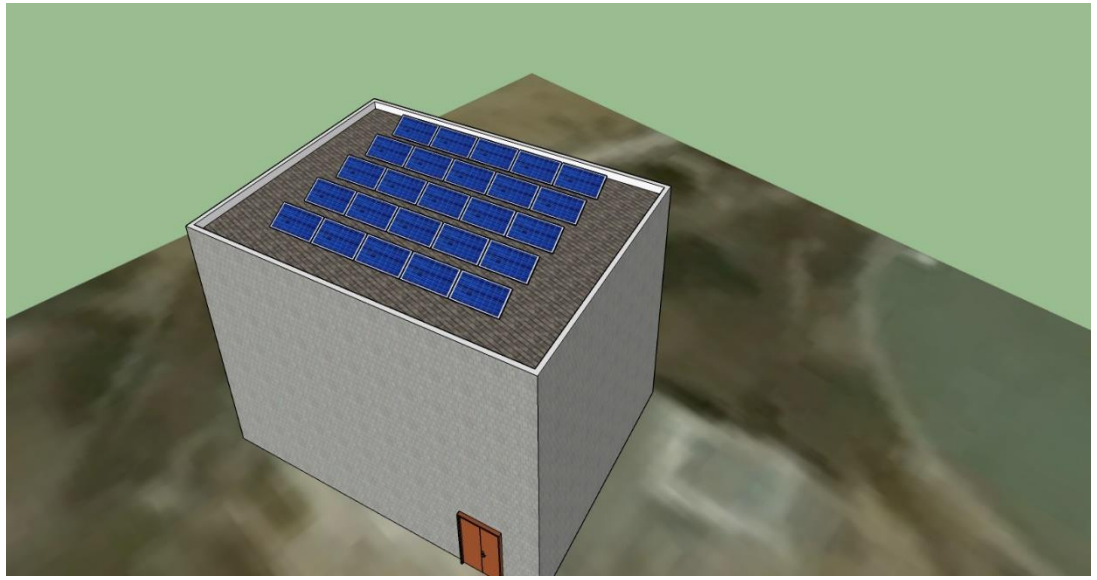


Monastir Municipality Pumping Station

Building Four

01

The available spaces on the rooftop can fit approximately 7 kWp.



6. Monastir Municipality Pumping station– Energy Saving

Replacing three pumps with new efficient larger pumps with VFD controller:

FLOW RATE PERCENTAGE $Q/Q_{NOMINAL}$ [%]	SAVED ELECTRIC POWER PER 1KW KW/ (KW)	OPERATING HOURS (HR/YR)	ANNUAL ENERGY SAVING PER 1 KW(KWH/KW)
69%	0.23	1,165	268
55%	0.35	1,165	408
42%	0.38	1,165	443
34%	0.4	1,165	466
23%	0.4	1,165	466
12%	0.4	1,165	466
9%	0.4	466	186
		7,457	Total = 2,703

Cost saving:

Cost Saving = 48,693.75 TD Annually

Cost of Investment:

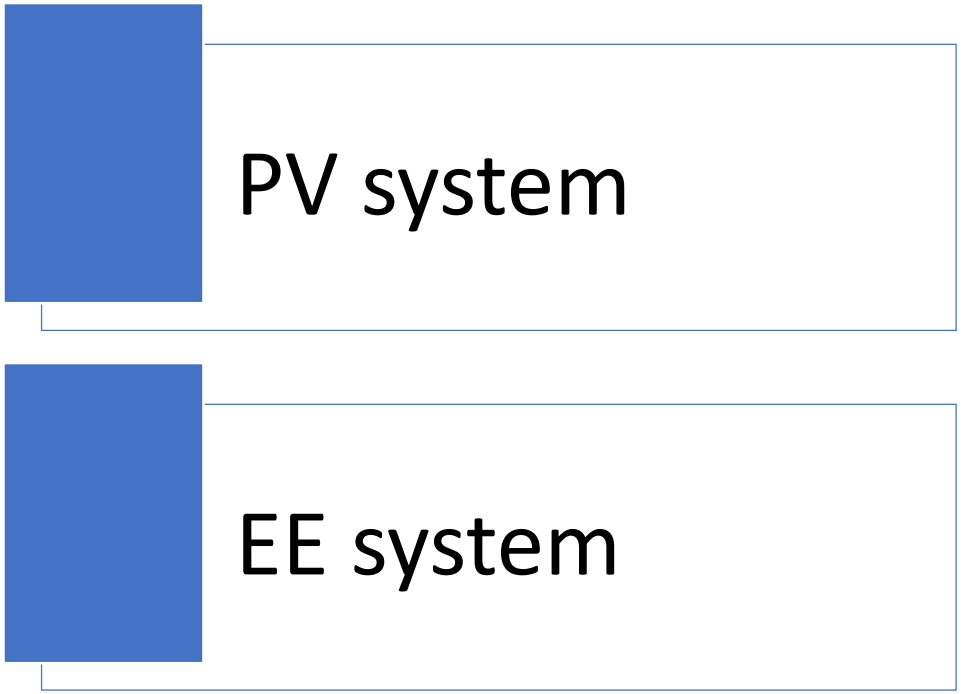
Average cost of the new centrifugal pumps with VSD motors = 49,000 TD

Average cost of VFD controllers with pressure transducers = 31,850 TD

Total investment cost = 80,850 TD

Simple Payback: 1.66 years

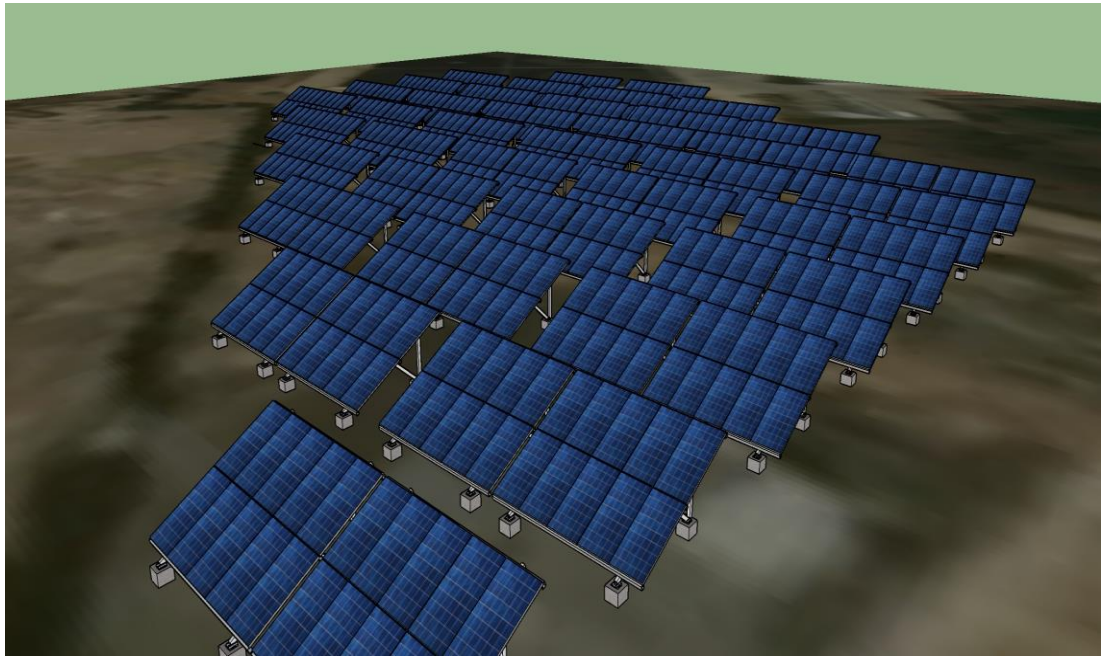
Waste Water Treatment Plant (Onas Frina)



Waste Water Treatment Plant – PV system

01 The available area that could be exploited for the installation of PV system is 3 Hectares and shall covers the station’s consumption

02 The installation will be ground-mounted



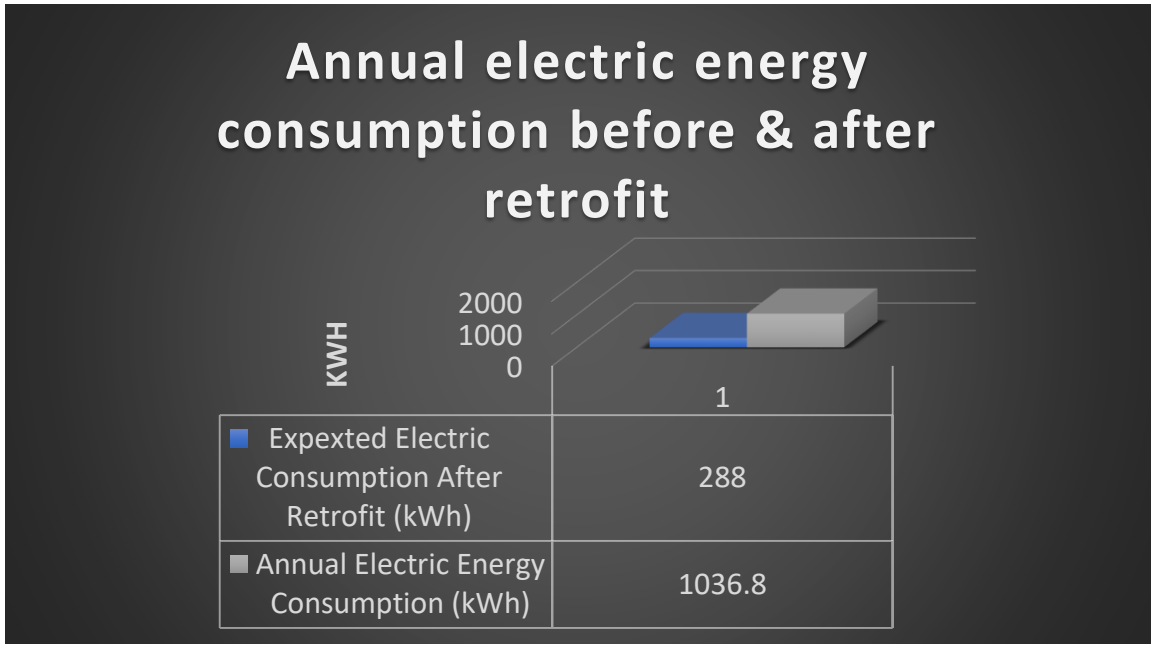
Waste Water Treatment Plant – Energy Saving

1. Replace six air blower units for air pumping and distributing rather than aerobic mixture; this step will increase the efficiency of the treatment process, so it will reduce the dependence on the circulation pumps and pass pump in aerobic reactor and clarifier.
2. Replace new and efficient pumps rather than the old pumps; this step will increase the efficiency of the pumping system.
3. Replace LED and CFL lamps rather than Halogen and Fluorescent lamps; this step will increase the efficiency of the lighting system and reduce the energy consumption of the lighting system.

The expected saving opportunity in energy consumption in Farina WWTP after implementing the upper steps is more than 50% from the annual energy consumption, which it's 2,334,986 KWh for 2016.

7.Municipal Slaughter House – Lighting Retrofit

LIGHTING SYSTEM LOAD PROFILE AFTER RETROFIT							
ECMS	No. of lamps to be replaced	Total connected Load (kW)	Annual electric energy saving (kWh)	Annual cost saving (TD)	Investment (TD)	Expected lifetime (yr.)	Simple payback period (yr.)
REPLACE FL 36W WITH LED 20 W	10	0.2	384.0	76.8	250	25	3.3
REPLACE HPS 250W WITH LED 100W	4	0.4	364.8	73.0	2000	25	27.4
TOTAL		0.6	748.8	149.8	2250		15.0



Expected Saving:

749 kWh Annually

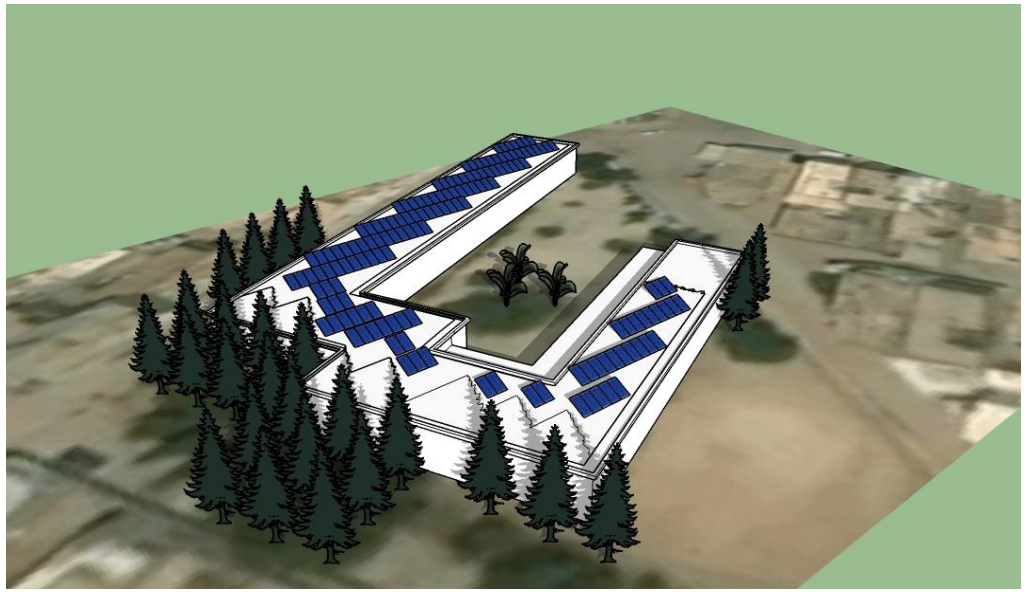
Saving:

72%

Al-Basatin School

01

A high potential at Al-Basatin school in which the available area could fit approxmielty 50 kWp



02

Obstacles:
- Shading due to tree surrounding the school rooftops
- No access to the rooftops
- Civil study is required

Higher Institute Of Biotechnology De Monastir

01

The proposed PV system capacity is 90 kWp.

02

However, more study is required for the available space in addition to a civil study as the previous locations.

Dabeebi Hospital & Monastir Hotel Centre

01

The team visited both Dabeebi Hospital and Monastir Hotel Center, but unfortunately, there was no space available on the rooftops for both locations.

9.Olympic Complex – Swimming Pool

1. Insulate the heat exchanger and the connected pipes. Expected Saving is (4-6) %.
2. Reuse the swimming pool water for irrigation.
3. Install solar hot water system combined with the boiler plant to cover the domestic hot water demand. The energy saving could be reach 80% in the summer and 30% in winter, this depends on the available area and the collector type.

MINARET Project

Limitations of the collected data

- Deficiency of available data on the municipality level.

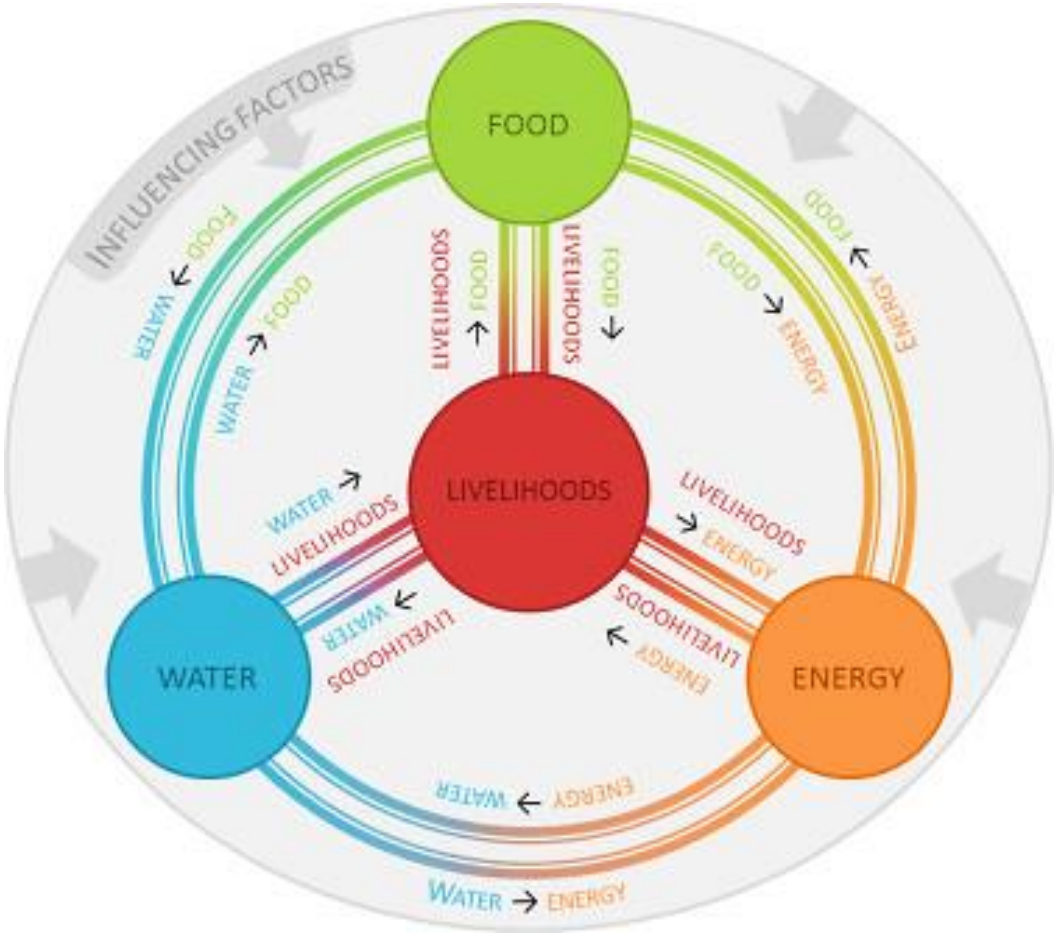
- Inherited discrepancy of information from different sources.

- Lack of existing resources and expertise on gender assessment at national and municipal levels.

- Some of the data obtained are old back to the years of 2010, 2012 and 2013.

- Gender stereotyping remains entrenched in society in terms of both social behaviors and biological determinism.

MINARET Project



NEXUS Model

MINARET Project

NEXUS Model from a Socio Economic Perspective

-Two outcomes resulted from the socio-economic study:

1. Cooperation between multiple entities to introduce the establishment of an eco-tourism model, which also addresses SDG 17 (Partnerships for the Goals)

2. Revolving Fund