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Biogas Portable Unit

Workshop on RES and new technologies for energy production

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MIEMA
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PROJECT SUMMARY

This project was implemented at Royal Scientific Society (RSS) in Amman, the capital of Jordan. The food residue that produced from the RSS's cafeterias was exploited in producing biogas using portable digester unit.

The biogas unit was locally designed and fabricated.

THE OBJECTIVES OF THIS PROJECT

1. Design, build and operate the first green portable biogas unit to be used for cafeterias and houses.
2. Contribute in reducing the effect of the methane gas on the climate.
3. Examine the effectiveness and safety of using these products.
4. Examine the socio-economic impact of such these portable units on the community.

INNOVATION

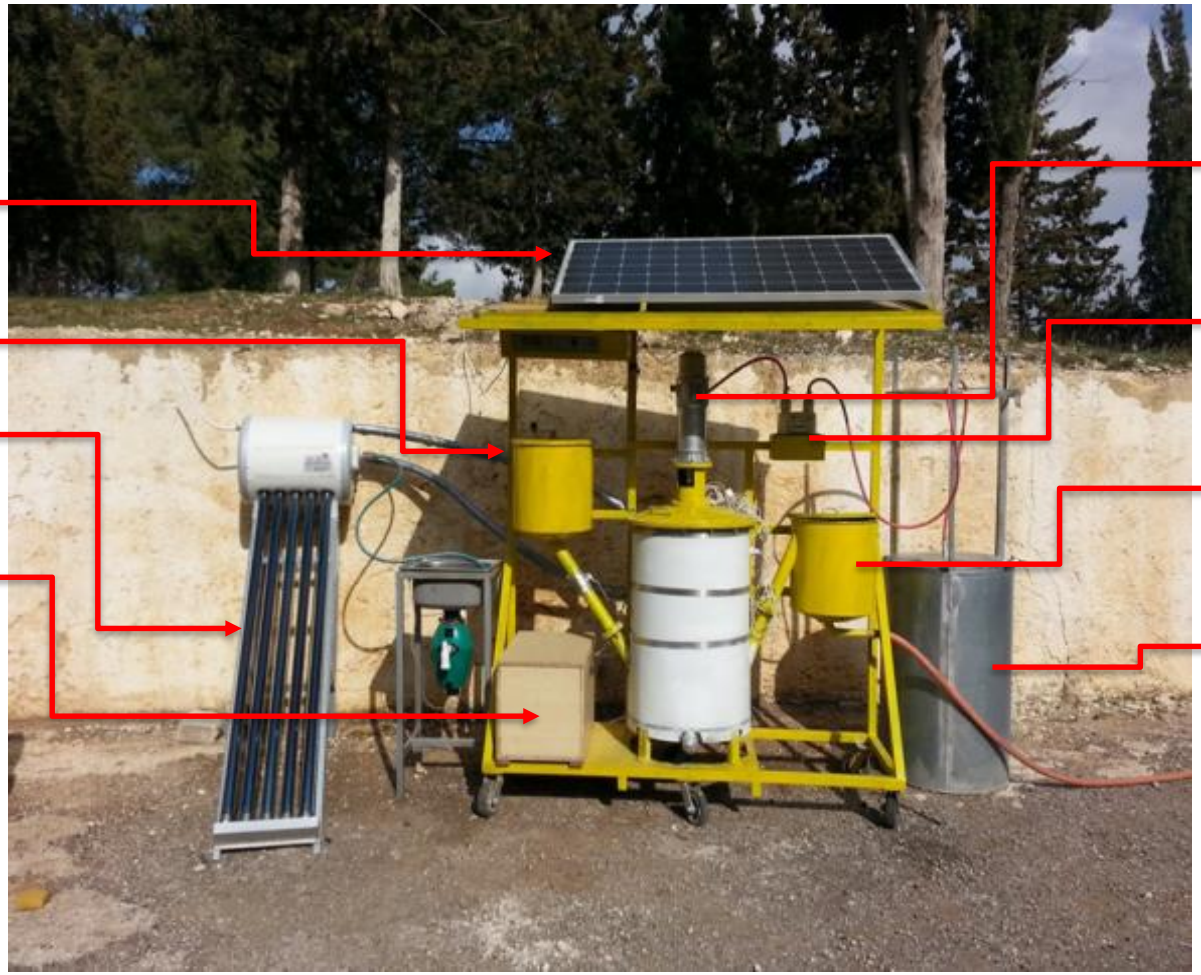
- Using of RE systems in Jordan are quickly growing due to continuous rising of fossil fuel cost. Most of installed RE systems are based on the solar energy and wind energy resources, while only few RE projects that are based on biomass resource were considered. Therefore, this innovative project was designed in order to dissipate the use of bioenergy resources and to increase the share of bioenergy in the total RE mix in Jordan.

INNOVATION

- The innovative portable biogas unit targeted mainly restaurants, cafeterias and houses to treat the daily bio-waste rather than sending it to the landfills. It was designed to be self operated by renewable energy resources.

BIOGAS UNIT COMPONENTS AND SIZES

- Thermally Insulated Digester, volume: **210 liters**
- Food shredding machine
- PV system : **200 W** connected with batteries.
- Solar water heater: **50 liters** of hot water /day
- Gas meter.
- Steel biogas holder, volume of **150 liters**
- Mixing and Fertilizer tanks


PV Module
Mixing tank
SWH
Batteries
Agitator
Gas meter
Fertilizer tank
Bio gas storage

COMPONENTS FUNCTIONS

1. In the biogas digester , biogas is generated from biomass by anaerobic bacteria (without oxygen).
2. Shredding machine is used to shred (cut) the waste food and mix it with warm water at **35° C**.
3. Photovoltaic system is used to operate electrical agitator.
4. Solar water heater is used to heat the water that will be mixed with the daily batch. And also to keep the temperature inside the insulated digester around **35° C** .

COMPONENTS FUNCTIONS

5. Gas meter is used to measure the amount of daily generated biogas.
6. Steel biogas holder: to store produced biogas.

DESCRIPTION AND RESULTS

1. The biomass from the cafeteria is exploited to produce biogas by using anaerobic fermentation.
2. The batch size is **3.5 kg** per day.
3. Generating about **0.75 m^3** of biogas per day.
4. Methane content in the average **55%**.
5. The digester converts the food residue from unhealthy waste to sterile bio fertilizer of about **3.0** kg per day to be used for planting and easy to sell.

DESCRIPTIONS AND RESULTS

5. The solar water heater is used to produce **50** liters of hot water in order to cover the needs of the system from the hot water and keep the digester temperature about **35°C**.
6. The PV system covers the electrical energy for the electrical agitator to mix the digestate inside the digester.

ENVIRONMENTAL EFFECT

1. The project reduce the effect of the methane gas on the climate by about **185 m^3** of methane gas that is produced annually from the food residue of the cafeteria.
2. The unit is self operated by using solar heater, and photovoltaic module to operate the portable biogas unit rather than using conventional energy.

PILOT BIOGAS UNIT COST

- The pilot unit costs about **1400** Jordanian dinar for all its parts including PV, SWH and the digester.

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THANK YOU

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