WEPCO - Renewable Energy Utilization

EL-Hamra Terminal – Western Desert Operating Petroleum Company

Introduction

- El-Hamra Terminal District owned by WEPCO consumes 100% of the electrical energy from the National Electricity Utility and due to the fast-track projects at site, the electrical consumption has been increased.
- WEPCO installed 500Kw Solar Station to save almost 20% of the consumed energy from National Electricity Utility
- Also WEPCO installed Solar Water Heating System for all accommodation buildings to save estimated 8% of the consumed energy from National Electricity Utility if Normal Electrical Heaters were used

Solar Panel

Literature Review for Solar Cells:

Concept:-

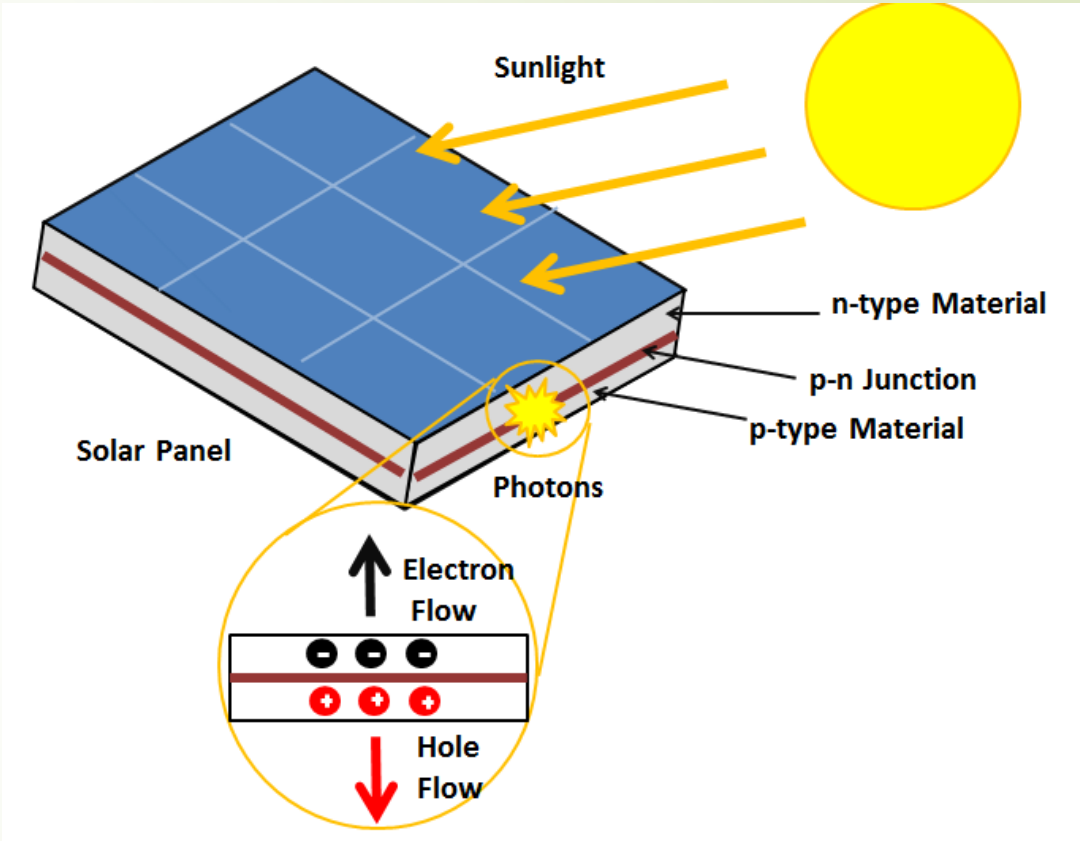
- The **photovoltaic effect** is the generation of voltage and electric current in a material upon exposure to light and It is chemical & physical phenomenon.

Key Points of Solar Cells:-

- Efficiency – Power Capacity – Life Span.

Types of Solar Cells

- Polycrystalline – Monocrystalline - PERC

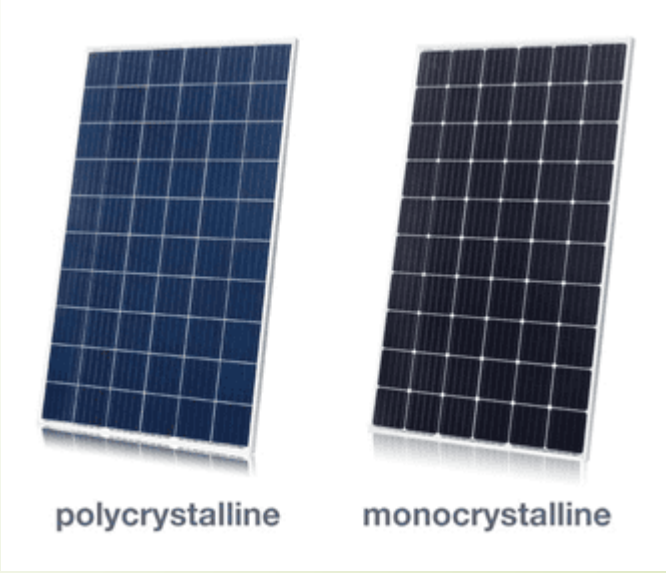


Solar Panel

- **Types**

Factors	Monocrystalline Panels	Polycrystalline Panels
Color	Black	Blue
Efficiency rate	15%–20%	14%–17%
Temperature coefficient	Lower temperature coefficient, more efficient in heat	Higher temperature coefficient, less efficient in heat

- **Passivated Emitter and Rear Cell (PERC)**
  - It is an improvement of the traditional monocrystalline cell. By adding a new layer in the rear surface of the cell that enhances efficiency.
  - **PERC is used in our Project**



Solar Station Project

- **Main Features for solar system:**

1. Number of PV Modules 912 Cells.
2. Total Power Output 500 Kw.
3. Lifetime 25 Years.
4. Payback Period 5 Years.
5. ON-Grid System, export Excess Power to National Grid through Bidirectional Meter in Net Metering Basis.
6. Cell Efficiency at the end of lifetime 83%

- **Station inaugurated by His Excellency Minister of Petroleum and Mineral Resources in August 2023**

Project Components For Solar Station

- The basic components of a solar power system includes:

1. PV Modules
2. Inverter
3. Electrical Panels
4. Bi Directional Meter
5. Grid

Solar Station Project Economics

- Total Area For Solar Cells 3,577 m^2 excluding cross ways.
- Expected Net Income 1,500,000 L.E/Year based on the current price of 1.5 L.E/kwh and the profit shall increase with each prices increase in the upcoming 25 years.
- Expected Payback period 5 years
- Expected Operation & Maintenance Cost 100,000 L.E/Year and there are ongoing studies to reduce such cost.

Electrical Loads Supplied by Solar Station

- **Industrial Loads:**

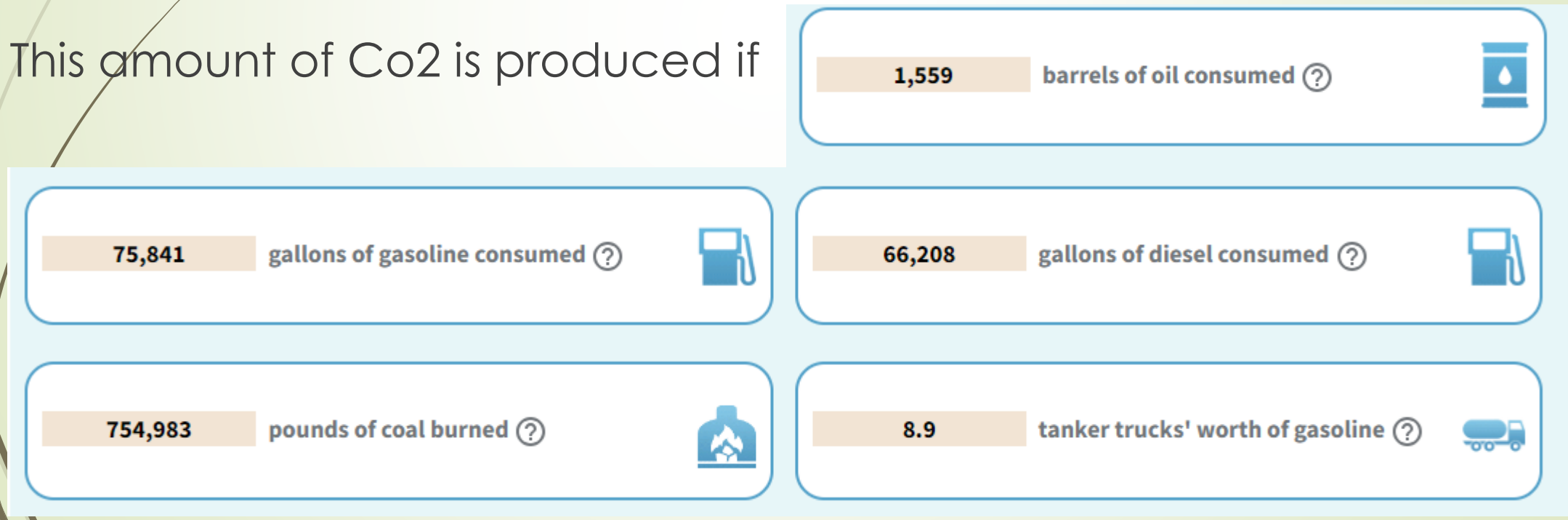
1. Tanks Mixers
2. Motor Operated Valves
3. Automatic Control System
4. Fire Alarm & Detection System
5. Cathodic Protection

- **Residential & Administration Loads:**

1. Air Conditioner System
2. Lighting
3. Kitchen Equipment

Solar Station Environmental Effect

- WEPCO installed 500 KW solar station in 2023.
- The solar station shall produce nearly 1000 Mwhr yearly
- The Solar Station shall mitigate Co2 Emissions by 674 metric tons yearly.
- This amount of Co2 is produced if



Summary Benefits For Solar Station Project

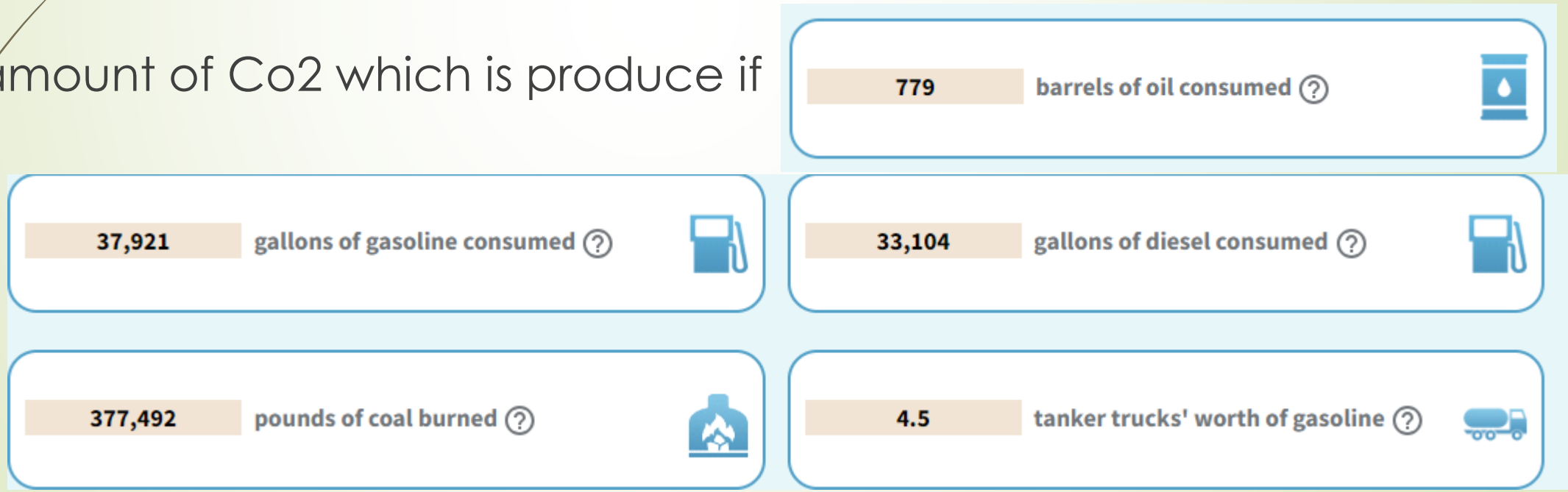
- Meets Petroleum Sector directives that aiming toward increasing Sustainable Green Energy and Energy Transition.
- Short Payback period (Expected 5 years) subjected to current price of 1.5 L.E/kwh.
- Considerable Net Income (Expected 1,500,000 L.E/Year) as the profit shall increase in case of increase in unit price per Kwh along with the project lifetime (Expected 25 years).
- Lower Running Cost (Expected Operation & Maintenance Cost 100,000 L.E/Year) as ongoing studies for using Artificial Intelligent (AI) equipment that target reducing such operating cost and achieve sustainability.

Project Components For Solar Water Heating System

- **<u>The basic components of a solar water heating system includes:</u>**
  - Solar Collector(to collect solar energy).
  - Insulated tank (to store hot water).
  - Supporting stand.
  - Connecting pipes and instrumentation etc.

Solar Water Heating System Environmental Effect

- The Solar Water Heating System shall contribute in mitigating Co2 Emissions by 337 metric Ton yearly.
- The Solar Water Heating System shall save nearly 500,000 Kwh yearly.
- This amount of Co2 which is produce if



Summary Benefits For Solar Water Heating System

- Meets Petroleum Sector directives that aiming toward increasing Sustainable Green Energy and Energy Transition.
- Ease for implementation through two stages that reduce initial cost and using income saving for executing the next stage.
- Short Payback period (Expected 5 years) subjected to current price of 1.5 L.E/kwh.
- Considerable Net Saving (Expected 750,000 Kwh/Year) as the profit shall increase in case of increase in unit price per Kwh along with the system lifetime (Expected 20-25 years).
- Lower Running Cost as ongoing studies that target reducing such operating cost and achieve sustainability.


Thank You
Very Much