

# Renewable Energy application in oil & Gas Industry

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## Outline

- Introduction
- Oil & Gas Industry Energy requirements
- Renewable Energy Technologies
- Applications of Renewable Energy in Oil & Gas Industry
- Conclusions

## Introduction

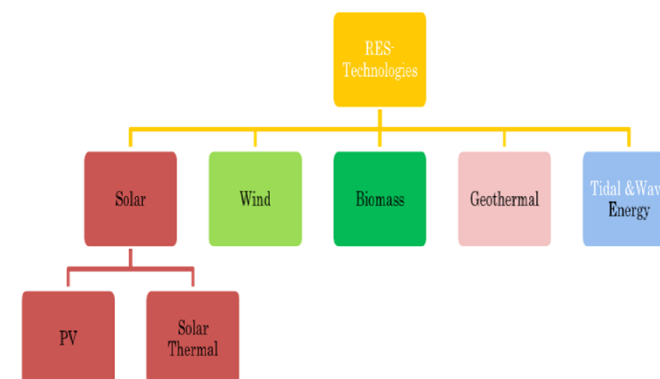
- Oil and gas industry is a major consumer, producer of energy
- Energy use in oil & gas industry in range of activities
- Oil and gas production and oil refining became gradually more energy intensive.
- Most oil production facilities are in remote areas
- Produced Water Management Issues
- Oil and gas industry waste Management
- Renewable energy technologies consists of solar energy ,wind energy biomass, geothermal and Ocean (tidal) power, most of these technologies are mature technologies except Ocean (tidal)

## Oil & Gas Industry Energy requirements

Energy use covers a range of activities

- Driving pumps to extract hydrocarbons and to reinjection water;
- Heating the output stream to allow separation of the oil, gas and water;
- Steam Production enhanced oil recovery
- Gas reinjection for enhanced oil recovery;
- powering compressors and pumps for transporting oil and gas through gathering pipelines to processing plants;
- Driving turbines to generate the electricity and heat needed for on-site operations and living quarters.
- The energy intensity in oil & gas industry has been increasing despite heavy investments to improve efficiency this is due to the growing maturity of oil and gas fields and increased use of energy-intensive secondary , enhanced recovery techniques are also boosting energy needs and Increasing

# Renewable Energy Technologies

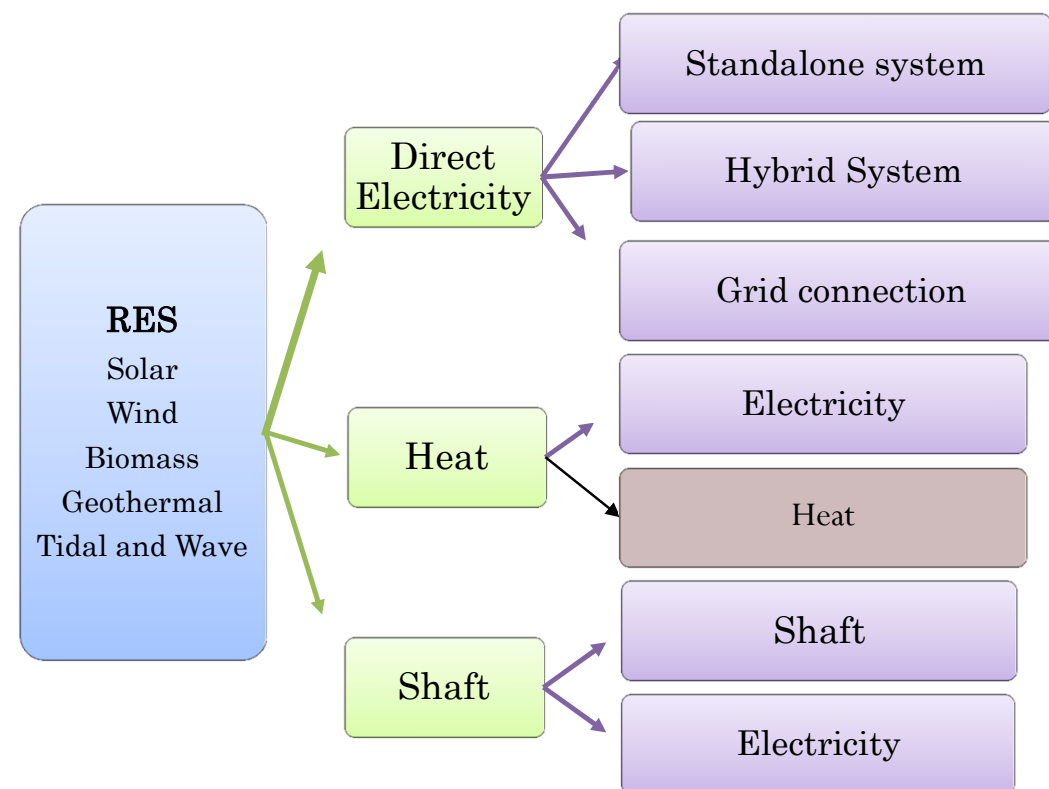


Renewable Energy Technologies

## Total World Renewable Electric Power Capacity (year-end 2011)

Technology	Capacity (GW)
Solar PV	70
Concentrating solar thermal power	1.8
Wind	238
Biomass power	72
Geothermal power	11.2
Ocean (tidal) power	0.5

## Applications of Renewable Energy in Oil & Gas Industry

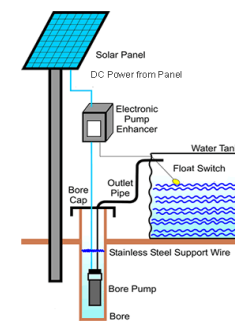


# Solar Energy potential Applications in Oil & Gas industry- Photovoltaic

## 1. Standalone Solar Photovoltaic Energy supply system

Solar photovoltaic and wind energy standalone or hybrid system are currently used to supply power for the following applications in the oil& gas industry

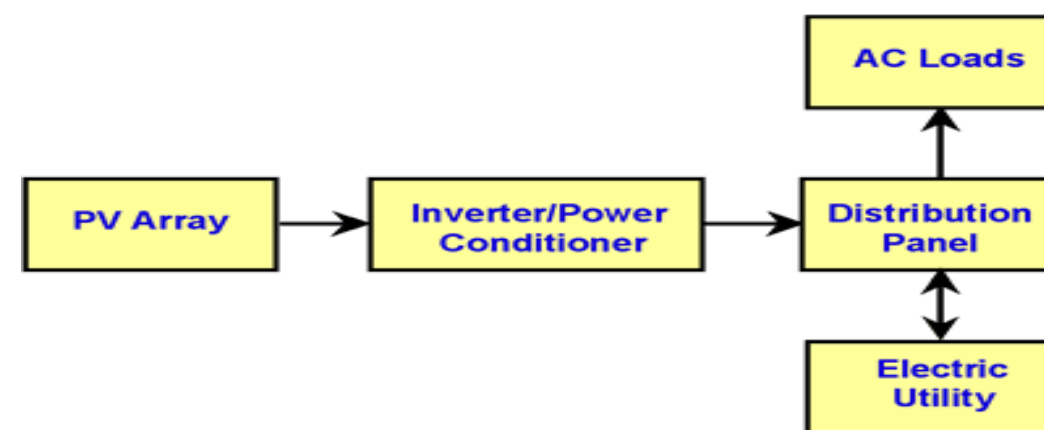
- Remote monitoring & telecommunication system
- Cathodic Protection system
- Chemical injection skid systems
- Instrumentation & Control
- Solar pumping system
- Solar water treatment
- Water ozonation system





## Photovoltaic grid connection System

Grid-connected or utility-interactive PV systems are designed to operate in parallel with and interconnected with the electric utility grid



Schematic Diagram of grid-connected photovoltaic system

# Solar thermal- Technologies

Solar thermal systems classified into:

- Low Temperature Solar thermal system
- High Temperature Solar thermal system

## Low Temperature Solar thermal system



Evacuated tubes (50–200°C)



Flat plate (60–80°C)



Unglazed solar collector  
40–60°C

## High Temperature Solar thermal system (above 100°C)



Dish



Parabolic Trough



Tower



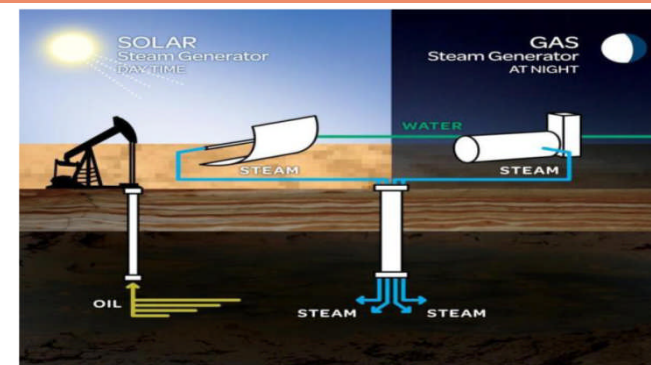
Fresnel

## Solar Energy potential Applications in Oil & Gas industry- Solar Thermal

### Steam Generation Enhance Oil Recovery

Currently tow project constructed by GlassPoint Company:

- Berry Petroleum, *McKittrick, California, USA*
- Petroleum Development Oman , Sultanate of Oamn*

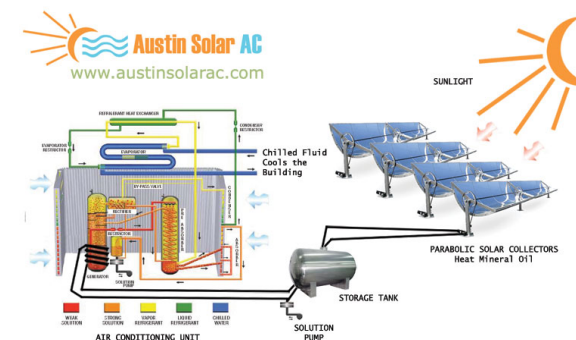
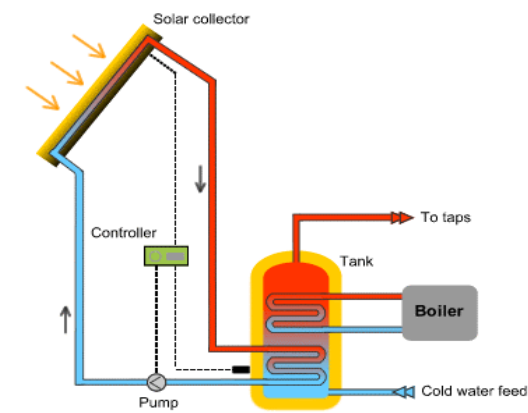


<http://www.glasspoint.com>

## Solar Energy potential Applications in Oil & Gas industry- Solar Thermal

### Other Solar Thermal Application in oil & gas industry

- Hot water systems
- Air-conditioning
- Space heating
- Water treatment
- Solar Disinfection
- Electricity generations

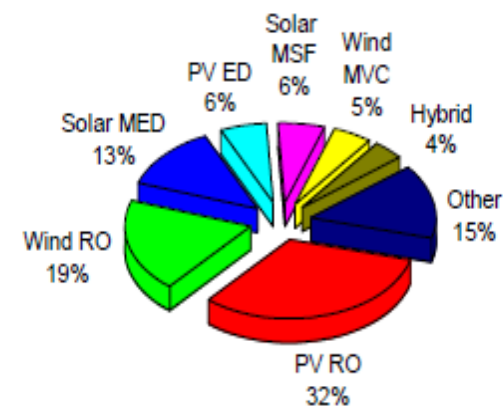


## Water treatment using RE

- Renewable energy sources have been used and will continue to be used, either directly or indirectly, in water and wastewater treatment.
- solar detoxification—is often used for wastewater treatment and is still used in many countries.
- Solar energy is still the simplest technology for desalination for water disinfection.
- Solar still is the simplest desalination technology.

## Renewable energy & Water desalination

- In oil gas industry the fresh water is required for domestic use in the camps or to supply fresh water for enhance oil recovery
- While many renewable energy technologies exist the two dominant ones used for powering desalination systems are PV modules and wind turbines.



*Breakdown of renewable energy powered desalination system technologies implemented worldwide (Richards, B.S. ; Schäfer, A.I. (2009)).*

## Biomass

- Oil & gas industry produce different types of waste which can be used to generate electricity or heat by using incinerator to provide power and heat for the production of oil & gas
- Waste to energy technologies are mature technologies are being used many parts of the world
- Used produced water to irrigate different type of plants to produce biomass that produce biodiesel

## Conclusions

- Oil & gas industry is a major consumer, producer of energy
- Renewable energy technologies have been used in Oil & gas industry to provide energy for small applications as standalone system to power remote areas application e.g. communications system, data transmission, control and cathodics production
- Few pilot project to generate steam for enhance oil recovery in USA, Oman
- The of Solar energy ( photovoltaic & thermal ) wind energy are used to generate electricity in MW to power this can applied in oil & gas to reduce Co2 emission in oil & gas production
- Instead of using electricity in generate heat With maturity of Solar Thermal technologies in heat production, oil and gas industry should be utilized Instead of using electricity to generate heat
- Renewable energy are proven to run desalination unit which can be applied in oil & gas industry (treat produced water , provide fresh water to staff and water to provide steam for enhance oil recovery)
- Utilized produced water to grow biofuels plants to generate biodiesel to be used for transportation
- Apply waste- to energy concept in the management of the waste generated in oil& gas industry to reduce energy requirement, hence reduce co2 emission