Renewable Energy application in oil & Gas Industry

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Outline

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- Oil & Gas Industry Energy requirements
- Renewable Energy Technologies
- Applications of Renewable Energy in Oil & Gas Industry
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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)
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
<table>
<thead>
<tr>
<th>Technology</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV</td>
<td>70</td>
</tr>
<tr>
<td>Concentrating solar thermal power</td>
<td>1.8</td>
</tr>
<tr>
<td>Wind</td>
<td>238</td>
</tr>
<tr>
<td>Biomass power</td>
<td>72</td>
</tr>
<tr>
<td>Geothermal power</td>
<td>11.2</td>
</tr>
<tr>
<td>Ocean (tidal) power</td>
<td>0.5</td>
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</tbody>
</table>
Applications of Renewable Energy in Oil & Gas Industry

RES
- Solar
- Wind
- Biomass
- Geothermal
- Tidal and Wave

Direct Electricity
- Standalone system
- Hybrid System
- Grid connection
- Electricity
- Heat
- Shaft
- Electricity

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

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)).*
Oil & gas industry produce different types of waste which can be used to generate electricity or heat by using inclinators to provide power and heat for the production of oil & gas.

Waste-to-energy technologies are mature technologies being used in many parts of the world.

Used produced water to irrigate different types of plants produced by biomass that produced biodiesel.
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 catholics 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

Conclusions