

# OPAL



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THE VOICE OF THE  
OIL & GAS INDUSTRY

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## COVID-19 CRISIS: Oil Markets Upended

THE IMMEDIATE OUTLOOK FOR THE OIL MARKET WILL ULTIMATELY DEPEND ON HOW QUICKLY GOVERNMENTS MOVE TO CONTAIN THE CORONAVIRUS OUTBREAK.

MARKET

ANALYSIS

ARTICLES

INTERVIEWS

VIEWPOINT

PROJECTS



## PLUS



### 2020: A Tough Start with three Compounded Crises

The triple crisis — health, economic and potentially financial — currently affecting the world, led to sharp cuts in capital expenditures, practical restrictions to projects and supply chains.

### Climate Change: Turning Challenges into Opportunities

More than 300 stakeholders from the Omani energy sector came together for a one-day brainstorming session at the 7<sup>th</sup> Gulf Intelligence Oman Energy Forum.

### Understanding the Importance of Accreditation

OPAL, in cooperation with the Gulf Accreditation Council (GAC) and Petroleum Development Oman (PDO), organized the first Engagement Forum with inspection companies in the Sultanate.

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## Impressum



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# Oil and Gas Research Centre contribution to Oman's Industrial Strategy 2040

**B**y 2040 most of the current knowledge will change. Higher educational institutes in Oman, such as Sultan Qaboos University (SQU), should modify their educational system and research to meet future challenges to diversify sources of energy utilizing local resources. Exposure of new generation with the available sustainable resources and solving future economic and social challenges will require redirection of educational system and research towards relevant interdisciplinary/multidisciplinary applied sciences. Trillions of dollars are generated globally based on scientific findings, so far, such findings in Oman has negligible contribution to its socio-economy. Oil and Gas Research Centre (OGRC) in SQU perceives opportunities in the following few examples:

## Enhanced Oil Recovery (EOR) Chemicals

Large proportion of Omani industries are based on oil and gas as a source of raw material, energy and this is expected to continue beyond the 2040 projection. As the Omani oil fields, mature, more advanced technologies are required in order to sustain or increase production. These are technically known as Enhanced Oil Recovery (EOR) techniques. Oman is already a leader in the application of EOR techniques in the region and it is anticipated that EOR will constitute more than 20% of total production by 2025. Developing local capacity for chemicals that are environmentally friendly to serve as import substitution and create employment opportunities is ongoing. The manufacturing of EOR chemicals was one of the opportunities identified in the In-Country Value (ICV) of Oil and Gas industry blueprint strategy unveiled in 2013. It is one of the large number of industry opportunities, which Petroleum

Development Oman (PDO) has been leading in recent years. OGRC in collaboration with the oil and gas industries has developed capacities and resources that could be utilized to grow the industry.

## Produced Water Treatment

Worldwide production of produced water (PW) associated with hydrocarbon recovery is greater than 80 billion bbl per annum. PDO annual production of PW represents around 20% of the country's consumption for agriculture and domestic use (\*Omanobserver.om). PW usually contains high concentrations of dissolved salts and other pollutants. Without proper treatment, PW can lead to bioaccumulation threatening aquatic habitats and subsequent biological sequestration of the harmful pollutants into the food chain and crops when it is used for irrigation.

Thus, PW treatment and management are the major challenges in Oman and worldwide. These volumes make the economics of most physical or membrane based methods uneconomical. However, produced water can be consumed in beneficial uses, such as: treated or untreated PW can be used for irrigation and rangeland restoration. If treated properly and utilized for beneficial usages, this waste resource could lead to environmental pollution remediation and social wellbeing, generation of value-added byproducts, and generation of employment opportunities and quality of jobs in Oman. Some more recent technologies for PW treatment include a thermal membrane distillation processes based separation where only vapor molecules/pass through porous hydrophobic membranes. Hundred percent pollutants' rejection is achieved with high water recovery (>90%) depending on water source with low operating temperature



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compared to other technologies. PW treatment can be harnessed as an industry with huge potential for employment that can serve the sultanate's industrialization strategy 2040.

### **Environmental Bioremediation & Social Wellbeing**

PW could be biologically treated using microorganisms and biosurfactant based treatments. Biosurfactants are known to reduce the surface and interfacial tension between oil and water interfaces, and making oil-water/water-oil emulsions, thus leading to enhanced oil recovery or enhancing its biodegradation by indigenous microbes. We have different types of biosurfactants, and crude-oil degrading bacteria isolated locally. Under this method, we were able to bioremediate pollution and remove the remaining oil in our labs using biosurfactant. The separated oil can be sold as a useful commodity. Those biosurfactants are non-toxic, and biodegradable. Such an environmentally friendly approach will lead to environmental pollution remediation and social wellbeing in a longer run.

### **Generation of Value-Added Byproducts**

There are several ways by which this enormous amount of treated or untreated produced water could be utilized for generation of value-added products. We have tested different microbes to generate added value products and enhance its bioeconomy value. Algal technologies are one such option. Algae are simple organisms that range from very small, single-celled microalgae to multicellular macroalgae, such as seagrass. Total world production of dry algal biomass is estimated at about 10,000 tons per year. There are several benefits of Algal system: impressive productivity; non-competitive with agriculture; flexible on water quality; mitigation of CO<sub>2</sub> and reduce its emission responsible for climate change. This requirement offers an opportunity to make productive use of the CO<sub>2</sub> from power plants, biofuel facilities, and other sources.

### **Bioproducts from Reclaimed Water and Its Role in Employment**

The world market value from algal products alone is worth trillions of dollars/year, having applications in biofuels, as an animal feed, in agricultural sector, as a food supple-

ments, in cosmetics and as a nutraceutical. Algae are reported to produce high-value pigments, when grown in hypersaline water (such as produced water). Incorporating such innovative bio-based technology to treat oil field produced water would lead to both treatment and enhanced manufacturing sector in Oman, in turn providing so many quality employment opportunities in the country. SQU, through OGRC, could support the national industrial strategy 2040 by providing such an innovative bio-based application.

**“ ALTHOUGH THERE IS STILL HUGE POTENTIAL FOR OIL IN OMAN, THIS COMMODITY IS NOT SUSTAINABLE ”**

### **Sustainable Energy Resources**

One of the major challenges for Oman is treatment of seawater and reclamation of produced water. About 30% of the energy required for desalination in Oman can be obtained from solid organic waste. Additionally, newer technologies have been developed recently for powering the dynamos using solar energy. These sustainable technologies can minimize the usage of fossil fuel for energy production and save them the production of other valuable synthetic products as well as being friendly to the environment. SQU can explore the use of other sources of energy

Developing of carbon-non-emitting energy industries are highly needed to join global efforts to curb global warming. This will also help Oman in diversifying its energy sources and creating new employment opportunities.

### **Conclusion**

Although there is still huge potential for Oil in Oman, this commodity is not sustainable. The Sultanate should carefully focus and strategize towards renewable resources to conserve the exhaustible resources for other usage. Pollutants from WP remain an immense challenge unless it is treated and utilized to generate revenues targeted to diversify economy and produce new employment opportunities. Education and funding of research should be streamlined to solve such challenges. It is unavoidable for Oman to create new avenues for employment to its teeming youth and diversify its socio-economy. ●