

# Enhanced Oil Recovery, 2nd Edition

<https://marketpublishers.com/r/EA673A400C5EN.html>

Date: June 2012

Pages: 196

Price: US\$ 4,950.00 (Single User License)

ID: EA673A400C5EN

## Abstracts

Enhanced oil recovery (EOR), also referred to as improved oil recovery or tertiary oil recovery, is most often achieved by injecting a liquid or gas into an oil reservoir, thereby lowering oil viscosity and increasing the amount of oil available for production. Some of the more common EOR methods include gas EOR (mostly CO-2 EOR), thermal EOR and chemical EOR. Microbial EOR and seismic EOR also hold small, but strong niches in the EOR market. While only about 10% - 30% of oil is typically extracted from a well by conventional oil production processes, EOR methods can enhance these recovery rates by an additional 5% to 20% (on a conservative average).

The global market for EOR, estimated at more than \$126.02 billion in 2011, has shown exciting growth since 2007, when the market totaled \$54.96 billion. Technological challenges, hazy regulations, and high implementation costs have often been inhibitory to EOR projects, although this is quickly changing. Government interest and generous investments are helping to spur new developments in technology and also to increase the availability of necessary materials (such as CO-2). SBI Energy expects the EOR industry will continue to flourish in light of these types of developments and that many individuals involved in the EOR business will enjoy exponential growth in the near future.

A large number of oil fields around the globe are maturing and are producing less oil – those affected are looking to EOR to increase, or at least maintain, their oil production levels. Many countries rely heavily on oil production for their financial health, and are becoming increasingly willing to invest in EOR, especially as the group of successful EOR projects grows and as the high price of oil continues to support research and development schemes.

Around the world, the EOR market is growing and metamorphosing to fit the various regions in which it resides. EOR market growth depends largely on regional factors,

such as the health of the local economy; the level of foreign investment; existing politics and policies that may hinder or spur market growth; available technological knowledge and expertise; the type of oil being produced, the geographical location of oil fields and the geology of oil reservoirs; as well as regional oil supply and oil demand. A plethora of technologies and processes are emerging and becoming available that are fulfilling these regional niches and easing EOR production for many oil operators.

Many regions are jumping, or at least easing, into the world of EOR. The Middle East previously did not have much of a need for EOR; oil was plentiful and lower oil prices did not encourage seemingly un-needed experimentation. This is quickly changing; however. Many oil fields in the Middle East are maturing and are producing less oil; other fields in the region are nearing their peak oil production limits and their operators are proactively looking to EOR to maintain steady production in the future. SBI Energy considers the Middle East will whole heartedly be immersing itself in the EOR scene by 2021, with the United Arab Emirates, Kuwait, Saudi Arabia, Iran and Oman leading the way.

The Global Market for Enhanced Oil Recovery, 2nd Edition contains comprehensive historical data (2007-2011) and forecast data (2012-2021) for the enhanced oil recovery (EOR) market. Data, in terms of value (dollars) and volume (barrels) are provided for various methods of EOR, including thermal EOR, gas EOR and chemical EOR. Historical and forecast data are also provided for the oil industry as a whole. Market share between the top dozen countries is discussed and is also broken down by value and volume for each individual country.

This report identifies key trends and factors (such as the regulatory scene, new technologies, economic drivers, challenges and environmental concerns) affecting the size and direction of market growth; discusses employment opportunities in the industry; provides a broad overview of regional involvement in the EOR market; reports on some of the more current or innovative technological advancements and schemes; and contains 15 profiles of major – or simply interesting – companies involved in the EOR market.

## Contents

### CHAPTER 1: EXECUTIVE SUMMARY

Report Scope

Report Methodology

Introduction

Thermal Recovery

Gas/CO-2 EOR

Chemical Injection

'Other' Methods

Market Size and Growth

EOR Value Worldwide Exceeds \$126 Billion in 2011

Figure 1-1 Total EOR Market Production Value Worldwide In Million Dollars

Figure 1-2 Total EOR Production Volume Worldwide In Million Barrels (2007 – 2011)

EOR Market Value Projected to catapult into 2021

Figure 1-3 Projected EOR Production Value Worldwide In Million Dollars (2011 – 2021)

Figure 1-4 Projected EOR Volume Worldwide In Barrels (2011 – 2021)

Gas/CO2 Injection EOR Holds its Own in EOR Market

Figure 1-5 Worldwide Gas/CO-2 EOR Production Value In Million Dollars (2007 – 2011)

Figure 1-6 Worldwide Gas/CO-2 EOR Production Volume In Million Barrels (2007 – 2011)

Gas/CO2 EOR Segment Nears 7.6 Billion Barrels in 2021

Figure 1-7 Worldwide Gas/CO-2 EOR Production Value Projections, In Million Dollars (2011 – 2021)

Figure 1-8 Worldwide Gas/CO-2 EOR Production Volume Projections, In Million Barrels (2011 – 2021)

China Dominates EOR

Figure 1-9 China's EOR Market In Million Dollars (2007-2021)

Figure 1-10 China's EOR Market In Million Barrels (2007-2021)

United States Holds its Own in EOR World

Figure 1-11 United States' EOR Market In Million Dollars (2007-2021)

Around the World

EOR around the World

North America

Factors in Market Size and Growth

Many Factors Affect Market Size and Growth

Global and Regional Economies Impact EOR Market Growth

EOR Market Guided by Sporadic Price of Oil  
EOR Market Affects Global and National Economies  
Potential for CO-2 EOR Sequestration Questionable  
Technological Innovations and Schemes  
EOR Industry Inundated with New Technologies  
Solar Power Joins Forces with EOR  
Acoustic Enhanced Oil Recovery Stimulates Production  
Employment Opportunities  
Wide Range of Jobs in EOR Market  
423,000 Employed in EOR Market in 2011  
Figure 1-12 Number of Employees in EOR Market (2007-2011)

## **CHAPTER 2: INTRODUCTION**

Report Scope  
Report Methodology  
Data for Regional EOR Involvement by Method Elusive  
Oil 101  
Phases of Oil Production  
Primary Recovery  
Secondary Recovery  
Tertiary Recovery, Also Known As Enhanced Oil Recovery  
Methods of Enhanced Oil Recovery  
Thermal Recovery  
Gas/CO-2 EOR  
Chemical Injection  
'Other' Methods  
The History of EOR

## **CHAPTER 3: MARKET SIZE AND GROWTH**

Total Oil Production Value Exceeded \$2.6 Trillion in 2011  
Figure 3-1 Total Value of Oil Production Worldwide In Trillion Dollars (2007 – 2011)  
Figure 3-2 Total Volume of Oil Production Worldwide In Billion Barrels (2007 – 2011)  
EOR Value Worldwide Exceeds \$126 Billion in 2011  
Figure 3-3 Total EOR Market Production Value Worldwide In Million Dollars  
Figure 3-4 Total EOR Production Volume Worldwide In Million Barrels (2007 – 2011)  
EOR Share of Total Oil Market Approximately 4.8% in 2011  
Figure 3-5 EOR % Share of Total Oil Market In Dollar Value (2007)

- Figure 3-6 EOR % Share of Total Oil Market In Dollar Value (2011)  
Total Oil Production Value Projected to Continue Small Climb  
Figure 3-7 Projected Total Oil Production Value Worldwide In Trillion Dollars (2011 – 2021)  
Figure 3-8 Projected Total Oil Production Volume Worldwide In Barrels (2011 – 2021)  
EOR Market Value Projected to catapult into 2021  
Figure 3-9 Projected EOR Production Value Worldwide In Million Dollars (2011 – 2021)  
Figure 3-10 Projected EOR Volume Worldwide In Barrels (2011 – 2021)  
EOR Share of Total Oil Market Experiences Large Jump in 2021  
Figure 3-11 EOR % Share of Total Oil Market In Dollar Value (2015)  
Figure 3-12 EOR % Share of Total Oil Market In Dollar Value (2021)  
Projected EOR Value in Three Oil Price Scenarios  
Figure 3-13 Projected EOR Value, Based on Oil Price per Barrel Three Oil Price Scenarios (2011 – 2021)  
Table 3-1 Projected EOR Market Production Value, Based on Oil Price per Barrel Three Scenarios (2011 – 2021)  
Thermal EOR Exceeds \$30.2 Million in Production Value in 2011  
Figure 3-14 Worldwide Thermal EOR Production Value In Million Dollars (2007 – 2011)  
Figure 3-15 Worldwide Thermal EOR Production Volume In Million Barrels (2007 – 2011)  
Gas/CO<sub>2</sub> Injection EOR Holds its Own in EOR Market  
Figure 3-16 Worldwide Gas/CO<sub>2</sub> EOR Production Value In Million Dollars (2007 – 2011)  
Figure 3-17 Worldwide Gas/CO<sub>2</sub> EOR Production Volume In Million Barrels (2007 – 2011)  
Chemical Injection Valued at \$27.7 Billion in 2011  
Figure 3-18 Worldwide Chemical EOR Production Value In Million Dollars (2007 – 2011)  
Figure 3-19 Worldwide Chemical EOR Production Volume In Million Barrels (2007 – 2011)  
'Other' EOR Methods Complete Market Pie  
Figure 3-20 Worldwide 'Other' EOR Production Value In Million Dollars (2007 – 2011)  
Figure 3-21 Worldwide 'Other' EOR Production Volume In Million Barrels (2007 – 2011)  
Thermal EOR Dominates Share of EOR Methods in 2021  
Figure 3-22 Worldwide Thermal EOR Production Value Projections, In Million Dollars (2011 – 2021)  
Figure 3-23 Worldwide Thermal EOR Production Volume Projections, In Million Barrels (2011 – 2021)

## Gas/CO<sub>2</sub> EOR Segment Nears 7.6 Billion Barrels in 2021

Figure 3-24 Worldwide Gas/CO<sub>2</sub> EOR Production Value Projections, In Million Dollars (2011 – 2021)

Figure 3-25 Worldwide Gas/CO<sub>2</sub> EOR Production Volume Projections, In Million Barrels (2011 – 2021)

## Chemical EOR Tallies in at Nearly 3.4 Billion Barrels in 2021

Figure 3-26 Worldwide Chemical EOR Production Value Projections, In Million Dollars (2011 – 2021)

Figure 3-27 Worldwide Chemical EOR Production Volume Projections, In Million Barrels (2011 – 2021)

## 'Other' EOR Responsible for Almost 2.2 Billion Barrels in 2021

Figure 3-28 Worldwide Thermal EOR Production Value Projections, In Million Dollars (2011 – 2021)

Figure 3-29 Worldwide 'Other' EOR Production Volume Projections, In Million Barrels (2011 – 2021)

## Three Main EOR Methods Hold Majority Share of Market

Figure 3-30 Worldwide EOR Market Value, % Share, by Method (2007)

Figure 3-31 Worldwide EOR Market Value, % Share, by Method (2011)

Figure 3-32 Worldwide EOR Market Value, % Share, by Method (2015)

Figure 3-33 Worldwide EOR Market Value, % Share, by Method (2021)

## EOR Industry Distributed Unevenly Around the Globe

Figure 3-34 EOR Production Worldwide, % Share By Country, 2007

Figure 3-35 EOR Production Worldwide, % Share By Country, 2012

Figure 3-36 EOR Production Worldwide, % Share By Country, 2021

## China Dominates EOR

Figure 3-37 China's EOR Market In Million Dollars (2007-2021)

Figure 3-38 China's EOR Market In Million Barrels (2007-2021)

## United States Holds its Own in EOR World

Figure 3-39 United States' EOR Market In Million Dollars (2007-2021) . 63

Figure 3-40 United States' EOR Market In Million Barrels (2007-2021) . 64

## Canada Doesn't Hold Back With EOR Ventures

Figure 3-41 Canada's EOR Market In Million Dollars (2007-2021)

Figure 3-42 Canada's EOR Market In Million Barrels (2007-2021)

## Russia Enjoys Participation in EOR Schemes

Figure 3-43 Russia's EOR Market In Million Dollars (2007-2021)

Figure 3-44 Russia's EOR Market In Million Barrels (2007-2021)

## Kuwait Has Handle on EOR

Figure 3-45 Kuwait's EOR Market In Million Dollars (2007-2021)

Figure 3-46 Kuwait's EOR Market In Million Barrels (2007-2021)

### Oman is No Slacker in EOR Industry

Figure 3-47 Oman's EOR Market In Million Dollars (2007-2021)

Figure 3-48 Oman's EOR Market In Million Barrels (2007-2021)

### Norway Sees Light in EOR

Figure 3-49 Norway's EOR Market In Million Dollars (2007-2021)

Figure 3-50 Norway's EOR Market In Million Barrels (2007-2021)

### Mexico Has Stake in EOR

Figure 3-51 Mexico's EOR Market In Million Dollars (2007-2021)

Figure 3-52 Mexico's EOR Market In Million Barrels (2007-2021)

### United Arab Emirates Ups Its Stake in EOR

Figure 3-53 United Arab Emirates' EOR Market In Million Dollars (2007-2021)

Figure 3-54 United Arab Emirates' EOR Market In Million Barrels (2007-2021)

### Iran Plays EOR Field

Figure 3-55 Iran's EOR Market In Million Dollars (2007-2021)

Figure 3-56 Iran's EOR Market In Million Barrels (2007-2021)

### Nigeria Banks on EOR

Figure 3-57 Nigeria's EOR Market In Million Dollars (2007-2021)

Figure 3-58 Nigeria's EOR Market In Million Barrels (2007-2021)

### India Wades through EOR

Figure 3-59 India's EOR Market In Million Dollars (2007-2021)

Figure 3-60 India's EOR Market In Million Barrels (2007-2021)

### 'Other' EOR Market No Ghost

Figure 3-61 'Other' EOR Market In Million Dollars (2007-2021)

Figure 3-62 'Other' EOR Market In Million Dollars (2007-2021)

### Proven Oil Reserves Estimated at Nearly 1.5 Trillion Barrels

Figure 3-63 Potential EOR Recovery, Based on Proven Oil Reserves 2011-2021

### Saudi Arabia, Venezuela and Canada Boast Largest Oil Reserves

Table 3-2 Potential EOR Production Based on Proven Oil Reserves Top 20 Oil Producing Countries

## **CHAPTER 4: AROUND THE WORLD**

### EOR around the World

#### North America

EOR in North America

EOR Schemes in North America

#### Central and South America

EOR in Central and South America

EOR Schemes in Central and South America

## Europe

EOR in Europe

EOR Schemes in Europe

## Asia

EOR in Asia

EOR Schemes in Asia

## The Middle East

EOR in the Middle East

EOR Schemes in the Middle East

## Africa

EOR in Africa

EOR Schemes in Africa

## Australia and the Oceania

EOR in Australia and the Oceania

EOR Schemes in Australia and the Oceania

## **CHAPTER 5: FACTORS IN MARKET SIZE AND GROWTH**

### Many Factors Affect Market Size and Growth

#### Market Variables

Global and Regional Economies Impact EOR Market Growth

EOR Market Guided by Sporadic Price of Oil

Peak Oil – Reality or Myth?

The Politics of Global Warming and EOR

#### Market Drivers

EOR Market Affects Global and National Economies

EOR Industry Sits Happily in Shadow of Giant Oil Market

Easy Oil Becoming Harder to Find

There is Still A Heck of A Lot of Oil Out There!

Increase in CO<sub>2</sub> Pipelines Create Market Stability

Electric and Hybrid Cars May Not Be as Popular as Expected

Rise of BRICS Countries

Funding for EOR R&D Fueling Market Growth

Petroleum Products in High Demand

The Kyoto Protocol

United Nations Climate Change Conferences

OPEC Aims to Coordinate and Unify Policies among Countries

GHG Emissions Tackled through CO<sub>2</sub> EOR Schemes

#### Market Deterrents



Potential for CO-2 EOR Sequestration Questionable  
Alternative Fuel Sources May Decrease Oil Demand...Some Day  
Not All EOR Methods Suitable for All Oil Fields  
Figure 5-1 Share of Global Oil Reserves By Density  
EOR Not as Viable for Small Producers  
EOR Still a Young Market with Much to Learn  
Spills Do Happen  
Tighter Regulations Not Helpful to EOR Market  
EOR Regulations Still in Early Stages of Development  
CO2 Leakage May Compromise Integrity of EOR Projects  
Environmentalists Hard Set against Oil Production  
The Future of EOR Bright, with a Few Dark Spots

## **CHAPTER 6: TECHNOLOGICAL INNOVATIONS AND SCHEMES**

EOR Industry Inundated with New Technologies

EOR Methods

Thermal Recovery

Gas/CO-2 EOR

Chemical Injection

Microbial EOR

Seismic EOR

WAG and SWAG

Enzyme EOR

Innovative Projects & Technological Schemes

Solar Power Joins Forces with EOR

Acoustic Enhanced Oil Recovery Stimulates Production

Emerson's Wireless System for EOR Gets Smart

Wintershall's Biopolymer Schizophyllan – Simply Fungus

Carbon Disulphide Dips into EOR

Oman's MEOR Formula Increases Oil Production by 23%

Ridgeline's Modular 'STCI' for Use in Polymer Flooding

Maersk's TriGen Power Generation Useful in EOR

Chevron Develops Computer Monitoring System for EOR

Enhanced Bitumen Recovery Using High Permeability Pathways

Optimal's E2EOR® Ideal for High Salinity, Heavy Oil Production

Paradigm Oil & Gas' Transportable EOR Platform

Dow Earns Patent for Surfactant Injection System

Fluid Dynamics™ Creates Polymer Blending System

Electric EOR Saves Electricity!  
Nikron's Super Hot Steam Injection Heats up Market  
VeruTEK®'s EOR Product Line Biodegradable  
NiMin's CMD Technology Recovers Up to 60%  
Saudi Aramco Creates Microscopic Robots for EOR Monitoring

## **CHAPTER 7: EMPLOYMENT OPPORTUNITIES**

Wide Range of Jobs in EOR Market  
Increase in EOR Schemes Incites Job Growth  
Many Experience Requirements and Salary Levels in EOR  
423,000 Employed in EOR Market in 2011  
Figure 7-1 Number of Employees in EOR Market (2007-2011)  
About 1,786,827 Employed in EOR Market in 2021  
Figure 7-2 Projected Number of Employees in EOR Market (2011-2021)  
Job Openings Found on Employment Websites  
Job Openings Found on Company Websites  
Scholarships and Training

## **CHAPTER 8: COMPANY PROFILES**

EOR Mostly Majors; Smaller Companies Easing In  
Company Profiles  
Cairn Energy Plc.  
Table 8-1 Cairn Energy Plc. Profile  
Corporate Overview  
Financial Performance  
Cairn Uses EOR in Rajasthan Bloc  
Chevron Corp.  
Table 8-2 Chevron Corp. Profile  
Corporate Overview  
Financial Performance  
EOR Ventures  
China Oilfield Technology Services Group, Ltd.  
Table 8-3 China Oilfield Technology Services Group, Ltd. Profile  
Corporate Overview & EOR Involvement  
Financial Performance  
Denbury Resources, Inc.  
Table 8-4 Denbury Resources, Inc. Profile

Corporate Overview

Financial Performance

EOR Ventures

Enhance Energy, Inc.

Table 8-6 Enhance Energy, Inc. Profile

Corporate Overview

Financial Performance

Enhance at Helm of the Alberta Carbon Trunk Line

Exxon Mobil Corp.

Table 8-7 Exxon Mobil Corp. Profile

Corporate Overview

Financial Performance

EOR Ventures

GlassPoint Solar, Inc.

Table 8-8 GlassPoint Solar, Inc. Profile

Corporate Overview

Financial Performance

GlassPoint's Solar Steam Generator

Kinder Morgan, Inc.

Table 8-9 Kinder Morgan, Inc. Profile

Corporate Overview

Financial Performance

EOR Ventures

Maersk Oil Co.

Table 8-10 Maersk Oil Co. Profile

Corporate Overview

Financial Performance

EOR Ventures

Penn West Exploration

Table 8-11 Penn West Exploration Profile

Corporate Overview

Financial Performance

EOR Positioning

PetroChina Co., Ltd.

Table 8-12 PetroChina Co., Ltd. Profile

Corporate Overview

Financial Performance

EOR Ventures

Petroleum Nasional Berhad (Petronas)

Table 8-13 Petroliam Nasional Berhad (Petronas) Profile

Corporate Overview

Financial Performance

EOR Ventures

Royal Dutch Shell Plc.

Table 8-14 Royal Dutch Shell Plc. Profile

Corporate Overview

Financial Performance

EOR Ventures

Saudi Arabian Oil Co.

Table 8-15 Saudi Arabian Oil Co. Profile

Corporate Overview

Financial Performance

EOR Ventures

## **APPENDIX: ADDRESSES OF SELECTED MARKETERS**

## I would like to order

Product name: Enhanced Oil Recovery, 2nd Edition

Product link: <https://marketpublishers.com/r/EA673A400C5EN.html>

Price: US\$ 4,950.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/EA673A400C5EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:  
Last name:  
Email:  
Company:  
Address:  
City:  
Zip code:  
Country:  
Tel:  
Fax:  
Your message:

**\*\*All fields are required**

Customer signature \_\_\_\_\_

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970