Water for Onshore Oil & Gas: Opportunities in produced water management, hydraulic fracturing and enhanced oil recovery

Description: Oil and Gas production is increasing rapidly and, by 2035, it’s predicted that oil production will increase to 97 million barrels and gas production will reach 5 trillion cubic metres per year to meet growing demands.

Managing the increased volumes of produced water associated with this production and sourcing water for operations is becoming more challenging. Scarce water resources have pushed operators to reuse produced water for water floods and fracturing fluids. Tighter environmental regulations are restricting the usual methods for disposing of produced water, encouraging operators to look at new approaches. Consequently, there are huge long-term opportunities for oilfield service companies and water technology providers in offering solutions to manage these challenges. This new report showcases the potential of this growing market.

Key Features

- Global market forecast for expenditure on produced water treatment and management, provision of hydraulic fracturing fluid and pre-treatment for enhanced oil recovery methods – so you can identify the regions with the best prospects for your business over the next 5 years.
- Technology trends – understand how existing technologies from the water sector are being adopted by the oil and gas industry, how new technologies will shape the future of this market and how these developments are creating opportunities for your business.
- Procurement models and supply chain analysis – understand the dynamics of the most attractive markets to help plan your market entry strategy and identify potential partners or competitors in these markets.
- Identify regional opportunities in the development of unconventional resources including shale gas, tight oil, heavy oil, coal bed methane and mature conventional oil fields
- Understand how the tailored solutions you offer can meet the unique water requirements for enhanced recovery from resources around the world.

Resource by region

- For every type of oil and gas resource, this report focuses on the regions with the biggest opportunities now and in the future, their unique extraction methods, water requirements and the regional trends and regulations for water sourcing and produced water treatment.

- This is the essential resource for identifying the areas that offer the best prospects for your business and identifying ways of developing your service offering in line with new trends and demands.

The report covers the following key areas of growth:

- Shale gas/tight oil – with a focus on tight oil production in the USA
- Heavy oil / bitumen – with focus on the Athabasca oil sands in Canada
- Coal bed methane – with a focus on coal seam gas production in Australia
- Conventional oil and gas (including IOR/EOR)

Regional breakdown

This report is your guide to the unique opportunities in the most attractive segments of this market. Find what's going on in:

- North America – Bitumen extraction in Canada, tight oil in the USA, coalbed methane and shale gas in the USA
- Latin America – Steam injection for heavy oil extraction in Colombia and Venezuela, and recent development of shale gas potential in Argentina and Mexico
- Asia-Pacific – Coal seam gas in Australia, and recent developments in coal bed methane extraction in Indonesia and China
- Middle East – Improved and enhanced oil recovery from fields in Kuwait, Saudi Arabia, Iraq and Oman
Europe and Africa – Potential developments of shale gas and coalbed methane resources.

Opportunities

We show you the opportunities in the biggest markets and offer procurement models and supply chain analysis so you can understand the dynamics of each market and how to sell your services and technologies. The report identifies the following key areas opportunity:

- Produced Water Management – global volumes of produced water are steadily increasing in line with increased volumes of oil production. Water sector opportunities for handling this water are therefore increasing, driven largely by regulatory pressure and disposal restrictions. This report shows you how this is creating opportunities for advanced water treatment for reuse in hydraulic fracturing and enhanced oil recovery (EOR) processes; transport of this water; and disposal.
- Hydraulic Fracturing – unconventional oil and gas resources like shale gas, tight oil and coal bed methane use hydraulic fracturing to help bring the oil to the surface which requires large volumes of treated water. This report identifies the regional opportunities in pre-treatment of fracturing fluids, water sourcing and chemical services.
- Enhanced Oil Recovery (EOR) – EOR increases the amount of oil that can be extracted from a well by reducing the viscosity of the oil. In a market where oil producers need to maximise resources in mature oil fields or to extract unconventional resources, EOR is becoming a huge area of opportunity for water companies. We look at the prospects for secondary and enhanced oil recovery.

Contents:

1. Introduction
   Figure 1.1 Oil prices, 2000–2014
   Figure 1.2 Gas prices, 2000–2014
1.1 Produced water
   1.1.1 Produced water treatment
   1.1.1.1 Produced water treatment trains
   Figure 1.3 Oil-water separation and suspended solids removal
   Figure 1.4 Oil-water separation treatment technologies
   1.1.1.2 Treatment of produced water with TDS removal technologies
   Figure 1.5 Treatment trains for TDS removal
   Figure 1.6 Comparison of produced water treatment technologies
   Figure 1.8 Cost of different produced water treatment options
   1.1.1.3 Trends in the produced water treatment market
   Figure 1.9 Selected produced water treatment technologies
   1.1.2 Channels to the market
   Figure 1.10 Supply chain matrix
   Figure 1.11 Route to the market (evaporator/crystalliser system) in North America
   1.1.2.1 Investment in water technologies
   Figure 1.12 Selected venture/growth equity investments in water technologies for O&G

2. General trends
   2.1 Oil production
   Figure 2.1 Historical and forecasted oil production by region, 2000–2030
   Figure 2.2 Onshore and offshore oil production, 2012
   Figure 2.3 Onshore oil production by region, 2012
   2.2 Oil reserves
   Figure 2.4 Proven oil reserves by region, 2012
   Figure 2.5 Proven oil reserves by resource type, 2012
   2.3 Gas production
   Figure 2.6 Historical and forecasted gas production by region, 2000–2030
   Figure 2.7 Onshore and offshore gas production, 2012
   Figure 2.8 Onshore gas production by region, 2012
   2.4 Gas reserves
   Figure 2.9 Proven gas reserves by region, 2012
   Figure 2.10 Technically recoverable gas reserves by resource type, 2012
   2.5 Global E&P companies
   2.6 Market forecast
   Figure 2.11 Global oil and gas water management market, 2014–2020
   Figure 2.12 Global oil and gas water management market by region, 2014–2020
   2.6.1 Produced water volumes
   Figure 2.13 Global produced water volumes by resource type, 2011–2020
Figure 2.14 Global produced water volumes by region, 2011–2020
Figure 2.15 Global capital expenditure on produced water treatment by system, 2011–2020
Figure 2.16 Global capital expenditure on produced water treatment by region, 2011–2020
Figure 2.17 Global capital expenditure on produced water treatment by resource type, 2011–2020

2.6.3 Produced water management
Figure 2.18 Global oil and gas water management services expenditure, 2011–2018
Figure 2.19 Global oil and gas water management services expenditure by region, 2014
Figure 2.20 Global expenditure on water hauling services by region, 2011-2020
Figure 2.21 Global expenditure on water disposal services by region, 2011-2020
Figure 2.22 Global expenditure on produced water treatment operations by region, 2011–2020
Figure 2.23 US oil and gas water management services expenditure, 2011–2020
Figure 2.24 US oil and gas water treatment operations expenditure, 2011–2020

2.6.4 Alternative scenarios
Figure 2.25 Global produced water treatment market: Reference and low oil price scenarios
Figure 2.26 Shale gas and tight oil produced water treatment market: Reference and high gas price scenarios

3. Shale gas/tight oil
3.1 Extraction by hydraulic fracturing
Figure 3.1 Permeability of formations containing oil and gas
Figure 3.2 Changes in flowback water volumes and TDS levels over time
Figure 3.3 Change in water and oil production from tight oil wells in the Bakken Shale, US
3.1.1 Water management in the unconventional oil and gas industry
Figure 3.4 Water management in the unconventional oil and gas industry
3.2 Global shale gas and tight oil resources
Figure 3.5 Total global in-place and technically recoverable shale gas and shale oil resources
Figure 3.6 Map of assessed shale plays worldwide
Figure 3.7 Top 10 countries with technically recoverable shale gas and shale oil resources
Figure 3.8 Projections of tight oil production worldwide
Figure 3.9 Projections of shale gas production worldwide

3.3 United States
3.3.1 Overview of shale play production
Figure 3.10 Major shale plays in the US
Figure 3.11 Major tight oil producing shale plays in the US
Figure 3.12 Major shale gas producing shale plays in the US
Figure 3.13 Projected tight oil production in the US, 2008–2020
Figure 3.14 Projected shale gas production in the US, 2000–2020

3.3.2 Market drivers
3.3.3 Regulatory overview
3.3.3.1 Federal regulatory overview
Direct and indirect produced water discharge
Deep well injection
Current developments in federal regulatory oversight
3.3.3.2 State regulatory overview
Figure 3.15 List of regulatory agencies in major shale gas and tight oil producing states Water sourcing regulations
Figure 3.16 Groundwater and surface water law overview Water reuse regulations
Figure 3.17 Permitted water recycling companies in Texas
3.3.4 Water sourcing
3.3.4.1 Water usage in hydraulic fracturing
Figure 3.18 Average water usage for fracturing an oil and gas well
3.3.4.2 Alternative sources of water for hydraulic fracturing
Figure 3.19 Proportion of water sources used for hydraulic fracturing in Texas
3.3.5 Water for fracturing
3.3.5.1 Fracturing fluids trends
Figure 3.20 Fracturing fluids water treatment matrix
3.3.6 Water management practices
Figure 3.21 Cost indicators for drilling and completion of horizontal wells
Figure 3.22 Water management economics
Figure 3.23 Overview of water management practices in major unconventional plays in the US
3.3.6.1 Produced water management in Pennsylvania
Figure 3.24 Produced water management practices in Pennsylvania, 2013
3.3.6.2 Challenges to produced water reuse

Figure 3.25 WORs in major unconventional plays in the US, 2013
Figure 3.26 WGRs for major unconventional plays in the US, 2013

3.3.7 Produced water treatment technologies

Figure 3.27 Produced water treatment and reuse diagram
Figure 3.28 Selection of current water reuse solutions in the US

3.3.8 Water treatment delivery systems

3.3.8.1 Overview

3.3.8.2 Future opportunities

Figure 3.29 Centralised produced water treatment facilities in the US

3.3.9 Dynamics in the unconventional market

3.3.10 Procurement of water treatment technologies

Figure 3.30 Overview of procurement routes in the unconventional O&G industry in the US

3.3.10.1 Water treatment technology drivers

3.3.10.2 Market entry strategies

Partnering with water service providers
Partnering with OSCs

3.3.10.3 New technology entrants to the market

3.3.11 Supply chain

3.3.11.1 Exploration and production companies

Figure 3.31 Major exploration and production companies

3.3.11.2 Oilfield service companies

Figure 3.32 Major oilfield service companies in the US

3.3.11.3 Water service providers

Figure 3.33 Major water service providers in the US

Figure 3.34 Estimated market share of major water hauling service providers in the US, 2013

3.3.12 Market forecast: United States

Figure 3.35 Produced water volumes in shale gas and tight oil production, 2011–2020
Figure 3.36 Capital expenditure on produced water treatment for shale gas and tight oil, 2011–2020

3.4 Canada

3.4.1 Resources

Figure 3.37 Shale gas and shale oil resources in Canada

3.4.2 Exploitation

Figure 3.38 E&P companies active in the Horn River basin, 2011
Figure 3.39 The main E&P companies active in tight oil production in Canada

3.4.3 Market forecast: Canada

Figure 3.40 Produced water volumes in shale gas and tight oil production, 2011–2020
Figure 3.41 Capital expenditure on produced water treatment for shale gas and tight oil, 2011–2020

3.5 China

3.5.1 Resources and production

Figure 3.42 Basins and formations in China with assessed shale gas and shale oil resources

3.5.2 Institutional support

3.5.3 International E&P companies in China's shale gas development

3.5.4 Challenges in E&P of shale gas in China

3.5.5 Market forecast: China

Figure 3.43 Produced water volumes in shale gas and tight oil production, 2011–2020
Figure 3.44 Capital expenditure on produced water treatment for shale gas and tight oil, 2011–2020

3.6 Argentina

3.6.1 Shale resources and activity

Figure 3.45 Size of shale resources in Argentina, by basin and formation

3.6.2 Challenges

3.6.3 International participation

3.6.4 Market forecast: Argentina

Figure 3.46 Produced water volumes in shale gas and tight oil production, 2011–2020
Figure 3.47 Capital expenditure on produced water treatment for shale gas and tight oil, 2011–2020

3.7 Mexico

3.7.1 Shale resources

Figure 3.48 Size of shale resources in Mexico, by basin and formation

3.7.2 Shale activity

3.7.3 Private participation in oil and gas E&P

3.7.4 Market forecast: Mexico

Figure 3.49 Produced water volumes in shale gas and tight oil production, 2011–2020
Figure 3.50 Capital expenditure on produced water treatment for shale gas and tight oil, 2011–2020

3.8 Global forecast
3.9 Regional forecast

3.9.1 North America

3.9.2 Latin America-Caribbean

3.9.3 East Asia-Pacific

4. Coalbed methane

4.1 Australia

4.1.1 Market overview

4.1.1.1 CSG recovery

4.1.2 Market drivers

4.1.3 Regulations

4.1.3.1 Regulatory bodies in Queensland and NSW

4.1.4 Regional overview of the CSG market

4.1.4.1 CSG production in Queensland

4.1.4.2 CSG production in New South Wales

4.1.5 CSG produced water treatment

4.1.5.1 Quality of CSG produced water

4.1.5.2 Challenges of the CSG produced water market

4.1.5.3 Treatment of CSG produced water

4.1.5.4 Technology trends

4.1.6 Management of CSG produced water

4.1.7 Market dynamics

4.1.7.1 Procurement

4.1.7.2 Accessing the market

4.1.8 Supply chain analysis

4.1.8.1 E&P companies

4.1.9 Market dynamics

4.1.9.1 Procurement

4.1.9.2 Accessing the market

4.1.9.3 Opportunities in water treatment technologies

4.1.9.4 Supply chain analysis

4.1.9.5 E&P companies

4.1.10 CSG and water production by E&P companies in Queensland (January-June 2013)
4.1.8.2 Engineering
4.1.8.3 EPC companies
4.1.8.4 Leading water technology companies
Water technology companies entering the market
4.1.8.5 Recent and upcoming CSG projects
Figure 4.17  Recent CSG produced water projects
Figure 4.18  Upcoming LNG projects
4.1.9 Market forecast: Australia
Figure 4.19  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.20  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.2 United States
4.2.1 Market overview
Figure 4.21  CBM production in the US, 1990–2012
4.2.1.1 Regulations
4.2.2 Regional overview  Figure 4.22  US CBM production by state, 2006–2011
4.2.3 CBM water treatment and management
4.2.3.1 CBM water quality and volumes
Figure 4.23  CBM produced water characteristics
Figure 4.24  Average WGR of CBM wells in Colorado
4.2.3.2 CBM produced water treatment
Figure 4.25  CBM water treatment technologies
4.2.3.3 CBM produced water management  Water management strategies
Figure 4.26  Discharge routes in San Juan and Powder River basins
Figure 4.27  Water management strategies in San Juan and Powder River basins
4.2.4 Market forecast: United States
Figure 4.28  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.29  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.3 Canada
Figure 4.30  Main E&P companies active in CBM extraction
4.3.1 Market forecast: Canada
Figure 4.31  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.32  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.4 China
4.4.1 Exploration and production
4.4.2 CBM produced water
4.4.3 Market forecast: China
Figure 4.33  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.34  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.5 The Russian Federation
4.5.1 Market forecast: Russian Federation
Figure 4.35  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.36  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.6 Global forecast
Figure 4.37  Coalbed methane: Global produced water volumes, 2011–2020
Figure 4.38  Coalbed methane: Produced water capital expenditure by region, 2011–2020
Figure 4.39  Coalbed methane: Produced water capital expenditure by system, 2011–2020
4.7 Regional forecast
4.7.1 North America
Figure 4.40  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.41  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.7.2 Eastern Europe-Central Asia
Figure 4.42  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.43  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.7.3 East Asia-Pacific
Figure 4.44  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.45  Capital expenditure on produced water treatment for coalbed methane, 2011–2020
4.7.4 Southern Asia
Figure 4.46  Produced water volumes in coalbed methane production, 2011–2020
Figure 4.47  Capital expenditure on produced water treatment for coalbed methane, 2011–2020

5. Heavy oil/bitumen
5.1 Steam EOR
Figure 5.1  The SAGD process
Figure 5.2 Breakdown by country of current onshore oil production using steam EOR
Figure 5.3 Onshore oil production using steam EOR, including future projects in the Middle East
5.2 Canada
5.2.1 Market overview
Figure 5.4 Estimates of Canadian crude oil production, 2012–2030
Figure 5.5 Main bitumen deposits in Alberta, Canada
5.2.2 Bitumen extraction: in-situ and open-pit mining
Figure 5.6 Extraction of bitumen in the Canadian oil sands: in-situ vs. mining, 2005–2012
Figure 5.7 Forecast of Canadian oil sands production by in-situ extraction and open-pit mining to 2035
5.2.3 Water requirements for in-situ and mining processes
Figure 5.8 Water requirements of bitumen extraction methods
5.2.4 Water requirements of in-situ technologies
Figure 5.9 Water requirements of in-situ extraction methods
5.2.5 Bitumen upgrading
5.2.6 Market drivers
5.2.7 Regulations
5.2.7.1 Regulatory bodies
5.2.7.2 Relevant regulations
Figure 5.10 Regulations affecting water management in the Canadian oil sands industry
Water licence approval process for mining or in-situ projects
In-situ production water uptake, recycling and disposal
Mining water uptake and tailings management
5.2.8 Water treatment in SAGD operations
Figure 5.11 SAGD water treatment train: conventional and evaporative methods
Figure 5.12 Comparison of conventional and evaporative water treatment approaches
Figure 5.13 Production by technology in existing and planned SAGD projects
5.2.8.1 Other technology approaches in SAGD Process water treatment Blowdown management
5.2.8.2 Tailing ponds management
5.2.9 Procurement process
5.2.9.1 Characteristics
Procurement process stages
Recent trends in procurement
Figure 5.14 Procurement process for oil sands projects
5.2.9.2 Entering the market
Key factors to consider
5.2.10 Supply chain analysis
5.2.10.1 E&P companies
Figure 5.15 Major E&P companies in the Canadian oil sands industry
5.2.10.2 Engineering firms
Figure 5.16 The main engineering firms active in the Canadian oil sands industry
5.2.10.3 Water technology providers Overview
Figure 5.17 The main water technology providers by type of equipment
Focus on evaporation technology
5.2.11 Market forecast: Canada Figure
5.18 Produced water volumes in steam EOR for heavy oil production, 2011–2020
Figure 5.19 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020
5.3 Colombia
5.3.1 Market drivers
5.3.2 Water treatment technologies
5.3.3 Enhanced oil recovery (EOR)
5.3.4 Accessing the market
5.3.5 Procurement
5.3.6 Produced water reuse: initiatives in the Rubiales and Castilla oilfields
5.3.6.1 Desalination plants at the Rubiales oilfield
5.3.6.2 Conventional treatment in the Castilla oilfield
5.3.7 Unconventional plays
5.3.8 Market forecast: Colombia
Figure 5.20 Produced water volumes in steam EOR for heavy oil production, 2011–2020
Figure 5.21 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020
5.4 Oman Figure
5.22 Current and future steam EOR projects in Oman
5.4.1 Market forecast: Oman
Figure 5.23 Produced water volumes in steam EOR for heavy oil production, 2011–2020
Figure 5.24 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.5 Kuwait

5.5.1 Market forecast: Kuwait

Figure 5.26 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.27 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.6 Venezuela

Figure 5.28 Total oil reserves in Venezuela, 2012

5.6.1 Orinoco Oil Belt (FPO)

5.6.2 Recovery methods for heavy oil in Venezuela

5.6.3 International participation in heavy oil E&P

5.6.4 Market forecast: Venezuela

Figure 5.29 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.30 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.7 United States

5.7.1 Market overview

Figure 5.31 Heavy oil production from steam EOR in the US, 1990–2020

5.7.2 Regional overview

5.7.2.1 California

Figure 5.32 Heavy oil production in the four main Californian oil fields, 1977–2012

Figure 5.33 Water to oil ratio for years following initial steam flood

Figure 5.34 Produced water disposal methods in fields using steam EOR in California, 2005–2013

5.7.3 Market forecast: United States

Figure 5.35 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.36 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.8 Global forecast

Figure 5.37 Steam EOR in heavy oil: Global produced water volumes, 2011–2020

Figure 5.38 Steam EOR in heavy oil: Produced water capital expenditure by region, 2011–2020

Figure 5.39 Steam EOR in heavy oil: Produced water capital expenditure by system, 2011–2020

5.9 Regional forecast

5.9.1 North America

Figure 5.40 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.41 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.9.2 Latin America-Caribbean

Figure 5.42 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.43 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.9.3 Western Europe

Figure 5.44 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.45 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.9.4 East Asia-Pacific

Figure 5.46 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.47 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

5.9.5 Middle East-North Africa

Figure 5.48 Produced water volumes in steam EOR for heavy oil production, 2011–2020

Figure 5.49 Capital expenditure on produced water treatment in steam EOR for heavy oil, 2011–2020

6. Conventional production

6.1 Water requirements for enhanced oil recovery (EOR)

Figure 6.1 Breakdown by country of global onshore enhanced oil production using EOR methods

Figure 6.2 Breakdown of global onshore enhanced oil production by EOR method used

Figure 6.3 Forecast of oil production by EOR from different countries in 2015 and 2030

6.2 The Middle East

6.2.1 Market overview

6.2.2 Market drivers

6.2.3 Produced water management and use

Figure 6.4 Estimated breakdown of management options for reinjection in the Middle East

6.2.4 Treatment trains

6.2.5 Procurement

6.2.5.1 Greenfield projects

6.2.5.2 Brownfield projects

6.2.5.3 Challenges and issues in the procurement process

6.2.6 Entering the market

6.2.7 Market players

6.2.7.1 E&P companies
6.2.7.2 EPC companies
Figure 6.5  Selected EPC companies active in the Middle East
6.2.7.3 Engineering consultants
Figure 6.6  Selected engineering companies active in the Middle East
6.2.7.4 Oilfield service companies
Figure 6.7  Selected oil service companies active in the Middle East
6.2.7.5 Water technology providers
Figure 6.8  Selected water technology companies active in the Middle East

6.2.8 Iraq
6.2.8.1 Oil and gas reserves and production
Figure 6.9  Proven oil and dry natural gas reserves in Iraq, 1980–2013
Figure 6.10  Map showing the main oil and gas fields in Iraq
Figure 6.11  Oil and dry natural gas production in Iraq, 1980–2012
6.2.8.2 Challenges in oil and gas industry development
6.2.8.3 Unconventional resources
6.2.8.4 Produced water management and use
6.2.8.5 Oil recovery methods
6.2.8.6 Treatment trains
6.2.8.7 Produced water market
6.2.9 Market forecast: Iraq
Figure 6.12  Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.13  Capital expenditure on produced water treatment for conventional production, 2011–2020

6.2.10 Kuwait
6.2.10.1 Oil and gas reserves and production
Figure 6.14  Proven oil and natural gas reserves in Kuwait, 1980–2013
Figure 6.15  Map showing the main oil fields in Kuwait
Figure 6.16  Oil and dry natural gas production in Kuwait, 1980–2012
6.2.10.2 Unconventional resources
6.2.10.3 Produced water management and use
6.2.10.4 Enhanced oil recovery methods
Figure 6.17  Current and future oil recovery projects in Kuwait
6.2.10.5 Treatment trains
6.2.10.6 Produced water market
6.2.11 Oman
6.2.11.1 Oil and gas reserves and production
Figure 6.18  Proven oil and natural gas reserves in Oman, 1980–2013
Figure 6.19  Oil and dry natural gas production in Oman, 1980–2012
6.2.11.2 Unconventional resources
6.2.11.3 Produced water
6.2.11.4 Produced water management and use
6.2.11.5 Enhanced oil recovery methods
Figure 6.20  PDO’s oil recovery methods
Figure 6.21  Current and future EOR projects in Oman
6.2.11.6 Treatment trains
6.2.12 Market forecast: Oman
Figure 6.22  Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.23  Capital expenditure on produced water treatment for conventional production, 2011–2020

6.2.13 Saudi Arabia
6.2.13.1 Oil and gas reserves and production
Figure 6.24  Major onshore oil fields in Saudi Arabia
Figure 6.25  Map of major oil fields and reservoirs in Saudi Arabia
Figure 6.26  Proven oil and dry natural gas reserves in Saudi Arabia, 1980–2013
Figure 6.27  Oil and dry natural gas production in Saudi Arabia, 1980–2012
6.2.13.2 Unconventional resources
6.2.13.3 Produced water management and use
6.2.13.4 Oil recovery methods
6.2.13.5 Treatment trains
6.2.13.6 Produced water market
6.2.14 Market forecast: Saudi Arabia
Figure 6.28  Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.29  Capital expenditure on produced water treatment for conventional production, 2011–2020

6.3 The United States
6.3.1 Market overview
6.3.2 Conventional oil production
Figure 6.30 US conventional oil production, 2000–2020
6.3.2.1 Regional overview
6.3.3 Conventional gas production
Figure 6.31 US conventional gas production, 2000–2020
6.3.3.1 Regional overview
Figure 6.32 Leading US states for conventional gas production 2007–2011
6.3.4 Market forecast: United States
Figure 6.33 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.34 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.4 The Russian Federation
6.4.1 Major players
6.4.2 Improved and enhanced oil recovery
6.4.3 Produced water treatment
6.4.4 Market forecast: Russian Federation
Figure 6.35 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.36 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.5 Global forecast
Figure 6.37 Conventional oil and gas: Global produced water volumes, 2011–2020
Figure 6.38 Conventional oil and gas: Produced water capital expenditure by region, 2011–2020
Figure 6.39 Conventional oil and gas: Produced water capital expenditure by system, 2011–2020
6.6 Regional forecast
6.6.1 North America
Figure 6.40 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.41 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.2 Latin America-Caribbean
Figure 6.42 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.43 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.3 Western Europe
Figure 6.44 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.45 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.4 Eastern Europe-Central Asia
Figure 6.46 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.47 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.5 East Asia-Pacific
Figure 6.48 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.49 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.6 Southern Asia
Figure 6.50 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.51 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.7 Middle East-North Africa
Figure 6.52 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.53 Capital expenditure on produced water treatment for conventional production, 2011–2020
6.6.8 Sub-Saharan Africa
Figure 6.54 Produced water volumes in conventional oil and gas production, 2011–2020
Figure 6.55 Capital expenditure on produced water treatment for conventional production, 2011–2020
Interviewees
References

Ordering:
Order Online - http://www.researchandmarkets.com/reports/3162222/
Order by Fax - using the form below
Order by Post - print the order form below and send to
Research and Markets,
Guinness Centre,
Taylors Lane,
Dublin 8,
Ireland.
Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit http://www.researchandmarkets.com/contact/

Order Information
Please verify that the product information is correct and select the format(s) you require.

Product Name: Water for Onshore Oil & Gas: Opportunities in produced water management, hydraulic fracturing and enhanced oil recovery
Web Address: http://www.researchandmarkets.com/reports/3162222/
Office Code: SCBRZUNS

Product Formats
Please select the product formats and quantity you require:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic (PDF) -</td>
<td></td>
</tr>
<tr>
<td>Single User:</td>
<td>USD 3026</td>
</tr>
<tr>
<td>Electronic (PDF) -</td>
<td></td>
</tr>
<tr>
<td>Enterprisewide:</td>
<td>USD 12105</td>
</tr>
</tbody>
</table>

Contact Information
Please enter all the information below in BLOCK CAPITALS

Title: 
Mr [ ] Mrs [ ] Dr [ ] Miss [ ] Ms [ ] Prof [ ]

First Name: __________________________ Last Name: __________________________
Email Address: * __________________________
Job Title: __________________________
Organisation: __________________________
Address: __________________________
City: __________________________
Postal / Zip Code: __________________________
Country: __________________________
Phone Number: __________________________
Fax Number: __________________________

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:
Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:

<table>
<thead>
<tr>
<th>Account number</th>
<th>833 130 83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sort code</td>
<td>98-53-30</td>
</tr>
<tr>
<td>Swift code</td>
<td>ULSBIE2D</td>
</tr>
<tr>
<td>IBAN number</td>
<td>IE78ULSB98533083313083</td>
</tr>
<tr>
<td>Bank Address</td>
<td>Ulster Bank, 27-35 Main Street, Blackrock, Co. Dublin, Ireland</td>
</tr>
</tbody>
</table>

If you have a Marketing Code please enter it below:

Marketing Code: ____________________________

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp

Please fax this form to:

(646) 607-1907 or (646) 964-6609 - From USA
+353-1-481-1716 or +353-1-653-1571 - From Rest of World