

Assumptions to the Annual Energy Outlook 2007

Table 50. Crude Oil Technically Recoverable Resources
 (Billion barrels)

Crude Oil Resource Category	As of January 1, 2005
Undiscovered	51.62
Onshore	20.58
Northeast	1.17
Gulf Coast	5.23
Midcontinent	1.12
Southwest	2.97
Rocky Moutain	7.78
West Coast	2.32
Offshore	31.04
Deep (>200 meters Water Depth)	28.81
Shallow (0-200 meters Water Depth)	2.23
Inferred Reserves	63.91
Onshore	52.22
Northeast	1.05
Gulf Coast	5.20
Midcontinent	7.12
Southwest	17.90
Rocky Mountain	12.14
West Coast	8.80
Offshore	11.69
Deep (>200 meters Water Depth)	6.88
Shallow (0-200 meters Water Depth)	4.81
Total Lower 48 States Unproved	115.53
Alaska	30.70
Total U.S. Unproved	146.23
Proved Reserves	22.59
Total Crude Oil	168.82

Note: Resources in areas where drilling is officially prohibited are not included in this table. The Alaska value is not explicitly utilized in the OGSM, but is included here to complete the table. The Alaska value does not include resources from the Arctic Offshore Outer Continental shelf.

Source: Conventional Onshore, State Offshore, and Alaska - U.S. Geological Survey (USGS); Federal (Outer Continental Shelf) Offshore - Minerals Management Service (MMS); Proved Reserves - EIA, Office of Oil and Gas. Table values reflect removal of intervening reserve additions between the date of the latest available assessment and January 1, 2005.

Table 51. Natural Gas Technically Recoverable Resources
(trillion cubic feet)

Natural Gas Resource Category	As of January 1, 2005
Lower 48 Nonassociated Conventional Gas	509.27
Undiscovered	283.36
<i>Onshore</i>	119.06
Northeast	4.72
Gulf Coast	67.63
Midcontinent	14.39
Southwest	11.30
Rocky Mountain	14.68
West Coast	6.35
<i>Offshore</i>	164.30
Deep (>200 meters water depth)	106.30
Shallow (0-200 meters water depth)	58.00
Inferred Reserves	225.90
<i>Onshore</i>	175.85
Northeast	0.96
Gulf Coast	82.72
Midcontinent	59.08
Southwest	16.62
Rocky Mountain	15.74
West Coast	0.74
<i>Offshore</i>	50.05
Deep (>200 meters water depth)	5.95
Shallow (0-200 (meters water depth)	44.10
Unconventional Gas Recovery	477.52
• Tight Gas	277.73
Northeast	54.94
Gulf Coast	54.18
Midcontinent	10.82
Southwest	7.84
Rocky Mountain	149.47
West Coast	0.48
• Shale	125.81
Northeast	28.23
Gulf Coast	0.00
Midcontinent	44.45
Southwest	39.02
Rocky Mountain	14.11
West Coast	0.00
• Coalbed	73.99
Northeast	8.12
Gulf Coast	4.84
Midcontinent	5.62
Southwest	0.00
Rocky Mountain	55.41
West Coast	0.00
Associated-Dissolved Gas	130.84
Total Lower 48 Unproved	1117.62
Alaska	30.83
Total U.S. Unproved	1148.45
Proved Reserves	192.51
Total Natural Gas	1340.97

Sources and Notes for this table are listed in the 'Notes and Sources' section at the end of chapter.

Table 52. Assumed Size and Initial Production Year of Major Announced Deepwater Discoveries

Field/Project Name	Block	Water Depth (feet)	Year of Discovery	Field Size Class	Field Size (MMBOE)	Start Year of Production
Atlantis	GC699	6130	1998	15	691	2007
Atlas	LL050	8934	2003	11	45	2007
Cheyenne	LL399	8974	2004	11	45	2007
Cottonwood	GB244	2130	2001	11	45	2007
Crested Butte	GC242	2846	2004	11	45	2007
Jubilee	AT349	8776	2003	12	89	2007
MC837	MC837	1524	2000	11	45	2007
Merganser	AT037	8015	2001	11	45	2007
Neptune	AT575	6220	1995	13	182	2007
Puma	GC823	4129	2003	14	372	2007
Q	MC961	7926	2005	12	89	2007
San Jacinto	DC618	7814	2004	12	89	2007
Silvertip	AC815	9226	2004	11	45	2007
South Dachshund/Mondo	LL001	8351	2004	12	89	2007
Spiderman/Amazon	DC621	8082	2003	14	372	2007
Vortex	AT261	8344	2002	12	89	2007
Anduin	MC755	2400	2005	9	12	2008
Blind Faith	MC696	6989	2001	14	372	2008
Chinook	WR469	8831	2003	14	372	2008
Great White	AC857	8717	2002	15	691	2008
Jubilee Extension	LL309	8774	2005	11	45	2008
Knotty Head	GC512	3557	2005	15	691	2008
Shenzi	GC653	4238	2002	14	372	2008
Slammer	MC849	3598	2002	13	182	2008
St. Malo	WR678	7036	2003	14	372	2008
Stones	WR508	9556	2005	12	89	2008
Sturgis	AT182	3710	2003	12	89	2008
Tahiti	GC640	4292	2002	15	691	2008
Thunder Hawk	MC734	5724	2004	13	182	2008
Thunder Horse	MC778	5993	1999	17	2954	2008
Tobago	AC859	9493	2004	11	45	2008
Trident	AC903	9743	2001	13	182	2008
Atlas NW	LL005	8807	2004	11	45	2009
Baccarat	GC178	1404	2004	11	45	2009
Cascade	WR260	8143	2002	14	372	2009
EB197	EB197	1249	2004	11	45	2009
Entrada	GB782	4690	2000	14	372	2009
Goose	MC751	1624	2002	12	89	2009
Gretchen	GC114	2506	1999	9	12	2009
Sw Horseshoe	EB430	2285	2000	8	6	2009
Telemark	AT063	4457	2000	12	89	2009
Hack Wilson	EB598	3650	2001	12	89	2010
Hawkes	MC509	4082	2001	11	45	2010

Table 52. Assumed Size and Initial Production Year of Major Announced Deepwater Discoveries (cont.)

Field/Project Name	Block	Water Depth (feet)	Year of Discovery	Field Size Class	Field Size (MMBOE)	Start Year of Production
Hornet	GC379	3878	2001	13	182	2010
Shiner Deep	GB700	4542	2003	11	45	2010
Tubular Bells	MC725	4334	2003	12	89	2010
Daniel Boone	GC646	4230	2004	11	45	2011
EB599	EB599	1250	2006	12	89	2011
GC767	GC767	5116	2004	11	45	2011
Longhorn	MC546	2460	2006	15	691	2011
MC161	MC161	2924	2005	11	45	2011
Thunder Horse North	MC776	5660	2000	16	1419	2011
Jack	WR759	6963	2004	17	2954	2012
Pony	GC468	3497	2006	13	182	2012
Raton	MC248	3400	2006	11	45	2012
Redrock	MC204	3334	2006	11	45	2012
Harrier	EB759	4114	2003	11	45	2013
Thunder Bird	MC819	5673	2006	11	45	2013
Casear	GC683	4457	2006	13	182	2014
Clipper	GC299	3452	2005	11	45	2014
Daredevil	LL095	9112	2005	11	45	2014
Great White West	AC856	7600	2006	11	45	2014
Kaskida	KC292	5860	2006	15	691	2014
Norman	GB434	5000	2006	15	691	2014
Claymore	AT140	3725	2006	11	45	2014
Egmont	MC413	2500	2006	13	182	2015
Grand Cayman	GB517	5000	2006	13	182	2015

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting. The discovery year, initial production year, and field sizes are based on industry announcements and MMS estimates.

Table 53. Assumed Annual Rates of Technological Progress for Conventional Crude Oil and Natural Gas Sources
(percent/year)

Category	Slow	Reference	Rapid
Lower 48 Onshore			
Costs			
Drilling	0.45	0.89	1.34
Lease Equipment	0.29	0.58	0.87
Operating	0.19	0.38	0.57
Finding Rates			
New Field Discoveries	0.00	0.00	0.00
Known Fields	0.50	1.00	2.00
Success Rates			
Exploratory	0.25	0.50	0.75
Developmental	0.25	0.50	0.75
Lower 48 Offshore			
Exploration success rates	0.50	1.00	1.50
Delay to commence first exploration and between exploration (years)	0.25	0.50	1.00
Exploration and Development drilling costs	0.50	1.00	1.50
Operating costs	0.50	1.00	1.50
Time to construct production facility (years)	0.25	0.50	1.00
Production facility construction costs	0.50	1.00	1.50
Initial constant production rate	0.25	0.50	1.00
Production Decline rate	0.00	0.00	0.00
Alaska			
Costs			
Drilling	0.50	1.00	1.50
Lease Equipment	0.50	1.00	1.50
Operating	0.50	1.00	1.50
Finding Rates	1.50	3.00	4.50

Source: The values shown in this table are developed by the Energy Information Administration, Office of Integrated Analysis and Forecasting from econometric analysis for onshore costs and discussions with various industry and government sources for offshore and Alaska costs. Onshore drilling cost data are based on the American Petroleum Institute's *Joint Association Survey on Drilling Costs*. Onshore lease equipment and operating costs are based on the Energy Information Administration's *Costs and Indices for Domestic Oil & Gas Field Equipment and Production Operations*.

Table 54. Technology Types and Impacts

Technology Group	Technology Type	Impact
1	Basin assessments	Increase the available resource base by a) accelerating the time that hypothetical plays in currently unassessed areas become available for development and b) increasing the play probability for hypothetical plays – that portion of a given area that is likely to be productive.
2	Play specific, extended reservoir characterizations	Increase the pace of new development by accelerating the pace of development of emerging plays, where projects are assumed to require extra years for full development compared to plays currently under development.
3	Advanced well performance diagnostics and remediation	Expand the resource base by increasing reserve growth for already existing reserves.
4	Advanced exploration and natural fracture detection R&D	Increases the success of development by a) improving exploration/development drilling success rates for all plays and b) improving the ability to find the best prospects and areas.
5	Geology technology modeling and matching	Matches the “best available technology” to a given play with the result that the expected ultimate recovery (EUR) per well is increased.
6	More effective, lower damage well completion and stimulation technology	Improves fracture length and conductivity, resulting in increased EUR's per well.
7	Targeted drilling and hydraulic fracturing R&D	Results in more efficient drilling and stimulation which lowers well drilling and stimulation costs.
8	New practices and technology for gas and water treatment	Result in more efficient gas separation and water disposal which lowers water and gas treatment operation and maintenance costs.
9	Advanced well completion technologies, such as cavitation, horizontal drilling, and multi-lateral wells:	Defines applicable plays, thereby accelerating the date such technologies are available and introduces and improved version of the particular technology, which increases EUR per well.
10	Other unconventional gas technologies, such as enhanced coalbed methane and enhanced gas shales recovery	Introduce dramatically new recovery methods that a) increase EUR per well and b) become available at dates accelerated by increase R&D, with c) increased operation and maintenance costs (in the case of coalbed methane) for the incremental gas produced.
11	Mitigation of environmental constraints	Removes development constraints in environmentally sensitive basins, resulting in an increase in basin areas available for development.

Source: Advanced Resources International.

Table 55. Assumed Rates of Technological Progress for Unconventional Gas Recovery

Technology Group	Item	Type of Deposit	Technology Case		
			Slow	Reference	Rapid
1	Year Hypothetical Plays Become Available	All Types-Non DOE All Types-DOE	NA NA	NA 2016	NA 2009
2	Decrease in Extended Portion of Development Schedule for Emerging Plays (per year)	Coalbed Methane and Tight Sands - Non DOE Gas Shales-Non DOE All Types - DOE	0.83% 1.25% 1.25%	1.67% 2.50% 2.50%	2.50% 3.75% 3.75%
3	Expansion of Existing Reserves (per year -declining 0.1% per year; eg., 3.0, 2.0...)	Tight Sands Coalbed Methane & Gas Shales	1.0% 2.0%	2.0% 4.0%	3.0% 6.0%
4	Increase in Percentage of Wells Drilled Successfully (per year) Year that Best 30 Percent of Basin is Fully Identified	All Types All Types	0.1% 2100	0.2% 2044	0.3% 2031
5	Increase in EUR per Well (per year)	All Types	0.13%	0.25%	0.38%
6	Increase in EUR per Well (per year)	All Types	0.13%	0.25%	0.38%
7	Decrease in Drilling and Stimulation Costs per Well (per year)	All Types	NA	NA	NA
8	Decrease in Water and Gas Treatment O&M Costs per Well (per year)	All Types	NA	NA	NA
9	Year Advanced Well Completion Technologies Become Available	Coalbed Methane Tight Sands & Gas Shales	NA NA	NA 2016	NA 2009
	Increase in EUR per well (total increase)	Coalbed Methane Tight Sands Gas Shales	NA NA NA	NA 10% 20%	NA 15% 30%
10	Year Advanced Recovery Technologies Become Available	Coalbed Methane & Tight Sands Gas Shales	NA NA	NA NA	2023 NA
	Increase in EUR per well (total increase)	Coalbed Methane Tight Sands Gas Shales	NA NA NA	NA NA NA	45% 15% NA
	Increase in Costs (\$1996/Mcf) for Incremental CBM production	Coalbed Methane Tight Sands Gas Shales	NA NA NA	NA NA NA	1.75 0.75 NA
11	Proportion of Areas Current Restricted that become Available for Development (per year)	All Types - Non DOE All Types - DOE	0.5% 0.25%	1.0% 0.5%	1.5% 0.75%

EUR = Estimated Ultimate Recovery.

O&M = Operation & Maintenance.

CBM = Coalbed Methane.

NA = Not applicable.

DOE = Those plays in the Rocky Mountain basins assessed as part of Department of Energy sponsored basin studies.

Source: Reference Technology Case, Advanced Resources, International; Slow and Rapid Technology Cases, Energy Information Administration, Office of Integrated Analysis and Forecasting.