

Assessment of Undiscovered Oil and Gas Resources of the Central Burma Basin and the Irrawaddy–Andaman and Indo-Burman Geologic Provinces, Myanmar

The Irrawaddy–Andaman and Indo-Burman Geologic Provinces were recently assessed for undiscovered technically recoverable oil, natural gas, and natural gas liquids resources as part of the U.S. Geological Survey’s (USGS) World Oil and Gas Assessment. Using a geology-based assessment methodology, the USGS estimated mean volumes of 2.3 billion barrels of oil, 79.6 trillion cubic feet of gas, and 2.1 billion barrels of natural gas liquids.

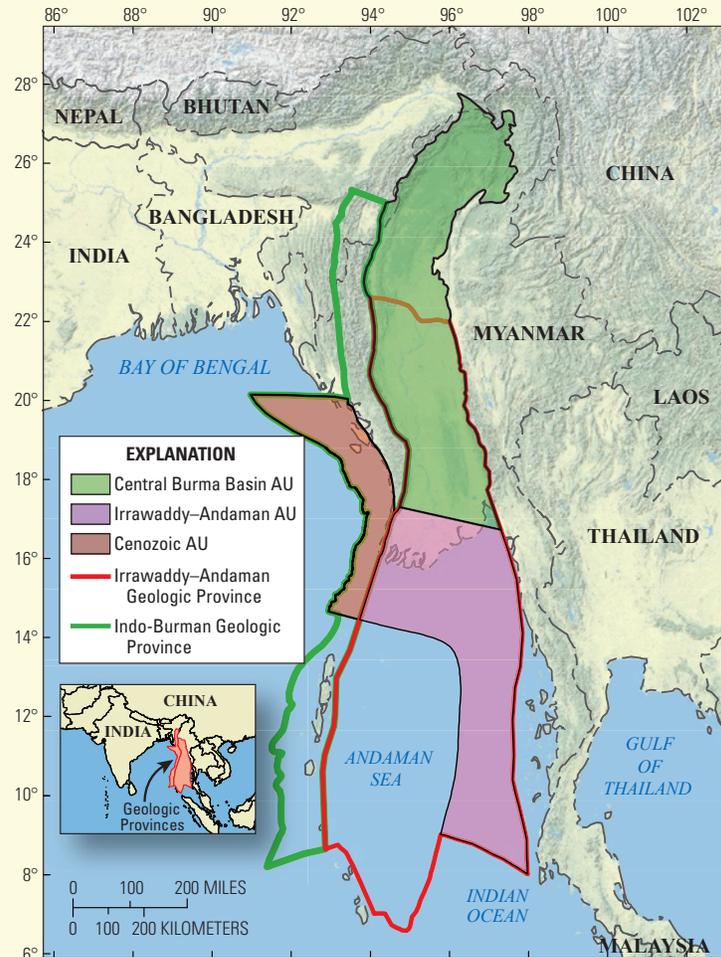


Figure 1. Assessed areas of Myanmar were defined as three composite assessment units (AU) (outlined in black). These are the Central Burma Basin AU (80480101), Irrawaddy–Andaman AU (80480102), and Cenozoic AU (80050101).

Introduction

The U.S. Geological Survey (USGS) World Petroleum Resources Project assesses the potential for undiscovered, technically recoverable oil and natural gas resources of the world, exclusive of the United States. As a part of this program, the USGS recently completed an assessment of the onshore and offshore areas of the Central Burma Basin and the Irrawaddy–Andaman and Indo-Burman Geologic Provinces (fig. 1). This assessment was based on data from oil and gas exploration and production wells, production data, and published geologic reports. Only conventional oil and gas resources were assessed.

Central Burma Basin Assessment Unit

The Central Burma Basin assessment unit (AU) encompasses an area of 242,000 km² in the Central Burma Basin and includes source, reservoir, and seal rocks predominately of Eocene to Miocene age, although Upper Cretaceous and Paleocene source rocks also may contribute to the AU. The basin is an Eocene back arc basin formed by oblique collision of oceanic and continental plates and filled with sediments of a restricted marine environment overlain by sediments of a southward-prograding delta and alluvial system. Compression and folding developed anticlines and faulted anticlines intermittently from Oligocene to present (U.S. Geological Survey

World Energy Assessment Team, 2000). Traps are primarily anticlines and stratigraphic traps including pinchouts. Eleven oil and nine gas fields greater than the minimum assessed size of 5 million barrels of oil equivalent (MMBOE) (grown or maximum expected recovery) have been discovered in the Central Burma Basin AU (IHS Energy, 2010).

Irrawaddy–Andaman Assessment Unit

The Irrawaddy–Andaman AU includes an area of 226,000 km² and includes source, reservoir, and seal rocks primarily of Eocene to Miocene age. It is the southward extension of the Central Burma Basin with a similar geologic setting and tectonic history; however, the effects of compression caused by plate collision are less evident, whereas the oblique or strike-slip component becomes more dominant. The features distinguishing the Irrawaddy–Andaman AU from the Central Burma Basin AU are that the source and reservoir rocks were deposited in a predominately deltaic and marine environment, and source rocks are more gas prone. Source rock burial depths become greater to the south, and cracking of oil to gas because of greater depths of burial may contribute to this AU being more gas prone. Traps are primarily anticlines, alluvial channels, deltaic features, and carbonate reefs and pinnacles (Wandrey, 2006). Twenty-two gas fields greater than the minimum assessed size of 5 MMBOE (grown) have been discovered (IHS Energy, 2010).

Cenozoic Assessment Unit

The Cenozoic AU encompasses an area of 71,000 km² and includes source, reservoir, and seal rocks primarily of Eocene to Pliocene age. The AU includes the Rahkine Basin and occupies the eastern abyssal plain of the Bay of Bengal and part of the accretionary wedge created by oblique subduction of the Indian Plate beneath the Burmese Plate. Source rocks are postulated to be middle to late Eocene shales. Reservoirs are Oligocene–Miocene thick sheet sandstones and turbidites sourced by the Bengal fan, Miocene–Pliocene turbidites, and aggraded lower-slope channel sandstones sourced by the younger Rahkine–Yoma fan. Three gas fields greater than the minimum assessed size of 5 MMBOE (grown) have been discovered (IHS Energy, 2010).

Table 1. Myanmar assessment results for undiscovered oil and gas resources of the Central Burma Basin and the Irrawaddy–Andaman and Indo-Burman Geologic Provinces, Myanmar.

[MMBO, million barrels of oil; BCFG, billion cubic feet of gas; MMBNGL, million barrels of natural gas liquids. Results shown are fully risked estimates. For gas fields, all liquids are included under the NGL (natural gas liquids) category. Undiscovered gas resources are the sum of nonassociated and associated gas. F95 represents a 95-percent chance of at least the amount tabulated. Other fractiles are defined similarly. Fractiles are additive under the assumption is in MMBO; largest expected gas field is in BCFG. TPS, total petroleum system; AU, assessment unit. Gray shading indicates not applicable]

Total petroleum systems (TPS) and assessment units (AU)	Field type	Largest expected mean field size	Total undiscovered resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Central Burma Basin AU	Oil	84	1,049	1,732	2,822	1,808	2,501	4,157	6,804	4,340	67	112	185	117
	Gas	411					4,786	7,988	13,072	8,332	126	213	349	222
Irrawaddy–Andaman Geologic Province, Eocene to Miocene TPS														
Irrawaddy–Andaman AU	Oil	44	198	372	680	397	256	568	1,156	619	7	15	32	17
	Gas	2,201					17,693	33,163	60,715	35,309	470	884	1,624	941
Indo-Burman Geologic Province, Eocene to Pliocene TPS														
Cenozoic AU	Oil	31	40	88	175	95	37	122	348	148	1	3	10	4
	Gas	6,351					12,008	28,366	58,386	30,862	316	753	1,579	823
Total conventional resources			1,287	2,192	3,677	2,300	37,281	74,364	140,481	79,610	987	1,980	3,779	2,124

Resource Summary

The USGS geology-based assessment of the undiscovered technically recoverable oil, natural gas, and natural gas liquids resources in the Central Burma Basin and the Irrawaddy–Andaman and Indo-Burman Geologic Provinces resulted in estimated undiscovered mean volumes of 2.3 billion barrels of oil, 79.6 trillion cubic feet of gas, and 2.1 billion barrels of natural gas liquids.

References Cited

- IHS Energy, 2010, International petroleum exploration and production database [current through December 2010]: Available from IHS Energy, 15 Inverness Way East, Englewood, CO 80112.
- U.S. Geological Survey World Energy Assessment Team, 2000, U.S. Geological Survey World Petroleum Assessment 2000—Description and results: U.S. Geological Survey Digital Data Series DDS-60, 4 CD ROMS.
- Wandrey, C.J., 2006, Eocene to Miocene composite total petroleum system, Irrawaddy–Andaman and North Burma Geologic Provinces, Myanmar, chap. E in Wandrey, C.J., ed., Petroleum systems and related geologic studies in Region 8, South Asia: U.S. Geological Survey Bulletin 2208-E, 26 p.

For Additional Information

Assessment results are available at the USGS Central Energy Resources Science Center website: <http://energy.cr.usgs.gov/oilgas/> or contact Craig J. Wandrey, the assessing geologist (cwandrey@usgs.gov).

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