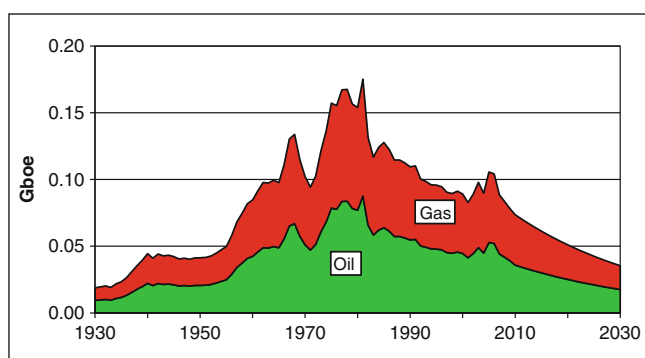
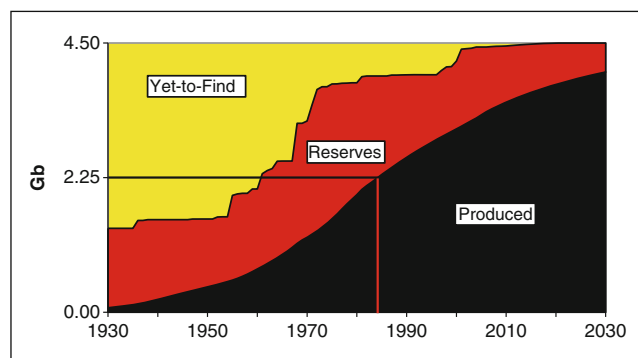


**Table 56.1** Trinidad regional totals (data through 2010)

	Production to 2100					Peak Dates			Area	
	Amount		Rate			Oil		Gas	'000 km <sup>2</sup>	
	Gb	Tcf	Date	Mb/a	Gcf/a	Discovery	1959	1968	Onshore	Offshore
PAST	3.5	22	2000	45	577	Production	1981	2010	5	12.5
FUTURE	1.0	28	2005	53	1175	Exploration	1972		Population	
Known	0.9	24	2010	36	1576	Consumption	Mb/a	Gcf/a	1900	0.3
Yet-to-Find	0.1	4.2	2020	25	1358	2010	15	780	2010	1.3
DISCOVERED	4.45	46	2030	18	502		b/a	kcf/a	Growth	4.0
TOTAL	4.5	50	Trade	+21	+796	Per capita	11.5	600	Density	254

**Fig. 56.1** Trinidad oil and gas production 1930 to 2030**Fig. 54.2** Trinidad status of oil depletion

## Essential Features

Trinidad is one of the two islands making up the Republic of Trinidad and Tobago, off the east coast of Venezuela. It covers an area of 5,000 km<sup>2</sup> and is cut by the Northern and the Central Ranges, rising to respectively 900 and 300 m, while in the south are a series of low hills, termed the Southern Ranges. The intervening lowlands are partly swampy, giving the Caroni and Ortoire Swamps. The natural vegetation is tropical rain forest, but most of the lowlands are under cultivation, with sugarcane being a substantial cash crop. The island supports a population of one million people, which has increased by a factor of four over the last century, making it a crowded place with a density of 252/km<sup>2</sup>.

The bulk of the population is of African and Indian origin, being the descendants of slaves and indentured labour brought in to work the sugar estates after the abolition of slavery. The remaining 20% are of mixed Spanish, French, Portuguese, English, Chinese and Amer-Indian descent.

## Geology and Prime Petroleum Systems

In geological terms, Trinidad forms an extension of the oil-rich East Venezuelan Basin, being in turn flanked by a continental shelf that extends southwards along the margin of South America. The Northern Range is a direct extension of the Andean Coast Range of Venezuela, being composed of low-grade Cretaceous and Jurassic metamorphic rocks.

To the north of it lie structures associated with the Antillean Island arc. A major transcurrent fault, known as the El Pilar Fault, marks the southern boundary of the Northern Range, before extending offshore into the Atlantic. Another wrench fault, the Los Bajos Fault, cuts obliquely across the southern part of the island, being partly responsible for oil accumulations.

The main oil-bearing region lies to the south of the Central Range including offshore extensions both eastward into the Atlantic and westward into the Gulf of Paria, which separates Trinidad from Venezuela. The principal source-rock in the Caribbean region was a deposit of organic-rich clay laid down under conditions of global warming about 90 million years ago in the mid-Cretaceous. It crops out in parts of the Central Range of Trinidad, and is probably an important source of oil in the basin to the south. In addition are other sources for both oil and gas in the thick sequence of Tertiary sediments that overlie it, especially in the Atlantic offshore, which constitutes the palaeo-delta of the Orinoco River. The depth of the source-rock helps determine whether the fields yield oil or gas.

The geology of the southern basin is exceedingly complex. The Tertiary sequence is made up of a great thickness of deformed, monotonous clays, with intervening and overlying sands, some being of turbiditic origin. It was also affected by slumping as rafts of sediment slipped into the subsiding basins. Another somewhat unusual feature are mud-volcanoes, forming mounds of mud brought to the surface by gas seepages that occasionally catch fire. The famous Pitch Lake is a huge natural seepage of degraded oil.

---

## Exploration and Discovery

Trinidad has had a long oil history, starting in 1866 when two shallow boreholes were drilled, followed by efforts to distil tar from the Pitch Lake. The first truly commercial well was drilled in 1907 which was followed by the discovery of the Forest Reserve Field in 1914, with some 320 Mb. That prompted a more intensive search by several British companies, which was rewarded with a number of small to modest finds. Shell, BP and Trinidad Leaseholds, itself being sold to Texaco in 1956, became the dominant onshore operators. The latter ran a major refinery at Pointe-a-Pierre, which, for a period, refined Middle East, in addition to local, oil for export to the United States and European markets. The refinery was in fact important for the United Kingdom during Second World War, supplying much of the high-octane aviation fuel for the Air Force.

A second cycle of exploration opened offshore in the 1950s leading to the discovery in 1956 of the giant Soldado Field with 600 Mb in the shallow, calm waters of the Gulf of Paria, off the delta of the Orinoco River. It was in turn

followed by a third cycle in 1961 when Amoco (now BP) secured rights to the offshore Columbus Basin in the Atlantic, bringing in a series of major oil and gas finds, starting in 1967. A somewhat surprise fourth cycle may be opening with the discovery of about 2.4 Tcf of gas-condensate in an entirely new province to the northwest of the island near the Venezuelan median line. It remains to be seen if any deepwater potential will be identified after the failure of the six deepwater boreholes drilled so far. A State company, Petrotrin, has taken an active role in exploration and refining in recent years, and British Gas and BHP are relative late-comers with a strong position in gas.

A total of 363 exploration boreholes have been drilled making it a very mature area.

---

## Production and Consumption

Onshore oil production commenced in 1909 and grew steadily to an early peak in 1968 at 145 kb/d, since when it has declined to about 20 kb/d. The production of offshore resources commenced in 1955 to peak in 1977 before declining. Overall production peaked in 1981 at 240 kb/d, since when it has declined to 98 kb/d and is set to continue to decline at about 3.5% a year.

Gas production also started early in parallel with oil, but surged upwards with the opening of the offshore, especially after 2000 to reach its present level of 1.5 Tcf/a, which will likely now stabilize at the present pipeline capacity. Oil and gas consumption stand at respectively 15 Mb/a and 780 Gcf/a making the country an exporter, especially of gas, with as much as 796 Gcf/a being sold, especially to the United States. Trinidad operates important NGL plants producing as much as 43 kb/d. Plans for a gas pipeline to Miami, supplying the other West Indian islands along the way, have been under consideration. Present levels of gas production can probably be held until around 2020 before terminal decline sets in.

---

## The Oil Age in Perspective

Christopher Columbus made landfall on Trinidad on his Third Voyage in 1498, giving it its name after three prominent hills in the southeast corner of the island, which was at the time inhabited by a small number of Arawak Indians. It was later visited, in 1559, by Sir Walter Raleigh who came upon the Pitch Lake oil seepage, from which he caulked his ships. It became a Spanish territory for 300 years until the French took it in 1781, to be in turn defeated by a British naval expedition in 1797.

It remained a British colony until 1956 when a degree of autonomy was imposed prior to full independence in 1962. This brought an element of racial conflict, culminating in a

failed coup by Muslim Fundamentalists in 1990. Renewed security fears were expressed in December 2002 stimulated by the Afghan and Iraq wars. The two main political parties are the People's National Movement—representing primarily those of African origins—and the United National Congress, representing those of Indian origins. Soaring oil and gas prices have brought great wealth to the country,

meaning that the decline of oil in the years ahead will be severely felt. Even so, it appears fairly well placed to face at least the initial years of the Second Half of the Oil Age, having ample remaining oil and gas for domestic use, but in due course will have to revert to sustainable agriculture facing population pressures which are likely to stimulate ethnic tensions.

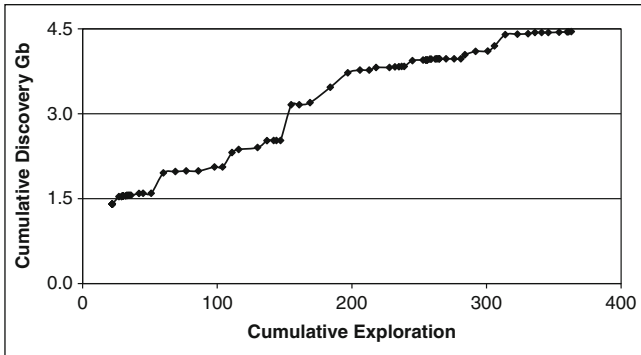


Fig. 56.3 Trinidad discovery trend

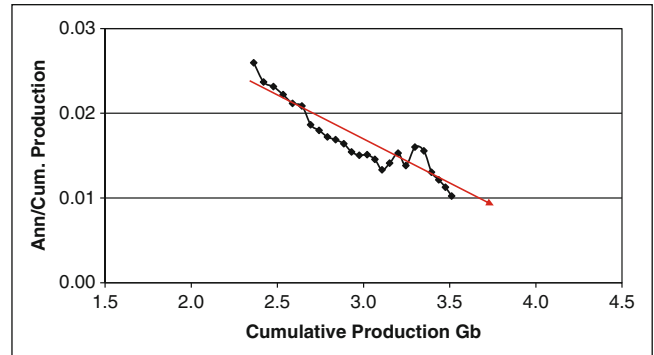


Fig. 56.4 Trinidad derivative logistic

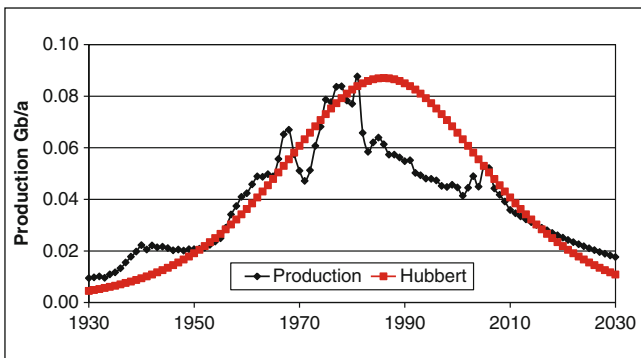


Fig. 56.5 Trinidad production: actual and theoretical

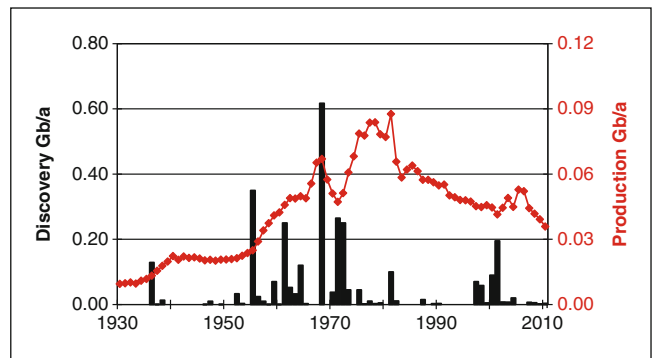


Fig. 56.6 Trinidad discovery and production