

Oil and natural gas extraction data

Richard Heede
 Climate Mitigation Services
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Petronas, Malaysia

yellow column indicates original reported units
SOE (wholly owned)

www.petronas.com.my Kuala Lumpur

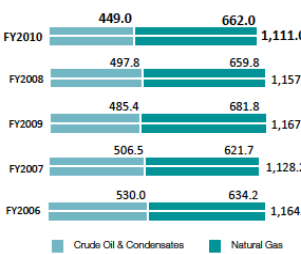
Production / Extraction data

Year	Crude Oil & NGL			Natural Gas			Background data	
	Net production	Net production	Net production	Net production	Net production	Net production		
	Thousand bbl/d	Million bbl/yr	Million tonnes/yr	Million cf/d	Million SCM/d	Billion cf/yr	Million tonnes/yr	Million tonnes/yr
		Petronas				Petronas		

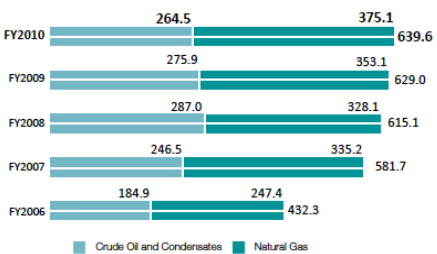
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PETRONAS' Share of Malaysia's Production
 In '000 boe per day



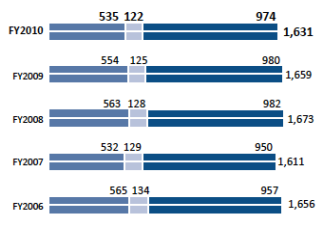
PETRONAS' International Oil and Gas Production
 In '000 boe per day



Petronas Annual Report 2010, page 36.

Petronas Annual Report 2010, page 38.

Malaysia's Average Production
 In '000 boe per day



Petronas Annual Report 2010, page 35.

Malaysia	
million bbl /yr	%
1.7	
1.5	
1.1	
0.9	
0.9	
0.4	
0.4	
0.3	
0.3	
1.6	
3.3	

Year	Malaysia		Petronas		%	Malaysia		Petronas		%
	thousand bbl /d	%	million bbl /yr	%		Billion cf/yr	%	Billion cf/yr	%	
1970	18	6.6								
1971	69	25.2								
1972	93	33.9								
1973	91	33.1								
1974	81	29.5								
1975	98	35.8	27	90%	Petronas establ. 1974	17.0	17	98%		
1976	165	60.4	32	90%		20.0	20	98%		
1977	184	67.0	55	90%		22.6	22	98%		
1978	217	79.2	61	90%	interpolated	31.0	30	98%		
1979	283	103.3	72	90%	interpolated	39.3	39	98%		
1980	283	103.3	93	90%	interpolated	47.7	47	98%		
1981	264	96.4	87	90%		56.0	55	98%		
1982	306	111.7	101	90%		62.0	61	98%		
1983	365	133.2	120	90%		55.8	55	98%		
1984	450	164.3	148	90%		148.0	146	98%		
1985	450	164.3	148	90%		325.0	320	98%		
1986	513	187.2	148	90%		437.0	430	98%		
1987	508	185.4	175	94%		528.0	520	98%		
1988	551	201.1	191	95%		551.0	568	98%		
1989	596	217.5	206	94%		580.9	591	98%		
1990	631	230.3	238	103%		606.0	526	98%		
1991	658	240.2	238	99%		654.0	570	98%		
1992	666	243.2	241	99%		747.0	585	98%		
1993	657	239.8	241	99%		796.4	735	98%		
1994	662	241.6	235	98%	average Petronas	880.4	732	98%		
1995	702	256.4	234	97%	of Malaysia	922.8	729	98%		
1996	715	261.0	253	99%	1987 to 2010	1,019.9	925	98%		
1997	750	273.8	236	90%	90.35%	1,230.0	1,482	98%		
1998	810	295.7	230	84%		1,356.1	1,760	98%		
1999	778	284.0	263	89%		1,370.2	847	98%		
2000	755	275.6	230	81%		1,422.1	1,825	98%		
2001	729	266.2	255	93%		1,599.8	1,438	98%		
2002	773	282.3	249	94%		1,686.6	1,608	98%		
2003	818	298.5	314	117%		1,705.7	1,823	98%		
2004	835	304.9	350	117%		1,836.4	1,893	98%		
2005	725	264.8	267	88%	Petronas NatGas	1,899.9	1,893	98%		
2006	715	255.1	269	101%	thousand BOE/d	1,967.0	1,952	98%		
2007	753	241.3	261	102%		1,972.7	1,931	98%		
2008	772	252.2	275	114%		957	2,096	98%		
2009	774	247.8	282	114%		1,010	2,212	98%		
2010	714	239.8	282	114%		1,013	2,218	98%		
			260	109%		1,037	2,271	98%		

Petronas, 1987-05	24,413	thousand bbl /d
Malaysia, 1987-05	24,805	
Petronas/Malay	98.4%	

OGJ100 1987-2005	529	thousand bbl /d
2000-2001	674	

2010 AR	2010 AR
Bcf/y	Malaysia prodn k bbl / day
1,931	699
2,096	661
2,212	691
2,218	679
2,271	657

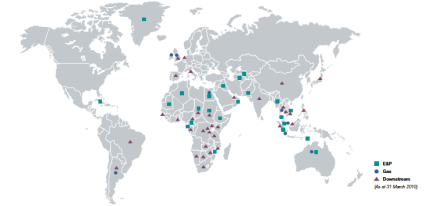
OGJ100	2010 AR
million bbl /yr	Malaysia prodn k BOE/d
255.2	957
252.4	950
177.2	982
163.9	980
	974

Total		na	7,545	7,239		na	26,594	34,971	
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A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
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Alternate production estimate for 2008				
Thousand bbl /d	Million bbl /yr	Million cf/d	Bcf/yr	
2008	534	195	4,076	1,488

Source: Hults, & Thurber, 2012, Introduction, Table 1.1, page 24, in Victor et al, eds, 2012, *Oil and Governance*.
Table 1.1 is based on information from Wood Mackenzie's Pathfinder Database; www.woodmacresearch.com



US Energy Information Administration, International Energy Statistics

www.eia.gov/emeu/internationalenergy.html

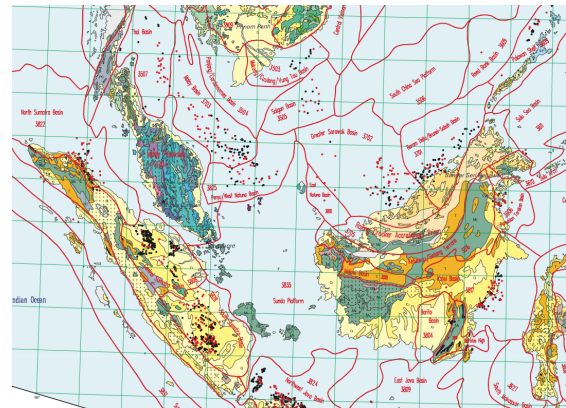
Vented & Flared of

Petronas operations

	Malaysia		Malaysia		Malaysia		Malaysia		Malaysia	
	Crude oil, condensate, & NGPL k bbl per day	million bbl per yr	Prod Marketed Gas Bcf per year	Dry natural gas Bcf per year	Vented & Flared Bcf per year	gross %	Reinjected Bcf per year	Gross Prod'n Bcf per year		
1980	283	103	NA	56	-	-	NA	NA		
1981	264	96	NA	62	-	-	NA	NA		
1982	306	112	NA	56	-	-	NA	NA		
1983	365	133	NA	148	65	65	NA	NA		
1984	450	164	NA	325	95	95	NA	NA		
1985	450	164	NA	437	60	60	NA	NA		
1986	513	187	NA	528	75	75	NA	NA		
1987	508	185	NA	551	28	28	NA	NA		
1988	551	201	NA	581	-	-	NA	NA		
1989	596	218	NA	606	-	-	NA	NA		
1990	631	230	664	654	65	8%	97	826		
1991	658	240	759	747	-	0%	-	759		
1992	666	243	808	796	52	6%	-	852		
1993	657	240	895	880	-	0%	-	895		
1994	662	242	938	923	-	0%	-	938		
1995	702	256	1,036	1,020	-	0%	-	1,036		
1996	715	261	1,249	1,230	-	0%	-	1,249		
1997	750	274	1,376	1,356	-	0%	-	1,376		
1998	810	296	1,391	1,370	-	0%	-	1,391		
1999	778	284	1,443	1,422	-	0%	-	1,443		
2000	755	276	1,734	1,600	-	0%	-	1,734		
2001	729	266	1,825	1,687	-	0%	-	1,825		
2002	773	282	1,812	1,706	51	2%	437	2,300		
2003	818	299	2,084	1,836	64	2%	478	2,625		
2004	835	305	2,057	1,900	60	2%	483	2,600		
2005	725	265	2,147	1,967	57	2%	477	2,680		
2006	703	257	2,084	1,973	53	2%	343	2,479		
2007	677	247	2,281	2,104	46	2%	330	2,657		
2008	700	255	2,292	2,151	57	2%	343	2,691		
2009	664	242	2,264	2,133	64	2%	339	2,666		
2010	637	232	2,347	2,171	42	2%	328	2,718		
2011	588	215	2,360	2,180	46	2%	288	2,694		
2012	598	218								
1990-2011 totals			35,845	33,806	656	1.6%	3,942	40,435		

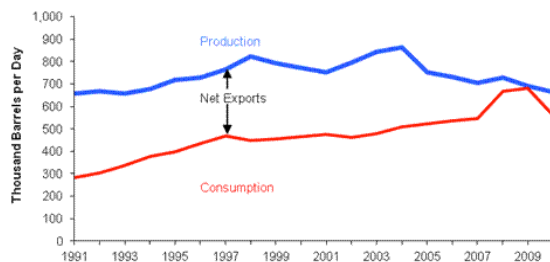


EIA Country Studies, Malaysia



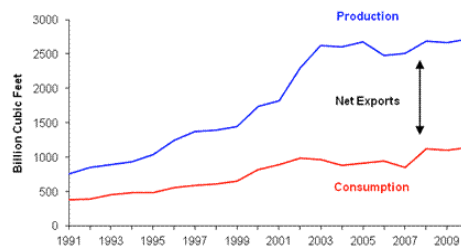
USGS oil and geology provinces of Asia, detail.

Malaysia's Oil Production and Consumption, 1991-2010



EIA Country Studies, Malaysia

Malaysian Natural Gas Production and Consumption, 1991-2010



EIA Country Studies, Malaysia

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263	<p>Petronas Financial & Operational Review, 2010, page 27.</p>																																																				

Cell: I9

Comment: Rick Heede:

Petronas.com: "PETRONAS, the acronym for Petrolia Nasional Berhad, was incorporated on 17 August 1974 under the Companies Act 1965. It is wholly-owned by the Malaysian government and is vested with the entire ownership and control of the petroleum resources in Malaysia through the Petroleum Development Act 1974. Over the years, PETRONAS has grown to become a fully-integrated oil and gas corporation and is ranked among FORTUNE Global 500's largest corporations in the world. PETRONAS has four subsidiaries listed on the Bursa Malaysia and has ventured globally into more than 32 countries worldwide in its aspiration to be a leading oil and gas multinational of choice. Petronas is a national oil company with a broad portfolio of investments and production ventures both offshore eastern Malay Peninsula, the South China Sea, and offshore Eastern Malaysia on Borneo. The company has pursued shared production agreements (PSAs) with IOCs rather than nationalization, although the 1974 legislation that established Petronas also made the company the sole custodian of Malaysia's hydrocarbon reserves and the regulator of the national oil and gas sector. Specific information on Petronas' ownership share or working interest in the many PSAs are not available to us, however, and we base Petronas production on a combination of Oil & Gas Journal estimates and on Petronas annual reports. Shell and Esso /Exxon had to surrender their concessions in Malaysia and negotiate production sharing agreements, the details of which we do not have access and are not reported by Petronas. Lopez (2012, page 815-ff) reports some contractual information regarding the minority interests taken by Petronas Carigali (the exploration arm of Petronas); the first PSA (with Shell, signed in 1976) accorded a cost recovery of 20 percent (25% for gas), 10 percent royalty, and the 70 percent remainder split 70:30 in Petronas favor. Carigali was typically "grafted on" as a minority partner, with the IOCs (chiefly Shell and Exxon) until the late 1990s when Petronas was able to negotiate more favorable contracts with higher equity participation. Lopez, Leslie (2012) Petronas: reconciling tensions between company and state, in Victor et al, eds, Oil and Governance, pp. 809-835. Bowie, Paddy (2001) A Vision Realised: The Transformation of a National Oil Corporation, Orillia Corporation Sdn Bhd, Kuala Lumpur, 425 pp. von der Mehden, Fred, & Al Troner (2007) "Petronas of Malaysia," in: The Changing Role of National Oil Companies in International Energy Markets, James Baker III Institute for Public Policy, Rice University, 2 March 2007.

Cell: M9

Comment: Rick Heede:

Petronas was founded on 17Aug1974. Wholly owned by the Government of Malaysia, the corporation is vested with the entire oil and gas resources in Malaysia. Wiki, Apr12. Petronas has, since its founding, pursued a strategy of signing production sharing agreements rather than outright nationalization. See Lopez, 2012, for Petronas history. Lopez, Leslie (2012) Petronas: reconciling tensions between company and state, in Victor et al, eds, Oil and Governance, pp. 809-835.

Cell: E12

Comment: Rick Heede:

Total net worldwide crude oil plus natural gas liquids produced by each company or state-owned enterprise. Where data is available, we list gross production (before royalty production is netted out). More often, however, oil companies report production net of royalty production. Crude production includes natural gas liquids (NGL) unless noted.

Cell: I12

Comment: Rick Heede:

Natural gas is typically reported as dry gas; natural gas liquids are reported under crude oil. Carbon dioxide is normally removed from the gas flow at the production site (see "Vented Carbon Dioxide"). "SCM/d" = standard cubic meters per day. "cf/d" = cubic feet per day. Net production typically excludes a number of diverted gas streams. Quantities and fractions vary; ExxonMobil's exclusions are probably typical of the industry: "Net production available for sale quantities are the volumes withdrawn from ... natural gas reserves, excluding royalties and volumes due to others when produced, and excluding gas purchased from others, gas consumed in producing operations, field processing plant losses, volumes used for gas lift, gas injections and cycling operations, quantities flared, and volume shrinkage due to the removal of condensate or natural gas liquids production." ExxonMobil Corporation (2004) 2003 Financial and Operating Review, www.exxonmobil.com, p. 55.

Cell: E25

Comment: Rick Heede:

US Bureau of Mines (1971) International Petroleum Encyclopedia, p. 37, shows oil production for 1959-1969, in million bbl per year.

Cell: D34

Comment: Rick Heede:

Energy Information Administration International Energy Statistics, World Production of Crude Oil, Lease Condensate, & NGPL, 1980-2010. EIA, Crude Oil production (excluding NGL, and other liquids), for 1970-1980.

Cell: E36

Comment: Rick Heede:

EIA annual oil, condensate, and NGPLs for 1980-2010 converted to million bbl per year.

Cell: F38

Comment: Rick Heede:

See cell H62 for calculation of Petronas' average oil production of Malaysia's total from 1987 to 2010 (90.35 percent). While international oil companies produce oil in Malaysia, Petronas also produces oil outside the country. This percentage is applied to total Malaysian oil production for 1974 (when Petronas was established) to 1986. After 1986 we use Oil & Gas Journal estimates of Petronas production

Cell: B40

Comment: Rick Heede:

Petronas was formed on 17 August 1974 as a national oil company whollyowned by the government of Malaysia.

Cell: I40

Comment: Rick Heede:

U.S. Bureau of Mines (1976) Minerals Yearbook 1976, Natural gas, Koelling, Gordon W.; Fanelli, Leonard L. pp. 847-888. Table 26, page 888. Data for 1974-1976. Gas data not available for 1977-1979.

Cell: D46

Comment: Rick Heede (Jan10):

Energy Information Administration International Energy Statistics for 1980 to 2005, Crude Oil, Lease Condensate, & NGPLs,(Thousand Barrels per Day) for Malaysia. Details reproduced on page 2.

Cell: F53

Comment: Rick Heede:

Petronas oil production 1987-2005 from Oil & Gas Journal, OGJ1000, various years.

Cell: G53

Comment: Rick Heede:

This is the calculated percentage of Petronas' oil production of Malaysia's total production (EIA data). However, this is not a significant indicator in Petronas' case inasmuch as the company produces ~40 percent of its oil abroad in Kazakhstan, Iran, and Iraq, Sudan, and elsewhere.

Cell: J64

Comment: Rick Heede:
Discontinuity in OGJ100 reports not explained.

Cell: D72

Comment: Rick Heede:
2010 AR pdf pg 36 shows Petronas domestic production of oil & condensates for 2006-2010 in k bbl /d. (see pg 35 for Malaysia's prodn, also shown in column M at right.). CMS adds international oil production (incl condensates) from Petronas Annual Report 2010, page 38. International production has risen from 27.1 percent of total in FY2006 to 36.5 percent in FY2010.
2010 crude + condensates: 449.0 k bbl /d (domestic) + 264.5 k bbl /d (international) = 713.5 k bbl /d = 260.4 million bbl.

Cell: F72

Comment: Rick Heede:
CMS cites Petronas AnnRpt data for 2006-2010. Estimates for 1987-2005 are from OGJ 100, various years.
Petronas AnnRpt 2010 page 35 states that Petronas produces 68.2 percent of Malaysian total oil in FY2010 (and 70.4 percent in 2009).
CMS has not adjusted prior years' OGJ estimates, since we do not have supporting data.
Note also that the production data for 2008 cited in Hults & Thurber, 2012, (see bleow, page 2) for "working interest production" is 195 million bbl. Compare Petronas' own production report of 282 million bbl. We do not have access to the Hults & Thurber cited data from Wood Mackenzie, and can only assume it includes Petronas domestic and foreign production, as well as crude plus NGLs, but we cannot confirm this.

Cell: H72

Comment: Rick Heede:
2010 AR pdf pg 36 shows Petronas domestic production of natural gas for 2006-2010 in k BOE/day.
CMS adds international oil production (incl condensates) from Petronas Annual Report 2010, page 38.
2010 natural gas: 662 k BOE /d (domestic) + 375.1 k BOE /d (international) = 1,037 k BOE /d = 2,271 Bcf. CMS uses 6,000 cf per bbl.

Cell: P72

Comment: Rick Heede:
2010 AR pdf pg 35; average production per day, thousand boe per day

Cell: F73

Comment: Rick Heede:
World Bank, 2008b page 95, reports Petronas oil production as 1,682,000 bbl per day (614 million bbl) in 2007. "For the fiscal year ended 3/31/07 Petronas reported proven domestic reserves of 5.4 million barrels of oil and 86 TCF of gas reserves which represents 100% of Malaysia's reserves. Petronas reported domestic production of 1.1 MMBOE/D for 2007 down 3% from 2006. 55% of its domestic production is natural gas. Petronas accounts for 77% of Malaysia's oil production and 65% of its gas production. Foreign and private companies operate pursuant to production sharing contracts (PSAs) negotiated and administered by Petronas. ExxonMobil is the largest oil producer of the private/foreign companies. Exploration activities are currently focusing on offshore deepwater prospects. Petronas is a net exporter of oil and gas focusing on Asian markets. For fiscal 2007, Petronas reported international reserves of 2.6 million barrels of oil and 22 TCF of gas representing 33% and 20% of the company's oil and gas reserves respectively. International production for fiscal 2007 was 582 MBOE/D up 35% from 2006. International production accounts for 34% of Petronas' total production. Petronas operates in more than 20 countries including Vietnam, Myanmar, Indonesia, Sudan, Iran, Chad, Egypt, Pakistan, Thailand, Russia, India and Turkmenistan. Most international investment is carried out by Petronas Carigali and has an upstream focus."
World Bank (2008b) A Citizen's Guide to National Oil Companies, Part B: Data Directory, World Bank, Washington, & Center for Energy Economics, Bureau of Economic Geology Jackson School of Geosciences University of Texas, Austin, 764 pp.
The World Bank reported production (Petronas data) conflicts with Petronas' reported production in its annual reports. CMS relies on Petronas data. Note also that the WB data conflicts with Wood Mackenzie "working interest production" for 2008 (195 million bbl); see cell E84 for details.

Cell: J73

Comment: Rick Heede:
World Bank, 2008b, page 95, reports Petronas gas production as 1.3 Tcf (domestic) and 709 Bcf (international).

Cell: M73

Comment: Rick Heede:
AR2010 pdf pg 35; thousand boe per day "Malaysia average production," crude oil+condensates. Petronas prodn on pdf pg 36, listed in column D.

Cell: O75

Comment: Rick Heede:
Oil & Gas Journal OGJ100 30Oct2011, page 48, for 2009-2010.
CMS note: OGJ apparently only shows Petronas domestic production and ignores substantial international production.

Cell: D76

Comment: Rick Heede:
Higher LNG sales volume of 26.1 million tonnes, with 22.8 million tonnes contributed by the PETRONAS LNG Complex and 1.9 million tonnes contributed by Egyptian LNG, while an additional 1.4 million tonnes were from trading activities. Produced 9.7 million tonnes of petrochemical products, a 5% increase from the 9.2 million tonnes produced in the previous year, resulting from the first full-year operation of our Mega Methanol plant as well as improved operational performance. Attained a total production of 1.75 million boe per day, amid a higher contribution from international acreages, which accounted for 639.6 thousand boe per day or 36.5% of the Group's total production. Petronas (2011) Annual report 2010, page 26.
PETRONAS' share of Malaysia's production for the year, inclusive of PETRONAS Carigali's domestic production, amounted to 1.1 million boe per day or 68.2% of total average national production, a decrease from the previous year's share of 70.4%. This reflected lower production entitlements due to higher cost recovery by Product Sharing Contractors amid lower average oil prices for the year in review. Petronas (2011) Annual report 2010, page 35.
2010 AR pdf pg 36 shows Petronas domestic production of oil & condensates for 2006-2010 in k bbl /d. (see pg 35 for Malaysia's prodn, also shown in column M at right.). CMS adds international oil production (incl condensates) from Petronas Annual Report 2010, page 38. International production has risen from 27.1 percent of total in FY2006 to 36.5 percent in FY2010. 2010 crude + condensates: 449.0 k bbl /d (domestic) + 264.5 k bbl /d (international) = 713.5 k bbl /d = 260.4 million bbl.

Cell: K151

Comment: Rick Heede:
Source: U.S. Geological Survey (~1997) Maps Showing Geology, Oil and Gas Fields, and Geologic Provinces of the Asia Pacific Region, Compiled by Douglas W. Steinshouer, Jin Qiang, Peter J. McCabe, & Robert T. Ryder, Open- File Report 97-470F, U.S. Dept of Interior, Reston. pubs.usgs.gov/of/1997/ofr-97-470/OF97-470F/aspac.PDF

Cell: L260

Comment: Rick Heede:
Wako, Yoshiaki (2007) "The Secrets of Petronas' Success," Nippon Oil Research Institute; in: The Changing Role of National Oil Companies in International Energy Markets, Baker Institute for Public Policy, Rice Univ., 2 March.

Cell: P262

Comment: Rick Heede:

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