

Oil and natural gas extraction data

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 Climate Mitigation Services
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Petroleo Brasileiro (Petrobras), Brazil

yellow column indicates original reported units 55.6% SOE

www.petrobras.com Rio de Janeiro

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	Thousand SCM/d	Million SCM/d	Billion cf/yr		

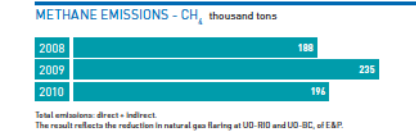
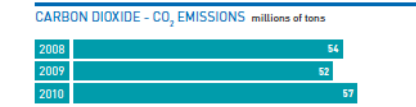
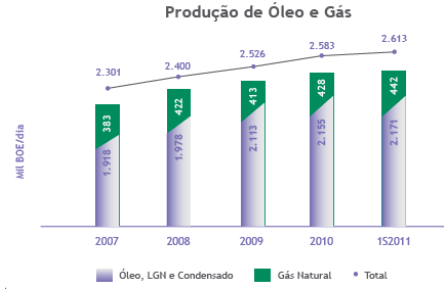
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- 77 2011
- 78 2012
- 79 2013
- 80 2014
- 81 2015
- 82 2016
- 83 2017
- 84 2018

Data: petrobras.com	Petrobras oil & NGL	Data: petrobras.com
thousand bbl /day	million bbl /yr	bbl per day
3	1	2,663
5	2	5,482
11	4	10,921
27	10	27,298
51	19	51,133
64	23	63,961
80	29	80,261
95	35	94,903
91	33	90,911
98	36	97,746
91	33	90,944
94	34	93,988
116	42	116,173
146	53	146,141
160	58	160,231
172	63	172,199
164	60	164,088
170	62	170,206
166	61	166,475
170	62	170,053
177	65	177,051
171	63	171,485
166	61	166,201
160	58	159,564
160	58	160,185
165	60	165,401
181	66	181,026
213	78	213,087
259	95	259,351
329	120	328,931
468	171	467,516
557	203	556,777
589	215	589,425
588	215	588,368
577	211	577,100
617	225	616,844
654	239	653,628
647	236	646,730
653	238	653,101
668	244	668,291
693	253	692,832
716	261	716,161
809	295	809,052
869	317	869,308
1,004	367	1,004,280
1,132	413	1,131,836
1,324	483	Petrobras stats
1,379	503	Petrobras stats
1,535	560	Petrobras stats
1,701	621	Petrobras stats
1,661	606	Petrobras stats
1,847	674	Petrobras stats
1,920	701	Petrobras stats
1,918	700	Petrobras stats
1,978	722	Petrobras stats
2,111	771	Petrobras stats
2,155	787	Petrobras stats
2,169	792	Petrobras stats
2,126	776	Petrobras stats
2,060	752	Petrobras data
2,150	785	Petrobras data
2,227	813	Petrobras data
2,224	812	Petrobras data
2,217	809	Petrobras data
2,099	766	Petrobras data

Data: petrobras.com	Petrobras gas
Million SCM/day	Bcf/yr
0.17	2
0.17	2
0.23	3
0.43	6
0.82	11
1.17	15
1.46	19
1.44	19
1.40	18
1.27	16
1.34	17
1.80	23
2.07	27
2.35	30
2.60	34
3.32	43
3.36	43
3.09	40
3.23	42
3.08	40
3.89	50
4.24	55
4.28	55
4.74	61
5.08	65
5.00	64
5.81	75
6.56	85
8.10	104
11.00	142
13.39	173
14.54	187
15.38	198
15.81	204
15.47	199
16.25	209
16.32	210
17.16	221
18.17	234
19.31	249
20.30	262
21.30	274
24.16	311
25.92	334
28.52	368
31.39	405
38,601	498
41,048	529
43,943	566
54,271	700
58,144	749
59,826	771
61,154	788
61,956	799
68,136	878
66,862	862
69,076	890
72,912	940
76,148	982
77,378	997
83,700	1,079
89,829	1,158
90,824	1,171
87,858	1,132
84,482	1,089

cf per m^3
35.3147

Petrobras
thousand m^3/d



Petrobras (2011) Sustainability Report 2010, page 85.

Oil & Gas Journal OGJ100	
Crude + NGLs	Natural Gas
million bbl	Bcf
741	4.4
776	2.6
750	2.8

Compare EIA stats

663

Total	na	18,981	na	na	21,823
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Additional information on Petrobras

Alternate production estimate for 2008				
	Thousand bbl /d	Million bbl /yr	Million cf/d	Bcf/yr
2008	1,921	701	1,713	625

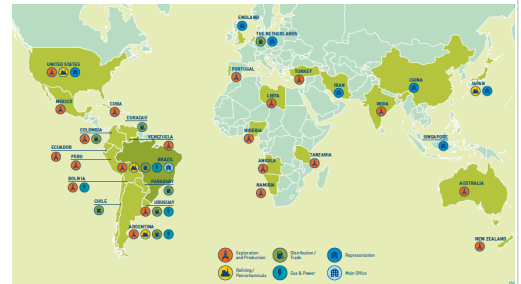
Source: Huils, & Thurber, 2012, Introduction, Table 1.1, page 24, in Victor et al, eds, 2012, *Oil and Governance*.
Table 1.1 is based on information from Wood Mackenzie's Pathfinder Database; www.woodmacresearch.com

PROVED OIL, NGL, CONDENSATE AND NATURAL GAS RESERVES ANP/SPE CRITERIA
billion boe

2006	12.3	2.7	15.0
2007	12.4	2.6	15.0
2008	12.6	2.4	15.1
2009	12.6	2.3	14.9
2010	12.4	2.4	14.8

Oil, LNG and Condensate Natural Gas

Petrobras' oil & gas reserves 2006-2010, 2011 SustRpt, page 39.



Petrobras' international operations, 2011 SustRpt, page 9.

	Oil (mmbbl)(1)			Gas (mmcf)(2)			Total (mboe)			Stationary production units		
	2017	2016	2015	2017	2016	2015	2017	2016	2015	2017	2016	2015
Brazil	786.1	784.8	776.8	556.0	534.0	563.4	878.8	873.8	870.7	118	121	120
Campos Basin	442.4	497.2	543.1	78.3	192.3	210.7	455.4	529.2	578.2	53	55	56
Santos Basin	269.0	203.9	144.3	296.1	193.3	177.9	318.3	236.1	174.0	22	15	12
Other Basins(3)	74.8	83.7	89.4	181.6	148.4	174.8	105.1	108.4	118.5	43	51	52
South America (excluding Brazil)	1.9	8.0	14.1	85.4	144.7	173.3	16.1	32.1	43.0	—	—	—
North America	13.2	12.1	11.2	21.5	32.1	24.5	16.7	17.4	15.3	2	2	2
Equity and non-consolidated affiliates	8.2	9.2	11.0	0.0	0.1	0.3	8.2	9.2	11.0	—	—	—
South America (excluding Brazil)	—	0.5	1.2	—	0.1	0.3	—	0.5	1.3	—	—	—
Africa	8.2	8.7	9.7	—	—	—	8.2	8.7	9.7	—	—	—
Total	809.4	814.1	813.0	662.8	710.9	761.6	919.8	932.6	939.9	120	123	122

- (1) Oil production includes production from extended well tests (EWT) and NGL.
- (2) Natural gas production figures are the production volumes of natural gas available for sale, excluding flared and reinjected gas and gas consumed in operations.
- (3) Includes NGL, synthetic oil, and synthetic gas production from oil shales deposits in São Mateus do Sul, in the Paraná Basin of Brazil.

Petrobras (2018) Form 20-F for 2017, page 42.

Note: gas production in error (663 Mcf in all of 2017?). CAI: judging from the Boe stats, the units are meant to be Bcf.

Table note 2: Natural gas production figures are the production volumes of natural gas available for sale, excluding flared and reinjected gas and gas consumed in operations.

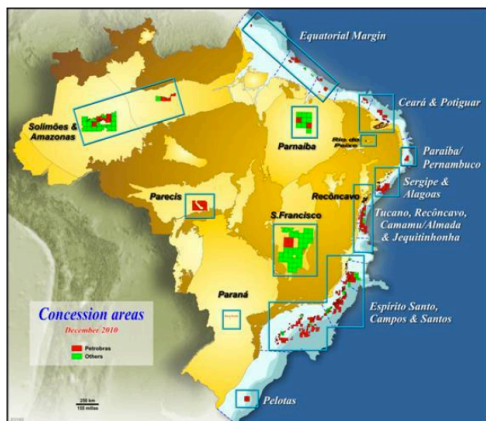
Petrobras energy consumption, Terajoules, excludes flaring

INDICATOR	2006	2007	2008	2009	2010
Environment					
Oil & Oil Product Leaks (m³)	293	386	436	254	668
Energy consumption (terajoule - TJ)	576,762	574,145	604,333	527,717	716,673
Greenhouse gas emissions (million tons of CO ₂ equivalent)	50.43	49.88	57.6	57.8	61.1
Carbon dioxide emissions - CO ₂ (million tons)	46	45	54	52	57
Methane emissions - CH ₄ (thousand tons)	190	206	188	235	196
Nitrous oxide emissions - N ₂ O (tons)	997.23	919.5	1,215	1,241	1,360
Atmospheric emissions - NO _x (thousand tons)	233.54	222.65	244.50	222.04	227.75
Atmospheric emissions - SO _x (thousand tons)	151.96	150.9	141.79	135.39	133.73
Other atmospheric emissions - includes particulate matter (thousand tons)	17.11	15.22	16.71	19.30	17.51
Fresh water withdrawal (million m³)	178.8	216.5	195.2	176.0	187.3
Water effluent disposal (million m³)	164.3	172.8	181.14	197.2	172.6

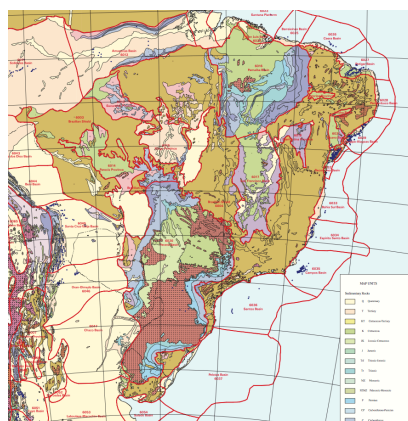
Petrobras (2011) Sustainability Report 2010.

PERIOD	2010	2009	2008
Direct energy			
Diesel fuel	37,919	34,205	27,292
Fuel oil	65,844	81,670	129,539
Natural gas	423,183	298,603	429,622
Refinery gas	74,599	88,006	68,262
Residual gas	5,920	0	0
LPG	937	1,773	9,762
FCC Coke	67,962	70,841	78,413
Others	431	1,906	2,275
Total direct energy	676,795	577,004	745,164
Indirect energy			
Steam acquired	13,953	9,198	12,185
Electric energy acquired	25,925	17,868	33,411
Total indirect energy	39,878	27,066	45,595
TOTAL	716,673	604,070	790,759

Petrobras (2011) Sustainability Report 2010, page 83

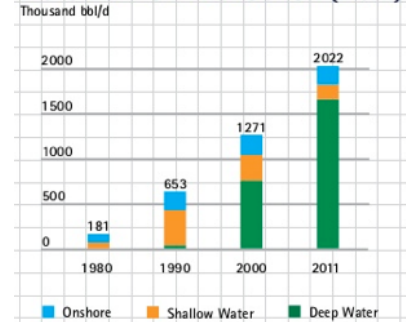


Petrobras 2011 SEC Form 20-K, page 33.



USGS map

HISTORICAL OIL PRODUCTION (Brazil)
Thousand bbl/d



www.investidorpetrobras.com.br/en/investor-s-center/fact-sheet.htm

Cell: J9**Comment:** Rick Heede:

petrobras.com / history: In October 1953, after Law 2.004 was passed, Petrobras' was allowed to be incorporated to undertake oil sector activities in Brazil on behalf of the Union. Petróleo Brasileiro S/A - PETROBRAS commenced its activities with the collection it inherited from the old National Oil Council (Conselho Nacional do Petróleo, CNP), which, however, preserved its inspection function for the sector. The oil exploration and production operations, as well as the remaining activities connected to the oil, natural gas, and derivative sector, except for wholesale distribution and retail via service stations, were a monopoly Petrobras held from 1954 to 1997.

History (Wikipedia, en.wikipedia.org/wiki/Petrobras):
 Petrobras standard model for its land oil pump, popularly known as Wooden Horse (Cavalo de Pau in Portuguese) in UFRN, Natal, Brazil.
 Petrobras was created in 1953 during the government of Brazilian president Getúlio Vargas, with the support of both the ruling parties and the opposition alike in Congress.
 Petrobras commenced its activities with the collection it inherited from the old National Oil Council (Conselho Nacional do Petróleo, CNP), which, however, preserved its inspection function for the sector.
 The oil exploration and production operations, as well as the remaining activities connected to the oil, natural gas, and derivative sector, except for wholesale distribution and retail via service stations, were a monopoly Petrobras held from 1954 to 1997. During this period, Petrobras became the leader in derivative marketing in Brazil, and, thanks to the company's performance, it was awarded the Offshore Technology Conference (OTC) in 1992, one which it was granted again in 2001.
 After 40 years of exploration, production, refining and transportation of Brazil's oil, Petrobras started to compete with other foreign and domestic companies in 1997. The Brazilian government created the National Petroleum Agency (Agência Nacional do Petróleo, ANP), responsible for the regulation and supervision of activities in the petroleum industry, and the National Council of Energy Policies, a public agency responsible for the development of public energy policy.
 In 2003, commemorating its 50 years, Petrobras doubled its daily production of oil and natural gas, surpassing the mark of 2 million barrels (320,000 m3).
 On 21 April 2006, Brazilian president Luiz Inácio Lula da Silva started production on the P-50 oil platform, in the Albacora East Field at Campos Basin, which gave Brazil self-sufficiency in oil production.
 In 2009, Petrobras announced a market capitalization plan to finance its future investments in ultra-deep oil exploration. The share offering in the BM&F Bovespa Stock Exchange took place in September 2010, becoming the largest market capitalization in history, with R\$ 120,4 billion (US\$ 69,97 billion) in shares issued.
 Petrobras was established as a state-owned oil and natural gas monopoly in 1954. Significant discoveries -- mostly offshore in the Campos Basin -- since the 1980s and more recently in deeper waters in "pre-salt" formations (that is, underneath the salt deposits) has allowed Brazil to become self-sufficient (and a net exporter) in petroleum since 2008. The Brazilian government is also creating another state-owned oil company Petrossal, is introducing production-sharing agreements (IOCs have operated in Brazil, but typically on a contractual basis).
 de Oliveira, Adilson (2012) "Brazil's Petrobras: strategy and performance," in Victor et al, eds, Oil & Governance, pp. 515-556.

Cell: M9**Comment:** Rick Heede:

The Federal Govt owns 55.6 percent of voting shares. Petrobras.com Capital Ownership Breakdown, accessed Apr12.
 World bank, 2008b, page 309: "Petrobras is a state-controlled company created pursuant to Law No.2,004. A majority of the voting capital must be owned by the Brazilian federal government, a state or a municipality. The Brazilian government controls 58% of Petrobras' shares." Older datum.
 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.

Cell: D11**Comment:** Rick Heede:

Production statistics for Petrobras include domestic and international natural gas production. Data from Petrobras website, in million cf per day. Domestic production in 2004 was 1.591 Bcf/d, and international 0.565 Bcf/d.

Cell: D12**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 net production. Crude production includes natural gas liquids (NGL) unless noted.

Cell: H12**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: F18**Comment:** Rick Heede:

Petrobras.com data on crude oil production 1954-1999. CMS note Jan10: this dataset not found (for update). April 2013: no historic production data found on petrobras.com (except 2007-2012 data used below).

Cell: D24**Comment:** Rick Heede:

Minor production variance reported in de Oliveira (2012), page 524: 57,000 bbl per day in 1958.
 de Oliveira, Adilson (2012) "Brazil's Petrobras: strategy and performance," in Victor et al, eds, Oil & Governance, pp. 515-556.

Cell: E53**Comment:** Rick Heede:

OGJ100 production data is in very close agreement with the Petrobras data for 1987-1999.

Cell: J54**Comment:** Rick Heede:

Good agreement with OGJ100 data for 1988-1990, 1994, 1996, and 1997 only.

Cell: O76**Comment:** Rick Heede:

Petrobras reported gas production data is roughly twice the EIA estimated production for Brazil (445 Bcf in 2010). Oil & Gas Journal OGJ 100 estimates are ~5 percent higher than Petrobras own data (935 Bcf in 2010). Oil production, on the other hand, are in agreement across all three sources.

Cell: E80**Comment:** Rick Heede:

Petrobras production data 2000-2016 as Excel file.
<http://www.investidorpetrobras.com.br/en/operational-highlights/production-and-marketing>

Cell: H80**Comment:** Rick Heede:

Petrobras production data 2000-2016 as Excel file.
<http://www.investidorpetrobras.com.br/en/operational-highlights/production-and-marketing>

Cell: E83**Comment:** Rick Heede:

Petrobras (2018) Form 20-F for 2017, page 42. Oil production in Mb per year.

Cell: H83**Comment:** Rick Heede:

Petrobras (2019) History of oil and gas production 2000-201. CAI cites production for 2017 and 2018: Downloaded 3 June: Historico Tabela Producao.xlsx at <https://www.investidorpetrobras.com.br/en/overview/production-and-marketing>

Cell: L83**Comment:** Rick Heede:

Petrobras (2018) Form 20-F for 2017, page 42. See table below. The units appear to be in error, listed as 662.8 mmcf per year (Mcf), in 2017, not Mcf per day. Assuming that the units are meant to be 662.8 Bcf, this is still 33% below 2016 production of 1,171 Bcf.

Petrobras

Verify units, and whether significant gas producing assets were divested.
CAI: judging from the Boe stats, the units are meant to be Bcf.

Cell: E84

Comment: Rick Heede:

Petrobras (2019) History of oil and gas production 2000-2017, downloaded 3 June: Historico Tabela Producao.xlsx at <https://www.investidorpetrobras.com.br/en/overview/production-and-marketing>