

Oil and natural gas extraction data

Richard Heede
Climate Mitigation Services
File started: 11 January 2005
Last modified: April 2013

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Oil and Natural Gas Corporation, India

www.ongcindia.com

New Delhi

yellow column indicates original reported units

84.11% State-owned entity

Production / Extraction data

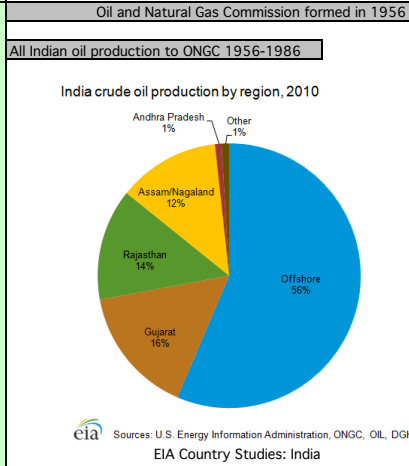
Year	Crude Oil & NGL			Natural Gas			Background data	
	Net production	Net production	Net production	Net production	Net production	Net production	Gross production	Gross production
	Thousand bbl /d	Million bbl /yr	Million tonnes/yr	Million cf/d	Million SCM/d	Billion cf/yr	Million tons/yr	Million tonnes/yr
		Assam Oil Co / Oil India 1950-1959 ONGC 1956-2010				Assam Oil Co / Oil India 1950-1959 ONGC 1956-2010		



1 cubic meter = 35.3147 cf

15	1950
16	1951
17	1952
18	1953
19	1954
20	1955
21	1956
22	1957
23	1958
24	1959
25	1960
26	1961
27	1962
28	1963
29	1964
30	1965
31	1966
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35	1970
36	1971
37	1972
38	1973
39	1974
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45	1980
46	1981
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50	1985
51	1986
52	1987
53	1988
54	1989
55	1990
56	1991
57	1992
58	1993
59	1994
60	1995
61	1996
62	1997
63	1998
64	1999
65	2000
66	2001
67	2002
68	2003
69	2004
70	2005
71	2006
72	2007
73	2008
74	2009
75	2010

India	ONGC India
Million bbl /yr	Million bbl /yr
2.9	3
3.2	3
3.3	3
3.4	3
3.4	3
3.4	3
8.0	8
12.3	12
17.0	17
22.5	22
35.6	36
43.4	43
43.6	44
51.7	52
52.6	53
52.1	52
57.0	57
55.4	55
55.7	56
61.6	62
64.6	65
72.6	73
82.5	82
89.4	89
66.4	66
118.8	119
142.7	143
175.6	176
190.2	190
227.0	227
231.8	232
224.8	222
235.1	232
259.2	247
244.6	243
228.1	227
215.0	204
205.9	195
231.7	228
273.9	256
266.8	239
	242
	212
Energy Intelligence	198
534	192
494	195
ONGC AnnRpt08	192
million tonnes	201
29.7	218
27.6	202
29.3	214
31.1	228
30.4	223
33.7	247
33.0	242



ONGC oil production of total India, 1987-2010

ONGCI, 1987-2010	5,299
India, 1987-2010	7,024
ONGCI of India, %	75.4%

ONGC India and OGJ100, 1987-2010

OGJ100	269.1
Oil & Natural Gas Commission	312.3
Oil & Natural Gas Commission	374.4
Oil & Natural Gas Commission	437.7
Oil & Natural Gas Commission	484.7
Oil & Natural Gas Commission	569.4
Oil & Natural Gas Commission	551.6
Oil & Natural Gas Commission	600.7
Oil & Natural Gas Commission	691.2
Oil & Natural Gas Commission	761.4
Oil & Natural Gas Commission	789.4
Oil & Natural Gas Commission	650.2
Oil & Natural Gas Commission	664.5
Oil & Natural Gas Commission	868.7
Oil & Natural Gas Commission	895.6
Oil & Natural Gas Commission	897.6
Oil & Natural Gas Commission	918.1
Oil & Natural Gas Commission	907.6
Oil & Natural Gas Commission	811.2
Oil & Natural Gas Commission	849.2
Oil & Natural Gas Commission	887.1
Oil & Natural Gas Commission	898.1
Oil & Natural Gas Commission	983.5
Oil & Natural Gas Commission	988.1

Energy Intelligence	Energy Intelligence
million cf/day	Bcf
2,453	895.35
2,540	927.10

OGJ100: na 2006-2008

billion m^3	27.850
billion m^3	27.980

Gross production

Bcf/yr	55
	50
	53

ONGC gas production of total India, 1987-2010

ONGCI, 1987-2010	17,061
India, 1987-2010	20,743
ONGCI of India, %	82.3%

Total	na	7,348	na	na	na	18,312
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82	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
83															
84				Alternate production estimate for 2008											
85			Thousand bbl /d	Million bbl /yr		Million cf/d	Bcf/yr								
86	2008		696	254		2,231	814								

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

91	US Energy Information Administration, International Energy Statistics														
92	www.eia.gov/emeu/internationalenergy.html														
93	Updated April 2013														
94		India	India		India	India	India	India	India	India	India	India	India	India	India
95		Crude oil, condensate, & NGPL	million bbl per yr		Prod Marketed Gas	Dry natural gas	Vented & Flared	gross		Reinjected	Gross Prod'n				
96		k bbl per day			Bcf per year	Bcf per year	Bcf per year	%		Bcf per year	Bcf per year				
97	1980	182	66		NA	51.0	67.0			NA	NA				
98	1981	325	119		NA	64.0	80.0			NA	NA				
99	1982	391	143		NA	89.0	87.0			NA	NA				
100	1983	481	176		NA	105.6	84.0			NA	NA				
101	1984	521	190		NA	113.0	83.0			NA	NA				
102	1985	622	227		NA	135.0	135.0			NA	NA				
103	1986	635	232		NA	180.0	100.0			NA	NA				
104	1987	616	225		NA	226.7	127.0			NA	NA				
105	1988	644	235		NA	310.0	137.0			NA	NA				
106	1989	710	259		NA	315.2	166.0			NA	NA				
107	1990	670	245		399.0	399.0	177.0	27%		68.0	644.0				
108	1991	625	228		465.0	449.0	201.0	30%		4.0	669.0				
109	1992	589	215		482.0	476.8	172.0	26%		3.5	658.4				
110	1993	564	206		546.0	531.8	88.3	14%		3.5	637.8				
111	1994	635	232		635	593.6	70.6	10%		3.5	685.5				
112	1995	750	274		650.5	627.6	93.6	13%		3.5	747.6				
113	1996	731	267		720.8	696.4	86.2	11%		3.5	810.5				
114	1997	760	277		742.7	716.9	86.5	10%		3.5	832.7				
115	1998	751	274		786.5	760.7	86.2	10%		3.5	876.2				
116	1999	743	271		778.0	752.2	85.8	10%		3.5	867.3				
117	2000	736	269		821.1	794.6	85.8	9%		3.5	910.4				
118	2001	742	271		893.5	851.1	26.5	3%		-	920.0				
119	2002	780	285		974.7	925.3	26.5	3%		-	1,001.2				
120	2003	782	285		1,078.5	964.1	47.0	4%		-	1,125.5				
121	2004	803	293		1,095.8	995.9	38.8	3%		-	1,134.7				
122	2005	780	285		1,153.0	1,055.9	37.1	3%		-	1,190.1				
123	2006	801	292		1,087.7	1,087.7	31.8	3%		-	1,119.5				
124	2007	803	293		1,108.2	1,108.2	32.5	3%		-	1,140.7				
125	2008	804	293		1,137.1	1,137.1	32.5	3%		-	1,169.6				
126	2009	790	289		1,437.0	1,437.0	35.7	2%		-	1,472.6				
127	2010	866	316		1,848.4	1,848.4	35.0	2%		-	1,883.3				
128	2011	889	324		1,681.7	1,681.7	33.5	2%		-	1,715.2				
128	2012	879	321												
129					1990-2011 totals	20,498	19,891	1,610	7.2%	104	22,212				

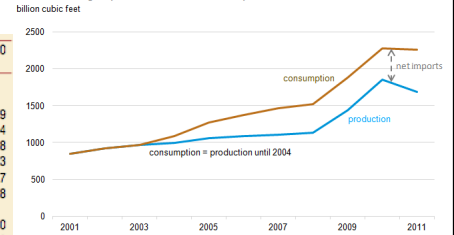
million tonnes	2008	2007
crude	27.13	27.93
C2-C3	0.50	0.52
LPG	1.03	1.04
Naphtha	1.55	1.47
Kerosene	0.16	0.17
total liquids	30.36	31.12

billion m³	2008	2007
Natural gas	25.43	25.12
Bcf	898.05	887.10

35.3147 cf/m³

Source: ONGC India AnnRpt2008.

India natural gas production and consumption, 2001-2011

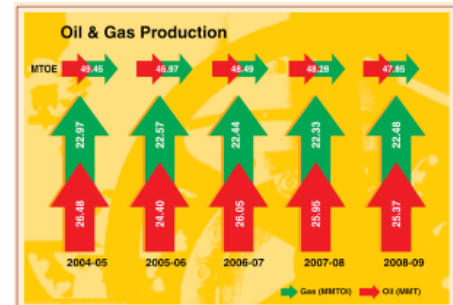


Source: U.S. Energy Information Administration, International Energy Statistics

EIA Country Studies: India

143	(Rupees in million unless otherwise stated)	2008-09	2007-08	2006-07	2005-06	2004-05	2003-04	2002-03	2001-02	2000-01	1999-00
144	PHYSICAL										
145	Quantity Sold (Other than Trading)										
146	- Crude Oil (MMT)	22.88	24.08	24.42	22.45	24.09	23.94	23.90	22.86	23.38	23.39
147	- Natural Gas (MMM3)	20,534	20,432	20,306	20,500	20,644	21,103	21,110	20,446	20,501	20,064
148	- LPG (000 Tonnes)	1,029	1,037	1,033	1,084	1,086	1,161	1,198	1,157	1,211	1,208
149	- Naptha/ARN (000 Tonnes)	1,545	1,442	1,442	1,578	1,567	1,656	1,642	1,681	1,514	1,393
150	- Ethane/Propane (000 Tonnes)	497	520	548	535	528	534	619	528	570	557
151	- Superior Kerosene Oil (000 Tonnes)	153	168	156	176	177	218	234	231	221	228
152	Quantity Sold (Trading)										
153	- Superior Kerosene Oil (000 KL)	441	308	563	432	970	0	0	0	0	0
154	- HSD (000 KL)	1,742	1,539	1,394	874	1,538	0	0	0	0	0
155	- Motor Spirit (000 KL)	273	232	121	110	262	0	0	0	0	0

	Unit	Production		Sales		Value (Rs. in million)	
		2008-09	2007-08	2008-09	2007-08	2008-09	2007-08
159	DIRECT						
160	CRUDE OIL (MMT)	* 27.13	* 27.93	22.88	24.08	391,907	386,803
161	NATURAL GAS (BCM)	** 25.43	** 25.12	20.53	20.43	75,528	71,780
162	C2-C3 (000 MT)	497	520	497	520	9,889	9,291
163	LPG (000 MT)	1026	1035	1029	1037	22,752	20,169
164	NAPHTHA (000 MT)	1553	1469	1545	1442	48,406	43,848
165	SKO (000 MT)	156	167	153	168	4,448	3,374
166	OTHERS					1,554	937
167	SUB TOTAL					554,484	536,202



CMS note: The charted data matches neither crude oil produced or total liquids produced

Cell: I9

Comment: Rick Heede:

"ONGC was set up under the visionary leadership of Pandit Jawahar Lal Nehru, going against the wisdom of the then multinational oil companies operating in the country, who had almost written India off as a "Hydrocarbon Barren" country. Pandit Nehru reposed faith in Shri Keshav Dev Malviya who laid the foundation of ONGC in the form of Oil and Gas division, under Geological Survey of India, in 1955. A few months later, it was converted into an Oil and Natural Gas Directorate. The Directorate was converted into Commission and christened Oil & Natural Gas Commission on 14th August 1956. In 1994, Oil and Natural Gas Commission was converted into a Corporation, and in 1997 it was recognized as one of the Navratnas by the Government of India. Subsequently, it has been conferred with Maharatna status in the year 2010.

Over 50 years of its existence ONGC has crossed many a milestones to realize the energy dreams of India. The journey of ONGC, over these years, has been a tale of conviction, courage and commitment. ONGCs' superlative efforts have resulted in converting earlier frontier areas into new hydrocarbon provinces. From a modest beginning, ONGC has grown to be one of the largest E&P companies in the world in terms of reserves and production.

ONGC as an integrated Oil & Gas Corporate has developed in-house capability in all aspects of exploration and production business i.e., Acquisition, Processing & Interpretation (API) of Seismic data, drilling, work-over and well stimulation operations, engineering & construction, production, processing, refining, transportation, marketing, applied R&D and training, etc.

Today, Oil and Natural Gas Corporation Ltd. (ONGC) is, the leader in Exploration & Production (E&P) activities in India having 72% contribution to India's total production of crude oil and 48% of natural gas. ONGC has established more than 7 Billion Tonnes of in-place hydrocarbon reserves in the country. In fact, six out of seven producing basins in India have been discovered by ONGC. ONGC produces more than 1.27 million Barrels of Oil Equivalent (BOE) per day. It also contributes over three million tonnes per annum of Value-Added-Products including LPG, C2 - C3, Naphtha, MS, HSD, Aviation Fuel, SKO etc." www.ongcindia.com/history.asp

Sourcing Equity Oil Abroad (www.ongcindia.com/wps/wcm/connect/ongcindia/Home/Investors/Company+Overview/):

ONGC Videsh Limited (OVL) is operating in 15 countries with 30 projects with cumulative investment worth over USD 15 billion, to source equity oil & gas for energy security of the country. Over the years OVL has emerged as the biggest Indian Multinational.

The company now has participation in 30 E&P projects in 15 countries namely Vietnam (1 project), Russia (2 projects), Sudan (2 projects), South Sudan (2 projects), Iraq (1 project), Libya (1 project), Myanmar (2 projects), Syria (2 projects), Cuba (2 projects), Brazil (4 projects), Nigeria (1 project), Colombia (6 projects), Venezuela (2 projects) and Kazakhstan (1 project). Out of 30 projects, ONGC Videsh is Operator in 9 projects and Joint Operator in 7 projects.

OVL continued to maintain its robust growth with production of 6.214 MMT of Crude Oil and 2.539 BCM of Gas during 2011-12. Its proved reserves (1P) as on 1st April 2012 stood at 193.381 MTOE, which next to ONGC, is the second largest holding of proved oil and gas reserves by any Indian Company. OVL's share of total reserves (3P) of oil and oil equivalent gas as on 1st April 2012 was 425.941 MTOE. As on 31st March, 2012, the Reserves-to-Production (R/P) Ratio considering proved reserves was 22.09.

Also see Rai, Varun (2012) Fading star: explaining the evolution of India's ONGC, in Victor et al, eds, Oil and Governance, pp. 753-808.

Cell: M9

Comment: Rick Heede:

Ganguly, Sumit (2007) "The Oil and Natural Gas Corporation: The Oil and Natural Gas Corporation: Charting a New Course? Department of Political Science Indiana University, Bloomington, in: The Changing Role Of National Oil Companies In International Energy Markets, James Baker III Institute for Public Policy, Rice University, 1 March 2007.

Rai, Varun (2012) Fading star: explaining the evolution of India's ONGC, in Victor et al, eds, Oil and Governance, pp. 753-808.

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 net 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: E15

Comment: Rick Heede:

"After 1990. The liberalized economic policy, adopted by the Government of India in July 1991, sought to deregulate and de-license the core sectors (including petroleum sector) with partial disinvestments of government equity in Public Sector Undertakings and other measures. As a consequence thereof, ONGC was re-organized as a limited Company under the Company's Act, 1956 in February 1994.

After the conversion of business of the erstwhile Oil & Natural Gas Commission to that of Oil & Natural Gas Corporation Limited in 1993, the Government disinvested 2 per cent of its shares through competitive bidding. Subsequently, ONGC expanded its equity by another 2 per cent by offering shares to its employees.

During March 1999, ONGC, Indian Oil Corporation (IOC) - a downstream giant and Gas Authority of India Limited (GAIL) - the only gas marketing company, agreed to have cross holding in each other's stock. This paved the way for long-term strategic alliances both for the domestic and overseas business opportunities in the energy value chain, amongst themselves. Consequent to this the Government sold off 10 per cent of its share holding in ONGC to IOC and 2.5 per cent to GAIL. With this, the Government holding in ONGC came down to 84.11 per cent.

In the year 2002-03, after taking over MRPL from the A V Birla Group, ONGC diversified into the downstream sector. ONGC will soon be entering into the retailing business. ONGC has also entered the global field through its subsidiary, ONGC Videsh Ltd. (OVL). ONGC has made major investments in Vietnam, Sakhalin and Sudan and earned its first hydrocarbon revenue from its investment in Vietnam."

www.ongcindia.com/history.asp#b

Cell: D22

Comment: Rick Heede:

Natural gas production data for India 1956-1979 from U.S. Bureau of Mines Minerals Yearbook, various years, Oil & Gas Journal OGI100 1987-2003, and ONGC Annual Reports 2004-2010.

Cell: B24

Comment: Rick Heede:

Oil and Natural Gas Corporation of India in 1956 (originally as a state commission) to lead India's indigenous exploration and production projects, in part motivated by energy security, independence, and opportunistic behavior by IOCs.

Rai, 2012, gives a good overview of the formation and history of ONGC, India's experience with Stanvac in the Bengal Basin in the early 1950s, and Russia's favorable technological and financial assistance to India in the 1950s and 1960s. Rai, Varun (2012) Fading star: explaining the evolution of India's ONGC, in Victor et al, eds, Oil and Governance, pp. 753-808.

Cell: D24

Comment: Rick Heede:

U.S Bureau of Mines 1962) Minerals Yearbook 1960, Crude petroleum and petroleum products, Kirby, James G.; Messner, Walter G.; Moore, Betty M. pp. 361-496. Data for 1956-1958, Table 89, page 487.

Cell: J24

Comment: Rick Heede:

U.S. Bureau of Mines (1062) Minerals Yearbook 1960, natural gas.

Cell: F26

Comment: Rick Heede:

Oil & Gas Journal attributes all of Indian crude and natural gas production to Oil & Natural Gas Corporation of India, and CMS adopts this full attribution. OGJ may not have accounted for unknown levels of joint production agreements with international oil companies, and this percentage may be adjusted.

Cell: D27

Comment: Rick Heede:

U.S. Bureau of Mines (1965) Minerals Yearbook 1964, world oil production; Crude petroleum and petroleum products, James G. Kirby, & Betty M. Moore, pp. 381-497, GPO Washington.

Cell: J29

Comment: Rick Heede:

U.S. Bureau of Mines has no data for Indian natural gas production 1961-1963 and is interpolated.

Cell: J32

Comment: Rick Heede:

U.S. Bureau of Mines (1969) Minerals Yearbook 1968 Natural gas, Harper, William B.; Fanelli, Leonard L. pp. 723-750.

Cell: J37

Comment: Rick Heede:

U.S. Bureau of Mines (1965) Minerals Yearbook 1964, Natural gas, Zaffarano, Richard F.; Avery, Ivan F. pp. 319-352.

Cell: L37

Comment: Rick Heede:

Minerals Yearbook for 1971, p. 798, shows India's marketed natural gas production as well as gross production (marketed plus vented, flared, and re-injected natural gas) for 1969-1971:
 1969: gross = 55.0 Bcf, marketed production = 25.7 Bcf;
 1970: gross = 50.3 Bcf, marketed production = 23.9 Bcf;
 1971: gross = 53.0 Bcf, marketed production = 25.9 Bcf (0.489 of gross).

Cell: D38

Comment: Rick Heede:

US Bureau of Mines (various years) Minerals Yearbook 1972, 1974, 1976.

Cell: J41

Comment: Rick Heede:

U.S. Bureau of Mines (1974) Minerals Yearbook 1974, Natural gas, Koelling, Gordon W.; Fanelli, Leonard L. pp. 833-871.

Cell: J43

Comment: Rick Heede:

U.S. Bureau of Mines (1976) Minerals Yearbook 1976, Natural gas, Koelling, Gordon W.; Fanelli, Leonard L. pp. 847-888.

Cell: J45

Comment: Rick Heede:

Interpolated between U.S. Bureau of Mines, India 1976, and EIA International Energy Statistics, 1980.

Cell: D48

Comment: Rick Heede:

Energy Information Administration International Energy Annual 2006, Table 2.2 World Crude Oil including Lease Condensate Production, 1980-2006 (Thousand Barrels per Day) - converted by CMS to million bbl per year, attributed to ONGC through 1986, after which OGJ100 data is used for 1987 through 2003.

Cell: E55

Comment: Rick Heede:

Oil & Gas Journal OGJ100, various years, for 1987-2003.

Cell: B58

Comment: Rick Heede:

ONGC started with 450 employees in 1956; by 1990 it employed 47,000 people. Rai, 2012, page 762.
 ONGC started having problems with flogging and erratic production of its Mumbai High offshore fields, and the company decided to shut in all 90 flogged fields in order to build reservoir pressure. This caused a 30 percent drop in total ONGC production between 1990 and 1994.
 Rai's table 17.3 shows crude oil production in India for 1989/1990 of 21.71 Mt (159.1 million bbl), 1990/1991 of 20.38 Mt (149.4 million bbl), 1991/1992 of 18.96 Mt (139.0 million bbl), 1992/1993 of 15.75 Mt (115.5 million bbl), and 1993/1994 of 15.38 Mt (112.7 million bbl). This is substantially below the Oil and Gas Journal estimates for 1990 to 1994. While ONGC also produces petroleum internationally (via ONGC's Videsh Ltd), this was zero to negligible in the 1990s. Also, O&GJ reports crude oil plus NGLs whereas the ONGC's reported data (Rai cites IndiaStat.com, to which we do not have access) is for crude oil only.

Cell: D67

Comment: Rick Heede:

On this worksheet we report extractive data for each company or state-owned enterprise. Three columns under crude oil and natural gas allow for data reported in one of three formats (e.g., thousand barrels per day, or million barrels per year, or million tonnes per year).
 Note: the carbon content of the extracted resources is adjusted by a number of factors before emissions estimates are made. Most important is the subtraction of the fraction typically sequestered in petrochemicals and other non-combusted uses such as road oils, waxes, lubricants, greases, etc. See the worksheets on non-energy uses and factors for oil and natural gas in SumOil.xls and SumGas.xls

Cell: D71

Comment: Rick Heede:

Oil & Natural Gas Corporation (2009) Annual Report 2008-2009, New Delhi, www.ongcindia.com.
 Does not contain clear data on production, except for 2007 & 2008. E.g., chart below does not include NGL production. Better data on petroleum sales by year. CMS thus adds average 2007 and 2008 NGL production (3.21 million tonnes per year) to stated crude oil production for 2004-2006, and actual data for 2007 and 2008.
 Oil & Gas Journal does not estimate ONGC production for 2006-2008.

Cell: E72

Comment: Rick Heede (Jan10):

Oil & Gas Journal does not report ONGC production for oil or gas for 2006 - 2008, and CMS calculates total liquids from the company's AnnRpt08. OGJ100 estimates liquids production at 202 and 193 million bbl in 2004 and 2005, respectively -- slightly lower than CMS estimates that include NGL production.

Cell: D77

Comment: Rick Heede:

ONGC AR 2010 pdf pg 83 crude oil production MMT

Cell: I77

Comment: Rick Heede:

ONGC Annual Report 2010 pdf pg 83, natural gas production Bcm.

Rai, 2012, Figure 17.4 "Natural gas production by ONGC, 1980-2007" (citing IndiaStat.com and Ministry of Petroleum and Natural Gas) shows gas production ranging from approximately 21 Bcm in 1995-1996 to ~23 Bcm in 2001-2002 and ~22 Bcm in 2007-2008.

Cell: J77

Comment: Rick Heede:

calculated, 1 CM= 35.315 CF

Cell: E86

Comment: Rick Heede:

ONGC "working interest liquids production in 2008" at 696 thousand bbl per day.

Victor, 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

Cell: J86

Comment: Rick Heede:

ONGC "working interest natural gas production in 2008" at 2,231 thousand cf per day.

Victor, 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

Cell: N172

Comment: Rick Heede:

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