

Oil and natural gas extraction data

Richard Heede
 Climate Mitigation Services
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Sonatrach, Algeria

www.sonatrach-dz.com Algiers

yellow column indicates original reported units
 100% State-owned enterprise

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

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Oil	Million bbl /yr
Sonatrach 1987-2010	8,338
Algeria 1987-2010	13,475
Sonatrach of Algeria %	61.88%

Nations Encycl.
 Sonatrach established in 31Dec1963
 Nationalized in 1971

Marketed gas production underestimates total emissions

Year	Algeria		%	Algeria		%	Sonatrach	%
	million bbl /yr	million bbl /yr		gross gas prod'n	net gas prod'n			
1960	68	7	10%	na	na		4	47%
1961	121	12	10%	na	na		7	49%
1962	158	16	10%	na	13		8	51%
1963	184	18	10%	na	15		15	53%
1964	204	64	31%	na	29		34	55%
1965	206	67	32%	na	62		42	57%
1966	262	87	33%	na	73		45	59%
1967	298	102	34%	na	76		58	61%
1968	331	117	35%	340	94		67	63%
1969	345	125	36%	350	106		67	65%
1970	1,038	379	37%	340	102		71	67%
1971	794	290	38%	260	105		83	69%
1972	1,071	391	39%	350	120		120	71%
1973	1,106	404	40%	360	168		146	73%
1974	1,021	373	41%	700	199		254	75%
1975	1,003	366	41%	740	337		272	77%
1976	1,099	401	43%	863	351		291	79%
1977	1,171	428	44%	interpolated	366		310	81%
1978	1,256	458	45%	interpolated	381		331	83%
1979	1,254	458	46%	interpolated	396		351	85%
1980	1,142	417	47%		411		675	87%
1981	1,051	384	48%		772		843	89%
1982	1,045	381	49%		942		1,202	91%
1983	1,017	371	50%	1,314			1,272	93%
1984	1,114	407	51%	1,360			1,299	95%
1985	1,141	416	52%	1,360			1,283	96%
1986	1,192	435	53%		1,330		1,472	96%
1987	1,201	438		OGJ100 1987-2010	1,525		1,542	94%
1988	1,175	429	53%		1,635		2,317	136%
1989	1,236	451	58%		1,709		1,588	89%
1990	1,315	480	61%	OGJ Sonatrach of	1,788		1,618	75%
1991	1,310	478	61%	Algeria 1987-2010	2,164		1,837	84%
1992	1,342	490	58%	61.88%	2,197		1,787	86%
1993	1,312	479	57%		2,086		1,779	90%
1994	1,295	473	58%		1,986		1,834	82%
1995	1,307	477	58%		2,236		2,020	85%
1996	1,377	503	59%		2,376		2,097	79%
1997	1,419	518	60%		2,643		2,066	74%
1998	1,401	512	59%		2,796		2,127	70%
1999	1,387	506	55%		3,054		2,311	74%
2000	1,434	523	56%		3,136		2,311	78%
2001	1,515	553	52%		2,972		2,653	89%
2002	1,619	591	53%		2,991		2,839	88%
2003	1,786	652	79%		3,212		2,980	93%
2004	1,847	674	65%		3,217		3,180	88%
2005	1,957	714	69%		3,613		3,287	93%
2006	1,969	719	68%		3,539		3,310	93%
2007	1,968	718	69%		3,548		3,300	90%
2008	1,955	714	70%		3,649		2,940	86%
2009	1,910	697	65%		3,405		2,980	86%
2010	1,880	686	66%		3,465		2,730	79%
2011	1,862	680	69%		3,453		2,725	76%
2012	1,874	684	62%		3,593		2,760	###
2013	1,762	643	65%		NA		2,760	erroneous reporting?
2014		OGJ100 Sep16			OGJ100 Sep16		4,531	35.3147 cf/m^3
2015		OGJ100 Sep17			OGJ100 Sep17		3,290	3,454
2016		OGJ100 Sep18			OGJ100 Sep18		3,347	
2017		OGJ100 Sep18			OGJ100 Sep18		3,387	
2018		OGJ100 Sep19			OGJ100 Sep19			



Algeria crude 1970-1980	Algeria NGL 1970-1980
1,029 thousand bbl /day	9
785	9
1,062	9
1,097	9
1,009	12
983	20
1,075	24
1,152	19
1,231	25
1,224	30
1,106	36



Total	na	24,428	15,364	na	na	90,853	na	na
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	A	B	C	D	E	F	G	H	I	J	K	L	M	N
88	Alternate production estimate for 2008													
89		Thousand bbl /d		Million bbl /yr		Million cf/d		Bcf/yr						
90		1,201		438		6,658		2,430						
91	Source: Hults, & Thurber, 2012, Introduction, Table 1.1, page 24, in Victor et al, eds, 2012, Oil and Governance.													
92	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/international/energy.html

	Algeria		Updated Apr 2019 gas only	Vented & Flared of					
	Oil, NGPL, other k bbl per day	Oil, NGPL, other million bbl per yr		Algeria Gross NatGas Prod Bcf per year	Algeria Prod Market Gas Bcf per year	Algeria Reinjected NatGas Bcf per year	Algeria gross %	Algeria Vented & Flared Bcf per year	Algeria Dry NatGas Prod Bcf per year
1980	1,142.0	417		NA	NA	NA		343	411
1981	1,051.0	384		NA	NA	NA		238	772
1982	1,045.0	381		NA	NA	NA		170	942
1983	1,017.0	371		NA	NA	NA		154	1,314
1984	1,114.0	407		NA	NA	NA		129	1,360
1985	1,141.0	416		NA	NA	NA		160	1,360
1986	1,192.0	435		NA	NA	NA		199	1,330
1987	1,201.0	438		NA	NA	NA		222	1,525
1988	1,175.0	429		NA	NA	NA		212	1,635
1989	1,236.0	451		NA	NA	NA		216	1,709
1990	1,315.0	480		4,471	1,788	2,235	5%	236	1,787
1991	1,310.0	478		4,458	2,164	2,135	4%	159	1,933
1992	1,342.0	490		4,486	2,197	2,148	3%	141	1,971
1993	1,312.0	479		4,723	2,086	2,399	5%	237	1,902
1994	1,295.0	473		4,701	1,986	2,472	5%	243	1,807
1995	1,306.8	477		4,864	2,236	2,377	5%	251	2,052
1996	1,377.1	503		4,903	2,376	2,283	5%	244	2,194
1997	1,418.7	518		5,259	2,643	2,371	5%	245	2,433
1998	1,401.4	512		5,299	2,796	2,259	5%	245	2,604
1999	1,387.3	506		5,347	3,054	2,055	4%	238	2,876
2000	1,433.9	523		5,757	3,136	2,382	4%	239	2,940
2001	1,515.0	553		5,668	2,972	2,552	3%	144	2,787
2002	1,619.0	591		5,672	2,991	2,533	3%	148	2,799
2003	1,786.0	652		5,820	3,212	2,467	2%	141	2,850
2004	1,846.8	674		6,078	3,217	2,741	2%	120	2,830
2005	1,957.3	714		6,819	3,613	3,057	2%	106	3,151
2006	1,969.1	719		6,837	3,539	3,182	2%	117	3,079
2007	1,968.4	718		6,999	3,548	3,286	2%	165	2,996
2008	1,955.0	714		7,105	3,649	3,281	2%	175	3,055
2009	1,909.9	697		6,954	3,405	3,355	3%	194	2,876
2010	1,880.0	686		6,788	3,465	3,146	3%	177	2,988
2011	1,862.0	680		6,714	3,453	3,134	2%	127	2,923
2012	1,874.2	684		6,448	3,593	2,732	2%	123	3,053
2013	1,761.8	643		6,339	NA	2,692	2%	129	2,813
2014	1,720.0	628		6,594	NA	2,868	2%	139	2,942
2015	1,797.0	656		6,492	NA	2,721	2%	124	2,933
2016	1,697.4	620		NA	NA	NA	-	-	3,312
2017	1,640.3	599		NA	NA	NA	-	-	3,302
2018	1,575.7	575							

Updated June 2019
Crude oil, condensate, & NGPL

Updated June 2019

Updated June 2019

Updated June 2019
(dry gas, EIA stat to 2017)

1990-2011 totals	132,171	67,117	60,584	3.2%	4,214	59,885
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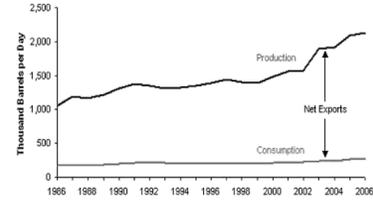
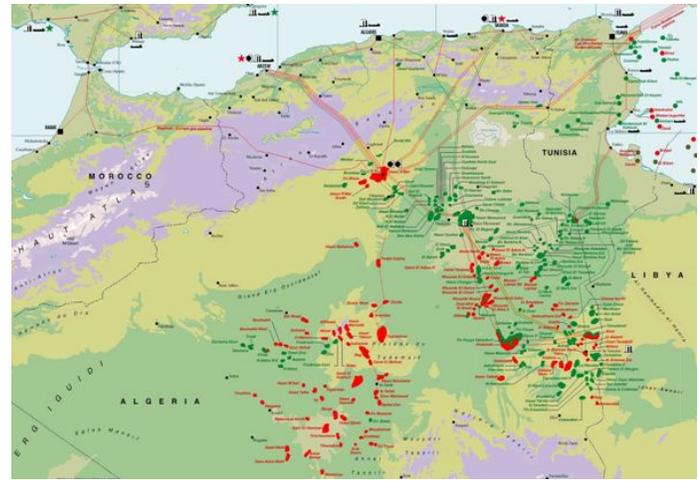


Figure 1.2 Algerian crude oil production and consumption. Source: <http://www.eia.doe.gov>, EIA Algeria Country Analysis 2007

Arweriokuma (2009) The Political Economy of Oil and Gas in Africa, page 3.



Sonatrach-dz.com: Algérie : un riche potentiel pétrolier et gazier



Cell: H9**Comment:** Rick Heede:

Wiki: "Sonatrach (Société Nationale pour la Recherche, la Production, le Transport, la Transformation, et la Commercialisation des Hydrocarbures s.p.a.) is an Algerian government-owned company formed to exploit the hydrocarbon resources of the country. Its diversified activities cover all aspects of production: exploration, extraction, transport, and refining. It has diversified into petrochemistry and the desalination of seawater. Founded 31 December 1963. 120,000 employees, net income \$175 billion in 2002, 30% of Algeria's GDP, operates the largest oil field in Algeria, Hassi Messaoud, which produced around 440,000 bbl/d (70,000 m³/d) of crude in 2006, Hassi R'Mel field (north of Hassi Messaoud, south of Algiers), which produces around 180,000 bbl/d (29,000 m³/d) of crude, produces (as of 2002) 206 million tep, including 11.7 % (24 million tep) for the domestic market."

Sonatrach was founded in December 31, 1963. At the time, however, the Algerian state held only 4.5% of the exploration perimeters, while French interests were as high as 67.5%. After the Arab-Israeli War in June 1967, Algeria decided to nationalize the refining and distribution activities of Mobil and Esso, and Sonatrach signed an agreement with Getty Oil on October 19, 1968 receiving 51% of Getty Oil's interests. It gained control over all Algerian petrochemical resources following President Houari Boumedienne's nationalisation of all French oil and gas holdings beginning on February 24, 1971. The old concession system was replaced by a seizure of a 51% share of French petroleum companies. Only Total agreed to continue its activities; the other companies left Algeria. Beginning on December 10, 1979, a conference on the exploitation of petroleum recommended increasing participation in the research efforts by foreign companies and countries. By a decree published in the Journal Officiel on May 17, 1980, Sonatrach was divided into four enterprises. From 1986, it became possible for foreign hydrocarbon companies to do business in Algeria within a partnership with Sonatrach (this process was simplified in 1991). The Sonatrach-Gaz de France accord, signed on January 12, 1989, allowed the state to set a compromise price of about \$2.30 per million BTUs. A total of 9.5 billion cubic meters of natural gas were delivered annually until 1990, and Sonatrach recovered 850 million francs in arrears, since the accord applied retroactively beginning on November 1, 1987. In March 2005, the Algerian parliament adopted the hydrocarbon reform bill, encouraging international oil company (IOC) investment in the hydrocarbon sector, which Sonatrach previously dominated. However, 2006 amendments to the hydrocarbon bill created a windfall tax on IOC profits when oil prices top \$30 per barrel. This tax reached up to 50% on some contracts. In addition, the amendments gave Sonatrach rights to a 51% or higher participation option on each newly discovered project.

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

CMS attributes 93.9 percent of total Algerian gas production to Sonatrach for 1980-1986. Actual production estimates by Oil & Gas Journal OGJ100 are used for 1987-2004.

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

We use OGJ data for Sonatrach. Energy Intelligence data show higher production for 2000 and 2001 of 488 and 485 million bbl per year (1.336 and 1.330 million bbl per day), respectively, compared to OGJ's 296 and 286 million bbl.

Cell: I16**Comment:** Rick Heede:

Oil was discovered at Edjeleh and Hassi Messaoud in 1956 and at Al-Gassi in 1959; by 1969, the Franco-Algeria Cooperative Association (ASCOOP), a petroleum development company, had discovered eight major fields. The Société Nationale pour la Recherche, la Production, le Transport, la Transformation et la Commercialisation des Hydrocarbures (Sonatrach), founded in 1964 as the state-owned petroleum company, handles the distribution and transport of oil. On 24 February 1971, President Boumedienne announced the Algerian takeover of controlling interest in all French oil company subsidiaries and the nationalization of all pipelines and natural gas deposits. Holdings of all other foreign petroleum interests in Algeria were nationalized by the end of 1971. Subsequent agreements have generally treated foreign companies as minority partners in Algerian state enterprises. Contracts for sales of natural gas to Western Europe and the United States increased spectacularly in the 1970s but decreased in the 1980s as world energy prices fell, pushing Algeria into severe debt. By 1991, Sonatrach was reversing its monopolistic policy, and forming joint ventures for new exploration contracts. The company plans to invest \$20 billion through 2004 to develop Algeria's oil and gas fields, focusing on wet gas field development, enhanced oil recovery techniques, pipeline expansion, exploration, and dry gas field development. In April 2000 Sonatrach announced a \$500 million joint venture with Amerada Hess to develop the el-Gassi, el-Agreb, and Zotti oilfields, with the goal of increasing production to 45,000 barrels per day by the end of 2003. www.nationsencyclopedia.com/Africa/Algeria-ENERGY-AND-POWER.html

Cell: L21**Comment:** Rick Heede (Jan10):

Gas production and thus combustion (& venting, flaring, etc) is greatly underestimated by this methodology, inasmuch as gross production was 3+ times as high as marketed production (in 1969-1972); much of this may have been re-injected ro EOR, some vented or flared, some company use, etc.

Cell: E25**Comment:** Rick Heede:

U.S. Bureau of Mines, Minerals Yearbook, various years, data for 1959-1969.

Cell: I26**Comment:** Rick Heede:

U.S. Bureau of Mines, Minerals Yearbook 1964, page 348, marketed production 1960-1964.

Cell: J27**Comment:** Rick Heede:

As explained in cell note F30, we do not have detailed Sonatrach production data for oil or natural gas, and rely on Oil & Gas Journal production estimates attributed to Sonatrach for 1987 to 2010. We use Sonatrach of total Algerian gas production in 1987 (97 percent) and reduce this percentage by 1 percent per annum back to 1964. This will be revised in Sonatrach or independent experts make detailed production records available.

Cell: B29**Comment:** Rick Heede:

Algeria achieved political independence from France on 5 July 1962. Sonatrach was founded in 1963 as a joint stock company "that, in theory, allowed the firm some semblance of independence. In reality, Sonatrach was conceived as an instrument by which the state would exert central control over the industry -- the very status it has today." Entelis, John P. (2012) "Sonatrach: the political economy of an Algerian state institution," in Victor et al, eds, Oil and Governance, pp. 557-598, at page 561.

Cell: F30**Comment:** Rick Heede:

Since Sonatrach's creation as a state-owned "joint stock company" in 1963 (with all shares owned by the government), Algeria oil and gas sectors have continued to rely on IOC involvement, technology, capital, and expertise. We do not have access to Sonatrach's own equity production, and rely on Oil & Gas Journal for Sonatrach production data from 1987 to 2010. While we could, in the absence of publicly available records, apply the percent of Algerian production allocated to Sonatrach by O&GJ 1987-2010 (61.9 percent; see cell H58), this would likely overestimate Sonatrach's equity production. Instead we take the 1987 percentage Sonatrach of total Algerian oil production (53 percent) and reduce this percentage by 1 percent per annum back to 1964 (then 31 percent).

It is hoped this allocation method approximates Sonatrach's equity production, but will be revised if Sonatrach makes its production data public, or some better methodology comes to light, such the details of production sharing agreements (PSAs) or other contractual details.

Both BP (then British Petroleum) and Total SA (then CFP) have operated in Algeria since 1956 and 1952, respectively. ENI entered Algeria in 1981 (Eni Algeria), BHP in 1989, Maersk in 1990, Anadarko in 1991, ConocoPhillips in 1993, Hess in 2000, and Statoil in 2003. While weakly indicative of equity production by each entity, using Table 13.1 in Entelis, 2012, IOCs represented \$11.82 billion worth of oil and gas production in 2005, and Sonatrach \$24.0 billion (Algeria's Naftec and Naftel are not estimated); Sonatrach is thus 67 percent of the partial total; this financial information is not detailed, may include royalty payments taxes, and other fees, and thus a poor guide to relative oil and gas production shares. However, this 67 percent share is close to O&GJ's estimate of 69 percent of Algeria's oil production allocated to Sonatrach.

Entelis, John P. (2012) "Sonatrach: the political economy of an Algerian state institution," in Victor et al, eds, Oil and Governance, pp. 557-598; at page 572.

For the years 1987-2010 we use OGJ100 data for Sonatrach.

Aissaoui, Ali (2001) Algeria: The Political Economy of Oil and Gas, Oxford University Press.

Marcel, Valerie (2006) Oil Titans: National Oil Companies in the Middle East, Chatham House, London, Brookings Institution Press, Washington, 322 pp.

Cell: G30**Comment:** Rick Heede:

See cell note at F30.

Cell: I30**Comment:** Rick Heede:

U.S. Bureau of Mines, Minerals Yearbook 1968, page 750, marketed production 1964-1967. Gross production not shown.

Cell: D34**Comment:** Rick Heede:

Energy Information Administration International Energy Annual 2003, Table G.1 World Production of Crude Oil, Lease Condensate, & NGPL, 1980-2010. Also Table 4.1c World Crude Oil Production (Including Lease Condensate), 1970-1979 (detailed in Columns L and M).

Cell: I34**Comment:** Rick Heede:

U.S. Bureau of Mines, Minerals Yearbook 1970, page 764, gross and marketed production 1968-1970.

Cell: B37**Comment:** Rick Heede:

Under President Boumediene, Algeria fully nationalized the oil and gas sector.

Entelis, John P. (2012) "Sonatrach: the political economy of an Algerian state institution," in Victor et al, eds, Oil and Governance, pp. 557-598. At page 561.

Cell: I38

Sonatrach

Comment: Rick Heede: U.S. Bureau of Mines Minerals Yearbook 1974, page 887, reports both gross and marketed production for 1972-1973.

Cell: I40

Comment: Rick Heede: U.S. Bureau of Mines Minerals Yearbook 1976, page 887, reports both gross and marketed production for 1974-1976.

Cell: D46

Comment: Rick Heede:
Energy Information Administration, International Energy Annual 2006 Table 2.2 World Crude Oil including Lease Condensate Production, 1980-2010 (Thousand Barrels per Day), for Algeria.

Cell: I46

Comment: Rick Heede:
Energy Information Administration, International Energy Annual 2006 Table 2.4 World Dry Natural Gas Production, 1980-2006 (Trillion Cubic Feet), for Algeria.

Cell: J53

Comment: Rick Heede:
Oil & Gas Journal OGJ100 data for 1987-2010.
Entelis, 2012, page 566, cites Standard & Poor's 2009 estimates for Algerian natural gas production: 1986 (1,289 Bcf), 1990 (1,737 Bcf), 1996 (2,327 Bcf), and 2006 (2,966 Bcf).
Hults & Thurber (also in Victor et al, Oil & Governance) cite Wood Mackenzie's "working interest production for Sonatrach of 2,430 Bcf in 2005; in comparison, O&GJ's estimate is 3,180 Bcf. See page 2 below for Wood Mackenzie attributed oil and natural gas production.

Cell: F69

Comment: Rick Heede:
Anomalously high, but as estimated in Oil & Gas Journal OGJ100, 19Sep05, for Sonatrach in 2003.

Cell: B72

Comment: Rick Heede:
An amendment to Algerian law passed in 2006 requires Sonatrach to hold at minimum a 51 percent stake in production sharing agreements (PSAs), rather than the optional 20 to 30 percent in the original 2005 law.

Cell: F74

Comment: Rick Heede:
OGJ100 6Sep10 pg 69; updated 2008 production; OGJ 3 Oct 2011 pg 49; "estimated."

Cell: J74

Comment: Rick Heede:
OGJ100 6Sep10 pg 69; 2008 value consistent; OGJ 3 Oct 2011 pg 49; "estimated."

Cell: F83

Comment: Rick Heede:
Sonatrach (2018) Rapport Annuel 2017, page 55. Reports petrole brut and condensat "capacity" totaling 1,386 Mb in 2017 (when converted from kt/day). This far exceeds the OGJ100 estimate of 386 Mb, Sep2018. As a conservatism we cite the OGJ estimate.
Future inventors may revise.
EIA reports that ~80% of Algerian oil production is Sonatrach equity production, and ~20% by IOC such as BP, Equinor, Repsol, Total, etc.
Sonatrach owns more than 75% of total hydrocarbon production in Algeria, and IOCs account for the remaining 20%. The Hydrocarbon Act of 2005 governs Algeria's oil and natural gas industries. In 2013, Algeria revised parts of the hydrocarbon law in an attempt to attract foreign investors to new projects. Algeria has experienced difficulties attracting foreign investors, particularly at licensing rounds. Sonatrach owns more than 75% of total hydrocarbon production in Algeria, and IOCs account for the remaining 20%, according to BMI Research.[4] IOCs with notable stakes in oil and natural gas fields are Cepsa (Spain), BP (United Kingdom), Eni (Italy), Repsol (Spain), Total (France), Equinor (Norway), and Anadarko (United States). Sonatrach's substantial assets in Algeria make it the largest oil and natural gas company, not only in the country, but also in Africa. The company operates in several parts of the world, including Africa (Mali, Niger, Libya, and Egypt), Europe (Spain, Italy, Portugal, and the United Kingdom), Latin America (Peru), and the United States..
https://www.eia.gov/beta/international/analysis_includes/countries_long/Algeria/background.htm

Cell: J83

Comment: Rick Heede:
CAI cites OGJ100 estimate of 3,347 Bcf of gas production. EIA's estimate of dry natural production is 3,312 Bcf (also reports gross production of 6,492 Bcf (2015), reinjected gas of 2,721 Bcf, flared and vented gas of 124 Bcf).
Sonatrach (2018) Rapport Annuel 2017, page 55, reports gas capacity of 186.5 Bcm/y, or 6,587 Bcf/y, which clearly approximates gross production, not dry gas available for sale.
CAI therefore cites the OGJ100 datum for 2017.

Cell: F91

Comment: Rick Heede:
Sonatrach "working interest liquids production in 2008" at 1,201 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: J91

Comment: Rick Heede:
Sonatrach "working interest natural gas production in 2008" at 6,658 thousand cf per day. Victor, Hults, & Thurber, 2012.

Cell: B165

Comment: Rick Heede:
Ariweriokuma, Soala (2009) The Political Economy of Oil and Gas in Africa: The Case of Nigeria, Routledge, 384 pp.