



**Fact Sheet II**

**The Economy of Sudan's Oil Industry**

October 2007

## Foreword

This fact sheet offers basic information about the economy of Sudan's oil industry, all taken from publicly available sources. It a living document, we will regularly issue updates on our website [www.esoconline.org](http://www.esoconline.org). Hard copies will be forwarded on request. We hope to provide a useful source of information for people who are interested in this vital industry.

Sudan's oil wealth has the potential to be a major driver of peace and equitable development. While driving of strong economic growth rates and being the principal source of income for both the National Government and the Government of Southern Sudan, it also continues to be a source of controversy.

The European Coalition on Oil in Sudan (ECOS) believes that the oil industry should promote peace and respect for human rights, first of all by actively supporting the implementation of the Comprehensive Peace Agreement. We support Sudanese civil society organizations in their advocacy towards the implementation of social and environmental standards, financial accountability, fair compensation for victims of oil operations, and multi-stakeholder consultation processes, all of which are required by the CPA, but not yet fully realised.

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## 1. Background

Sudan belongs to the least developed countries in the world but is unique among low income post conflict countries in terms of available domestic resources. Sudan is much better off than all other post conflict cases in recent history with a projected outturn of over \$185 per capita in Southern Sudan in 2007, compared with Afghanistan (\$5) or Timor Leste (\$22).

Despite strong economic growth, the country still faces formidable economic challenges, as it starts at a level of deep poverty. With few linkages to other productive sectors of the economy, growth in the oil sector will not raise incomes for the many poor, while pro-poor spending is very low, standing at 3% of GDP compared with an African average of 7.5%

Since 1997, Sudan has been carrying out macroeconomic reforms recommended by the IMF. In 1999, Sudan began exporting crude oil. Increased oil production, high oil prices, revived light industry, and expanded export processing zones helped sustain GDP growth at about 10% in 2006. Along with improvements to monetary policy, this has stabilized the exchange rate. For 2007, the World Bank expects more than 10% economic growth, driven by oil. The stiff American sanctions regime seems to have little impact, but without it the growth rate may have been even higher, as the sanctions are reducing competition and restrict access to the international financial markets.

Oil accounts for 92.6% of Sudan's export value.<sup>1</sup> Nonetheless, the country's economy remains predominantly agricultural, employing 80% of the work force, with a growth rate of 4% and contributing an average 40% to GDP in the period between 2001 and 2005. Most farms, however, remain rain-fed and susceptible to drought and the sector as a whole is lagging behind.

### IMF Selected Economic Indicators, 2001-2005<sup>2</sup>

	2001	2002	2003	2004	2005
<i>Real Sector</i>					
Real GDP growth (percent change)	6.1	6.4	5.6	5.2	8.0
GDP (in billions of dinars)	3,454	3,978	4,614	5,573	6,748
GDP (in millions of U.S. dollars)	13,369	15,109	17,680	21,610	27,699
GNP per capita	374	425	486	579	790
Inflation (in percent)	4.9	8.3	7.7	8.4	8.5
<i>Central government operations (% of GDP)</i>					
Revenue and grants	10.7	11.8	16.1	19.8	21.8
Expenditure	11.6	8.7	15.4	18.3	23.6
<i>External debt</i>					
In billions of U.S. dollars	20.9	23.6	25.7	26.0	27.7
In percent of GDP	157	156	145	120	100
Net international reserves (in millions of US \$)	-109	84	290	1,144	1,889

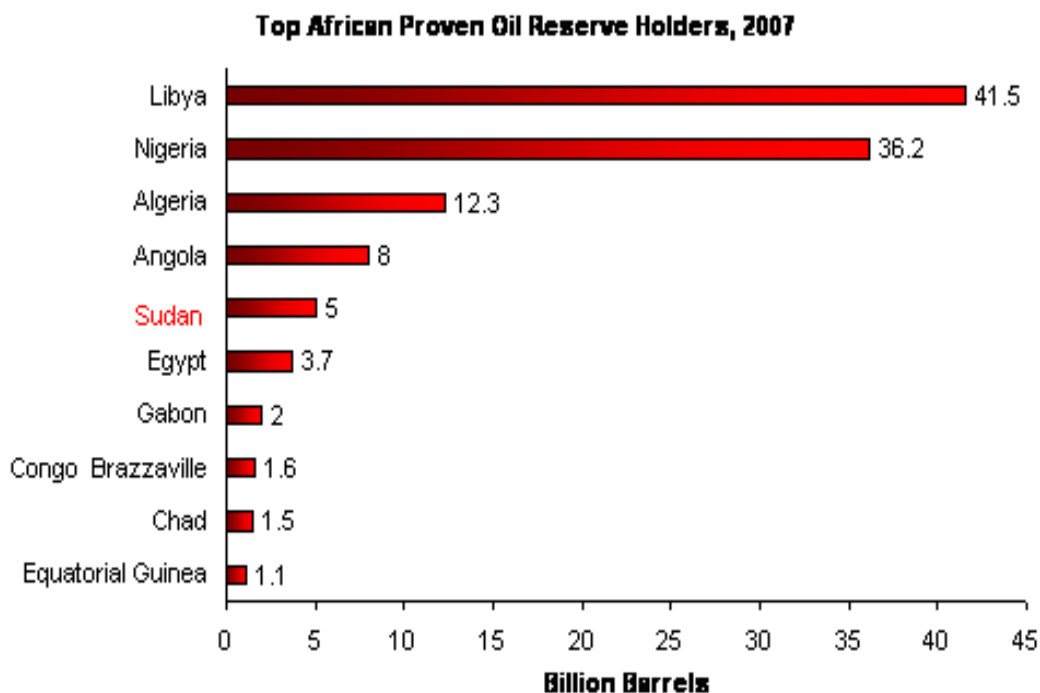
<sup>1</sup> Bank of Sudan, accessed 23 august 2007 [http://www.cbos.gov.sd/arabic/period/bulletin/q1\\_07/Tab\\_1.pdf](http://www.cbos.gov.sd/arabic/period/bulletin/q1_07/Tab_1.pdf)

<sup>2</sup> <http://www.imf.org/external/np/sec/pn/2006/pn0657.htm> (accessed 23 august 2007)

## 2. Asia Leads

Oil was discovered in Sudan in the mid-1970s, but production did not start until 1999. The pioneer companies Chevron and Shell were forced to bow out in 1984, after the outbreak of civil war. They eventually sold their rights in 1990, booking a \$1 billion loss. Mid-1990s, the Chinese National Petroleum Company (CNPC) and Petronas Caligary from Malaysia, both fully state controlled, grasped this unique opportunity to invest in an oil-rich area that was out of bounds for the oil majors. They continue to dominate the scene. In 2003, when the violent displacement campaign in their areas of operation became public knowledge, their junior western partners, OMV and Talisman Energy, left Sudan, while Lundin Petroleum from Sweden kept its interest in block 5B. ONGC Videsh from India stepped in, completing the prevailing position of Asian national oil companies in Sudan's oil industry.

CNPC, Petronas and ONGC account for over 90% of Sudan's total output. Not only are these companies important to Sudan, Sudan is also important to them. For each of them, Sudan will be the largest overseas operation in 2007, substantially so for both Petronas and ONGC. And their Sudanese assets are highly profitable. They are not very likely to offer opportunities for newcomers to farm in on their existing assets. They are mostly state-owned and their investment decisions are made at a country level rather than a company level, making them resistant to shareholder activism. While, at a global level, Sudan is a minor oil producing and exporting country, China, India and Malaysia have invested billions of dollars in the country, also outside the oil industry. They consider their relations with the country not only as economic, but also geo-strategic and energy-strategic successes that are worth defending.



Source: *Oil and Gas Journal 2007*

### **3. Infrastructure**

All of Sudan's production fields are landlocked. The country is therefore dependent on its export infrastructure, regardless of prospectivity. The infrastructure of the industry is concentrated in the northern part of the country, while most proven reserves are located in the South. In case the South will opt for secession after the 2011 referendum on self-determination, the North will have a considerable leverage over the South's sole independent source of income.

#### **3.1 Refining**

According to Oil and Gas Journal, Sudan's refineries in Khartoum and Port Sudan had a total combined refining capacity of 121,700 bbl/d as of January 2007.<sup>3</sup> In July 2006, CNPC announced the completion of the Khartoum refinery expansion project, which doubled the refinery's capacity from 50,000 bb/d to 100,000 bbl/d. The Khartoum refinery processes Nile blend crude, which has a low sulphur content and high fuel-yield. The additional refinery capacity from the expansion should help alleviate the short supply of refined products available in Sudan, while giving the country some additional export capacity. The Port Sudan facility is located near the Red Sea and is Sudan's smallest refinery, with a capacity of 21,700 bbl/d.

In September 2005, a contract was awarded to Petronas to build a new refinery at Port Sudan, together with Sudapet. The refinery will be designed to process Dar blend crude, which has high-acid content and is found in Sudan's Melut basin. The refinery will have a minimum capacity of 100,000 bbl/d and could be operational in 2009. Petronas is joined with the Sudanese Ministry of Energy and Mining in a 50:50 partnership in the project.

All this will not be enough to absorb the country's growing acidic crude production. Sudan wants to boost Dar Blend output to 300,000 b/d by 2010 from 160,000 b/d. And Sudan may increase production of Fula crude. The 40,000 b/d Fula stream is absorbed by Sudapet's 100,000 b/d Khartoum refinery.

Refineries:

- Khartoum (50/50 joint venture between the Government and the CNPC, capacity of 100,000 bbl/d)
- Port Sudan Refinery (21,700 bbl/d)
- Petronas has agreed to joint venture with the Government to build a new refinery in Port Sudan with capacity of 100.000 bbl/d to treat Dar Blend crude; to be operational in 2009
- The small top-up refinery in Abu Gabra is planned for closure in 2007
- There are plans to build a refinery in Kosti

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<sup>3</sup> Energy Information Administration, Sudan Country Brief, April 2007, (accessed 30 August 2007)

### **3.2 Export facilities**

The completion of the Melut Basin Pipeline and the two spur wells to the Greater Nile Oil Pipeline in 2006 have unleashed important production potential in Blocks 3, 5A, 6 and 7. Total pipeline potential is in excess of one million b/d if all of the current pipelines were to be upgraded. The Melut Basin Pipeline has an initial capacity of 180,000 b/d, which can be boosted to 500,000 b/d. The capacity of the Greater Nile Pipeline reached 310,000 b/d in March 2004 and was further increased to 400,000 b/d in December 2004 in anticipation of demand from Blocks 6, 5A and 4. Eventually, the pipeline could serve Blocks 5B and B, which are still in the explorative phase. The Block 6 spur pipeline could double its throughput, but is currently subject to restrictions by the Khartoum refinery's capacity.

Sudan is loading all of its 365,000 b/d crude exports through export terminal Bashayer 1, creating technical difficulties because of the difference in quality of Dar Blend and Nile Blend. Sudan is completing a second crude export terminal, Bashayer 2, which state-owned SPC needs to boost exports of heavy sweet Dar Blend crude. Bashayer 2 will have a capacity of 500,000 b/d; well over current Dar Blend production of 170,000 b/d. The new facility will have 3mn bl of onshore storage, 20km south of Port Sudan on the Red Sea coast. After the completion of Bashayer 2, Sudan's existing crude export facility — the 450,000 b/d Bashayer 1 — will be used exclusively for exports of heavy sweet Nile Blend.

#### **Pipelines:**

- 994 mile pipeline from Unity, Heglig and Kaikang fields (Block 1,2 and 4) to Port Sudan (\$ 1.2bn)
- 870 mile pipeline linking Melut Basin (Block 3 and 7) to Port Sudan (\$1.2 bn)
- 110 mile pipeline linking Thar Jath and Mala fields (Block 5a) to Port Sudan
- 460 mile pipeline connecting Fula fields (Block 6) to Khartoum Refinery (\$352m)
- 500 mile pipeline from the Khartoum refinery to Port Sudan

### **4. Sudan's Potential**

Sudan has proven oil reserves of 6.4 billion barrels, 32 times more than was estimated in 1981. According to the British Petroleum statistical review by late 2005, the country produced 379 million b/d and by late 2006 more than 450.000 b/d. Both reserves and production cover 0.5 percent of the world reserves and production.

Sudan is Africa's largest country and the tenth largest country in the world. Its only coastline is in northeast, whereas the main hydrocarbon reserves are located in the south. The country is divided into 23 prospective blocks that have all been awarded, with the exception of Blocks 10 and 12B. So far, the oil exploration has been limited to the central and south central regions, but the country may also have commercial reserves in the east and northwest. Sudan remains largely unexplored. Intensive and comprehensive seismic data have been collected from a few areas only. No aggressive exploration commitment has been contractually imposed by the Government and the operating companies have concentrated on the most immediately promising areas, leaving other areas

unexplored. On the other hand, the operators of the producing blocks are currently implementing aggressive exploration programs. With the companies wanting to achieve payback as quickly as possible, development of discoveries is likely to be prompt.

The average block size is immense: 61,000 km<sup>2</sup>, compared to 5,700 km<sup>2</sup> for Libya and 1,500 km<sup>2</sup> for Angola and Nigeria. Block B, for instance, covers 118.000 square kilometres, which is about half the UK.

The only producing blocks are 1 through 7. Except for the two off shore blocks in the red Sea, the remaining blocks look much less promising, even though they have little or no seismic data. They are all leased by marginal and inexperienced companies. For instance, Zafir Petroleum has a stunning gross acreage of 315,722 km<sup>2</sup> (Blocks 9 and 11), but has no previous operator experience. Among the non producing blocks, block B, also in the South, is the most promising.

Sudan's oil production will probably peak in 2008, but revenues may be maintained for another 10 years at current levels, depending on the development of oil prices and whether the Dar Blend refinery will indeed be a price booster. The only prospective block that remains to be explored, Block B, will not come on stream before 2014 and may then partially compensate for the exhaustion of the fields that are currently producing.

## 2.5 Oil reserves

### **Proven oil reserves<sup>4</sup>**

<i>Year</i>	<i>Proven reserves</i>	<i>Oil production</i>
1981	0,2 in billions of barrels	0,0 in millions of barrels
1991	0,3	0,0
2001	0,7	211
2005	6,4 <sup>5</sup>	379

### **Estimated commercial reserves vs. production - December 2006**

(Proven reserves only, all from blocks 1, 2, 3, 4, 5a, 6, and 7)

Total recoverable reserves	3 billion barrels
Remaining Reserves	2.23 billion barrels
Estimated Production	617 thousand b/d (2007)

### **Estimated commercial reserves 31 December 2006, in thousands of barrels**

	<i>Total</i>	<i>Remaining</i>
Block 1, 2 & 4 (GNPOC)	1.686.000	983.000
Block 3 & 7 (PDOG)	803.000	779.000
Block 5A (WNPOC-1)	175.000	168.000
Block 6 (CNPC/S)	331.000	299.000
<i>Total</i>	<i>2.995.000</i>	<i>2.229.000</i>

<sup>4</sup> Source: BP statistical review

<sup>5</sup> The US Energy Information Administration put this figure in its Sudan Country Report of February 2007 on 5 billion barrels. Yet it seems that this figure relates to the year 2003.

This estimate is based on expected production using technology-in-place. Some believe that the Melut Basin may in fact hold 1.3 billion recoverable barrels.

GNPOC's production in Blocks 1, 2 and 4 reached its peak production of 328,000 b/d in 2005. Reportedly, GNPOC's policy to pump as much as possible as quickly as possible has led to loss of production potential. Unity and Heglig fields are in decline with produced water ratios exceeding 65%. On the other hand, the Neem field in block 4 that came on stream in July 2006 has offset most of the decline in production from the Unity and Heglig fields and, together with other, smaller new fields, will allow GNPOC to remain Sudan's main oil producing company for a few more years.

Exploration outside Upper Nile and Abyei (South Kordofan) has been disappointing. Chevron's two dry wells in Block C were matched by five dry wells that APCO drilled in 2005-6, leading to the withdrawal of Cliveden Ltd.

Parts of Block 6 (CNPC/S) were relinquished in 2005 for lack of prospects to form the new Block 17. SUDAPAK 1 failed to find oil in Blocks 11 and 14, while WNPOC-3 in Block 8 did thus far not beat Chevron's 1982 small find of Dindir 1. The Suakin gas condensate structure in Block 15, discovered by Chevron in 1976, was then estimated to have potential reserves of 10 - 49 bcf of natural gas and 100 - 500 million barrels of condensate. However, recent re-appraisals indicate a less extensive pay zone. Blocks 12A and 14 are not highly prospective. The fact that the remaining open Blocks 10 and 12B, offer moderate prospects at best, concludes the modest outlook for the northern part of the country.

Among the non-explored blocks, 5B (WNPOC-2) and B (Total-led consortium) potentially contain important commercial quantities. On the other hand, results in the southern part of Block 7 (PDO) and in the adjacent Ethiopian province Gambella have been disappointing, possibly backing up the suspicions of some geologists that the further south, the smaller the hydrocarbon reservoirs.

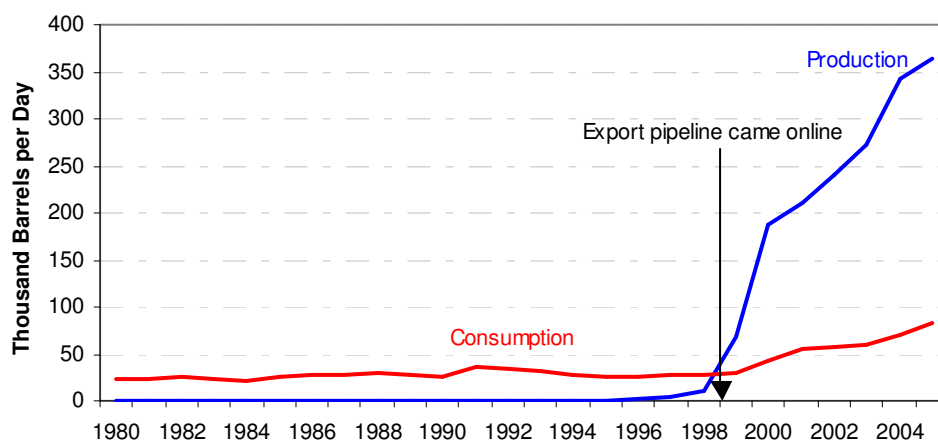
## **6. Production**

All of Sudan's proven commercial crude reserves are in the Muglad and Melut basins. The producing blocks are jointly operated and separate operating companies are created for the exploitation of the blocks. Staff distributions within the operating companies do not necessarily correspond with the distribution of ownership. Being mixed bags, the jointly operating companies are not always efficiently run.

Over 300 wells have been drilled in Sudan since the early 1960s. Around 200 of these have encountered hydrocarbons, giving an average technical and commercial success rate of around 60%.



### Sudan's Oil Production and Consumption, 1980-2005



Source: EIA *International Energy Annual 2004*; *Short Term Energy Outlook*

### 2006 Production of Oil Crudes, barrels per month

Item	Block 1A	Block 1B	Block 2A	Block 2B	Block 4	Block 5A	Block 3,7	Total
Jan.	4.024.850	1.917.819	502.088	1.325.312	419.548	-	-	8.189.617
Feb.	3.303.465	1.694.828	410.057	1.164.130	360.927	-	-	6.933.407
Mar.	3.625.269	1.987.393	466.555	1.260.840	457.096	-	-	7.797.153
Apr.	3.442.200	1.932.788	481.051	1.197.721	406.939	-	-	7.460.699
May.	3.416.926	1.855.272	489.069	1.263.966	360.670	-	-	7.385.903
Jun.	3.369.552	1.813.090	432.495	1.221.614	295.662	-	-	7.132.413
Jul.	3.420.893	1.731.791	503.486	1.255.258	963.204	-	-	7.874.632
Aug.	3.443.739	1.782.971	535.018	1.234.095	1.128.153	-	-	8.123.976
Sep.	3.325.042	1.768.904	505.613	1.128.971	1.109.039	-	-	7.837.569
Oct.	3.296.315	1.703.991	513.466	1.132.906	1.319.022	734.735	5.505.180	14.205.615
Nov.	3.050.819	1.664.793	491.704	1.115.305	1.298.675	635.558	5.155.147	13.412.001
Dec.	3.091.697	1.701.861	516.526	1.140.730	1.329.635	696.959	5.207.089	13.684.497
Total	40.810.767	21.555.501	5.847.128	14.440.848	9.448.570	2.067.252	15.867.416	110.037.482

Source: Bank of Sudan

According to a senior oil ministry official, Sudan's production reached 500,000 barrels per day by July 2007, of which about 425,000 were exported.<sup>6</sup>

<sup>6</sup> Reuters

### Estimated Oil Production 1997-2006 (in thousands of barrels per day)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Block 1, 2 & 4 (GNPOC)	6	6	52	194	219	245	268	291	328	316
Block 3 & 7 (PDOC)										66
Block 5A (WNPOC-1)										19
Block 6 (CNPC/S)	2	2	2	2	2	2	2	13	18	33
<i>Total</i>	<i>8</i>	<i>8</i>	<i>54</i>	<i>196</i>	<i>221</i>	<i>247</i>	<i>270</i>	<i>304</i>	<i>346</i>	<i>434</i>

### Expected Oil Production 2007-2016 (in thousands of barrels per day)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Block 1, 2 & 4 (GNPOC)	318	310	308	287	250	221	195	171	148	131
Block 3 & 7 (PDOC)	180	180	180	180	180	180	180	180	152	121
Block 5A (WNPOC-1)	50	60	54	46	39	33	28	24	20	17
Block 6 (CNPCIS)	69	96	92	81	72	64	57	50	44	38
<i>Total</i>	<i>617</i>	<i>646</i>	<i>634</i>	<i>594</i>	<i>541</i>	<i>498</i>	<i>460</i>	<i>425</i>	<i>364</i>	<i>307</i>

## 7. Costs

### Key Fields Capital Expenditures (US\$ Million, in 2007 terms) 1997-2016

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<i>Consortium</i>										
GNPOC	96	170	406	95	220	228	167	65	147	144
GN Oil Pipeline	57	321	492	42	41	74	72	109	53	51
PDOC							145	1021	420	185
WNPOC-1								43	278	338
CNPC/S							1137	293	263	234
<i>Total</i>	<i>153</i>	<i>491</i>	<i>898</i>	<i>137</i>	<i>261</i>	<i>302</i>	<i>1521</i>	<i>1531</i>	<i>1161</i>	<i>952</i>

	2007	2008	2009	2010	2011	2012	2013	2014
<i>Consortium</i>								
GNPOC	168	168	168				84	
GN Oil Pipeline								
PDOC	185	133	51	31	21			72
WNPOC-1	108	31	10	5	10			10
CNPC/S	80						51	
<i>Total</i>	<i>541</i>	<i>332</i>	<i>229</i>	<i>36</i>	<i>31</i>		<i>135</i>	<i>82</i>

Pipeline transportation tariffs Heglig-Port Sudan are between US\$4/bbl and US\$6/bbl. Operating costs are estimated to be between US\$1/bbl and US\$3/bbl.

Due to absence of independently verifiable data and the alleged occurrence of non-measurables (artificial pricing, non-competitive tendering, off-budget payments, and politicized deal-making and contracting routines), these figures

are estimations only. The expenditures by GNPOC and for the GN Oil Pipeline seem particularly low, considering the enormous efforts that were made in a short time span.

**8. Export<sup>7</sup>**

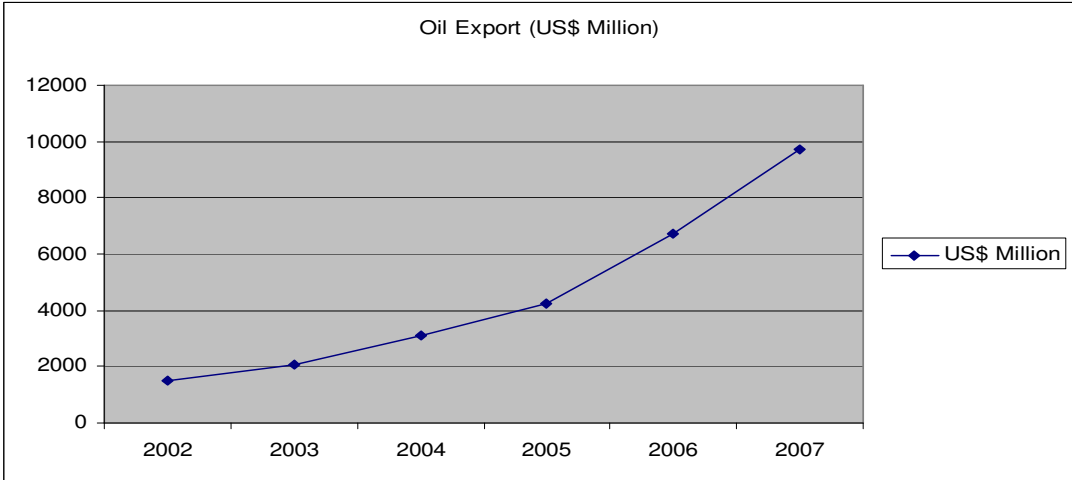
<b>Export of Crude Oil and total export earnings – total in US \$ 000’s</b>		
<i>Year</i>	<i>Crude oil</i>	<i>Total export earnings</i>
2003	1.934.020	2.542.176
2004	3.170.685	3.777.764
2005	4.268.186	4.824.278

<b>Petroleum Exports January – March 2006 in US \$ 000’s</b>				
	<i>January</i>	<i>February</i>	<i>March</i>	<i>Total 3 months</i>
Crude Oil	319.951	304.176	352.908	977.035
Refined oil	19.802	45.585	35.993	101.380

**Exports of Petroleum and Petroleum Products Jan-March 2006 in US \$ 000’s**

<i>Country</i>	<i>Amount</i>
Japan	112.894
Ethiopia	11.762
China	864.141
Lebanon	4.646
United Arab Emirates	30.077
Yemen	42.577
Others	17.527
<i>Total</i>	<i>1.083.624</i>

Differing figures exist however. According to official trade statistics as reported to the Global Trade, in 2006 Sudan shipped 124,000 bbl/d of its crude exports to Japan, and China’s import of Sudanese crude exports averaged only 99,000 bbl/d.<sup>8</sup>



<sup>7</sup> Central Bank of Sudan

<sup>8</sup> Sudan country brief, august 2007, (accessed 30 August 2007).

## 9. Profits

The Sudanese oil industry is exceptionally profitable. We have obtained the financial results of ONGC Nile Ganga B.V., a 100% subsidiary of ONGC Videsh Ltd that is a 25% partner to the GNPOC and WNPOC1 consortiums:

### ONGC Nile Ganga B.V.

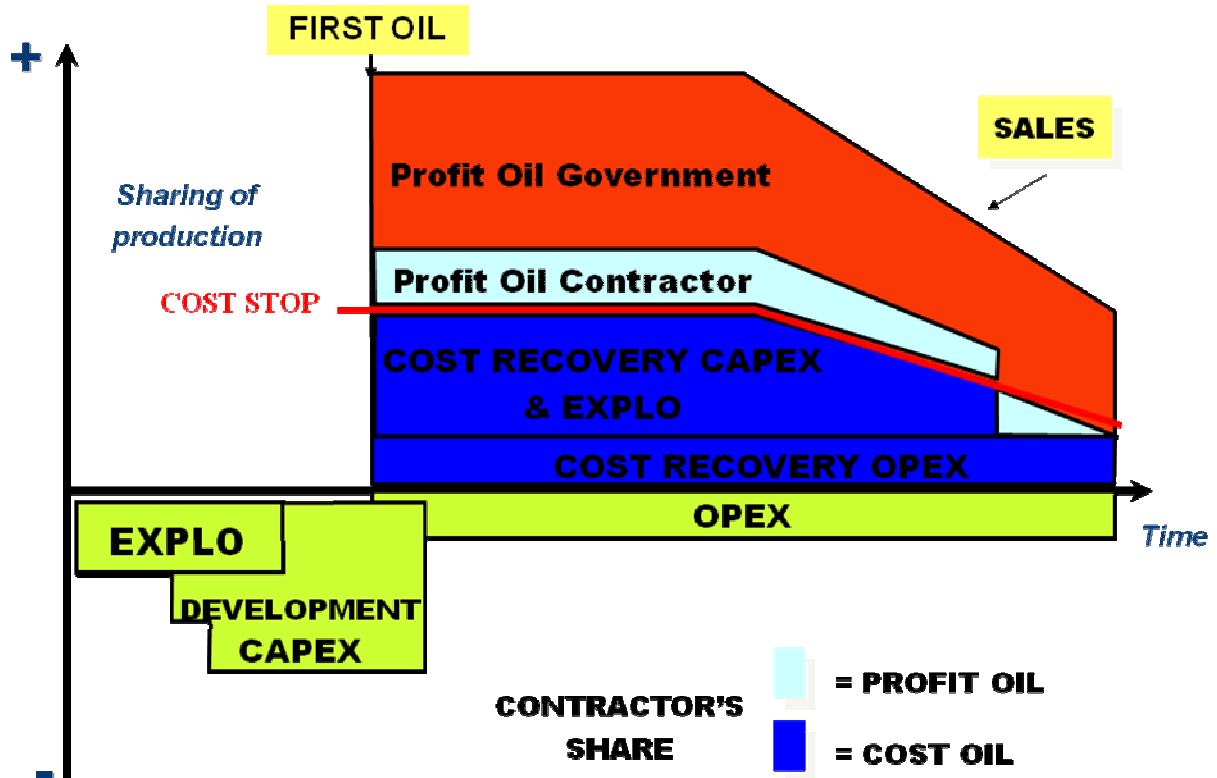
*Accounts as deposited with the Amsterdam Chamber of Commerce  
In Thousands of Euros*

	2005	2004	2003	2002	2001	2000	1999
Turnover	1,037,364	760,033	587,888	554,474	459,844	472,014	85,237
Costs	739,682	562,185	417,659	357,260	297,798	294,473	58,543
Operating profit	297,682	197,848	170,229	197,213	162,046	177,542	26,694
Financial income	6,937	13,008	12,392	17,924	0	2,696	0
Financial expense	2,758	0	1,048	0	9,533	10,858	11,690
Financial profit	4,179	13,008	11,344	17,924	-9,533	-8,162	-11,690
Profit before taxation	301,861	210,856	181,573	215,137	152,513	169,379	15,004
Taxation	92,843	60,009	51,873	53,793	47,884	45,775	6,531
Statutory payments	209,018	150,847	129,700	161,344	104,628	123,604	8,473
<b>Net profit</b>	<b>209,018</b>	<b>150,847</b>	<b>129,700</b>	<b>161,344</b>	<b>104,628</b>	<b>123,604</b>	<b>8,473</b>
Cash-flow	270,014	208,526	182,823	219,273	153,904	175,442	21,712
EBIT	297,682	197,848	170,229	197,213	162,046	177,542	26,694
EBITDA	358,679	255,526	223,352	255,142	211,322	229,380	39,934

ONGC Videsh paid Talisman Energy \$735 million for its 25% share in GNPOC and WNPOC1 in 2003 and made an aggregate profit of \$650 million in 2003-5 only. Based on these figures and taking the current high oil prices into account, we estimate that CNPC, Petronas and ONGC may be making aggregate profits of up to \$2 billion in 2007 on their operations in blocks 1, 2, 4, and 5A, all taxable outside the country.

## 10. Economics of an Exploration and Production Sharing Agreement

Sudan has opted for EPSAs to rule the distribution of revenues and risks between the government and the companies. The economics of an EPSA are basically as follows:



Based on the GNPOC contract that is circulating on the internet, the following figures illustrate the distribution of costs and revenues.

### Model results for a typical Sudanese Production Sharing Contract

Year	(a) Prod. b/d	(b) Oil price /bbl	(c) Capex US\$m	(d) Opex US\$m	(e) Field reve- nue US\$m	(f) Cost oil US\$m	(g) Profit oil US\$m	(h) State share of (g) %	(i) State profit oil US\$m	(j) Net cash flow US\$m
2004			40.0							-40.0
2005			335.0							-335.0
2006	19.0	50.0	285.0	14.4	294.7	132.6	162.1	60.0	97.3	-102.0
2007	50.0	50.0	61.5	143.8	775.6	370.9	404.7	65.0	263.0	307.3
2008	60.0	50.0	15.8	174.2	930.8	358.5	572.2	67.5	386.3	354.5
2009	56.0	50.0		167.5	868.7	351.9	516.8	66.6	344.3	356.9
2010	50.0	50.0		154.8	775.6	174.1	601.5	65.0	391.0	229.8
2011	44.0	50.0		141.3	682.6	145.3	537.3	64.3	345.6	195.6
2012	40.0	50.0		133.0	620.5	133.0	487.5	63.8	310.8	176.7
2013	35.0	50.0		121.2	542.9	121.2	421.8	62.9	265.1	156.7
2014	30.0	50.0		108.6	465.4	108.6	356.8	61.7	220.0	136.8
2015	25.0	50.0		95.4	387.8	95.4	292.4	60.0	175.5	117.0
2016	20.0	50.0		78.2	310.3	78.2	232.0	60.0	139.2	2.8

2017	16.0	50.0	66.8	248.2	66.8	181.4	60.0	108.9	72.6
2018	13.0	50.0	58.1	201.7	58.1	143.5	60.0	86.1	57.4
2019	10.0	50.0	49.0	155.1	49.0	106.1	60.0	63.7	42.4

a= Production profile

b= Oil price assumption

c= Capex profile

d= Opex profile (excluding transportation tariff)

e= Field revenue is based on oil price FOB Port Sudan less the transportation tariff. Tariff in this case is assumed to be constant at US\$6/bbl:

(a) x {(b) - 4.5} x 0.365

f= Smaller of: (45% x (e)) and ((d) + depreciated (c) due)

Where Cost Oil Limit = 45% of field revenue and depreciation is straight line over 4 years

g= {45% x (e)} - (f)

h= Profit Oil = 55% of field revenue.

55% x (e)

i= Profit Oil Sharing:

Average Daily Production (b/d)	State Share	Consortium Share
--------------------------------	-------------	------------------

Up to 25,000	60%	40%
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Between 25,000 and 50,000	70%	30%
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Greater than 50,000	80%	20%
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j= (g) x (h)

k= (f) + (g) - (i) - (c) - (d)

### Typical marginal government take in Sudan from US\$100 million of gross revenues from a 100.000+ b/d field

Gross revenues	100	
Cost Oil limit		40
Company cost recovery	15	
Excess Cost Oil to Government	25	
Profit Oil pool	60	
Company % Profit Oil (20%)	12	
Government % Profit Oil (80%)		48
Total Company take		27
Marginal Government take	73	

## 11. Revenue Sharing

### Government of Southern Sudan export revenue share, 1<sup>st</sup> half of 2007<sup>9</sup>

*In millions of US\$*

Month	Q Export (BBLs)	Total Export Revenue	Transportation cost (Export+ Local)	Net National Government Revenue	Net Available for Distribution after states share 2%	GOSS revenue share (50%)
Jan	5,055,697	219.10	27.30	191.80	187.96	64.50
Feb.	4,273,284	144.74	34.33	110.41	108.20	39.98
March	2,531,505	65.60	29.61	35.99	35.27	15.92
April	5,802,319	188.02	33.62	154.4	151.31	58.16
May	6,190,142	303.66	36.95	266.71	261.38	87.37
June	5,287,340	247.41	37.02	210.39	206.19	78.76
<b>Total</b>	<b>29.140.287</b>	<b>1.168.54</b>	<b>199.52</b>	<b>969.02</b>	<b>949.63</b>	<b>344.69</b>

### GOSS revenues from non-exported crude, 1<sup>st</sup> half of 2007<sup>10</sup>

*In millions of US\$*

Month	Actual Quantities (million BBL)	Average FOB price in previous month	Total Calculated revenue	Administrative Fees (Export+ Local)	Available Revenue after Deduction of Administration Fees	Revenue Available for Distribution less (2%)	%Of oil produced in south	GOSS (Net Share) "50%"
Jan	1.962	56.60	111.05	14.30	96.75	94.81	60.52 %	28.70
Feb.	1.670	49.16	82.10	11.73	70.37	68.96	59.97 %	20.68
March	2.000	56.59	113.18	16.78	96.40	94.47	60.57 %	28.61
April	1.892	58.36	110.42	19.02	91.40	89.57	59.94 %	26.84
May	1.918	65.0	124.67	14.62	110.05	107.85	60.59 %	32.67
June	2.010	66.17	133.0	13..38	119.63	117.23	59.33 %	34.78
<b>Total</b>	<b>11.452</b>		<b>674.42</b>	<b>89.83</b>	<b>584.59</b>	<b>572.9</b>		<b>172.28</b>

<sup>9</sup> Source: Bank of Sudan

<sup>10</sup> Source: Bank of Sudan

## Bank of Sudan's public data on oil shipments and export sales

Ship ment No. Govt	Date of shipment	Amount received Volume (Barrel)	Price	value	Date of addition to petroleum A/C	value received in Dollars	Govt. share ( \$55 per/ BBI ) receipts in SD "BOS" date Export A / c
1	4/12/2006	1,045,340	56.03	58,570,400.20	8/1/2007	47,040,300.00	9,438,636,195.00
2	17/12/2006	765,295	56.89	43,537,632.55	17/1/2007	34,438,275.00	6,907,629,199.50
3	20/12/2006	1,010,465	56.99	57,586,400.35	23/1/2007	45,470,925.00	9,118,284,590.25
1Dar	3/11/2006	1,093,520	37.31	40,800,000.00		40,800,000.00	8,220,601,943.42
4	1/1/2007	627,570	46.77	29,351,448.90	3/2/2007	28,240,650.00	5,656,319,788.50
5	29/12/2006	85,556	56.40	4,825,358.40	28/1/2007	3,850,020.00	770,928,004.8
6	8/1/2007	950,297	48.92	46,488,529.24	7/2/2007	42,763,365.00	8,609,722,876.20
7	26/1/2007	758,078	50.93	38,608,912.54	25/2/2007	34,113,510.00	6,825,431,080.80
2Dar		137,402	16.50	2,266,494.45	1/2/2007	2,266,494.45	456,245,333.30
3Dar		764,929	14.87	11,370,777.45	10/2/2007	11,370,777.45	2,288,027,838.11
4Dar		151,982	23.32	3,543,860.51	15/2/2007	3,543,860.51	712,918,419.76
5Dar		797,470	23.32	18,599,801.23	21/2/2007	18,599,801.23	3,740,792,022.48
8	16/2/2007	814,886	56.78	46,269,227.08	16/3/2007	36,669,870.00	7,335,807,493.50
9	26/2/2007	1,001,945	56.47	56,579,834.15	26/3/2007	55,106,975.00	11,021,946,069.75
10*	**	474,595	55.380	26,283,071.10	14/3/2007	26,102,725.00	5,251,091,900.25
6Dar	31/1/2007	474,772	9.41	4,468,005.34	1/3/2007	4,468,005.34	896,281,870.48
7Dar	6/2/2007	419,965	19.39	8,144,219.15	11/3/2007	8,144,219.15	1,632,091,738.08
8Dar	12/2/2007	821,882	19.86	16,320,553.00	27/3/2007	16,320,553.00	3,272,434,082.03
11	2/3/2007	625,514	58.04	36,304,832.56	2/4/2007	33,346,151.34	6,669,897,191.00
12	21/3/2007	409,801	59.62	24,432,335.62	21/4/2007	22,539,055.00	4,508,036,390.55
13	27/3/2007	433,081	59.62	25,820,289.22	27/4/2007	23,819,455.00	4,764,367,389.00
14	30/3/2007	629,574	57.93	36,471,221.82	30/4/2007	34,626,570.00	6,925,660,265.70
15	31/3/2007	628,955	57.67	36,271,834.85	30/4/2007	34,592,525.00	6,918,850,925.25
This represent the difference between the						1,057,118.66	211,455,445.56



price 53.31 & 55							
9Dar	26/2/2007	414,400	22.28	9,232,655.33	5/4/2007	9,232,655.33	1,868,296,545.63
10Dar	28/2/2007	400,269	22.16	8,870,878.65	5/4/2007	8,870,878.65	1,752,651,288.37
11Dar	6/2/2007	419,965	5.24	2,200,144.26	19/4/2007	2,200,144.26	344,375,361.04
12Dar	12/2/2007	208,243	1.76	366,960.71	19/4/2007	366,960.71	94,505,995.59
12Dar	6/3/2007	532,774	26.15	13,934,247.00	19/4/2007	13,934,247.00	2,723,350,545.80
13Dar	12/3/2007	523,243	16.82	8,800,577.05	19/4/2007	8,800,577.05	1,816,228,332.81
14Dar	1/4/2007	524,172	21.69	11,367,412.03	19/4/2007	11,367,412.03	2,356,454,049.71
15Dar	20/3/2007	159,736	33.19	5,301,763.93	19/4/2007	5,301,763.93	1,115,463,917.72
16Dar	12/3/2007	49,444	25.73	1,272,423.34	19/4/2007	1,272,423.34	262,648,689.87
17Dar	29/3/2007	532,813	27.46	14,632,898.44	19/4/2007	14,632,898.44	2,884,717,660.86
16	**			5,325,097.00	5/5/2007	5,325,097.00	1,097,948,149.79
16	**			4,726,667.42	26/5/2007	945,428,016.71	945,428,016.71
17	5/4/2007	495,153	65.31	32,338,442.43	5/5/2007	27,233,415.00	5,448,317,004.90
18	5/4/2007	153,078	65.31	9,997,524.18	5/5/2007	8,419,290.00	1,684,363,157.40
19	22/4/2007	983,317	64.61	63,532,111.37	22/5/2007	54,082,435.00	10,820,813,594.80
20	28/4/2007	821,364	65.31	53,643,282.84	28/5/2007	45,175,020.00	9,040,425,002.40
21	29/4/2007	591,633	64.96	38,432,479.68	29/5/2007	32,539,815.00	6,511,867,777.80
18Dar	29/3/2007	485,194	15.27	7,410,833.29	10/5/2007	7,410,833.29	1,468,093,807.1
19Dar	6/4/2007	485,237	33.49	16,248,270.62	17/5/2007	16,248,270.62	3,225,563,946.0
20Dar	12/4/2007	483,556	40.41	19,540,251.50	17/5/2007	19,540,251.50	3,879,079,331.4
21Dar	18/4/2007	467,275	36.03	16,833,629.05	30/5/2007	16,833,629.05	3,365,108,216.0
22Dar	26/4/2007	485,263	25.68	12,461,794.66	31/5/2007	12,461,794.66	2,494,228,201.2
<u>Total</u>		<u>24,139,003.00</u>		<u>1,029,385,384.49</u>		<u>1,875,969,029.70</u>	<u>187,353,386,646.18</u>

For additional official data, see (<http://www.cbos.gov.sd/english/oil>).

## 12. What is wrong with the Dar Blend crude?

The figures above show that Dar Blend crude, found in the Melut Basin East of the White Nile, is making low and extremely variable prices, from 40 to 1.76 US\$. This is quite remarkable and not well explained. Disappointing revenues from the blend have obliged the GONU and GOSS to painful adjustments to their 2007 budgets.

According to the International Crude Oil Market Handbook, Sudan's Nile Blend is considered sweet and light, having a gravity of 33 degrees API and a low sulfur content of 0.045 percent. Sudan produces up to 270,000 b/d of Nile Blend, of which 200,000 b/d is exported.

Dar Blend is heavy paraffinic crude (wax content 15 - 23 wt %) with a high pourpoint of about 40 °C. As such it has to be transported heated at about 45-50°C in order to avoid congealing in the ship tanks. In addition the crude, even when transported heated, can only be discharged in terminals having no restrictions for such crudes, or diluted with a light crude. This is a penalty for the potential customers.

Dar Blend is a high acid crude (Total Acid Number is 3 to 4 mg KOH/g). High acid crudes erode refinery metalwork. Refiners have to upgrade equipment, or pre-treat or blend the crude. Acidity is not an issue for fuel oil blending, but Dar Blend has limitations as a blend stock. The crude is viscous and has high water and sediment content. Dar Blend also has a flash point of 35°C, which means that blenders have to mix it with other components to reach fuel oil's 60°C minimum flash point requirement.

Dar Blend has a high Arsenic content (> 800 ppb). Arsenic is considered as a pollutant especially for refinery catalysts. Some Arsenic species are volatile and can contaminate all the crude fractions. This point can make Dar blend unacceptable for some customers.

The fuel content of Dar Blend is high, some customers are blending it with other component in order to sell the blend as fuel oil; As an order of magnitude, the price of fuel oil in Asia is around 15 to 20 \$/bbl lower than crude oil.

The technical value of Dar Blend as calculated in a valuation model is low; in addition all the non-quantifiable quality aspects above have a huge impact on its price. One advantage for Dar Blend is its low sulphur content enabling the production of low sulphur fuel oil.

China was the sole Dar Blend buyer for the first two months of its production. Italian refiner Saras bought Dar Blend in November for a trial. Saras' 285,000 b/d Sarroch refinery can refine high acid crude. Spain's Repsol-YPF has only considered buying Dar Blend.

Companies are looking at 0.12pc sulphur Dar Blend as a fuel oil blend stock to reduce sulphur content. Singapore-based Titan Oil and trading firm Vitol bought Dar Blend in December for fuel oil blending and China has mixed Dar Blend into fuel oil for small local electricity plants, although it refines most of what it takes.

The first two cargoes were sold for \$23.55/bl and \$8.90/bl, says an IMF report. Subsequent cargoes traded at \$30/bl discounts or more to dated BFO on a delivered basis. Interest in the crude as a blend stock has kept prices from falling too far, except, if we may rely on the data from the bank of Sudan, for a handful of incredibly low priced cargoes. Dar Blend is now priced at \$25-28/b below dated BFO and often even considerably less. This is still low compared with other acidic grades, which trade at much smaller discounts. Chad's Doba crude, although more acidic than Dar Blend, trades just \$10-15/bl below dated BFO.

Part of the reason for Dar Blend's larger discount may be explained by the absence of US buyers. Small volumes of Doba can be refined at Chevron's 325,000 b/d Pascagoula refinery in Mississippi, and by ExxonMobil and US refiner Sunoco. But US firms — and foreign firms with US assets — will not use Dar Blend. US sanctions Sudan's oil sector, leaving Dar Blend producers with fewer outlets.

Malaysia's Petronas, China's CNPC and Sudan's Sudapet produce Dar Blend. Vitol markets the crude for CNPC and Sudapet. Petronas markets its own share.

A refinery will be built in Port Sudan to treat Dar blend. The project is grossly over due. The characteristics of Dar Blend have been well known for many years and the belated construction of a custom refinery may be costing the country billions of dollars.

### **13. Recent developments**

- The National Petroleum Commission (NPC) has settled the dispute over Block B in favour of the Total led consortium, at the expense of White Nile Ltd. The consortium is currently seeking to replace the US company Marathon Oil, which has decided to leave Sudan. The decision marks an end to the scramble for Sudan's oil rights
- The off shore Block 13 has been awarded to a CNPC-led consortium.
- Block 12A in North Darfur has been allocated to a group of minor Arab and Sudanese oil companies.
- CNPC has relinquished most of Block 6 for lack of prospectivity, including most of its stake in Darfur. The relinquished acreage has been turned into a new Block 17, which has been awarded to a small Yemenite oil company, Ansan.
- An agreement has been reached between the Southern Sudanese oil company Nile Petroleum (NilePet) and the Spanish minor H Oil for Block Ea. No details have officially been made available and the NPC has yet to express its opinion on the legal status of the deal.
- The composition of the consortium that is exploiting Block 5b is under renegotiation, following the decision by the NCP to settle the dispute over the block through compromise, awarding NilePet and Ascom a right to farm into the block.

## **14. Final remarks**

The signature of the CPA in January 2005 marked a second boost for the industry. Until 2006 Sudan had only one major upstream project (Blocks 1, 2 and 4, operated by the Greater Nile Petroleum Operating Company in the Muglad Basin), one export pipeline (Greater Nile Oil Pipeline), and one crude oil blend (high quality Nile Blend). Late 2006, a second pipeline came on stream, a major refinery expansion was realized, a second major upstream project began, producing a second crude oil blend (low quality Dar blend), in addition to important field developments elsewhere

The focus for 2007 is on both exploration and development. The operators of the producing blocks are implementing aggressive exploration programs. With the companies wanting to achieve payback as quickly as possible, development of discoveries is likely to be prompt.

Sudan's oil production will probably peak in 2008, but revenues may be maintained for another 10 years at current levels, depending on the development of oil prices and whether the Dar Blend refinery will indeed be a price booster. The only prospective block that remains to be explored, Block B, will not come on stream before 2014 and may then partially compensate for the exhaustion of the fields in Western Upper Nile.