

# *Oil supply analysis from the Goldman Sachs Top230 study*

**September 2009**

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## ***The Top230 study: 3 key takeaways for oil supply***

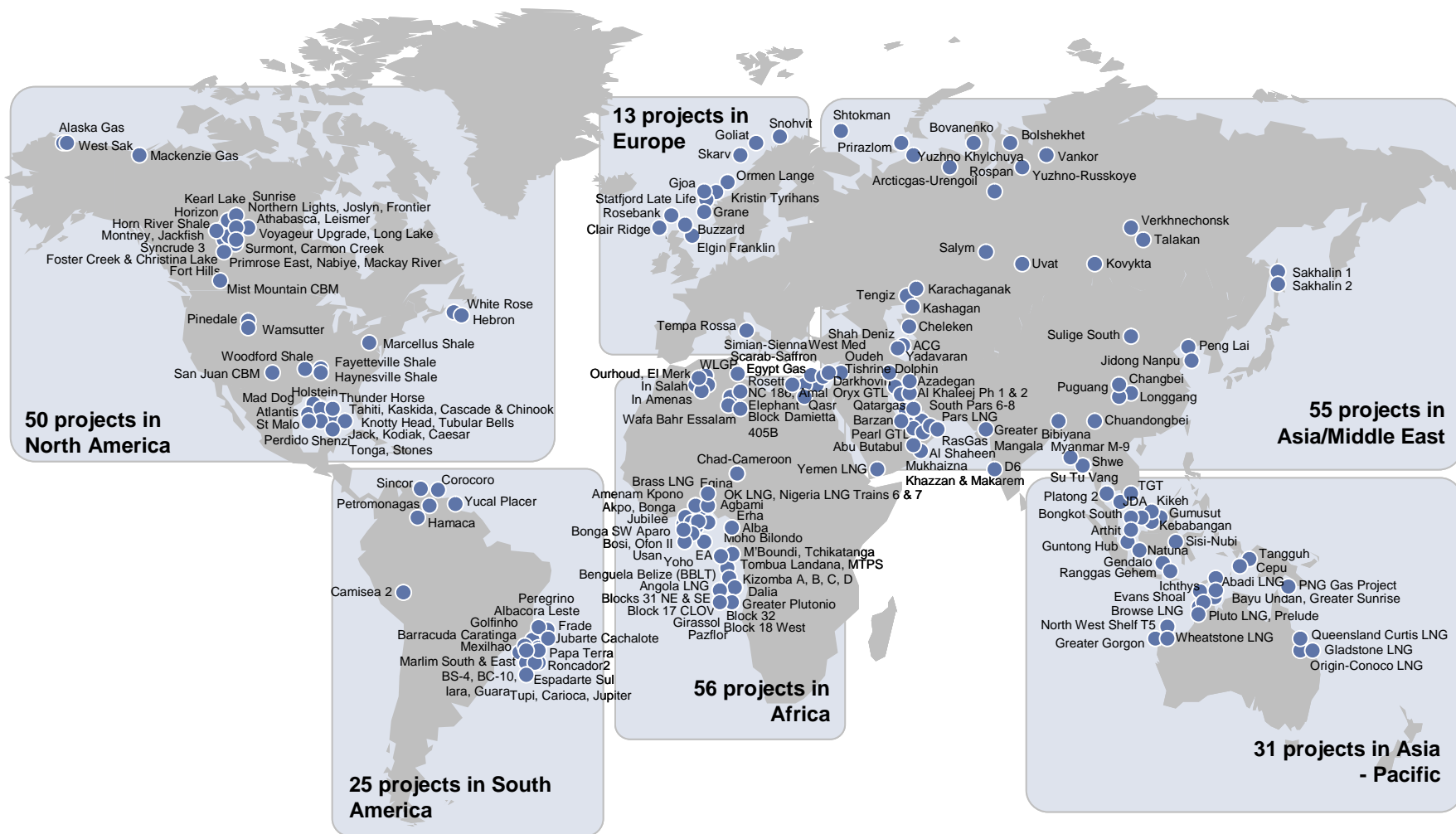
Our Top230 study models the largest 230 new oil and gas developments in the world, with a total 352 bn boe of reserves, \$2.6 tn of capex and 37 mn boe of peak production in 2019.

We have been conducting this study since 2003 and it gives us insight into the development of large new projects, the industry's ability to deliver them and the decline rates of the producing base.

Three key themes relevant to global oil supply emerge from this study:

- 1) the 2007-09 period was effectively wasted in terms of maturing new projects towards FID (Final Investment Decision);
- 2) decline rates in non-OPEC have increased;
- 3) the industry's delivery track record has been very poor. If this trend continues, non-OPEC faces potentially disastrous production declines.

# An introduction: the Top230 fields



Source: Goldman Sachs Equity Research

# ***A detailed analysis of global oil supply***

The following slides focus on six issues:

1. Modelling oil decline rates by region and adding production from the major new start-ups, non-OPEC production expected to decline c.1.2% pa in the coming five years;
2. Decline rates in non-OPEC have increased in the past years. The key question is whether this dynamic will continue;
3. The industry failed to move forward major new projects in the period 2007-09. Given a standard delivery period of c.4 years from FID to delivery, this implies that the 2011-13 period will suffer from a small amount of new start-ups;
4. Project delivery from the industry has been poor, with 5% less volumes than expected 1 year forward; 10%-15% less 2 years forward and 15%-20% less 3 years forward;
5. If this poor delivery continues, non-OPEC production would decline at 2% pa in the 2011-13 period;
6. OPEC (outside Saudi) should also struggle to grow capacity and 2009 is likely to prove a difficult year to repeat.

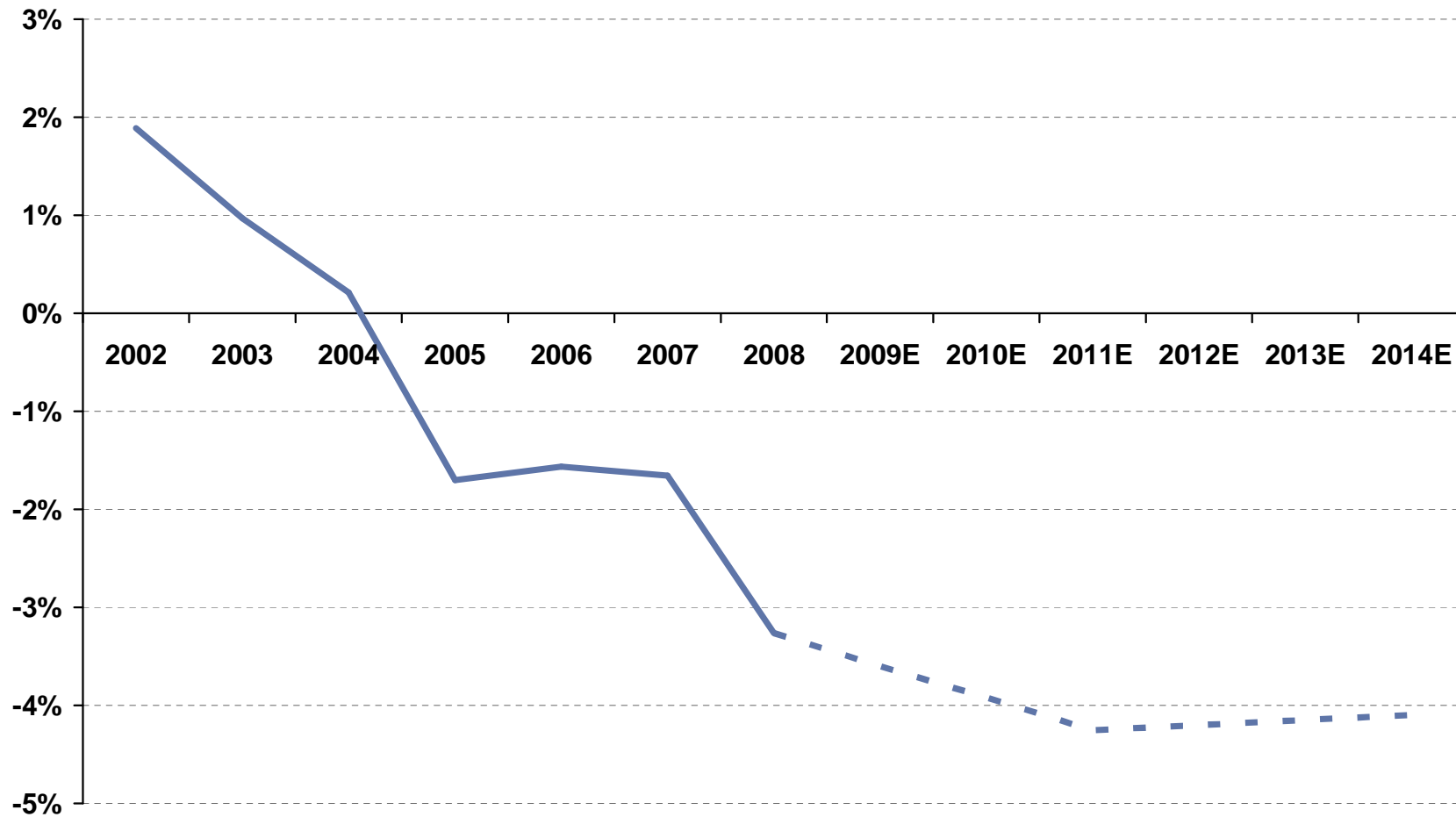
# 1: Non-OPEC production on our estimates will decline even with no delivery problems

Production ex-Top230 growth/(decline)	2002	2003	2004	2005	2006	2007	2008	2009E	2010E	2011E	2012E	2013E	2014E
Russia	9%	11%	9%	3%	2%	0%	-2%	-2%	-3%	-4%	-4%	-4%	-4%
US	-1%	-3%	-2%	-5%	0%	0%	-4%	-2%	-3%	-4%	-4%	-4%	-4%
Canada	7%	3%	0%	-3%	0%	2%	-4%	-5%	-5%	-5%	-5%	-5%	-5%
Mexico	1%	6%	1%	-2%	-2%	-6%	-9%	-8%	-8%	-8%	-8%	-8%	-8%
Western Europe	-1%	-4%	-6%	-9%	-9%	-8%	-6%	-9%	-9%	-9%	-9%	-9%	-9%
Caspian	8%	8%	7%	7%	-5%	5%	-2%	-3%	-3%	-3%	-3%	-3%	-3%
Australasia	0%	-1%	0%	1%	0%	-1%	-1%	-2%	-2%	-2%	-2%	-2%	-2%
Africa	3%	-2%	5%	3%	1%	7%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Middle East ex-OPEC	-5%	-5%	-7%	-1%	-8%	-8%	-4%	-7%	-7%	-7%	-7%	-7%	-7%
Latin America	2%	-1%	-5%	-4%	-1%	-7%	1%	-3%	-3%	-3%	-3%	-3%	-3%
Total	2%	1%	0%	-2%	-2%	-2%	-3%	-4%	-4%	-4%	-4%	-4%	-4%
<b>Top230 production</b>													
Russia	30	28	42	62	133	351	475	745	928	1,120	1,336	1,510	1,674
US	2	3	5	69	69	96	220	583	879	995	1,076	1,035	1,029
Canada	10	83	160	200	311	408	444	587	770	977	1,124	1,281	1,521
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0
Western Europe	135	148	251	307	402	551	584	574	598	616	638	656	653
Caspian	511	524	594	670	988	1,225	1,373	1,619	1,732	1,763	1,799	1,981	2,088
Australasia	6	30	73	125	117	125	244	398	579	702	906	1,140	1,211
Africa	2	35	220	217	221	192	230	271	302	411	450	467	532
Middle East ex-OPEC	0	0	1	2	16	34	69	99	141	183	215	225	233
Latin America	105	137	189	481	613	812	899	1,175	1,353	1,550	1,771	1,988	2,115
Total	801	988	1,537	2,133	2,870	3,792	4,538	6,049	7,281	8,316	9,314	10,283	11,055
<b>Total production</b>								1%	-1%	-2%	-1%	-2%	-2%
Russia	7,698	8,544	9,287	9,552	9,769	9,978	9,886	9,967	9,874	9,708	9,581	9,425	9,272
US	7,626	7,400	7,228	6,895	6,871	6,879	6,736	6,968	7,072	6,941	6,784	6,515	6,290
Canada	2,858	3,004	3,085	3,041	3,147	3,309	3,238	3,240	3,291	3,371	3,399	3,442	3,574
Mexico	3,585	3,789	3,824	3,760	3,683	3,477	3,157	2,905	2,672	2,458	2,262	2,081	1,914
Western Europe	6,902	6,628	6,326	5,855	5,425	5,187	4,921	4,520	4,189	3,884	3,612	3,363	3,116
Caspian	1,681	1,793	1,957	2,126	2,368	2,670	2,784	2,988	3,061	3,051	3,049	3,194	3,264
Australasia	7,884	7,791	7,829	7,926	7,941	7,907	7,928	7,928	7,958	7,934	7,993	8,086	8,018
Africa	1,937	1,937	2,216	2,265	2,281	2,391	2,401	2,421	2,430	2,518	2,536	2,532	2,577
Middle East ex-OPEC	1,953	1,847	1,719	1,698	1,583	1,480	1,463	1,396	1,347	1,305	1,258	1,195	1,136
Latin America	3,323	3,333	3,238	3,419	3,512	3,500	3,605	3,800	3,899	4,020	4,167	4,312	4,369
	45,447	46,066	46,710	46,538	46,579	46,778	46,120	46,134	45,794	45,191	44,640	44,144	43,528
	1,141	619	644	-172	41	199	-658	14	-340	-603	-551	-497	-615
	<b>2.6%</b>	<b>1.4%</b>	<b>1.4%</b>	<b>-0.4%</b>	<b>0.1%</b>	<b>0.4%</b>	<b>-1.4%</b>	<b>0.0%</b>	<b>-0.7%</b>	<b>-1.3%</b>	<b>-1.2%</b>	<b>-1.1%</b>	<b>-1.4%</b>

Source: Goldman Sachs Equity Research

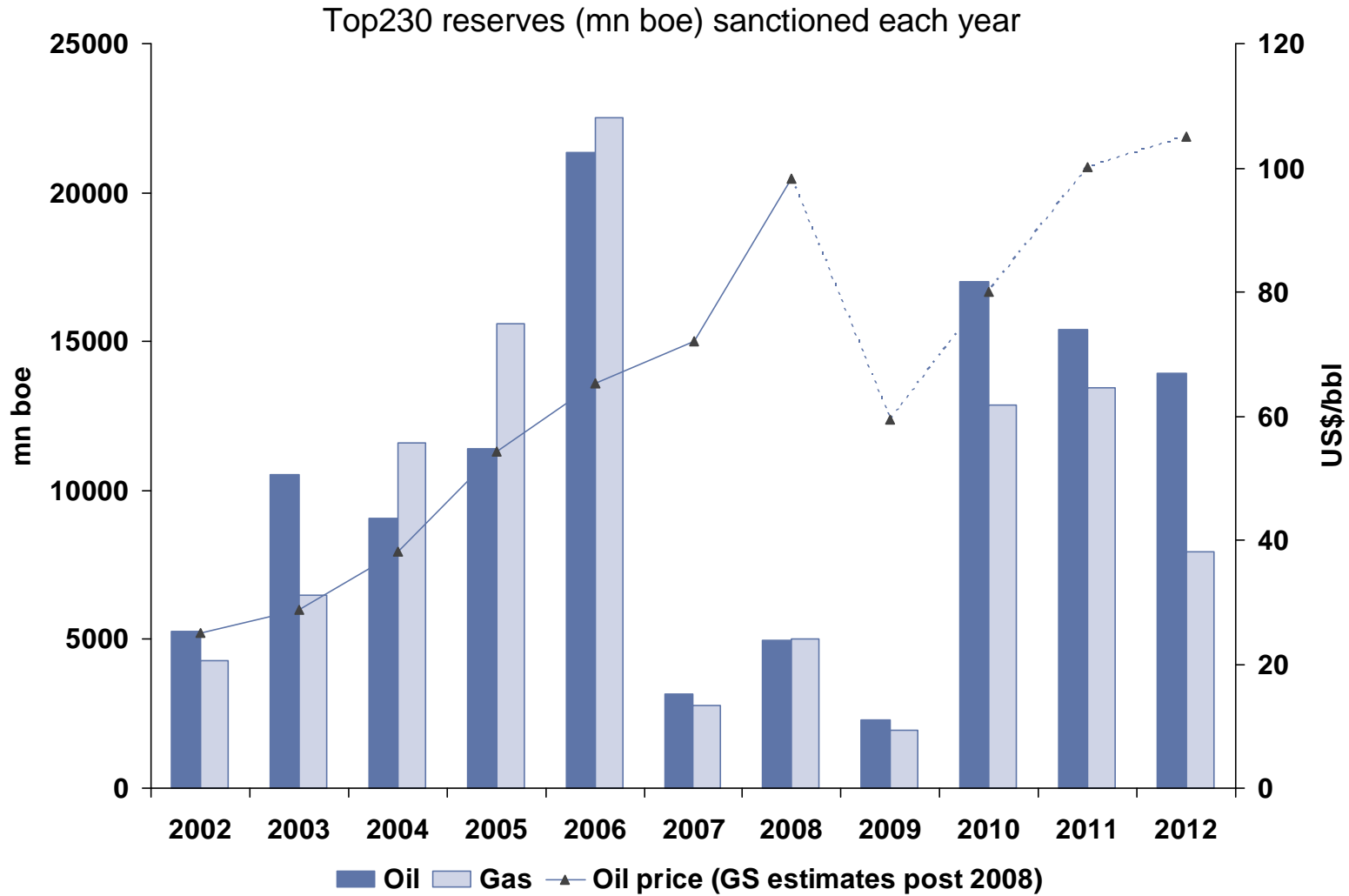
## 2: Non-OPEC decline rates are increasing

Non-OPEC decline rates ex-Top230 projects



Source: Goldman Sachs Equity Research

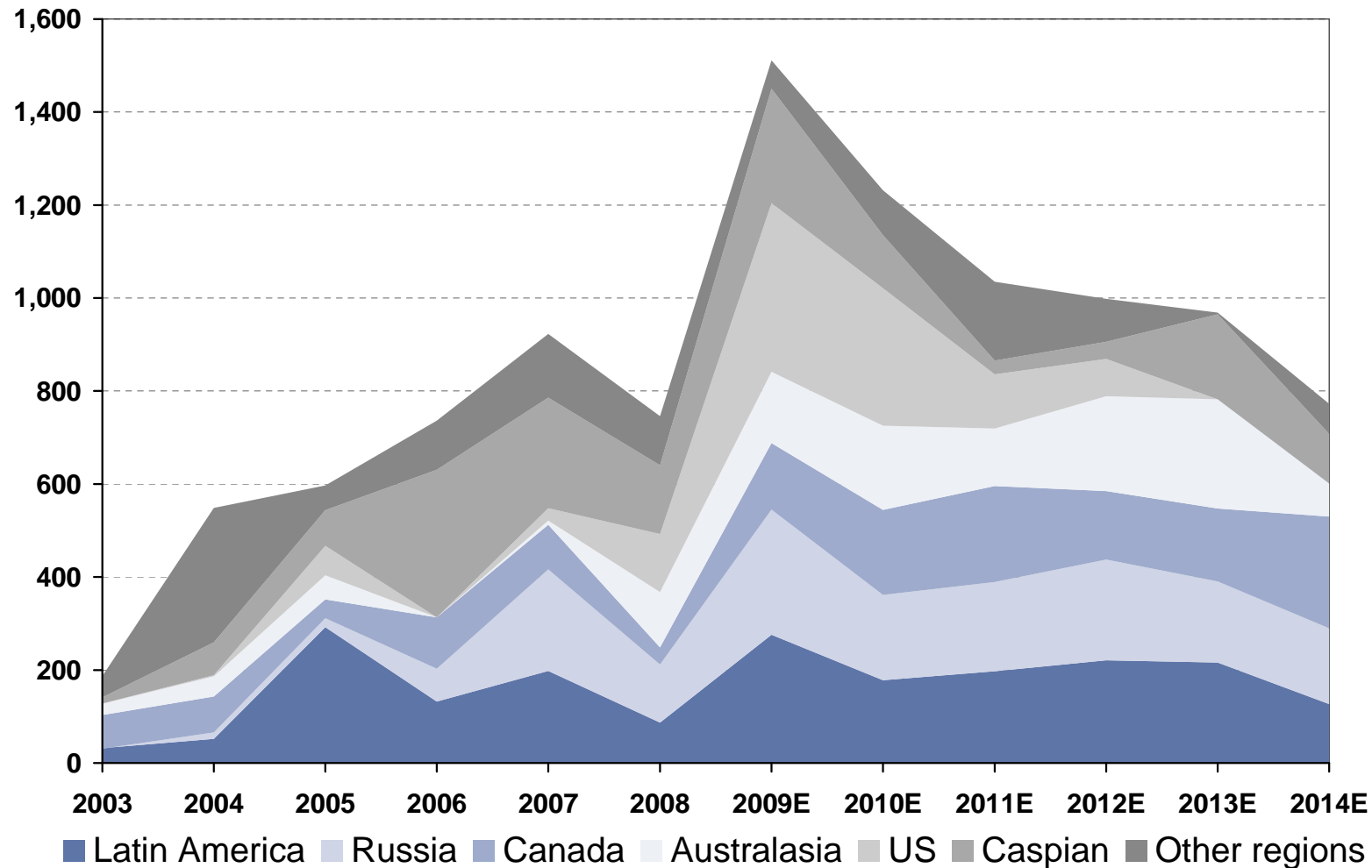
### 3: New projects have frozen for three years...



Source: Goldman Sachs Equity Research

# ...and the 2009 start-ups are unlikely to be repeated

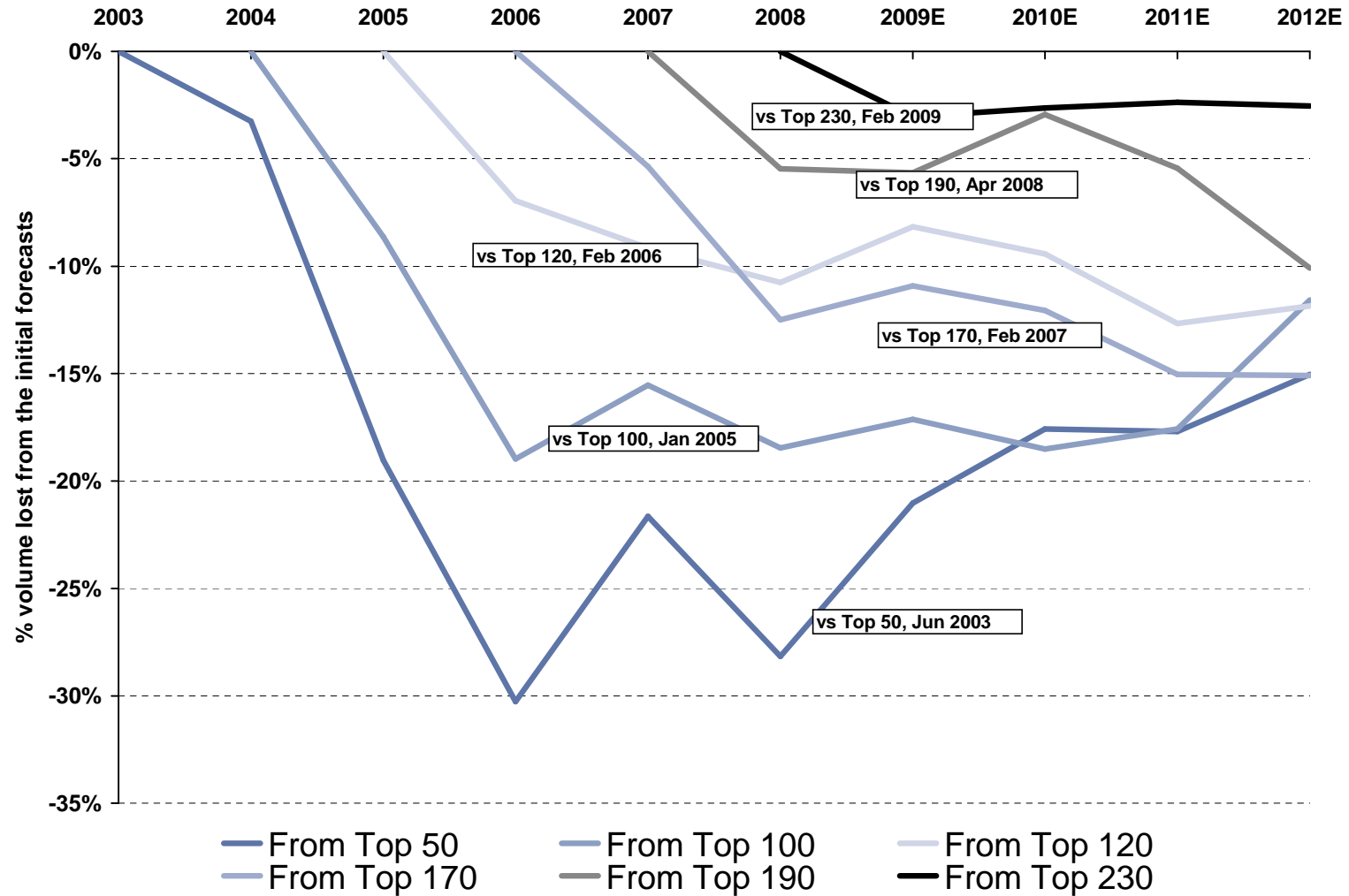
Top230 volume addition by year in each region



Source: Goldman Sachs Equity Research

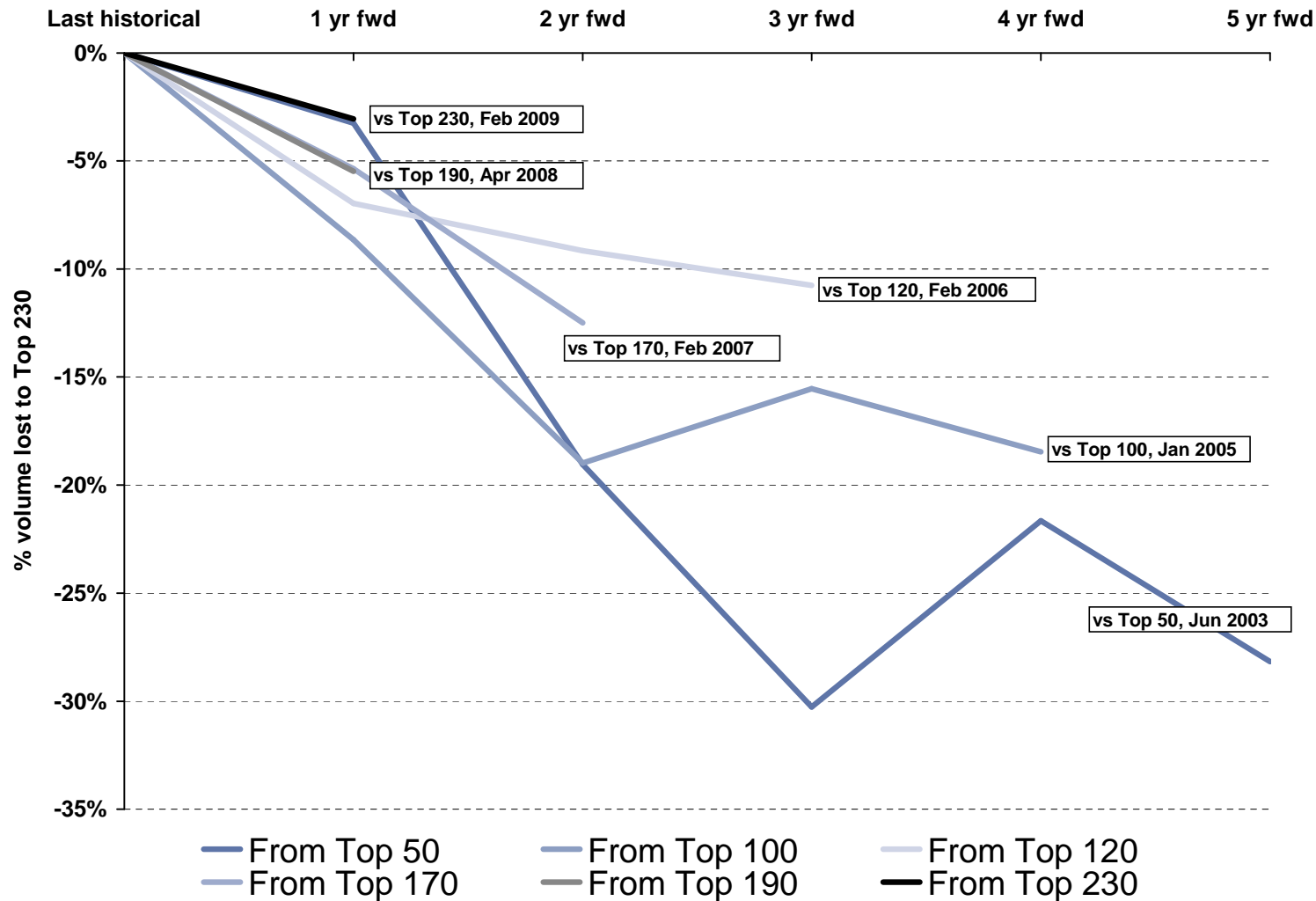


# 4: Execution: the industry has never delivered promised volumes...



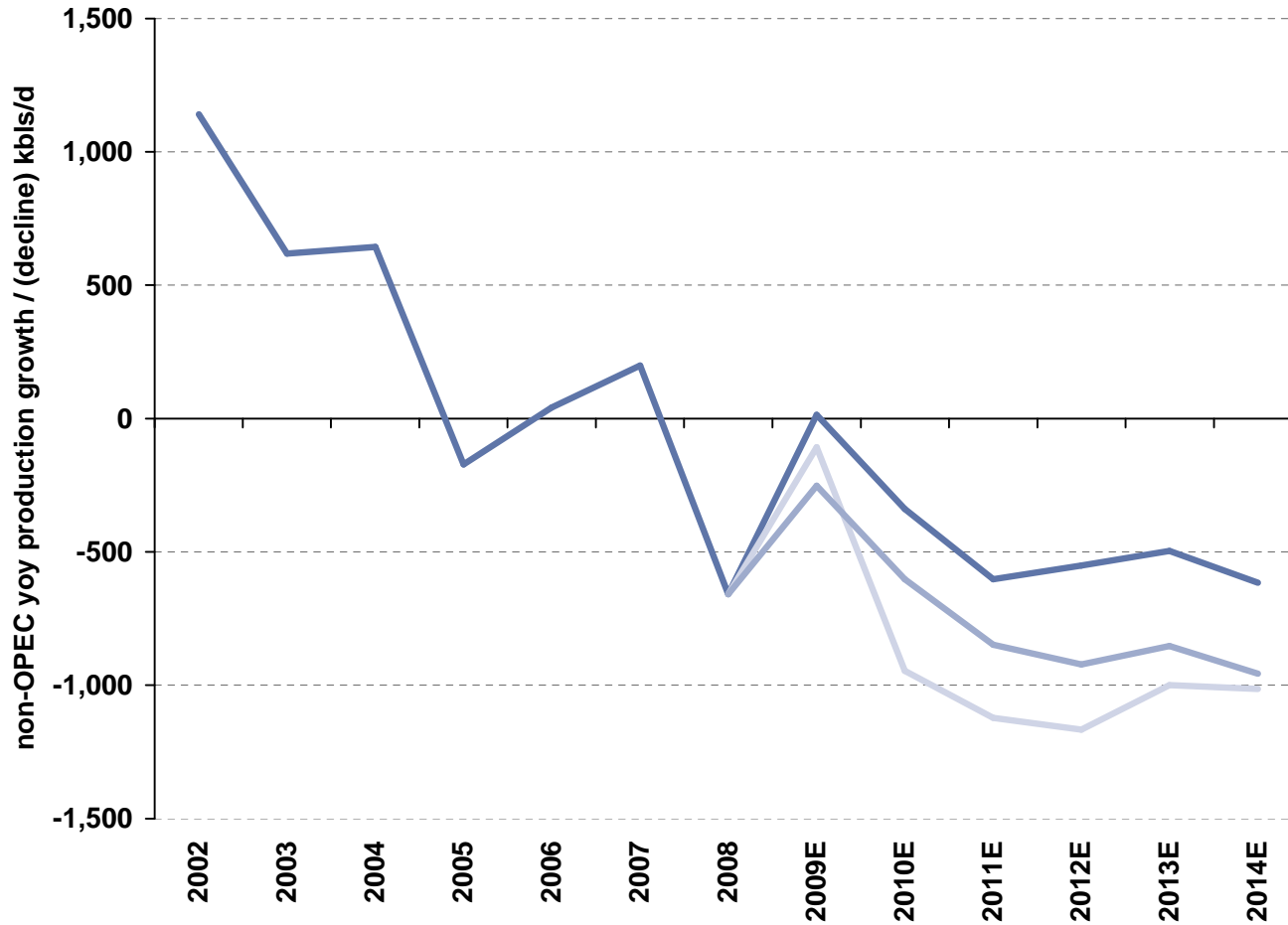
Source: Goldman Sachs Equity Research

**...delivering 5% less 1 yr fwd; 10%-15% less 2 yrs fwd and 15%-20% less 3 yrs fwd**



Source: Goldman Sachs Equity Research

## 5: Non-OPEC decline could be disastrous if recent trends continue



— Perfect delivery — Delivery in line with history — One percent more decline in the base

Source: Goldman Sachs Equity Research

## 6: OPEC dominated by IOCs is likely to witness a slow-down in capacity growth...

Prod ex-Top230	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Ecuador	409	416	401	427	535	541	545	520	514	493	473	454	436	419	402	386
Venezuela	3,239	3,064	2,698	2,259	2,548	2,514	2,385	2,174	2,066	1,922	1,787	1,662	1,546	1,438	1,337	1,243
Iraq	2,614	2,523	2,116	1,344	2,030	1,833	1,999	2,145	2,423	2,544	2,671	2,805	2,945	3,092	3,247	3,409
Qatar	855	854	783	917	990	1,044	1,087	1,020	1,025	1,015	1,005	995	985	975	965	956
Algeria	1,578	1,562	1,665	1,672	1,716	1,786	1,745	1,720	1,735	1,718	1,701	1,684	1,667	1,650	1,634	1,617
Angola	711	668	659	572	547	574	617	535	359	323	291	262	236	212	191	172
Libya	1,475	1,427	1,375	1,481	1,582	1,665	1,601	1,532	1,510	1,465	1,421	1,378	1,337	1,297	1,258	1,220
Nigeria	2,155	2,274	2,103	2,074	2,182	2,255	1,939	1,656	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
Total	13,036	12,789	11,801	10,745	12,130	12,212	11,918	11,300	11,109	10,957	10,826	10,717	10,628	10,560	10,510	10,480
gr																
Ecuador	-2%	2%	-4%	6%	25%	1%	1%	-5%	-1%	-4%	-4%	-4%	-4%	-4%	-4%	-4%
Venezuela	-6%	-5%	-12%	-16%	12.8%	-1.3%	-5.1%	-8.9%	-4.9%	-7%	-7%	-7%	-7%	-7%	-7%	-7%
Iraq	10%	-3%	-16%	-36%	51%	-9.7%	9.1%	7.3%	13.0%	5%	5%	5%	5%	5%	5%	5%
Qatar	0%	0%	-8%	17%	8%	5%	4%	-6%	1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Algeria	-1%	-1%	7%	0%	3%	4%	-2%	-1%	1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%
Angola	-13%	-6%	-1%	-13%	-4%	5%	7%	-13%	-33%	-10%	-10%	-10%	-10%	-10%	-10%	-10%
Libya	-3%	-3%	-4%	8%	7%	5%	-4%	-4%	-1%	-3%	-3%	-3%	-3%	-3%	-3%	-3%
Nigeria	-13%	6%	-8%	-1%	5%	3%	-14%	-15%	-11%	0%	0%	0%	0%	0%	0%	0%
Total	-3%	-1.9%	-7.7%	-8.9%	12.9%	0.7%	-2.4%	-5.2%	-1.7%	-1.4%	-1.2%	-1.0%	-0.8%	-0.6%	-0.5%	-0.3%
Prod Top180																
Ecuador	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Venezuela	0	78	197	295	359	423	439	439	500	546	546	546	546	546	546	546
Iraq	0	0	0	0	0	0	0	0	0	42	130	245	390	447	510	478
Qatar	0	0	0	0	0	2	46	177	353	547	830	1,063	1,238	1,297	1,297	1,322
Algeria	0	0	15	180	230	230	260	280	257	226	200	193	208	207	228	277
Angola	35	74	246	290	429	659	792	1,188	1,516	1,637	1,541	1,526	1,643	1,591	1,625	1,802
Libya	0	0	0	4	42	86	234	316	336	336	346	381	391	411	389	361
Nigeria	0	0	0	189	320	325	521	700	693	1,019	1,129	1,063	1,113	1,160	1,294	1,406
Indonesia	0	0	0	0	0	0	0	0	0	19	103	168	168	168	169	157
Total	35	152	458	958	1,380	1,725	2,292	3,101	3,656	4,373	4,825	5,185	5,698	5,827	6,057	6,349
Total prod																
Ecuador	409	416	401	427	535	541	545	520	514	493	473	454	436	419	402	386
Venezuela	3,239	3,142	2,895	2,554	2,907	2,937	2,824	2,613	2,566	2,468	2,333	2,208	2,092	1,984	1,883	1,789
Iraq	2,614	2,523	2,116	1,344	2,030	1,833	1,999	2,145	2,423	2,586	2,801	3,050	3,335	3,539	3,757	3,888
Qatar	855	854	783	917	990	1,045	1,133	1,197	1,378	1,562	1,835	2,058	2,223	2,272	2,262	2,278
Algeria	1,578	1,562	1,680	1,852	1,946	2,016	2,005	2,000	1,993	1,944	1,901	1,877	1,875	1,857	1,862	1,894
Angola	746	742	905	862	976	1,233	1,409	1,723	1,875	1,960	1,832	1,788	1,879	1,803	1,816	1,973
Libya	1,475	1,427	1,375	1,485	1,624	1,751	1,835	1,848	1,846	1,801	1,767	1,759	1,728	1,708	1,646	1,581
Nigeria	2,155	2,274	2,103	2,263	2,502	2,580	2,460	2,356	2,170	2,495	2,606	2,539	2,590	2,637	2,770	2,882
Total	13,071	12,941	12,259	11,703	13,510	13,936	14,209	14,401	14,765	15,310	15,548	15,733	16,158	16,218	16,399	16,672
		-130	-682	-556	1,807	427	273	191	364	545	238	185	425	60	181	273
		-1.0%	-5.3%	-4.5%	15.4%	3.2%	2.0%	1.3%	2.5%	3.7%	1.6%	1.2%	2.7%	0.4%	1.1%	1.7%

Source: Goldman Sachs Equity Research

***...and the burden to grow production capacity will all fall on Saudi Arabia***



Source: Goldman Sachs Equity Research

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