



September 20, 2016

Energy Insights

Supply Gap on the Horizon

In our minds, global oil producers have moved into a period of secular under-investment, precipitated by the steep drop in crude prices since 2014, but more importantly, reinforced by intensified oil price volatility and an ill-functioning OPEC.

In what has become a laissez-faire oil market, what this translates into is an increasing focus on shorter cycle-time projects which can be throttled up or down in short order to insulate returns from oil price risk. Accordingly, producers are likely to remain risk averse (hedging more frequently), and vigilant when it comes to their capital programs. Notwithstanding impressive strides made in operating efficiency against the backdrop of severe oilfield services under-utilization, the steep drop in capital investment is also laying the foundation for a supply gap to emerge, by 2019 (Exhibit 7), as long cycle-time projects, mostly sanctioned in a higher oil price world, become fewer in number. When those chickens come home to roost, we expect the oil futures contango to steepen substantially in order to stimulate incremental upstream capital investment to spur oil supply growth. Admittedly, the single biggest wildcard in this mix is the degree to which the United States will be able to sustain oil supply growth while containing its supply cost inflation. This theme is becoming more apparent in our updated global survey of capital investment, oil production and cash flow for 124 companies under RBC coverage. It is also reflected in our selected non-OPEC project roster from 2015-20 (Exhibits 7-9). Three key points:

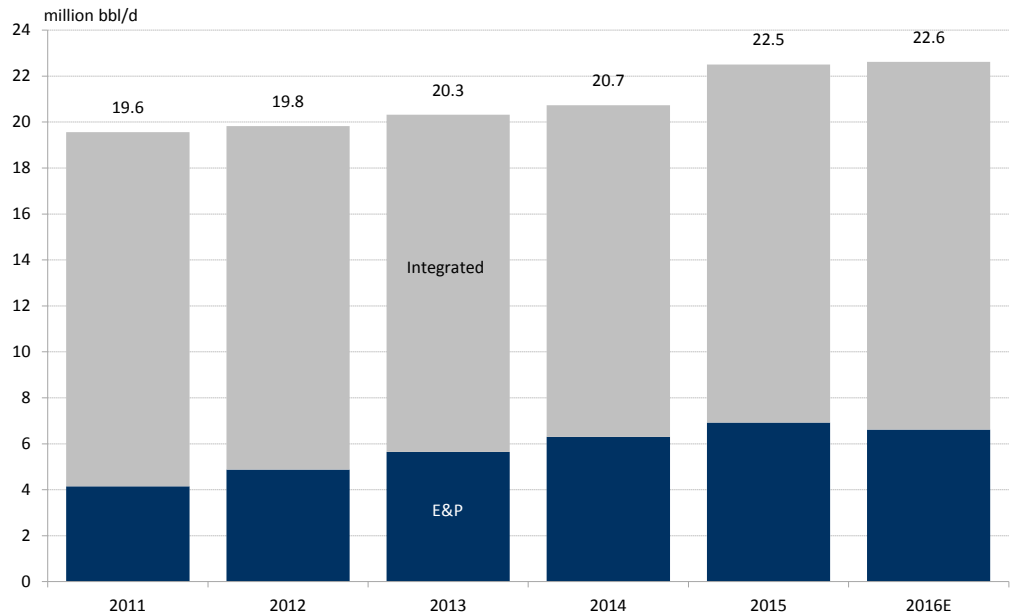
- **Oil & liquids production growth has slid lower this year.** When 2016 budgets were released for our global coverage group last year, they collectively pointed towards 3% (600,000 bbl/d) of year/year oil & liquids production growth. Following the collapse in WTI prices to \$26/bbl in February, this growth rate fell one-third to 2% (400,000 bbl/d) with our April 2016 survey update. Based upon our latest survey, year/year oil & liquids growth in 2016 has now fallen to just 0.5% (111,000 bbl/d) (Exhibits 1-2). This follows staggering production growth of 9% (1.8 million bbl/d) for our coverage group in 2015—fuelled by years of \$100+ Brent prices. While E&P companies under our coverage account for production declines of 4% (308,000 bbl/d) in 2016E, the integrated oils are showing output growth of 3% (419,000 bbl/d)—fortified by longer cycle-time projects.
- **Can efficiency gains entirely offset capital reductions?** We expect gross capital investment for our global coverage universe to fall by \$106 billion (32%) year/year to \$223 billion in 2016. This follows a \$99 billion (23%) drop in 2015. Given their commitment to longer cycle-time projects, the capital programs of integrated oil producers tend to be less flexible than E&P companies, but their absolute spending changes are sizeable. On our estimates, E&P companies under our coverage should see a \$45 billion (45%) drop in spending in 2016, versus the integrated oils at \$61 billion (27%) (Exhibits 3-4).
- **Cash flows are about one-half the level of 2014.** Under our Brent outlook of \$47/bbl in 2016, operating cash flows for our coverage group are set to drop by \$36 billion (13%) year/year to \$241 billion (Exhibits 5-6). This follows a \$147 billion (35%) drop in 2015. Upstream companies in our group should see a \$19 billion (27%) drop in operating cash flows versus the integrated oils at \$17 billion (8%). Based on the aforementioned capital spending outlook, energy producers in our coverage group will be spending about 92% of cash flow in 2016—supporting our under-investment thesis. By comparison, gross capital spending-to-operating cash flow averaged 118% in 2015, and was more evenly balanced at 102% from 2011-14 (average Brent was \$108/bbl).

FN: The thesis of this report is consistent with the [Capex - Opening the Black Box](#) report published on September 6, 2016.



Oil & liquids production is as reported by producers and incorporates acquisitions and dispositions.

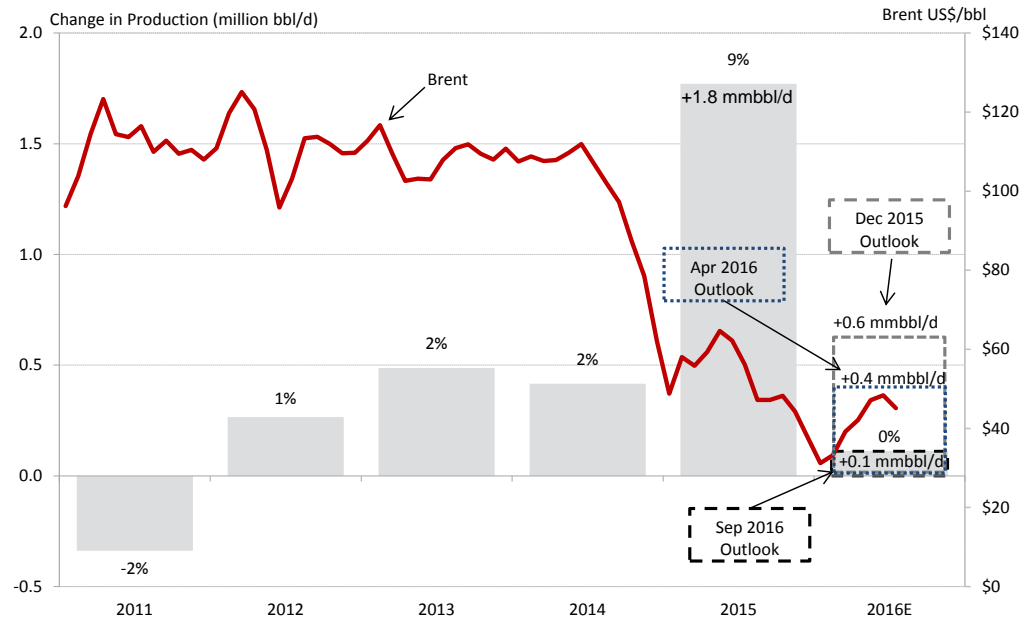
Exhibit 1: RBC Comparable Coverage Universe—Oil & Liquids Production



Source: Company reports, RBC Capital Markets estimates

The collapse in oil prices in early 2016 has caused production growth to stall this year.

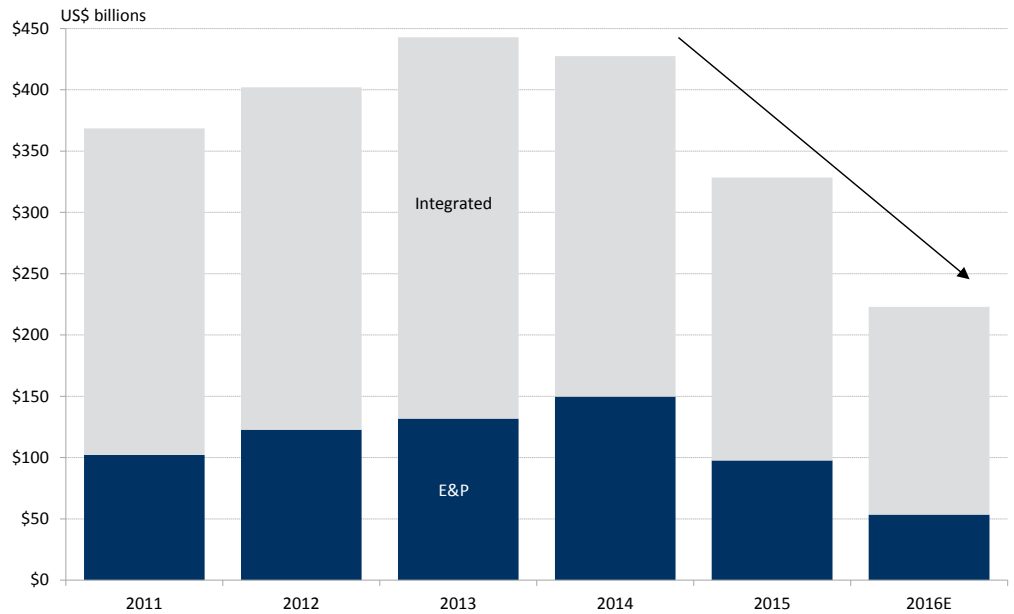
Exhibit 2: RBC Comparable Coverage Universe—Oil & Liquids Production Growth



Source: Company reports, RBC Capital Markets estimates



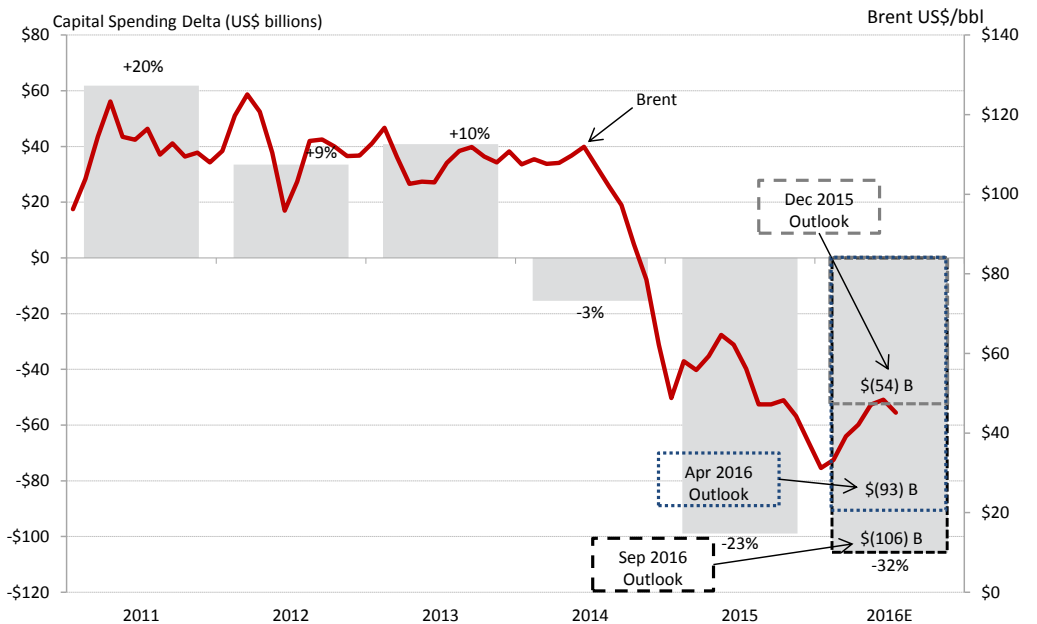
Exhibit 3: RBC Comparable Coverage Universe—Gross Capital Spending



Source: Company reports, RBC Capital Markets estimates

Exhibit 4: RBC Comparable Coverage Universe—Annual Change in Gross Capital Spending

Capital investment for our comparable coverage group is expected to drop by 32% in 2016—or a whopping \$106 billion.

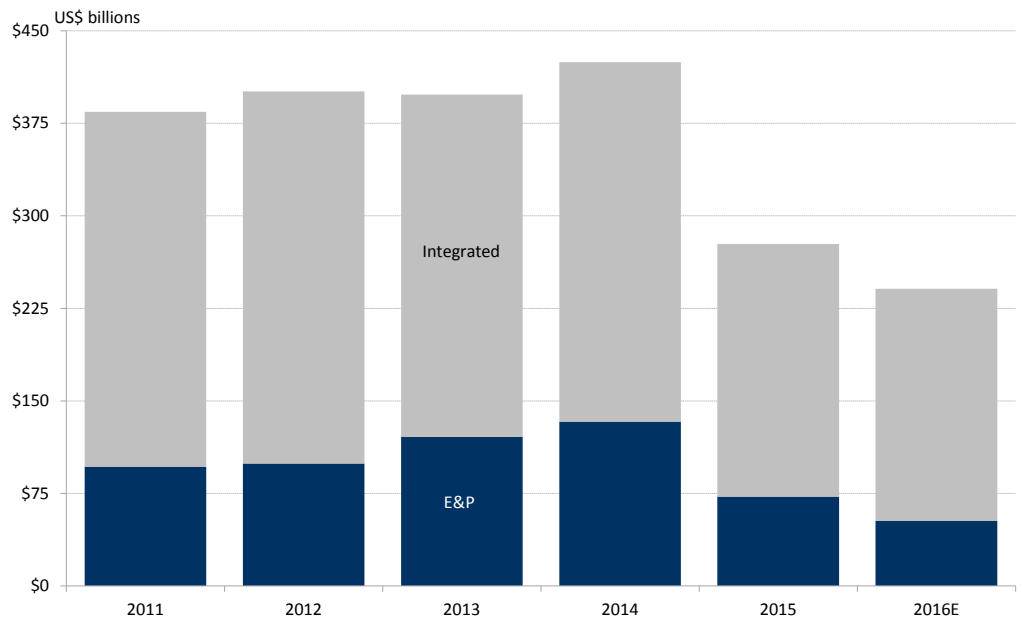


Source: Company reports, RBC Capital Markets estimates



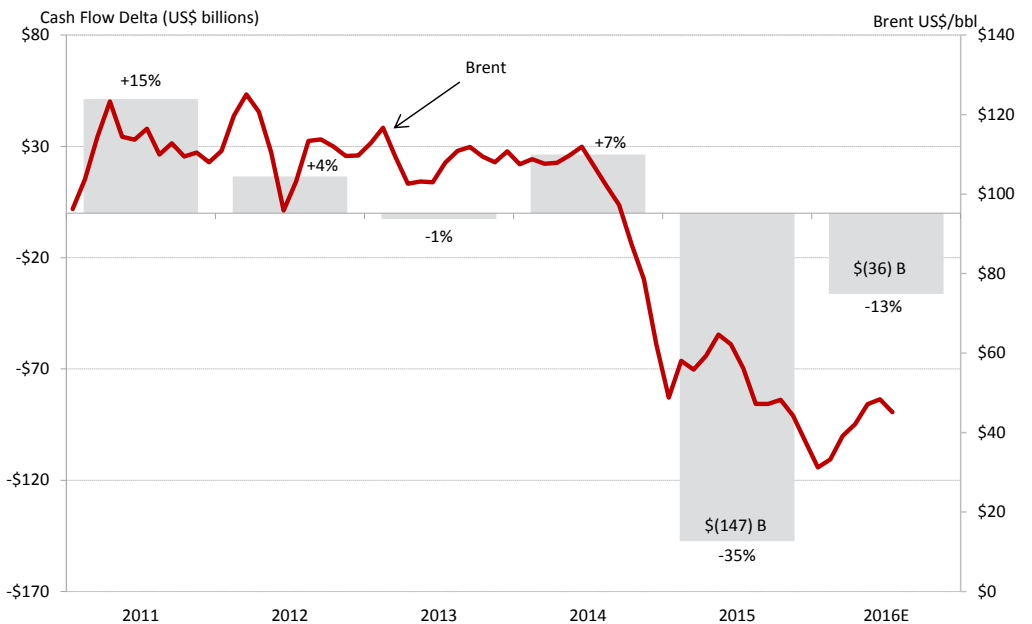
Under our Brent outlook of \$47/bbl in 2016, operating cash flows for our global coverage group fall by 13%, or \$36 billion.

Exhibit 5: RBC Comparable Coverage Universe—Operating Cash Flow



Source: Company reports, RBC Capital Markets estimates

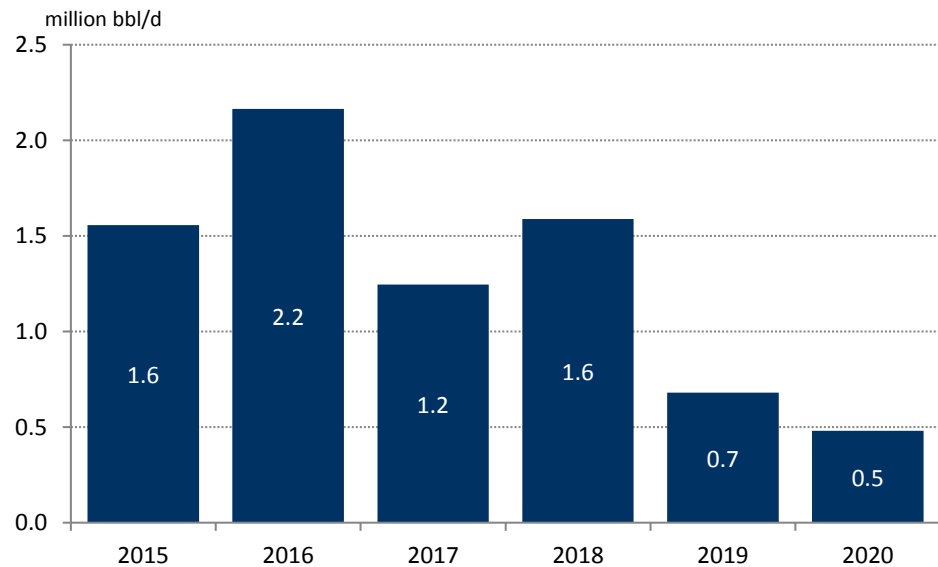
Exhibit 6: RBC Comparable Coverage Universe—Annual Change in Operating Cash Flow



Note: Price Assumptions in 2016E: Brent: US\$46.55/bbl, WTI: US\$45.42/bbl, Henry Hub: US\$2.40/mmBtu.
Source: Company reports, RBC Capital Markets estimates

Exhibit 7: Select Non-OPEC Crude Oil Project Pipeline—Annual Totals

Non-OPEC projects remain bountiful until 2018 but shift to a much lower pace of growth in 2019+.



Source: IEA Medium-Term Market Report, IHS Energy, Gunvor Group, RBC Capital Markets

Exhibit 8: Select Non-OPEC Crude Oil Project Pipeline—Regional Breakdown

The North Sea, Latin America (Brazil), and Russia/FSU figure highly in the non-OPEC (project) supply equation from 2015–20.

mbl/d	2015	2016	2017	2018	2019	2020	Total
							2015-20
Europe (North Sea) ⁽¹⁾	303	255	521	100	85	440	1,704
Asia/Australia ⁽²⁾	175	60	14	50	165	40	504
United States	160	234	90	230	175	–	889
Latin America ⁽³⁾	220	445	300	468	150	–	1,583
Canada	340	125	140	330	–	–	935
Africa	148	80	180	–	–	–	408
Russia/FSU ⁽⁴⁾	210	966	–	90	105	–	1,371
Mexico ⁽⁵⁾	–	–	–	320	–	–	320
Total	1,556	2,165	1,245	1,588	680	480	7,714

Notes:

(1) Includes UK, Norway, Denmark, and Italy.

(2) Includes India, Malaysia, Oman, and Australia.

(3) Includes Brazil and Bolivia.

(4) Includes Russia, Kazakhstan, and Azerbaijan.

(5) Project capacities/timing have not yet been confirmed.

Source: IEA Medium-Term Market Report, IHS Energy, Gunvor Group, RBC Capital Markets



Exhibit 9: Select Non-OPEC Crude Oil Projects (thousands of bbl/d)

2015			2016			2017			2018		
Project	Country	Capacity	Project	Country	Capacity	Project	Country	Capacity	Project	Country	Capacity
Cidade de Itaguaí (Cernambi Norte)	Brazil	150	Kashagan	Kazakhstan	370	P-66 (Lula Sul)	Brazil	150	Fort Hills	Canada	180
Gumusut	Malaysia	120	Cidade de Marica (Lula Alto)	Brazil	150	P-68 (Lula Ext. Sul)	Brazil	150	P-67 (Lula Norte)	Brazil	150
Summont 2	Canada	118	Cidade de Saquarema (Lula Central)	Brazil	150	Schiehallion (Quad 204)	UK	122	Tartaruga Verde/Mestica	Brazil	150
Kearl 2	Canada	110	Novoportovskoye	Russia	120	Moho Nord	Congo	100	Pemex Shallow water finds	Mexico	150
Edvard Grieg	Norway	100	Vladimir Filanovsky	Russia	120	Clair Ridge	UK	99	Hebron	Canada	150
Tass-Yuriakh	Russia	90	Yamal Mega project	Russia	170	Gina Krog	Norway	85	Iara Atapu South	Brazil	150
Delta House	USA	80	Goliat	Norway	100	Horizon Phase 3	Canada	80	Ayatsil-Tekel-Utsil	Mexico	110
Lucius	USA	80	Cidade de Caraguatatuba (Lapa)	Brazil	100	Martin Linge	Norway	80	Messoyakha	Russia	90
P-61 (Papa Terra)	Brazil	70	Trebs and Titov	Russia	96	OCTP	Ghana	80	Stampede	USA	80
Yarudeyskoye	Russia	70	Suzun	Russia	90	Tahiti 2	USA	60	Big Foot	USA	75
Eldfisk extension	Norway	70	Tweneboa, Enyenra, Ntomme (TEN)	Ghana	80	Kraken	UK	50	Ayin	Mexico	60
Knarr	Norway	63	Heidelberg	USA	80	Catcher	UK	45	Hopkins	USA	55
Nene Marine	Congo	62	Malikai	Malaysia	60	Western Isles	UK	40	Mariner	UK	55
Sunrise	Canada	60	Christina Lake Phase F	Canada	50	MacKay River (PetroChina)	Canada	35	Mumbai High	India	50
Rogozhnikovskoye Severnoye	Russia	50	Stones	USA	50	Horn Mountain Deep	USA	30	Tempa Rossa	Italy	45
Kinnoul	UK	50	Ivar Aasen	Norway	50	Hangingstone (JACOS)	Canada	20	Coulomb	USA	20
Lianzi	Congo	46	Atlanta EPS	Brazil	45	B-127	India	14	Margarita-Huacaya Phase 3	Bolivia	18
Barmer Hill	India	40	Horizon Phase 2B	Canada	45	West Ells	Canada	5			
Cold Lake (Nabiye)	Canada	40	Monarb	UK	35						
Moho-Bilondo 1B	Congo	40	Julia	USA	34						
Alma/Galia	UK	20	Foster Creek Phase G	Canada	30						
Bertam	Malaysia	15	Gunflint	USA	30						
Hangingstone (Athabasca)	Canada	12	Stella	UK	30						
			Solan	UK	20						
			Kodiak	USA	15						
			Holstein Deep	USA	15						
			Point Thomson	USA	10						
			Laggan-Tormore	UK	10						
			Scolty Crathes	UK	10						
Total		1,556	Total		2,165	Total		1,245	Total		1,588
2019			2020								
Project	Country	Capacity	Project	Country	Capacity						
Appomattox	USA	175	Johan Sverdrup	Norway	440						
Iara Berbigão / Sururu	Brazil	150	Manik	India	40						
Shah-Deniz 2	Azerbaijan	105									
Baronia / Tukau Timur	Malaysia	65									
Rabab Harweel Integrated Project	Oman	60									
Njord	Norway	50									
Greater Enfield	Australia	40									
Cragganmore	UK	20									
Hibonite	Denmark	15									
Total		680	Total		480						

Note: Certain Russian, Mexican, South American, and Asian projects have not been independently verified.
Source: IEA Medium-Term Market Report, IHS Energy, Gunvor Group, RBC Capital Markets



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