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SDA Bocconi
School of Management

SUPPLHI

OIL&GAS MARKET ANALYSIS

Full Report

January 27th, 2016

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The top-down analysis is based on information publicly available online, from leading international sources. **SupplHi Projects Database is proprietary by SupplHi** and can be shared only based on dedicated agreement.

Today's speakers and co-authors

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Professor, SDA Bocconi

- 11+ years (2004-present) as Professor at **SDA Bocconi** School of Management
- Research interests include **market trends identification** and marketing performance measurement
- Ph.D. in Business Administration and Management, Bocconi University

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Director, SupplHi

- Co-Founder **SupplHi.com**
- 6+ years at **Bain&Co.** (2008-2015), focusing on **Oil&Gas**
  - International projects across multiple geographies: Italy, Brazil, Russia, Saudi Arabia, Israel, UK, France, Turkey, …
  - Served clients on a number of strategic topics, including market sizing and trends description for industrial components manufacturers
- Specialized in **Oil&Gas market analysis for SME**

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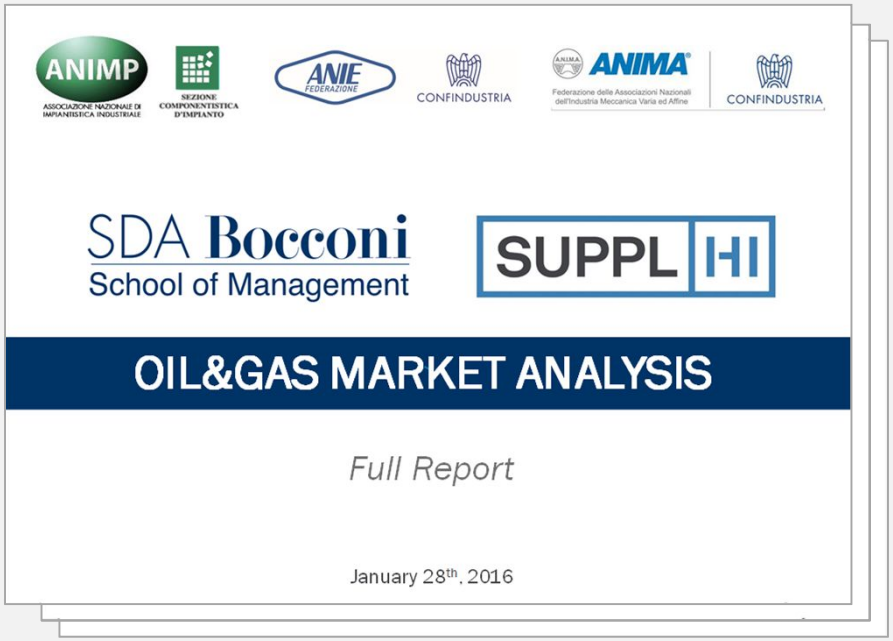
  - Brazil (1.5y) and Argentina (6m)
- Specialized in **Oil&Gas market analysis for SME**
- MBA at Yale School of Management (2015)

We thank Mr. Andrea Guerini Rocco for his contribution to this study

Objective of this analysis

Provide an **actionable tool** to their members – especially the **Small and Medium enterprises** - involved in the Oil&Gas plant engineering, to **better address** their **efforts in the global Oil&Gas market.** Special focus on 3 products: **Valves, Pressure Equipment, Switchboards.**

Shared by the Associations with their Members



- SOLID **APPROACH**
- DRIVEN BY THE **REAL PROJECTS**
- **COMPREHENSIVE** (ALL SEGMENTS, ALL GEOGRAPHIES)
- **SHARED** WITH KEY CONTRACTORS
- **UPDATABLE**

Agenda

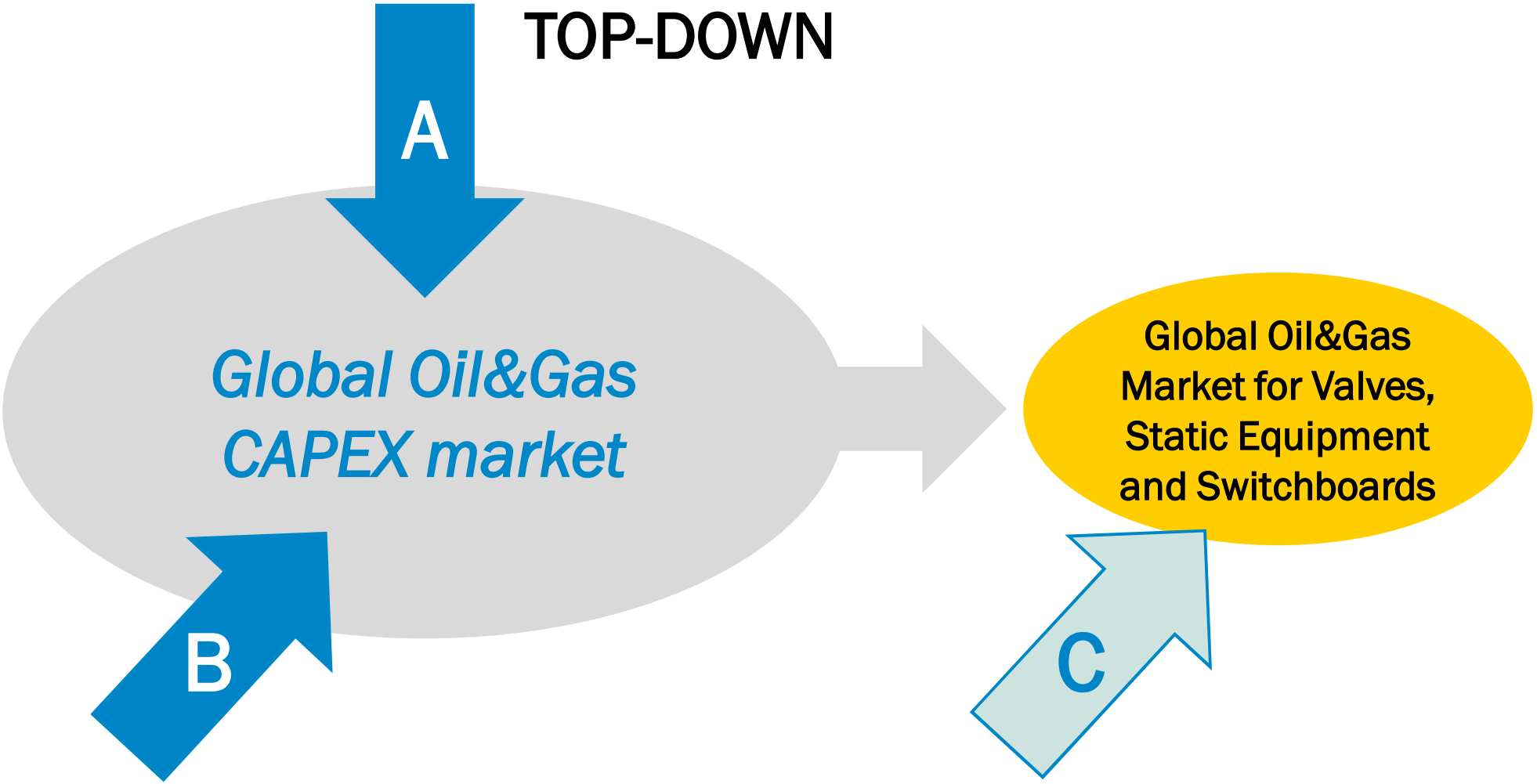
Approach

Demand for energy sources

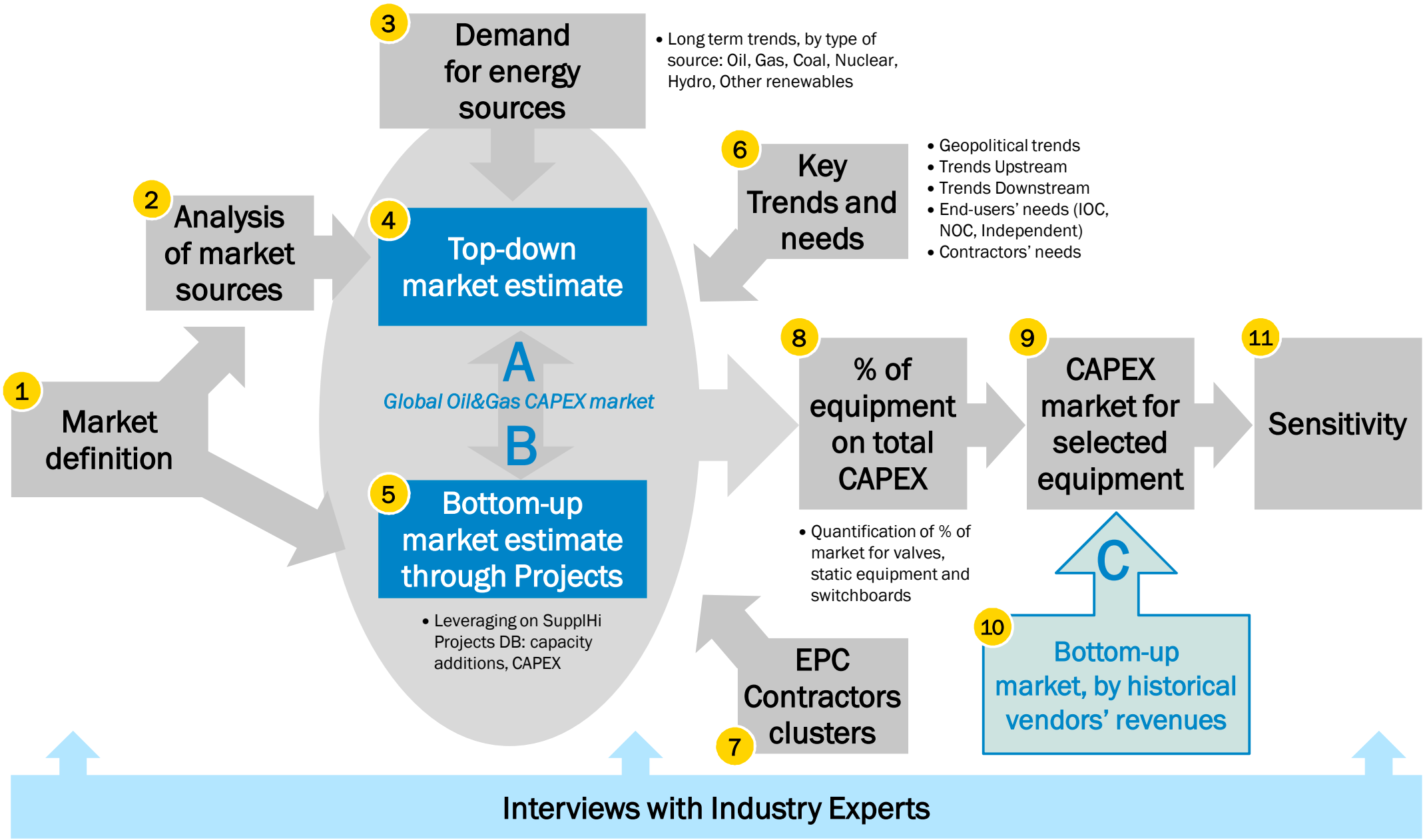
Market estimates and trends

Focus on selected equipment

High-level approach



Detailed approach for market estimate



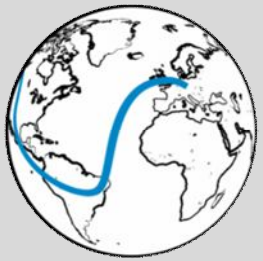
Effectively leveraged 20+ public sources for the top-down, cross-checking information

Segment		Capacity	CAPEX
Upstream	Onshore Conventional	• BP Energy Outlook	• JP Morgan • IHS • Press releases
	Shale gas / Tight Oil	• BP Energy Outlook • IHS	• IHS
	Oil Sands	• CAPP (Canadian Association of Petroleum Producers)	• CAPP (Canadian Association of Petroleum Producers) • Rystad
	Offshore (Shallow-water + Deepwater Subsea Development)	• BP Energy Outlook • Douglas-Westwood • EMA (Energy Maritime Associates)	• Douglas-Westwood • IHS
	FPSO/FPU/TLP	• Douglas-Westwood	• Douglas-Westwood
Midstream	LNG onshore	• IGU • Enerdata	• Douglas-Westwood
	FLNG	• Press releases	• Douglas-Westwood
	FSRU	• Enerdata • EIA • IGU	• Douglas-Westwood
	Onshore Pipeline	• Oil & Gas Journal • CIA world factbook	• Oil & Gas Journal
	Offshore Pipeline	• Oil & Gas Journal	• Oil & Gas Journal
Downstream	Refining & Petrochemicals	• OPEC	• Barclays • IHS • OPEC • Press releases
	Gas-to-Liquid (GTL)	• Press releases	• Press releases
Fertilizers	Fertilizers (Ammonia and UREA)	• IFA • PotashCorp • Yara	• IFA • Press releases

SupplHi Projects Database has been utilized for the bottom-up analysis

SupplHi Projects Database

A SINGLE, ACTIONABLE SOURCE FOR DECISION MAKING IN OIL&GAS



Global coverage, with **FEED and EPC** projects of **400+ Clients**

2,100+ ongoing and planned Oil&Gas projects

Monthly updated and delivered in **Excel** format

ACCESS GLOBAL MARKET INTELLIGENCE

PRIORITIZE COMMERCIAL EFFORTS

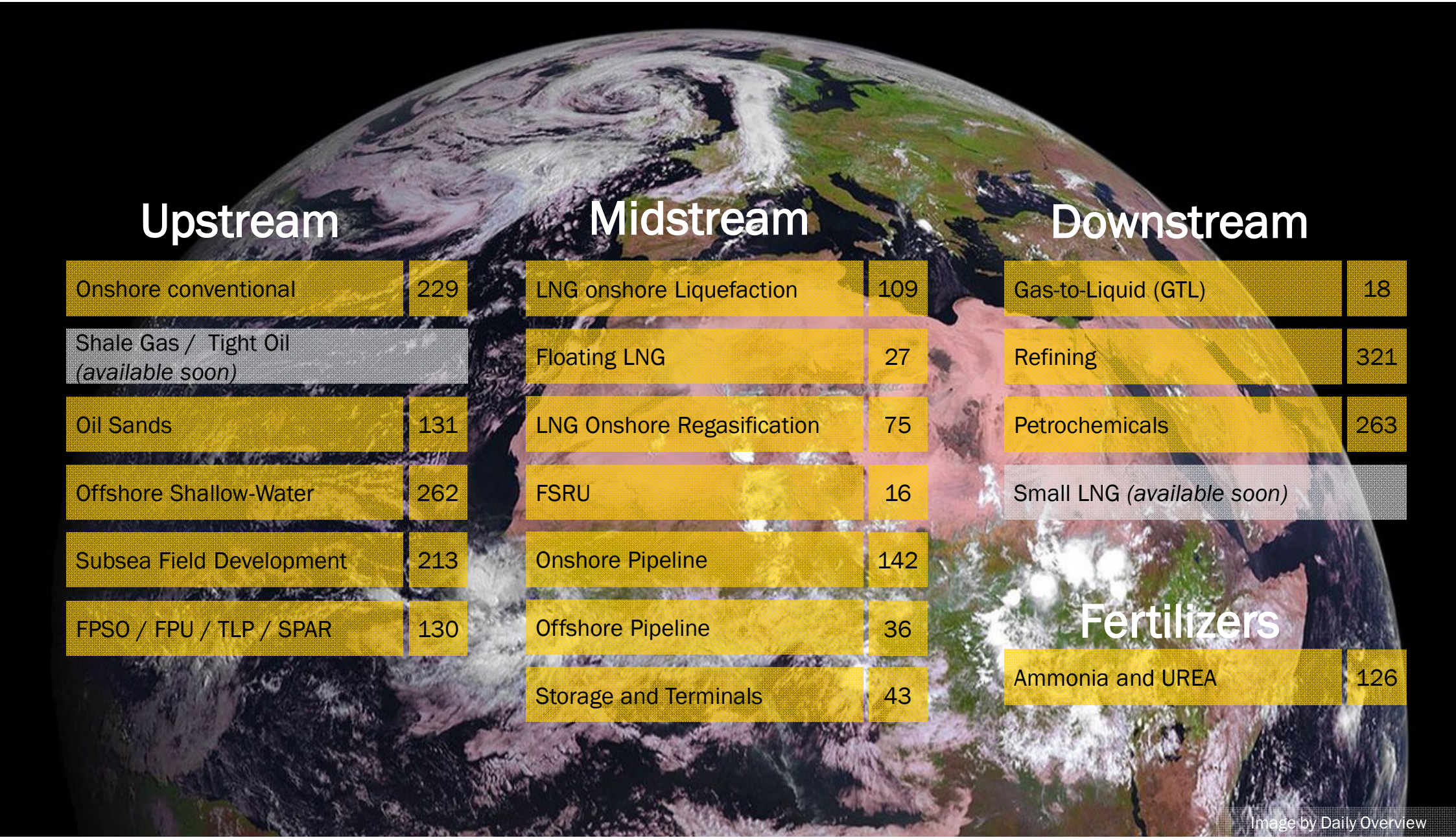
ENHANCE YOUR OWN COMMERCIAL PIPELINE

CHECK PROJECT STATUS AND TIMING

FIND CLIENTS' PROJECTS IN A PROACTIVE WAY

MONITOR TARGET GEOGRAPHIES AND SEGMENTS

The 2,100+ ongoing and planned projects cover the entire Oil&Gas value chain …



Upstream

Onshore conventional	229
Shale Gas / Tight Oil *(available soon)*	
Oil Sands	131
Offshore Shallow-Water	262
Subsea Field Development	213
FPSO / FPU / TLP / SPAR	130

Midstream

LNG onshore Liquefaction	109
Floating LNG	27
LNG Onshore Regasification	75
FSRU	16
Onshore Pipeline	142
Offshore Pipeline	36
Storage and Terminals	43

Downstream

Gas-to-Liquid (GTL)	18
Refining	321
Petrochemicals	263
Small LNG *(available soon)*	

Fertilizers

Ammonia and UREA	126

Image by Daily Overview

… as well as all types of contracts and statuses

Information by project

- Project name
- Industry
- Segment
- Location (final destination)
- Country (final destination)
- Region (final destination)
- Country (projects execution)
- End-user
- Engineering Co. / Contractor Co.
- Contract type
- Status
- Start date
- Expected end date
- CAPEX (Million USD)
- Date of last change on info
- Capacity and Unit of measure
- Notes

	Conceptual / Basic design	FEED	Execution		Ops		
Number of projects in the DB as of *January 2015*	Pre-FEED and Licensing	FEED	PMC	EP/EPC	O&M	Other	*Total*
Planning	3	2	1	508			514
Bid Ongoing	2	4		32			38
Just awarded	2	14	2	56	2	1	76
Ongoing	30	50	29	665	38	54	866
Completed	25	101	7	323		18	475
On Hold		9	1	121		1	131
Cancelled	1	4	1	27		6	33
Total	63	184	41	1,733	40	80	2,141

Feasibility Study	FEED	BOOT / BOO / BOT		
Basic Design		Technology Licensing	EP	Maintenance
		PMC	EPC	Maintenance &Modificat.
		Engineering & Consulting	EPCM	O&M
			Construction	Frame Agreement
			EPCI	
			Installation	

Please visit http://supplhi.com/web/portal/project-database for more information on the Database

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Approach

Demand for energy sources

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Focus on selected equipment

We are in an Oil Shock

$27.36 / barrel

42 US gallons or ~159 litres

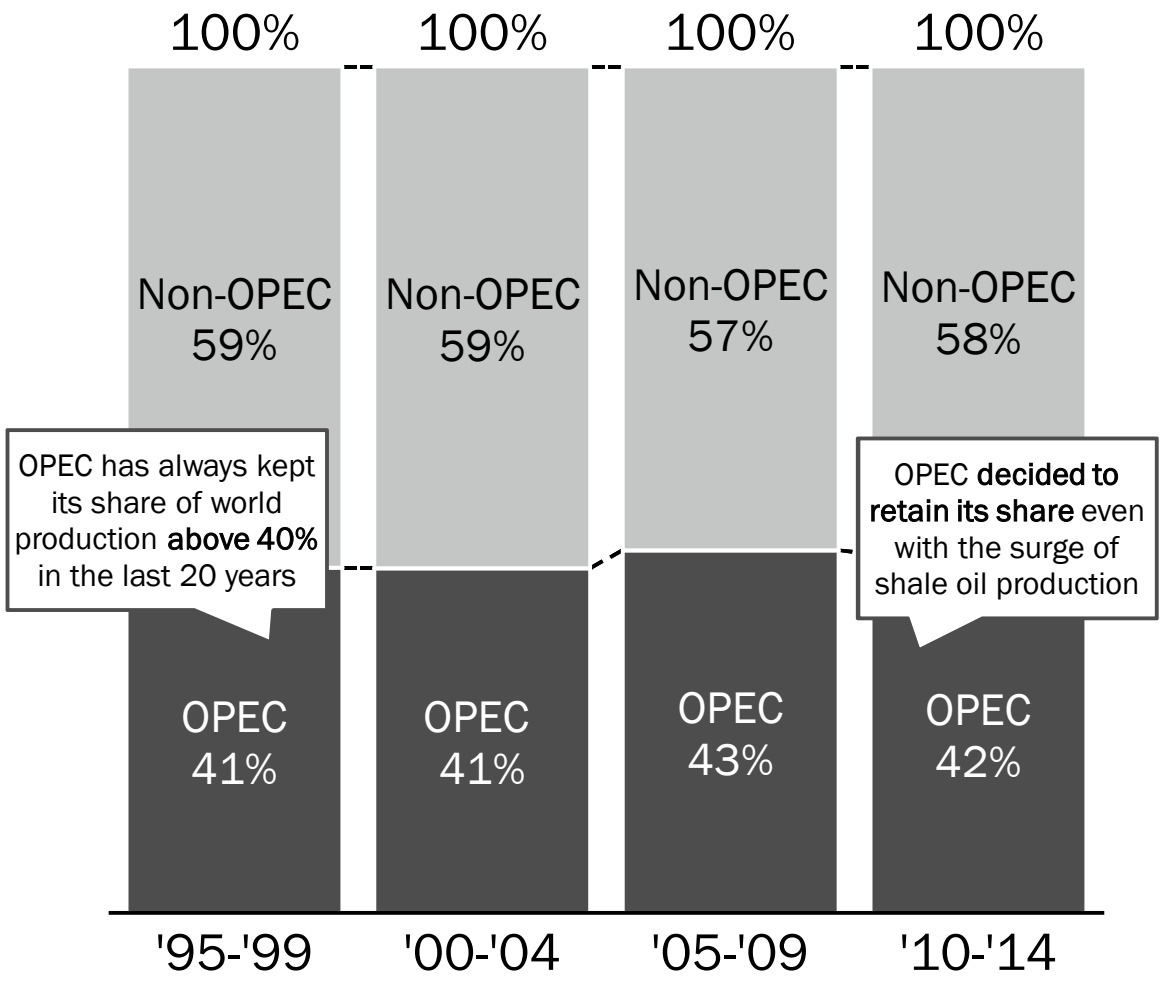
$29.99 / bucket

24 pieces Tailgate meal

Brent Spot Oil price as of Monday 18/01/2016 (source: EIA)

OPEC has always been very keen in defending its market shares in the recent decades

World oil production share, MBPD



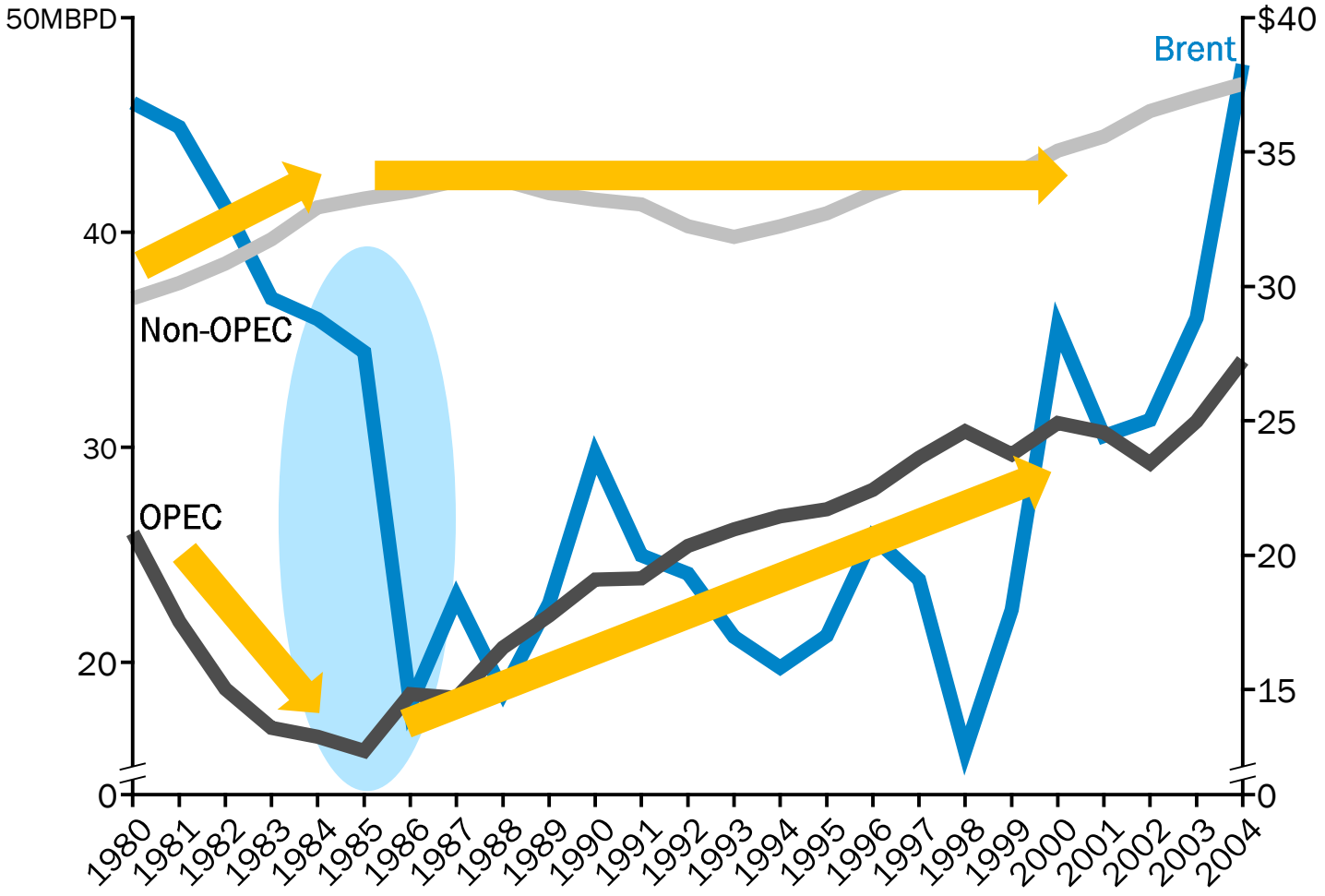
"Historically **OPEC has functioned as the world's swing producer for crude oil.** That strategy was essentially **abandoned at the November 2014** meeting when OPEC announced they would **defend market share** that was being lost due to the rise of non-OPEC production, especially from the United States. it should be clear that **with more than 40% of global production, OPEC maintains a position of dominance** over the global crude supply."

Forbes
January 2016

SDA Bocconi School of Management | SUPPLHI Source: SupplHi analysis on BP Statistical Review of World Energy, 2015

The last large oil price crisis took place in 1985-1986, driven by market share rationales

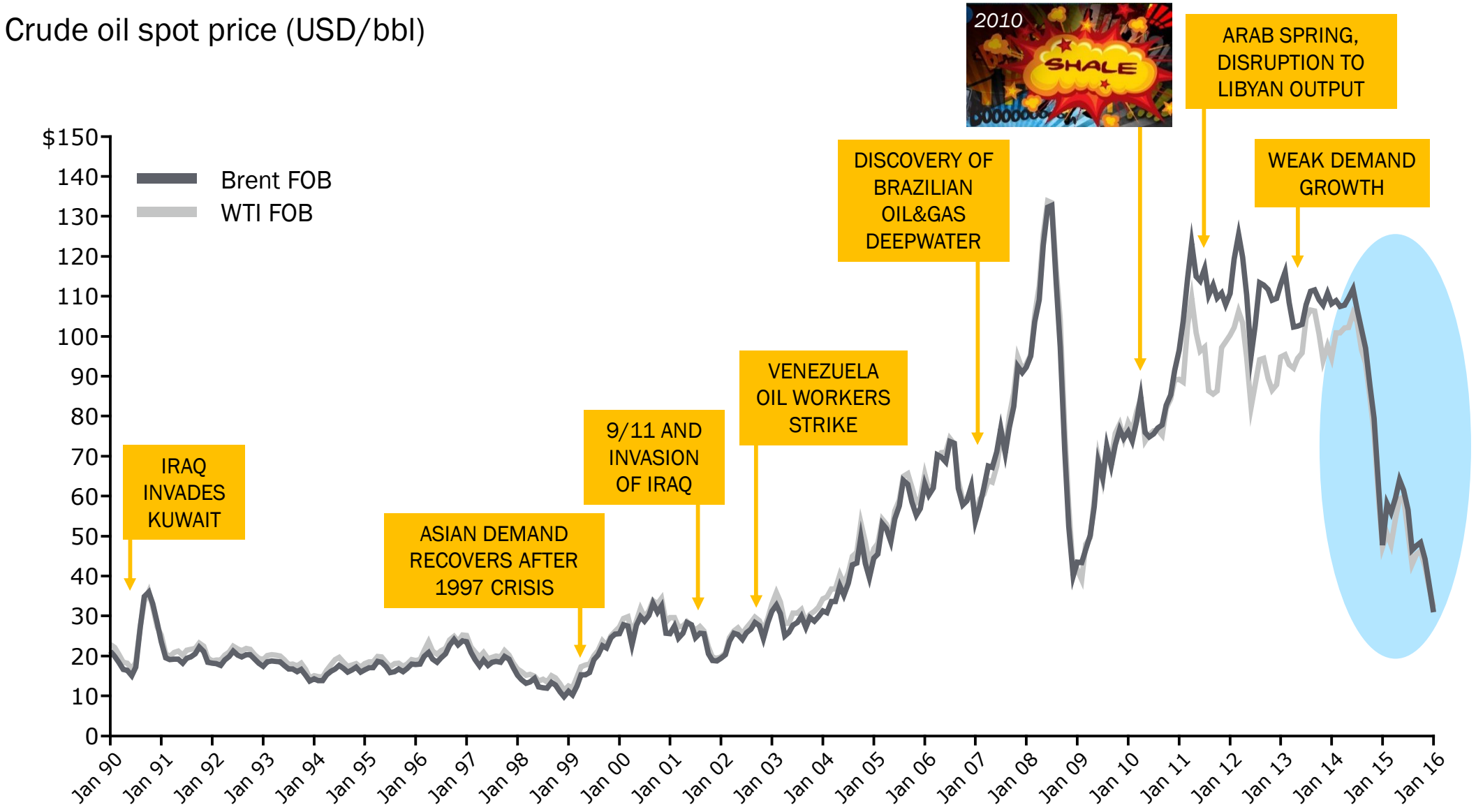
Crude oil spot price (USD/bbl) and production (MBPD)



- In the mid-1980s the OPEC sought to use low prices to **undercut producers in the North Sea**
- OPEC enacted a **policy to recoup *market share* from their Non-OPEC rivals**, but ended up **trying to defeat each other**, further weakening prices
- It **took several years for Oil prices to recover**

Source: SupplHi analysis on BP Statistical Review of World Energy, 2015, press clippings

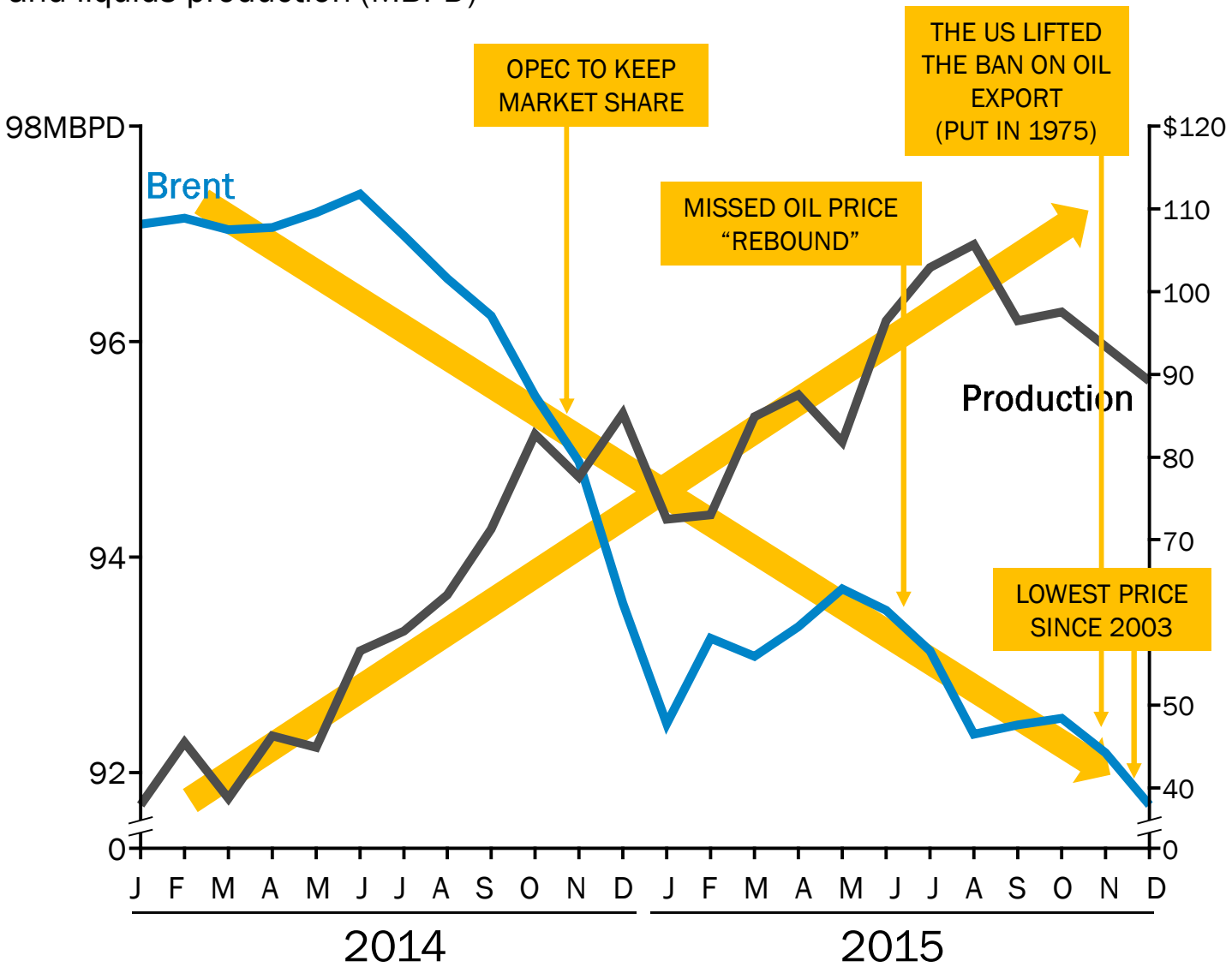
We lived for ~13 years in the 20 to 40 USD/barrel scenario



Note: Jan 2016 data include prices up to Jan 19
Source: Energy Information Administration (EIA), 2016, press clippings

~50 USD/bbl now seen as a “positive” scenario, after Oil prices failed to recover in June 2015

Crude oil spot price (USD/bbl)
and liquids production (MBPD)



“The oil market is even more oversupplied than we had expected and we now forecast this surplus to persist in 2016 … the potential for oil prices to fall to such levels, which **we estimate near $20/bbl, is becoming greater.**”

Goldman Sachs

September 2015

“The Saudis’ long term bet is that by keeping oil prices low, **they will squeeze American shale oil producers out of the game.** That way, the Saudis can again regain market share lost to the U.S.
Just 10 years ago, Saudi Arabia was the world's largest oil producing nation, churning out nearly twice as much crude oil as the U.S. But **American output has skyrocketed in recent years thanks to the shale revolution**, which has completely reshaped the global energy equation.”

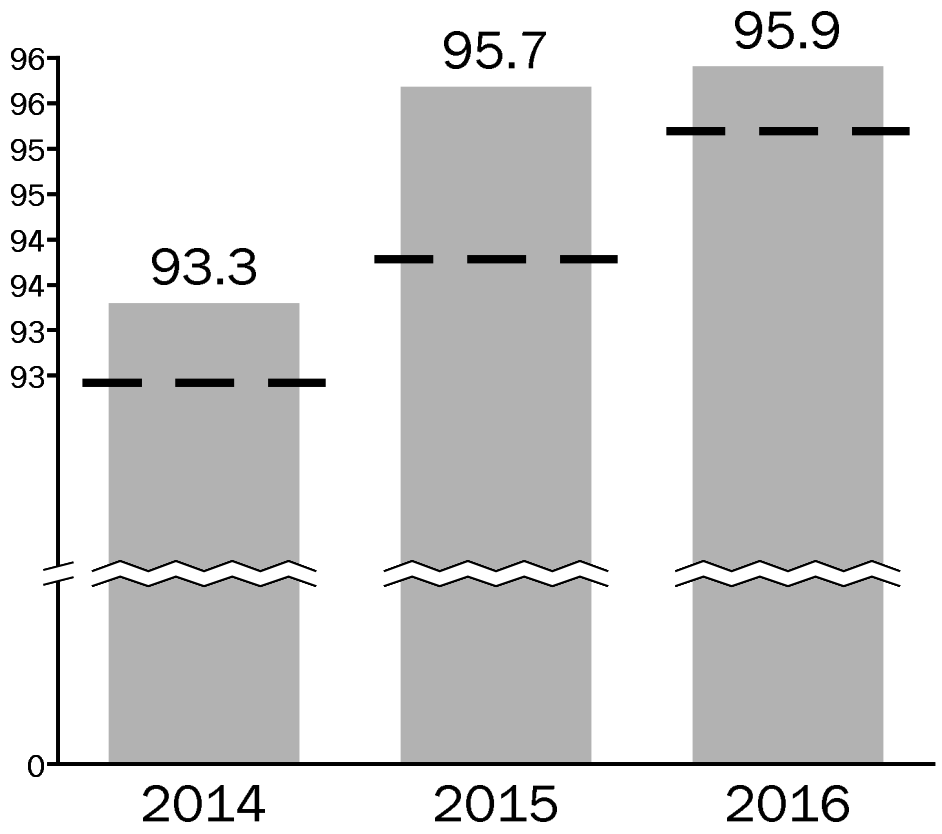
CNN Money

November 2015

Note: production of crude oil (including lease condensates), natural gas plant liquids, biofuels, other liquids, and refinery gains.
Source: Energy Information Administration, 2015, press clippings

Clear oversupply, ~1.9 M Bbl went into storage tanks each day (~Petrobras Oil production)

Oil and other liquids production and consumption, MBPD



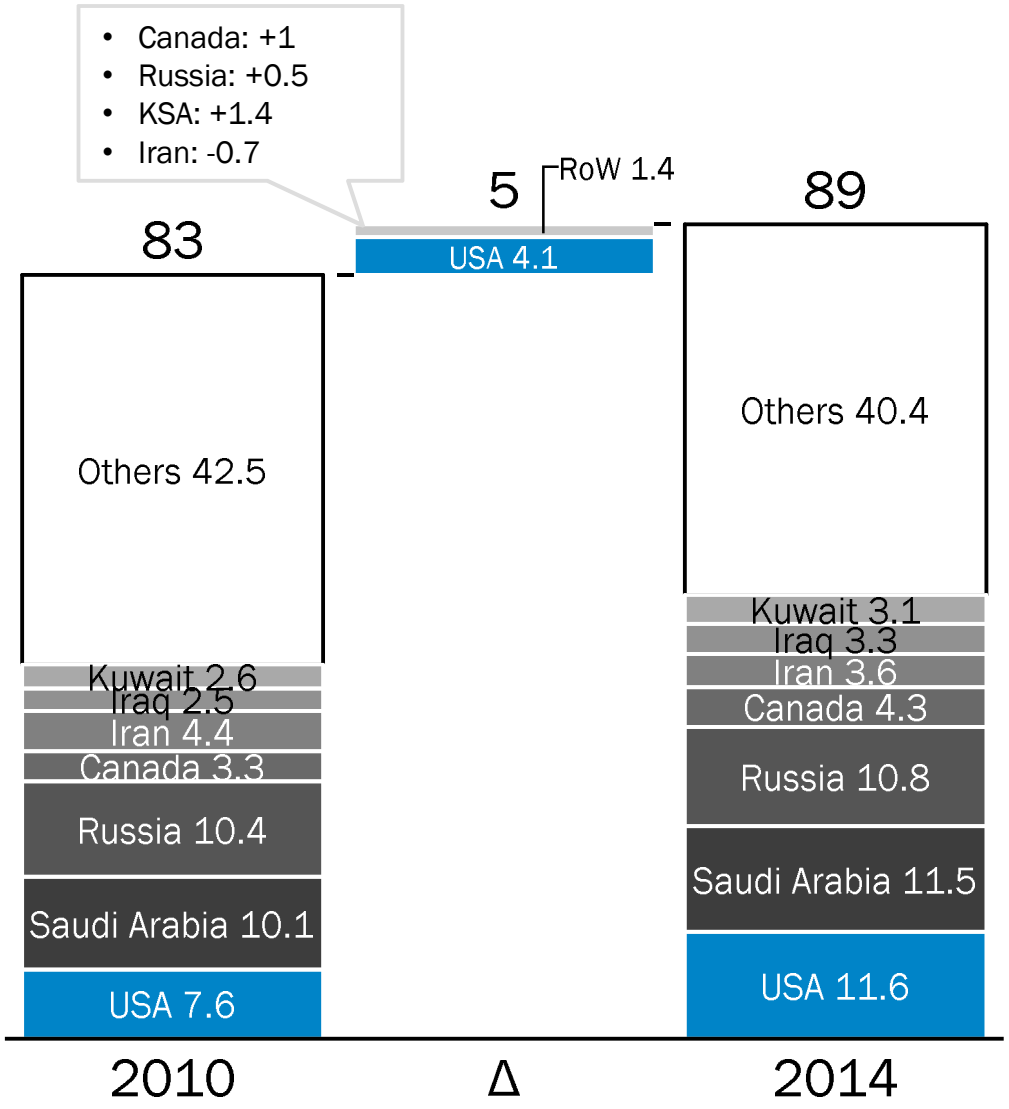
	2014	2015	2016
Inventory buildup	0.9	1.9	0.7

Iran will further increase offer, with its promises of an immediate boost to production of 500,000 b/d (however the target is overoptimistic)

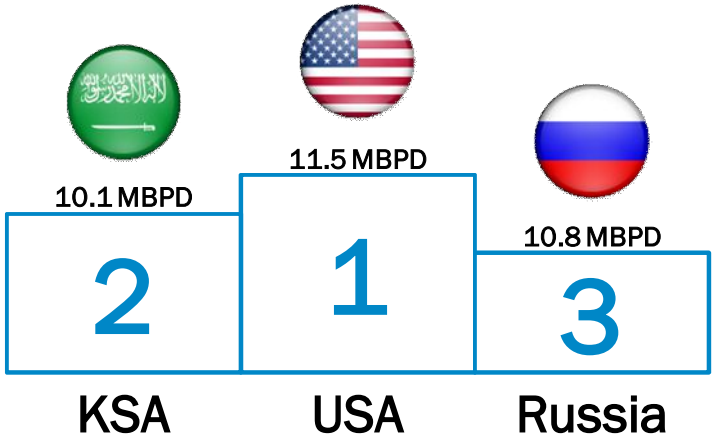
Note: production of crude oil (including lease condensates), natural gas plant liquids, biofuels, other liquids, and refinery gains.
Source: SupplHi analysis on U.S. EIA Short-Term Energy Outlook - January 2016, press clippings

How did we get here?

Oil production, MBPD



- The **USA** saw the **biggest increment in Oil production**, adding more than 4 MBPD (~5% of global production), and has had an **outsized impact on the market**
- Russia and key **members of OPEC such as Saudi Arabia and Iraq are pumping at record levels**
  - **Russian volumes** are mainly obtained **exploiting the existing fields as fast as possible**, and not from new fields coming online



Source: SupplHi analysis on BP Statistical Review of World Energy, 2015, press clippings

The Shale Boom reshaped the US Oil&Gas industry and impacted the global markets …

Shale gas and Tight Oil price advantage

Upstream

- A "**plant on trailers**"
- **Strong Shale Gas / Tight Oil production:** US oil output has jumped by almost 50% since 2011
- The US remain a **net importer of crude**
  - **West African producers** like Nigeria and Angola, who saw their **exports to the US collapse**
  - US crude oil imports from Russia heavily fell but started to rise again in 2016

Midstream

9.000+ km of new **Onshore Pipeline** in the USA and Canada

~113 B USD of **LNG Liquefaction plants** completed and ongoing

EXPORT

- 'Theo T' was the **1st oil tanker** to sail from the US and on **Jan 20th 2016** docked at the **French port of Fos**
- The most likely destination is the **Cressier refinery in Switzerland**

Downstream

~56 B USD of **PetChem** of **new plants and revamping** completed and ongoing

~5B USD of **Refinery improvements** completed and ongoing

Fertilizers

(Ammonia and UREA)

~13 B USD of new **Fertilizers plants** completed and ongoing

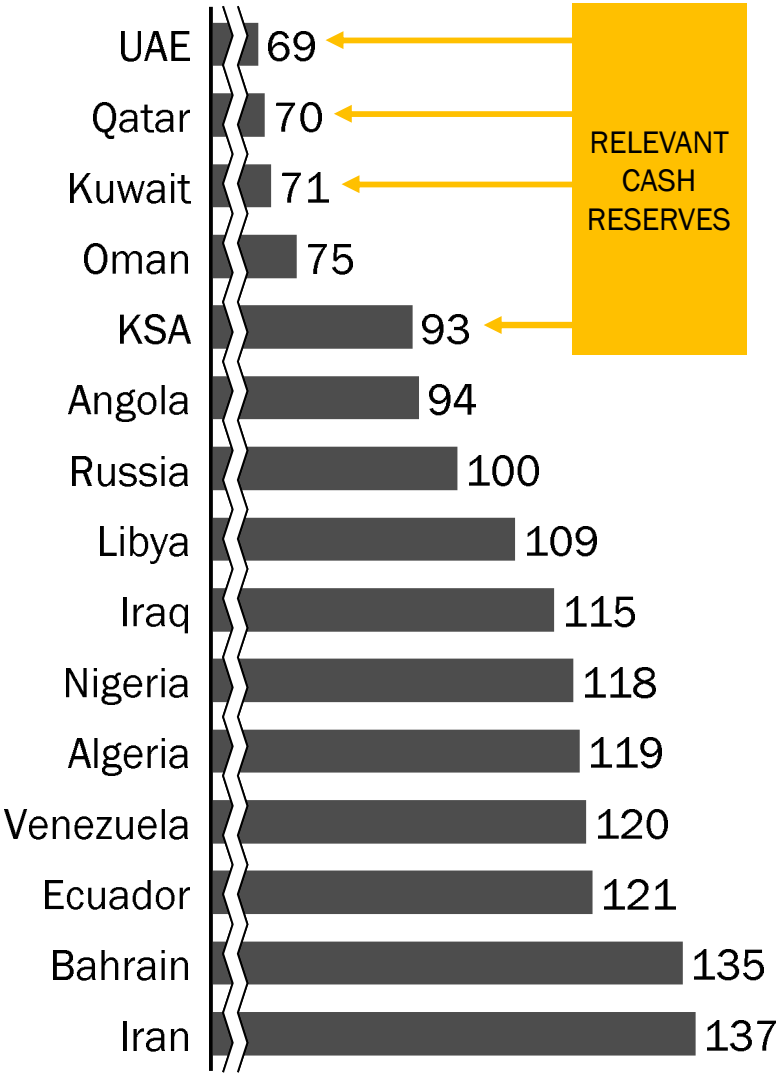
Source: SupplHi analysis, press clippings

… Shale has been resilient in 2015, is running out of "survival tricks", but will be there

- **Proved resilience of American shale producers** in the face of falling prices
  - During 2015 the **number of drilling rigs used in America fell by over 60%,** but the **number of well hydraulically fractured increased**
  - Since mid-2015 shale firms have cut more than 400,000 b/d from output in response to lower prices
  - EIA forecasts a cut of production of 570k barrel in 2016
- The shale-men **could become the world's swing producers**, adding to **volatility**
  - **Unique cost structure** and **short business cycle**, may undermine longer-term investment in high cost traditional oilfields

Current Oil price is not sustainable for many oil producing countries' budgets

Government budgets' break-even oil prices (USD/bbl)



"**Russia** has said it will cut public spending by a further 10% in response to the latest drop in crude prices. The **oil industry accounts for 70% of tax revenue in Nigeria**. In June the country's president, Muhammadu Buhari, said the treasury was "virtually empty". **Saudi Arabia** has deeper pockets but, with a **budget deficit that reached 15% of GDP last year**, even it has been forced to cut public spending."

The Economist

January 2016

"In **Russia**, energy accounts for more than **50% of federal budget revenue and 18% of national GDP**. In **Saudi Arabia**, the state relies on oil for about **80% of budget revenue**, and it represents **45% of GDP**. It's true that the **Saudis still have more than $620 billion in reserves**, which they can use to maintain stability. But that's **about $100 billion less than they had last year**. Unless oil rebounds–a lot–Saudi Arabia's problems will grow."

TIME

January 2016

"The last time oil prices dropped so low and stayed there, in the 1980s, the Soviet Union disintegrated. With the federal budget approved in December based on oil at **$50 a barrel**, Anton Siluanov, the Russian finance minister, announced that the country faced a **budget deficit of about $40 billion**."

The New York Times

January 2016

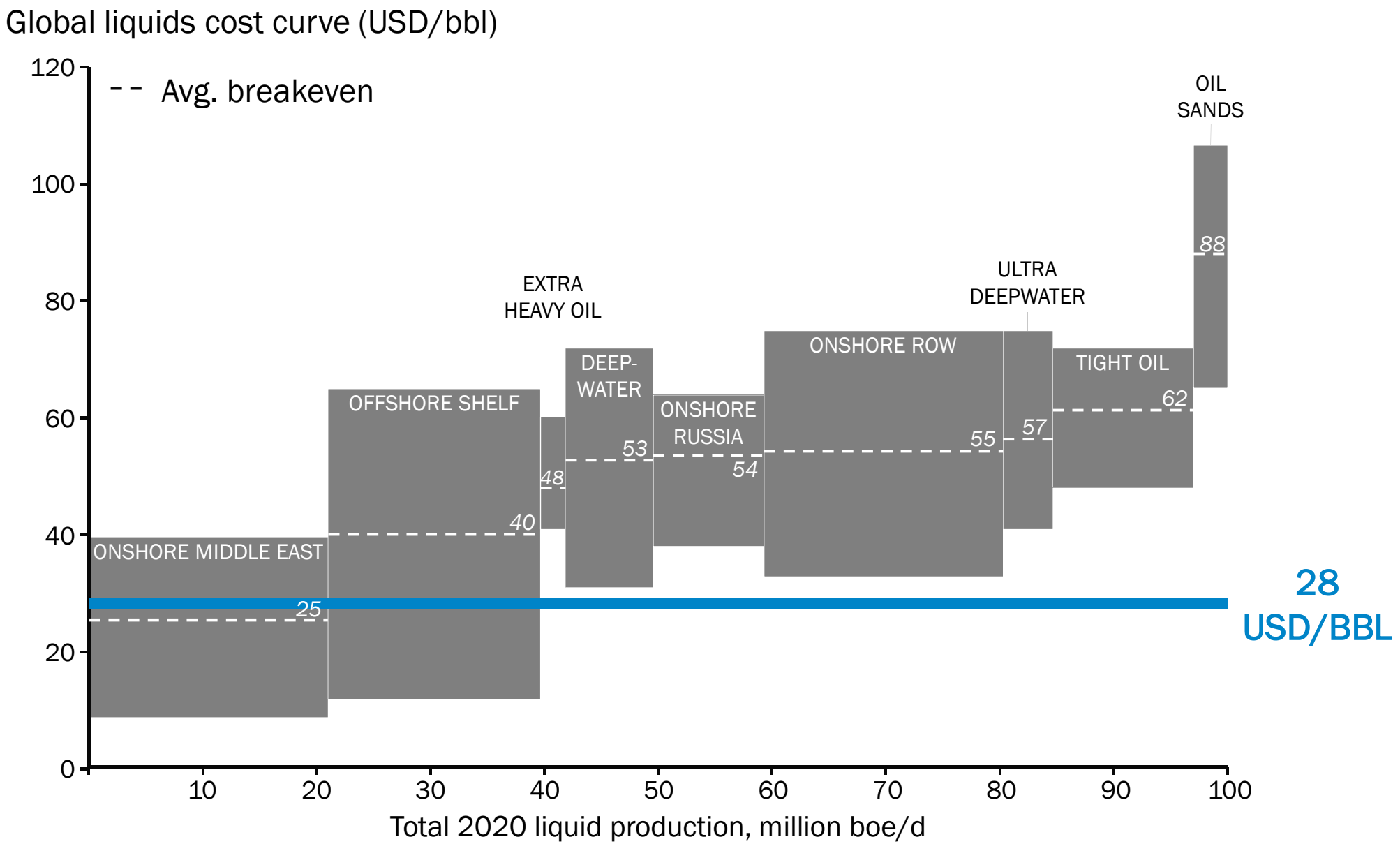
"**Saudi Arabia**'s deputy crown prince, Mohammed bin Salman, is driving through a sweeping economic reform program to counter the oil slump. The latest idea to come out of this environment is a **possible stock market flotation of Saudi Aramco**, the House of Saud's main source of power and wealth."

FINANCIAL TIMES

January 2016

Source: The Economist, press clippings

Current Oil price doesn't sustain the majority of the upstream CAPEX …

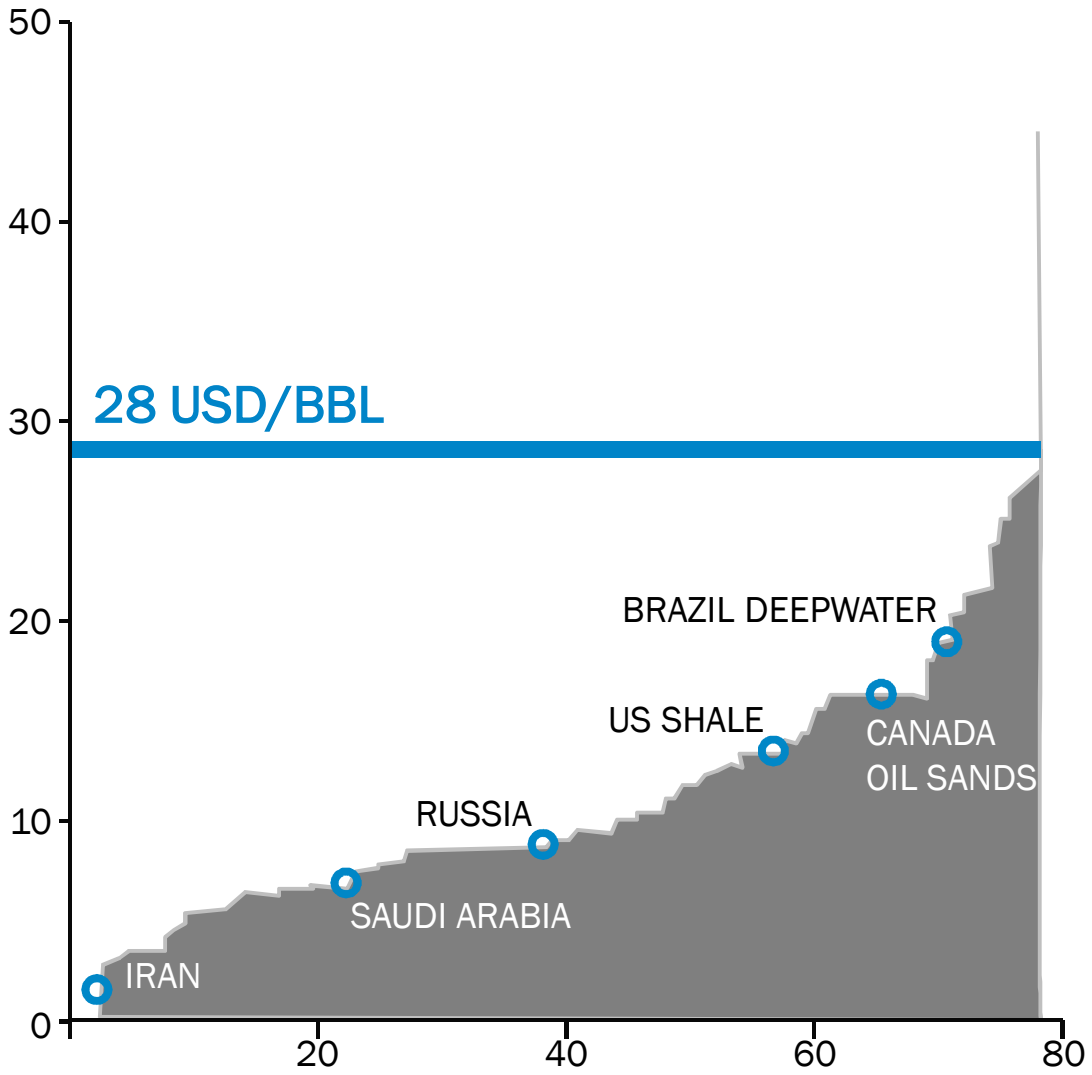


Note: The break-even price is the Brent oil price at which NPV equals zero using a real discount rate of 7.5%. The curve is made up of more than 20,000 unique assets based on each asset's break-even price and remaining liquids resources

Source: SupplHi analysis on Rystad 2015 (public data)

… but the cost curve of existing fields is below today's price → risk of "lower for longer"

Cash cost of oil production (2015, USD/bbl)



- Even at $30/barrel, **only 6% of global production fails to cover its operating costs**
  - It may be uneconomic to drill new Deepwater wells at prices under $60 a barrel, but **once they are built it may still make economic sense to keep them running at prices well below that**
  - Such **resilience** justifies prices are expected to remain "lower for longer"
- Projections for a meaningful recovery in the oil price have been pushed back until at least 2017
  - **The oil price will eventually find a bottom** and, if this cycle is like previous ones, shoot **higher** because of **the level of underinvestment in reserves and natural depletion of existing wells**

> "Projections for a meaningful recovery in the oil price have been pushed back until at least 2017"
>
> *January 2016* — The Economist

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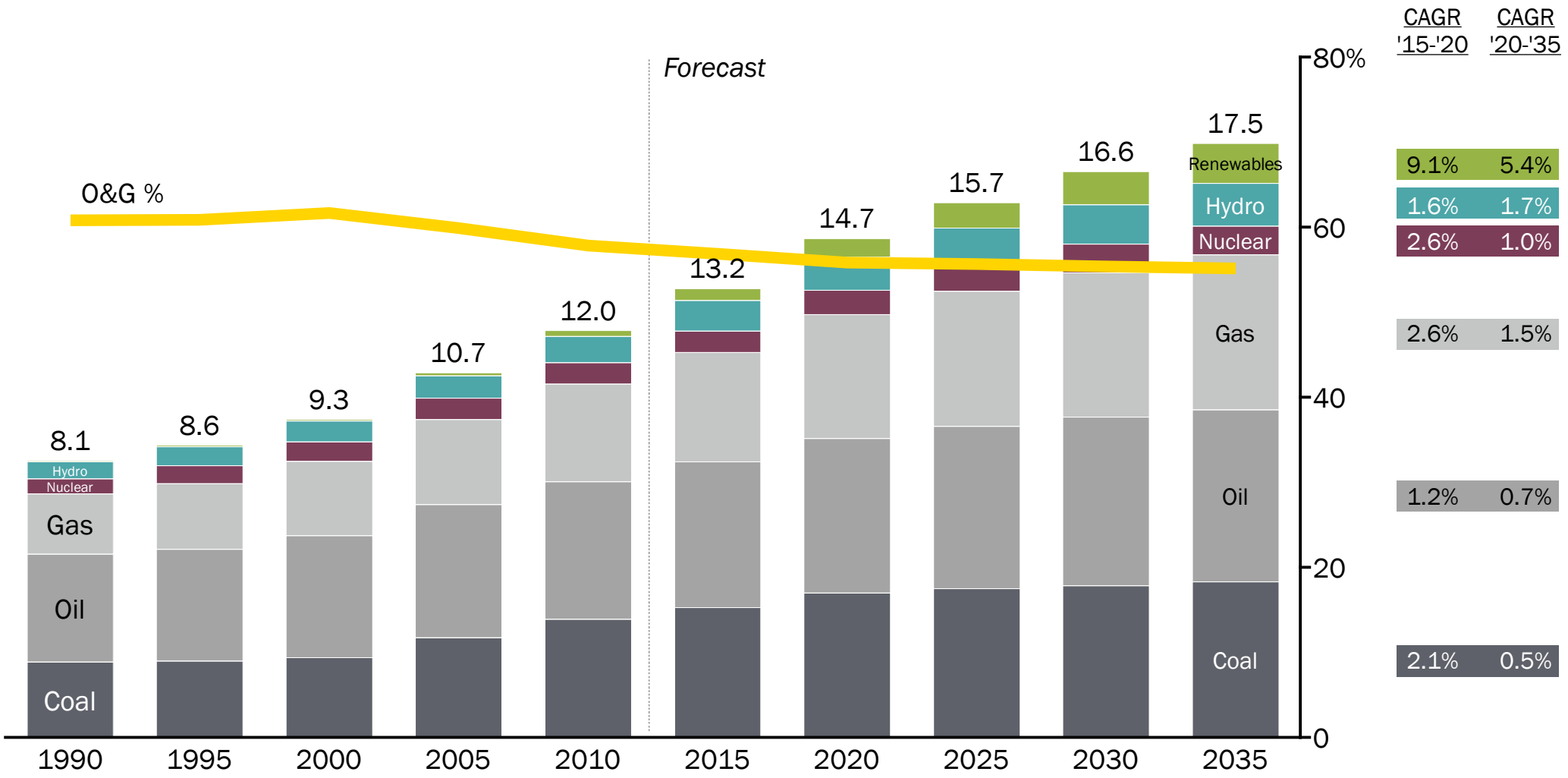
Note: includes royalties

Sources: The Economist, Wood Mackenzie, Citi Research, press clippings

Oil&Gas will keep playing a fundamental role, notwithstanding its declining relative importance

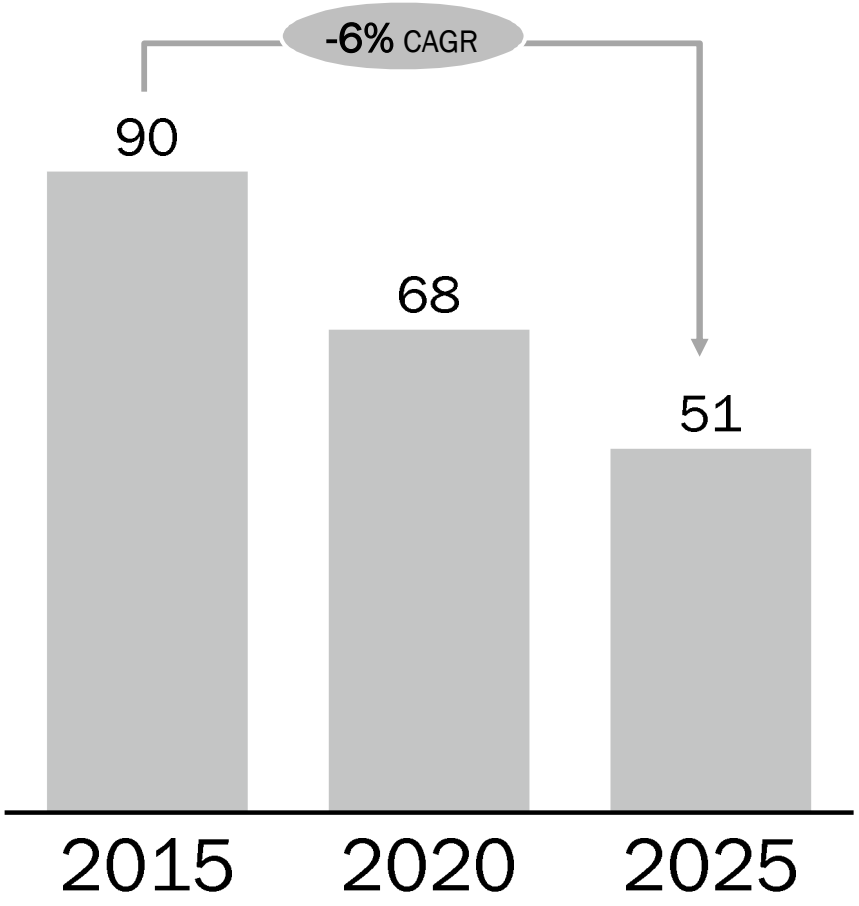
World primary energy consumption (Billion TOE)



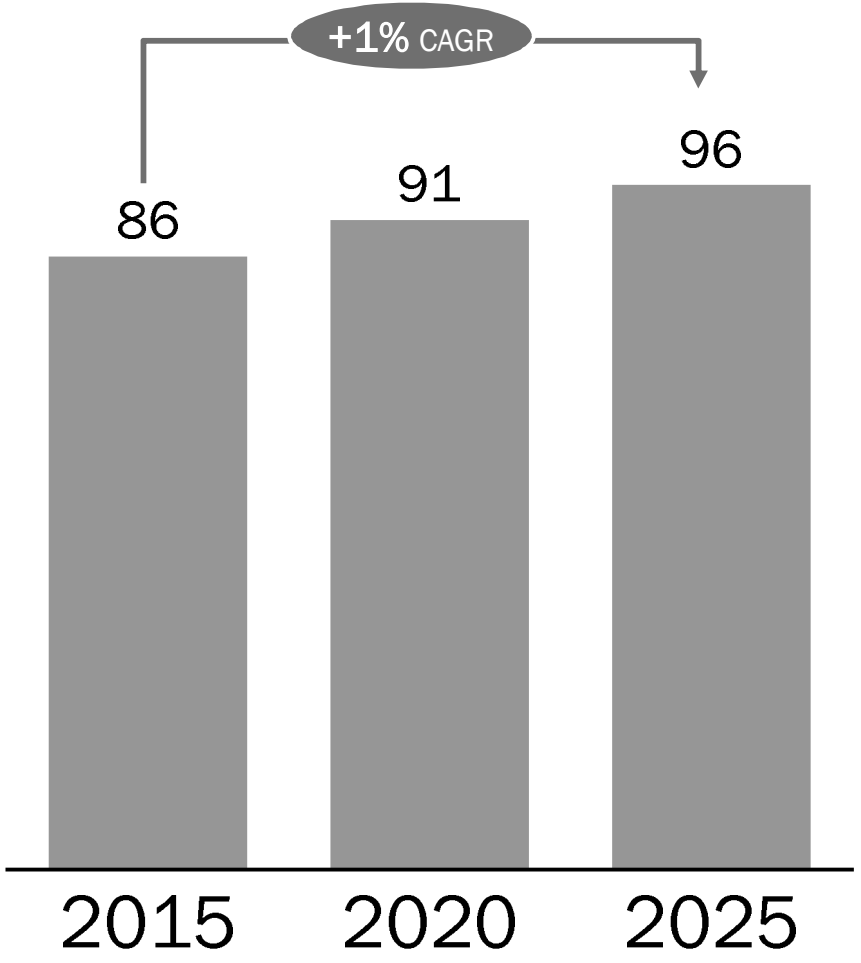
Note: oil Includes crude oil, tight oil, oil sands and NGLs
Source: SupplHi analysis on BP Energy Outlook 2015 (public data)

Oil demand tends to grow while oil fields incur in depletion

OIL: Base **production** from **current fields** (MBPD)



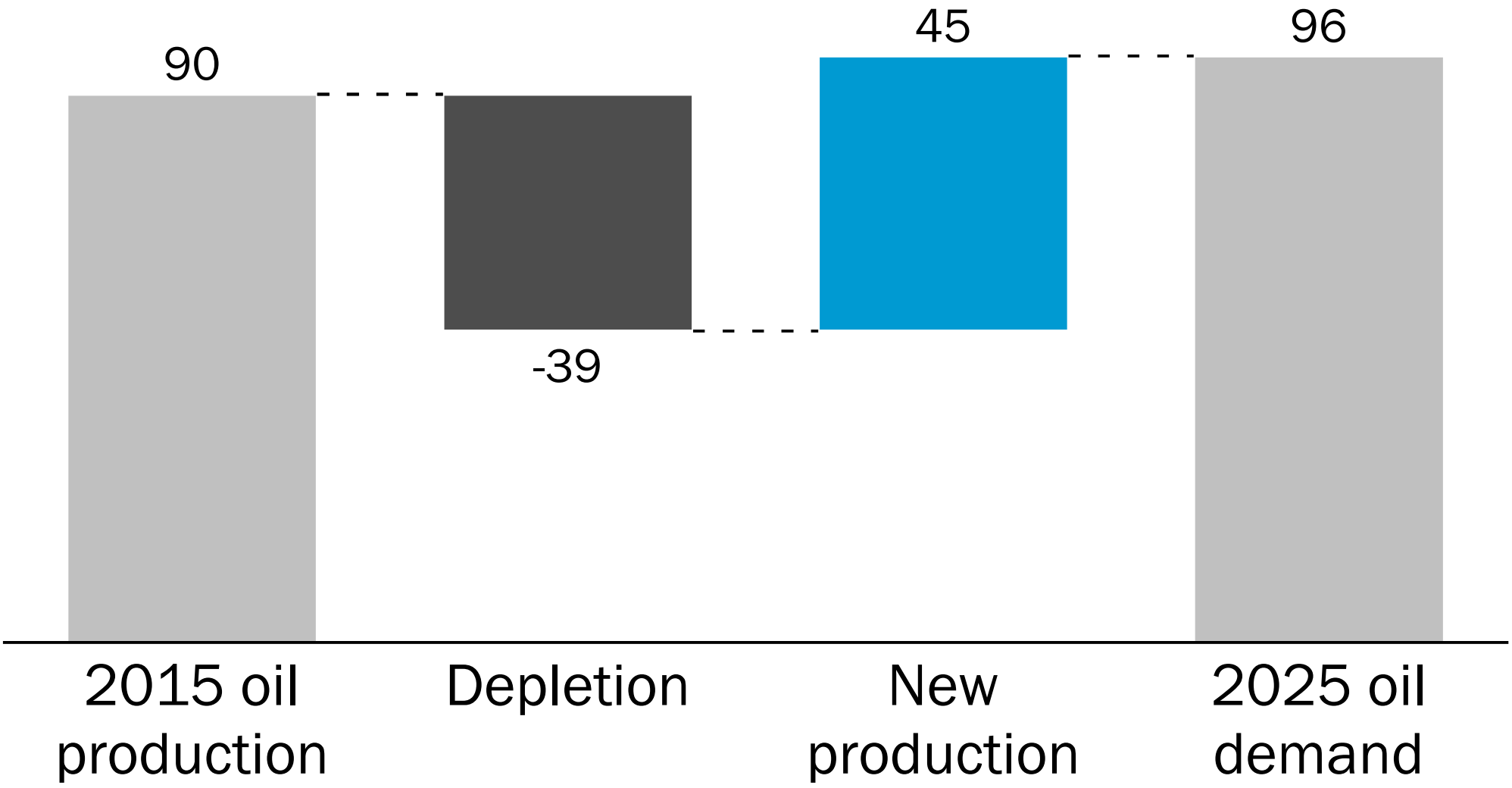
OIL: World **consumption** (MBPD)



Note: assumes 5.5% depletion rate for oil fields
Source: SupplHi analysis on BP Energy Outlook 2015 and Galp Energia "Capital Markets Day 2015" (public data)

New investments in oil production capacity are needed to substitute depletion and satisfy demand

OIL: Base production from current fields, demand, and implied depletion and new production need (MBPD)



Note: assumes 5.5% depletion rate for oil fields
Source: SupplHi analysis on BP Energy Outlook 2015 and Galp Energia "Capital Markets Day 2015" (public data)

Key takeaways

CLEAR OVERSUPPLY IN THE OIL&GAS GLOBAL MARKET, CAUSED BY A **FIGHT FOR MARKET SHARE**, DRIVEN BY **OPEC.**

ALL MAIN PRODUCERS **PUMPED AT RECORD** -BUT NOT SUSTAINABLE- **HIGHS.**

IRAN IS ABOUT TO FLOW THE MARKET WITH ADDITIONAL VOLUMES.

SHALE HAS BEEN RESILIENT IN 2015, IS RUNNING OUT OF "SURVIVAL TRICKS", BUT WILL BE THERE, ADDING **VOLATILITY** TO THE MARKET.

CURRENT OIL PRICE IS NOT SUSTAINABLE FOR:

- MANY OIL PRODUCING COUNTRIES' BUDGETS
- THE LARGE MAJORITY OF UPSTREAM INVESTMENTS.

BUT COULD REMAIN "LOWER FOR LONGER": PROJECTIONS FOR A MEANINGFUL RECOVERY OF THE OIL PRICE HAVE BEEN PUSHED BACK UNTIL AT LEAST 2017.

IN FACT, THE **EXISTING COST CURVE IS BELOW TODAY'S PRICE**, WITH NO CUTS TO PRODUCTION VOLUMES EXPECTED.

OIL&GAS WILL KEEP PLAYING A FUNDAMENTAL ROLE. **NEW INVESTMENTS IN OIL PRODUCTION CAPACITY WILL BE NEEDED** TO SUBSTITUTE FIELD DEPLETION AND SATISFY GROWING DEMAND (FURTHER STIMULATED BY **GLOBAL GDP GROWTH**).

Agenda

Approach

Demand for energy sources

Market estimates and trends

Focus on selected equipment

Segments of the Oil&Gas value chain

Upstream

Onshore Conventional

Onshore Unconventional

Shale gas/ Tight oil

Oil sands

Offshore
(Shallow Water Platform, Subsea Field Development, FPSO/FPU/TLP)

Midstream

LNG (Liquefaction On/Off, Regas On, FSRU, LNG Storage)

Pipelines
(Onshore / Offshore)

Storage and Terminals

Downstream

Refining and Petchem

GTL

Small LNG

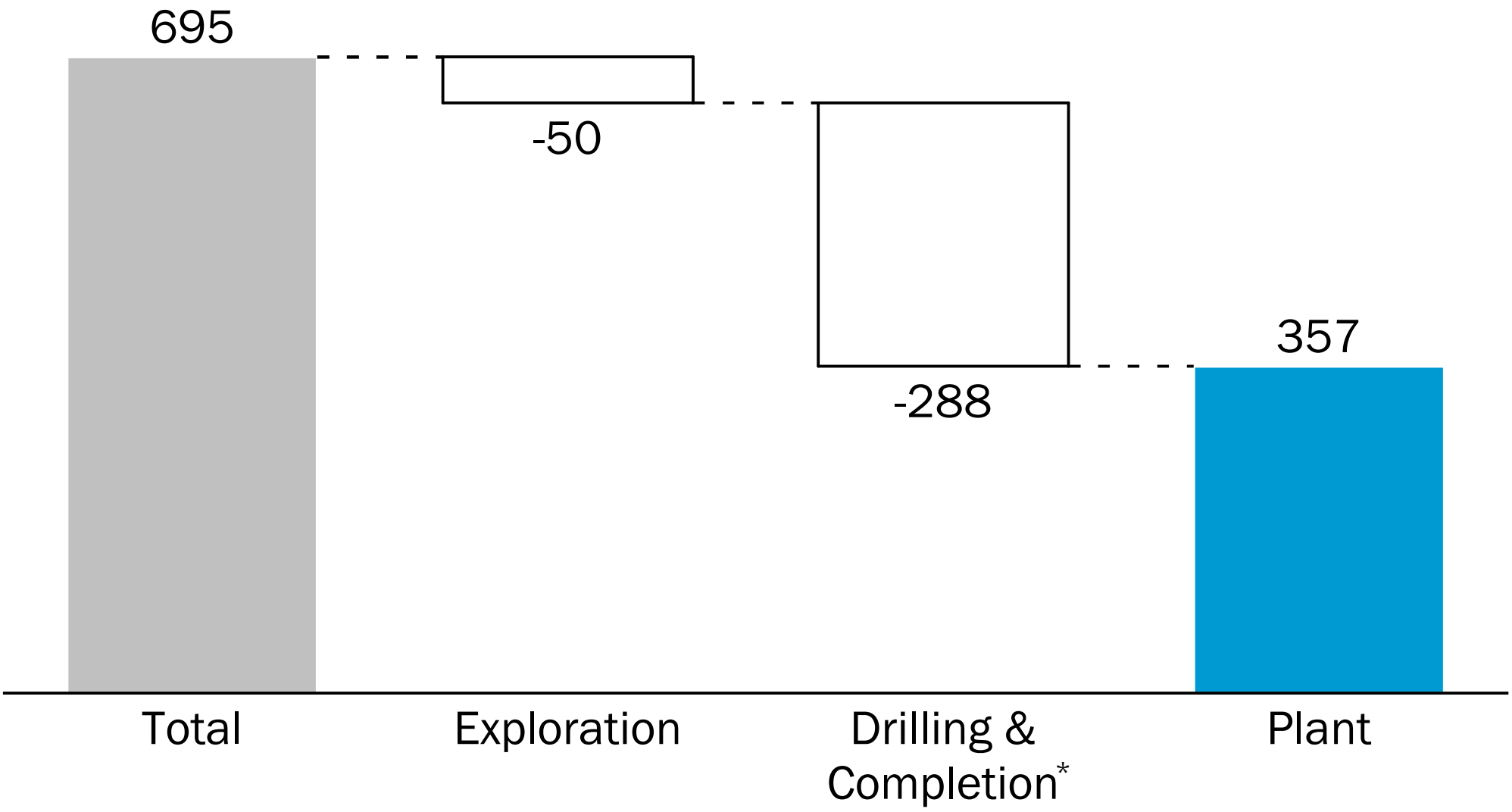
Fertilizers
(Ammonia and UREA)

End-users

CAPEX perimeter considered for this analysis

CAPEX relevant for components manufacturers (USD B, 2015)

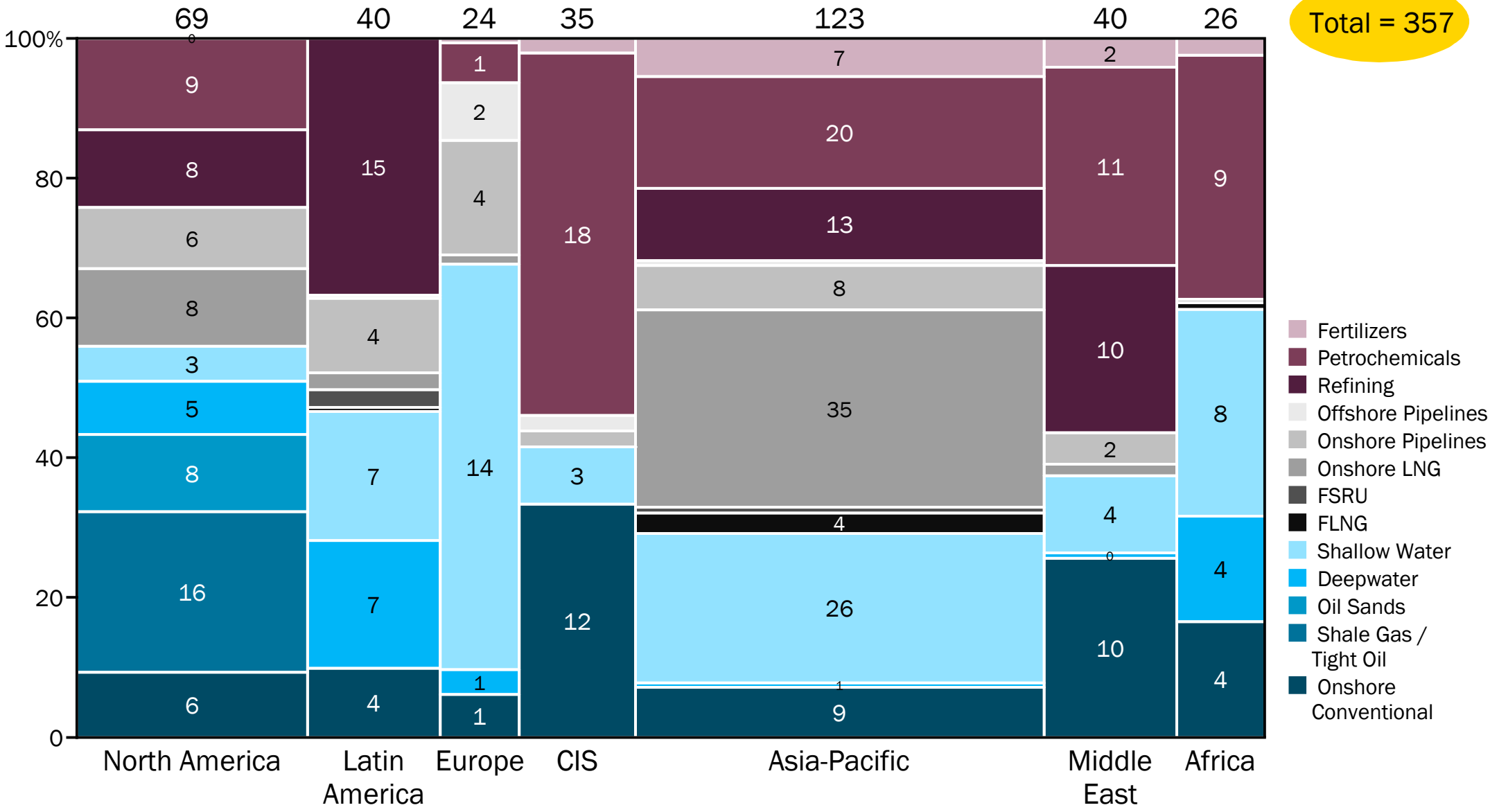
2015



*Includes fracking (shale) and excavation (oil sands)
Source: SupplHi analysis

Total 2015 CAPEX for Oil&Gas plant development (excluding Exploration and Drilling) is ~360 B USD

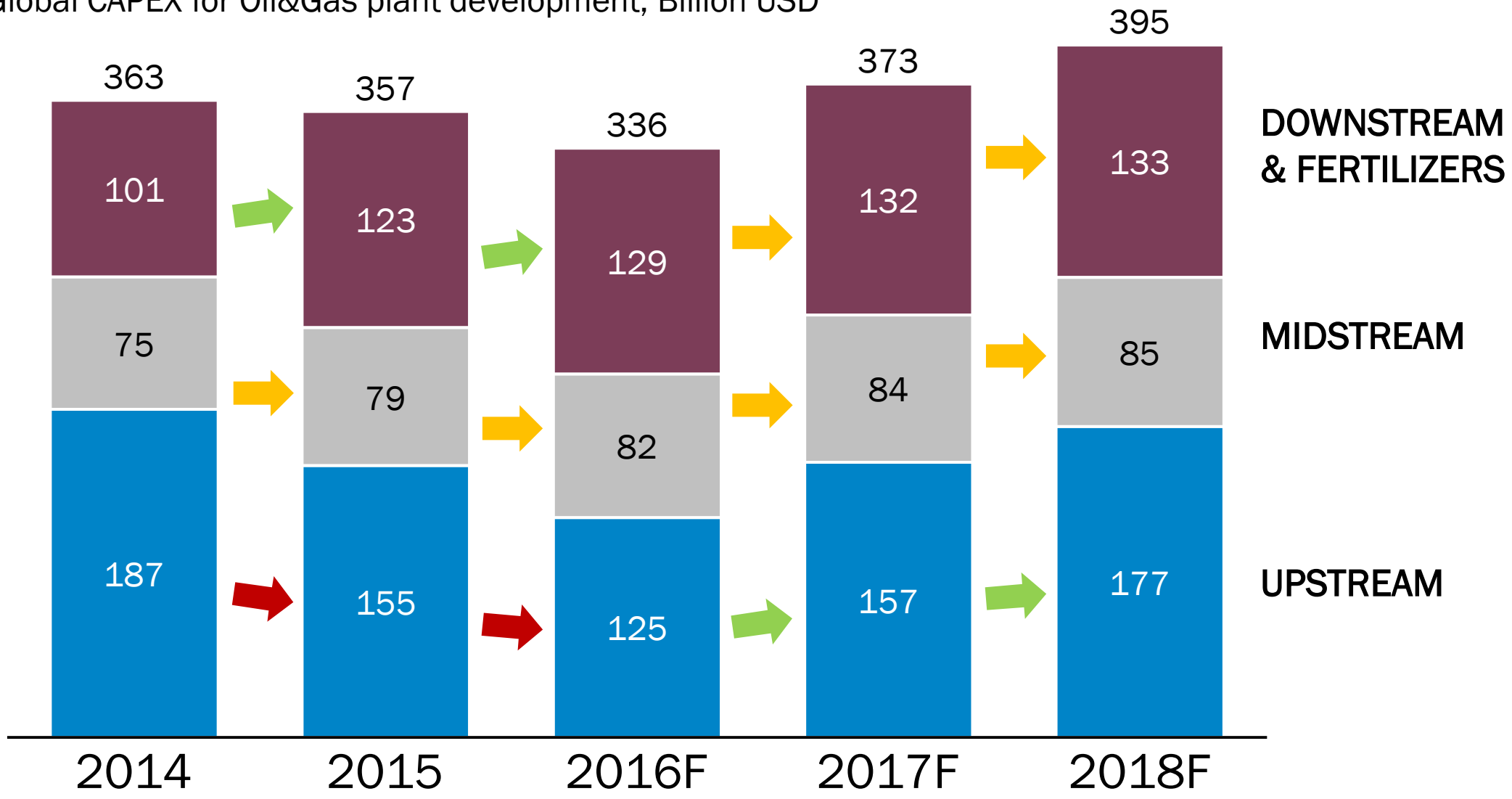
2015 Global CAPEX for Oil&Gas plant development, Billion USD



Note: not considering Exploration and Drilling CAPEX
Source: SupplHI analysis on public data, SupplHi Projects Database

Upstream, Midstream and Downstream will follow different trends in the immediate future

Global CAPEX for Oil&Gas plant development, Billion USD



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SUPPL HI

Note: not considering Exploration and Drilling CAPEX
Source: SupplHI analysis on public data, SupplHi Projects Database

THE CROMARTY FIRTH, NORTH OF INVERNESS, SCOTLAND
CURRENTLY PACKED WITH UNCONTRACTED RIGS

UPSTREAM

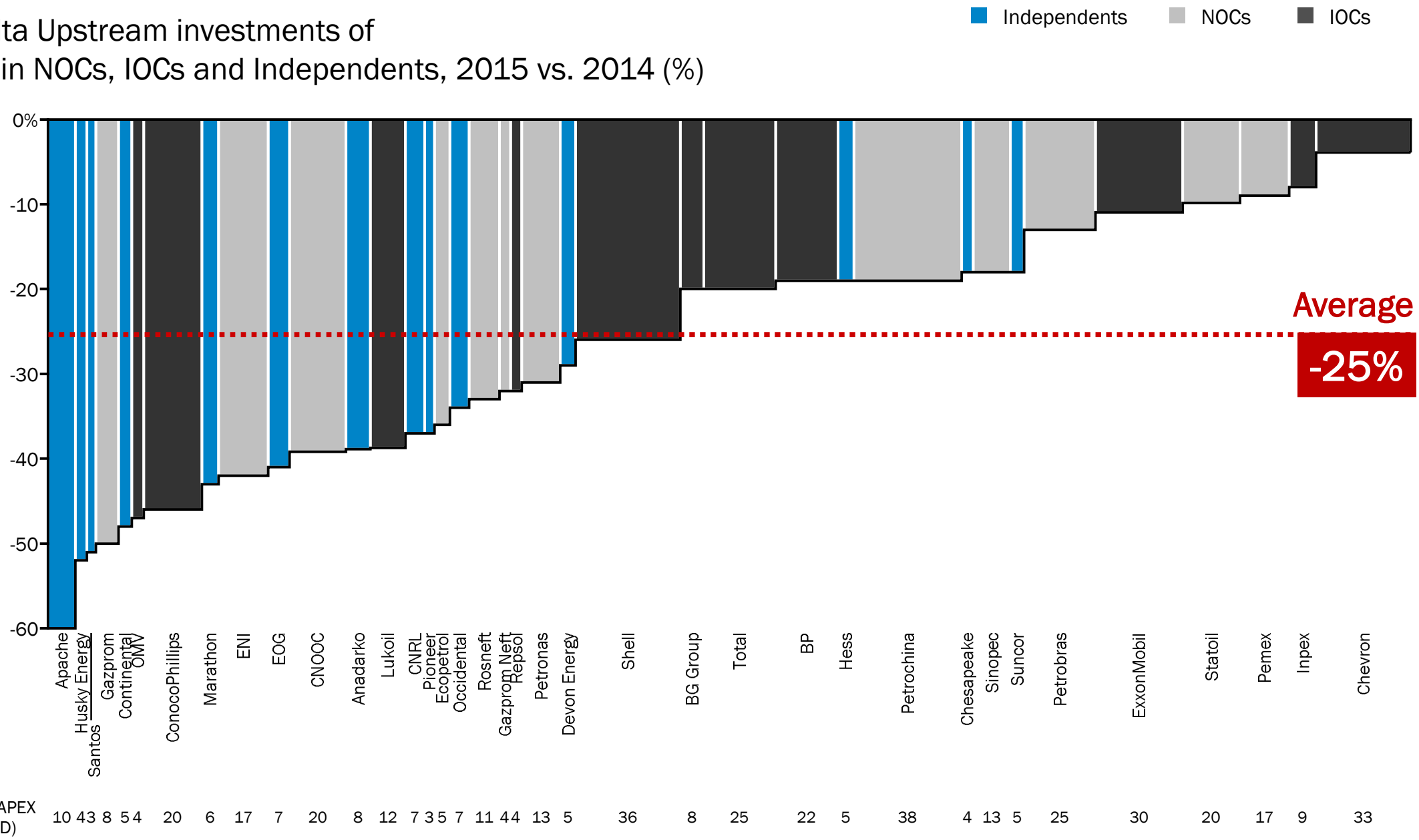
The outlook for 2015-2016 varies significantly by area of the value chain

UPSTREAM

- **Significant downturn of new investments**
  - Steep fall of the number of projects due to **cutbacks and delays**
  - ~200B CAPEX fallout in 2015 and 2016
  - Customers asking for **bold discounts on existing contracts**
  - Cuts by large corporations but smaller Oil Co. with higher intensity
- **Major cuts in Exploration and Drilling**, but also in Plant development
  - "Deferring discretionary spending, in particular in exploration and predevelopment projects, is a quick win." (Wood MacKenzie)

All main players have cut their overall Upstream budgets …

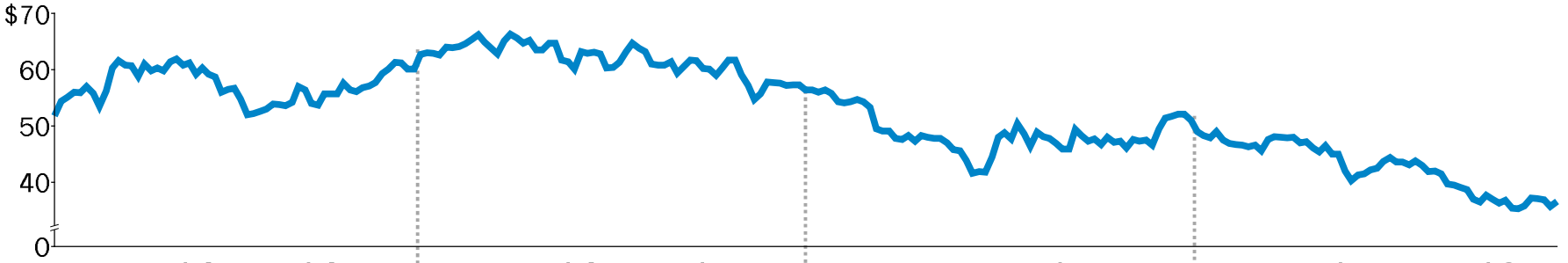
Delta Upstream investments of main NOCs, IOCs and Independents, 2015 vs. 2014 (%)



Source: JP Morgan, SupplHi Analysis

… with a dramatic collapse of Awards in Upstream, and **projects reduced in size**

BRENT, USD/barrel



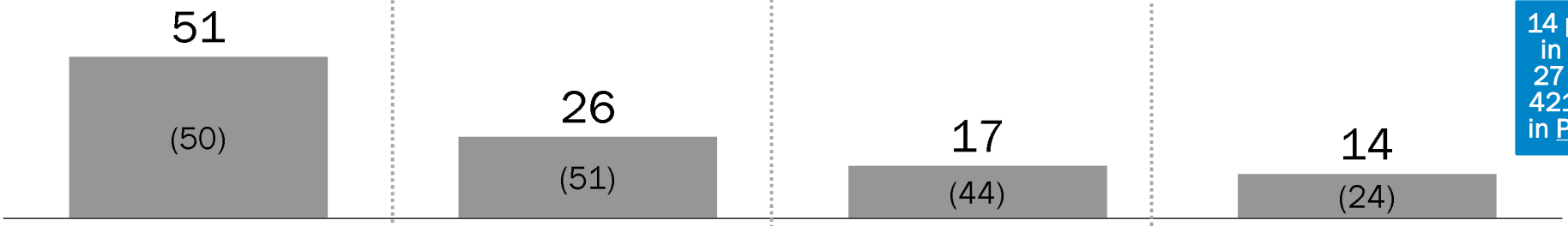
Feb 14 - Jul 14	Aug 14 - Jan 15	Feb - Jul 15	Aug 15 – Jan 16
start of the decline	*$50/60 scenario*	*missed rebound*	*further decline*

?

14 projects in Bid for 27 B USD; 421 B USD in Planning

MAIN EPC AWARDED CAPEX, B USD

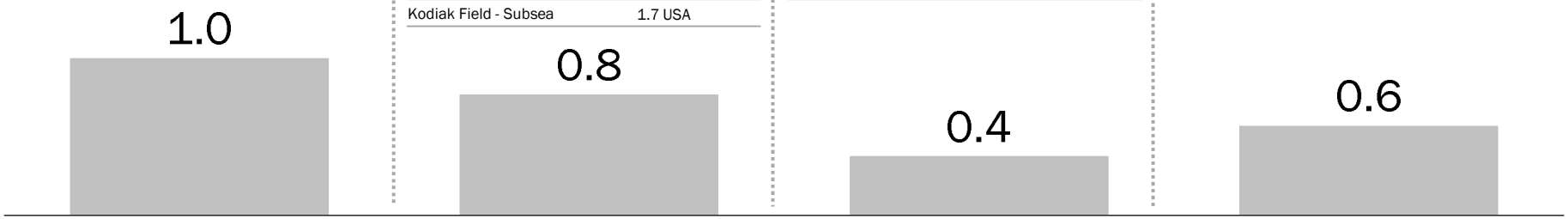
(# of awarded projects)



MAIN EPC AWARDS

Kaombo 2 FPSO	7.0 Angola	Ratqa Lower Fars Heavy Oil Development	4.0 Kuwait	Johan Sverdrup Field Development	10.0 Norway	Fadhili Gas Program	4.7 Saudi Arabia
Fort Hills	1.9 Canada	Kandym – Khauzak-Shady Mega Project	2.6 Uzbekistan	Safaniya Phase III Project	1.5 Saudi Arabia	Culzean Offshore Oil Field Development	4.5 UK
Gehem FPU	1.5 Indonesia	OCTP Field FPSO Yinson Genesis	2.6 Ghana	Persephone Gas Project	1.2 Australia	Madura Field FPSO	0.5 Indonesia
Gendalo FPU	1.5 Indonesia	Al-Nasr Full Field Dev. Project - Package 2	2.6 UAE	Glenlivet Field	1.0 UK		
Rabab Harweel Integrated Project (RHIP)	1.0 Oman	Kodiak Field - Subsea	1.7 USA	Malampaya Gas Field Phase III (MP3) - Subsea	1.0 Philippines		

AVERAGE EPC PROJECT SIZE (B USD)



ON HOLD: 55 projects for 98 B USD

CANCELLED: 17 projects for 50 B USD

SDA Bocconi School of Management | SUPPLHI

Source: SupplHi Projects Database, January 2016

But is also requesting challenging savings on existing projects

Triple negative effect in 2015

- PROJECTS AWARDS (20/30% LESS)
- PROJECT SIZE (10/30% SMALLER)
- COSTS (10/30% DISCOUNTS AND RENEGOTIATIONS)

"BP revealed that it was **deferring projects in order to benefit from falling supplier costs.**
By waiting longer before giving projects the green light, companies hope to **force savings out of the service groups** that carry out maintenance and repairs and supply labour, drilling rigs and other infrastructure.
Bob Dudley, BP chief executive, says **savings of 20/30% are being achieved.**"

FINANCIAL TIMES

September 2015

"In such a cut-throat environment, the **services companies are accepting heavy discounts for the few deals they can secure** as customers have the upper hand at the negotiating table.
North Sea oil producer Enquest, which hires services firms, said it had negotiated discounts of up to 50% on some contracts, while **the industry consensus on new rates is around 20% below previous years.**"

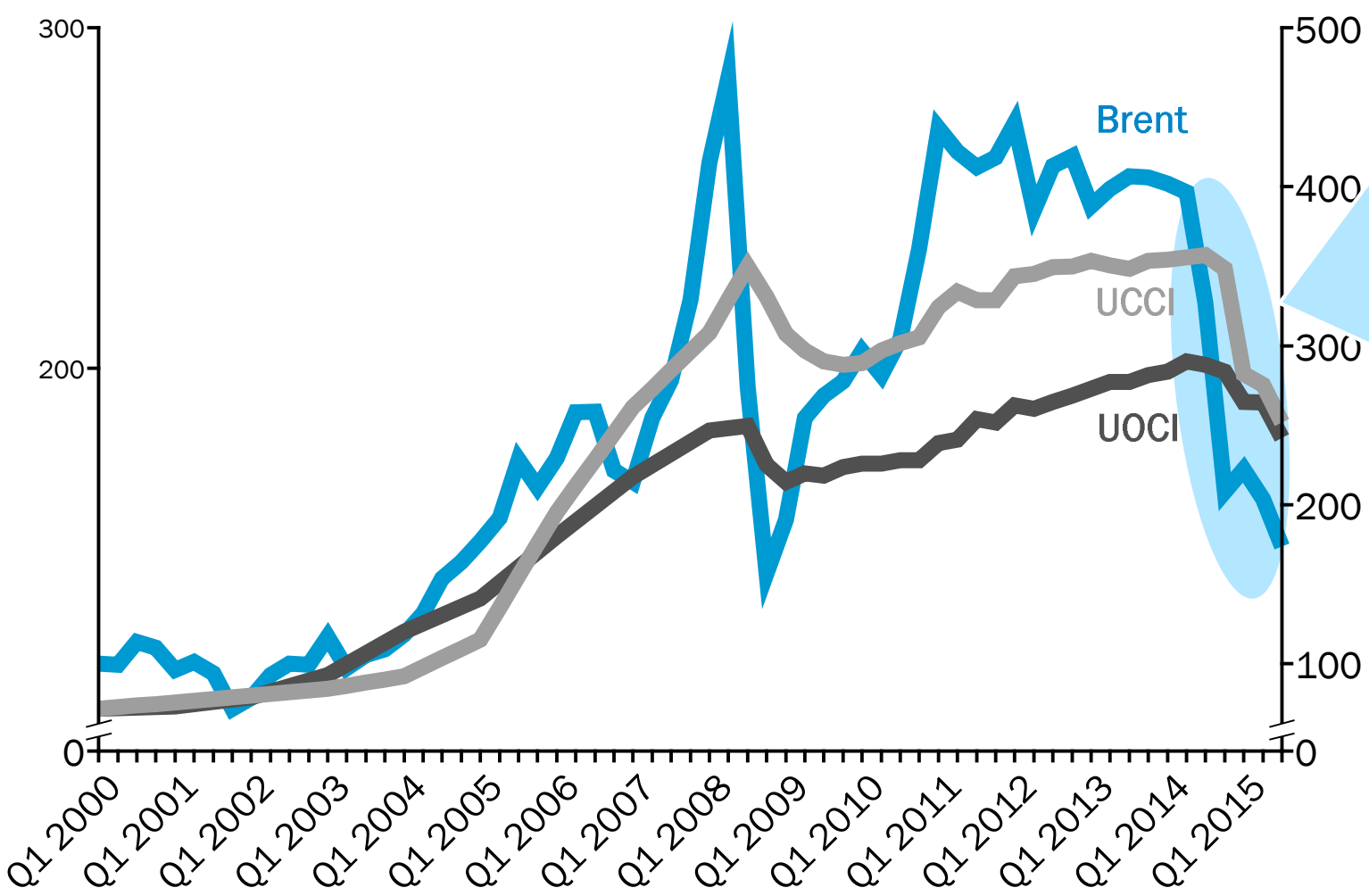
REUTERS

September 2015

SDA Bocconi School of Management SUPPLHI Source: press clippings

Oil prices drive Upstream Capital and Operational efficiencies

IHS Upstream Capital Costs (UCCI) and Operating Costs Index (UOCI); indexed Brent spot price



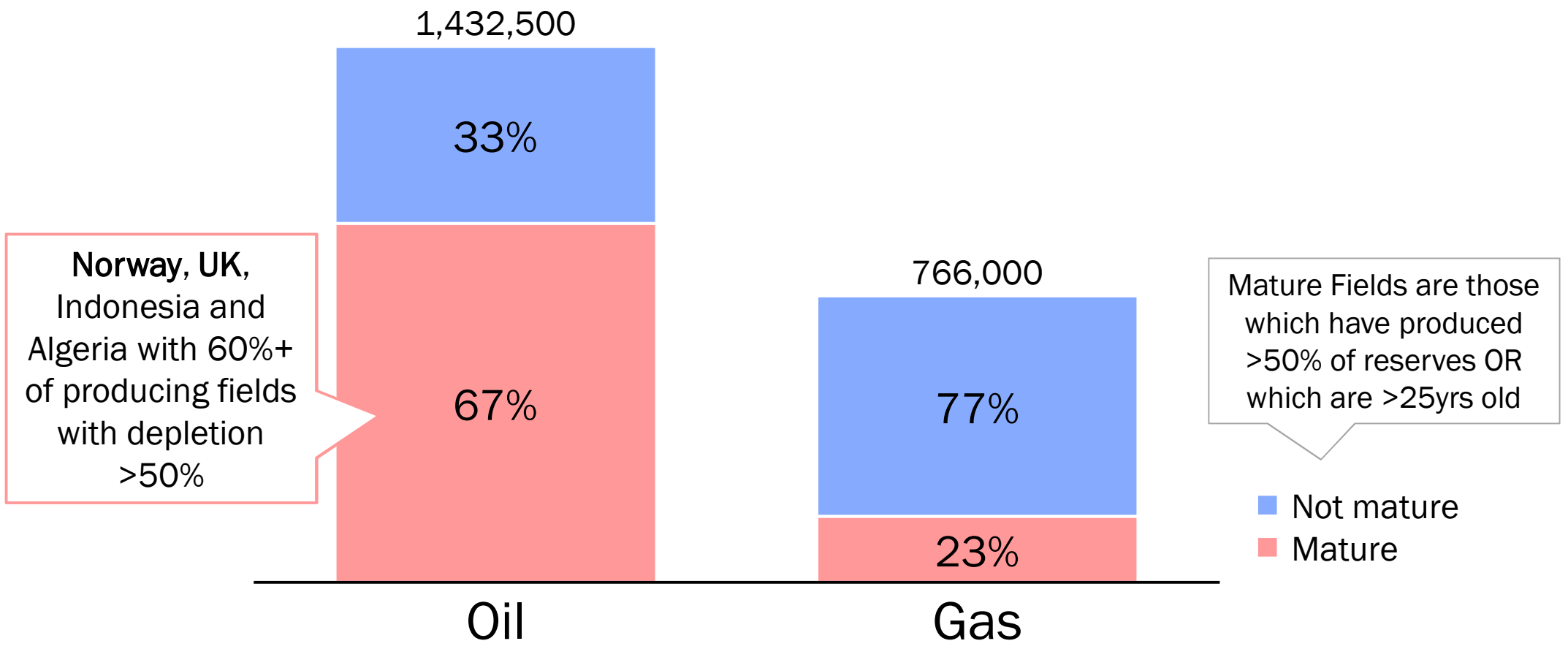
Further need of:

- **Capital Efficiency**
- **OPEX costs reduction**
- **Enhanced Oil Recovery (EOR):** 2/3 of remaining Oil reserves for fields in production are “mature” vs <1/3 of Gas

Note: Brent indexed price refers to the right axis; the UCCI and the UOCI to the left axis; Mature Fields are those which have produced >50% of reserves OR which are >25yrs old
Source: SupplHi analysis on IHS, 2016 and EIA, 2016 (public data)

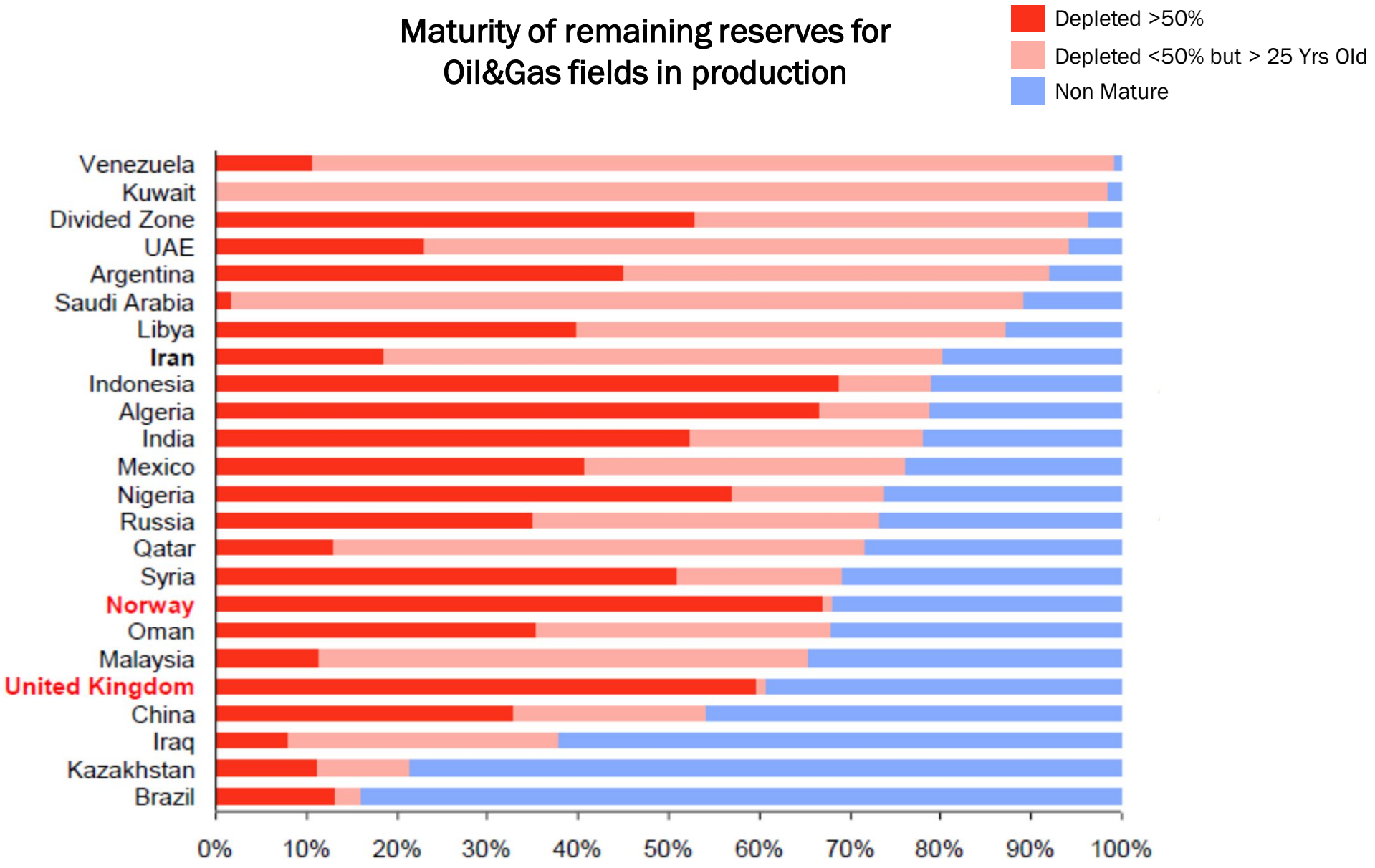
2/3 of remaining Oil reserves for fields in production are “mature” vs <1/3 of Gas

Global remaining reserves for fields in production, by maturity (MMboe)



Note: doesn’t include unconventional resources
Source: IHS EDIN (public data)

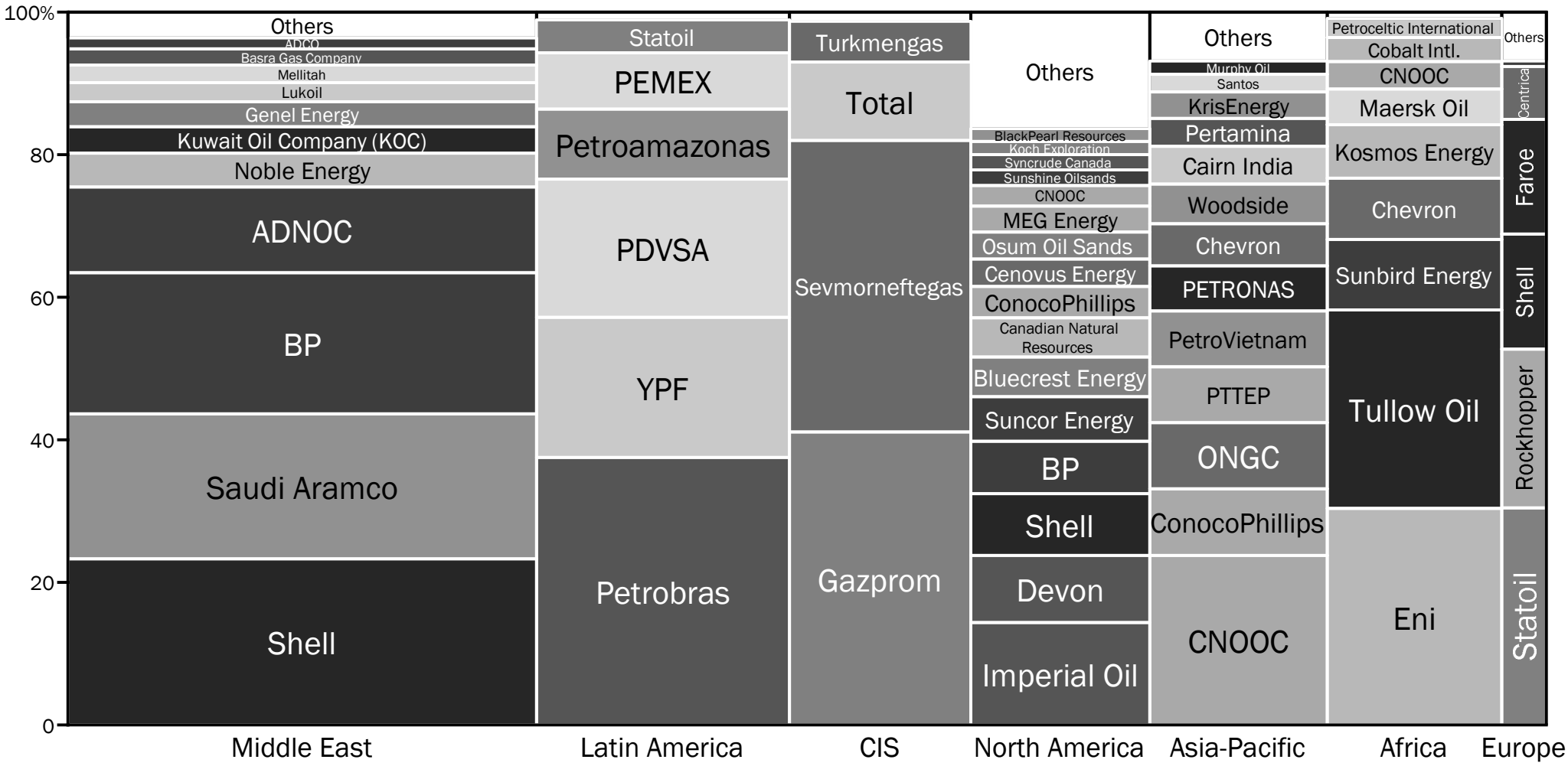
Majority of producing fields are “mature”, driven by Norway, UK, Algeria



Note: doesn’t include unconventional resources
Source: IHS EDIN (public data)

Upstream End-Users to qualify with, by region

End-Users incidence on projects with **Just Awarded, Bid Ongoing and Planning** statuses, Jan 2016

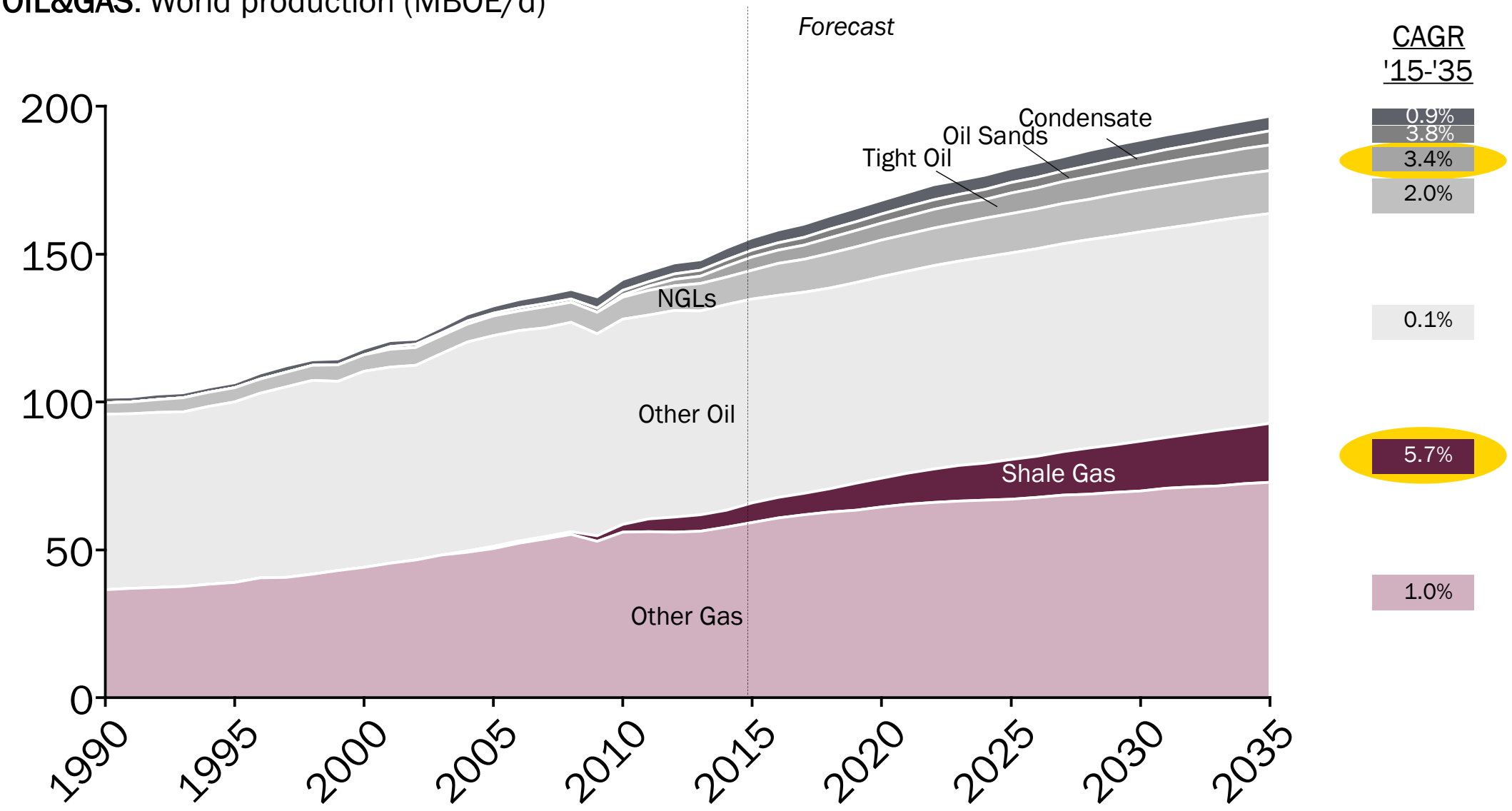


Note: based on Operatorship (not on the Equity in the project). Incidence is adjusted according to the estimated probability assigned to the single projects

Source: SupplHi Projects Database, January 2016

Unconventional fields are still expected to continue growing in 2015-2035

OIL&GAS: World production (MBOE/d)



Source: SupplHi analysis on BP Energy Outlook 2015; Canadian Crude Oil Production Forecast 2015 - 2030, June 2015 (public data)

Key takeaways

SIZE OF UPSTREAM PROJECTS IS BEING **REDUCED**, CREATING **MORE OPPORTUNITIES** FOR **MEDIUM AND SMALL FOCUSED AND/OR LOCAL CONTRACTORS**.

OIL PRICES DRIVE UPSTREAM CAPITAL AND OPERATIONAL EFFICIENCIES. ESPECIALLY IN OFFSHORE OIL&GAS, **VENDORS NEED TO SUPPORT CLIENTS TO ACHIEVE AN INTENSE FOCUS ON CAPITAL DISCIPLINE**, WHICH WILL BE THE **MANTRA OF THE INDUSTRY LOOKING FORWARD**.

SHALE GAS AND TIGHT OIL ARE STILL EXPECTED TO CONTINUE GROWING IN 2015-2035, BUT STRONGLY DEPEND ON OIL AND GAS PRICES. TIGHT OIL PRODUCTION OUTSIDE NORTH AMERICA WILL GRADUALLY EMERGE BUT AT A SLOW PACE.

OIL SANDS CAPEX EXPECTED TO START RECOVERING IN 2018, **CONDITIONAL TO THE RECOVERY OF OIL PRICES: OUT OF THE 113 CANADIAN OIL SANDS PROJECTS IN PLANNING PHASE, 36 ARE CURRENTLY SUSPENDED OR CANCELLED.**

CAPEX FOR **SHALLOW WATER** IS BEING IMPACTED IN THE MEDIUM TERM AND WILL SHOW ~0% CAGR 2014-2019.

THE **TOP-3 PLAYERS IN DEEPWATER** (**PETROBRAS, TOTAL AND SHELL**) DRIVE 50% OF EXPECTED SPENDING IN THE 2016-2018 PERIOD. **INDEPENDENT OIL&GAS CO.'S** (E.G. MAERSK, DANA OFFSHORE, TULLOW, PREMIER OIL, ...) ARE UNDERTAKING LARGE PROJECTS AND ARE **GROWING THEIR INCIDENCE IN DEEPWATER**.

MIDSTREAM

The outlook for 2015-2016 varies significantly by area of the value chain

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  - Steep fall of the number of projects due to cutbacks and delays
  - ~200B CAPEX fallout in 2015 and 2016
  - Customers asking for bold discounts on existing contracts
  - Cuts by large corporations but smaller Oil Co. with higher intensity
- Major cuts in Exploration and Drilling, but also in Plant development
  - "Deferring discretionary spending, in particular in exploration and predevelopment projects, is a quick win." (Wood MacKenzie)

MIDSTREAM

- **LNG continues to grow, but less than expected before**
  - **More Regasification** rather than Onshore Liquefaction
  - Less but larger projects in **Onshore Liquefaction** (e.g. Kuwait)
  - **Confirmed growth of Floating LNG**, representing however <10% of total Midstream CAPEX
  - Limited growth of **pipeline** capacity, mainly due to **geopolitical issues**
- Possible "threat"
  - **Japan** is re-activating its nuclear plants

Midstream has been impacted as well, even if less intensely than Upstream

"Despite the current low oil prices, **most LNG projects remain economically robust over the long term.** IHS Energy has calculated the oil-price thresholds required to cover life-cycle costs and provide an appropriate return for LNG projects. A typical greenfield project — for example in East Africa or Western Canada — requires a "free on board" (FOB) price of around $10-12 per MMBtu. With pricing at the historically normal ratio to oil, such projects would require oil prices in the range of $70-82 per barrel to break even. This is within the range of most anticipated long-term oil prices."

IHS ENERGY CERAWEEK

2015

"The longer the current oil price environment remains in place, **the smaller the US LNG sector is likely to be in the medium term. That could be important for the Australian producers** because the implications of the capital investment strike generated by the decline in the oil price — about $US170bn of planned investment has already been cancelled or deferred — could support a scenario where there were supply shortages in the oil and gas sector in the not-too-distant future and a consequent rebound in prices."

THE AUSTRALIAN BUSINESS REVIEW

January 2016

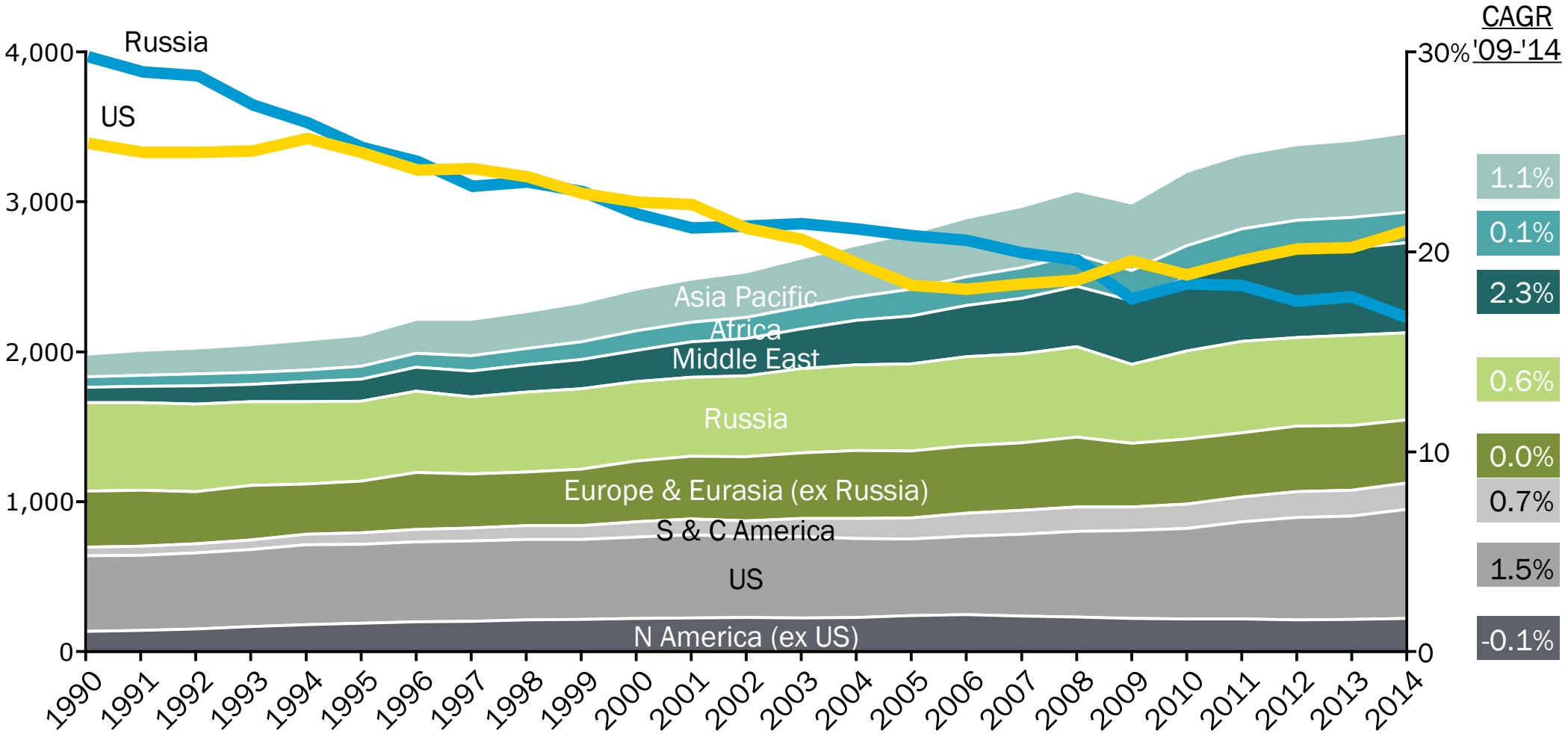
"Plunging Oil Prices Stall Demand for Pipelines: Royal Dutch Shell has lost $5 billion so far in 2015, **TransCanada Corp. is staring at a $2-billion write-off following the U.S. rejection of its Keystone XL pipeline**, and Baker Hughes said it took a 43% hit to earnings compared to last year, a measurement almost identical to the decline of North American oil-rig drilling over the same time."

ENR Engineering News-Record

December 2015

The influence of the two largest gas producers has been declining, but they still account for ~40% of world output

GAS: World production (Billion Cubic Meters - BCM)



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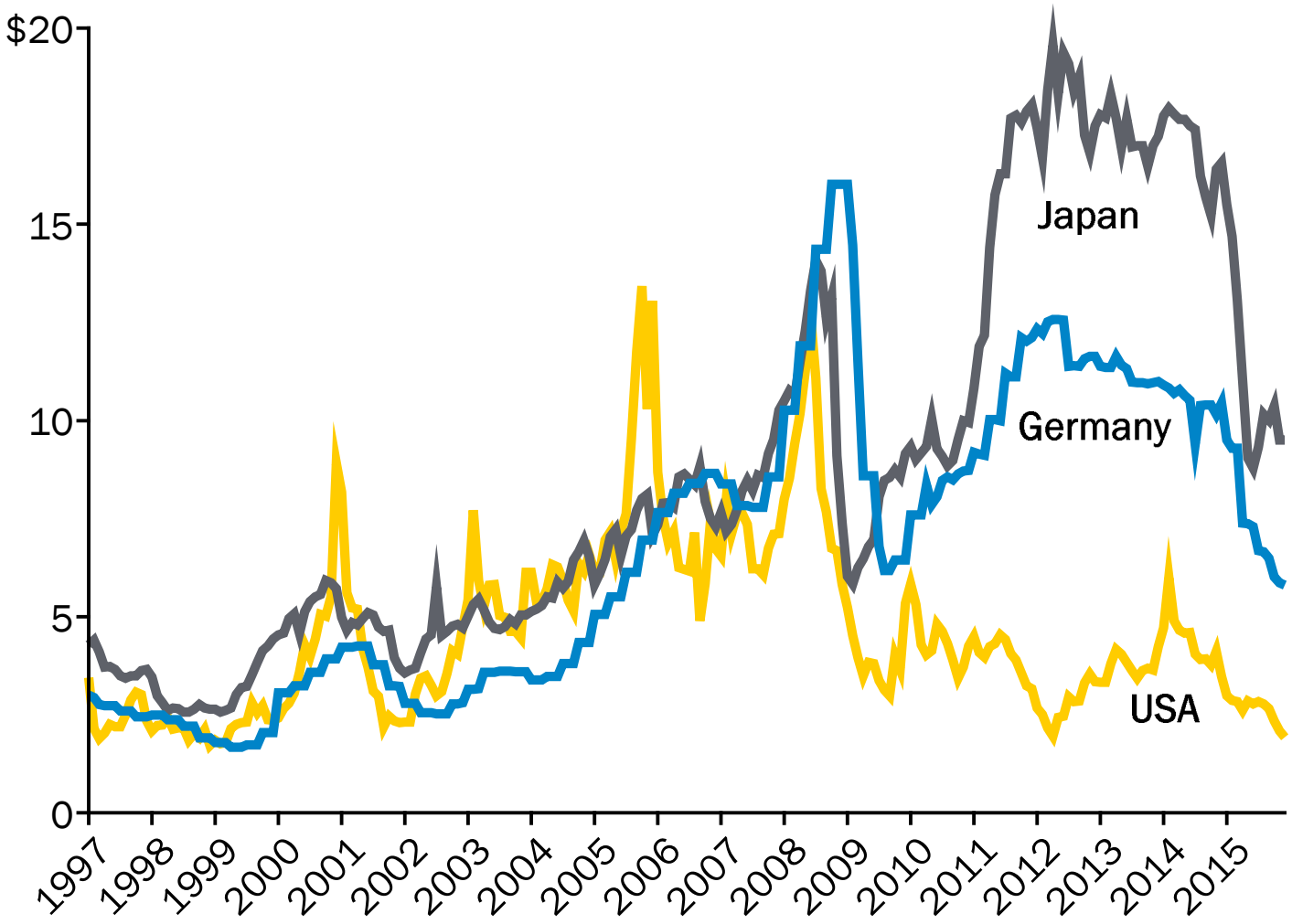
SUPPL HI

Source: SupplHi analysis on BP Statistical Review, June 2015 (public data)

Gas prices from 2010 started diverging and are expected to continue to do so

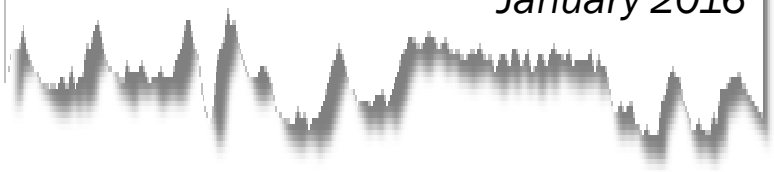
GAS: prices (USD/MBTU)



"**In theory a long period of low oil [and gas] prices should benefit the global economy.** The economies that have enjoyed the strongest GDP growth in the past year have indeed been oil importers: India, Pakistan and countries in east Africa. It is hard to explain the Consumer-led recovery in the euro area without assuming a positive impact from lower oil prices. **In the US, JPMorgan estimates the outcome was between a contraction of 0.3% and a boost of a measly 0.1%.** Consumers may have saved more of the windfall than had seemed likely and the share of oil-related capital spending in total business investment in America has fallen by half".

The Economist

January 2016



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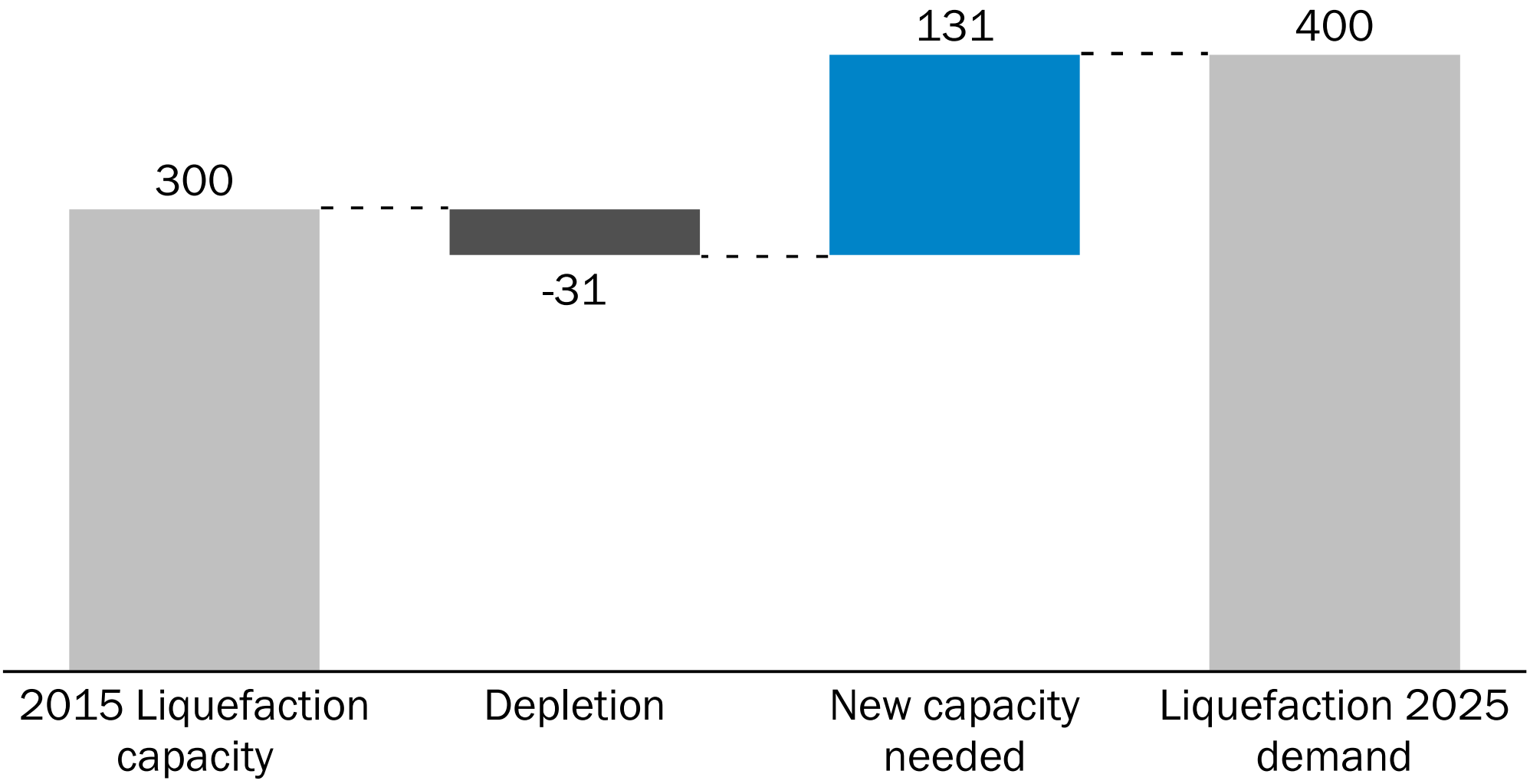
SUPPL HI

Note: considers Natural Gas, Russian Natural Gas border price for Germany, Indonesian Liquefied Natural Gas in Japan, Herny Hub for the US
Source: SupplHi analysis on EIA, 2015, press clippings

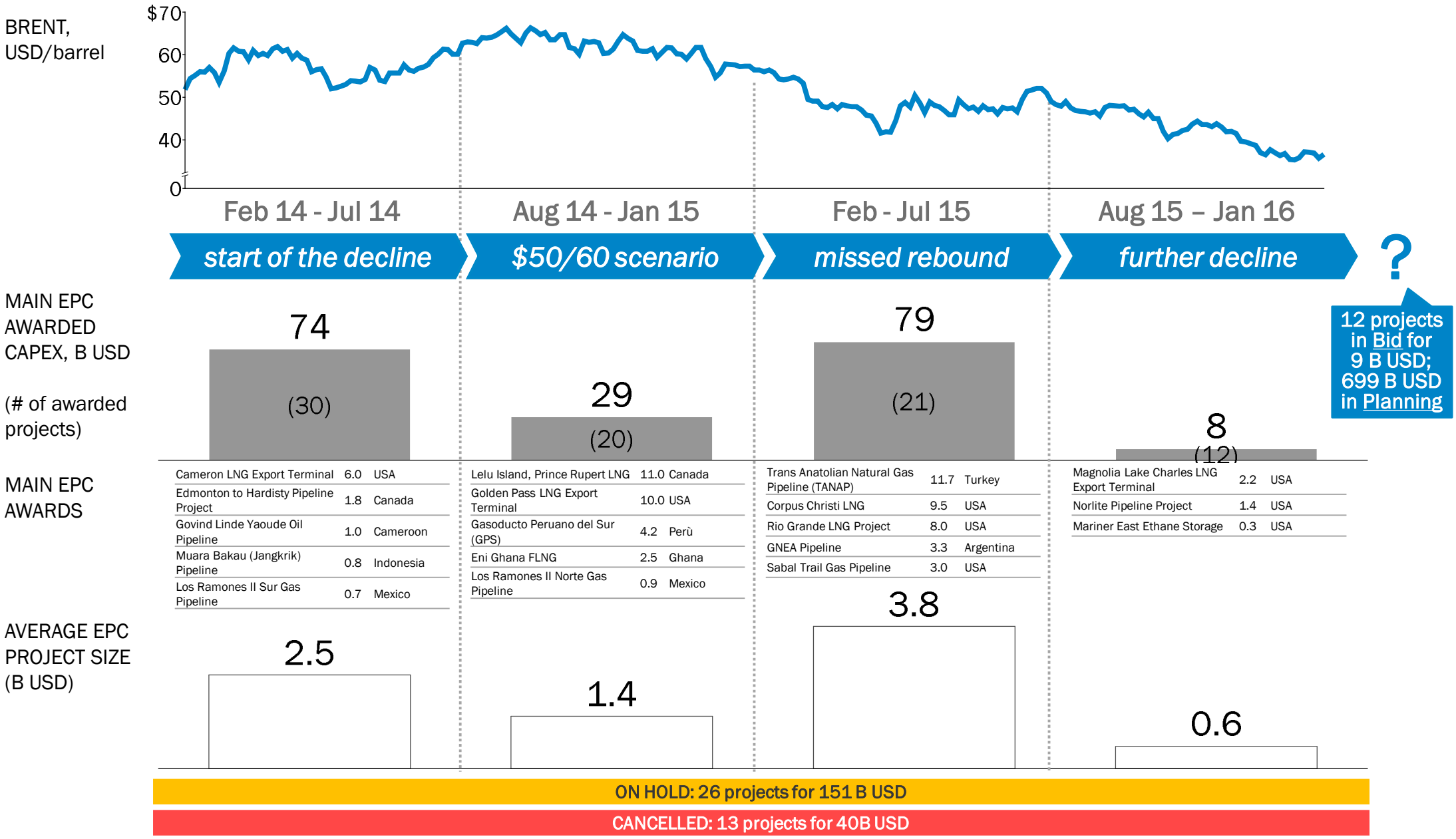
LNG presents a fast-growing demand

LNG base production from current fields, demand,
and implied depletion and new production need (MTPA)



Note: assumes 1% depletion rate for LNG
Source: SupplHi analysis on Galp Energia "Capita Markets Day" presentation (public data)

Midstream awards are highly driven by jumbo LNG and Pipeline projects in 1H15



Source: SupplHi Projects Database, January 2016

End-Users to qualify with, by region

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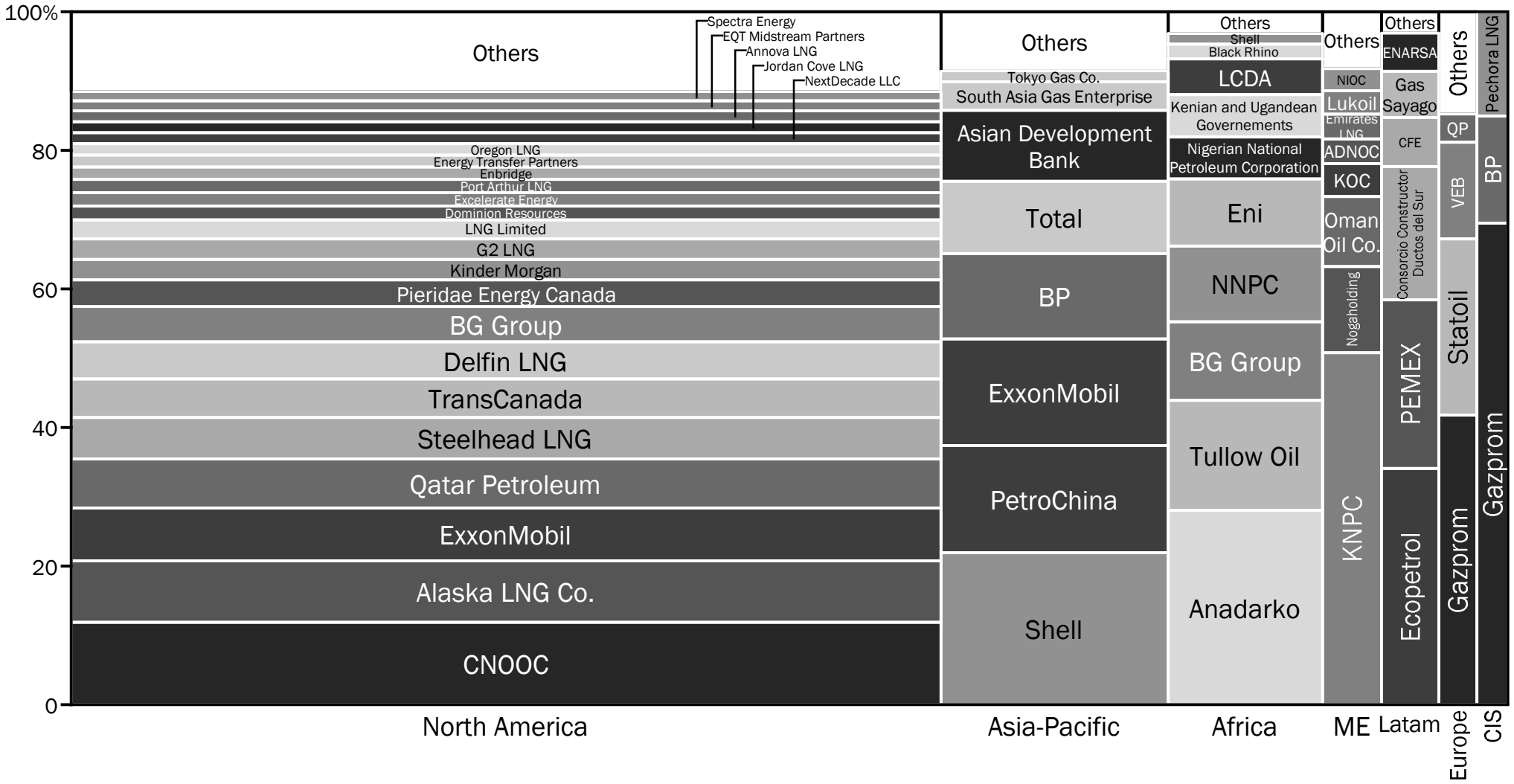

Note: based on Operatorship (not on the Equity in the project). Incidence is adjusted according to the estimated probability assigned to the single projects

Source: SupplHi Projects Database, January 2016

Key takeaways

MASSIVE PROPOSED INCREASE IN **NORTH AMERICAN LIQUEFACTION CAPACITY** IN BUT **HIGH PROJECT MORTALITY RATE** IS EXPECTED, WITH **RISK OF OVERSUPPLY.** MOREOVER, NORTH AMERICA REQUIRES A **STRONG KNOWLEDGE OF THE NEEDS OF THE LOCAL MARKET (REGULATIONS, MODULARIZATION, ...).**

MIDSTREAM REQUIRES **QUALIFICATION WITH EPC CONTRACTORS** (NORTH AMERICAN, EUROPEAN, JAPANESE, ...) RATHER THAN FOCUSING ONLY ON THE ~100 MEDIUM AND LARGE END-USERS SPREAD ON A GLOBAL LEVEL.

IN MIDSTREAM, **CO-PRESENCE OF JUMBO AND MEDIUM/SMALL PROJECTS**, WITH COST AND COMPLETION OVERRUNS ON RECENT MEGAPROJECTS. FINANCIAL WEAKNESS OF SOME INVESTORS PUTS AT RISK SOME OF THE PROJECTS.

6 FLOATING LNG PROJECTS SCHEDULED TO COME ONLINE BETWEEN 2015 AND 2018, THE MOST RELEVANT BEING **SHELL'S PRELUDE**. CHARACTERIZED BY A **MULTI-SITE EXECUTION** STRATEGY, **WITH GLOBAL PROCUREMENT.**

TRANSCANADA IS DOMINATING THE STRONG GROWTH IN NORTH AMERICAN ONSHORE PIPELINES WITH ~40% OF EXPECTED SPENDING, MAINLY DRIVEN BY THE SHALE BOOM. THE **SLOWDOWN OF UNCONVENTIONAL PRODUCTION IN NORTH AMERICA** MAY DELAY SOME PROJECTS.

DOWNSTREAM

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UPSTREAM

- Significant downturn of new investments
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  - Customers asking for **bold discounts on existing contracts**
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  - Less but larger projects in **Onshore Liquefaction** (e.g. Kuwait)
  - **Confirmed growth of Floating LNG**, representing however <10% of total Midstream CAPEX
  - Limited growth of **pipeline** capacity, mainly due to **geopolitical issues**
- Possible "threat"
  - **Japan** is re-activating its nuclear plants

DOWNSTREAM AND FERTILIZERS

- **Positive outlook**
  - CAPEX mainly driven by **greenfield** projects in **APAC**
  - **growth of brownfield** refining, mainly in OECD
- **Main drivers**
  - Reduction in feedstock costs **increases Downstream margins**
  - **Demand for oil products is recovering**, linked to **GDP**
  - "**Clean Fuels**" legislation a major driver everywhere
  - **Bottom-of-the-barrel processing** (marine fuel oil)
  - **Flexibility** for **broader crude choice**, emphasis on conversion and residue upgrading
  - **Growth in Gas** drives further PetChem CAPEX
- Possible "threat"
  - **Chinese crisis** to eventually impact PetChem growth

Downstream is benefitting from a temporary boost

"On the other hand, **demand for oil products is recovering**. One theme in the second quarter results was the resilience of the majors' refining operations, which ameliorates the impact of lower revenues from crude, as there was strong demand for refined gasoline and diesel fuel, especially in Europe.
The boost to downstream businesses may be temporary, however. And, for now, there is unlikely to be any let-up in cutting costs."

FINANCIAL TIMES

September 2015

"**Exxon is an integrated oil and gas company**, and its earnings reflect this advantage. **Despite historic low oil prices, it reported a net income of $4.24 billion**. Its upstream earnings declined from $6.42 billion in third quarter of fiscal 2014 (3QFY14), to $1.36 billion in 3QFY15. Contrary to this, its **downstream earnings increased from $1.02 billion to $2.03 billion**, with an increase in the chemicals segment. With oil prices expected to remain low in FY16 as well, Exxon can stand strong and survive tough times by recording stable performance dominated by its downstream segment."

BFN BUSINESS FINANCE NEWS

December 2015

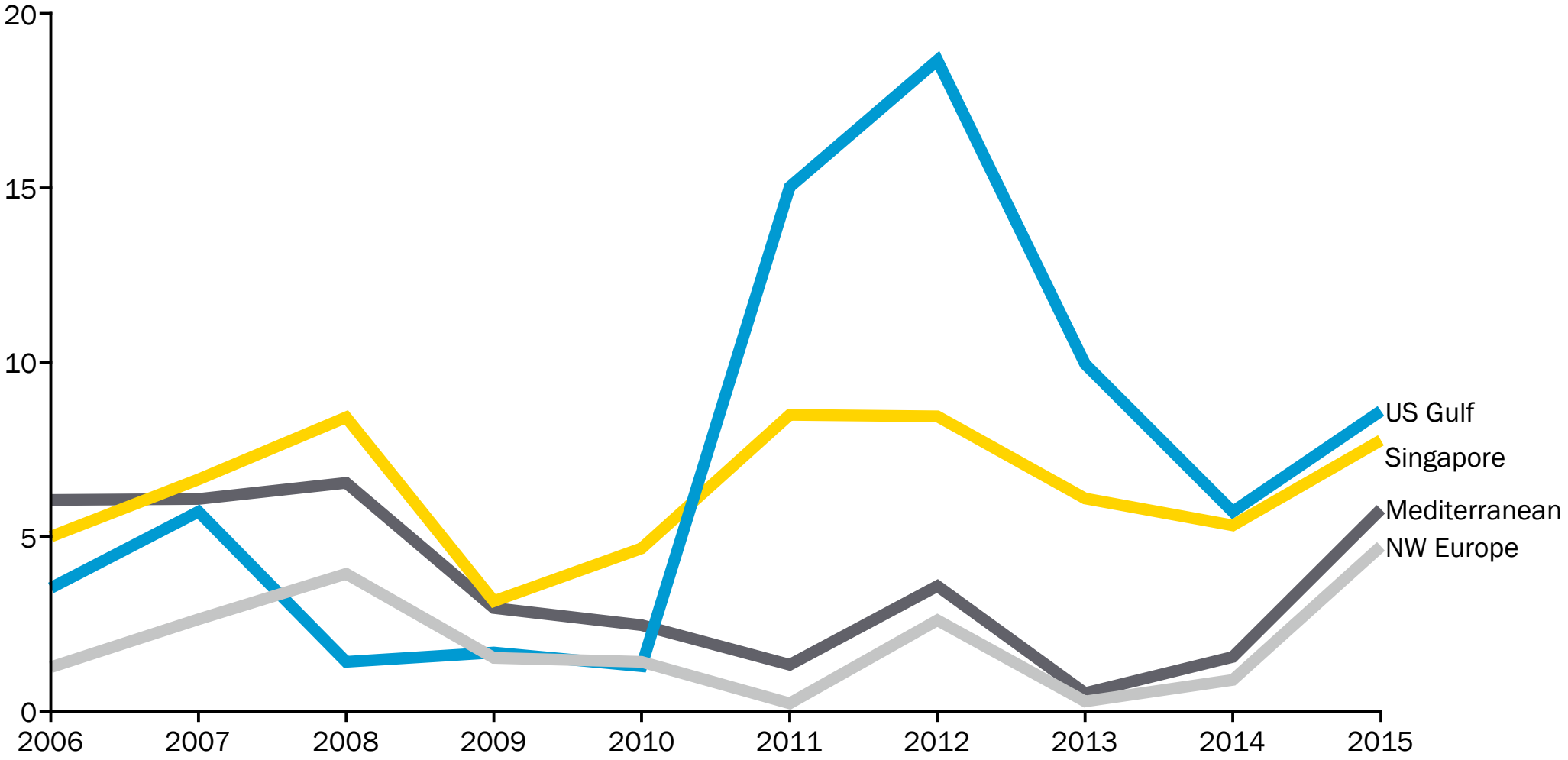
"**Reliance Industries** Ltd., operator of the world's largest crude-oil refining facility, **beat market estimates Tuesday to post its highest-ever quarterly profit**. The company's gross refining margin climbed to a seven-year high of $11.50 per barrel during the quarter, it said. "Our portfolio of world-class refining and petrochemical assets are paying off handsomely," Chairman Mukesh Ambani said in a statement. The petrochemical business also delivered **amongst its best quarterly performance**, driven by robust polymer margins," he added. The "benefits of low crude oil and energy prices for our downstream businesses clearly outweigh the impact of [crude oil prices] on our upstream segment," reflected in the record earnings for the quarter, Mr. Ambani said."

THE WALL STREET JOURNAL.

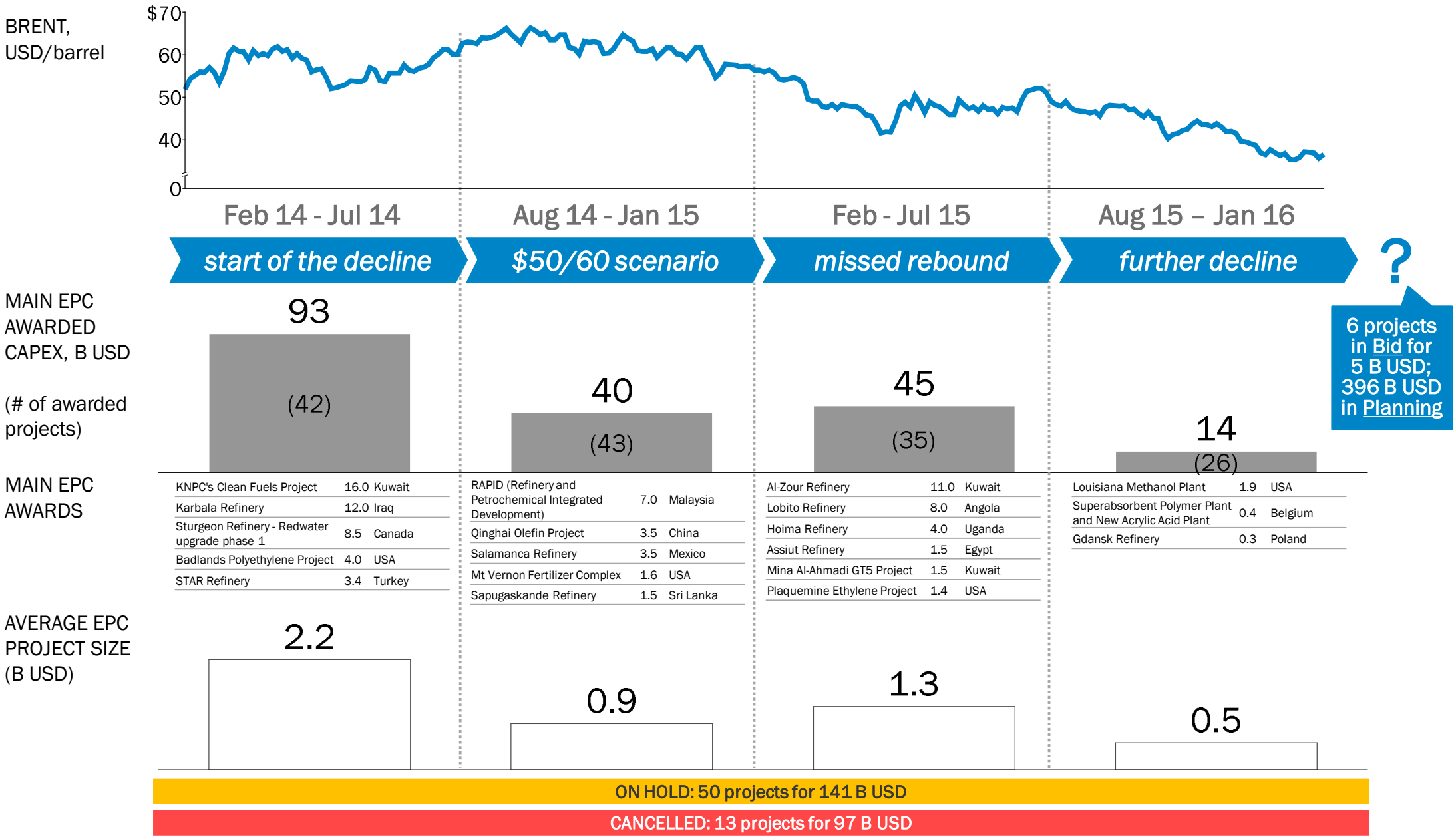
January 2016

2015 is seeing increasing refining margins in Europe, the US and Singapore

REFINING: Margins by region USD/bbl



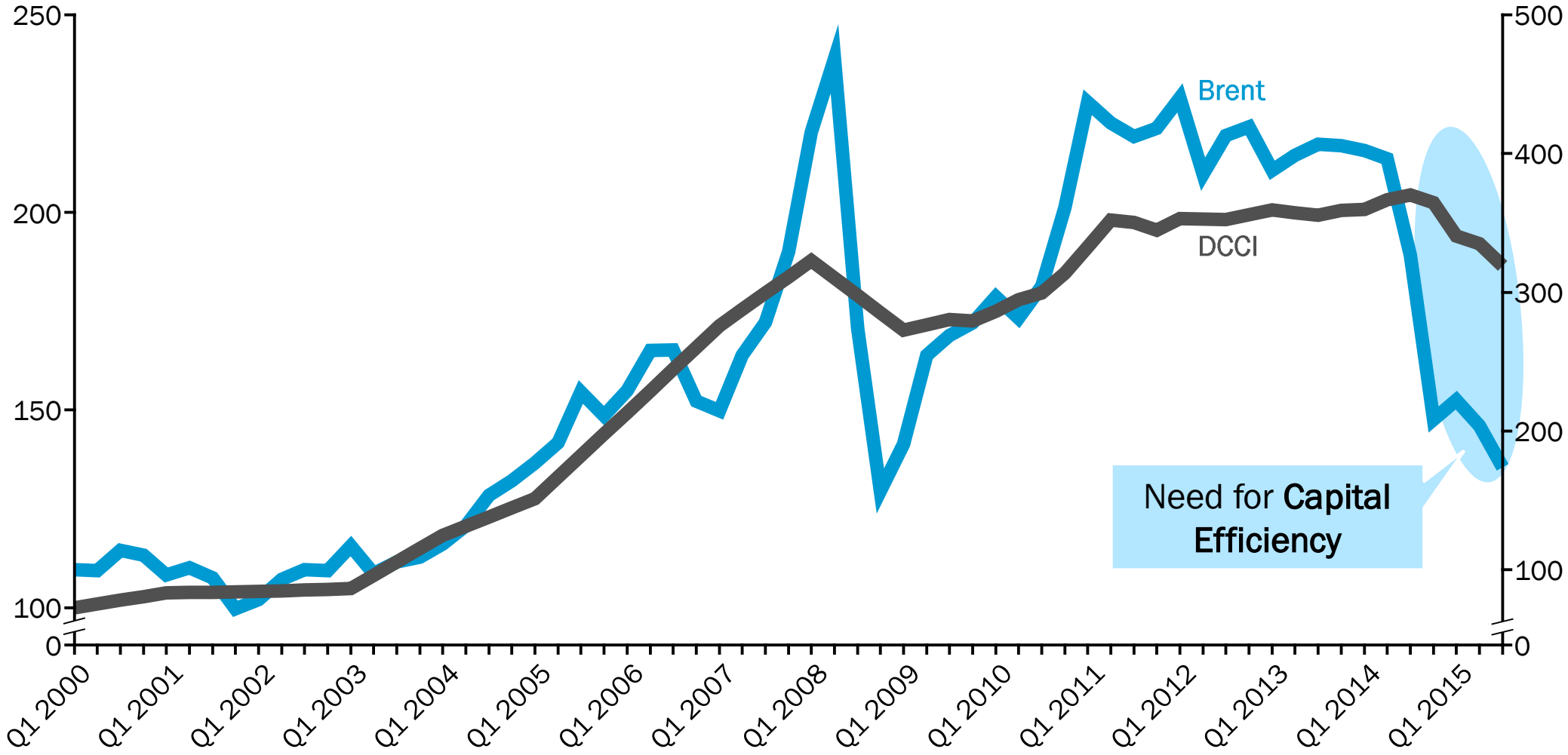
Downstream Awards in '14 was at historical high levels and in 2H15 reduced the avg project size



Source: SupplHi Projects Database, January 2016

Downstream Capital Cost Index has declined for 4 consecutive quarters, driven by Oil prices

DOWNSTREAM: IHS Downstream Capital Costs Index (DCCI); indexed Brent spot price



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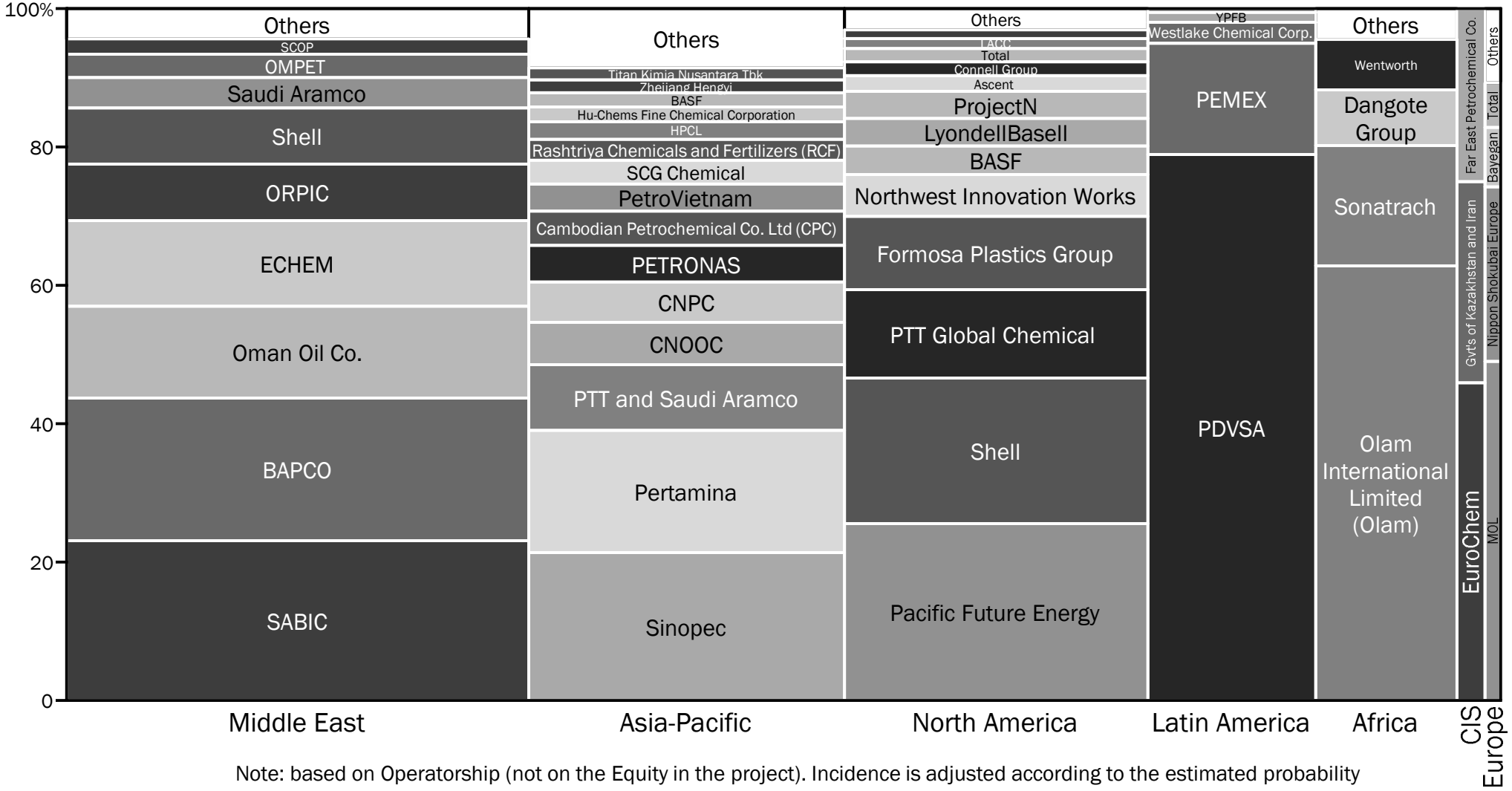
SUPPL HI

Note: Brent indexed price refers to the right axis; the DCCI to the left axis
Source: SupplHi analysis on IHS, 2016 and EIA, 2016 (public data)

End-Users to qualify with, by region

End-Users incidence on projects with **Just Awarded, Bid Ongoing and Planning** statuses, Jan 2016



Note: based on Operatorship (not on the Equity in the project). Incidence is adjusted according to the estimated probability assigned to the single projects

Source: SupplHi Projects Database, January 2016

Key takeaways

GROWING FUEL DEMAND IN NON-OECD NATIONS (MOSTLY IN ASIA, MIDDLE EAST).
IN **REFINING**, DEVELOPING COUNTRIES HAVING THE HIGHEST SPENDING (2/3 OF TOTAL) WITH LESS END-USERS (LARGER PROJECTS). OECD ECONOMIES FOCUS ON REVAMPING.

FOR POLYETHYLENE (PE), **CHINA DECREASING IMPORTS WHILE DEVELOPING NEW TECHNOLOGIES** (CTO, MTO). **MIDDLE EAST** IS THE **TRADITIONAL AND GROWING MARKET**.

FOR POLYPROPYLENE (PP), CIS IS GROWING, NEW PROJECTS ARE MAINLY IN CHINA, WHILE MIDDLE EAST IS FACING SHORTAGE OF ETHANE.

FOR **POLYOLEFINES**, IN THE SHORT TERM, **CONSIDERABLE UNCERTAINTIES** IN NEW INVESTMENTS (TEMPORARY OVERCAPACITY TILL 2017?), BUT, IN THE **SHORT-MEDIUM TERM PROJECTS IN NEWLY INDUSTRIALIZED COUNTRIES** (OMAN, MALAYSIA, CIS, ...) AND SOME PLANT MODERNIZATION OPPORTUNITIES IN EUROPE.

THE **CIS AREA** IS EXPERIENCING A **HIGH GROWTH IN FERTILIZERS**, DRIVEN BY 8 END-USERS THAT ARE INVESTING IN ONGOING AND PLANNED PROJECTS.

ASIA-PACIFIC EXPECTED SPENDING IN PETCHEM IS HIGHLY FRAGMENTED AMONG 40+ END-USERS WITH AT LEAST 300 M USD OF BUDGET FOR THE NEXT THREE YEARS. HOWEVER **IT'S VERY COMPLEX TO COMPETE IN CHINA WITHOUT A LOCAL PRODUCTION.**

MOST OF THE **LARGE GAS-TO-LIQUID (GTL)** PROJECTS PLANNED FOR THE COMING YEARS WERE PUT ON HOLD OR CANCELLED DUE TO **HIGH COSTS AND PRICE UNCERTAINTIES.**

TOTAL OIL&GAS

NORTH AMERICA

Number of projects in the Database

	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled

UPSTREAM

	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled
▲ ONSHORE CONVENTIONAL	6	-	-	92	12

- **Sustained** growth in **Gas Treatment Capacity** by **small local players**, with growing popularity of **pre-engineered solutions** as regards Gas Treatment capacity

▼ OIL SANDS	80	-	1	7	34

- Out of the 113 **Canadian** Oil Sands projects in planning phase, **36 are currently suspended or cancelled**

▶ SHALLOW WATER	1	-	-	4	-

- As shallow water developments on the East Coast of Canada reach completion, the only capacity increase in this segment is expected to come from **small developments in the Cook Inlet Basin, Alaska**

▶ DEEPWATER	1	-	-	1	-

- **No capacity additions are planned** after completion of ongoing deepwater projects in the Gulf of Mexico

MIDSTREAM

▲ LNG	32	-	5	18	3

- **The Shale Revolution has caused a massive shift from regasification to liquefaction projects,** with many regasification plants conversions and even more grassroots plants planned
- **However**, stringent environmental regulations, conflict with local communities, oversupply risk and financial weakness of some investors suggest a **high degree of uncertainty about the projects' future**

▲ ONSHORE PIPELINE	29	-	-	11	2

- **Most prominent geography**, mostly due to projects connected with **Shale Gas: US projects** mainly to be **developed by small, local companies; Canadian projects** planned by **larger companies and IOC's**
- **High project uncertainty** due to environmental concerns and political disputes, as well as possible decrease of Shale developments

▶ OFFSHORE PIPELINE	4	-	-	-	-

- **Offshore developments in the Gulf of Mexico explain all the 260 Km of planned offshore pipelines** in North America, with Shell's Mattox pipeline accounting for 50% of this figure

DOWNSTREAM

▲ PETCHEM	16	-	2	33	1

- Driven by the **availability of feedstock**, **investment** in this geography should be **sustained**: relatively **large average project size** in the US, with a **mix of local and international companies developing** them

▶ REFINING	5	-	-	21	2

- The **region** is characterised by **small developments**, mainly by local players: execution of **Canadian projects**, **related to tar sands exploitation**, is **highly unlikely** at the moment: only **minor developments** are planned **in the US**

▲ FERTILIZERS	4	-	1	18	7

- As existing projects, being developed by local players, are completed**, investment is likely to continue**, driven by the **availability of feedstock** the **Shale Revolution** has brought about

SUPPLHI Source: SupplHi Projects Database, January 2016

LATIN AMERICA

Number of projects in the Database	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled

UPSTREAM

	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled
ONSHORE CONVENTIONAL	8	-	-	10	-

- In spite of the turbulent political and financial situation of the country, **Venezuelan projects remain the only relevant capacity increase prospect in this segment,** together with some minor field developments in the Andes and the Amazon region

SHALLOW WATER	3	-	-	10	-

- **Brazilian and Mexican NOC's will drive growth in this region**, but capacity increase is expected to be minor in a geography **focusing more and more on deepwater** developments

DEEPWATER	7	3	-	25	2

- **Brazilian developments**, held either entirely or in JV **by NOC Petrobras**, represent the totality of future projects, with many others nearing completion
- Even though some **developments can be economical** even at **today's prices**, **corruption scandals** and, more recently, **a 25% cut to 5-year investment** budget bring **considerable uncertainty** over the future of this segment in this geography; Expected increase of partnerships with IOCs to sustain the developments

MIDSTREAM

LNG	4	-	-	3	2

- After the suspension of **Venezuelan LNG Project** at San José Anzoategui, the only increase in liquefaction capacity should come from minor Mexican developments; **Two small plants** (in Uruguay and Jamaica) are the **only planned additions to regasification capacity**

ONSHORE PIPELINE	13	1	2	11	1

- **~3000 Km of new pipelines** are expected to come from phases 2 and 3 of the "Oleoducto Bicentenario de Colombia" and the new Southern Perù Pipeline
- In **Mexico** state-owned actors are planning and already executing a **substantial increase in gas pipelines mileage**

OFFSHORE PIPELINE	1	-	-	2	-

- Planned developments **involve connecting offshore fields off the coast of Brazil** to the mainland; **Projects suspended** after Petrobras scandal (Lula Pipeline) **are likely to resume** in the near future, but **investment cuts** pose a **threat to further developments**

DOWNSTREAM

PETCHEM	4	-	-	6	1

- **Declining investments in Brazil** translate into poor growth prospects in this region
- **Venezuelan projects** suffer from the **high political and economic uncertainty of the country**

REFINING	8	-	3	19	5

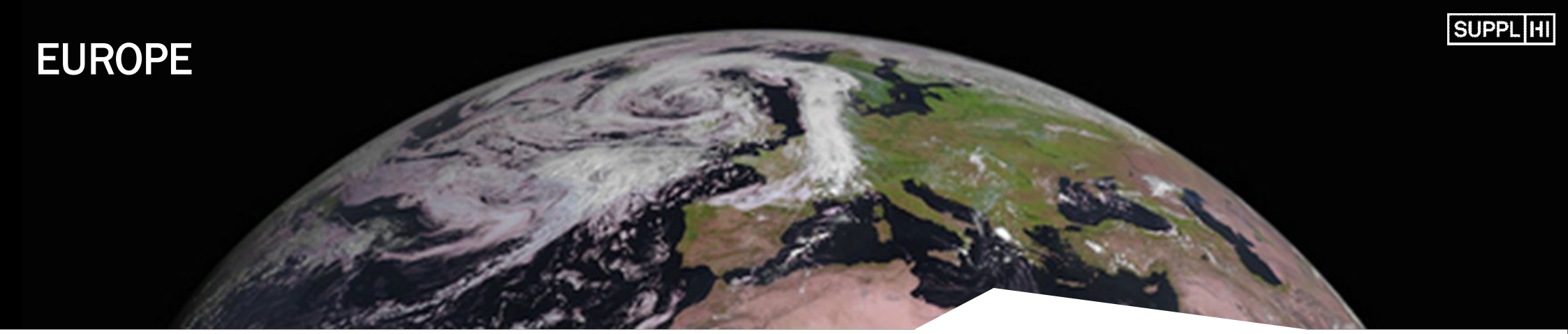
- Refining investments in Latin America will see a **decline in the near future: Petrobras cuts** are in fact expected to **hit mainly its downstream business; Venezuelan projects execution** seems also **highly uncertain**

FERTILIZERS	-	-	-	2	-

- **As Bolivia** is developing a fertilizer industry, **further investments are quite likely.** However, **Petrobras cuts make further investments in Brazil unlikely**, thus making Bolivia the only feeble growth prospect in the region

Source: SupplHi Projects Database, January 2016 SUPPLHI

EUROPE



Number of projects in the Database	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled

UPSTREAM

▶ *ONSHORE CONVENTIONAL*	-	-	-	3	-
• As latest North Sea developments reach completion **no further large increases in Gas Treatment capacity are planned**					
▶ *SHALLOW WATER*	9	-	2	68	-
• **North Sea developments will continue to drive growth** in the region, however, due to very high costs, **some projects have been delayed**					
• **Decommissioning of depleted North Sea fields is expected to gain momentum** through the next decade as well as **brownfield of mature fields**					
▶ *DEEPWATER*	6	-	4	7	2
• **FPSO's are being considered** for a number of **redevelopments** in mature fields in the North Sea, however no decisions have been taken, up to now, and therefore there is considerable uncertainty about the only expansion prospect in this segment for this region					

MIDSTREAM

▶ *LNG*	12	-	2	4	7
• Focus on **regasification** but **minor planned increase in capacity** most of which coming from **Croatia LNG Project**, still in earliest stages of development					
• **Small LNG** as a **new opportunity** for the Mediterranean Sea					
▶ *ONSHORE PIPELINE*	2	-	-	1	1
• **Future projects focusing** on gas **imports from Russia and Azerbaijian** have sparked political debate					
• **Political situation** is in fact likely to be the **main determinant** of projects such as the **Turkish and Nord Stream**, after cancellation of South Stream					
▲ *OFFSHORE PIPELINE*	7	-	2	1	-
• Future projects **focus on North Sea developments and gas imports from Russia** (offshore sections of Nord Stream and Turkish Stream)**, subject of political debate**					

DOWNSTREAM

▶ *PETCHEM*	4	1	2	6	1
• Only minor developments are planned in this geography					
▶ *REFINING*	4	-	1	12	2
• As larger ongoing projects are completed by 2018, **smaller brownfield developments** are being **planned**					
▶ *FERTILIZERS*	-	-	-	6	-
• **Eastern Europe** (Hungary in particular) and **Turkey** are now **driving investment** in the region					
• **Growth** prospects in the region are **very poor**, with no significant projects in the pipeline					

Source: SupplHi Projects Database, January 2016

AFRICA

Number of projects in the Database	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled

UPSTREAM

	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled
▶ *ONSHORE CONVENTIONAL*	6	2	1	16	1

- Minor **developments in Sub-Saharan Africa** are planned
- **Algeria continues to invest,** while political stabilisation in **Libya** may lead to **re-start of suspended projects**

▲ *SHALLOW WATER*	3	-	-	6	-

- **Development of fields off the West Coast of the continent**, by a mix of Independent, National and a few International Oil Co's will continue to add capacity both to the Gas and Oil sides

▶ *DEEPWATER*	8	-	-	11	3

- **Significant developments** are expected to come online by the end of the decade **offshore Angola, Namibia, Nigeria and South Africa**
- However, **some projects have been postponed** and others are likely to follow unless prices recover

MIDSTREAM

▲ *LNG*	6	-	-	7	2

- Liquefaction projects will target new field developments in South-East Africa with IOC's planning **two new plants in Mozambique** and one in Tanzania and Ghana
- Instead**, Nigerian projects face very high uncertainty** as some IOC's pull out due to long delays

▶ *ONSHORE PIPELINE*	9	-	1	3	1

- **Planned mileage** increase in the region is **minor** and aims at connecting new field developments with existing infrastructure; new developments being discussed in **Nigeria**

▼ *OFFSHORE PIPELINE*	2	-	-	-	-

- There is no further capacity planned in this region

DOWNSTREAM

▶ *PETCHEM*	3	-	-	2	1

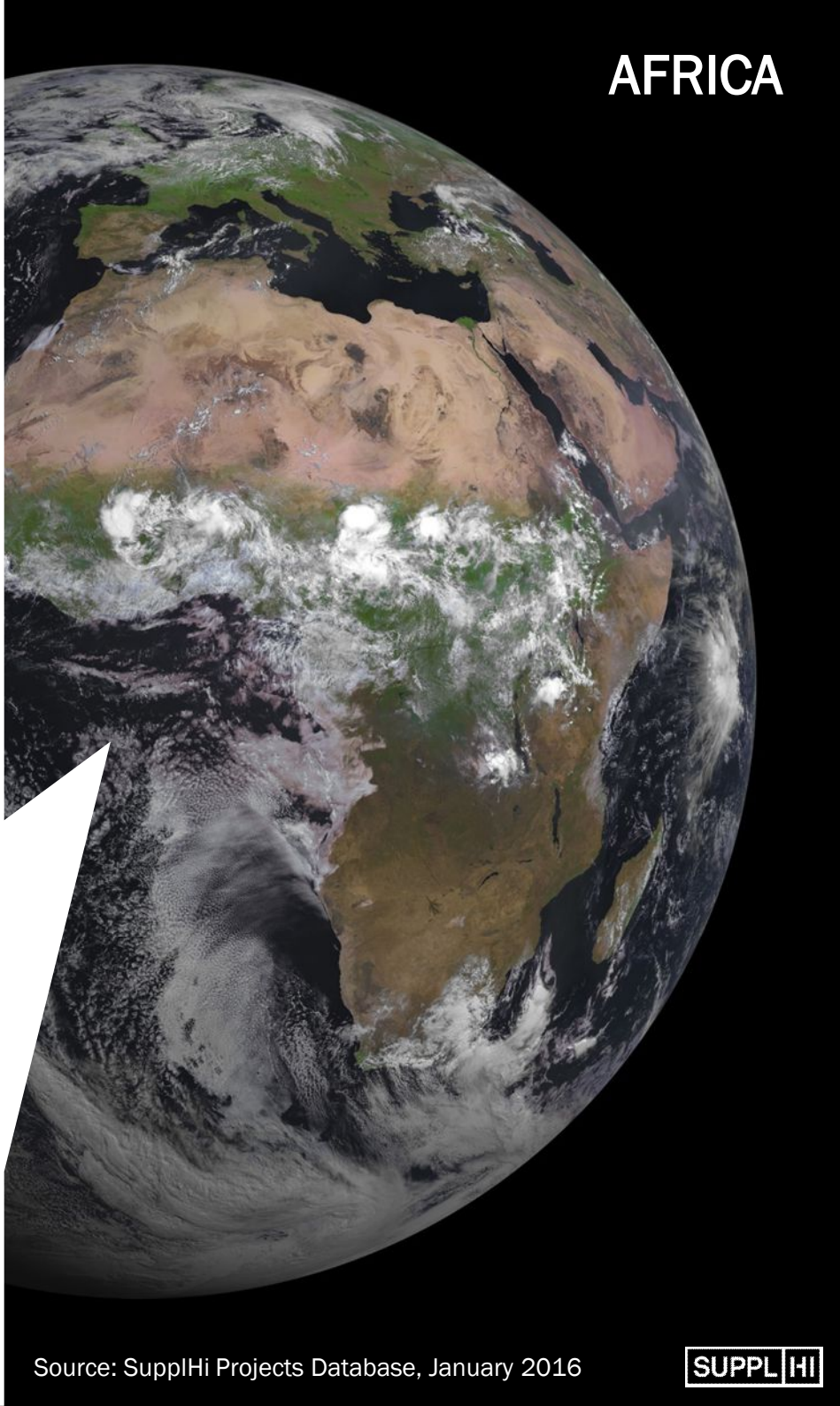
- Growth prospects in this region rely **solely on execution of planned substantial Nigerian and Tanzanian projects**
- However**, uncertainty is high** as usual in the region

▲ *REFINING*	9	-	-	5	3

- **Investment** in the region will mainly **focus on medium to large greenfield developments**
- Most significant countries in this time horizon will be **Algeria and Nigeria**

▲ *FERTILIZERS*	6	-	-	6	-

- **Sub-Saharan Africa will see a strong growth in demand** in the coming years, which may **further stimulate investments**
- **Nigeria and Gabon lead** the way **as regards planned projects**



Source: SupplHi Projects Database, January 2016

SUPPL|HI

MIDDLE EAST

Number of projects in the Database

UPSTREAM

	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled
▲ ONSHORE CONVENTIONAL	16	5	6	42	6

- **Investment** is expected to **continue** across the region, both to supply much needed **gas for industrial and power generation purposes**, and to **outpace the consequences of depletion**
- However, **reputation for delays of some National Oil Co.** (in particular Kuwait's), together with **exit** of IOC **from more costly projects**, and prolonged political instability in the area do pose **some threats to future developments**
- **Lifting of sanctions** in Iran is expected to **revive long suspended projects** as well as to initiate a **new wave of developments**, as the country pushes production levels back to pre-sanctions levels and beyond

▲ SHALLOW WATER	5	1	2	18	-

- **Investment will continue on Red Sea and Persian Gulf Gas Projects**, to provide gas for industrial and power generation purposes; **Lift of sanctions** could lead to **full development** of existing Iranian fields

▲ DEEPWATER	2	-	-	-	-

- **Recent gas discoveries in the Mediterranean** (such as giant Zohr field) constitute the **main growth prospect** in the region

MIDSTREAM

▲ LNG	2	2	5	18	3

- Lifting of sanctions may soon revive **Iran's** long suspended projects
- The increase in gas demand in Arab countries has sparked a **substantial increase in planned regasification capacity**, with many large scale projects due by the end of the decade

▶ ONSHORE PIPELINE	7	1	1	6	1

- **Planned mileage** increase in the region is **minor** and aims at connecting new field developments with existing infrastructure

▲ OFFSHORE PIPELINE	1	-	1	1	-

- Growth prospects for this segment in the Middle East rely on the **Iran-Oman Pipeline project** (260 Km) to be revived after sanctions lift

DOWNSTREAM

▲ PETCHEM	13	3	5	15	6

- One of the regions with the largest projects, with **Saudi Arabia leading the way;** long-suspended **Egyptian projects** are now **resuming**

▶ REFINING	5	2	2	49	3

- In the region with the **largest average project size**, as ongoing projects reach completion, a **slowdown in investment is expected**
- **Projects** will be **spread across the region**, with **substantial brownfield developments** in Saudi Arabia and UAE **about to be awarded**

▲ FERTILIZERS	3	-	-	3	1

- **Investment** in fertilizers in the region is expected to substantially increase with the **comeback of Iran**; the political instability in **Egypt** has delayed the development of important projects, which are now **more likely to resume**

SUPPLHI Source: SupplHi Projects Database, January 2016

ASIA PACIFIC

UPSTREAM

Number of projects in the Database

	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled
ONSHORE CONVENTIONAL	8	2	-	7	-

- In a geography where the upstream onshore segment is **focused on treatment plants for offshore fields** the only growth prospects rely on development of small fields in India and Myanmar

SHALLOW WATER	14	4	1	38	-

- In spite of gradual slowdown in the growth rate, **Australian** gas capacity should continue to increase in the near future
- **A number of small projects offshore Malaysia, Indonesia and in the South China** sea are also expected to be online by the end of the decade, with **many of them about to be awarded** soon

DEEPWATER	7	1	-	14	-

- **Planned developments** in the **South China Sea**, together with some **minor developments off the Indonesian Coast**, represent the **main growth prospect** in the region

MIDSTREAM

LNG	17	3	4	22	7

- The cancellation of planned LNG Plants in **Australia** suggests **no further increase** in liquefaction capacity as **ongoing projects reach completion**
- Increase in **Indian regasification capacity** (around 16 MTPA additional planned capacity in 4 plants) continues at a slower pace

ONSHORE PIPELINE	6	-	-	7	3

- **China** continues its massive West-East pipeline programme, which accounts for roughly **15000 Km of new gas pipelines**
- India-Myanmar long suspended pipeline project may soon resume after talks between the Indian and Bangladeshi governments

OFFSHORE PIPELINE	3	-	-	5	-

- A **massive Oman to India 1300 Km** pipeline is planned and could come **on-stream in the second half of the next decade,** with a **possible Iran spinoff** already planned

DOWNSTREAM

PETCHEM	13	-	5	25	1

- In spite of a **gradual slowdown**, this geography will **continue to grow** with China driving the investments in the region, followed by India and Indonesia
- **However, China's economic slowdown** may **affect future projects** execution as well as completion of existing ones, and **India's Oil companies** still have a **reputation for delays**

REFINING	17	-	2	30	5

- **Large grassroots developments in China** alongside **smaller projects in India**, will be the bulk of future investments in the region
- The **long delays**, and the number of **suspended projects**, suggest a **high mortality rate for Indian projects**, while **China's economic slowdown** could **affect project execution**

FERTILIZERS	8	-	2	9	1

- **60 Urea plants** are expected to come **on stream by the end of the decade**, 20 of whom located in China to sustain domestic demand for fertilizers
- **Investment** is then expected **to continue at a slower pace**, through smaller projects located in Indonesia and in the Indian subcontinent

Source: SupplHi Projects Database, January 2016

SUPPL|HI

CIS

UPSTREAM

Number of projects in the Database	Planning	Bid ongoing	Just awarded	Ongoing	On Hold/ Cancelled
▲ *ONSHORE CONVENTIONAL*	3	1	1	7	1
• Development of **Gazprom's** concessions in Russia continues in earnest, as Chayandinskoye Field is expected to come on stream by 2018					
• Low oil prices seem to have **slowed down progress** on the giant development of **TengizChevroil field**					
▲ *SHALLOW WATER*	2	-	-	12	-
• With **giant Shah Deniz II development expected to come online by 2018** expansion prospects in this geography rely on higher gas prices to revive large suspended Russian projects					
▶ *DEEPWATER*	-	-	-	-	-
• There are no planned additions to Deepwater capacity in this region					

MIDSTREAM

▶ *LNG*	2	-	-	1	3
• Russian NOC's are planning a **substantial increase in Liquefaction capacity**					
• However, the number projects **suspended or postponed** due to geopolitical and economic situation makes this **scenario highly unlikely**					
▲ *ONSHORE PIPELINE*	-	-	-	3	-
• **Construction** of the massive **Chayandinskoye-Vladivostok pipeline has started**, but **completion** of all its stages is **subject to considerable uncertainty**					
• **Small projects** focusing on boosting gas **exports from Central Asia to China**					
▶ *OFFSHORE PIPELINE*	1	-	-	4	-
• **Expansion prospects** in the region hinge on the **Shah Deniz development** in Azerbaijan and its Caspian Sea pipeline					

DOWNSTREAM

▶ *PETCHEM*	5	-	1	8	4
• Following completion of ongoing projects, main **growth prospects will come from a series of Russian developments**, often connected to upstream projects being developed					
▲ *REFINING*	4	1	-	15	1
• Investments in CIS forecast to **decline from 2017 on**					
• **Kazakhstan** will be host the highest-value projects and will be the first geography, even though Russia has a larger project pipeline					
▲ *FERTILIZERS*	4	-	-	7	-
• The trend in the region is now on the **revamping** of old facilities, especially in **Russia** where four important **brownfield projects** are ongoing or in planning phase					

Source: SupplHi Projects Database, January 2016

Key takeaways

IN 2015 AND 2016, THE OIL&GAS VALUE CHAIN IS MOVING AT **DIFFERENT SPEEDS**:
- A SIGNIFICANT DOWNTURN IN UPSTREAM
- MIDSTREAM CONTINUES TO GROW BUT LESS THAN PREVIOUSLY EXPECTED
- DOWNSTREAM HAS A POSITIVE OUTLOOK MAINLY DRIVEN BY BROWNFIELD

PLAYERS ABLE TO **ADDRESS THE ENTIRE VALUE CHAIN** ARE MORE RESILIENT TO THE CURRENT SITUATION.

THE **"MORTALITY" RATE OF PROJECTS INCREASED** IN THE LAST MONTHS, WHILE THE **AVERAGE SIZE DECREASED** BY MORE THAN 30%, ESPECIALLY IN THE UPSTREAM.

MIDDLE EAST IS CONFIRMED AS THE MOST ATTRACTIVE OIL&GAS MARKET FOR EUROPEAN PLAYERS, GIVEN THE:
- LARGE CAPEX
- GROWTH IN ALL THE MAIN SEGMENTS
- HIGHER PREDICTABILITY ON THE MARKET EVOLUTION
- FUTURE BROWNFIELD NEEDS.

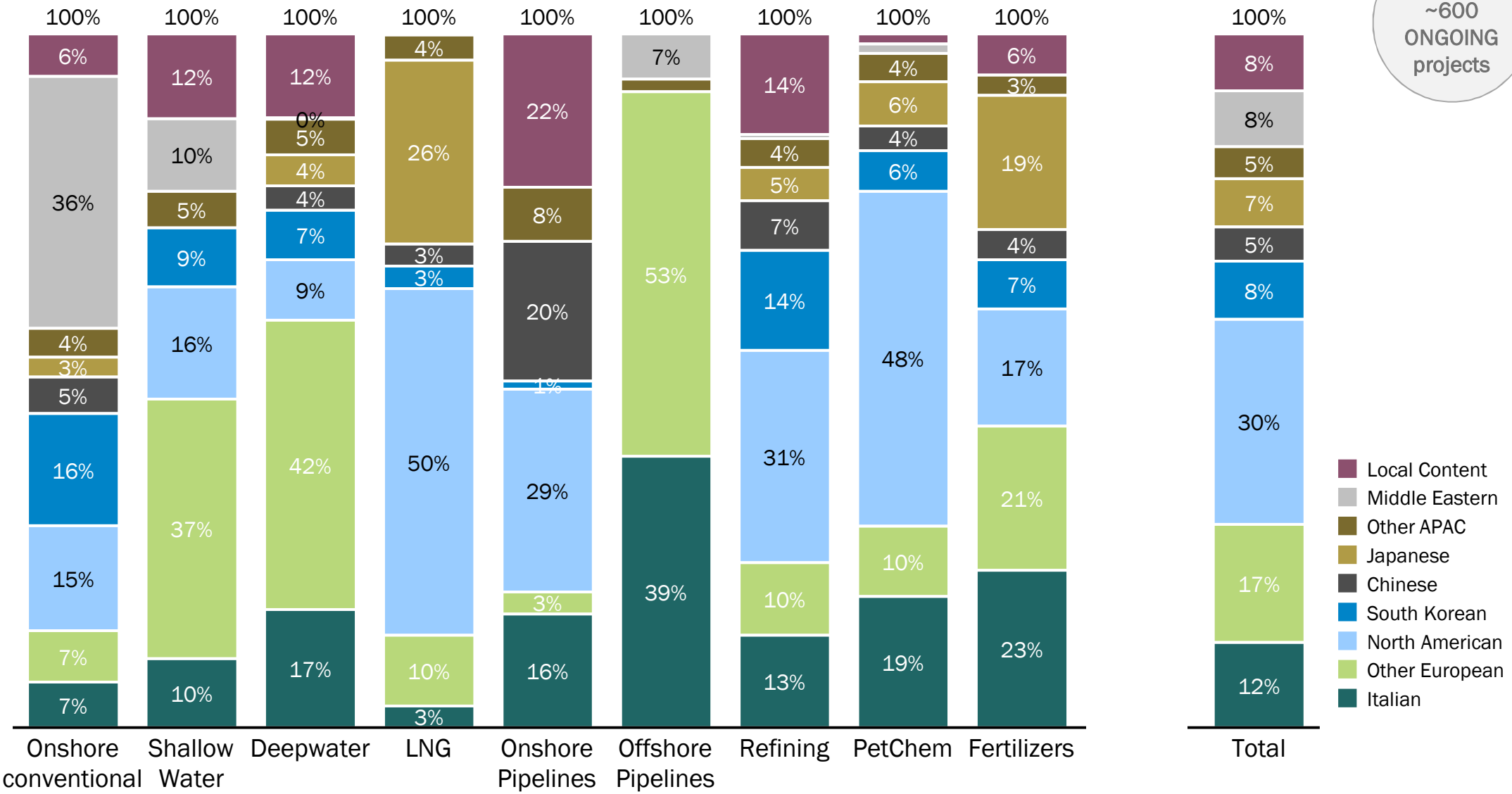
THE **DELIVERY OF LOCAL CONTENT** CAN MAKE THE DIFFERENCE IN WESTERN PLAYERS' ABILITY TO WIN.

EGYPT, OTHER AFRICAN COUNTRIES AND SOME CIS COUNTRIES MAY BE ATTRACTIVE AS WELL.
FOR THE OTHER MARKETS A **MORE OPPORTUNISTIC APPROACH MAY BE ADVISABLE** (LATIN AMERICA, RUSSIA, ...), GIVEN STRUCTURAL LACK OF FUNDING AT CURRENT OIL PRICES OR **COMPLEX COMPETITION WITH ASIAN SUPPLIES**.

CONTRACTORS AND TRENDS

The incidence of **clusters of EPC Contractors** strongly varies by segment

Contractors incidence on **Projects currently in Execution phase**, January 2016



Notes: considered full-life value of projects currently ongoing; for JV or Consortium, when not available, an equal split by participants has been considered; cluster assigned based on HQ country

Source: SupplHi Projects Database, January 2016

We identified 9 main trends in Oil&Gas …

NOC GROWTH IN RELEVANCE	**LOCAL CONTENT CONSTRAINTS & OPPORTUNITIES** ARE GROWING, BUT DIFFICULT TO ADDRESS	FIERCER **COMPETITION** IN **EPC** BY FAST GROWING PLAYERS
COST INFLATION HAS ALMOST **DOUBLED CAPEX** (COMPLEX PROJECTS, HIGH DEMAND)	FOCUS ON **REDUCING OPEX COSTS**	LARGE PROJECTS DIVIDED INTO SMALLER EPC PACKAGES (**LESS MEGAPROJECTS**)
POOR PROJECT EXECUTION PERFORMANCE	HIGHER **TRANSFER OF RISKS** TO CONTRACTORS (**LSTK** TO BE RE-AFFIRMED)	THE "**BIG CREW CHANGE**" ON RESOURCES

… that create a set of **Opportunities**

Qualify with NOCs	**Deliver Local presence** – if SME together with other complementary players	**Qualify also with abroad Contractors abroad.** Continue **supporting European E&C** that increased their competitiveness
Support Capital Efficiency **reducing costs and timing,** increasing **standardization**	Deliver value added through **After Sale** **Design product for Total Life** **Product life extension**	**Know the market and follow the projects**
Foster PM capabilities (Take Back Client) Support End-User and Contractors since **conceptual and bid phases** (e.g. **Co-Engineering**)	Be the **Partner** of the **Contractor** in **managing risks**	Leverage on **Experts** **Transfer knowledge** and **invest on Juniors**

Agenda

Approach

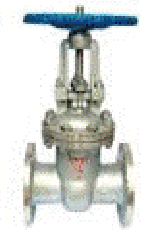
Demand for energy sources

Market estimates and trends

Focus on selected equipment

Market perimeter is very broad and comprehensive

Valves



Pressure Equipment

Switchboards

Utilized in the Oil&Gas market for any application / type of plant

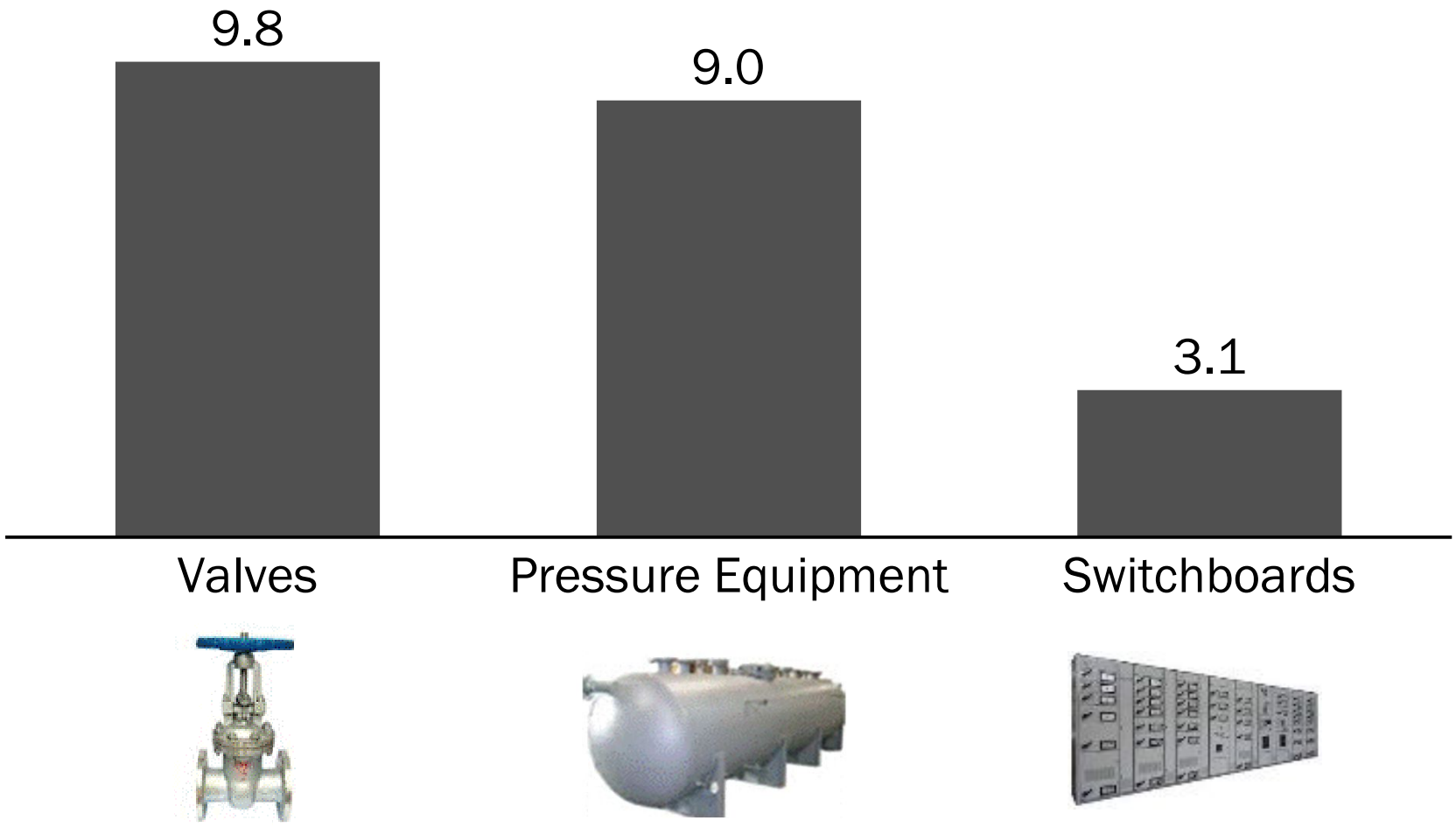
*All main segments will be considered; however, **reduced focus in Exploration and Drilling phases** where these equipment play a marginal role (that will be out of scope for this analysis)*

Mainly used for Greenfield / CAPEX projects and with limited after-sale and replacement as OPEX

*Focus of the analysis will be **only on CAPEX-driven investments***

Valves is the largest component market among the three examined

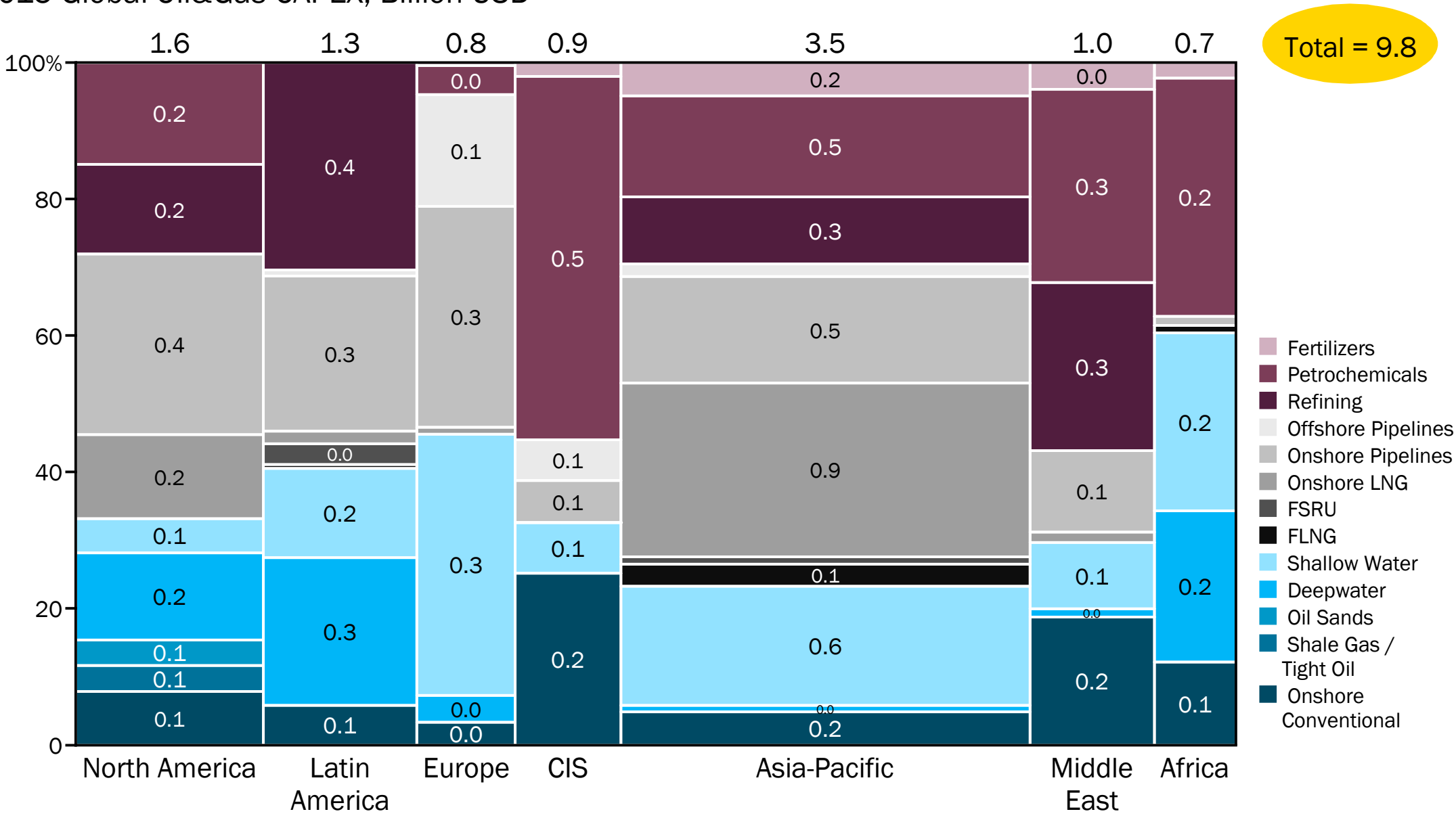
Global Oil&Gas CAPEX spending by equipment, 2015, Billion USD



Note: valves include manual/on-off and control valves
Source: SupplHI analysis on public data

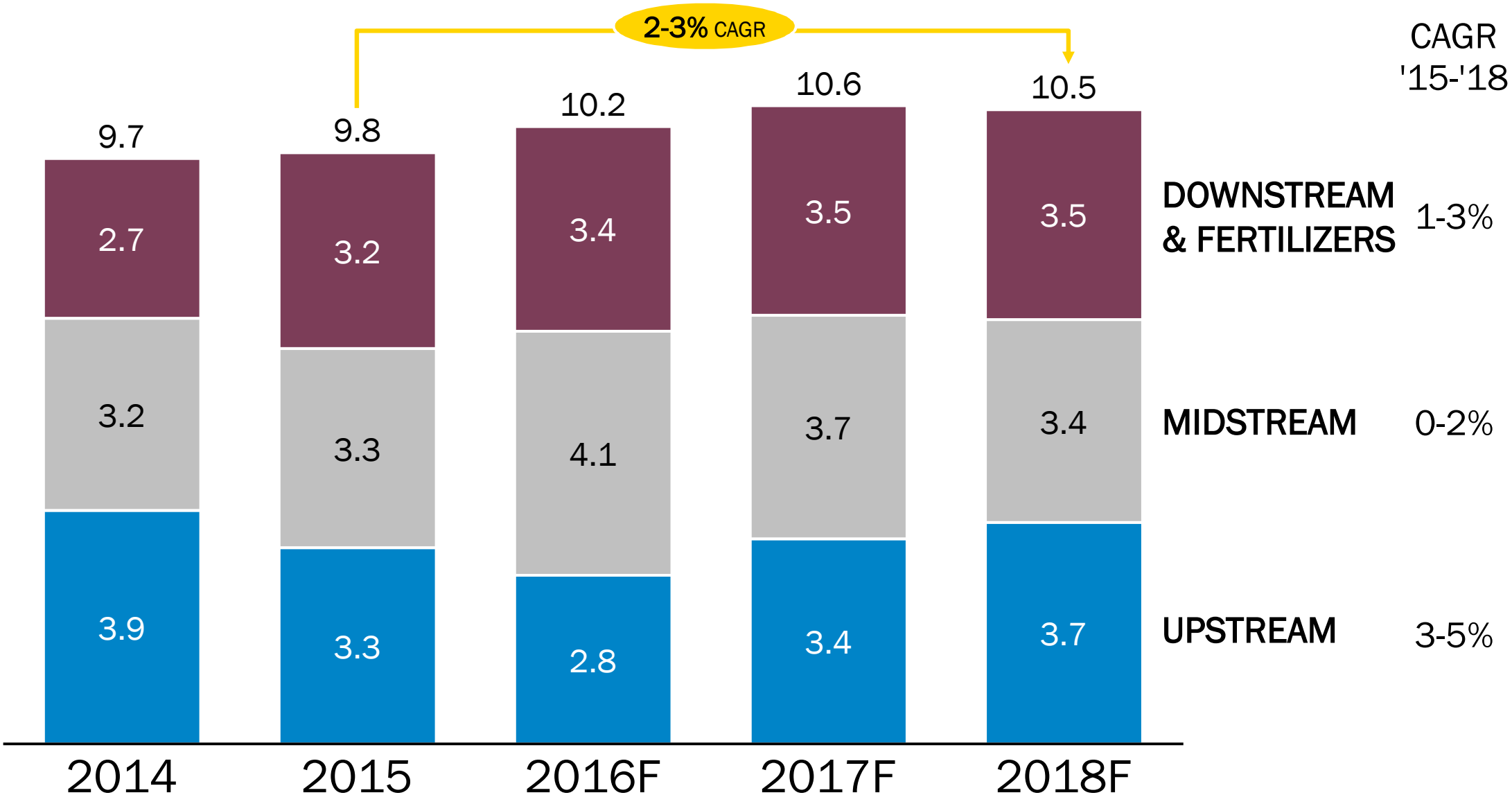
Total 2015 CAPEX for Valves is ~10 B USD

2015 Global Oil&Gas CAPEX, Billion USD



Expected 2-3% 2015-2018 CAGR for Valves CAPEX in Oil&Gas

Global Valves CAPEX, Billion USD



SDA Bocconi School of Management

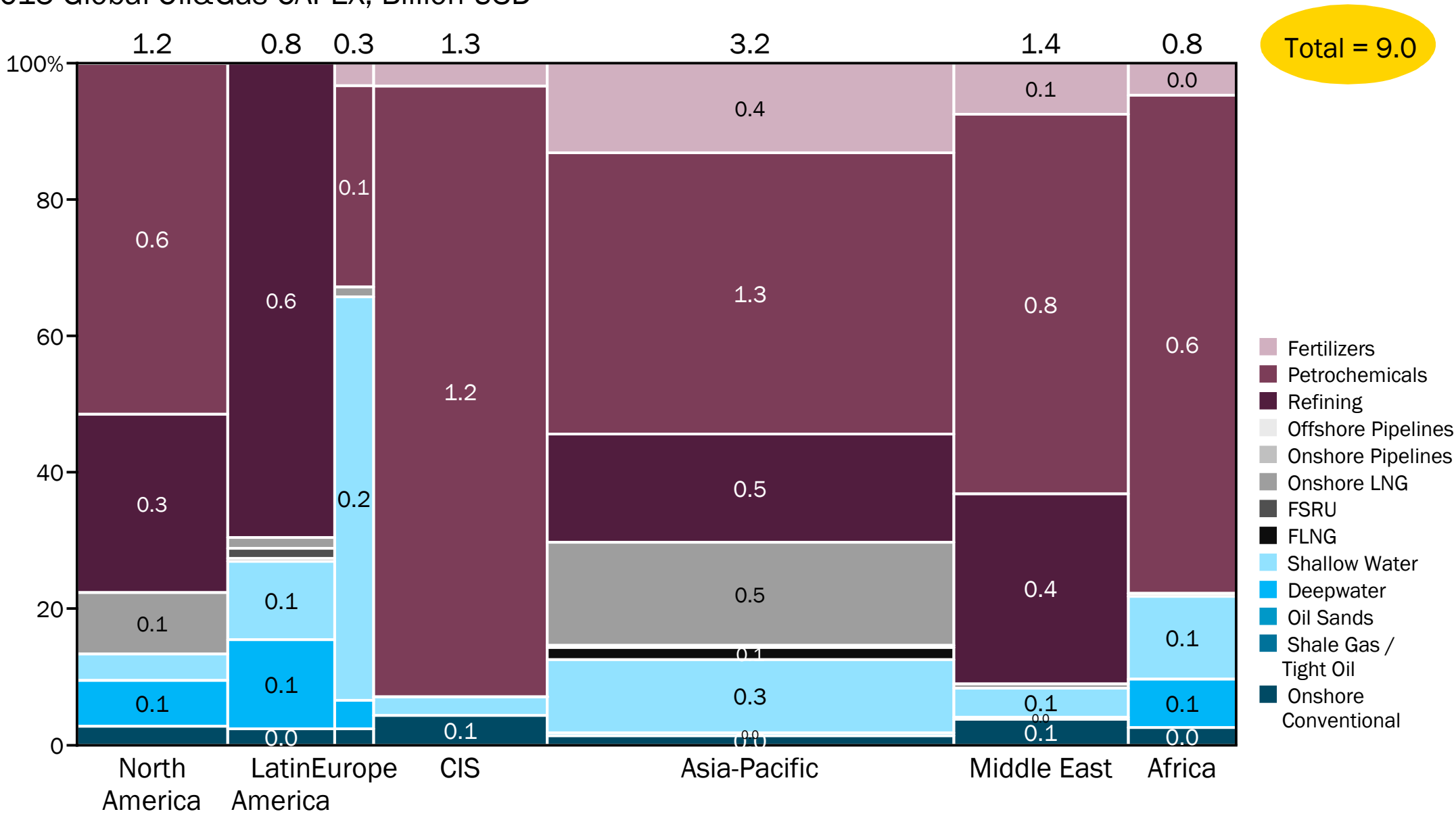
SUPPLHI

Note: size of bar chart is based on the expected value

Source: SupplHI analysis on public data and SupplHi Projects Database

Total 2015 CAPEX for Pressure Equipment is ~9 B USD

2015 Global Oil&Gas CAPEX, Billion USD



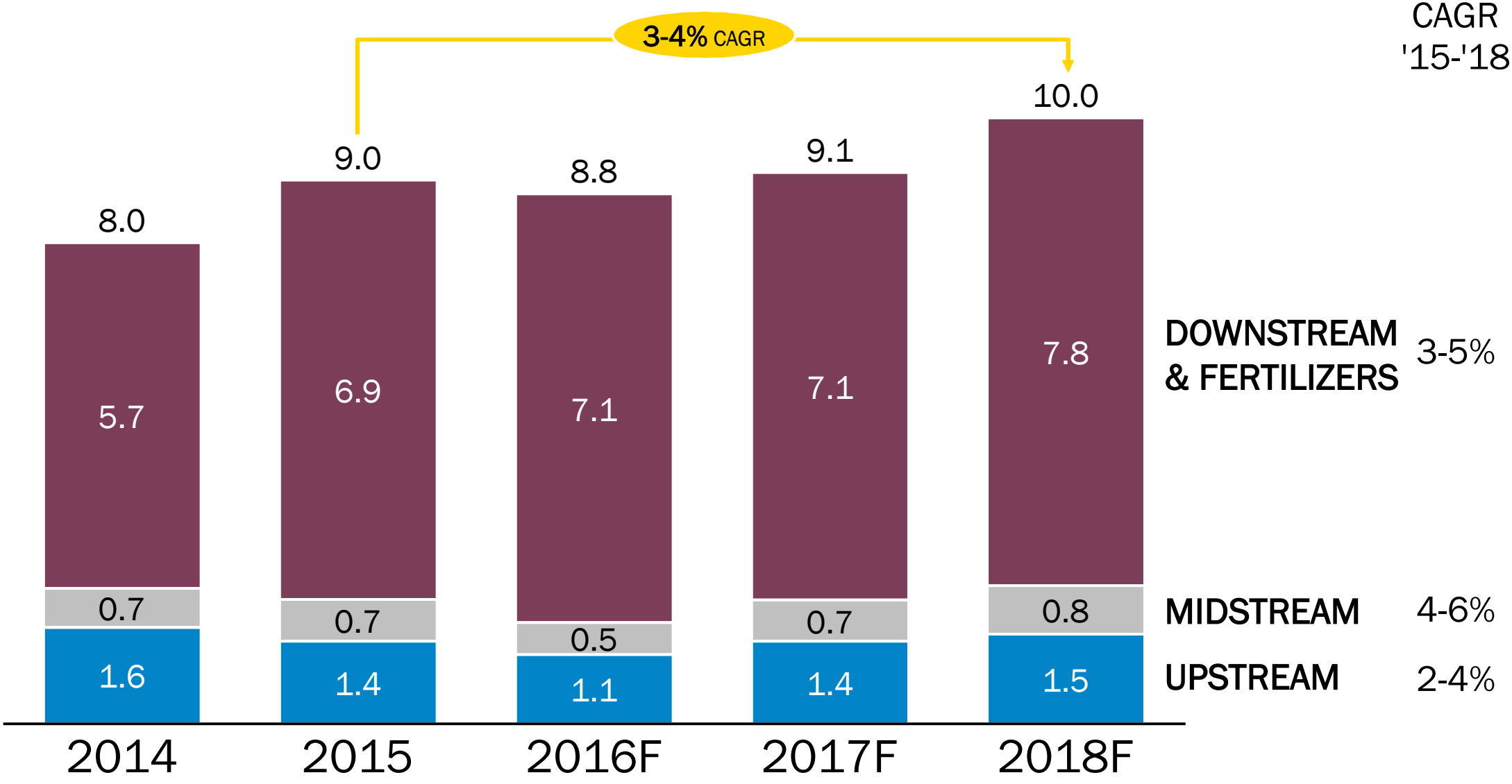
SDA Bocconi School of Management

SUPPLHI

Source: SupplHI analysis on public data and SupplHi Projects Database

Expected 3-4% 2015-2018 CAGR for Pressure Equipment CAPEX in Oil&Gas

Global Valves CAPEX, Billion USD

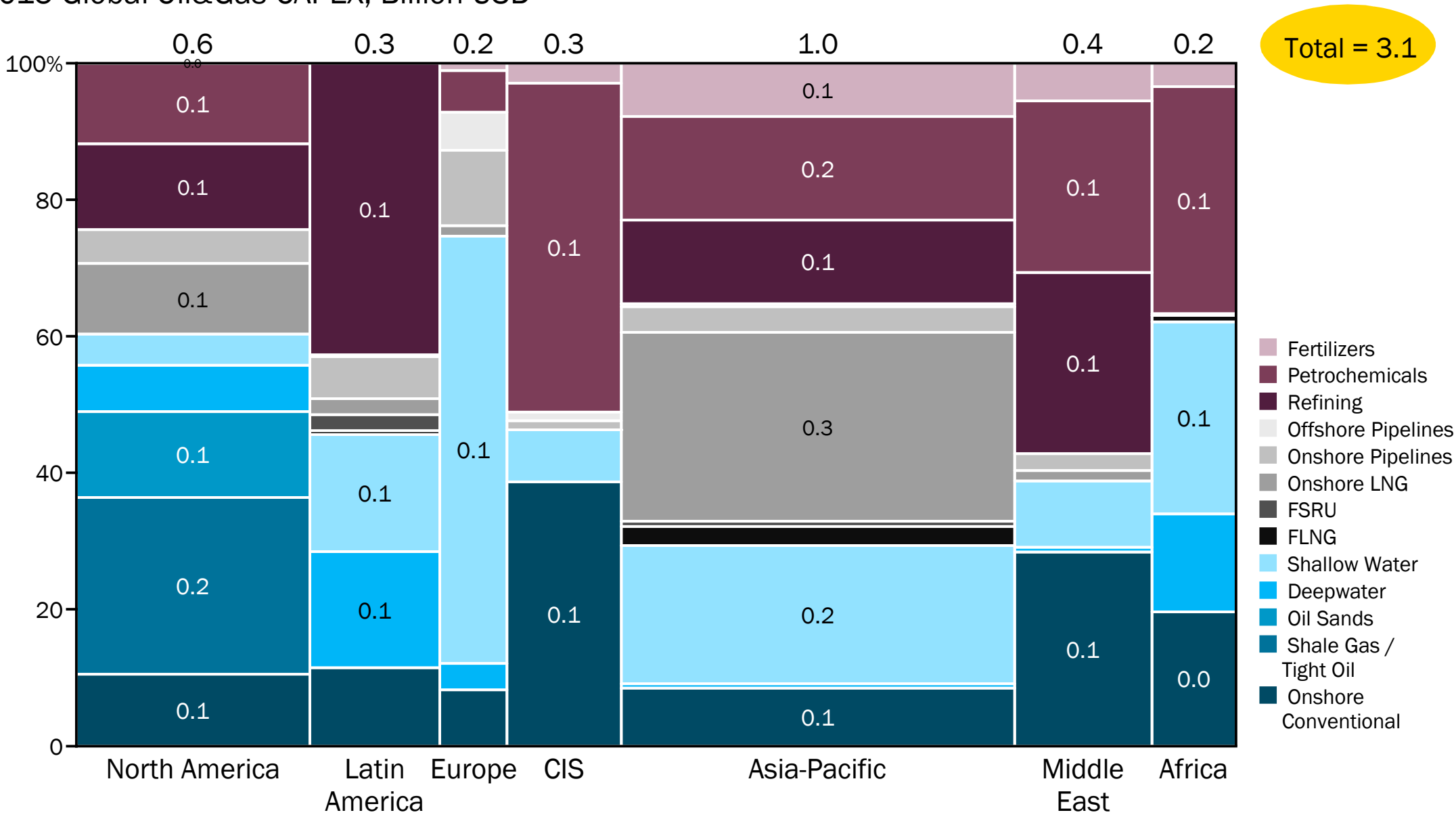


SDA Bocconi School of Management SUPPLHI

Note: size of bar chart is based on the expected value
Source: SupplHI analysis on public data and SupplHi Projects Database

Total 2015 CAPEX for Switchboards is ~3 B USD

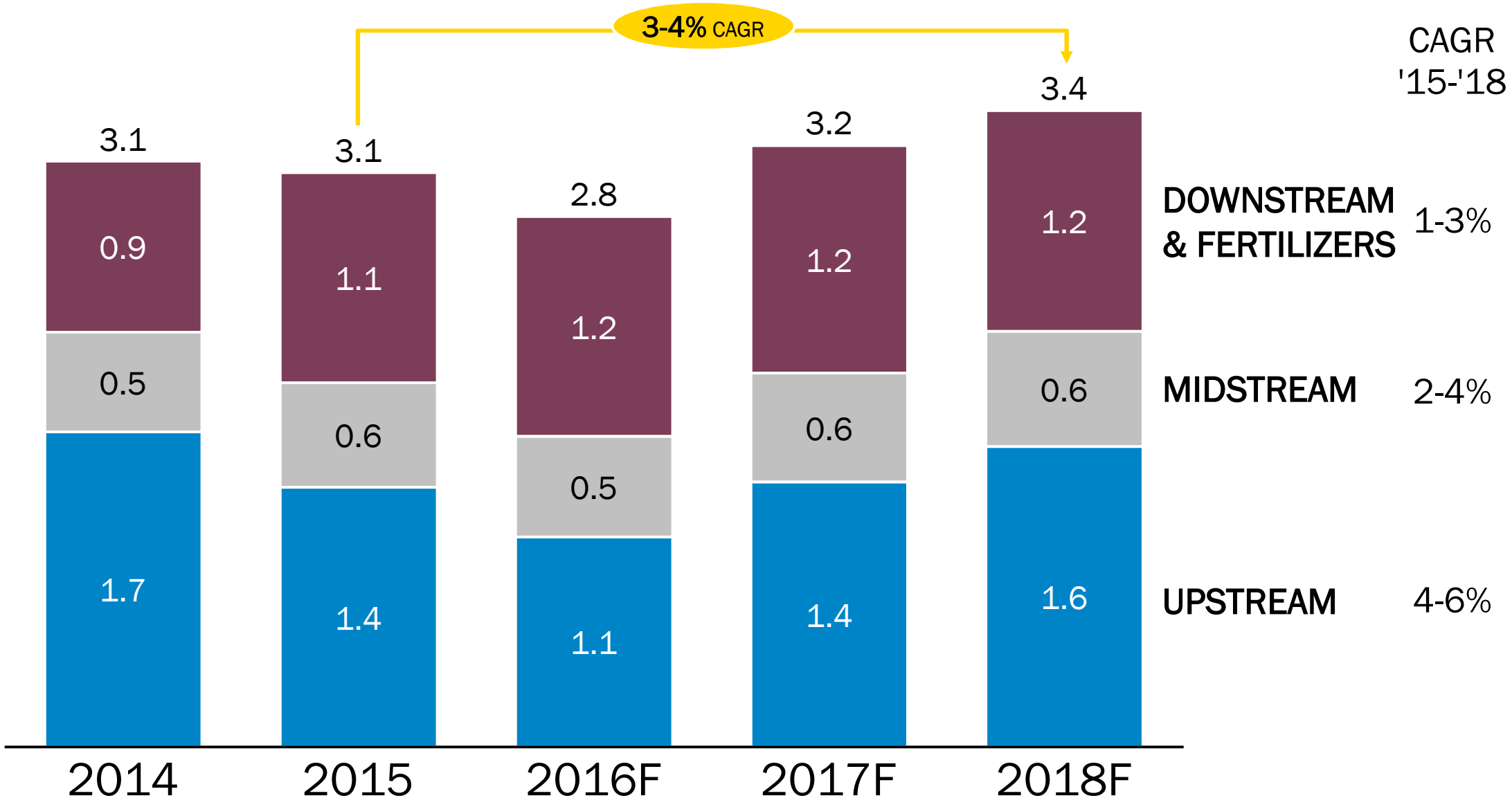
2015 Global Oil&Gas CAPEX, Billion USD



Source: SupplHI analysis on public data and SupplHi Projects Database

Expected 3-4% 2015-2018 CAGR for Switchboard CAPEX in Oil&Gas

Global Valves CAPEX, Billion USD



SDA Bocconi School of Management

SUPPLHI

Note: size of bar chart is based on the expected value

Source: SupplHI analysis on public data and SupplHi Projects Database

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OIL&GAS UNITS

Upstream

OIL RESERVES
- Billion barrels (B bbls)

OIL PRODUCTION
- Million barrels per day (M bbls/day)

OIL PRICE
- US dollars per barrel (US$/bbl)

GAS RESERVES
- Trillion cubic meters (Tcm)
- Trillion cubic feet (Tcf)

GAS PRODUCTION
- Billion cubic meters (Bcm)
- Billion cubic feet (Bcf)

GAS PRICE
- US dollars per Million British thermal units (US$/MBTU)

TO COMPARE DIFFERENT ENERGY SOURCES
- M barrels of oil equivalent (M BOE)
- Million tonnes of oil equivalent (M TOE)

Midstream

LNG PROCESSING
- Million tonnes per annum (MTPA)

LNG STORAGE
- Billion cubic feet (Bcf)
- Billion cubic meters (Bcm)

GAS PIPELINES
- Million standard cubic feet per day (MMscfd)
- Million cubic meters per day (Mcm/day)

GAS STORAGE
- Billion cubic feet (Bcf)
- Billion cubic meters (Bcm)

OIL PIPELINES
- Million barrels per day (M bbls/day)

OIL STORAGE
- Million barrels (M bbls)

Downstream

REFINING CAPACITY
- Million barrels per day (M bbls/day)

PETROCHEMICALS OUTPUT
- Million tonnes per annum (MTPA)

GTL PRODUCTION
- Thousand barrels per day (K bbls/day)

Fertilizers
(Ammonia and UREA)

AMMONIA / UREA PRODUCTION
- Million tonnes Nutrient (M tonnes N)
- Million tonnes Product (M tonnes P)

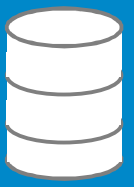
End-users

GUIDE TO OIL&GAS UNITS OF MEASURE AND CONVERSION FACTORS

AUGUST 2015 v01

SUPPL|HI

OIL



Source: BP

From \ *To*	Metric Tonnes	Kilolitres	Barrels	US gallons	Tonnes / year
Metric Tonnes	-	1.165	7.33	307.86	-
Kilolitres	0.8581	-	6.2898	264.17	-
Barrels	0.1364	0.159	-	42	-
US gallons	$325*10^{-5}$	0.0038	0.0238	-	-
Barrels / day	-	-	-	-	49.8

Note: based on the worldwide average gravity

GUIDE TO OIL&GAS UNITS OF MEASURE AND CONVERSION FACTORS

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GAS

Source: BP

From \ To	B m^3 NG	Bi ft^3 NG	M TOE	M T LNG	T BTU	M BOE
Billion cubic meters NG	-	35.3	0.90	0.74	35.7	6.60
Billion cubic feet NG	0.028	-	0.025	0.021	1.01	0.19
Million tonnes oil equivalent	1.11	39.2	-	0.82	39.7	7.33
Million tonnes LNG	1.36	48.0	1.22	-	48.6	8.97
Trillion British thermal units	0.028	0.99	0.025	0.021	-	0.18
Million barrels oil equivalent	0.15	5.35	0.14	0.11	5.41	-

PRODUCTS

Source: BP

For / *To convert*	Barrels to tonnes	Tonnes to barrels	Kilolitres to tonnes	Tonnes to kilolitres
LPG	0.086	11.6	0.542	1.844
Gasoline	0.118	8.5	0.740	1.351
Kerosene	0.128	7.8	0.806	1.240
Gas oil/diesel	0.133	7.5	0.839	1.192
Residual fuel oil	0.149	6.7	0.939	1.065
Product basket	0.125	8.0	0.786	1.272

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AMMONIA AND UREA

Source: IFA

From \ *To*	Urea M tonnes of Product	Urea M tonnes of Nutrient	Ammonia M tonnes of Product	Ammonia M tonnes of Nutrient
Urea M tonnes of Product	-	0.46	-	-
Urea M tonnes of Nutrient	2.17	-	-	-
Ammonia M tonnes of Product	-	-	-	0.82
Ammonia M tonnes of Nutrient	-	-	1.22	-