An Introduction to Hydrocarbon Geology & Exploration
Oil & Energy and the Petroleum Industry - Part 3

Rocco Imperatore

Perugia, October 2016

eni.com

- World oil reserves
- Supply and demand
- Prices
- Petroleum legislation and licensing
- The exploration and production industry cycle

World oil reserves

Units

- 1 barrel(bbl), the oil standard unit, = 159 liters: ~ 6.3 bbl make 1 m^3
- 1 foot^3 (cuft), the gas standard unit, = 28 liters: ~ 35.3 cuft make 1 m^3
- 1 Bcf gas (B = Billion, "Giga") = ~ 28,3 M m^3 (M = Million, "Mega")
- Statistics that often combine oil and gas (e.g. consumption or production) many time make reference to "boe", "barrel of oil equivalent"
- The equivalence is based on the energy produced, referred to a barrel of "reference" oil
- 1 Bcf gas equals 0,17 Mbo
- Production is measured in bopd (barrels oil per day, usually thousands, K) and scufd (standard cubic ft per day, usually M)
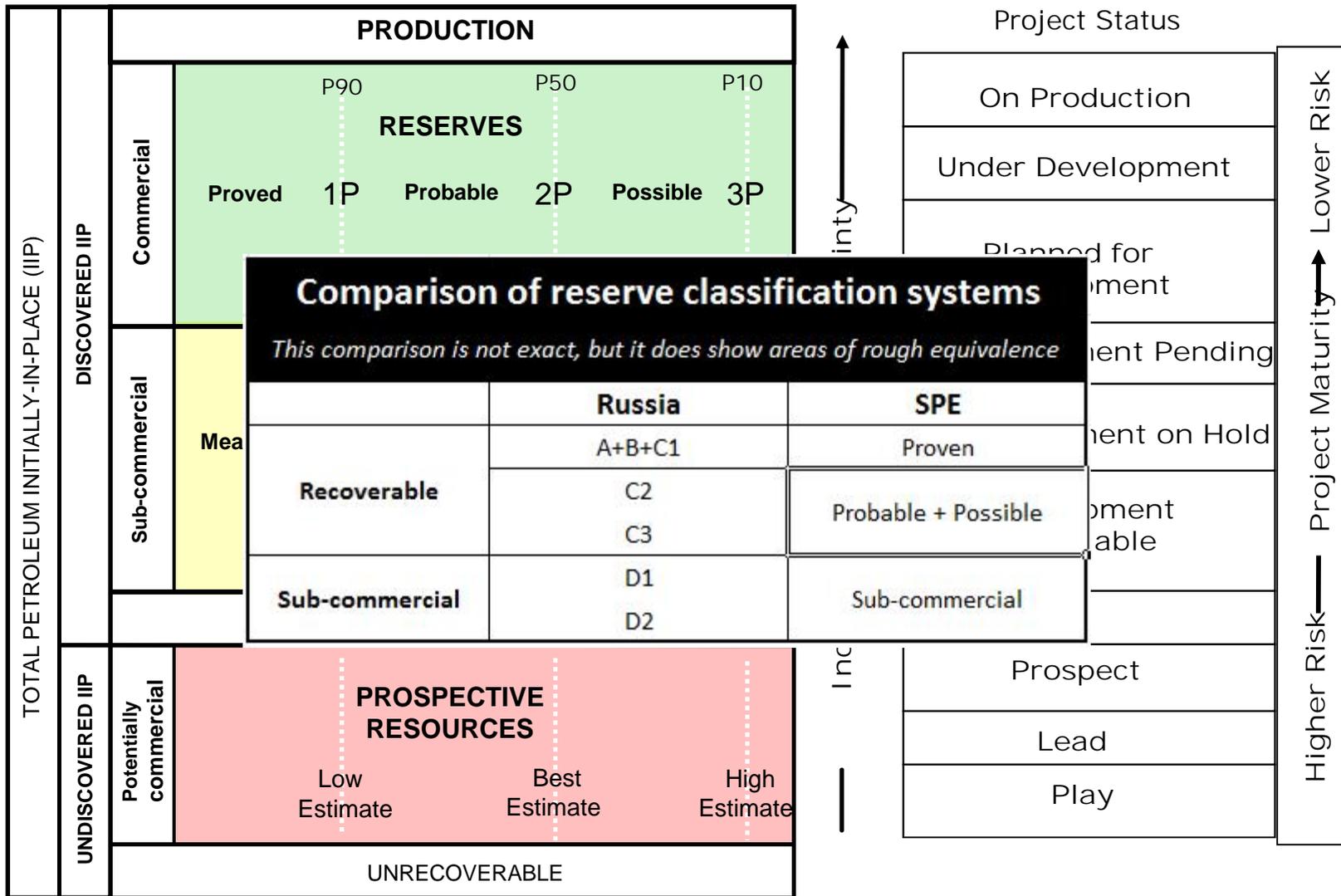- A very good oil well produces 10K bopd

Definitions

- A field is a measured accumulation that has been proved capable of profitably producing HC's

    - (RECOVERABLE/CONTINGENT RESERVES)

- A prospect is a defined geological structure, yet to be drilled, that based on sound information, is believed to be potentially capable of profitably producing HC's (a "possible" or "potential" field)

    - (PROSPECTIVE RESOURCES)

- A lead is an indication of the possible presence of structure that, with more and better information, may be upgraded to the "prospect" status

Resources Classification (SPE/WPC/AAPG/SPEE)

		PRODUCTION					Project Status	
		P90		P50		P10	On Production	
	Commercial	**RESERVES**					Under Development	
		Proved	1P	Probable	2P	Possible 3P	Planned for Development	
	Sub-commercial	Mea					...ent Pending	
							...ent on Hold	

Comparison of reserve classification systems

This comparison is not exact, but it does show areas of rough equivalence

	Russia	SPE
Recoverable	A+B+C1	Proven
	C2	Probable + Possible
	C3	
Sub-commercial	D1	Sub-commercial
	D2	

...oment ...able
Prospect
Lead
Play

PROSPECTIVE RESOURCES (Potentially commercial)

Low Estimate   Best Estimate   High Estimate

UNRECOVERABLE

TOTAL PETROLEUM INITIALLY-IN-PLACE (IIP)
DISCOVERED IIP
UNDISCOVERED IIP

Higher Risk ← Project Maturity → Lower Risk

← Range of Technical Uncertainty →

Definitions

- OOIP (Oil Originally In Place), GOIP (Gas OIP) refer to volumes of HC's (in bbl, cuft, m^3), at standard conditions, contained in a geological structure prior to the beginning of production; they are "fixed" values, although subject to errors and uncertainties

- Recovery factor refers to the ratio (in %) between the amount of HC that can be extracted from a structure with current technology and the relevant HOIP.

- Recoverable reserves refer to the fraction of HOIP (at standard conditions) that can be profitably extracted from a field with consolidated technology (they are a "variable", subject to technological progress and market conditions) .

- Contingent resources are discovered HC volumes that are not economically exploitable at present conditions (technical, economic, political, corporate).

- Prospective resources are estimated volumes associated with undiscovered accumulations. These represent quantities of petroleum which are estimated, as of a given date, to be potentially recoverable from oil and gas deposits identified on the basis of indirect evidence but which have not yet been drilled. This class represents a higher risk than contingent resources since the risk of discovery is also added.

Orders of Magnitude

- Oil/gas field are considered:
  - "large" if > 50 Mbo RR
  - "major" if >100 Mbo RR
  - "significant" if > 200 Mbo RR
  - "giant" if > 500 Mbo, i.e. 3 Tcf_{gas} (__ 85 Bm^3) RR
  - "super-giant" if > 1 Bbo, i.e. 6 Tcf_{gas} (__ 170 Bm^3) RR

How Much Oil there Was and What's left?

- There is no agreement on figures
- "Reserves" estimate are unreliable for "political" reasons
- Prices and improving technology require continuous updates
- USGS estimates are arguable
- Industry-fed Data Bases (IHSE) are the only source
- Explorers and Production engineers have different approaches (HOIP vs depletion)
- New discoveries probability vs unknown petroleum systems (plays)

DISCOVERED: 1,618Bbbl
YET-to-FIND: 182Bbbl
PRODUCED: 613Bbbl
YET-to-PRODUCE: 1,005Bbbl

Campbell, 1998

Cumulative Oil Production: 952Gbbls
Remaining recoverable: 2,029Gbbls
Ultimate Recov. RESERVES: 3,000 Gbbls

USGS 2004

Ultimate Reserves Estimates

Past Oil Predictions			
Date of Forecast	**Source**	**Forecast Date of Conventional Peak**	**Assumed Ultimate**
1972	ESSO	"Oil to become increasingly scarce from the year 2000"	2100 Gb
1972	Report for the UN Conf. on Human Environment	"likely that peak production will have been reached by the year 2000"	2500 Gb
1974	SPRU, Sussex University	n/a	1800–2480
1976	UK Dept of Energy	Peak: "about...2000"	n/a
1977	Hubbert	Peak: 1996	2000 Gb (Nehring)
1977	Ehrlich et al.	Peak: 2000	1900 Gb
1979	Shell	"...plateau within the next 25 years."	n/a
1979	BP (Oil Crisis...again?)	Peak (non-Communist world): 1985	n/a
1981	World Bank	"...plateau around the turn of the century"	1900 Gb
1995	Petroconsultants	Peak: 2005	1800 Gb
1997	Ivanhoe	Peak: 2010	~ 2000 Gb
1997	Edwards	Peak: 2020	2836 Gb
1998	IEA: WEO 1998	Peak: 2014	2300 Gb ref. case
1999	USGS (Magoon)	Peak: ~ 2010	~ 2000 Gb
1999	Campbell	Peak: ~ 2010	2000 Gb (inc. polar deep)
2000	Bartlett	Peak: 2004 or 2019	2000 or 3000 Gb
2000	IEA: WEO 2000	Peak: "Beyond 2020"	3345 Gb (from USGS)
2000	2000 US EIA	Peak: 2016-2037	3003 Gb (from USGS)
2001	Deffeyes	Peak: 2003-2008	~ 2000 Gb
2002	Smith	Peak: 2011-2016	2180 Gb
2002	'Nemesis'	Peak: 2004-2011	1950-2300 Gb equiv.

"Ultimate" means "total", prior to production start"

All attempts are based on pre-unconventional "shale" concepts
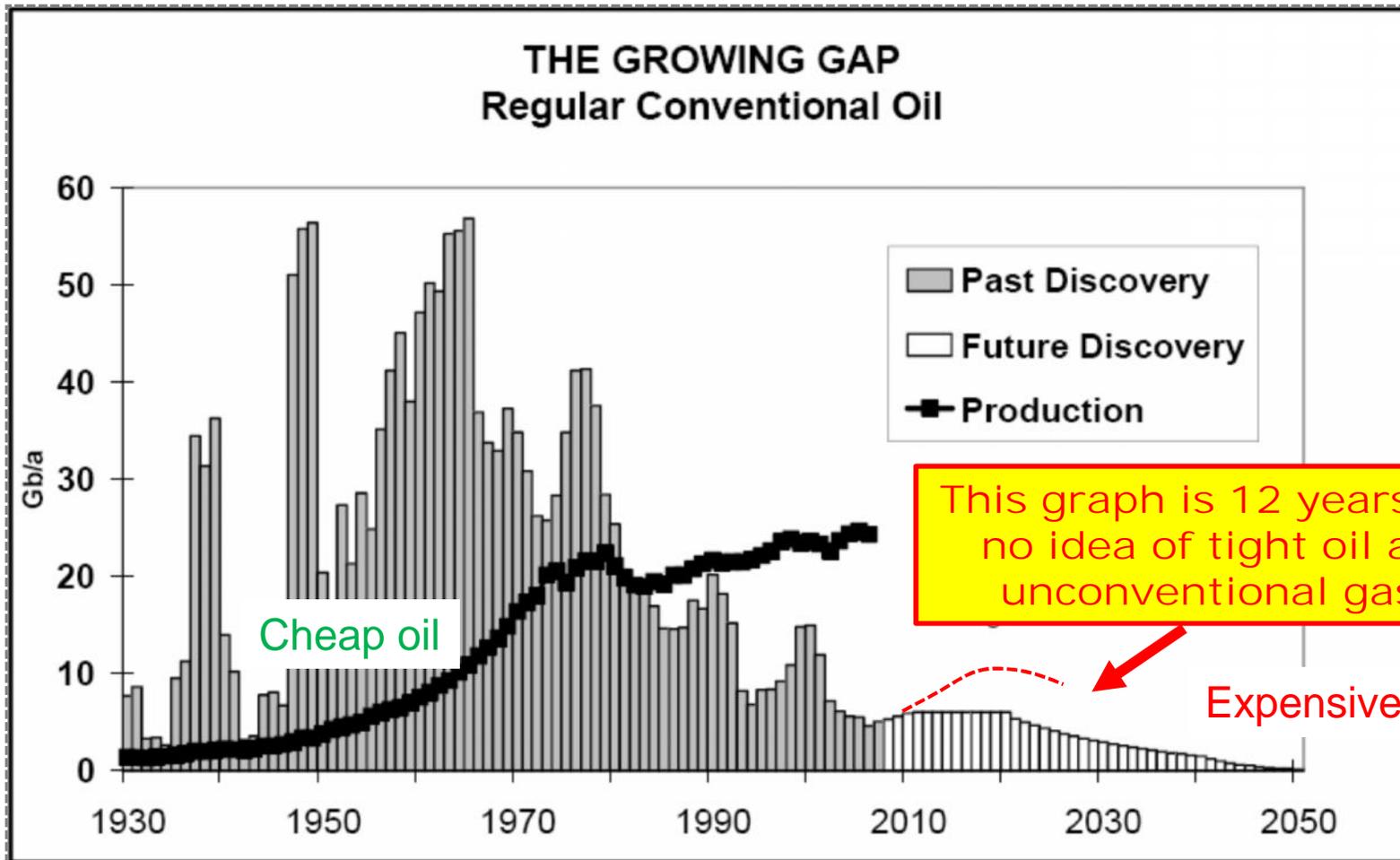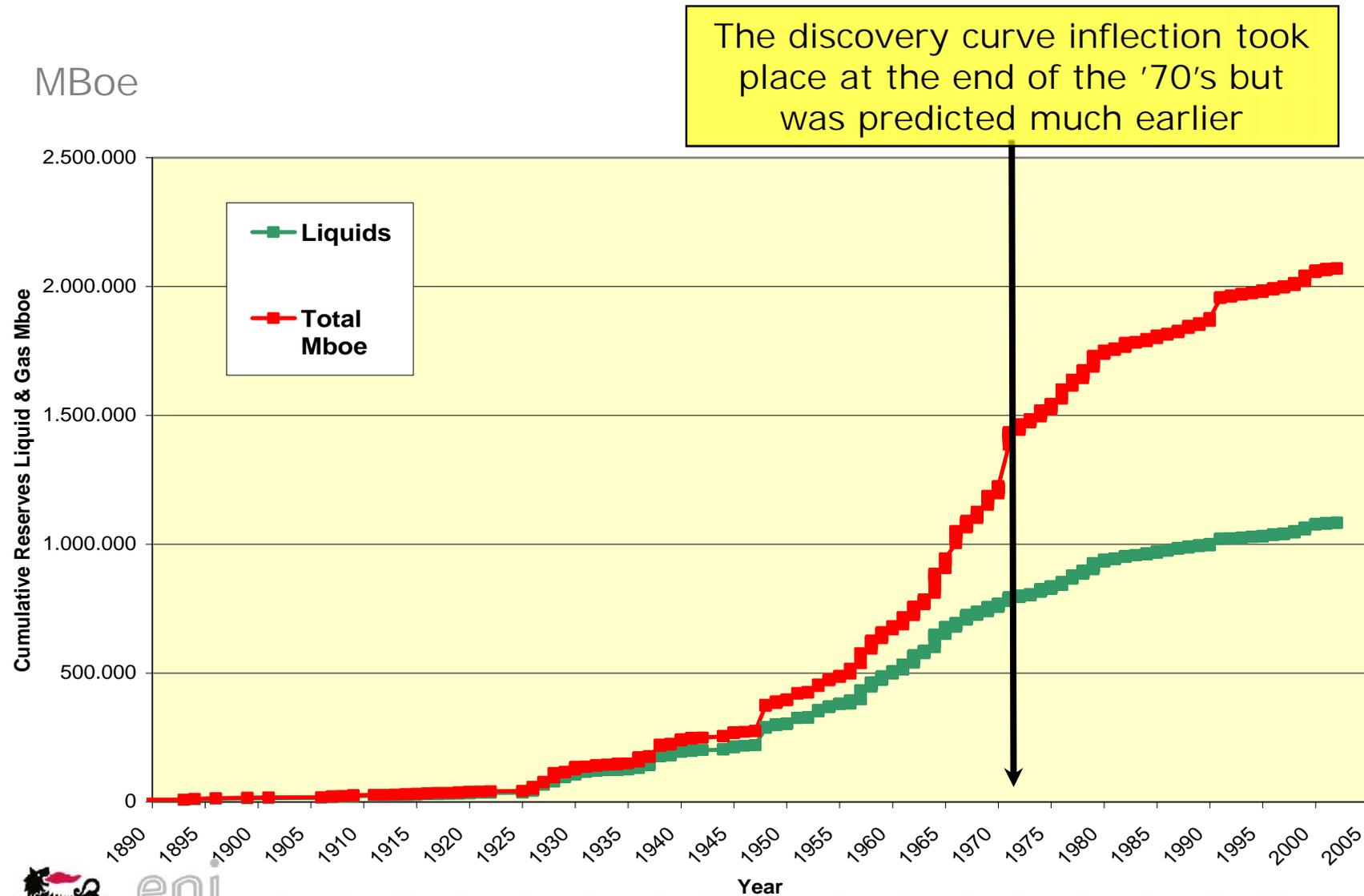
Modified from: Wolf at the Door

Oil Consumption

- Today, we consume 6 boe more than we find
- Most of the oil we use was discovered decades ago

THE GROWING GAP
Regular Conventional Oil

Legend:
- Past Discovery
- Future Discovery
- Production

Cheap oil

This graph is 12 years old: no idea of tight oil and unconventional gas !

Expensive oil

Y-axis: Gb/a (0, 10, 20, 30, 40, 50, 60)
X-axis: 1930, 1950, 1970, 1990, 2010, 2030, 2050

The Decline of Giant Discoveries

HISTORICAL DISCOVERY OF GIANT FIELDS

FIG. 1

Some of the largest finds ever
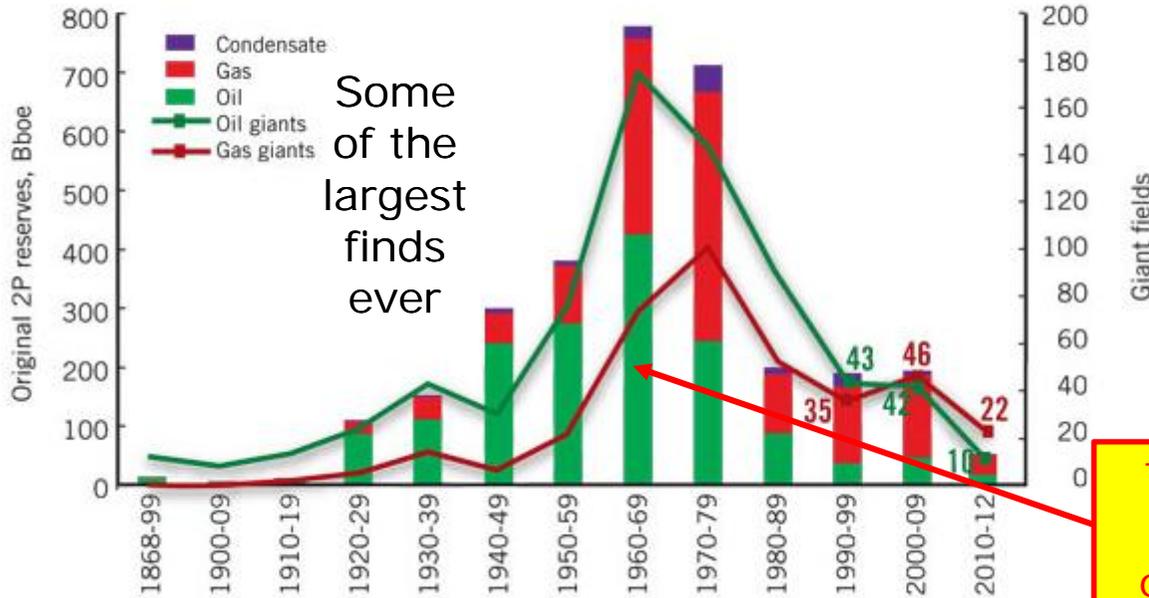
The effect of technological improvements (seismic, offshore exploration tools)

WORLDWIDE DISCOVERIES OVER THE LAST 20 YEARS

Notice the increasing role of National Oil Co's
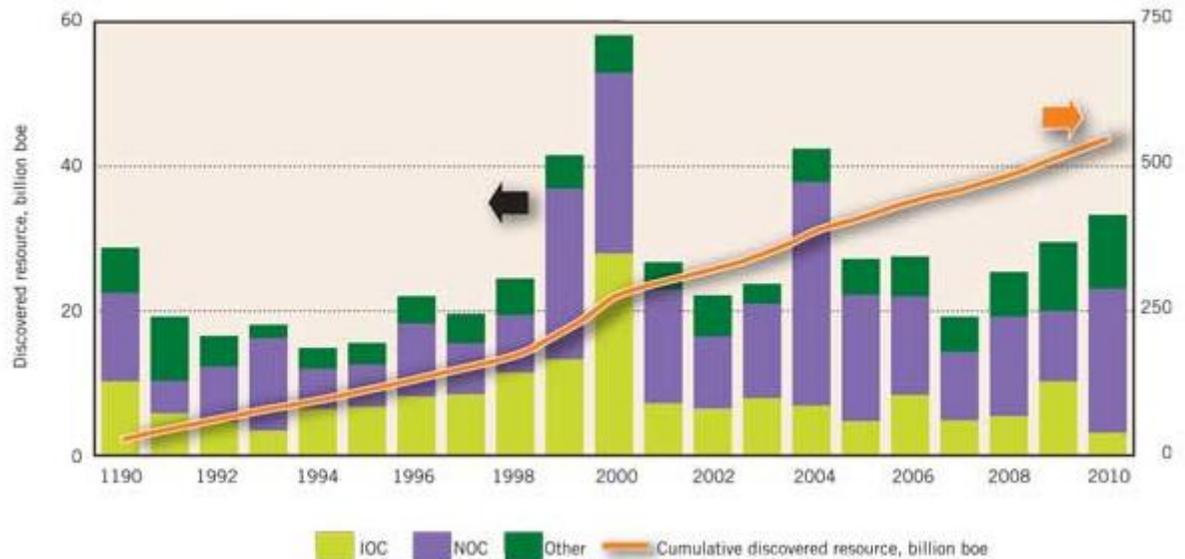
Source O&G J

The Decline of Cheap Discoveries

Exploration keeps delivering resources (at increasingly higher costs)
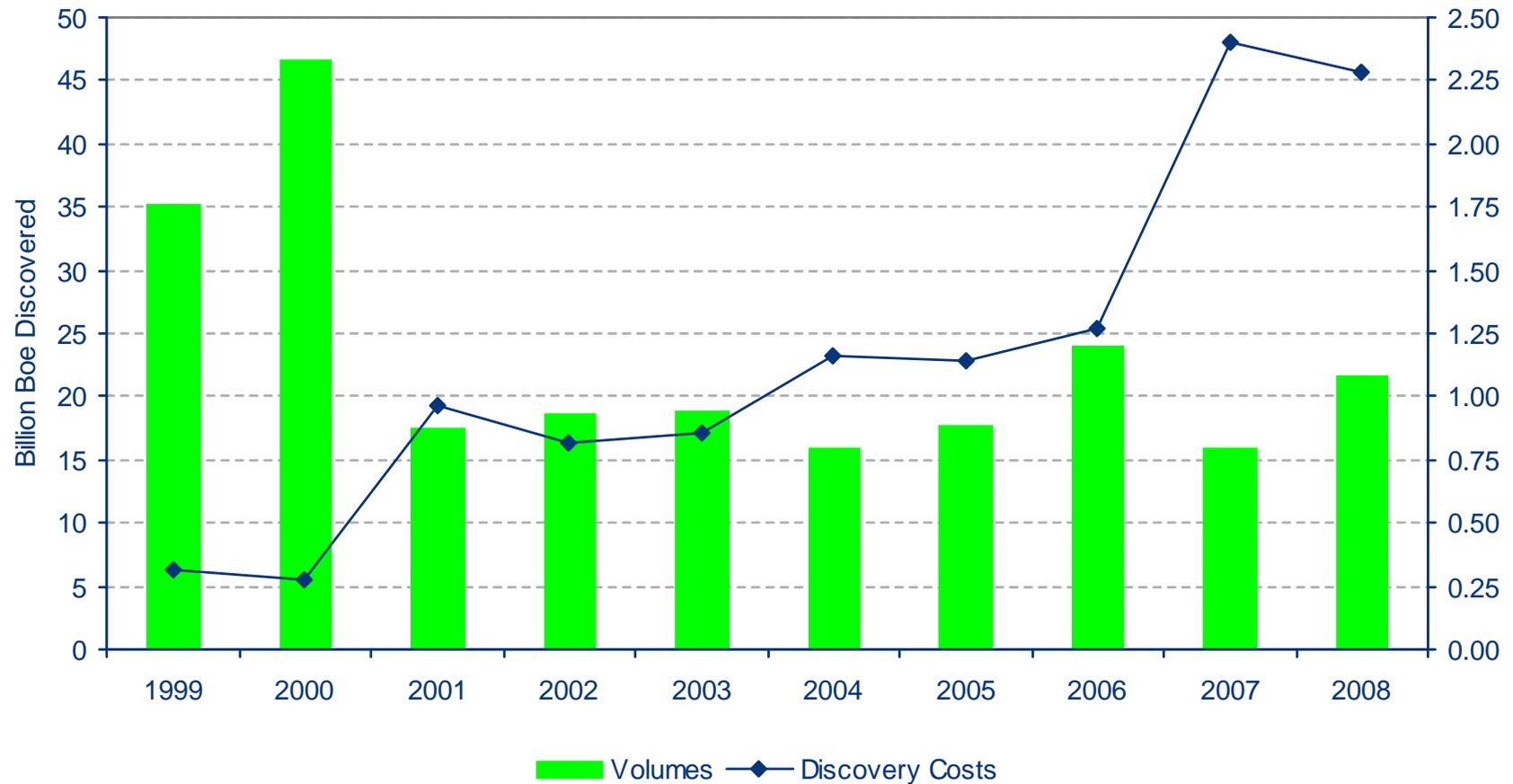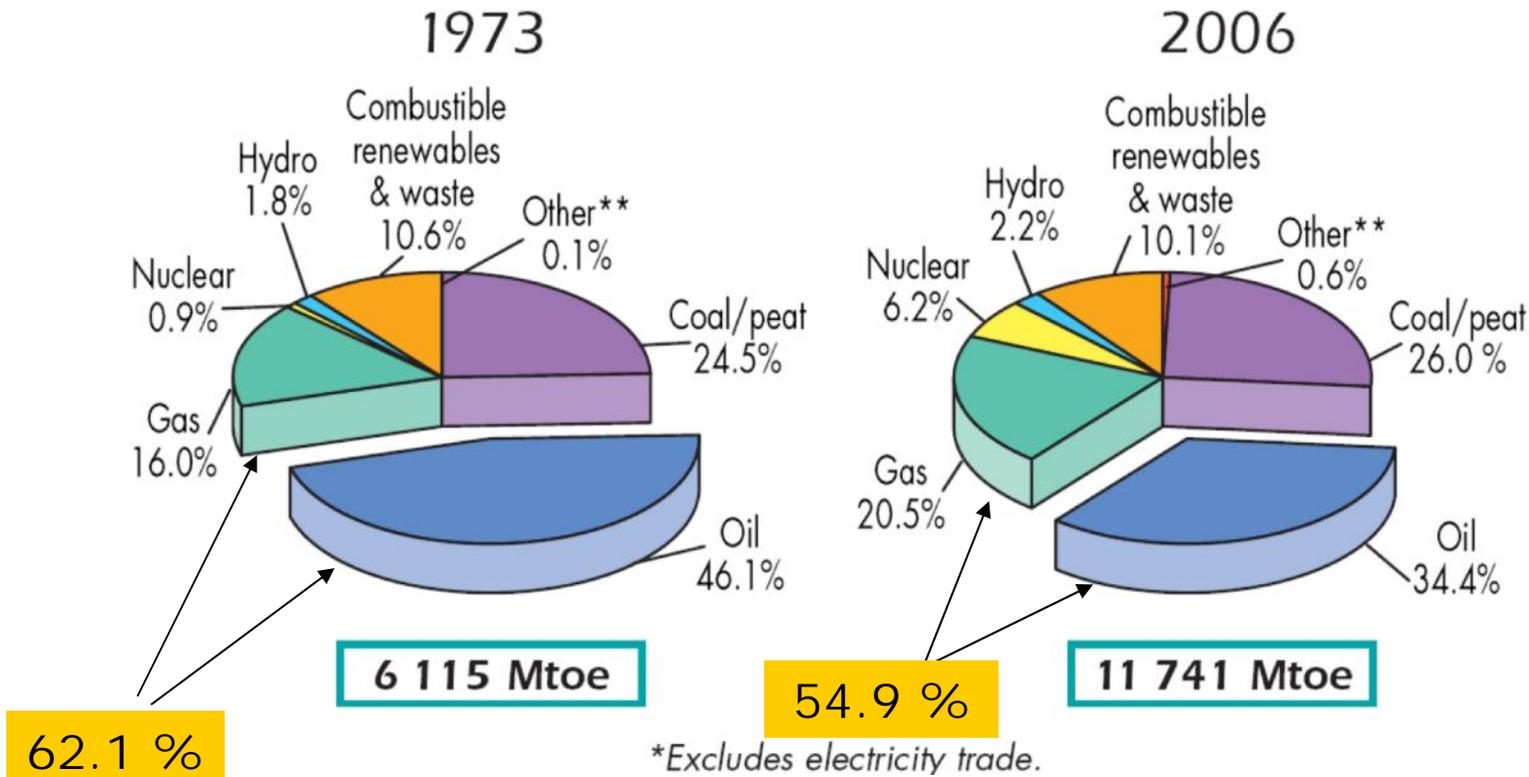

Source: WoodMacknzie

Your Future Professional Scenario

- Oil and gas demand is not going to decrease in the mid term

- Industry targets (large fields) and geology (a lot of small fields left) head opposite, but the search for smaller resources may provide an interim solution

- If prices goes up again and conventional oil remains valuable, new explorers will be called to look for increasingly difficult, smaller and subtler traps but…

- … not on "unconventional" resources (the long term future may be there, but now the low oil price does not help): different locations, different geopolitical scenarios

Where Did Our Energy Come from?

1973 and 2006 fuel shares of TPES*

1973

Hydro 1.8%
Combustible renewables & waste 10.6%
Other** 0.1%
Nuclear 0.9%
Coal/peat 24.5%
Gas 16.0%
Oil 46.1%

6 115 Mtoe

62.1 %

2006

Hydro 2.2%
Combustible renewables & waste 10.1%
Other** 0.6%
Nuclear 6.2%
Coal/peat 26.0 %
Gas 20.5%
Oil 34.4%

11 741 Mtoe

54.9 %

*Excludes electricity trade.

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Combustible renewables & waste 10.1%
Hydro 2.2%
Other** 0.6%
Nuclear 6.2%
Coal/peat 26.0 %
Gas 20.5%
Oil 34.4%

54.9 %

2006

World consumption of primary energy, 2012

Other 2,2%
Nuclear 4,1%
Biomass 8,5%
Hydro 6,1%
Coal 27%
Gas 22%
Oil 30%
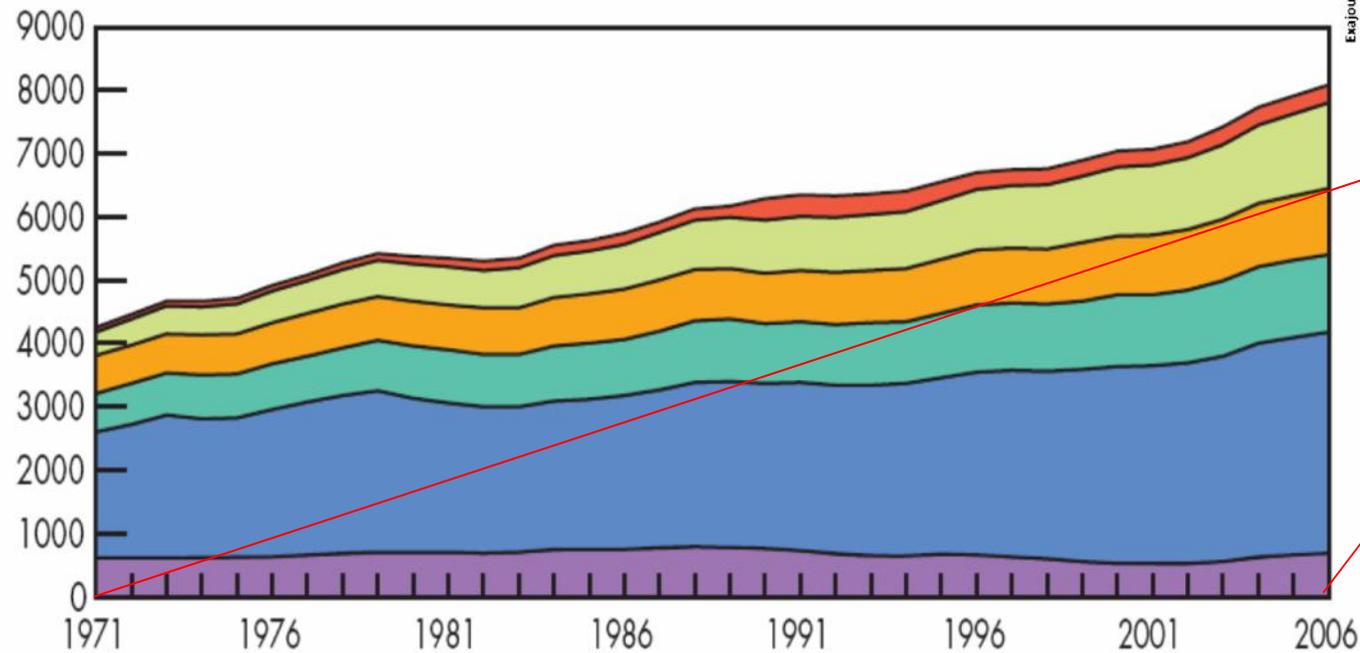
stable

52 %

% of much more!

- Still the same? Not quite:
- Renewables catching up
- Will nuclear keep declining ?
- … demand is increasing

Recent Past Energy Consumption Trend Perception

Evolution from 1971 to 2006 of world total final consumption by fuel (Mtoe)

Legend:
- Coal/peat
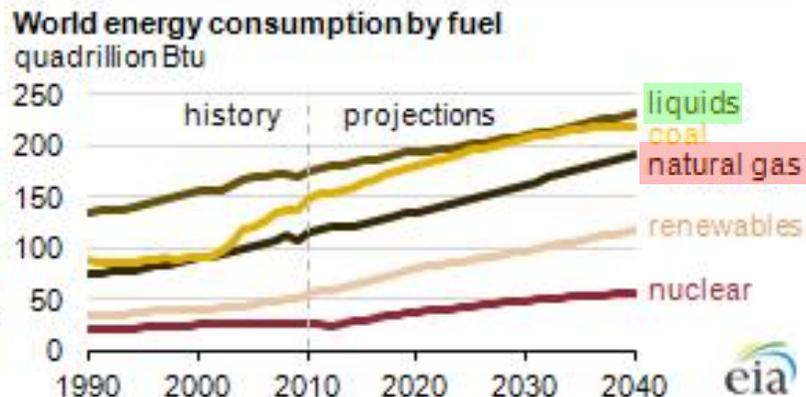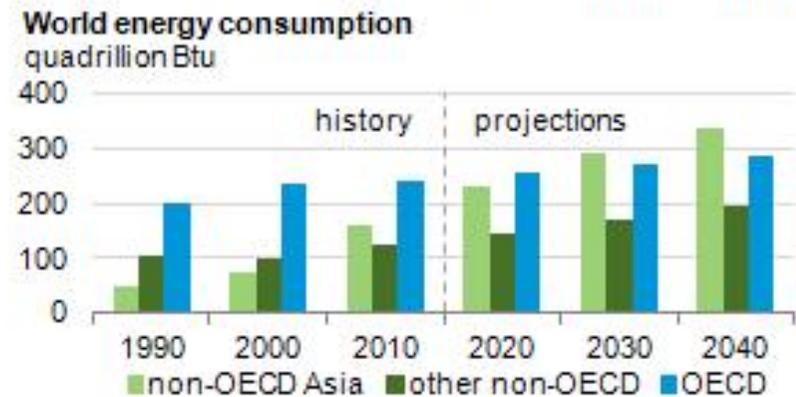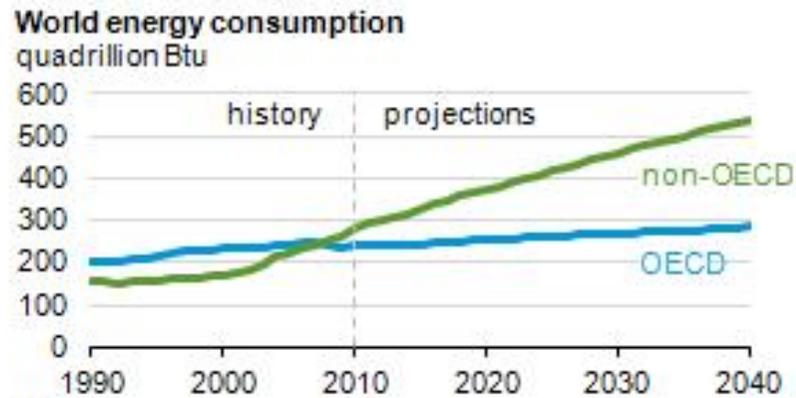- Combustible renewables & waste*
- Oil
- Electricity
- Gas
- Other**
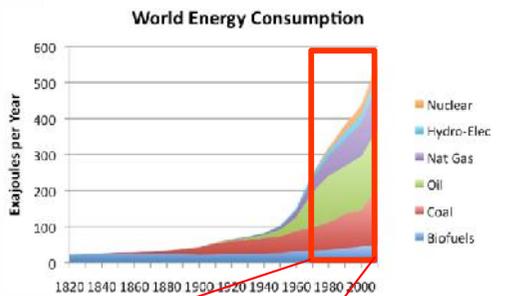
* Prior to 1994 combustible renewable & waste final consumption has been estimated.
**Other includes geothermal, solar, wind, heat, etc.

EIA projects world energy consumption will increase 56% by 2040

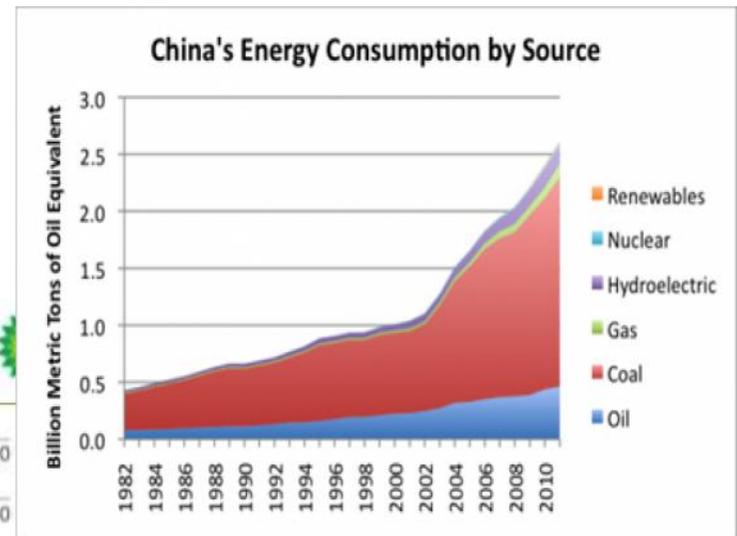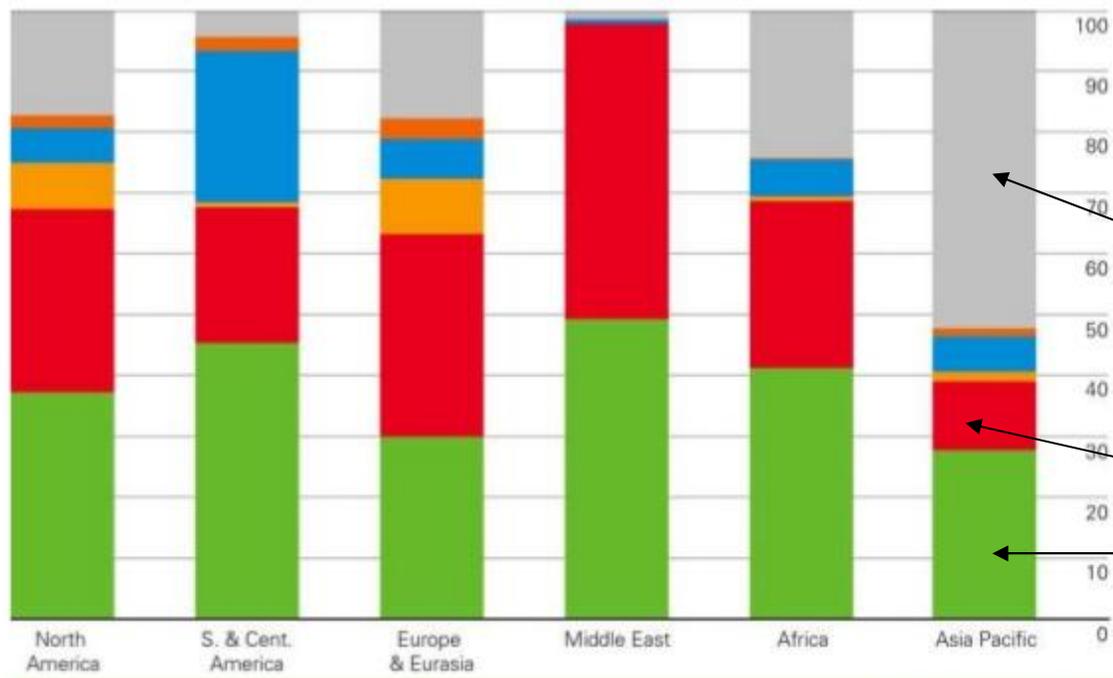# Energy Consumption Sources Are Different

China's Energy Consumption by Source

Primary energy regional consumption pattern 2012
Percentage

Coal
Renewables
Hydroelectricity
Nuclear energy
Natural gas
Oil

Is Oil Production Growing Too?

World Oil Production
(Million Metric Tons, 1965-2013)

Legend:
- World Total Less Top 11
- Venezuela
- Mexico
- Kuwait
- UAE
- Iraq
- Iran
- China
- Russia
- Saudi Arabia
- Canada
- United States
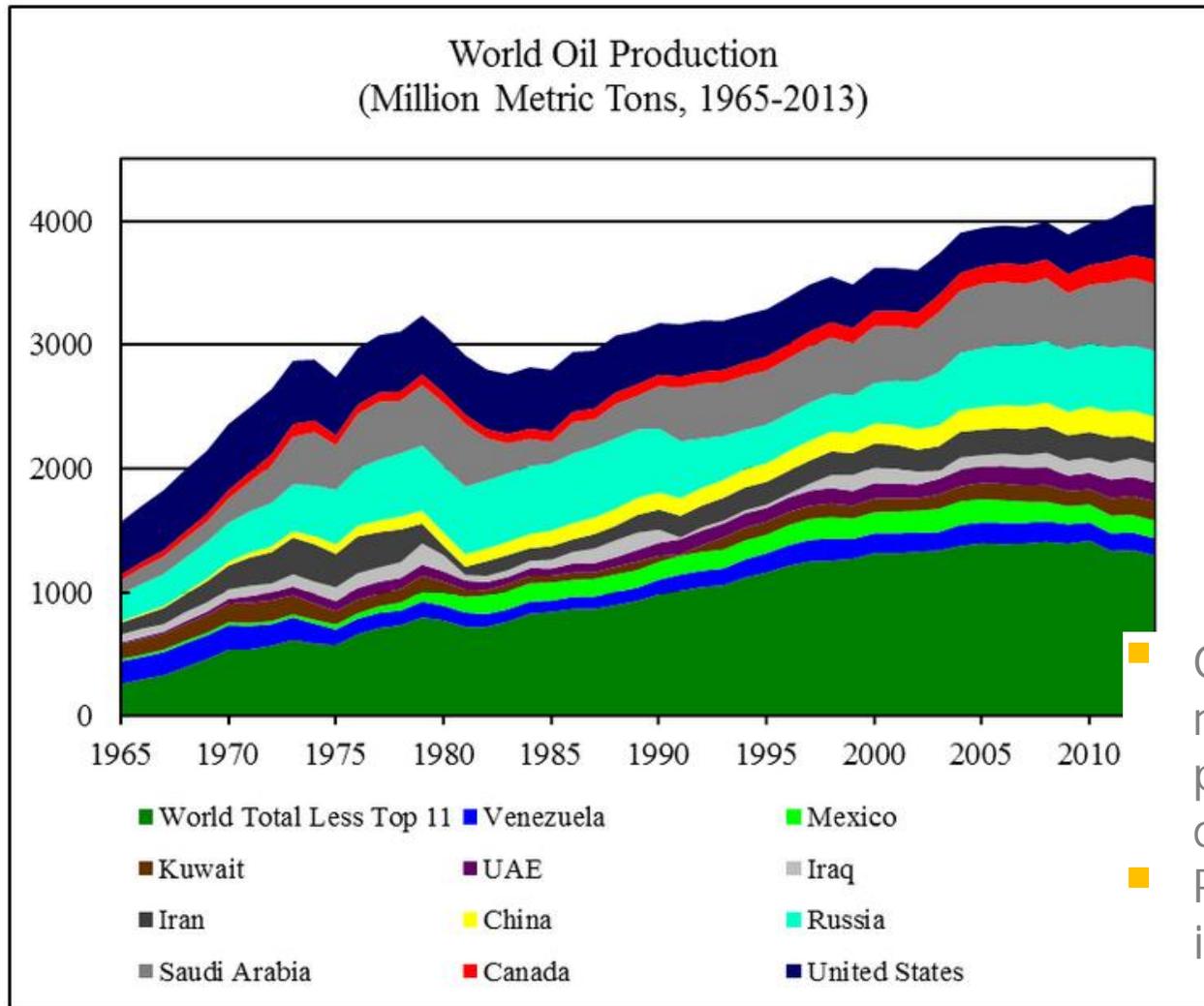
- Global production is raising at a lowering pace (will it start declining?)
- Production is declining in many areas

Peak Oil

O&G production peak is around the corner (2008)-2012-2020?

What do we mean by "peak oil"?

Peak Oil (Colin Campbell) is " the maximum rate of the production of oil in any area under consideration, recognizing that it is a finite natural resource, subject to depletion"

Source: ASPO

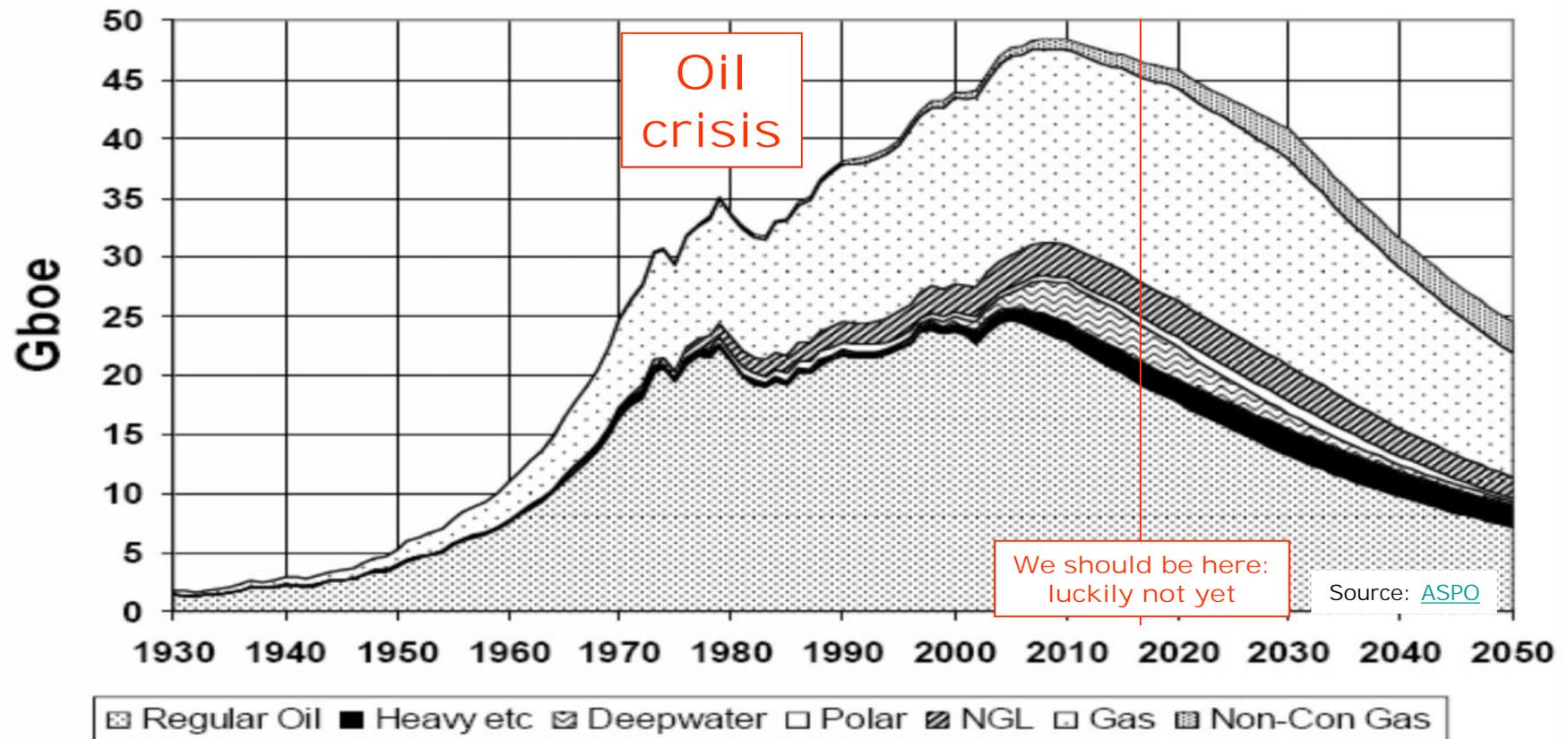**www.peakoil.net**
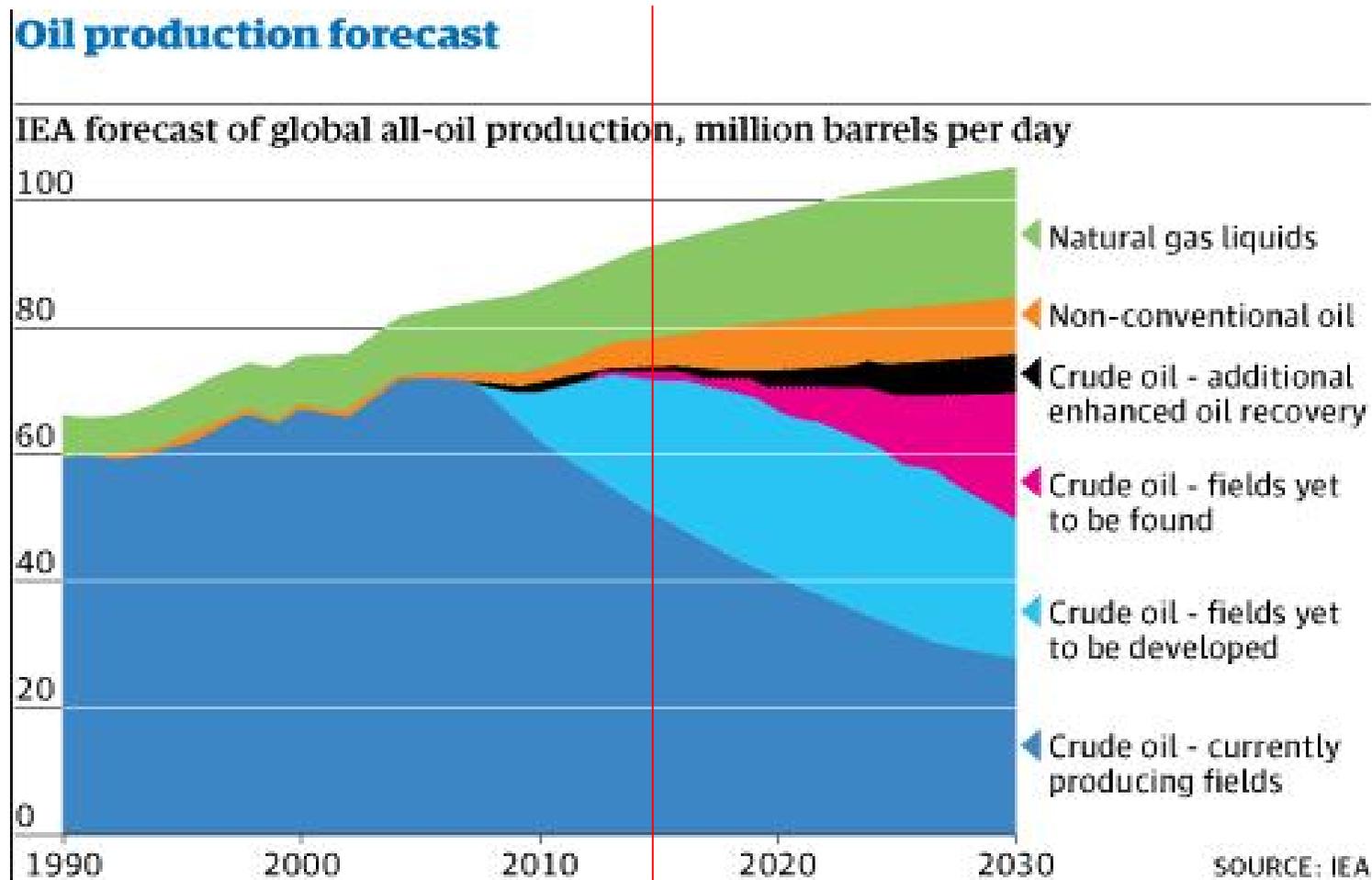
Commonly Assumed Projection (Old but Still Used)

OIL & GAS PRODUCTION PROFILES
2007 Base Case

Oil crisis

We should be here:
luckily not yet

Source: ASPO

☒ Regular Oil ■ Heavy etc ☒ Deepwater ☐ Polar ☒ NGL ☐ Gas ▦ Non-Con Gas

What the Industry Can Do

Oil production forecast

IEA forecast of global all-oil production, million barrels per day

- Natural gas liquids
- Non-conventional oil
- Crude oil - additional enhanced oil recovery
- Crude oil - fields yet to be found
- Crude oil - fields yet to be developed
- Crude oil - currently producing fields

SOURCE: IEA

Peak is continuously shifted and still to come

How shall we fill this gap?

A Commonly Proposed Vision (ca 2006)
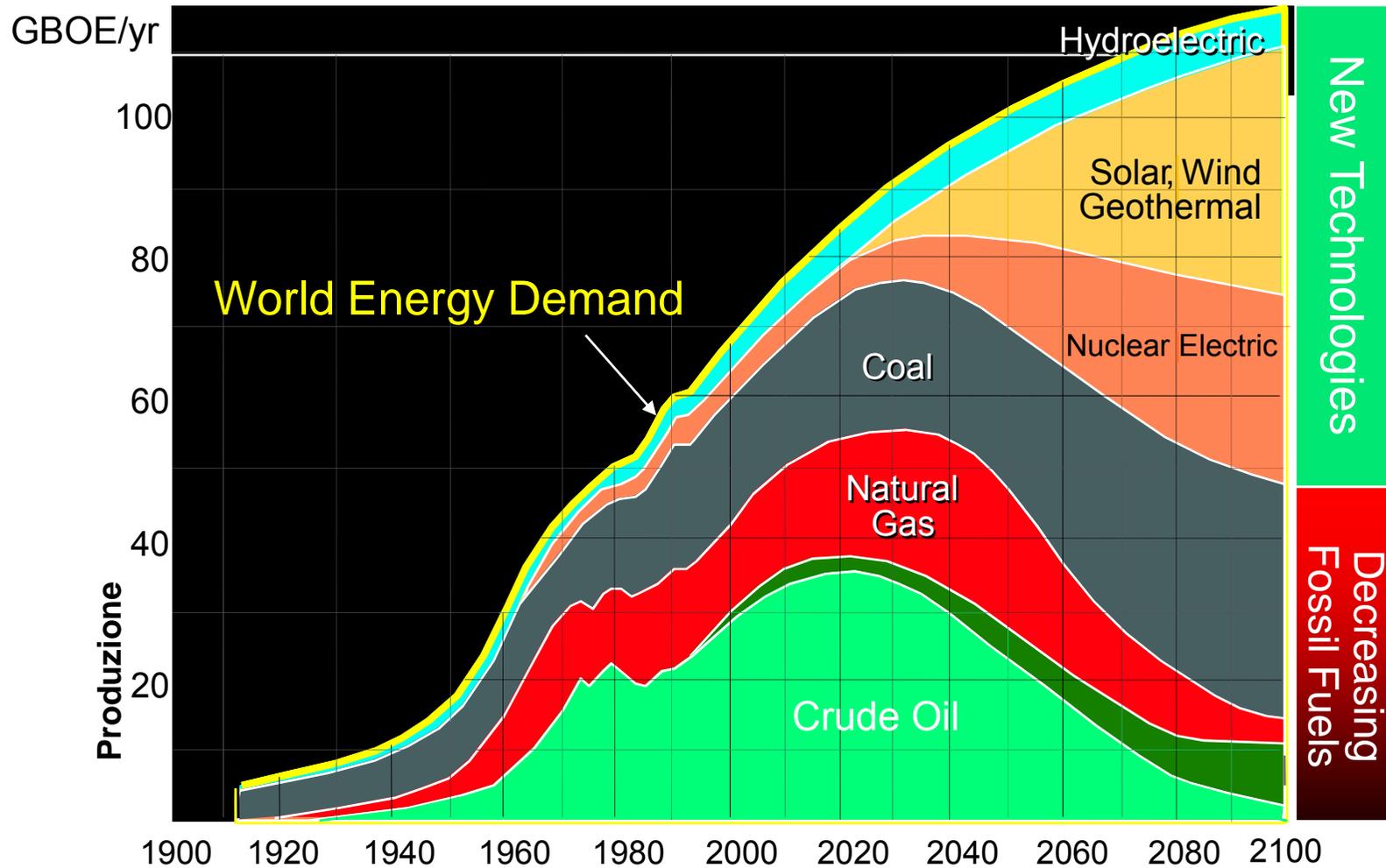
Updated Versions (Research vs Industry)

Projected end of your professional career
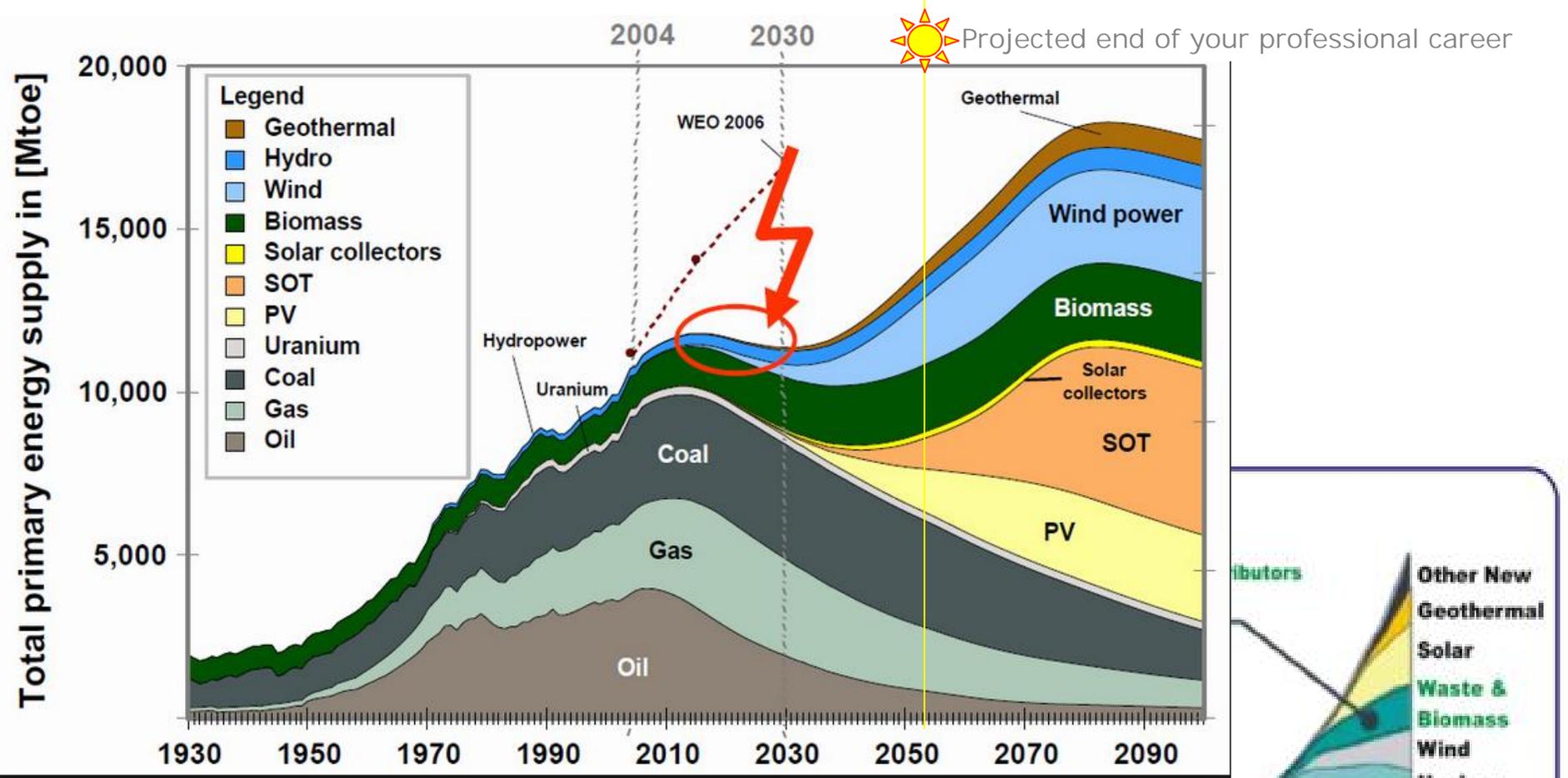
Peak in 2020? 4 years to go!
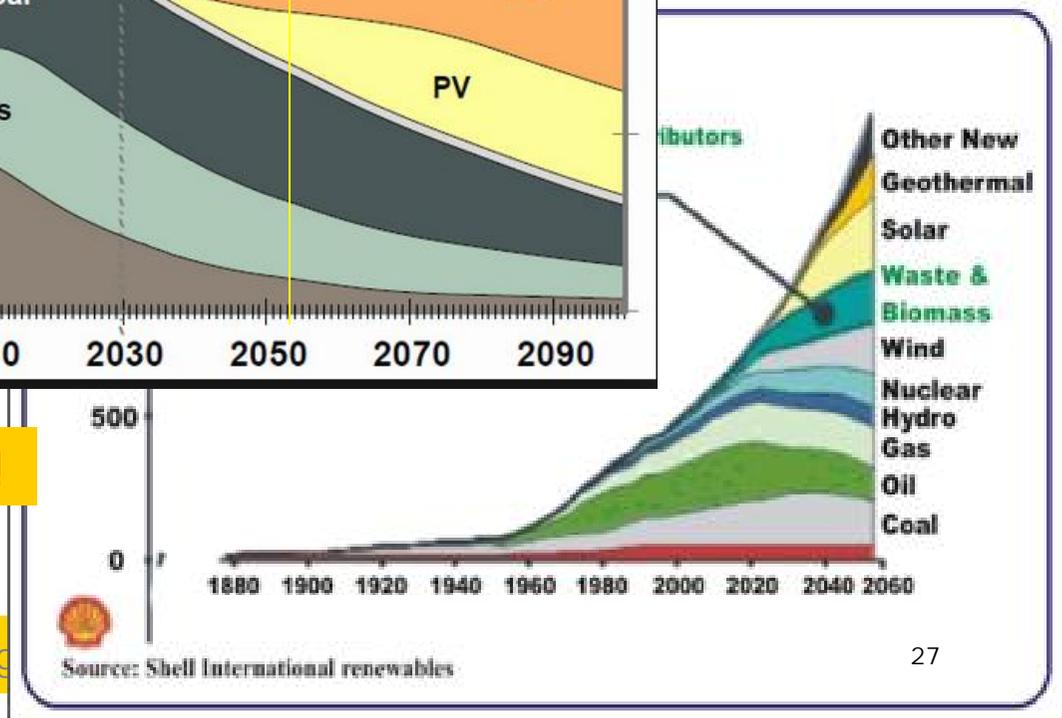
Source: Shell International renewables

Finding New Oil and Gas Resources

- The "pillars" of future oil and gas (energy) supply are:
  - Additions to and better recovery of existing fields
  - New discoveries (many and small?)
  - Unconventional resources (very large, but difficult to produce)

Source: P.H. Stark, K. Chew, and Bob Fryklund, IHS
at International Petroleum Technology Conference, 4-6 December 2007, Dubai, U.A.E.

What Are Unconventional Resources?

- OIL
    - Heavy oil
    - Extra heavy oil
    - Tar and bitumen
    - Bituminous shale
- GAS
    - Coal (coal bed methane)
    - Low K reservoirs (tight reservoir)
    - Gas shales
    - Hydrates (feasibility being tested)

- Unconventional resources outclass conventional ones, but are still in their technological infancy (or maybe their teen age)

The Availability of Unconventional Resources

- The estimated in place volumes of bitumen, heavy oil and bituminous sands and shales are about 7 times larger than the estimated remaining oil

- Equally, unconventional gas resources (excluding hydrates) are 4 to 5 greater than the estimated remaining gas

- Great technical challenges to economically extract and refine them without compromising the environment

The Effects of Unconventional Resources Can Be Seen

Growing tight oil and offshore crude oil production drive U.S. output close to historical high

U.S. crude oil production
million barrels per day

History — 2012 — Projections

U.S. maximum production level of 9.6 million barrels per day in 1970

Tight oil

Lower 48 offshore

Alaska

Other lower 48 onshore
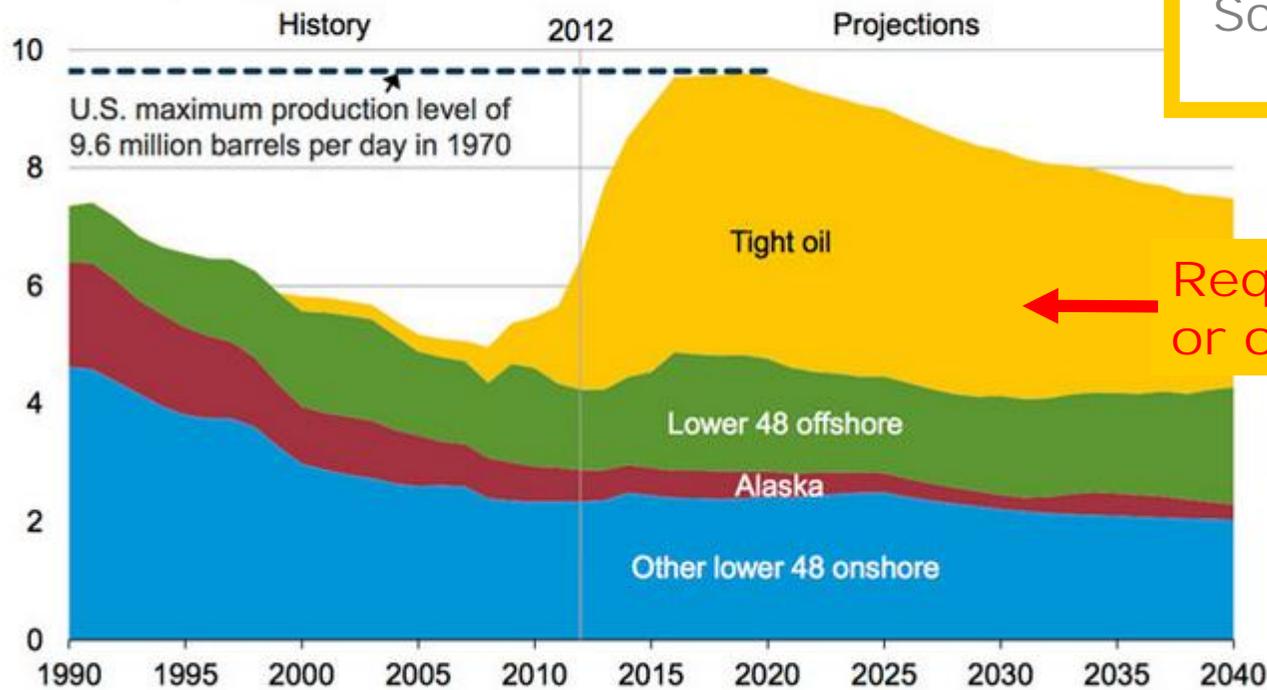
Source: EIA, Annual Energy Outlook 2014 Early Release

Will it be applicable worldwide? So far works in the US only

Requires fracking or open cast mining

Oil prices fall has stopped the rise

Major Facts and Issues

A hydrocarbon province is said "mature" when only the small field tail is left to find

Giant

large

small

- Imbalance of geopolitical HC reserves distribution
  - Nearly 65% ca. of known HC reserves sits in "Giants Fields" (900* out of 30,000)
  - About 60% of known HC reserves is in the Middle East
  - About 50% of HC consumption occurs in N. America & Europe (**)
  - Consumption in the Far East is dramatically growing
- Frontier vs mature sedimentary basins
  - The largest fields of any given area are discovered at an early stage, most have been found decades ago
  - 450 sedimentary basins out of 1000 are believed to be "mature"
  - All known HC provinces are approaching maturity
  - Frontier areas require yet difficult technological solutions and higher price scenarios

World Oil Reserves Distribition (2004)

World Oil Reserves, 2004

More than 50 Billion Barrels
10 to 49 Billion Barrels
1 to 9 Billion Barrels
500 to 999 Million Barrels
100 to 499 Million Barrels
< 100 Million Barrels
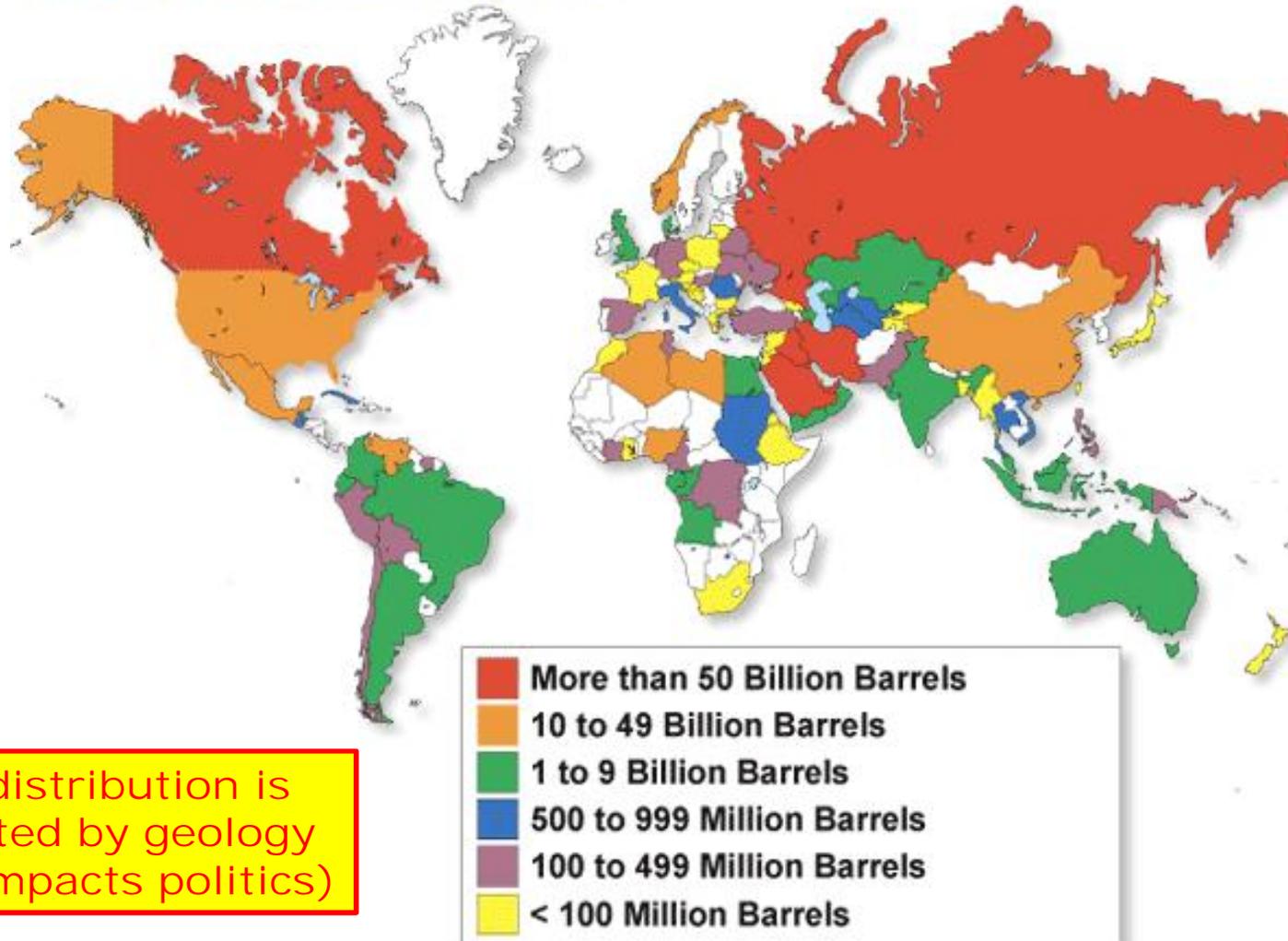
HC distribution is dictated by geology (but impacts politics)

Source: Oil & Gas Journal, "Worldwide Report," December 22, 2003

World Proven Reserves (Oil)

Distribution of proved oil reserves in 1992, 2002 and 2012
Percentage

Middle East
S. & Cent. America
North America
Europe & Eurasia
Africa
Asia Pacific

RESERVES are VARIABLE entities !

1992
Total 1039.3
thousand million barrels

2002
Total 1321.5
thousand million barrels

2012
Total 1668.9
thousand million barrels

BP 2013

World Gas Reserves Distribition (2004)

World Gas Reserves, 2004
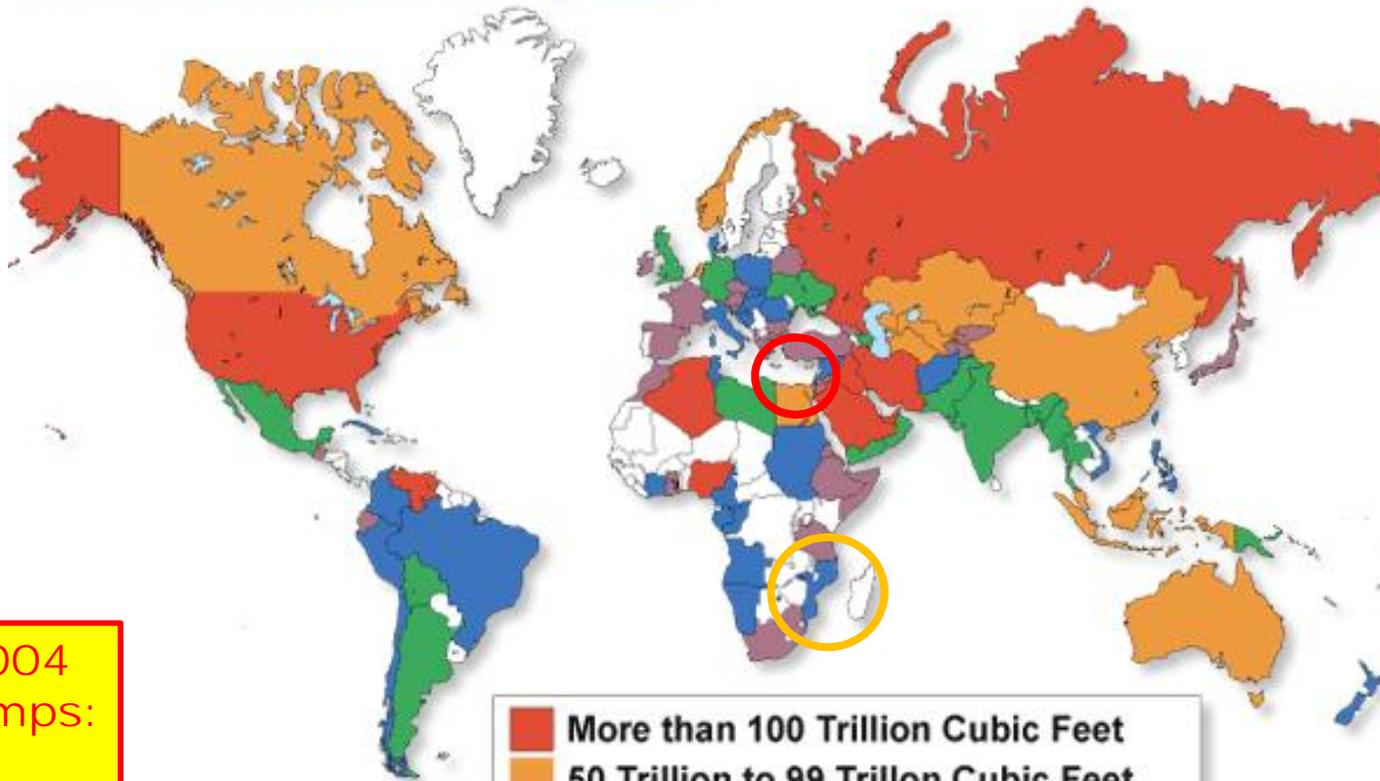
Post 2004 class jumps: Eni discoveries

More than 100 Trillion Cubic Feet
50 Trillion to 99 Trillon Cubic Feet
10 Trillion to 49 Trillion Cubic Feet
1 Trillion to 9 Trillion Cubic Feet
< 1 Trillion Cubic Feet

Source: Oil & Gas Journal, "Worldwide Report," December 22, 2003

Distribution of proved gas reserves in 1992, 2002 and 2012
Percentage
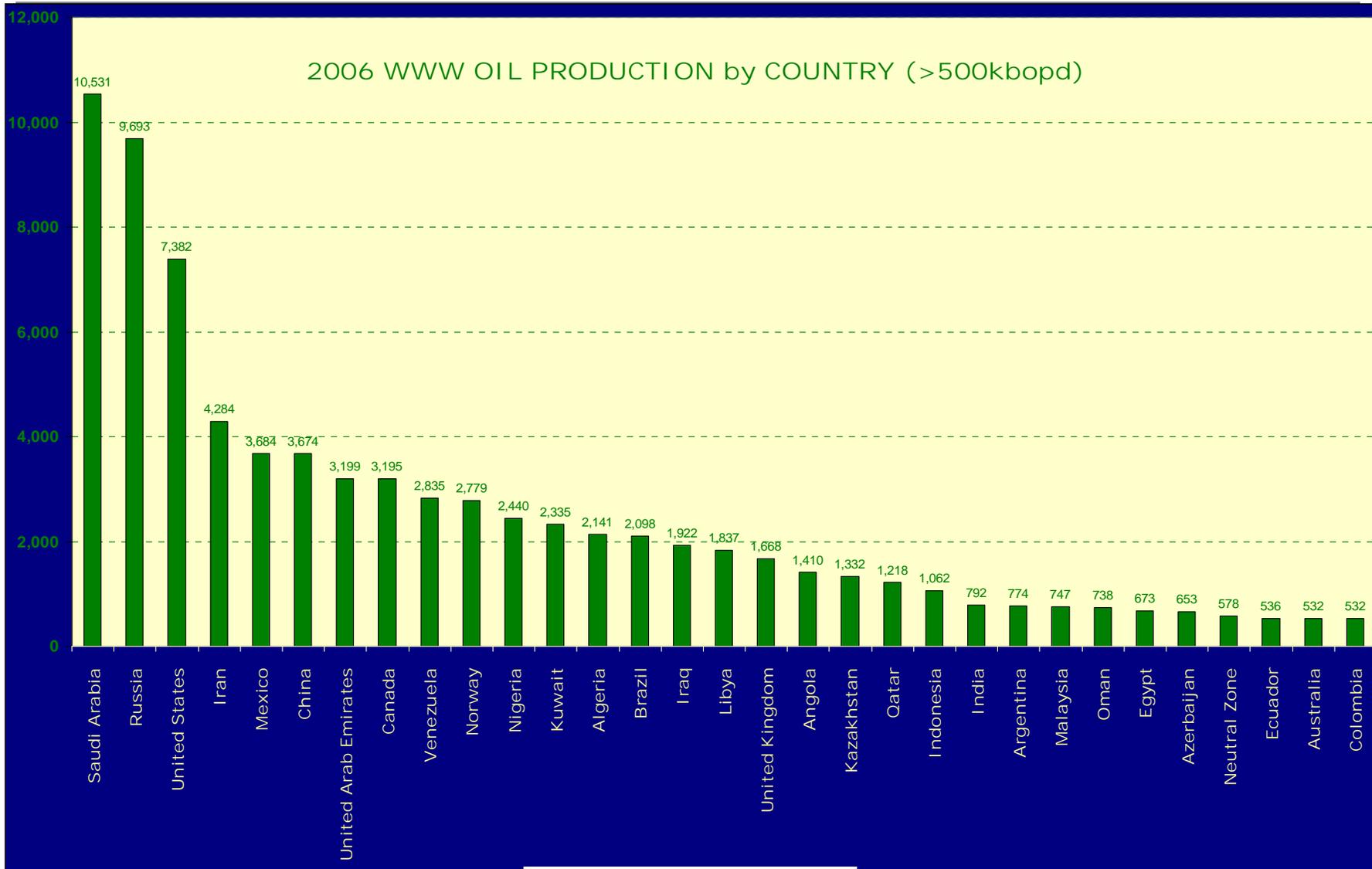
- Middle East
- Europe & Eurasia
- Asia Pacific
- Africa
- North America
- S. & Cent. America

RESERVES are VARIABLE entities !
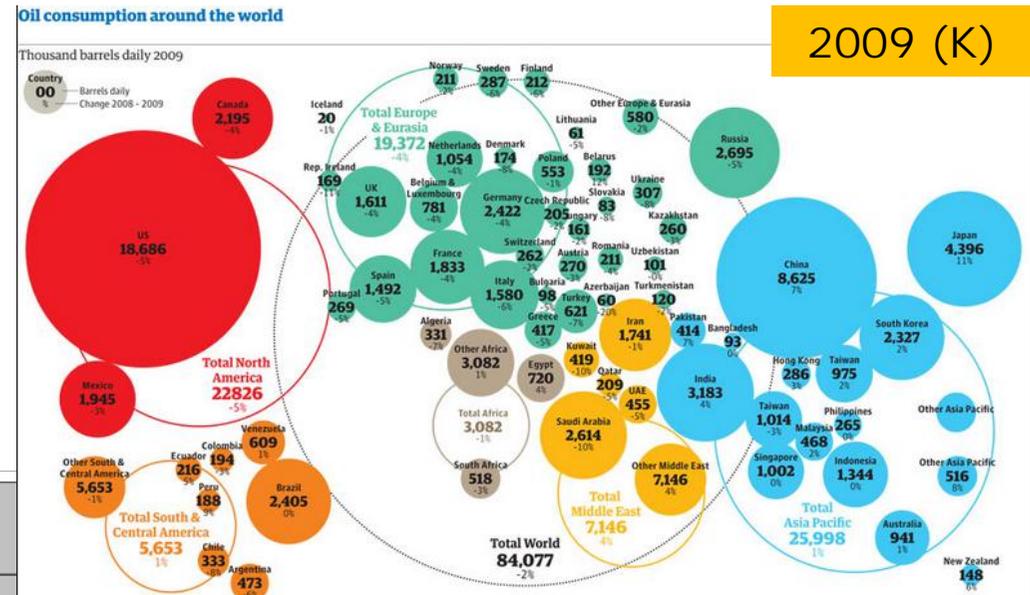
1992
Total 117.6
trillion cubic metres

37.4
4.6
7.9
8.4
8.0
33.7

2002
Total 154.9
trillion cubic metres

46.3
4.5
4.8
8.9
8.4
27.1

2012
Total 187.3
trillion cubic metres

43.0
4.1
5.8
7.7
8.2
31.2

BP 2013
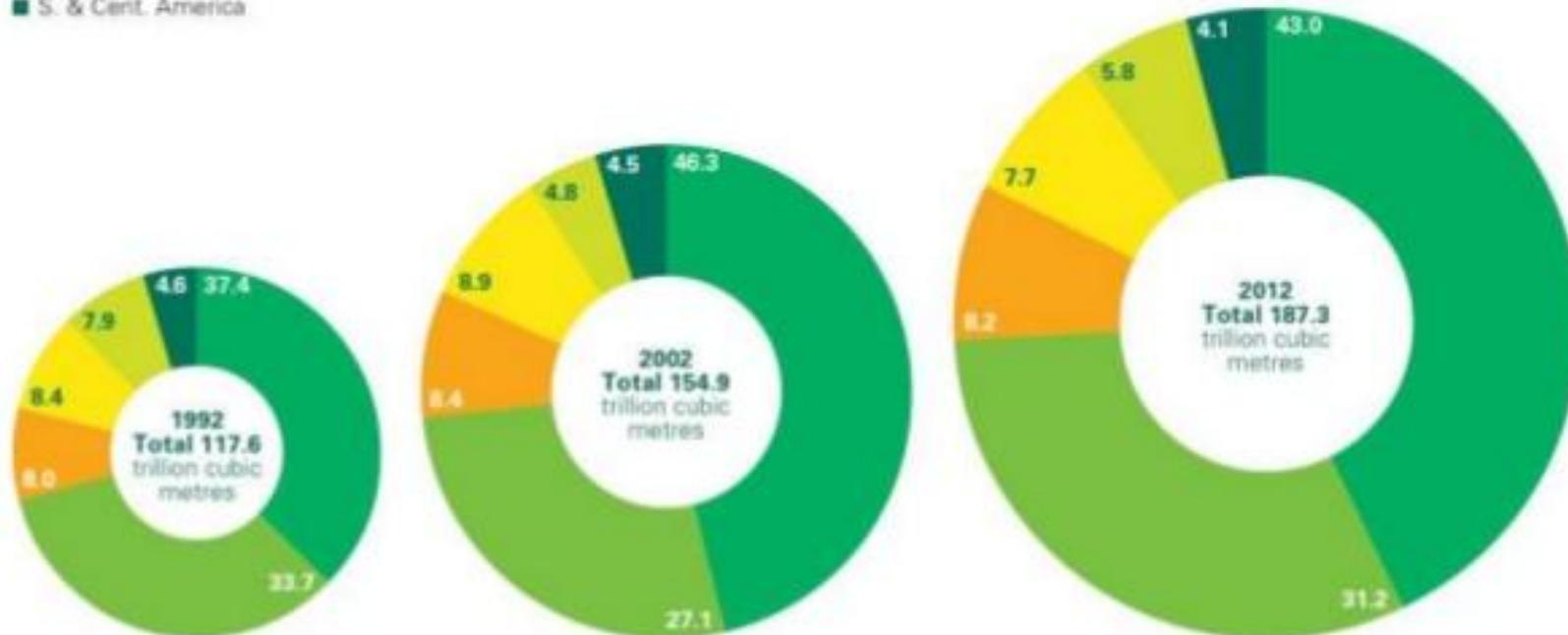
World Production by Country (2006)

2006 WWW OIL PRODUCTION by COUNTRY (>500kbopd)

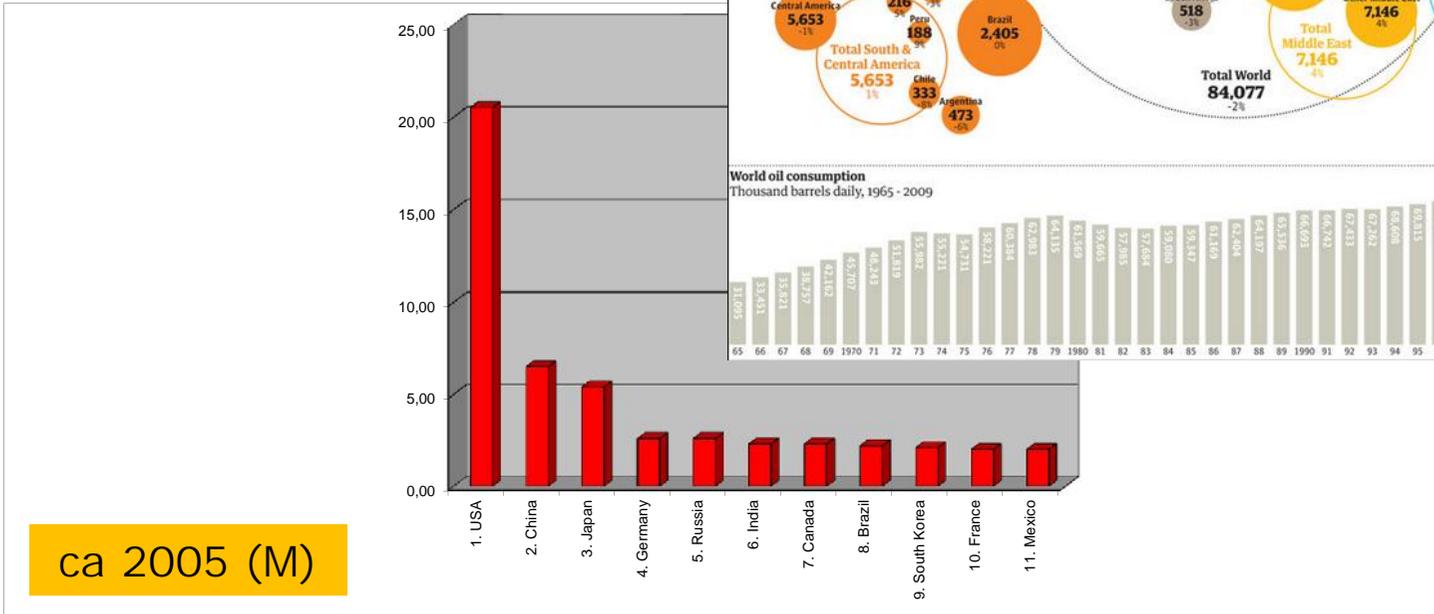| Country	Production
Saudi Arabia	10,531
Russia	9,693
United States	7,382
Iran	4,284
Mexico	3,684
China	3,674
United Arab Emirates	3,199
Canada	3,195
Venezuela	2,835
Norway	2,779
Nigeria	2,440
Kuwait	2,335
Algeria	2,141
Brazil	2,098
Iraq	1,922
Libya	1,837
United Kingdom	1,668
Angola	1,410
Kazakhstan	1,332
Qatar	1,218
Indonesia	1,062
India	792
Argentina	774
Malaysia	747
Oman	738
Egypt	673
Azerbaijan	653
Neutral Zone	578
Ecuador	536
Australia	532
Colombia	532

ENI, World Oil and Gas Review 2007

Consumers (Bopd) – per Country

2009 (K)

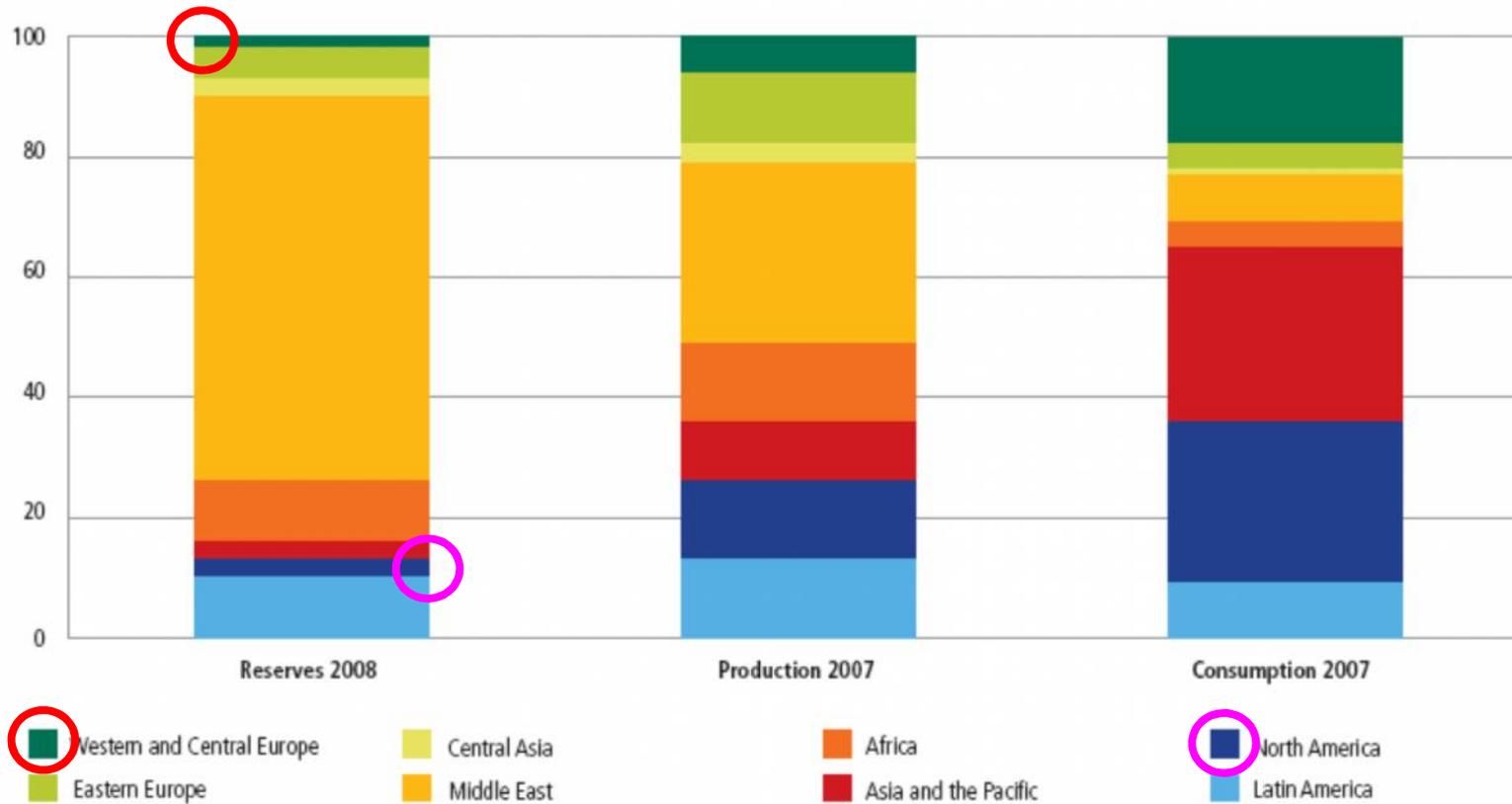ca 2005 (M)

2008 Oil Reserves, Production And Consumption

OIL IN THE WORLD

Reserves, production and consumption
(percentage)

Riserve, produzione e consumo
(valori percentuali)

Legend:
- Western and Central Europe
- Eastern Europe
- Central Asia
- Middle East
- Africa
- Asia and the Pacific
- North America
- Latin America

Categories: Reserves 2008, Production 2007, Consumption 2007
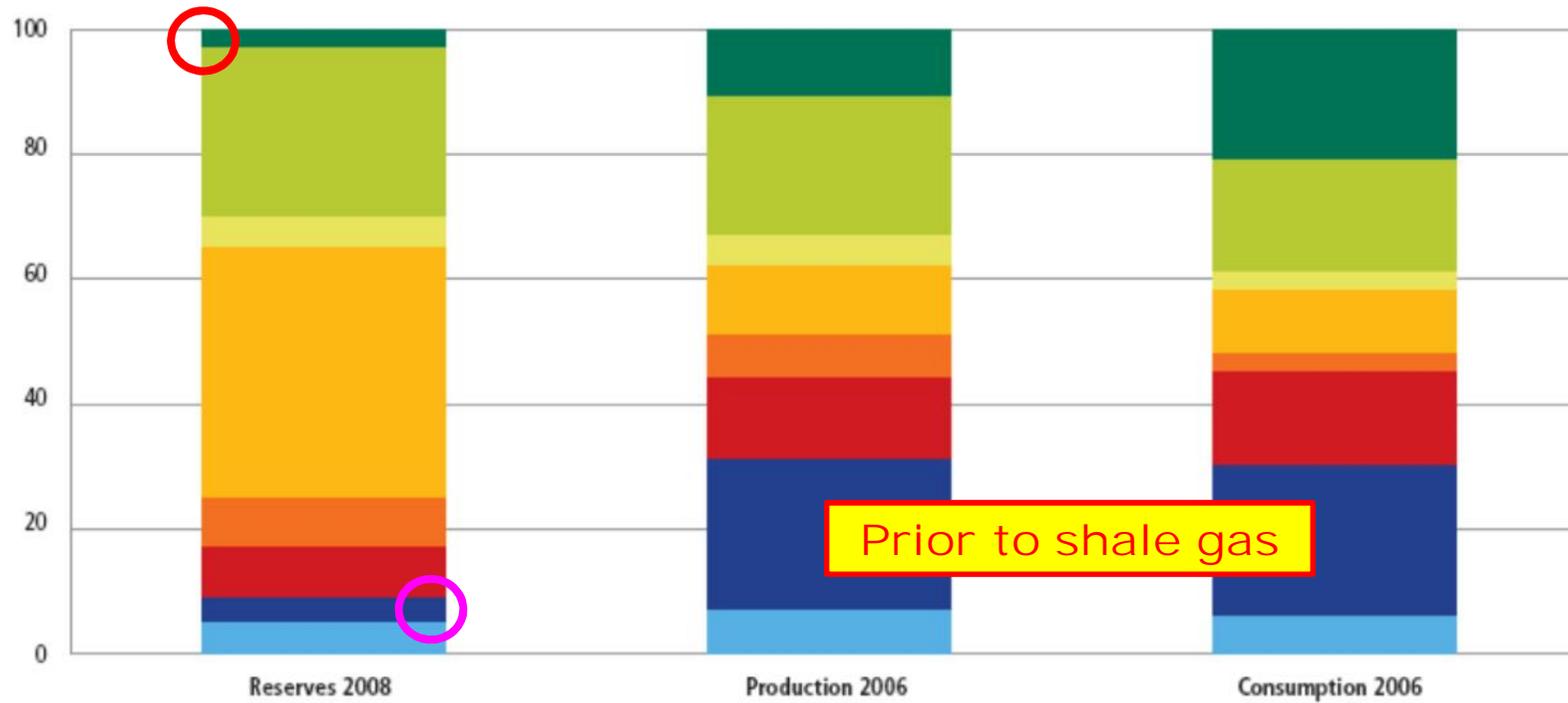
ENI, World Oil and Gas Review 2008

Consumers

Per Capita Consumption, OIL bbls/person/year

Legend: Saudi Arabia, United States, Canada, Netherlands, South Korea, Taiwan, Japan, Spain, France, Germany, United Kingdom, Italy, Iran, Russia, Mexico, Thailand, Brazil, China, Indonesia, India

Consumers – per Capita

Figure 1. China and India account for half of the world increase in energy consumption through 2040

world energy consumption
quadrillion Btu

Source: EIA, International Energy Outlook 2013

Primary energy consumption per capita 2012
Tonnes oil equivalent

- 0-1.5
- 1.5-3.0
- 3.0-4.5
- 4.5-6.0
- > 6.0
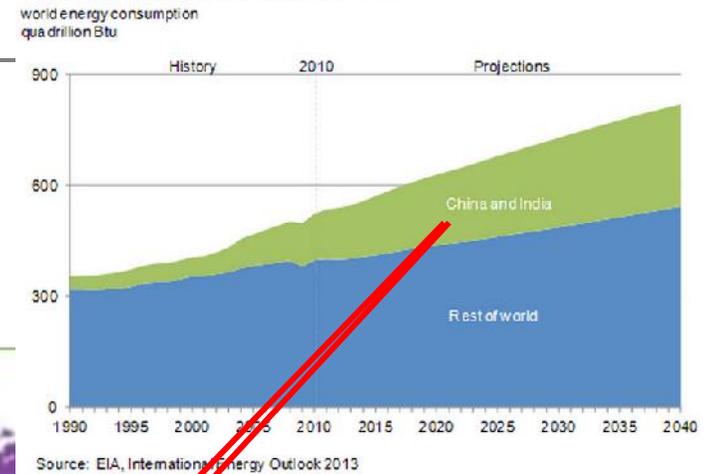
BP 2013

Consumption: Summary

- Each dweller of the Earth consumes 4.9 bo/year on avearge, but there are abyssal differences
  - 18.3 boe/yr in developed Countries vs 0.74 boe/yr in underdeveloped ones, 25 fold less.
- In detail, differences are greater:
  - In Nord America per capita consumption averaged 25.6 boe/yr in 2007
  - In 2007 US and Canadian citizens consumed twice as much as EU's, nearly 12 times as China's and 37 times as Nigeria's
- The world average pc consumption increased from 4.7 bo/yr in 2000 to 4.9 bo/yr in 2007.
- In developed Countries this indicator grew in developing Countries (from 2.0 boe/yr to 2.6 boe/yr in 2006) and remained stable in the richest and poorest Countries

ENI, World Oil and Gas Review 2008

- **Prices**

Aurina Valley- Sud Tirol 44
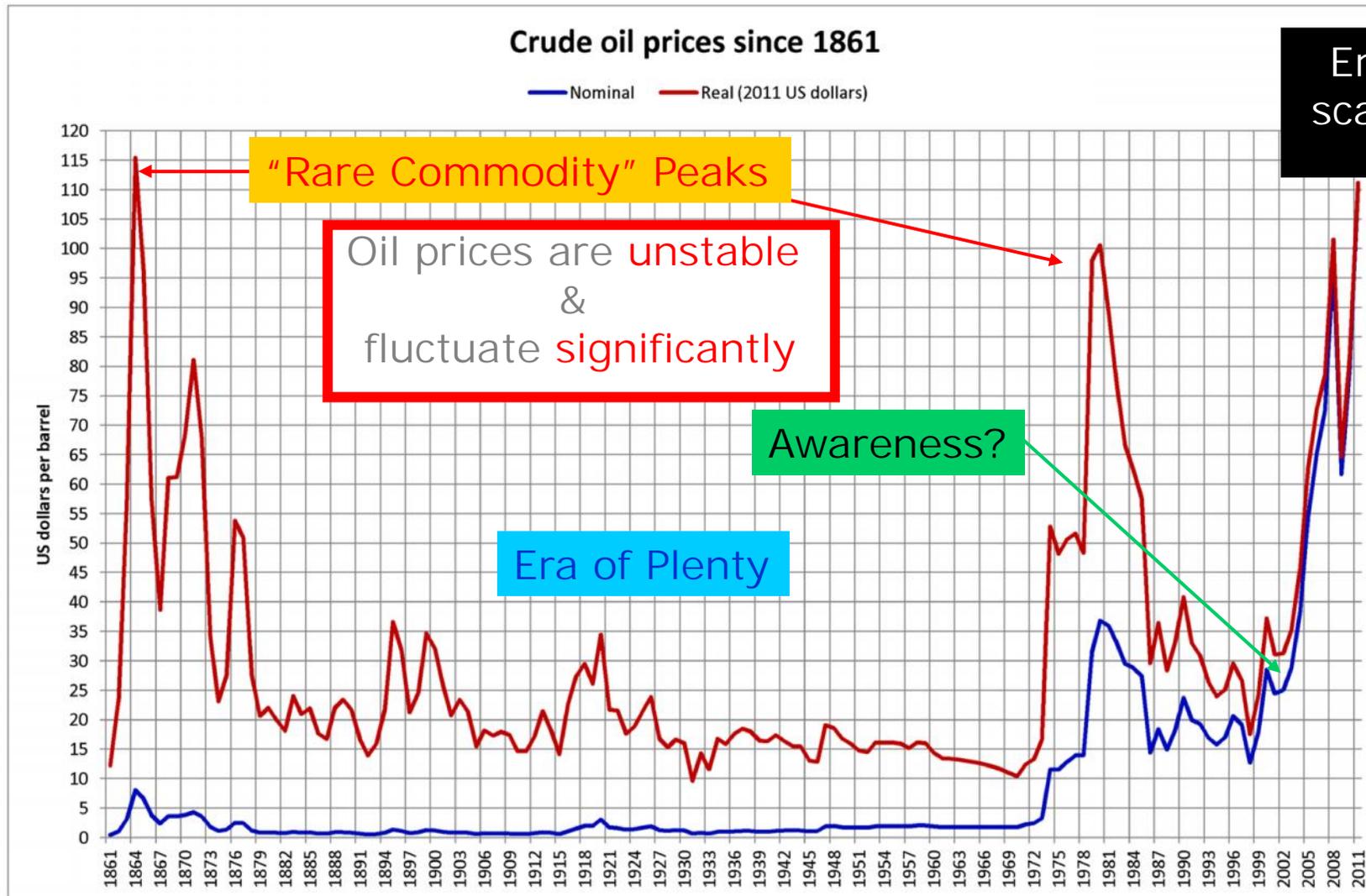
Prices

- Oil price is one of the most important factors in world economy
- Oil price certainly is the most important factor impacting on the Oil industry
- It determines capitalization, profits, finance availability (investments) and projects feasibility
- Ultimately, it affects the amount of available energy resources, as it

Defines Reserves

Prices (historical)

Crude oil prices since 1861

Nominal — Real (2011 US dollars)

"Rare Commodity" Peaks

Oil prices are **unstable** & fluctuate **significantly**

Awareness?

Era of Plenty

Era of scarcity ?

World Politics, Economy and Prices

Oil prices and political events are **not always** correlated. Speculation and commercial strategies **matter**.

June '08: Financial Crisis

Feb. '11: Libya Revolution

2005-07 High demand an no production increase

Jan. '79: Iran Revolution

Oct. '90: 1st Gulf War

2016: OPEC increase Quota

1986: Saudi price war and collapse of US production

Mar. '03: 2nd Gulf War

Oct. 2001: Afghanistan War

Oil - WTI Crude (Real)   Oil - WTI Crude (Nominal)

Historical Oil and Natural Gas Prices ($/mmBtu)

Gas is sold based on long term contracts, due to difficulties in transportation and capital intensive infrastructure

WTI

Nat Gas

Avalon 2012

Production vs Price

Global oil production by group

Data from: BP Statistical Review
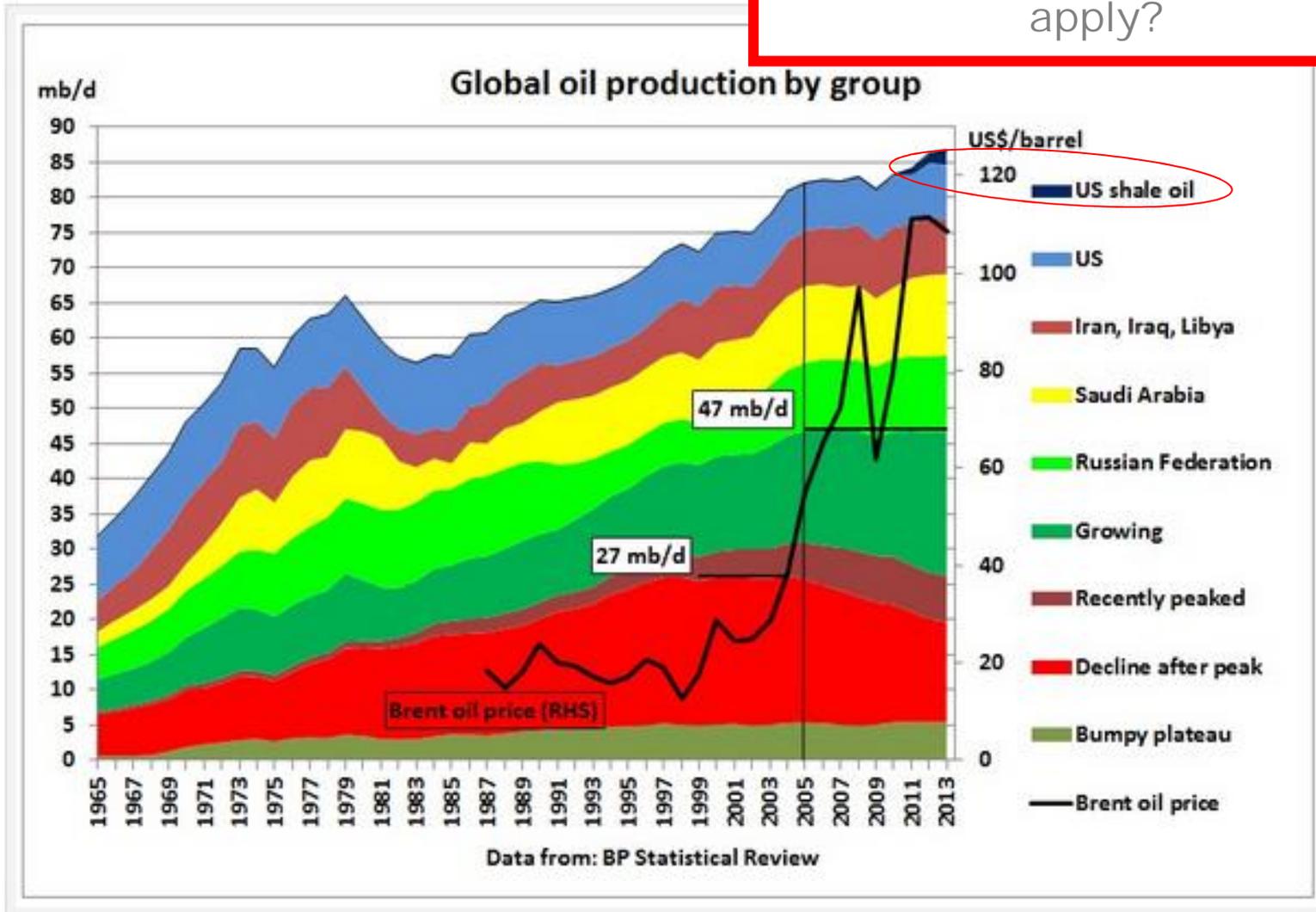
Oil and Gas Journal

Are Long Term Prices Predictable?
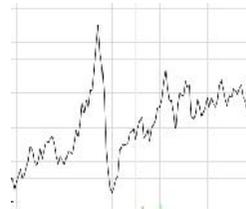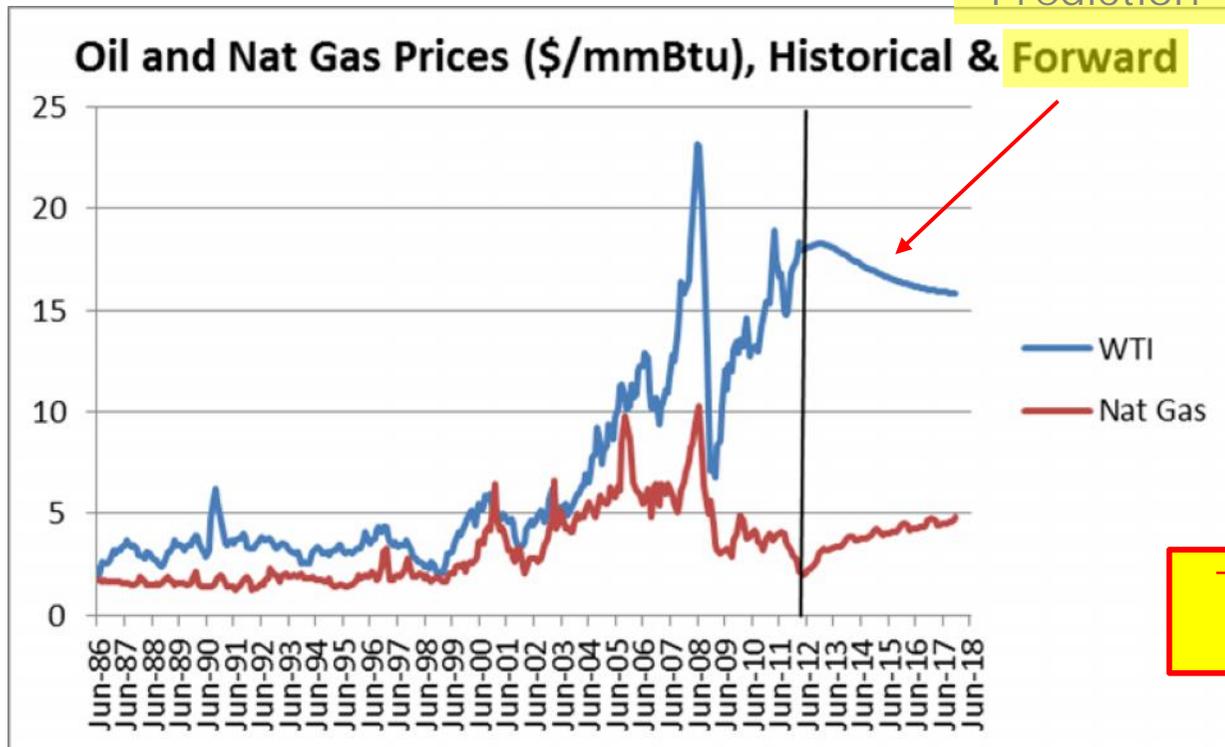
NO, contrary to industry needs.
Development of new fields takes years and requires huge investments (B$).
Returns must be proportionate.
Planning is mandatory, difficult and much caution is required.

Actual

Prediction

Oil and Nat Gas Prices ($/mmBtu), Historical & Forward

— WTI
— Nat Gas

This graph was prepared for the 2014 seminar!

Today's Oil Prices

Crude oil prices since 1861

2012 prediction

Sept 2015
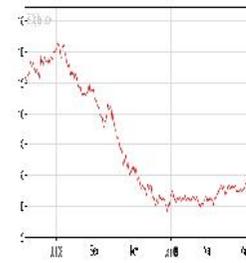
2008: 80% drop in 5 months

Upstream vs Downstream Activities
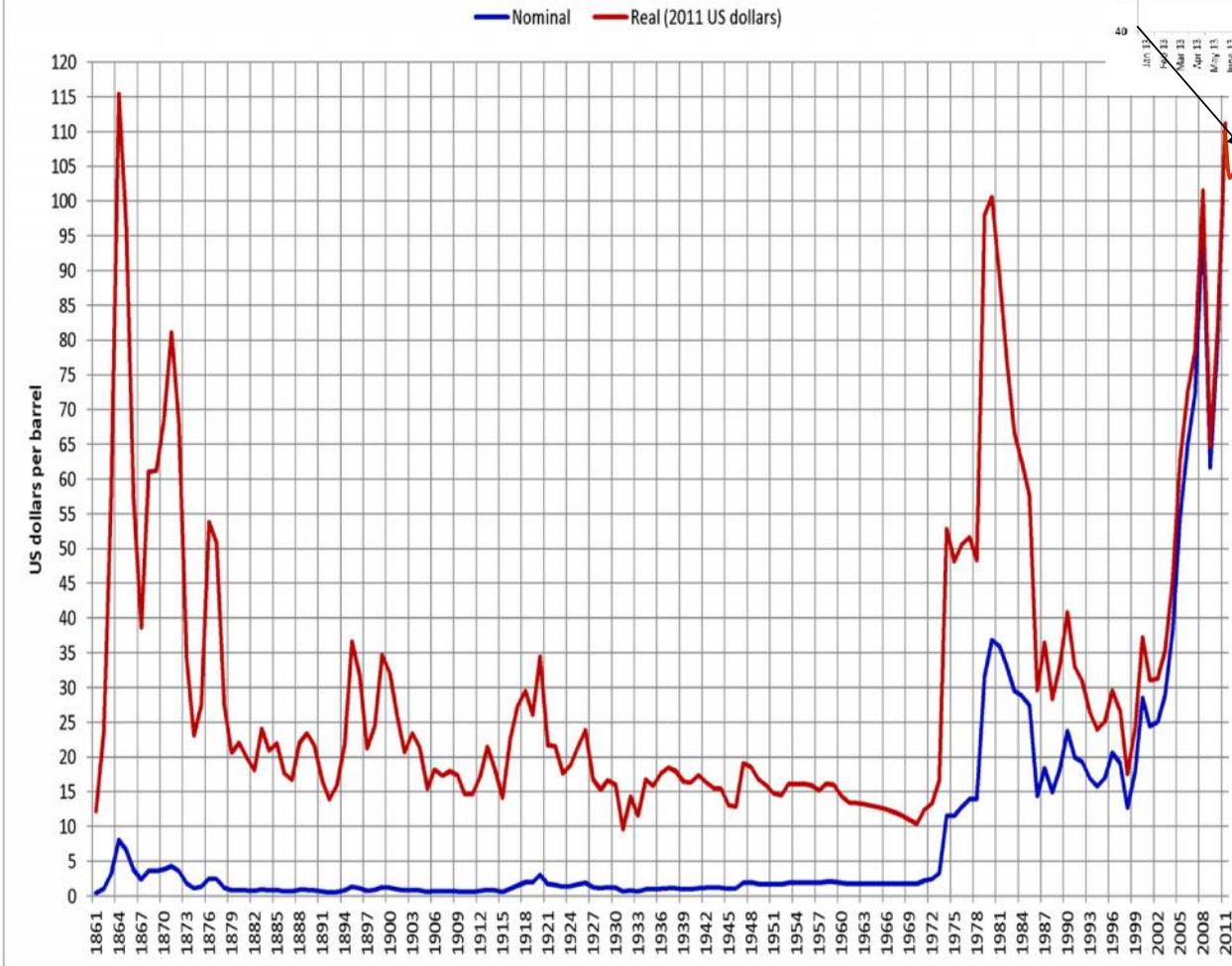

Regional studies
Generation of geological concepts & models

Negotiations

failure

Lease Acquisition

seismic acquisition, detailed mapping,

Prospect generation, scoping economics Drilling

RISK HI

RESOURCES

DISCOVERY

failure

Appraisal

EXPLORATION

RESERVES

Treatment & Stocking

Maintenance

Performance Optimization

Drilling and completion

Reservoir studies

LO

Development planning

Plant & infrastructure construction

DEVELOPMENT

Refining

Marketing

Shipment

Stocking

PRODUCTION

- **Petroleum legislation and licensing**

The Oil Companies

- An "integrated" Oil Co:
    - Searches for new oil fields ("explores")
    - Prepares discovered fields for exploitation ("develops")
    - Extracts oil and gas from the subsurface ("produces")
    - Processes crudes ("refines")
    - Sells raw and refined products ("markets")
- Not all Co's are integrated
    - Some may just explore
    - Others mainly produce
- Major Co's invest huge amounts of money in R&D to improve their performance and gain competitive edges
- Exploration, development and production are commonly referred to as "Upstream"
- Refining, petrochemistry and marketinng are commonly referred to as "Downstream"
- Oil Co's may be classified by size (Major, Independents...) or Capital (Public, State, Mixed)

Contractors and Service Companies

- In the oil industry, many activities are "outsourced" to external contractors
- Typical examples are seismic acquisition and processing, drilling, logging, environmental studies but also petrology, log interpretation (petrophysic), geochemistry or stratigraphy may be outsourced
- Some contracting companies may be international industrial groups, larger than their clients (Halliburton, Schlumberger, Baker-Huges, Fugro-Robertson, Saipem, Transocean, etc.)
- Some companies carry out operations assistance (well site assistance), sampling
- Service companies collect upstream and downstream data and produce statistics and market analyses (IHSE; Wood-McEnzie)
- Other Companies (e.g. Neftex, Robertson, JMJ, ISIS ...) produce geological studies
- Many geologist (both junior and expert) are employed in all of the above

Organization Sketch of an Integrated Oil Company
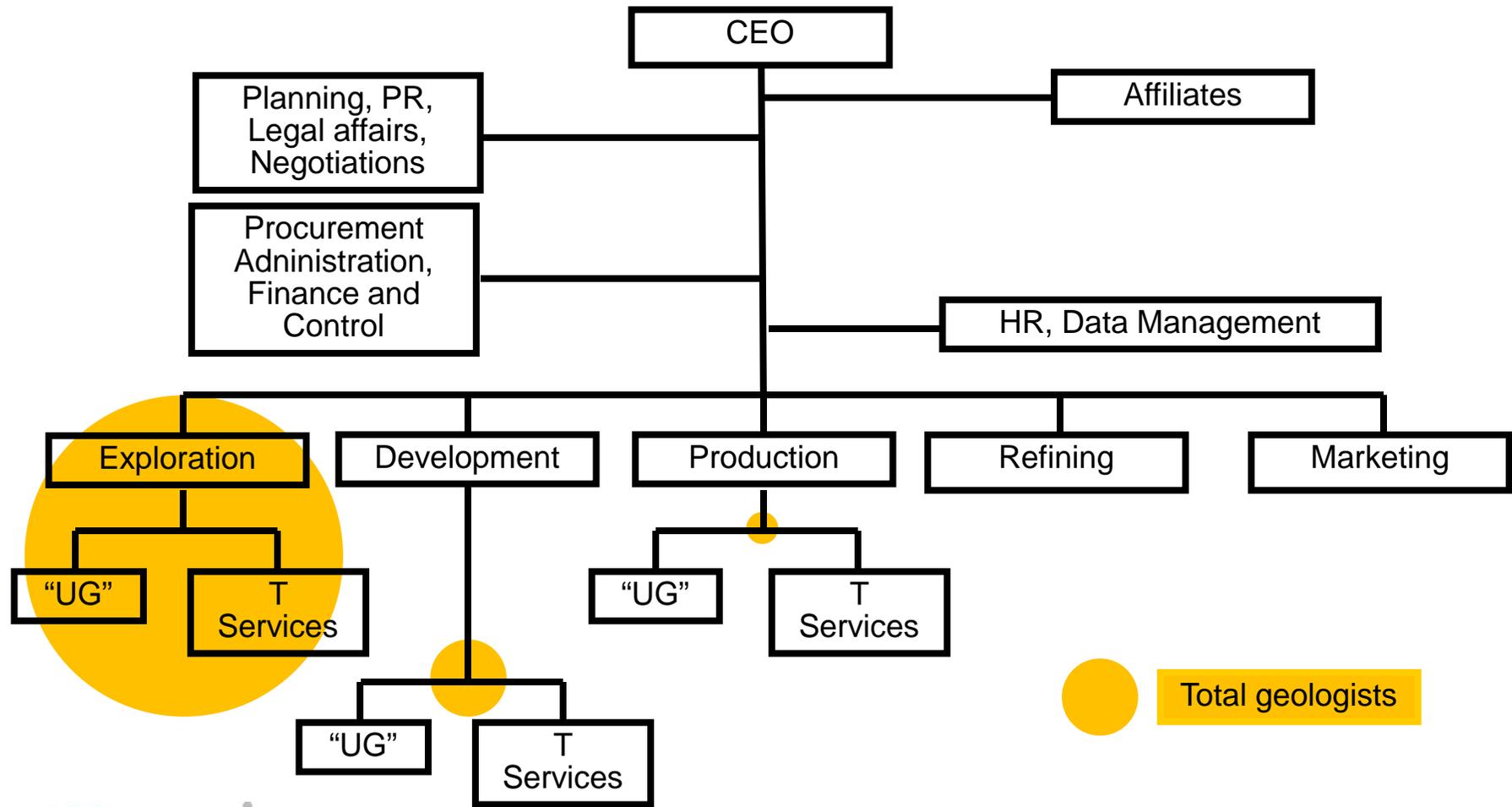
General Organization of an Exploration Division

- In most Co's, the "Exploration Division" is given the task of finding new resources, to enhance or keep the Company's value by replacing produced reserves and ...

- "Finding" can sometimes mean "buying" known resources
- Resources may be searched for in licensed areas (defined exploration) or in open areas and acreage controlled by competitors (new ventures)

- Exploration is mainly carried out in town offices (HQ-based or overseas) but activities in labs, drilling sites, offshore platforms are also common (and in the field, now rarely)

What does "Exploration" Mean?

- "Exploration" is a set of coordinated activities that stems out of different disciplines, sciences and technologies - not only geology – aiming at discovering new oil and gas volumes that could be exploited in a "reasonable" future with an <u>economic return</u>

- To explore, one needs to understand and carefully map the present day subsurface structure of an area, understand its evolution in time, locate the areas where HC's may be generated, locate and accurately map the structures in which they may be preserved, estimate their volumes, evaluate the chances that our prediction have to be correct...

- ... in order to estimate their potential economic returns and allow to objectively evaluate the soundness (and the probability of success) huge money and resource investments needed to drill exploratory wells (the ultimate way to discover oil and gas)

What does "Exploration" Mean?

- Exploring does not only mean "studying" a certain area
- It also means acquire and manage data
    - Geological surveys, sampling campaigns
    - Design and acquisition of geophysical surveys
    - Seismic data processing
    - Well data
    - Laboratory studies
    - Seeps, remote sensing
- Managing contracts
- It is also about obtaining and keeping titles in good standing, hence
    - Relate with Governments and Agencies
    - Negotiate and deal with other Companies
    - Strategic planning
    - Market studies
    - Understand the operating geopolitical and economic environment

... hence interact with complex realities that may be culturally very far from our common background of "geologists"
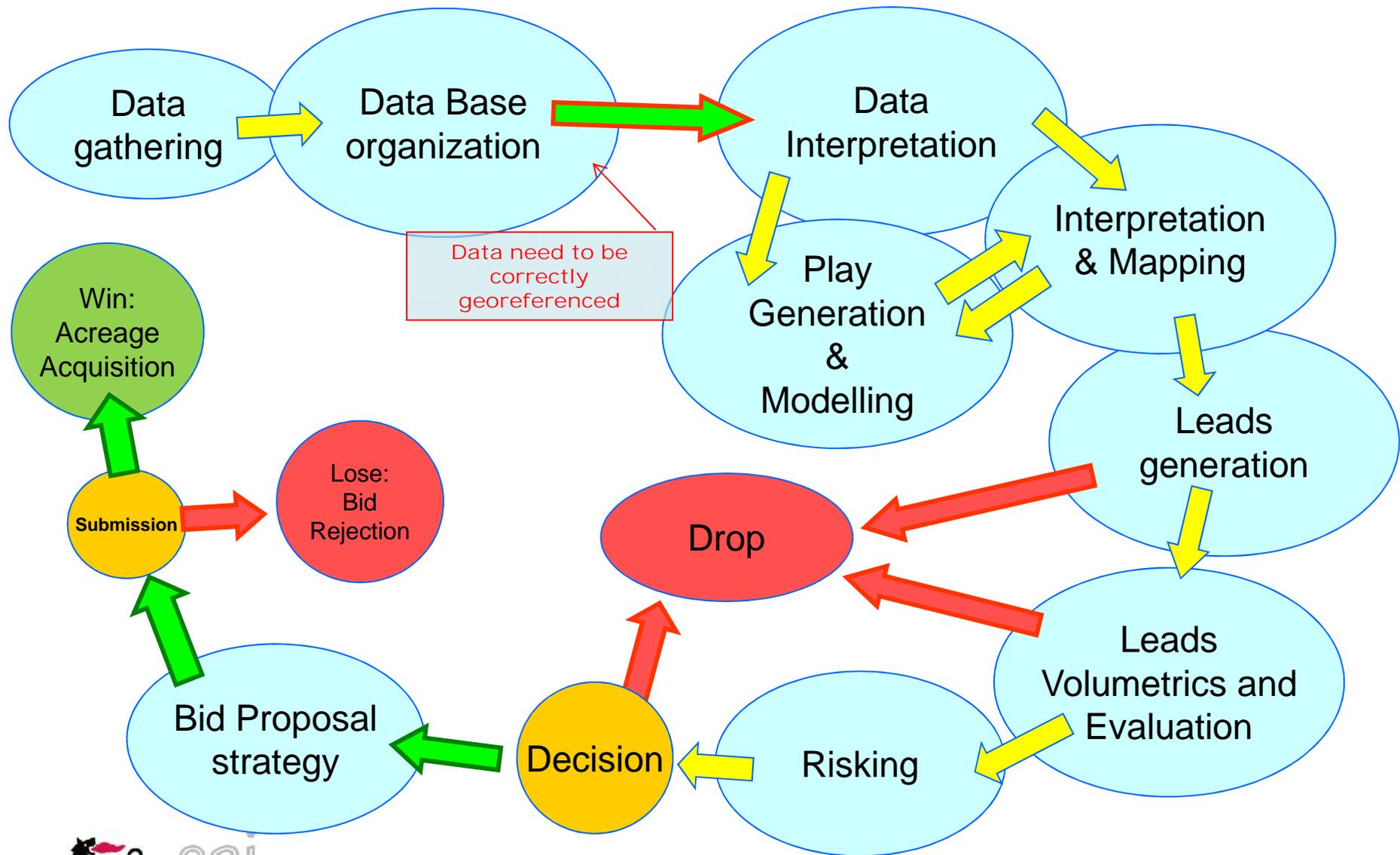
From Another Point of View …

- Within the oil industry, it least capital intensive activity (if compared to development and production) but nevertheless it requires investments in the order of tens to hundreds M$ …

- … but it is the riskiest of all, more prone to failure than success, for which it is more difficult to access the necessary finance

- It is a cyclic activity, subject to market (price) fluctuations

- It is not pure science but a practical activity founded on science, the results of which are largely dependent on the $ invested

- In the medium-long term it is an absolutely necessary activity with no valid substitutes

The exploration and production industry cycle

Sunset from Manarola 61

Work Cycle (New Venture- licence acquisition)

Data gathering → Data Base organization → Data Interpretation → Interpretation & Mapping

Data need to be correctly georeferenced

Play Generation & Modelling

Leads generation

Leads Volumetrics and Evaluation

Risking

Decision

Drop

Bid Proposal strategy

Submission

Win: Acreage Acquisition

Lose: Bid Rejection

Work Cycle (Defined Exploration – Licence Life)

Data gathering → Data Base organization → Data Interpretation → Interpretation & Mapping → Prospect generation → Prospects & Leads Evaluation → Risking & Ranking → Decision → Drill → Appraise → Develop

Play Generation & Modelling

Drop

Data need to be correctly georeferenced
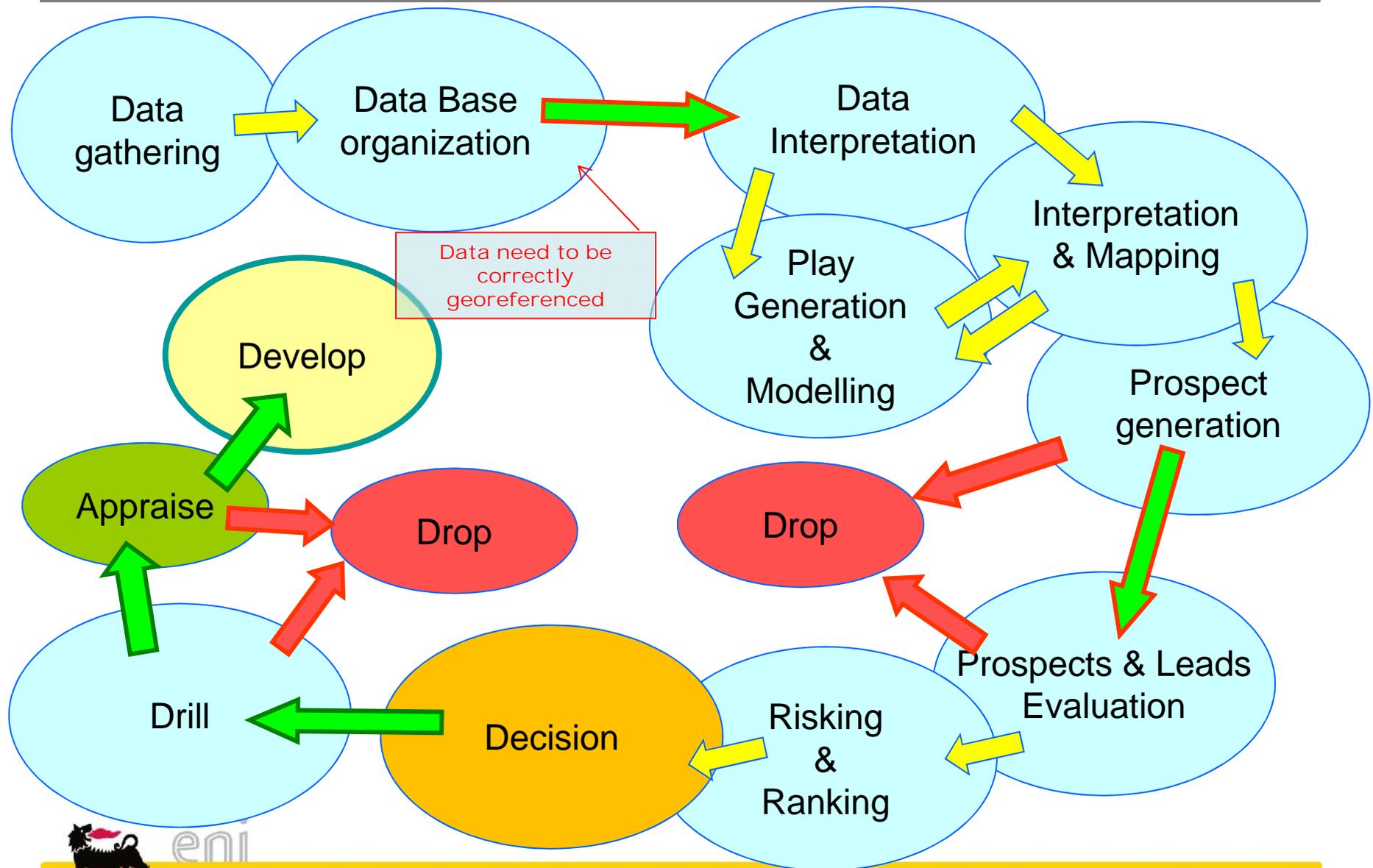
Weight of tool (Prospect Generation)

Wells

Outcrop

Grav/Mag

Reports
&
Scouting

Seismic
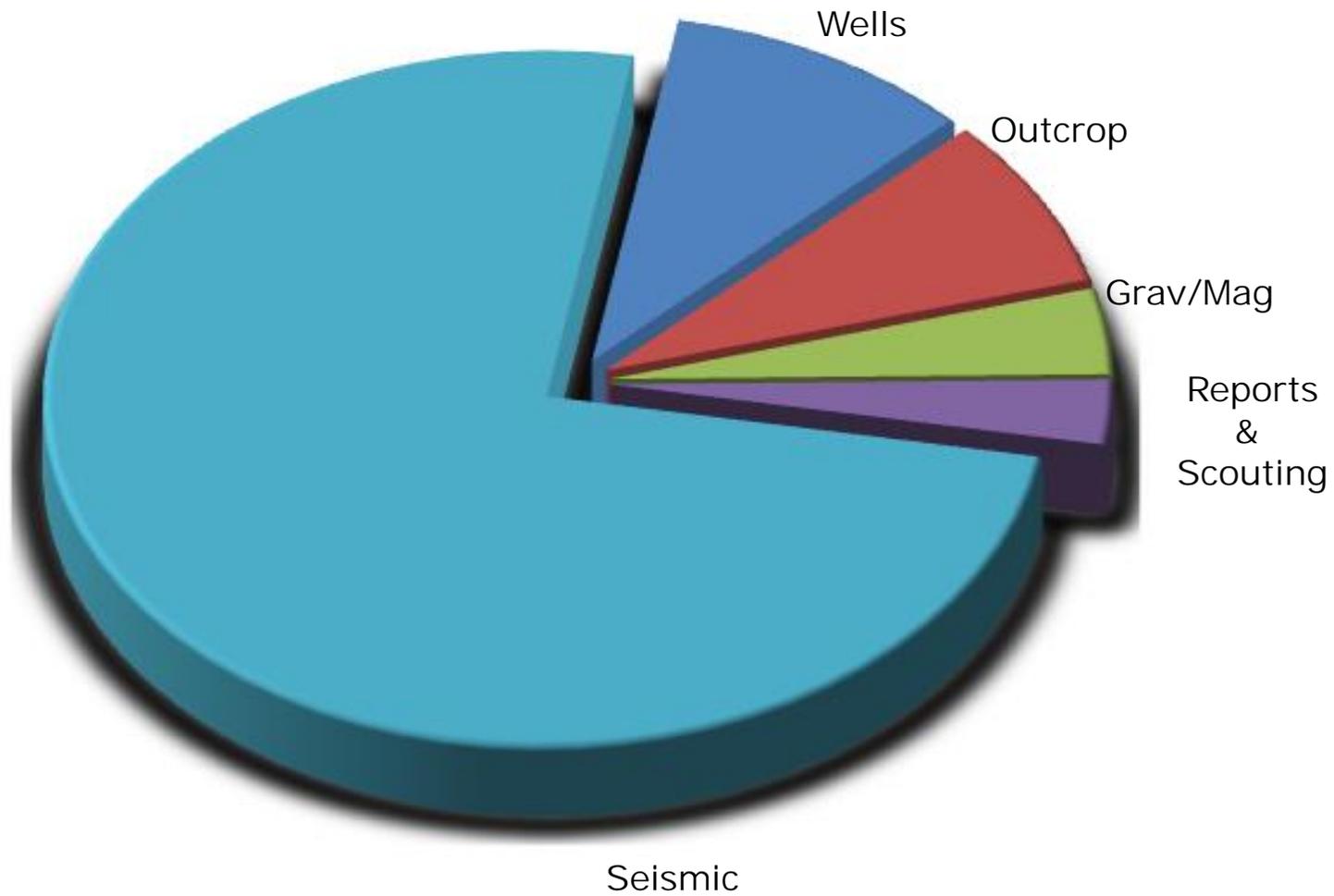
Investment Size (Defined Exploration)

10^3-10^4

10^6-10^7

10^5-10^6

10^9-10^{12}

10^7-10^8

10^4-10^5

10^5

DB Organization · Proprietary Seismic Acquisition · Interpretation · Play Concept Fine-tuning · Mapping · Prospect Generation / refinement · Develop · Appraise · Drop Licence · Drill · Decision · Economics & Ranking · Risking · Prospect Evaluation

exploration & production

!ARRIVEDERCI!