

# FUTURE GAS: FROM NORTH, SOUTH OR EAST?

## Africa and Middle East Perspective

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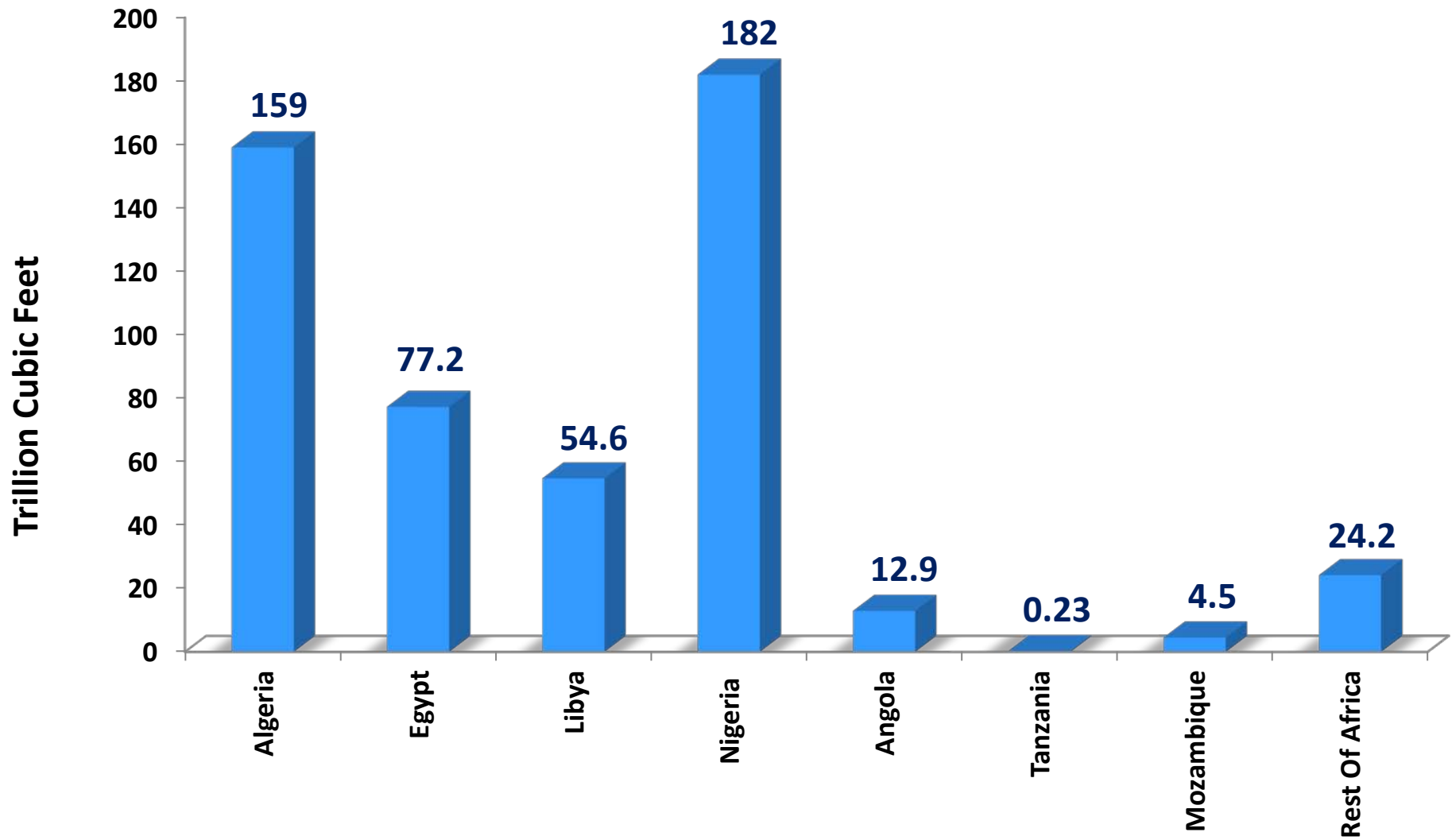
**Chairman**

- Recent international events, such as the uprisings in North Africa & Middle East, and the disaster at the Fukushima nuclear plant in Japan, have impacted on the European energy picture.
  
- **The supply side is undergoing major changes:**
  - ❑ Europe's natural gas production has declined in recent years,
  - ❑ Political events in key production areas such as North Africa risk to jeopardize the suppliers' capacity to produce and deliver their natural gas to the markets.
  - ❑ Access to alternative supplies such as LNG & Caspian pipeline gas remains limited especially that are not an option at all for some EU countries.
  
- **Two major types of geopolitical risks need to be taken into account:**
  - ❑ Source risks;
  - ❑ transit risks.

## Main gas regions for European supply:

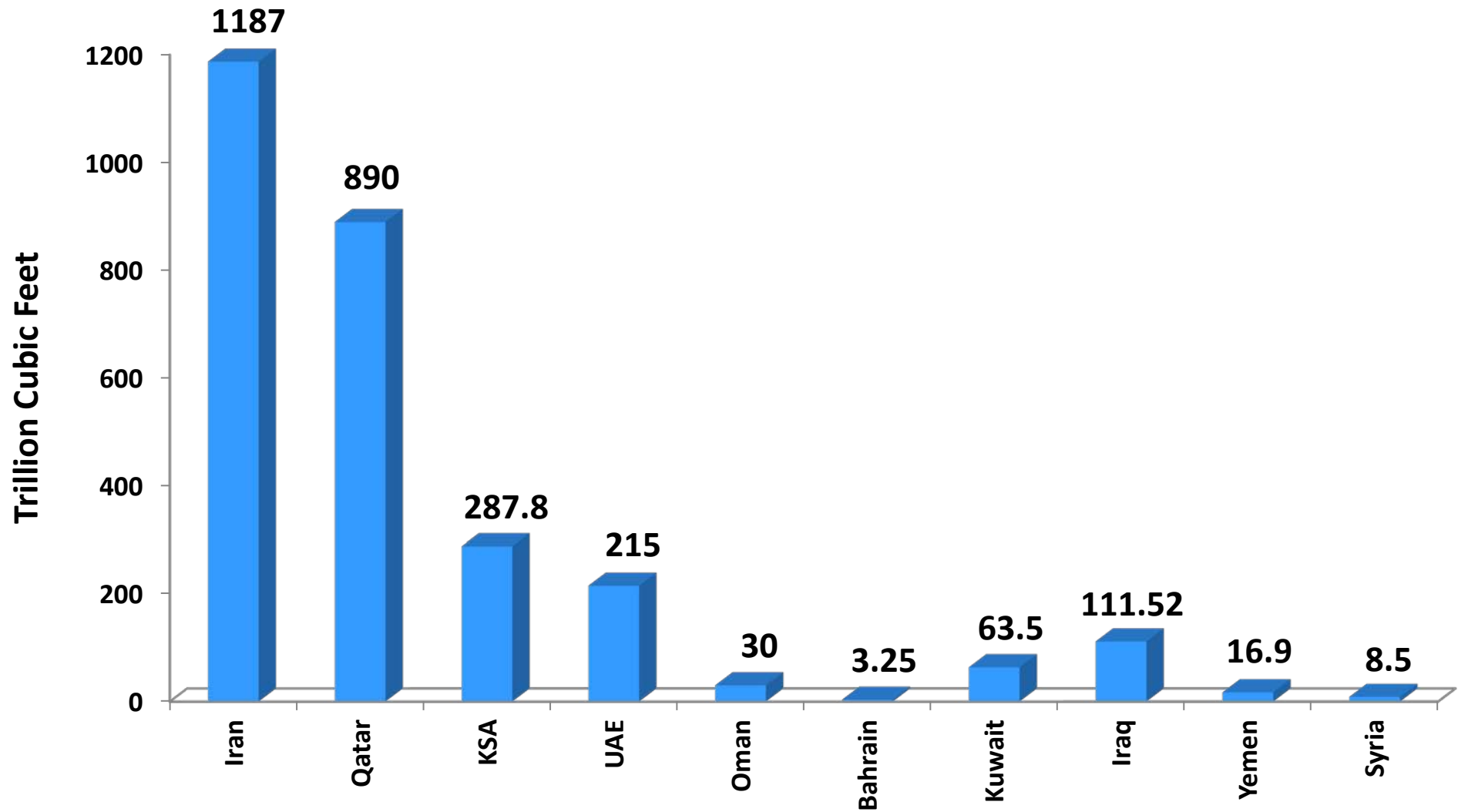
- **North Sea:** Norway, United Kingdom, The Netherlands, Denmark
  - **Russia**
  - **Caspian Area & Central Asia:** Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan.
  - **South America:** Trinidad & Tobago, Venezuela
- **North Africa:** Algeria, Libya, Egypt
  - **West Africa:** Nigeria, Angola
  - **East Africa:** Mozambique, Tanzania
  - **The Arabian Gulf:** Qatar, UAE, Oman, Yemen, Saudi-Arabia
  - **Middle East:** Iran, Iraq

# NATURAL GAS PROVEN RESERVES – AFRICA 2013



Source: [www.eia.gov](http://www.eia.gov)

# NATURAL GAS PROVEN RESERVES – MIDDLE EAST 2013



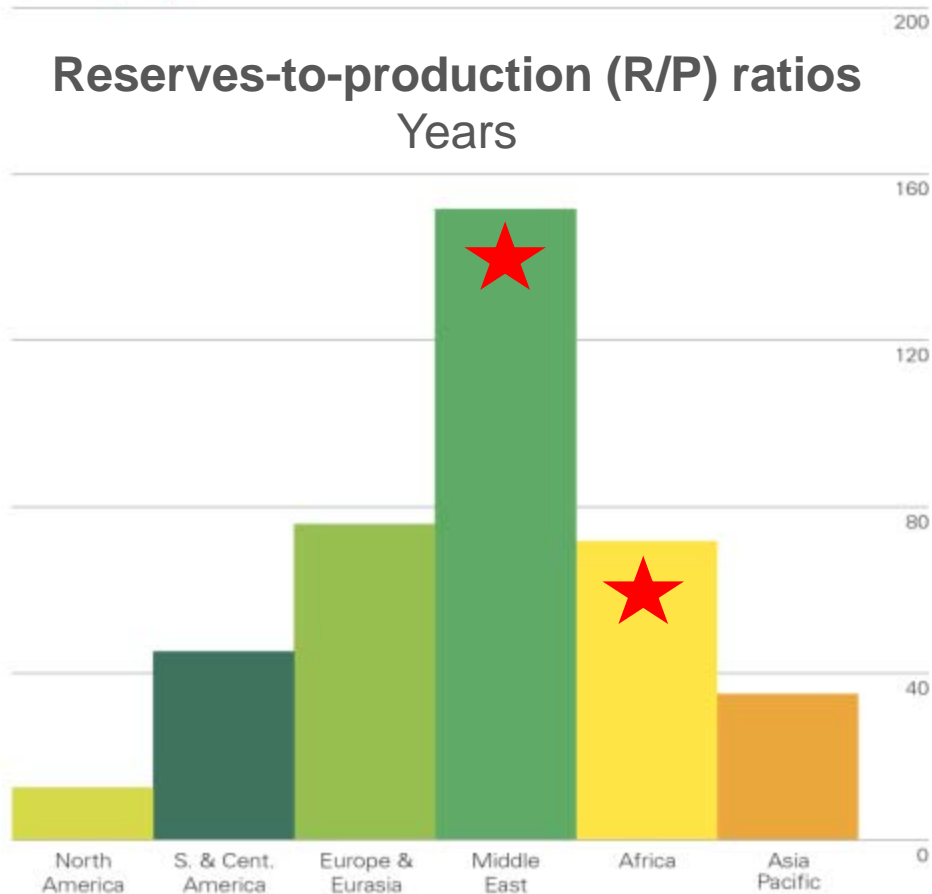
Source: [www.eia.gov](http://www.eia.gov)

# RESERVES/PRODUCTION RATIO – MIDDLE EAST & AFRICA

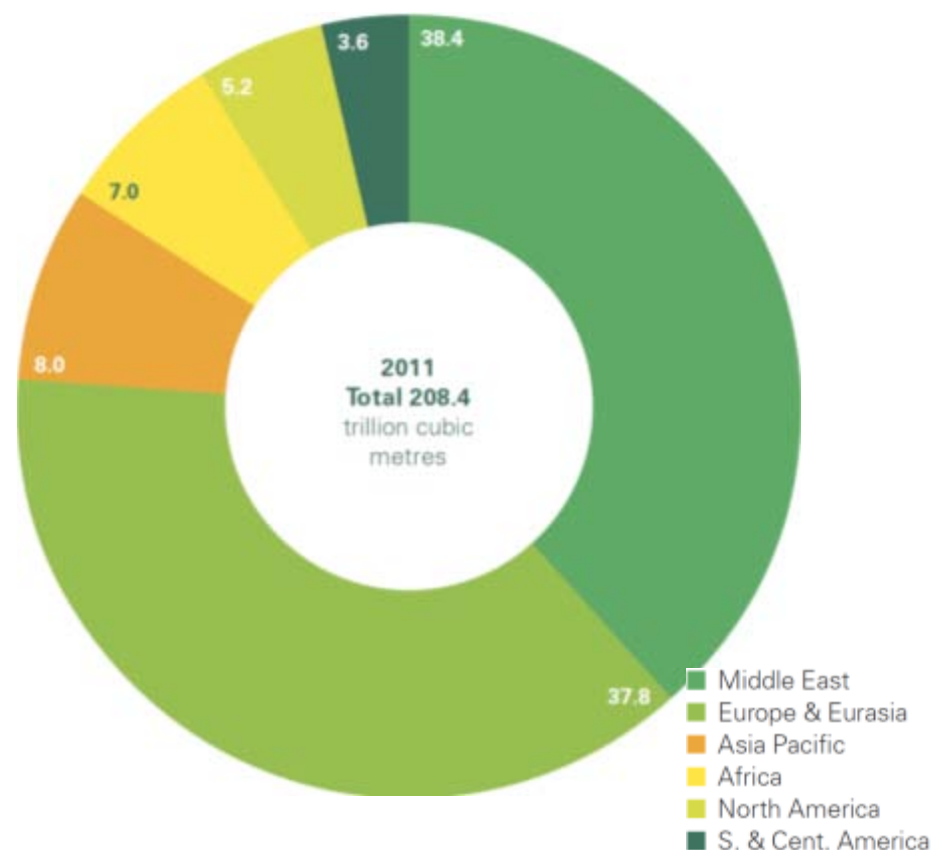
World proved gas reserves at 2012 were sufficient to meet 63.6 years of production.

**Africa** has an R/P ratio of almost 70 years, while The **Middle East** still holds the largest reserves and has an R/P ratio of over 150 years.

2011 by region



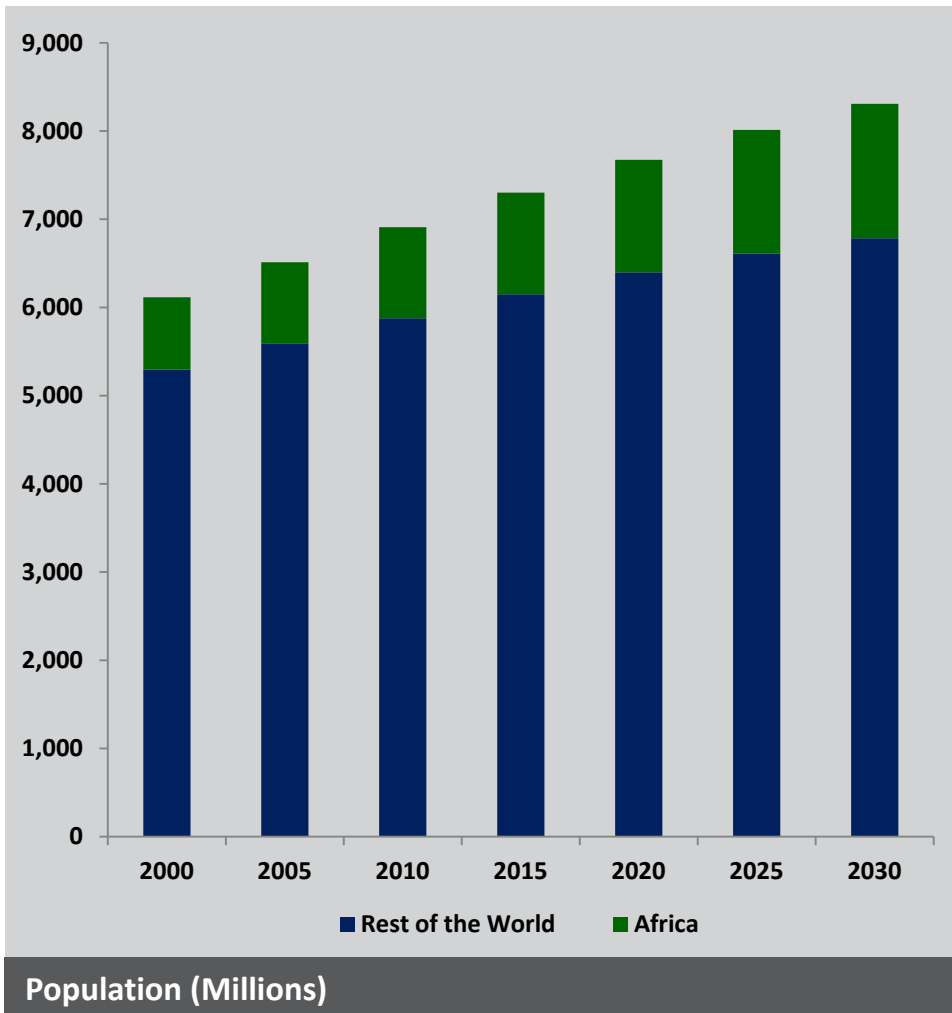
Distribution of proved reserves - 2011



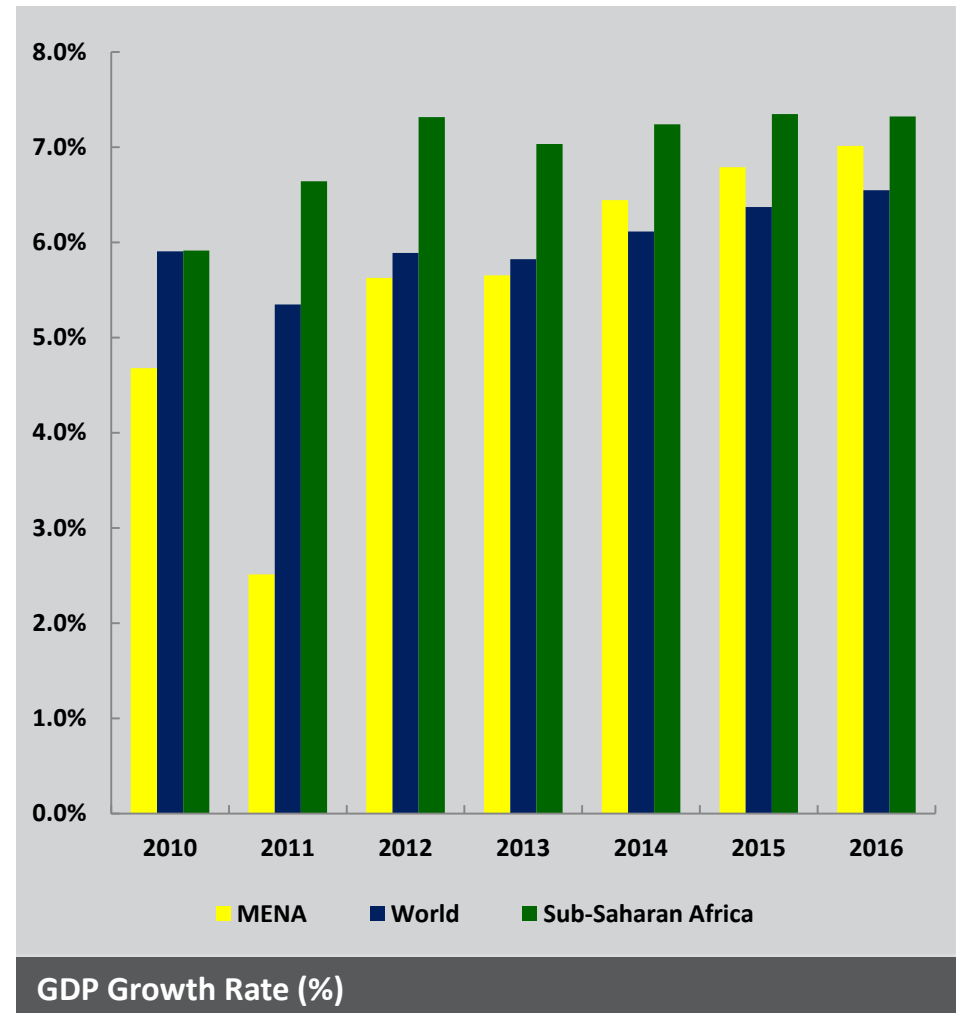
Source: BP Statistical Review of World Energy June 2012

- Africa's population is expected to grow from 1 bn in 2010 to 1.5 bn by 2030, at CAGR of **2%**, and almost 3 times World's CAGR for the same period, being **0.7%**.
- The region median age is 20, compared with 30 in Asia and 40 in Europe.
- Africa has the fastest-growing middle class.
- Over the past decade, six of the world's ten fastest-growing economies were African.
- In the last ten years, while foreign Aid only grew from **USD 20 bn** p.a. to **USD 28 bn** per year, FDI ballooned from **USD 20 bn** per annum to **USD 75 bn** per annum.
- Sub-Sahara GDP is forecasted to grow from **USD 1.8 tn** in 2011 to **USD 2.7 tn** in 2016 at a CAGR of **7.3%** well above the World's and MENA's CAGR that are forecasted at **6.1%** and **6.3%** respectively.

# AFRICA'S ENERGY DEMAND DRIVERS

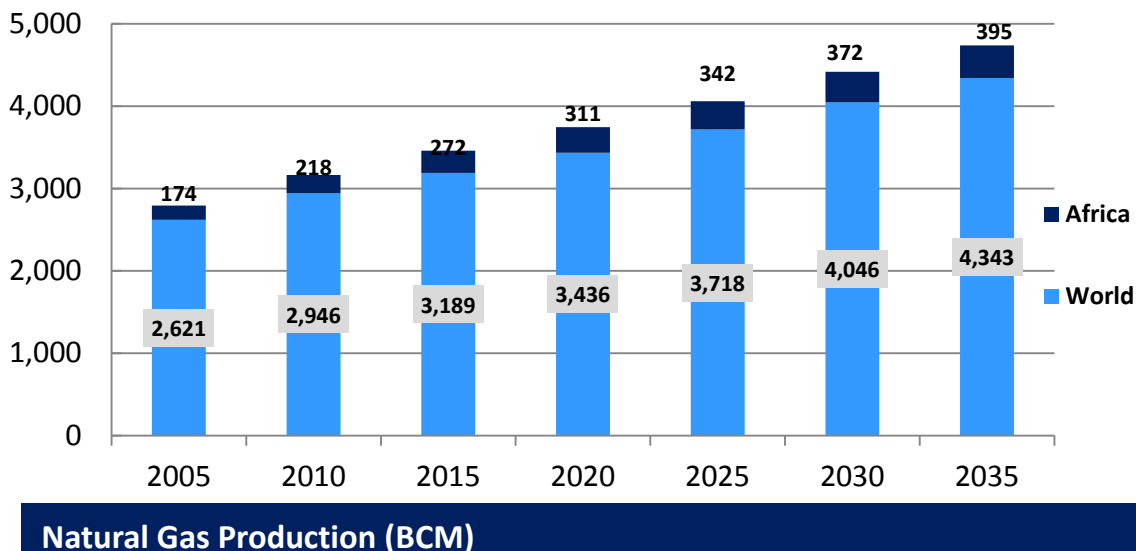
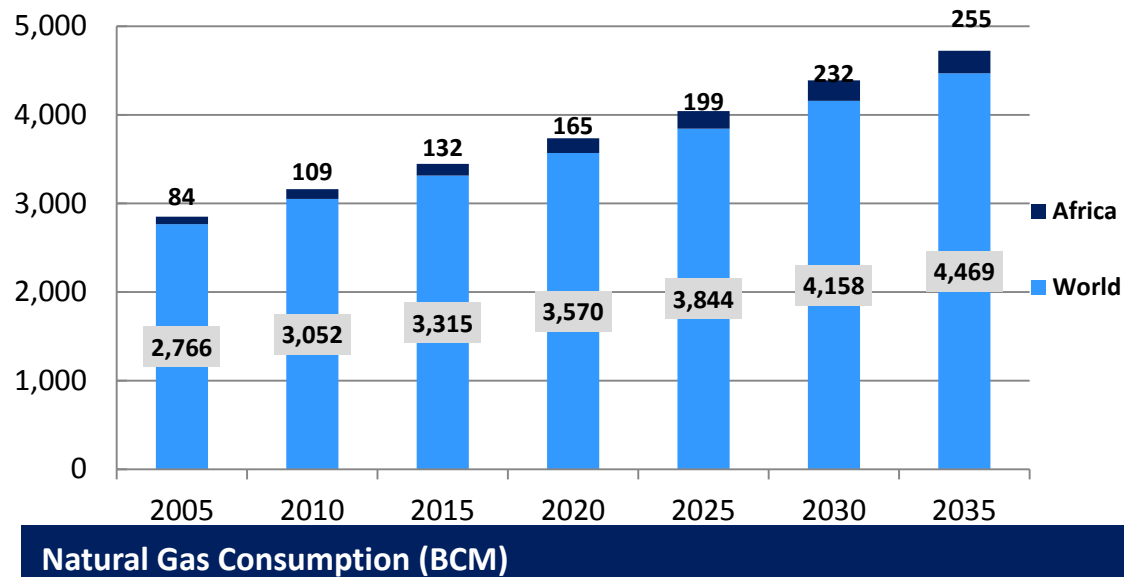


Source: United Nations

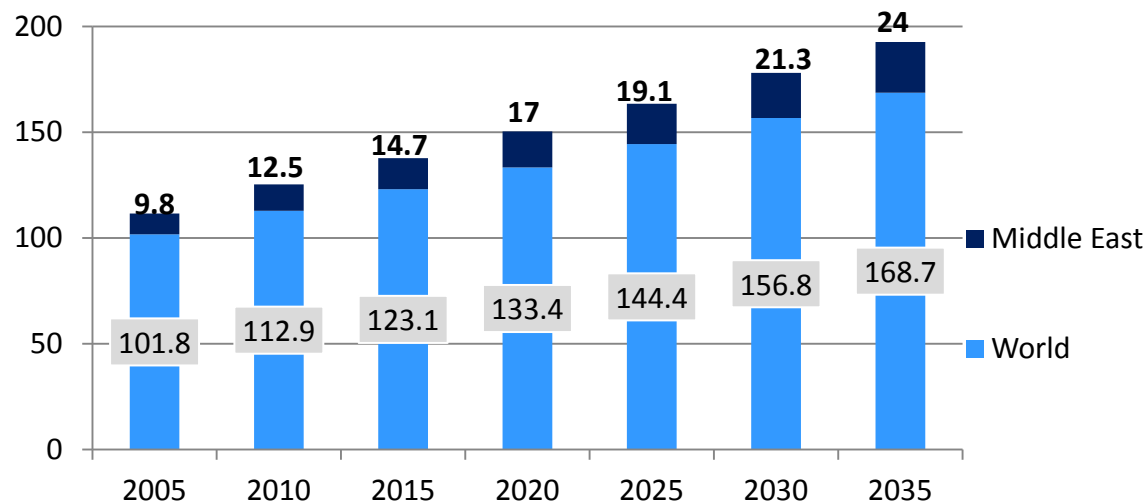


Source: International Monetary Fund (IMF)

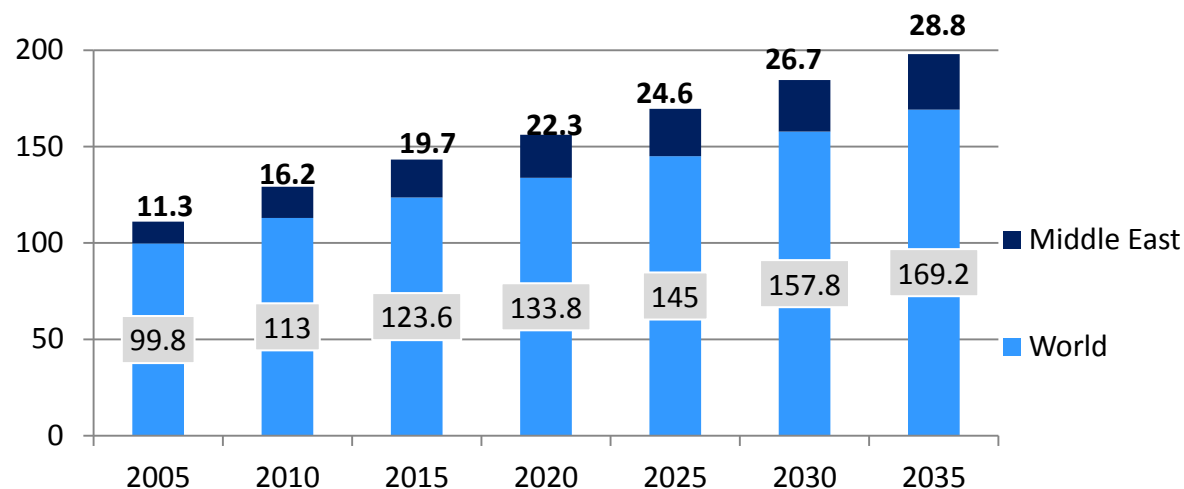




- Natural gas consumption growth in Africa forecasted to reach a growth rate of **3.4%** p.a. Vs. world's growth rate of **2.1%** p.a.
- Up till 2030, Africa's Natural Gas production is projected to record the highest growth rate of **4.3%** p.a. Vs. world's growth rate of **1.9%** p.a.
- Africa is expected to supply more than **10%** of the World's gas by 2030.



Natural Gas Consumption (TCF)



Natural Gas Production (TCF)

■ Total natural gas consumption in the Middle East is growing by an average of **2.7%** per year Vs. world's growth rate of **2.1%** p.a.

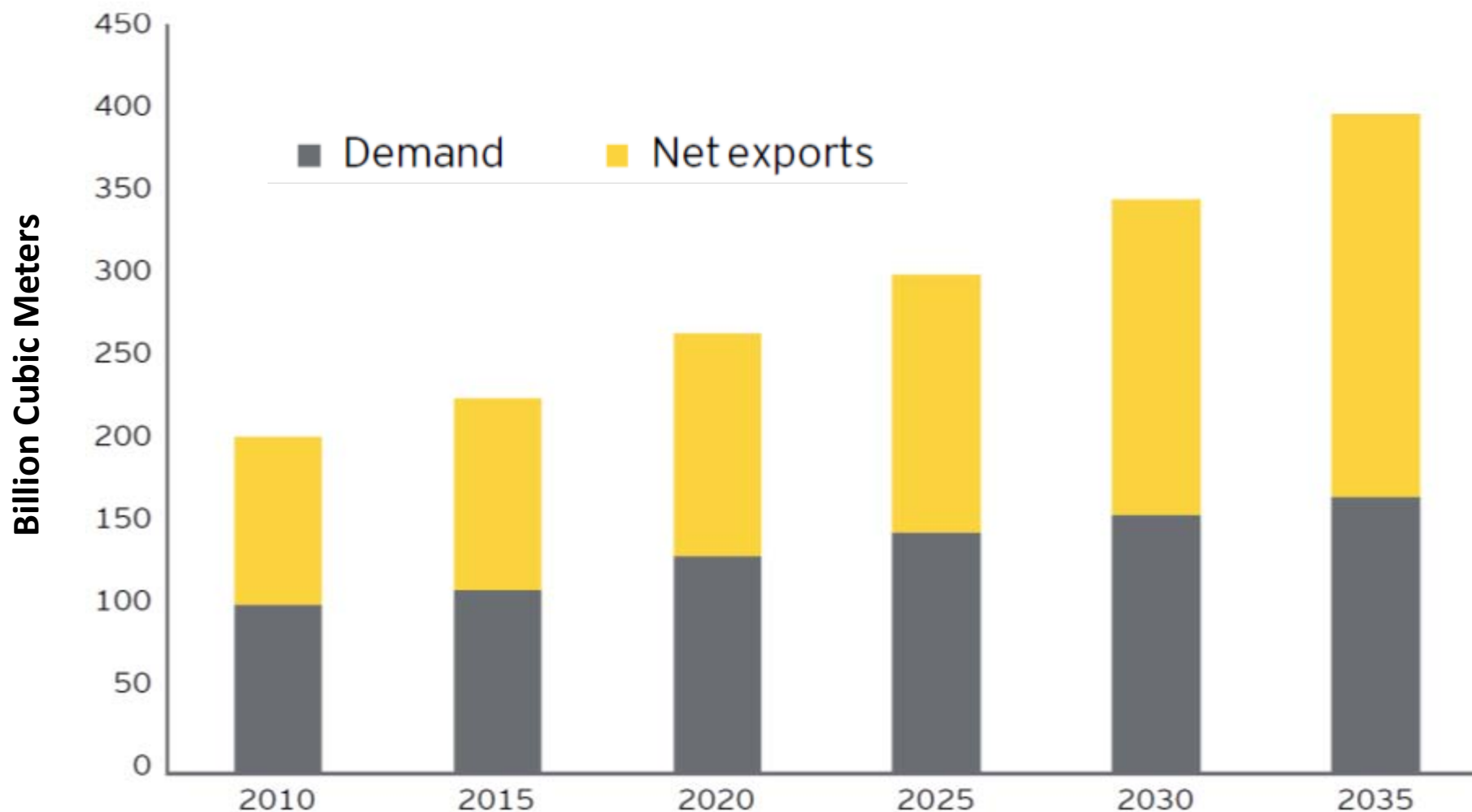
■ **Industrial consumption** of natural gas in the Middle East grows by an average of **4.5%** per year up to 2015.

■ After 2015, **industrial gas consumption** growth slows to a still robust rate of **2.9%** per year.

# Zoom on Africa ...

# FORECAST AFRICAN NATURAL GAS PRODUCTION AND DISPOSITION

(TOTAL PRODUCTION = DEMAND + NET EXPORTS)



Source: Ernst & Young calculations from the International Energy Agency (IEA), "Golden Rules for a Golden Age of Gas," June 2012

# AFRICAN LNG CAPACITY

Country	Project	Start*	Capacity (MT/yr)	Operator
<b>Existing/operating</b>				
Algeria	Arzew (3 trains)	1964	1.1	Sonatrach
	Skikda (4 trains)	1972	7.6	Sonatrach
	Bethioua (12 trains)	1978	16.5	Sonatrach
Egypt	Damietta (1 train)	2005	5.0	ENI
	ELNG (2 trains)	2005	7.2	BG Group
Libya	Marsa El Brega (2 trains)	1971	3.2	Sirte Oil
Nigeria	NLNG (6 trains)	1999	22.2	NNPC
Equatorial Guinea	Punta Eur (1 train)	2007	3.7	Marathon
Angola	Angola LNG (1 train)	2012	5.2	Chevron
			<b>71.7</b>	



Country	Project	Start*	Capacity (MT/yr)	Operator
<b>Planned/possible</b>				
Algeria	Arzew GL3Z	2013	4.7	Sonatrach
Algeria	Skikda LNG	2013	4.5	Sonatrach
Libya	Marsa El Brega T3	2016	2.6	Sirte Oil
Nigeria	Progress FLNG	2017	1.5	NNPC
Cameroon	Kribi LNG	2018	3.5	GDF Suez
Egypt	Damietta T2	2018	4.8	ENI
Equatorial Guinea	Punta Eur T2	2018	4.4	Marathon
Mozambique	Mozambique T1	2018	5.0	Anadarko
Nigeria	Brass LNG T1	2018	5.0	NNPC
Tanzania	Tanzania LNG T1	2018	6.6	BG Group
Mozambique	Mozambique T2	2019	5.0	Anadarko
Nigeria	Brass LNG T2	2019	5.0	NNPC
Nigeria	NLNG T7	2019	5.0	NNPC
Nigeria	NLNG T8	2020	8.5	NNPC
Nigeria	OK LNG	2020	12.6	NNPC
Mozambique	Mamba	2020	10.0	ENI
			<b>88.7</b>	

*\*For existing projects, start date is for first train; for planned/possible projects, start dates are nominal and subject to delay/cancellation.*

*Source: Ernst & Young calculations from the International Energy Agency (IEA), "Golden Rules for a Golden Age of Gas," June 2012*

- North Africa will continue to be the least cost gas supplier for EU due to its geographical proximity and low production cost.
- The change of regimes in Libya, in particular, and in Egypt as a result of the wave of regional unrest known as the “Arab Spring,” poses a potential opportunity to increase natural gas production and exports from these countries.



## Algeria

- 3<sup>rd</sup> largest supplier to Europe.
- A pioneer in LNG trade.
- More open to exploration.
- Algeria is seeking to expand its pipeline capacity towards Europe.
- Plans to boost export capacity from 60 to about 120 bcm/yr possibly before 2020 by pipelines and LNG

## Libya

- Since 2004 back to the international community, has attempted to similarly monetize its gas deposits.
- Still in a recovery mode following last year’s revolution.
- The lifting of US sanctions and the government’s offering of production-sharing agreements could help facilitate restoration.

## Egypt

- Africa’s biggest consumer of NG,
- NG is a politicized issue in Egypt.
- Any new deals to export gas have been frozen since two years.
- Needs: (i) exploration & development of oil & gas by encouraging international companies to invest, (iii) provide facilities and the right climate to do that.

## “The new promised land”

- With the huge recent discoveries in offshore East Africa; in particular, **Mozambique** and **Tanzania**; the future of African gas is, however, expected to shift eastward.
- East African LNG is expected to be very competitive into Asian gas markets, unless there are more incentives to direct gas to Europe.
- The region has more potential if limited gas activity in other East African areas such as Sudan, Ethiopia, and Uganda takes a positive turn from infrastructure woes and political issues.



Known for its oil, the West African region has limited domestic markets for gas with most of the gas being flared.

## Nigeria

- Nigeria dominates the sub-region in terms of reserves and production of oil & gas.
- Tribal and ethnic violence has frequently curtailed production and threatened foreign investment, while the development of a consistent government energy policy has often been seemingly compromised by corruption and mismanagement.

## Angola

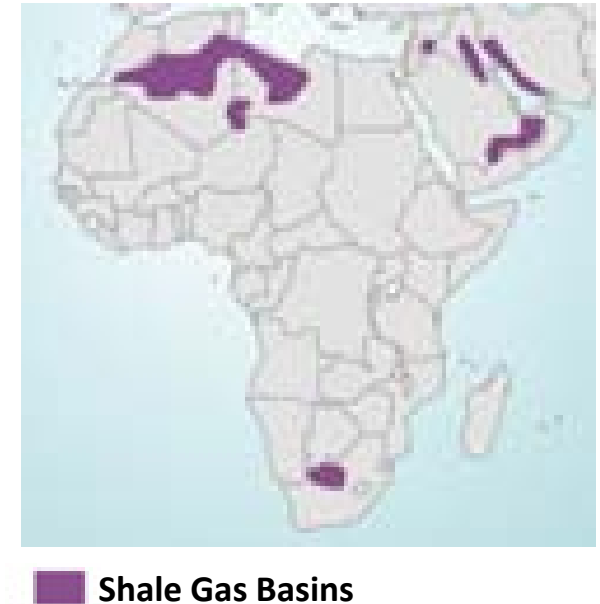
- It has been the area's and the continent's bright spot recently.
- Earlier this year, Angola joined the ranks of global LNG exporters with the commissioning of the Chevron-led Angola LNG project.

*Flaring reductions & gas capture have been a focus in **Cameroon, Gabon, Ghana, and Equatorial Guinea***





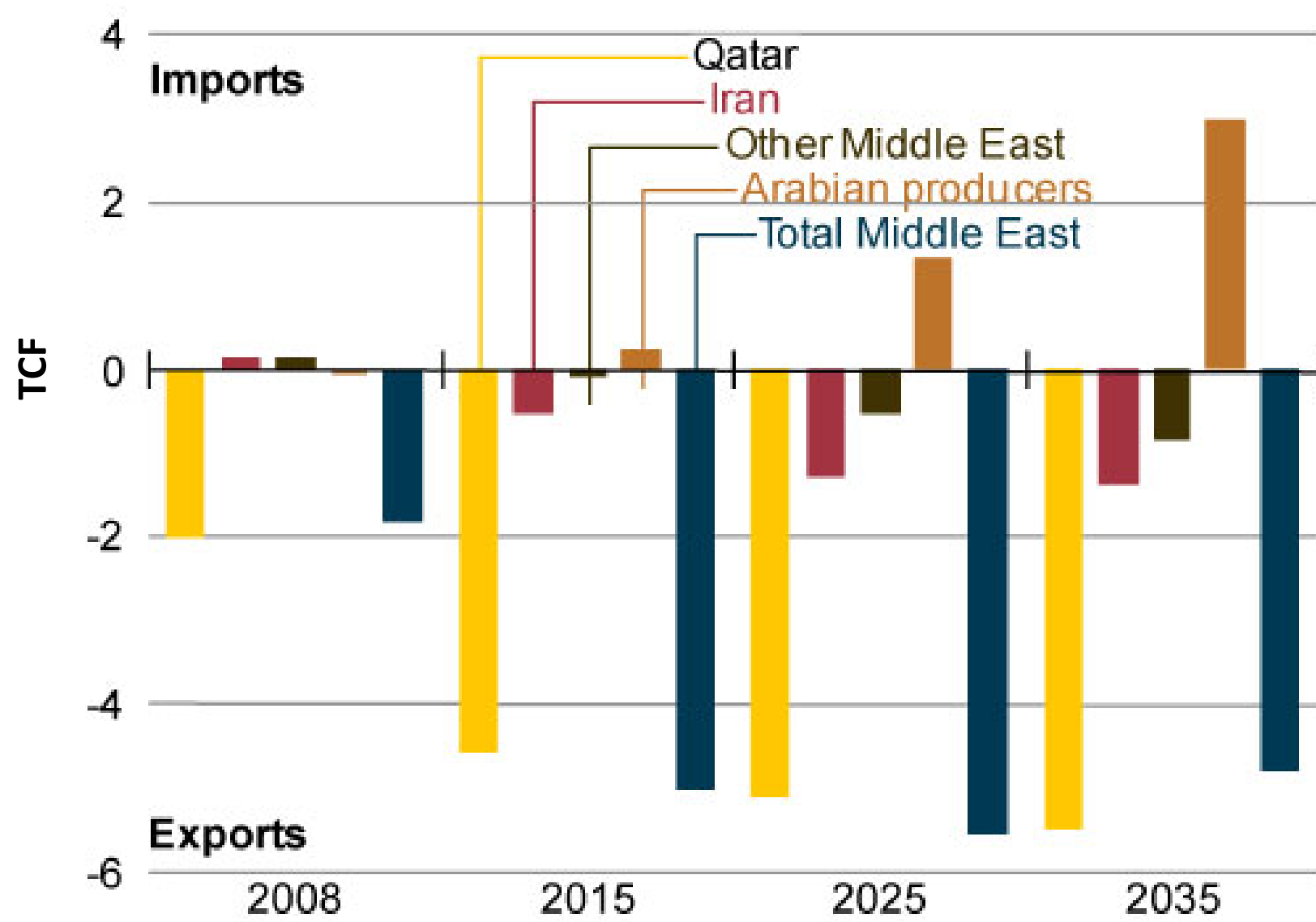
- Shale gas resources have been identified in Algeria, Libya and Tunisia in four formations in the Ghadames and Sirte Basins.
- Smaller concentrations of shale gas have been identified in western North Africa, primarily in Morocco in the Tindouf and Tadla Basins.
- Substantial shale gas resources have also been identified in South Africa



Source: EIA

# Zoom on Middle East ...

# FORECASTED MIDDLE EASTERN NET NATURAL GAS TRADE



Source: EIA

- The Middle East currently supplies around a fifth of world cross-border LNG trade.
- Gas is playing an increasingly important role in the region's energy mix, meeting growing power demand and also providing an important revenue source.
- The value of gas for the Arab Gulf as a region today extends far beyond its use as an additional export commodity.
- We can easily note the surge of domestic demand for gas which the Gulf is currently experiencing.
- In consequence, a number of Arab Gulf states have turned into net importers of natural gas – often from Gulf neighbors, but recently also from international markets.



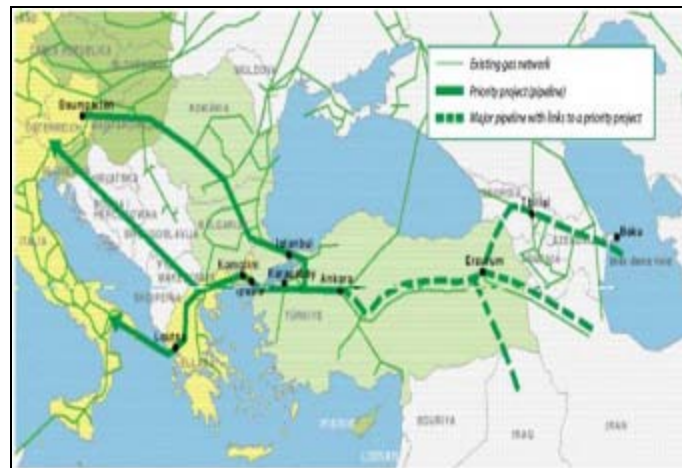
## Iran: "The Isolated Gas Giant"

- Has a high potential.
- Talked about the possibility to supply gas to Europe, through a pipeline framework.
- However, Iran is presently under constraint of ILSA (Iran Libya Sanction Act), coupled with its current nuclear standoff with parts of the international community makes it unlikely that such plans materialize in the near future.
- Other plans such as building a pipeline from South Pars in Iran into Iraq and then to Syria to feed the Arab Gas Pipeline have also been discussed, but with no clear timetable for implementation and seem unlikely to progress.



## Iraq: "The Sleeping Gas Giant"

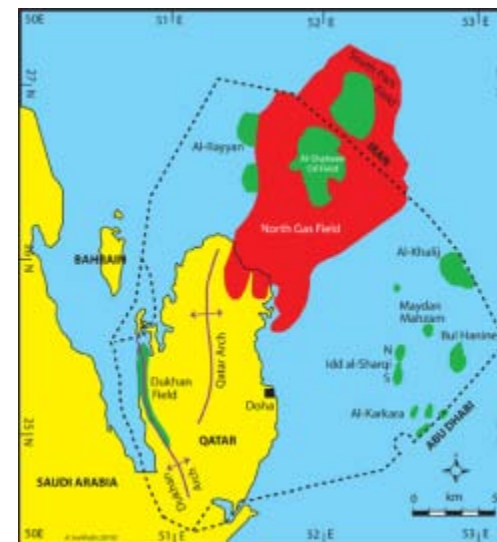
- Probably high export potential, but gas presently underdeveloped.
- Political instability remains Iraq's biggest threat in monetizing its gas reserves.
- Any future decision to export gas without domestic demand being fully satisfied will likely be met by strong public opposition.
- Given its vast reserves and geographical position, where it is shortest land route in the Gulf to Turkey, Iraq could become an important supplier to Europe. Iraq has two alternatives for having access to the European market:
  1. Nabucco Gas Pipeline
  2. Arab Gas Pipeline (AGP)



Arab Gas Pipeline and Alternatives for its Development

## Qatar:

- The country surpassed Algeria as the Middle East's largest exporter of natural gas and is today the world's leading exporter of LNG.
- Region's lead exporter (LNG to Europe, India, Eastern Asia, and pipeline to other regional markets "Dolphin").
- Emerging major gas producer (super-giant North Field)

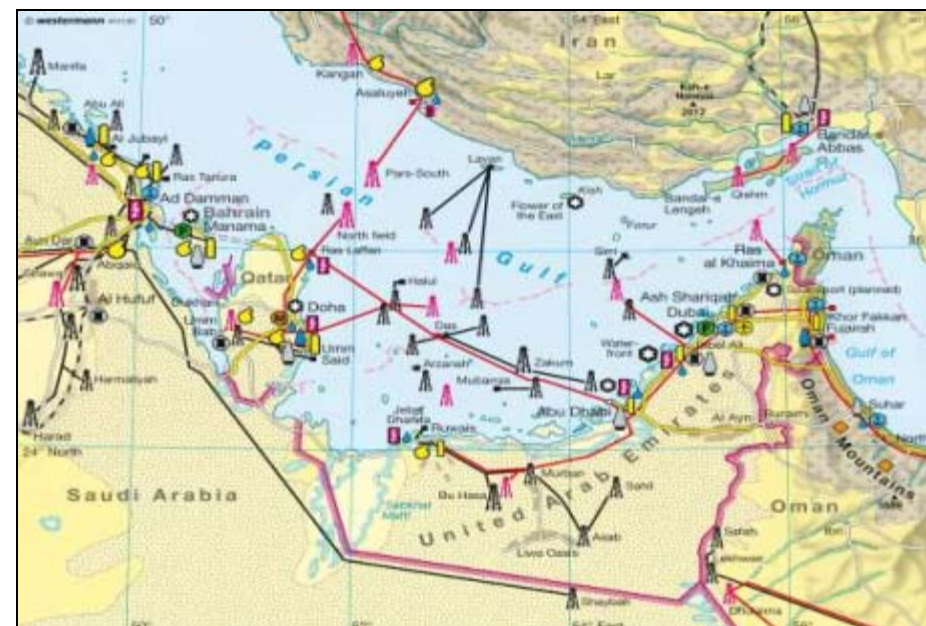


## Oman & Yemen:

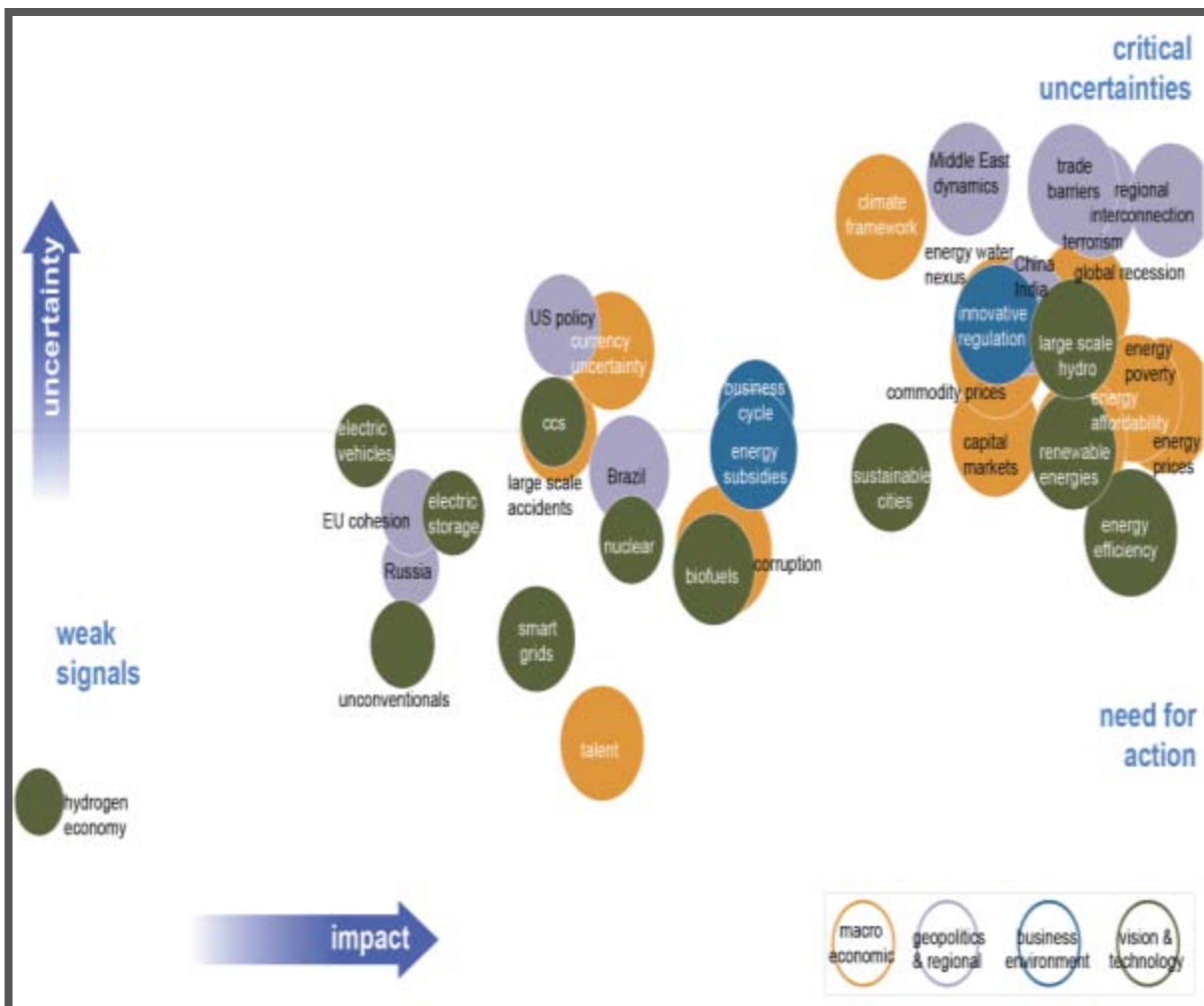
- Minor LNG export projects, operating and possible.

## UAE:

- Already a minor LNG exporter to the Far East.



# Region's Challenges

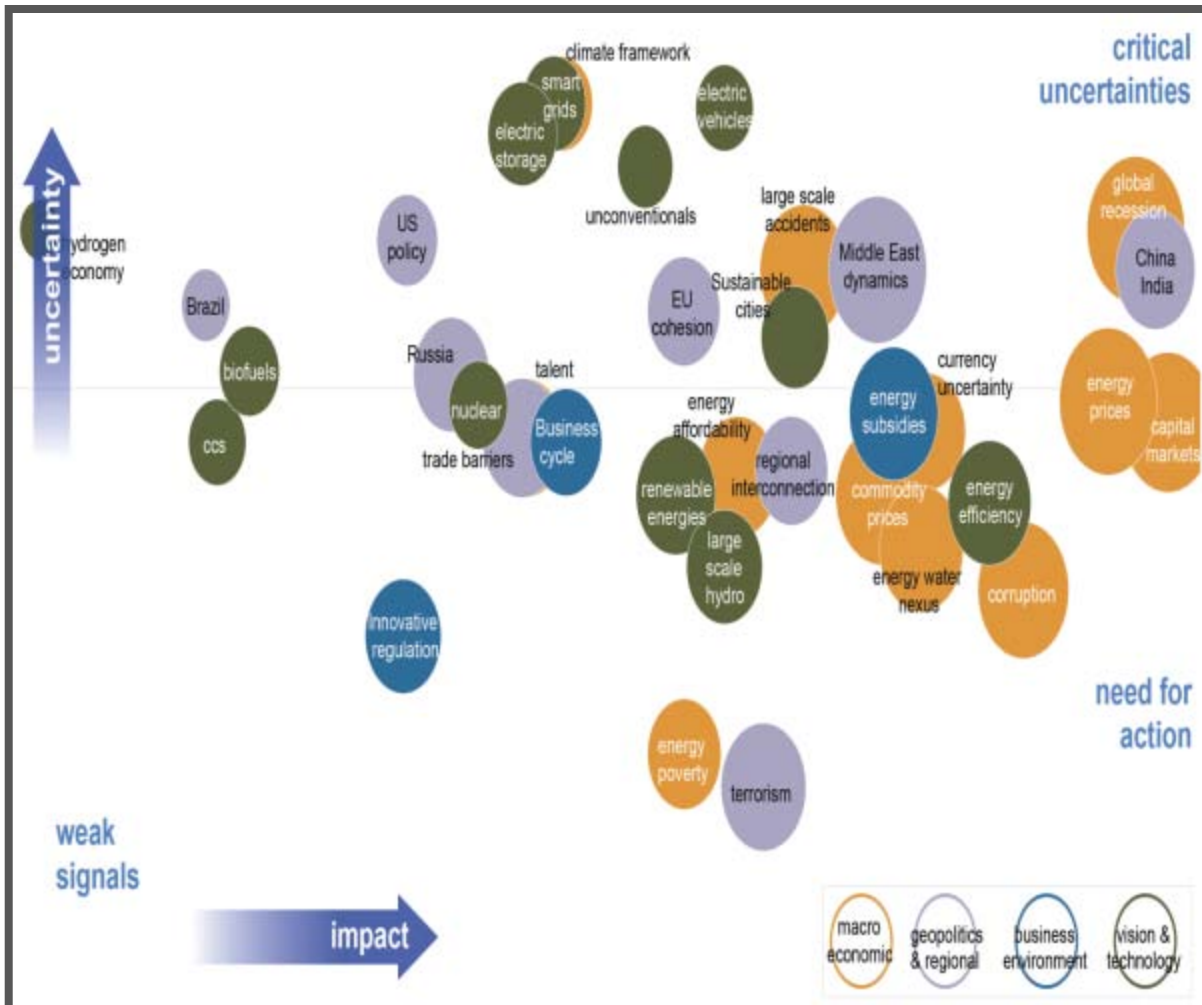


- The economic growth and energy poverty/access issues remain major concerns.
- Middle East dynamics and global recession issues are coming as high critical uncertain issues to Africa.
- The continent has seen trade barriers and terrorism, considered as uncertain issues.
- Moreover, with huge gas reserves and its new discoveries, further development and prospects of LNG markets and cross-border pipelines are anticipated.
- Energy efficiency, renewable energy, energy prices and energy poverty are also viewed as requiring bold immediate actions in the issues map.
- climate change issues have been considered as a lower priority.

Source: 2013 World Energy Issues Monitor – World Energy Council



# REGIONAL ENERGY CHALLENGES – MIDDLE EAST & NORTH AFRICA



- Geopolitical issues, notably Iranian nuclear standoff is a critical uncertainty,
- Other critical uncertainties include energy prices, and global recession, i.e., lower economic growth in key markets.
- High change issues are: nuclear, CCS and unconventional.
- The region has seen the importance of renewables grow, such as solar to make up for domestic oil consumption growth.
- Energy efficiency should be another issue to be dealt with.
- Ensuring electricity supply for both air conditioning and desalination purposes is a priority.
- The region needs investment to cope with the energy poverty or access issues.

Source: 2013 World Energy Issues Monitor – World Energy Council

- Middle East & Africa are growth markets for gas: Exports from the Middle East (75% of which are to Asia), and those from North Africa (most of which are focused on Europe), should remain stable overall.
- Only Qatar and Algeria remain as serious exporters up to the end of the decade.
- Iran, Iraq & Tanzania remain sleeping giants. In time they could become game changers in the region, particularly with respect to gas.
- Africa could increase its role as a gas exporter with the start-up of potential LNG projects in Mozambique.
- While the prospects for additional gas exports in the global market are dim for the short/medium term, the region still contains huge amounts of gas resources waiting to be developed.
- Development of Africa's unconventional gas resources - largely in North Africa & South Africa - could substantially add to the potential new supply.

**“Governments, International organizations (such as IGU), International NGOs (such as: World Bank, IMF, IFC, UNIDO, AFD) have critical a role to play” ...**

**Collaboration and partnerships with the IOCs, big and small, will also be critical ...**

- Their first and foremost role will be developing a meaningful and practical master gas development plans, that address:
  1. The upstream tax & Licensing models.
  2. The necessary infrastructure issues and investments,
  3. Local training and job creation issues.



**If various countries in the region are able to overcome obstacles ...**

**The rewards could be great, considering the abundance of untapped resources**

# THANK YOU

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