

Outlook for Oil and Gas Production


The Institute of Energy Economics, Japan (IEEJ)

*Please note this outlook was finalised before the day of East Japan Great Earthquake, thus does not reflect any impacts of the event.

Methodology

- Collect actual data.
 - Basically collecting from IEA. If not possible, employ BP data.

- Estimate production growth by expert judgment.
 - Estimate by country and sum up to region.
 - Timeframe between 2008-2020, 2020-2030, 2030-2035.
 - Evaluate production with reference to,
 - ✓ National production target / outlook
 - ✓ Input from the members
 - ✓ Publicly available information which indicate the status / prospect of production
 - ✓ Demand outlook

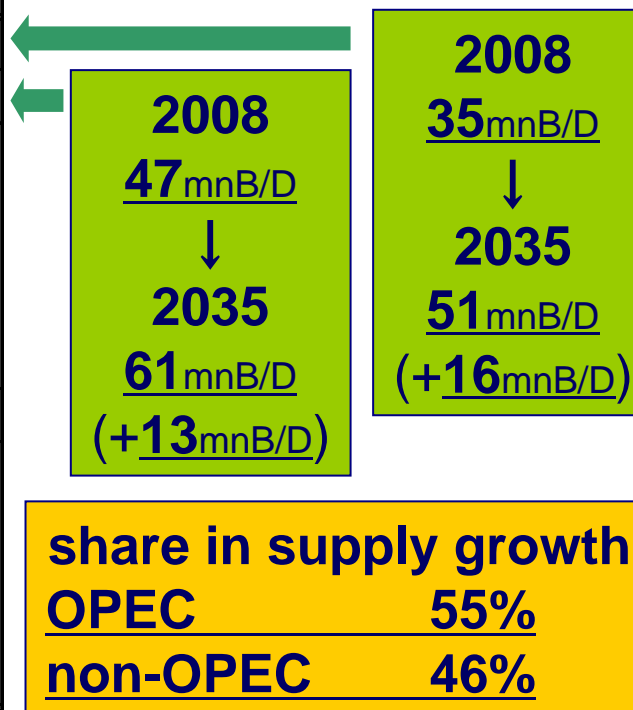
- Balance with demand
 - Estimate non-OPEC production.
 - Estimate OPEC production.  To meet global oil demand



I. Oil Production

Outlook of Oil Production (BAU)

	mn b/d					
	2008	2020	2030	2035	2008-2035	AAGR
OPEC	34.7	42.1	47.7	50.7	16.0	1.4%
non-OPEC	47.3	51.6	57.3	60.6	13.3	0.9%
North America	13.9	14.8	17.1	18.0	4.1	1.0%
Latin America	4.1	5.8	7.2	8.4	4.2	2.6%
Europe-Eurasia	16.9	17.8	19.8	21.1	4.2	0.8%
Middle East	1.6	1.6	1.6	1.6	-0.1	-0.2%
Africa	2.6	2.9	3.3	3.4	0.8	1.0%
Asia	8.1	8.7	8.4	8.1	0.0	0.0%
China	3.8	4.2	4.1	4.0	0.2	0.2%
India	0.8	1.0	1.0	1.0	0.2	0.8%
Indonesia	1.0	1.0	0.8	0.8	-0.2	-1.0%
Malaysia	0.8	0.7	0.6	0.6	-0.2	-1.2%
othe Asia	1.7	1.8	1.9	1.8	0.1	0.2%
World total	82.3	93.7	105.0	111.3	29.0	1.1%



- Share of OPEC in growth of world's oil production is 55%.
= OPEC is expected to play a key role as they are today.
- Oil production in Asia will slightly increase up to 2020, but in a long term it will gradually decrease.

OPEC production (BAU)

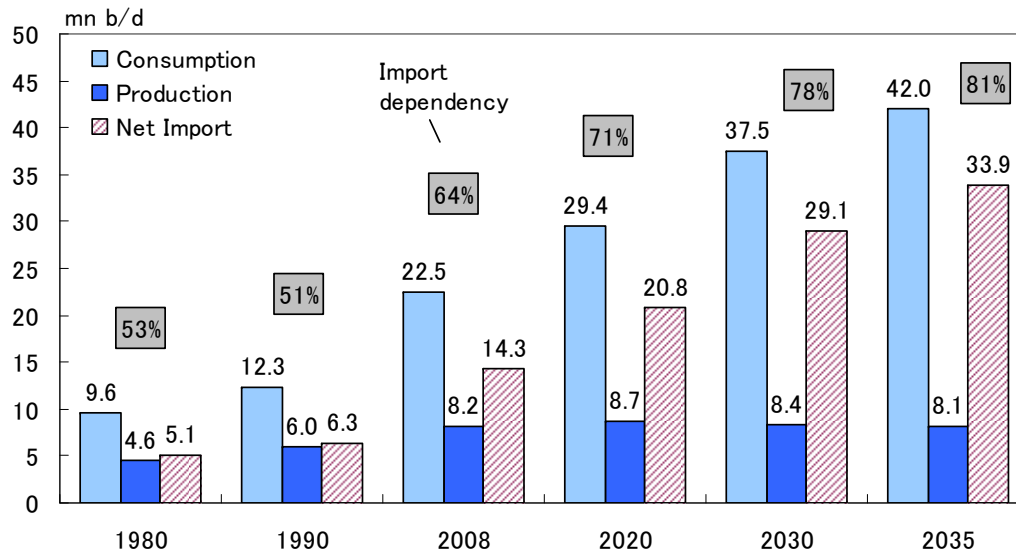
	mn b/d					
	2008	2020	2030	2035	2008-2035	AAGR
OPEC	34.7	42.1	47.7	50.7	16.0	1.4%
Saudi Arabia	12.6	14.2	14.7	15.0	2.3	0.6%
UAE	2.6	3.5	3.9	4.1	1.5	1.7%
Kuwait	2.6	2.8	3.2	3.4	0.8	1.0%
Qatar	0.9	0.9	1.0	1.1	0.3	1.0%
Nigeria	2.0	3.5	3.9	4.2	2.3	2.9%
Angola	1.9	3.0	3.6	3.8	2.0	2.7%
Libya	1.7	1.9	2.1	2.3	0.6	1.1%
Algeria	1.4	1.4	1.7	1.7	0.3	0.7%
Venezuela	2.4	2.9	3.5	3.8	1.4	1.7%
Ecuador	0.5	0.5	0.5	0.6	0.1	0.5%
Iran	3.9	4.1	4.6	4.8	0.9	0.8%
Iraq	2.4	3.4	5.0	6.0	3.6	3.5%

- Oil production from OPEC countries will steadily rise at an AAGR of 1.4% which exceeds the growth of world's demand.
 - Assume steady growth of oil production from GCC countries.
 - Expect strong growth of Iraq production after 2020.

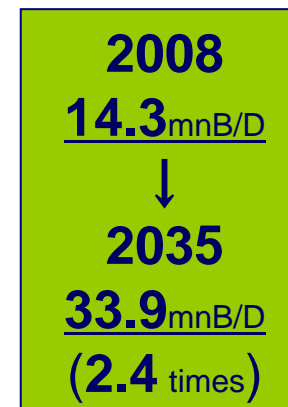
Regional Analysis Asia

- As a whole, oil production will slightly increase until up to 2020 then gradually decline to current level in 2035.
 - China: ERI estimate their production will rise to 4.0-4.4 mnb/d until 2020. After 2020, we estimate their production will gradually decline.
 - India: We assume oil production is 1 mnb/d through out the time range.

- Net import will increase from 14.3 mnb/d in 2008 to 33.9 mnb/d in 2035, led by steep rise of demand and stagnated oil production within region , import dependency of oil supply will rise to 81% in 2035.



Net Oil Import



Regional Analysis Europe & Eurasia

- Russia
 - 'Energy Strategy of Russia - for the period up to 2030 -'
 - They need continuous investment on new field to maintain their production level.
 - Assume their production will grow steadily.

- FSU (exclude Russia)
 - They need vast investment to turn their resources into production.
 - Assume their production will increase after 2020.

- Europe
 - Assume natural decline of North sea field will continue.

Oil Production target of Russia

<u>Year</u>	<u>mn b/d</u>
2013-15	9.72-9.90
2020-22	10.1-10.6
2030	10.6-10.7

Oil production will gradually rise at an AAGR of 0.8%.

Regional Analysis Americas

- North America

- We made a reference to the estimation published by each national institution.
(EIA for US, Natural Resources Canada for Canada)

N. American oil production will rise until around 2025 then flattening out.

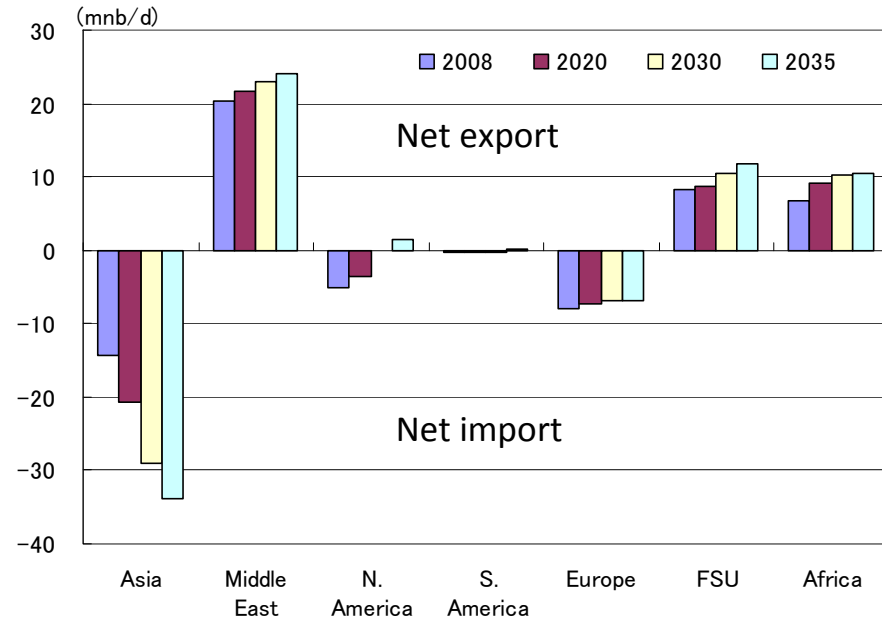
- Brazil

- With refer to the Petrobras's estimation, oil production will increase at an AAGR of 3.8% until 2020.
- Petrobras expects strong growth with production from 'pre-salt'. Although there may exist uncertainty on 'pre-salt' production, we assume the growth of other independent productions will make this up.

Oil production from Latin America will show high growth late of 3.8% (AAGR) until 2035.

Supply demand balance (BAU)

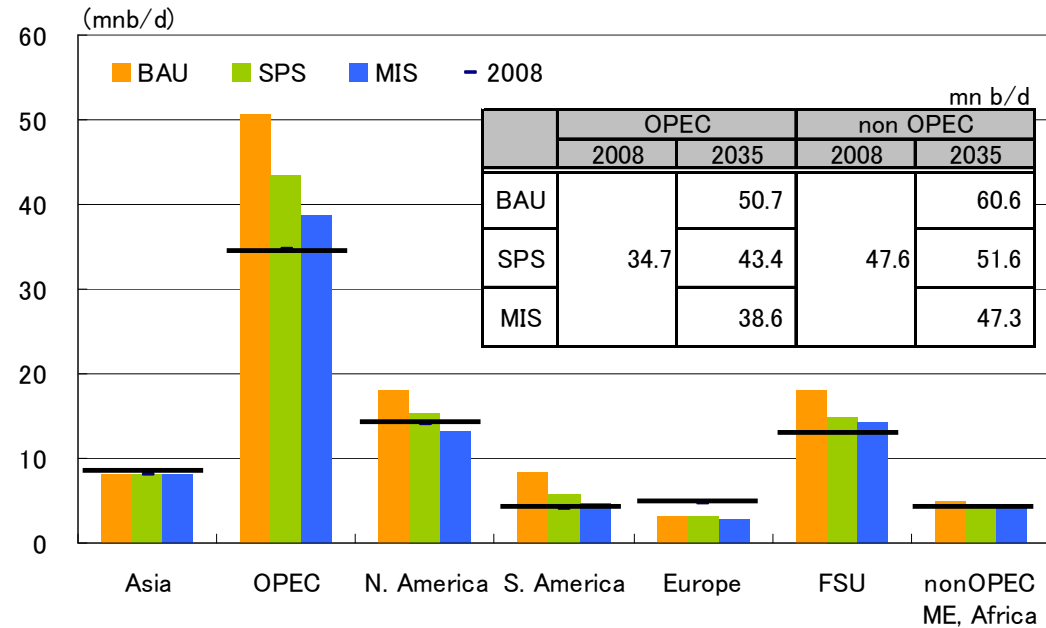
- Asia will face both demand growth and production decline simultaneously, thus their net import continues to grow strongly.
- In Europe, demand decrease will exceed the decline of production, thus their net import will stay at level.
- In N. America, in addition to demand decrease in US, production increase in Canada will improve their balance.
- In FSU, their production will rise because of export demand to Asia.
- In M.E., increase of production will surpass their demand growth.



It is expected oil will flow from M.E., FSU and Africa to two large import area, Asia and Europe.

Oil production by scenario (in 2035)

- Production from two importing region, Asia and Europe, has no notable change by scenario. We expect they continue try to maximize their production for their own use.
- Production from N. America is expected to slow down in the scenarios of lower demand.
- In FSU and S. America, production will be lower in SPS (and further in MIS) since both intra regional and export demand will decrease in the scenarios.
- OPEC will be affected by the demand scenarios since they play as a balancing mechanism of oil supply & demand. However, it is obvious that OPEC will still be a largest oil supplier, and even in a MIS scenario, their production in 2035 will exceed that of 2008.





II. Gas Production

Outlook of Gas Production

	Bcm					
	2008	2020	2030	2035	2008-2035	AAGR
North America	801.8	775.0	874.0	908.0	106.2	0.5%
Latin America	157.1	230.4	312.1	365.7	208.6	3.2%
Europe-Eurasia	1,086.3	1,212.7	1,418.2	1,502.7	416.5	1.2%
Middle East	383.4	564.6	838.8	1,065.5	682.1	3.9%
Africa	214.3	281.8	408.7	480.8	266.5	3.0%
Asia	417.9	625.4	765.1	840.2	422.3	2.6%
China	80.3	150.0	182.8	201.9	121.6	3.5%
India	30.5	70.0	95.0	104.9	74.4	4.7%
Indonesia	69.7	83.3	101.5	112.1	42.4	1.8%
Malaysia	64.9	65.0	63.1	62.1	-2.8	-0.2%
Australia	38.3	90.0	121.0	136.8	98.6	4.8%
othe Asia	134.2	167.1	201.7	222.4	88.2	1.9%
World total	3,060.8	3,690.0	4,616.9	5,163.0	2,102.2	2.0%

share in supply growth

Middle East 32%

Asia 22%

2008
418Bcm
↓
2035
840Bcm
(+422Bcm)

2008
383Bcm
↓
2035
1,066Bcm
(+682Bcm)

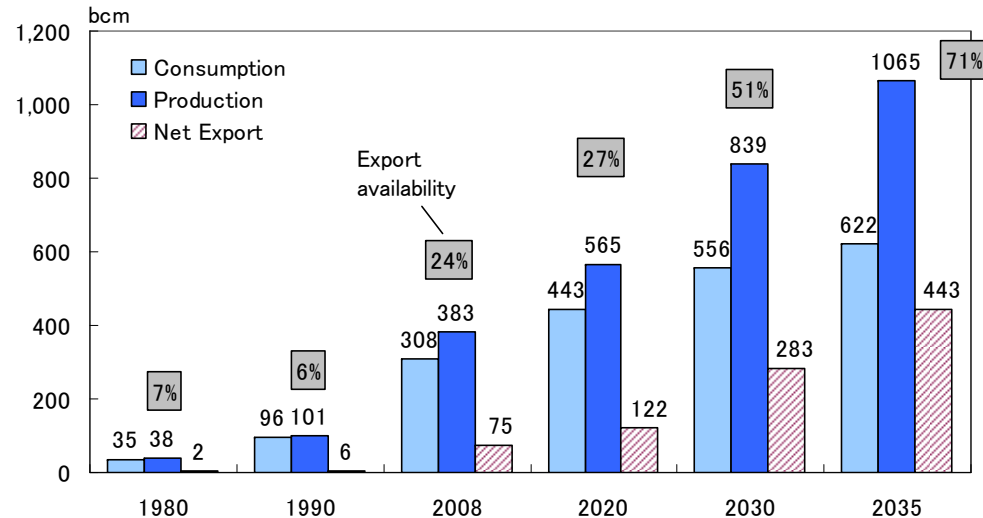
- In Middle East, rapid growth of gas production is expected, which contributes to global supply growth to meet world's rising gas demand.
- Gas production in Asia is also will increase strongly.

Regional Analysis Middle East

- Gas production in the Middle East countries will grow strongly at an AAGR of 3.9%.
 - Assume relatively high growth rate of gas production, led by strong domestic demand to fuel power plant.
 - Notably, we assume strong growth in Qatar (LNG for export) and Iran (development of South Pars after 2015).

- Net export will increase from 75 bcm in 2008 to 443 bcm in 2035.
- Thanks to the vast resources, 'export availability' will increase to 71% in 2035.

	2008	2020	2030	2035	2008-2035	AAGR
Middle East	383.4	564.6	838.8	1,065.5	682.1	3.9%
Saudi Arabia	80.4	114.7	154.1	178.7	98.2	3.0%
UAE	50.2	70.0	77.3	85.4	35.2	2.0%
Qatar	77.0	177.9	264.1	343.8	266.8	5.7%
Oman	24.1	26.5	29.3	32.3	8.2	1.1%
Kuwait	12.8	15.2	17.7	19.1	6.3	1.5%
Iran	116.3	134.8	265.2	372.0	255.7	4.4%
others	22.6	25.5	31.0	34.3	11.7	1.6%

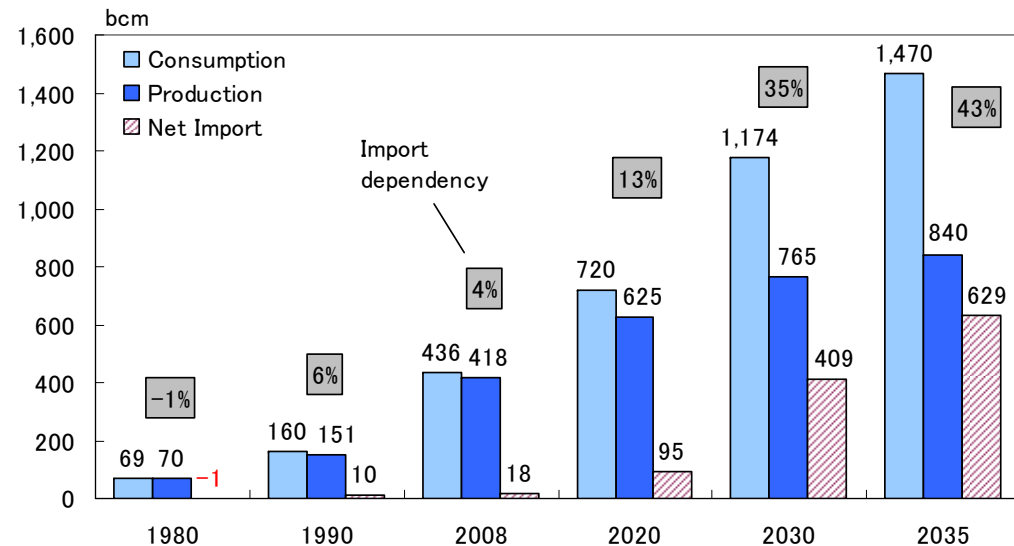


※Export availability = Net Export ÷ Consumption

Regional Analysis Asia

- Gas production will rise at relatively high rate (AAGR 2.6%) until 2035.
 - China: ERI estimate their production will increase to 150 bcm in 2020. After 2020, we estimate production including unconventional gas will rise.
 - India: Assume new production from NELP and unconventional resources after 2020.
 - Indonesia: Some of the propose LNG project (Donggi Senoro, Masela) will start production before 2020.
 - Australia: Assume many new LNG projects (Pluto, Queensland Curtis, Ichthys, etc) will start operating by 2020, thus strong growth (AAGR 4.8%) of gas production is expected.

- Although strong growth of gas production is expected, regional production can not fully meet the rapid demand growth. Thus gap between supply and demand (net import) will grow rapidly.



Regional Analysis Europe & Eurasia

- Russia
 - 'Energy Strategy of Russia - for the period up to 2030'
 - Production and export from east Siberia will increase.

- FSU (exclude Russia)
 - Assume current trend, effort to directly export their gas to China and Europe, will continue.
 - Assume their production (export) will steadily increase.

- Europe
 - Natural decline of southern part of North sea (UK, Netherland) will continue.
 - Assume Norwegian production (northern part of North sea and Barents sea) will slightly increase.

Gas Production target of Russia

<u>Year</u>	<u>bcm</u>
2013-15	685-745
2020-22	803-837
2030	885-940

Gas production will gradually rise at an AAGR of 1.2%.

Regional Analysis Americas

■ North America

- we made a reference to the estimation made by national institution.
(EIA for US, Natural Resources Canada for Canada)

N. American gas production will steadily rise until up to 2035.

■ Latin America

- Assume steady growth in Trinidad and Venezuela production.
- In Brazil, with refer to the Petrobras's estimation, gas production will rapidly increase at an AAGR of 7.9%.

Gas production from Latin America will show high growth late of 3.2% (AAGR) until 2035.