

IRAN ENERGY ECONOMY CHALLENGES IN SANCTION ERA

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Sharif Alumni Conferences

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Brent Crude Oil:
50.47 USD/bbl
WTI Crude Oil:
42.53 USD/bbl
Natural Gas:
3.47 USD/mbtu



Brent Crude oil price (December 18-24, 2018), USD per Barrell
www.nasdaq.com

Presentation Layout



Energy Infrastructures,
Supply & Demand,
and State Institution



Oil Peak, Oil Prices



Policies and Prospects

Infrastructures, Supply & Demand, and State Institution

IRAN Key Figures

80.2 million
population

annual GDP
growth rate
3.73% (2017)
-1.43% (2018)

100% energy
independence
self-produced energy

Total electricity
consumption per
capita= 2,722 kWh
(Europe 5,437 kWh)

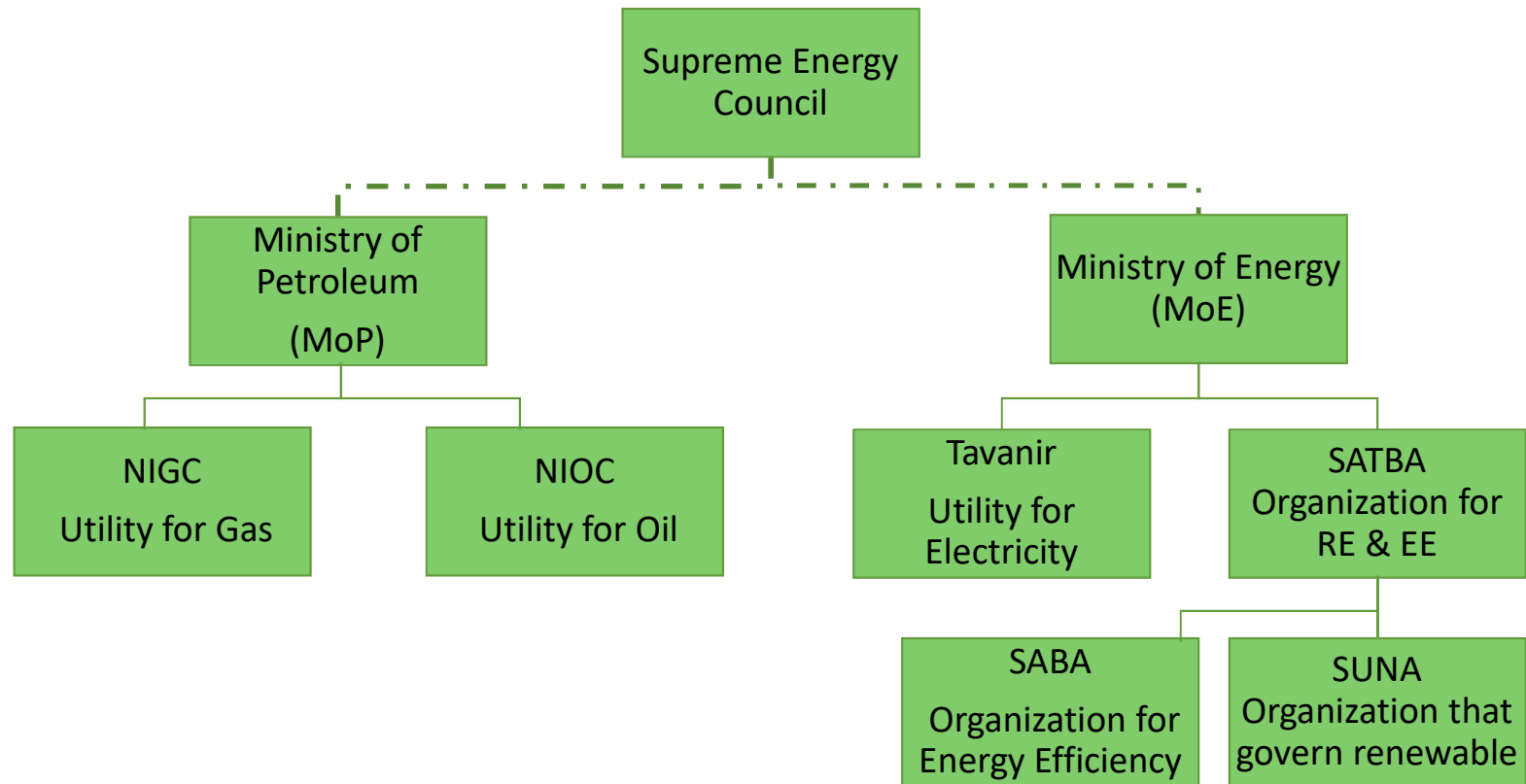
100% population
electrified

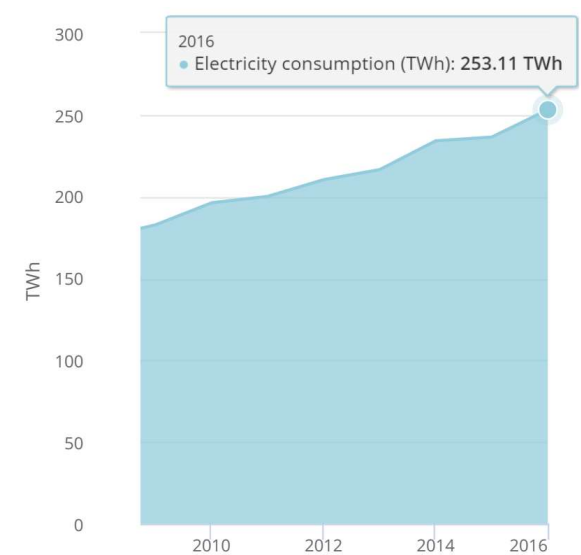
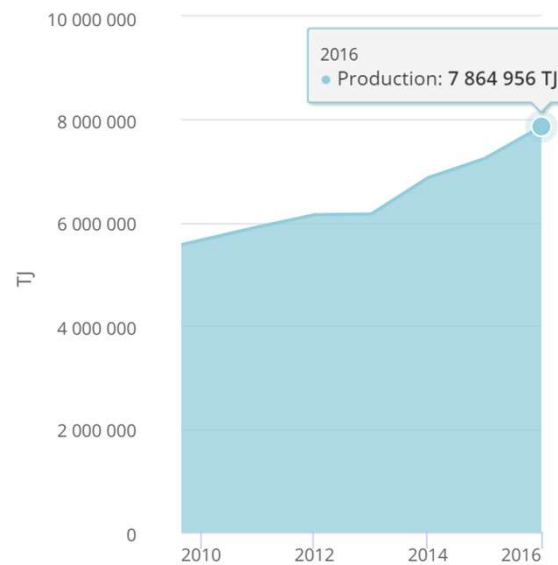
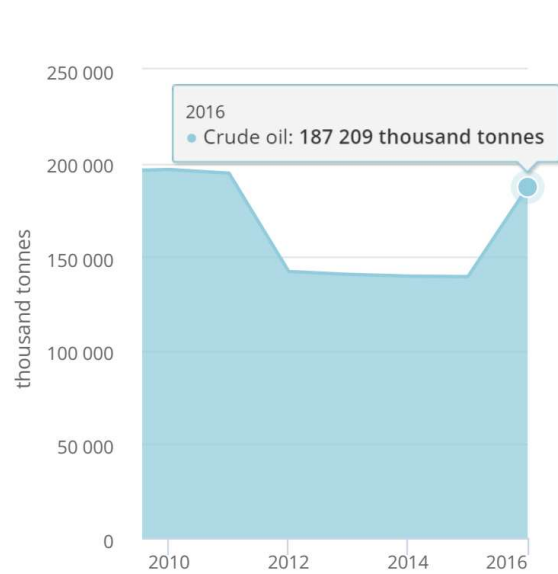
95% population in
village and cities
have access to
Natural Gas

Source:

[https://trilemma.worldenergy.org/#!/country-profile?country=Iran \(Islamic Republic\)&year=2017](https://trilemma.worldenergy.org/#!/country-profile?country=Iran%20(Islamic%20Republic)&year=2017)
<https://www.worlddata.info/asia/iran/energy-consumption.php>

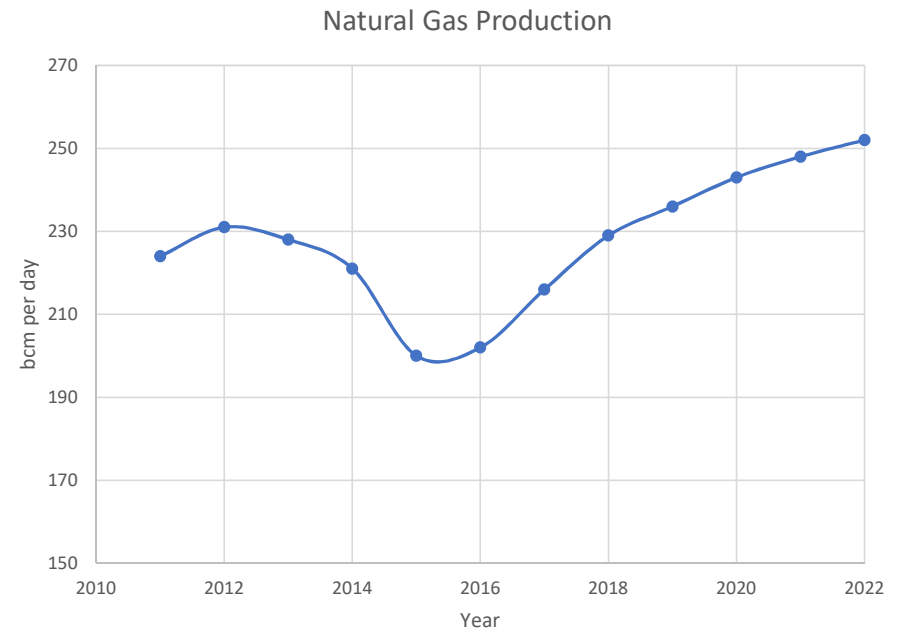
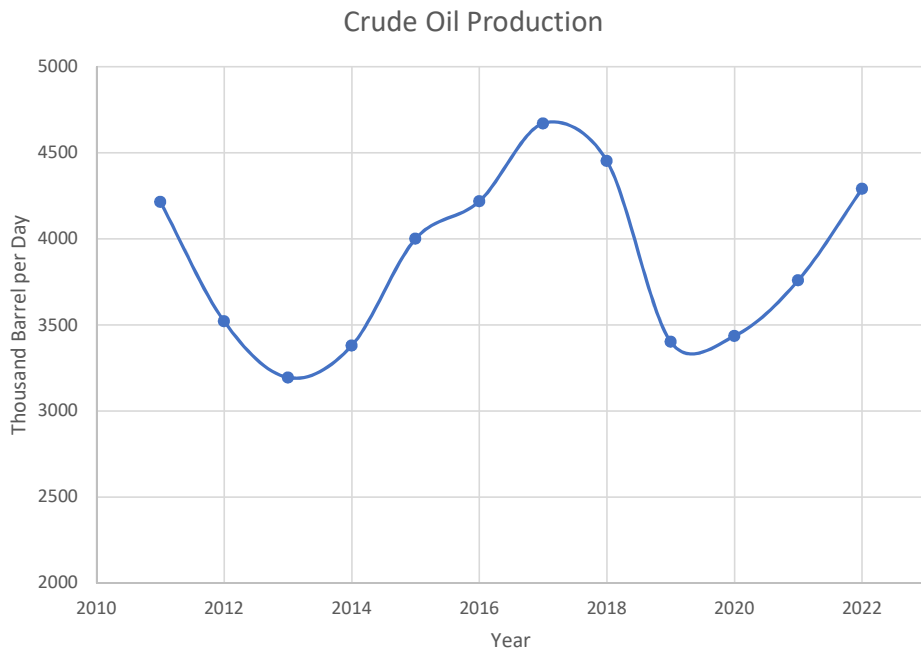
IRAN State Institution and Structure





Energy Supply : Crude Oil, Natural Gas and Electricity Production

Source: IEA Information 2018



Energy Supply : Crude Oil and Natural Gas Production (Forecast)

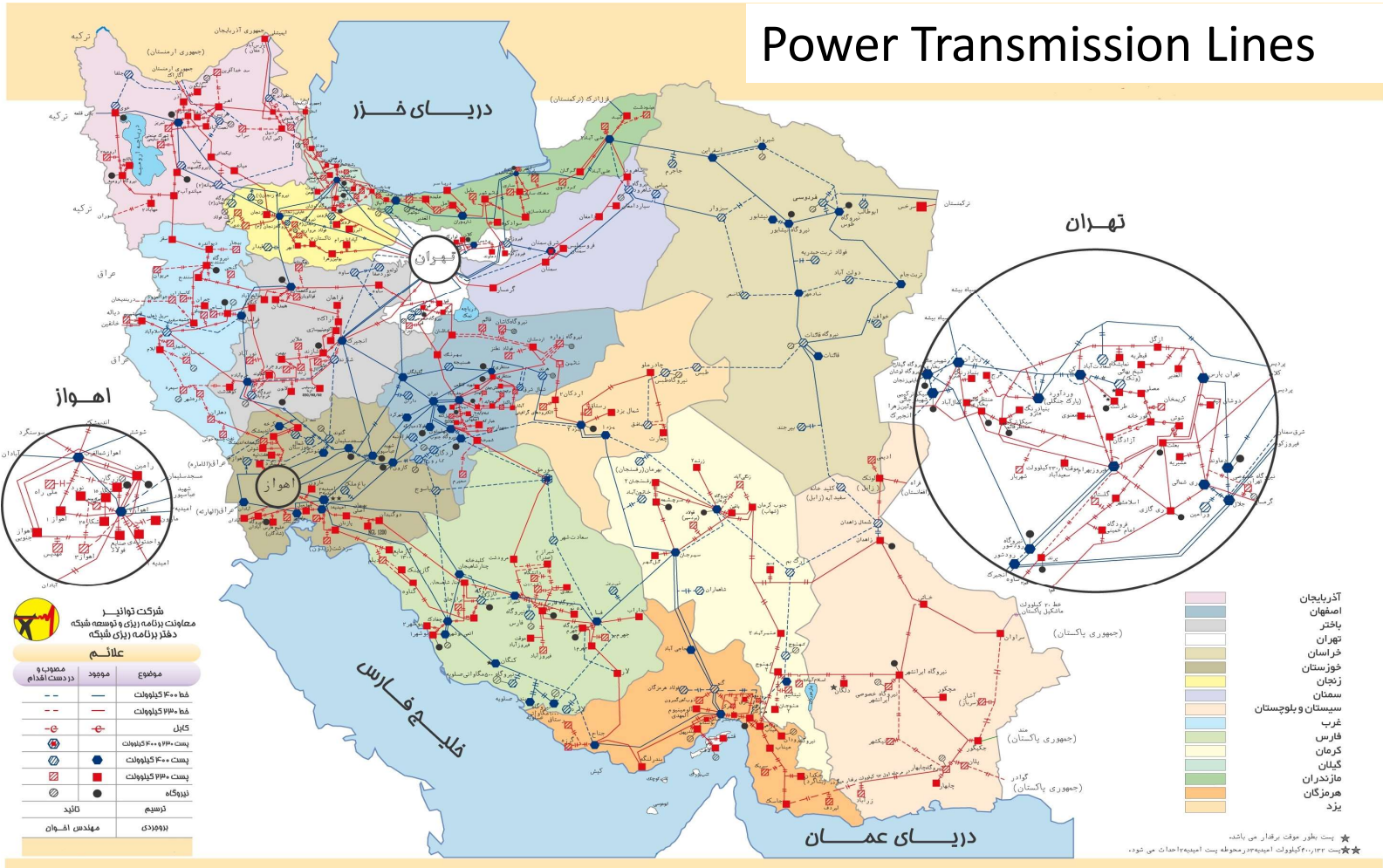
Source: IEA Information 2018, Fitch Solutions forecast

Iran Settlement Pattern (Future Energy Hub?)

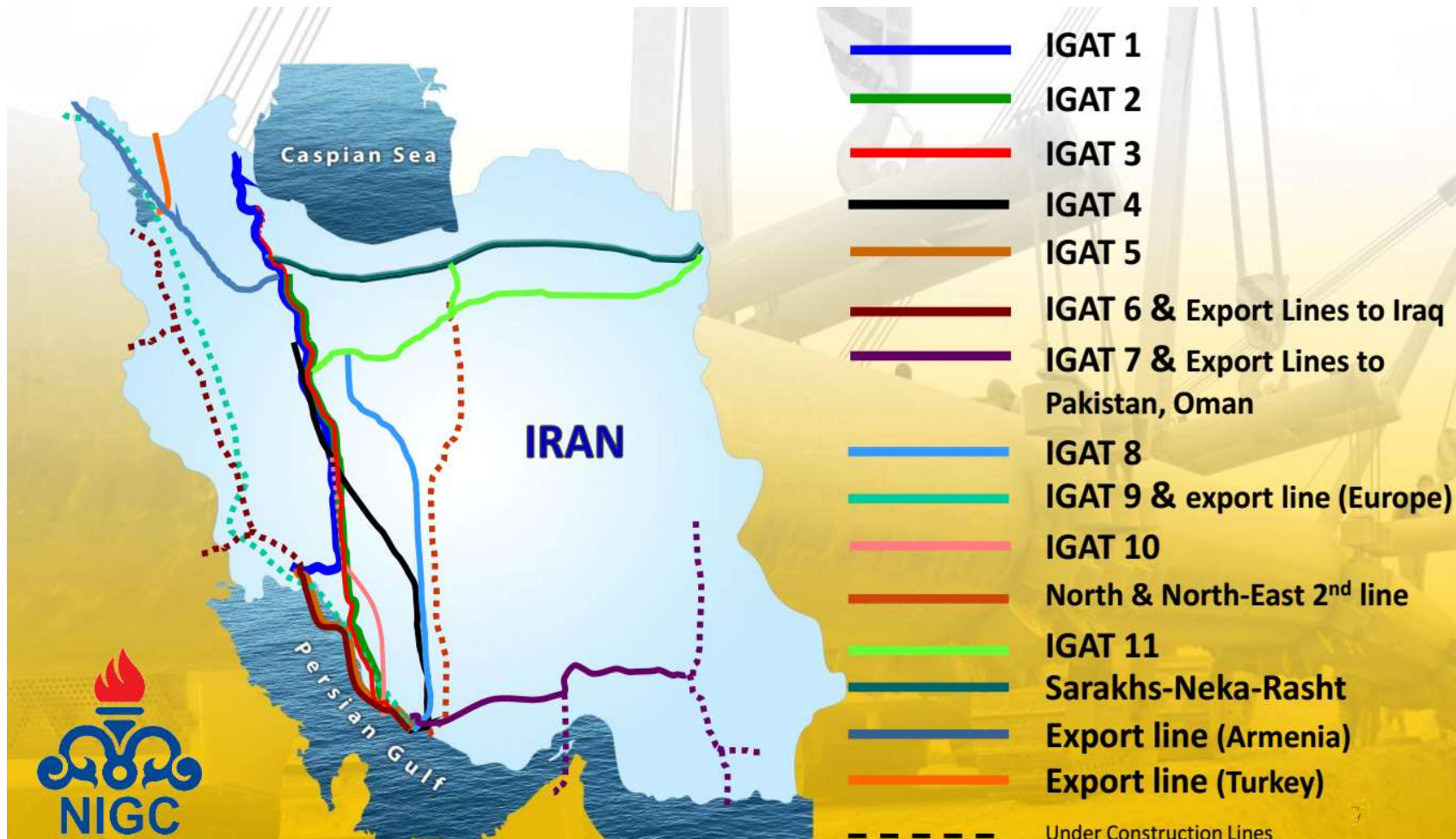


Access Infrastructure : Power

Power Transmission Lines



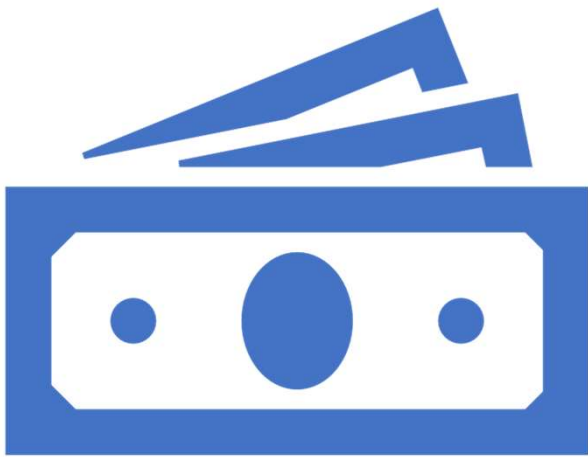
Access Infrastructure: Natural Gas Pipeline



Energy Consumption

**Energy consumption pattern is
Non-sustainable
and
Consumption Oriented.**

- **High subsidies** of energy consumption which accelerate the depletion of fossil fuel resources, generate additional pollutants with more financial relief to the rich.
- **Low price of energy** which represent an effective incentive for inefficient consumption and prevent profitability from renewable energies



Energy Consumption

- Per capita energy consumption stands at 3.1 toe (similar to that in the Middle East or the EU average), including about 3 000 kWh in 2016.
- **Since 2007 energy consumption growth has almost halved**, dropping from 6.4%/year between 2000 and 2007 to 3.0%/year between 2007 and 2016.

Oil Product Consumption

- Oil consumption **has been decreasing by 2.7% since 2013**. In 2016, it reached 79 Mt. This situation is mostly explained by the increase in the price of motor fuels and by the low economic growth.
- Transport is still the main consuming sector with a growing share over the last years reaching 25% share of final energy consumption.

Energy Consumption

Natural Gas Consumption

- **Gas consumption is skyrocketing**, increasing threefold between 2000 and 2016. It reached 188 bcm in 2016 (62 bcm in 2000).
- Buildings (i.e. residential-services sector) are the largest consumers with 31% in 2016, closely followed by the industry and power sectors (29% each in 2016).
- The share of Transport is about 10% of production, 10% for public services, and about 10 % is used for non energy use like pumping in oil reserves.

Electricity Consumption

- **Electricity consumption is increasing very quickly** (6.2%/year, on average, since 2000) and reached 250 TWh in 2016. Most of the population is electrified (98%). Industry represents 32% of electricity consumption, the residential sector 33%, and the services sector 18%. The remainder (17%) is consumed in agriculture sector.

Energy Consumption (2)

Issues & Prospects

Promote Greater
Efficiency Of Energy
Use

Develop Demand
Side Management

Introduce
Renewable Energies
Into The Energy
Basket

Shadow Pricing
of Energy
Resources

Energy-pricing
Trade-off policies

US Trade
Sanctions

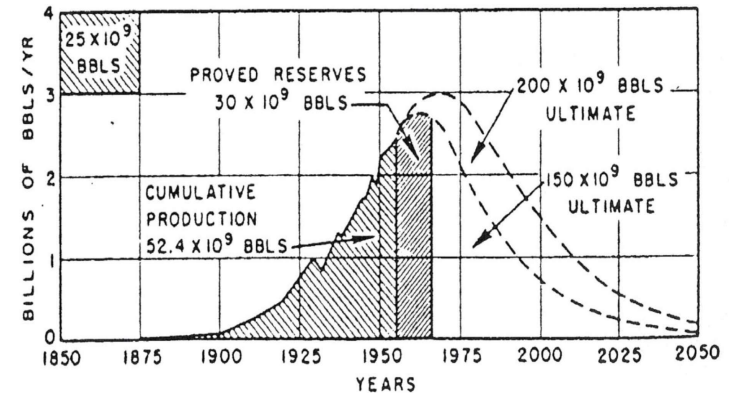
Oil Peak, Oil Prices

It is not about 'running out' – it is about 'peaking'

Hubbert's peak

Hubbert forecast in 1956 that US conventional oil production would peak around 1970. This forecast was widely derided at the time. But US conventional oil production did peak in 1971 – and has declined ever since.

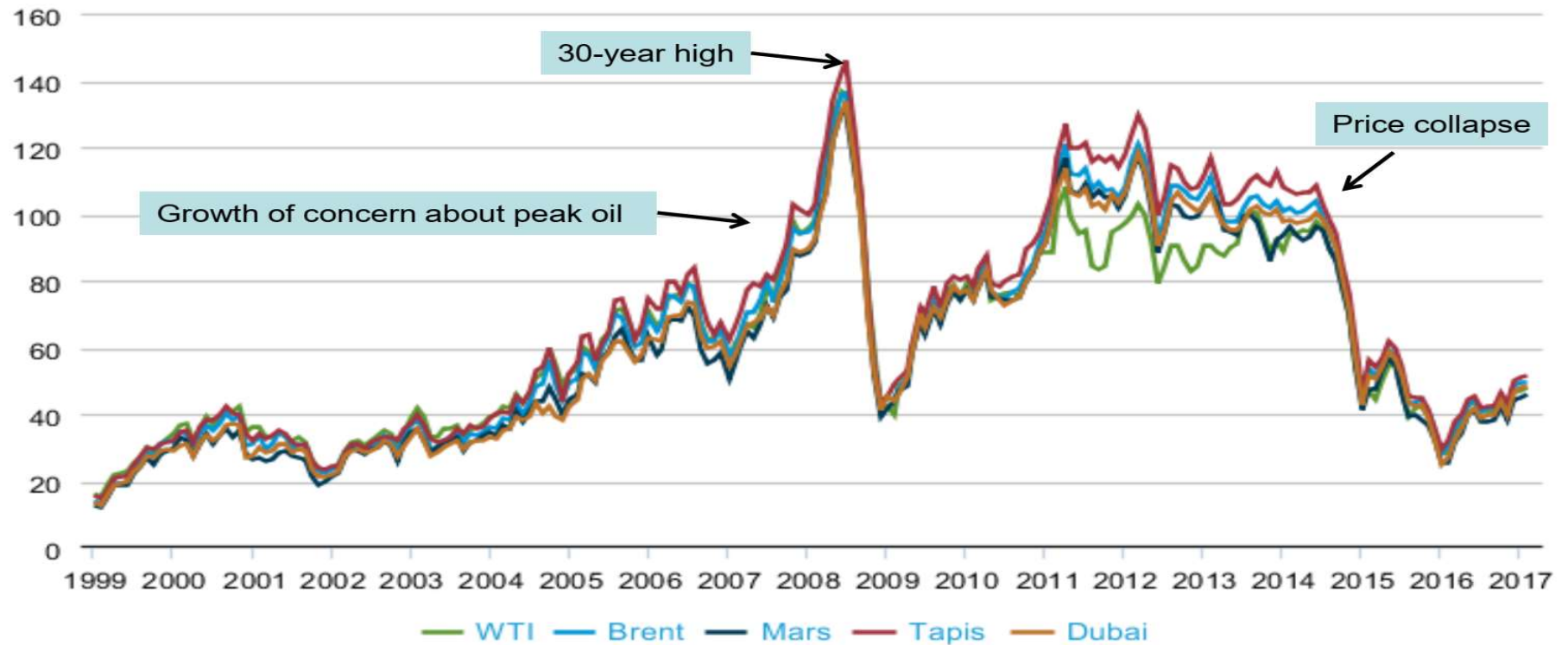
However, this excludes tight oil, partly powerful insight, partly lucky accident.



World Price Trends

World crude oil prices

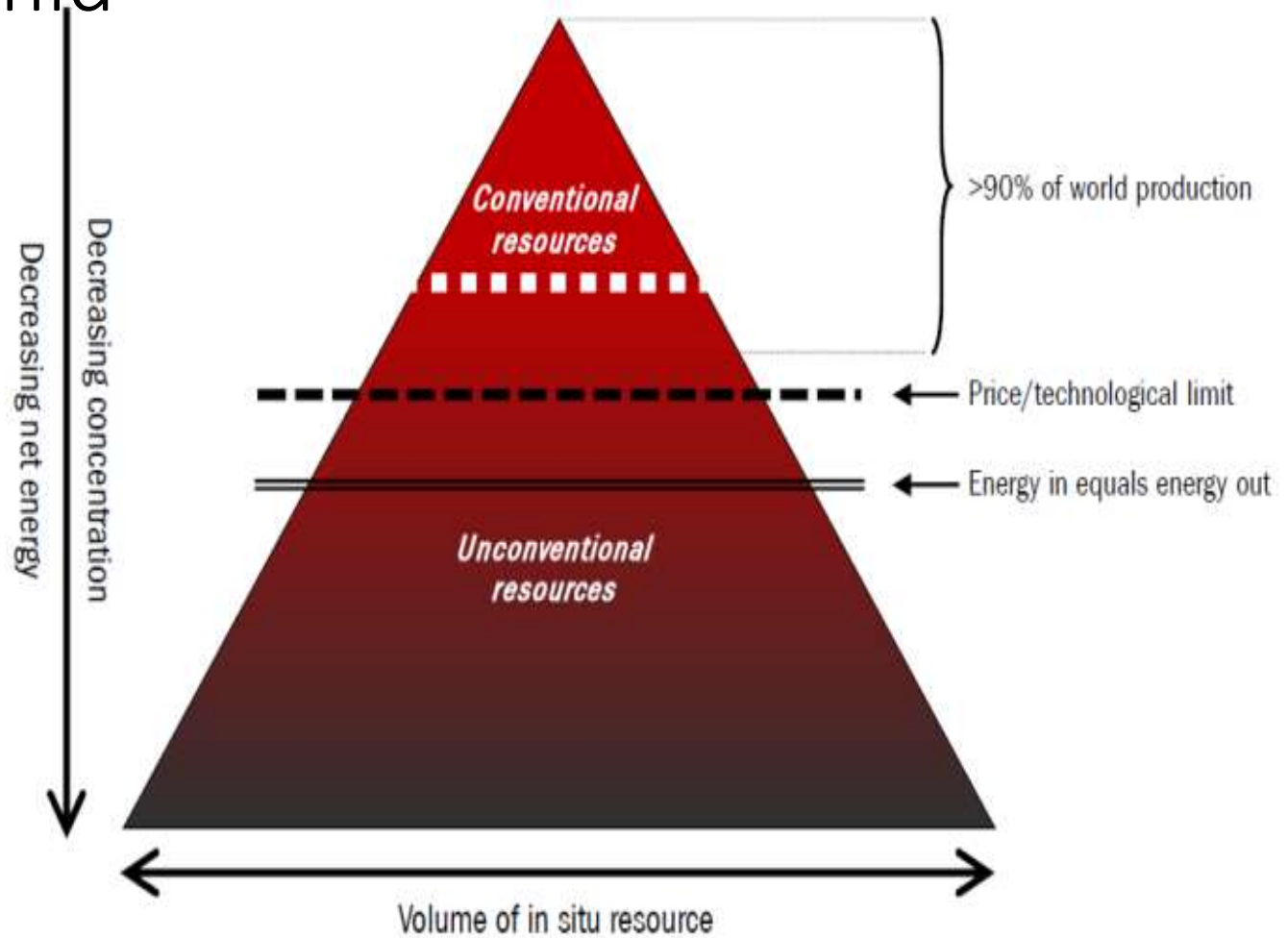
\$/bbl (real 2010 dollars, monthly average)



Source: Bloomberg L.P., Thomson Reuters, EIA

Resource Pyramid

Develop low cost, high quality and easily accessible resources first.
Move progressively to higher cost, poorer quality, less accessible and (often) more environmentally damaging resources.

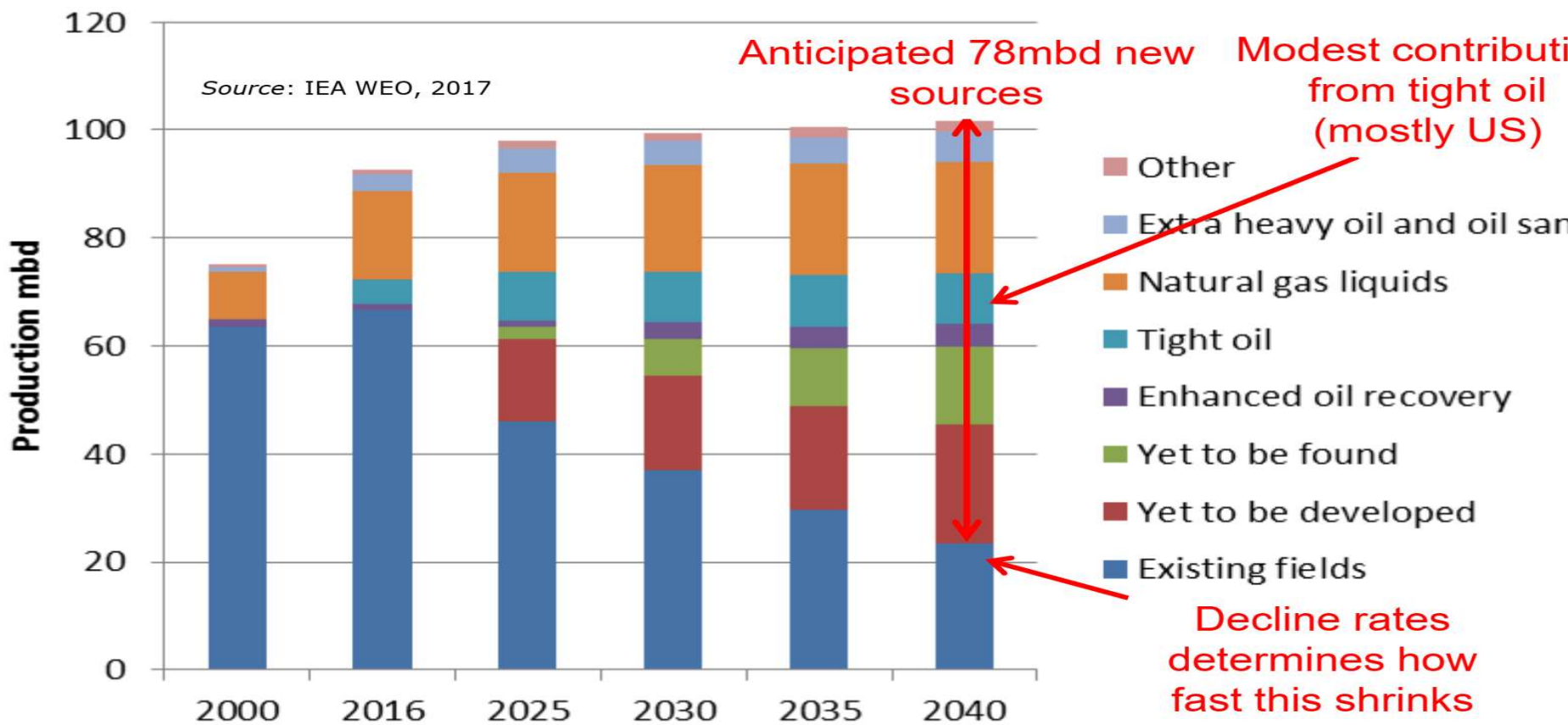


What caused the Price Collapse?

- Slowdown of **demand** growth in OECD countries (recession, peak car, efficiency improvements, EVs etc.)
- **Tight oil** revolution in the US increasing global liquids supply
- **OPEC** not restricting production

Price collapse inhibits upstream investment and encourages demand growth – thereby sowing the seeds for future price rises.

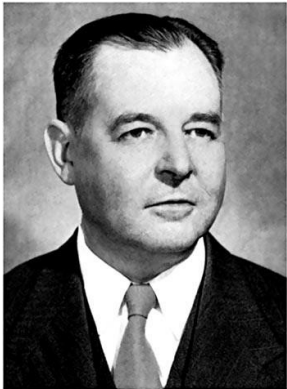
New Policies Scenario 2017





Hotelling's Theory (1931)

- **Owners of non-renewable resources will only produce a supply of their basic commodity if it can *yield* more than available financial instruments.**
- Keep the resource in the ground and hope for a better price the next year, or extract and sell it and invest the proceeds in an *interest-bearing security*.
- King Abdullah, April 12, 2008, Before financial crisis when $IRR=0$: "Let them remain in the ground for our children and grandchildren.. "



Harold Hotelling

Oil Depletion Summary

- Global **crude oil** production has reached a **plateau** and many (e.g. IEA) anticipate a fall in the near to medium term;
- In that sense, concerns about ‘peak oil’ appear valid;
- But prices are low and there is no shortage of **all-liquids** due *in part* to **substitution** of crude oil by other fuels - in particular, **natural gas liquids** (NGLs) and **tight oil**;
- Unclear whether this substitution can continue at a sufficient rate to offset the anticipated decline of crude oil production.

The background features several sets of curved, concentric lines in light gray and white, creating a sense of motion or depth. A blue rectangular box with a white border is positioned on the left side, containing the title text.

Depletion, Availability, Criticality

- Long-standing concerns about the physical **depletion** of non-renewable resources;
- Depletion threatens resource **availability**, but this also depends upon *technology* (extraction, separation, processing, use and recycling), *economics* and *politics*;
- Availability influences resource **criticality**, but this also depends upon economic importance and **substitutability**;
- Debates about resource depletion hinge upon **estimates** of resource size and **projections** of future supply and demand – both of which are uncertain and contested.

Policies and Prospects

A landscape photograph showing a field of tall grasses in the foreground, a line of trees in the middle ground, and a bright sky above.



Existing Policies

- The **MoE** has been obliged to generate **5,000 MWatt power** associated with **renewable energy** relying on the “Law on the **Sixth Five-Year Economic, Cultural, and Social Development Plan** for 1396-1400 (2016 - 2021)”.
- The installed capacity of existing powerplants is aggregated up to **77,000 MWatt** mostly associated with fossil fuels (60, 000 MWatt), with a small portion (450 MWatt) generated due to renewables plus 700 MWatt under construction.

Challenges in Oil and Gas Upstream Industries

- Lack of non-governmental or foreign investment in exploration, production and development of gas and oil fields, specially in the last six (6) years
- Aggregated debts of MoP unpaid to international oil companies
- Mismanagement
 - Total pulls out of IPC gas deal for South Pars because of US Trade Sanctions against Iran.
 - The contract between NIOC and Zarubezhneft company (Russia) is to be suspended for the oil fields Aban and West Paydar.
 - Most MOUs are signed without transforming to any contracts or executive plans.



Strategic Actions



- Choosing strategic customers of Crude Oil e.g. India, China, and South Korea
- Confronting with the US trade sanctions by (even non-significant) oil trade with European countries
- Bypassing the trade sanctions through oil exporting ways
- Putting into operation the Persian Gulf Refinery 3th phase in order to meet self-sufficiency in gasoline domestic demand
- Reconsidering Oil Price in next year budget.

Three Strategic Policies - recommended

- Modification and rehabilitation the existing national refineries for acquiring the optimum **efficiency** of their gas feeding
- Starting up the **Persian Gulf Refinery 3th phase** for confronting the sanctions against gasoline imports
- Cooperation with strategic oil customers for **oil export vs gasoline import** due to growing gasoline demand 7-10% annually



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