

**INTERNATIONAL
BEIRUT ENERGY
FORUM 2017**
For Sustainable Development
20th September 2017, Beirut - Lebanon

Economic and Social Commission for Western Asia

Natural Gas: Clean Alternative Fuel in the Transportation Sector

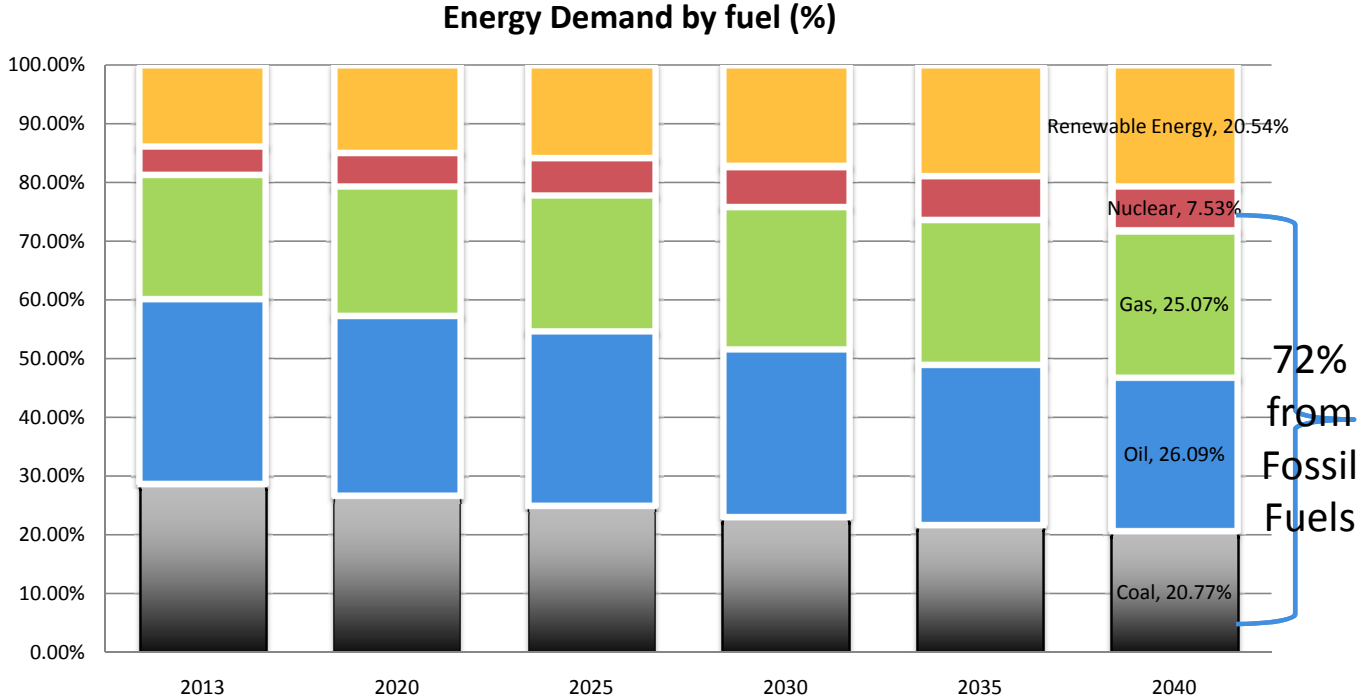


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**Total consumption of fossil fuels grows under most projections
natural gas is gaining market share relative to coal and oil**



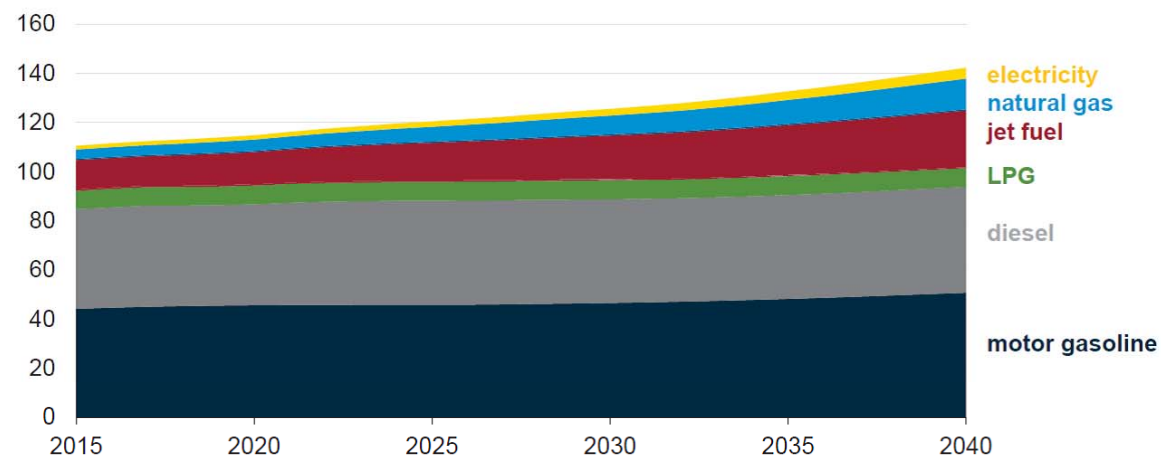
source: IEO2016

Electricity remains a minor fuel for the world's transportation energy use.....Natural gas have the potential to displace liquid fuels

Transportation sector energy consumption is projected to increase by an annual average rate of **1.4%** between 2010 and 2040

The share of natural gas as a transportation fuel grows from **3% in 2012 to 11% in 2040**

World transportation energy consumption
quadrillion Btu

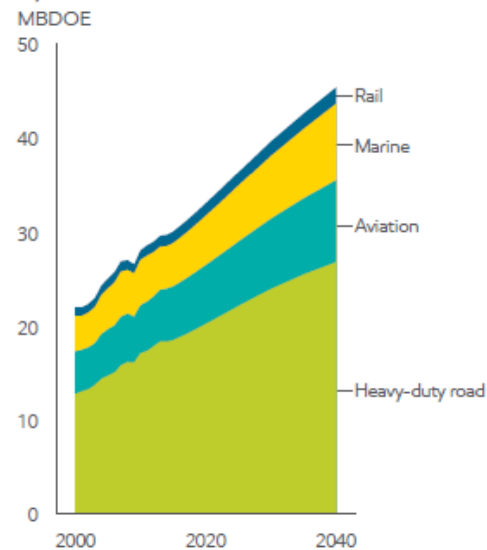


**Gasoline and Diesel lead the existing Transportation fuel patterns....but
Natural Gas has the potential to contribute to future Sustainable Transport
... and address Climate Change and Air Pollution**

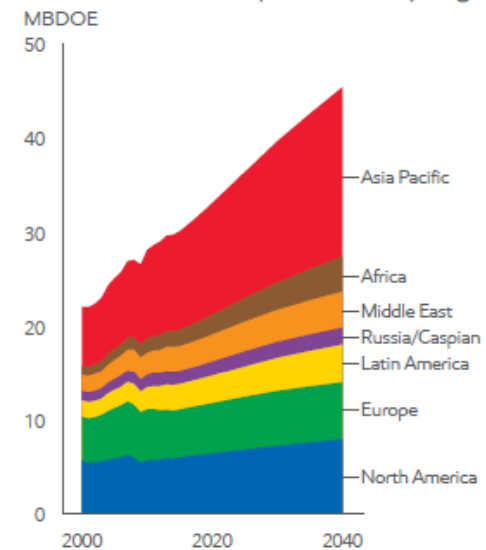
Outlook of Natural Gas in the Transportation Sector

- **50%** of Buses fuel consumption in 2040, **17%** of freight rail, **7%** of light-duty vehicles, **6%** of domestic marine vessels.
- LNG is preferred for marine shipping and heavy duty vehicles.
- CNG is more appropriate for smaller vehicles, already popular in the Asia Pacific Region.

Commercial transportation demand by sector



Commercial transportation by region



Source: Exxon Mobil, 2016

NGV: Major Opportunities & Challenges

Opportunities & Benefits

- Reduce urban air pollution and GHG,
- Reduce oil, diesel, gasoline imports or take benefit from their export revenues,
- Create jobs and strengthen the economy,
- More than 24 million NGV worldwide as of July 2017,
- More than 24,000 refueling stations,
- 2% of road transport demand (around 1% in the Arab Region).

Challenges

- Standards for equipment and processes have not been harmonized,
- Security of fuel supply and demand,
- Shortage of refueling infrastructure,
- Insufficient policy actions,
- Technology transfer and maturity,
- High up front and maintenance costs,
- Switching to a new fuel and rigid path dependency,
- Public perception of LNG as a dangerous fuel.

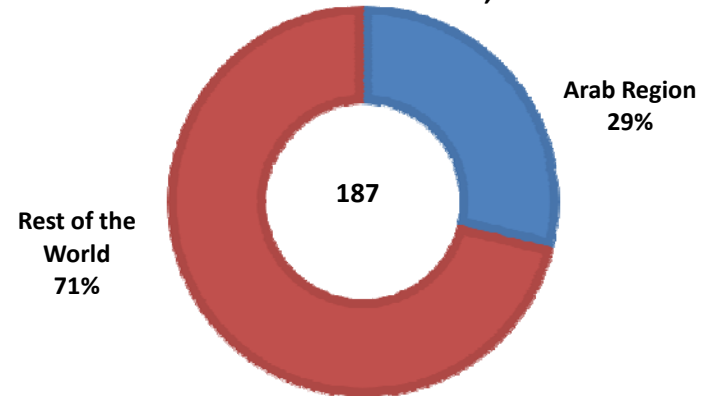
Reserves Abundance in the Arab Region

Oil Proved Reserves, 2016

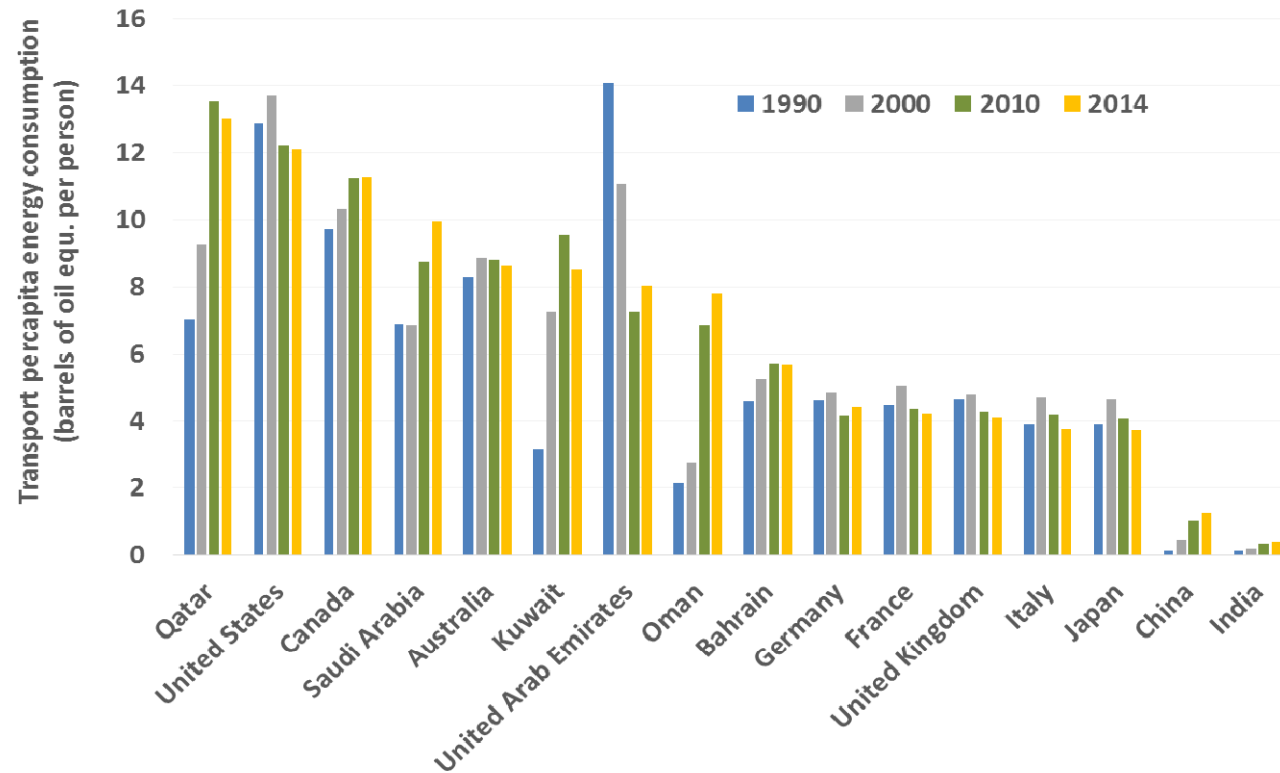


Source: BP Statistical Review, 2017

Gas Proved Reserves, 2016



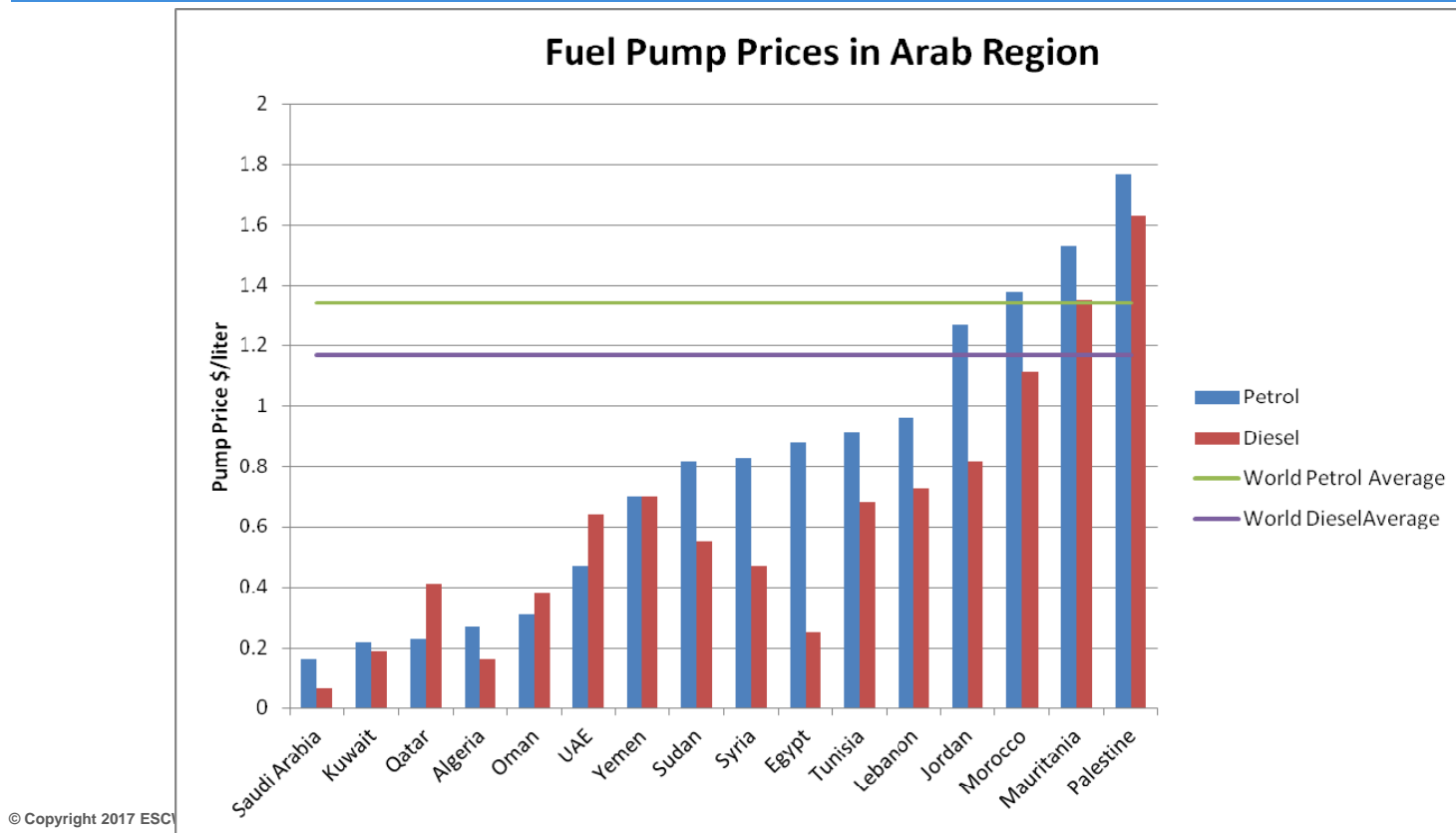
The Arab Countries display high level of energy intensity



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Source: Enerdata

Cost and Economics



Source: World Bank, 2016

Barriers for natural gas use in transportation sector in the Arab region

Political and regulatory framework:

- Subsidized prices for petroleum products
- Limited and/or lack of financial incentives
- Performance based Standards for gas quality, refueling stations, vehicles....
- Public/Private Partnership

Technology availability:

- Lack of local manufacturing of NGVs, components, conversion to NGV, and maintenance
- Vehicle imported and insufficient incentives for NGVs
- Potential of Electric vehicle vrs NGV

Cost and Economics:

- Large Price differential between gasoline/diesel and CNG prices.
- Natural gas supply availability
- Absence of regional gas market between the Arab countries
- Transportation Choices and Social / Behavioural Aspects

Infrastructure:

- Few NG refueling transmission and distribution networks
- Perception of commercial risk to use NG for the LNG fleet

Priority Areas for removing Barriers to the Use of Natural Gas as a Transportation Fuel in Lebanon

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- Development of potential gas resources and adequate gas national strategy
 - Sector reforms & restructuring energy subsidy and pricing systems
 - Financial incentives for conversion/repowering of gasoline & diesel vehicles to NG and for purchase of NGVs
 - Reinforcing standards, codes, and regulations for NGVs use
 - Incentivize the installation of natural gas fuel pumps at service stations
 - Develop public transportation and encourage the use of NGVs
 - Stimulate the production of Local content/spare parts and NGVs maintenance facilities

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Thank YOU