

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

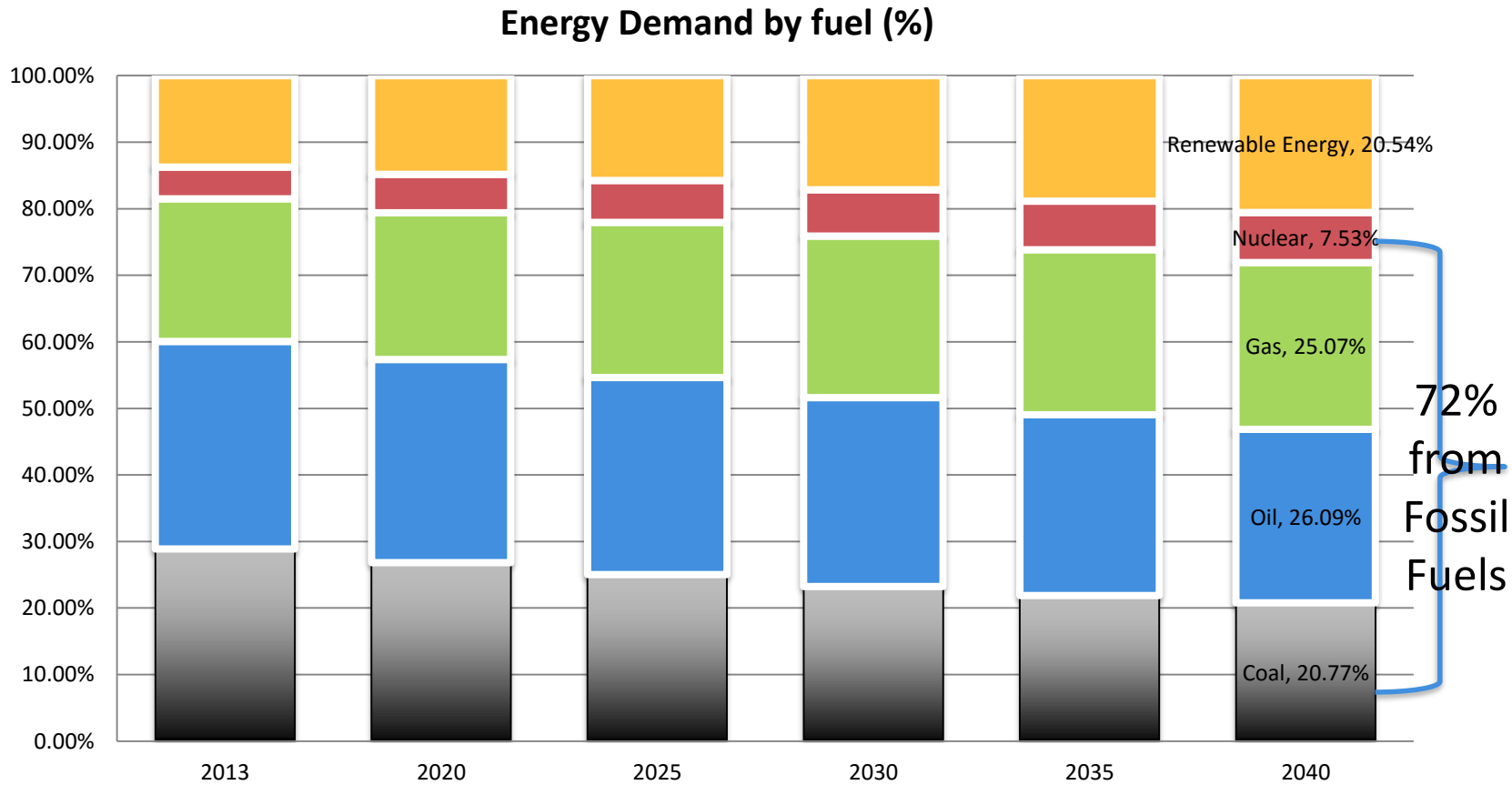


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Total consumption of fossil fuels grows under most projectionsnatural gas is gaining market share relative to coal and oil



source: IEO2016

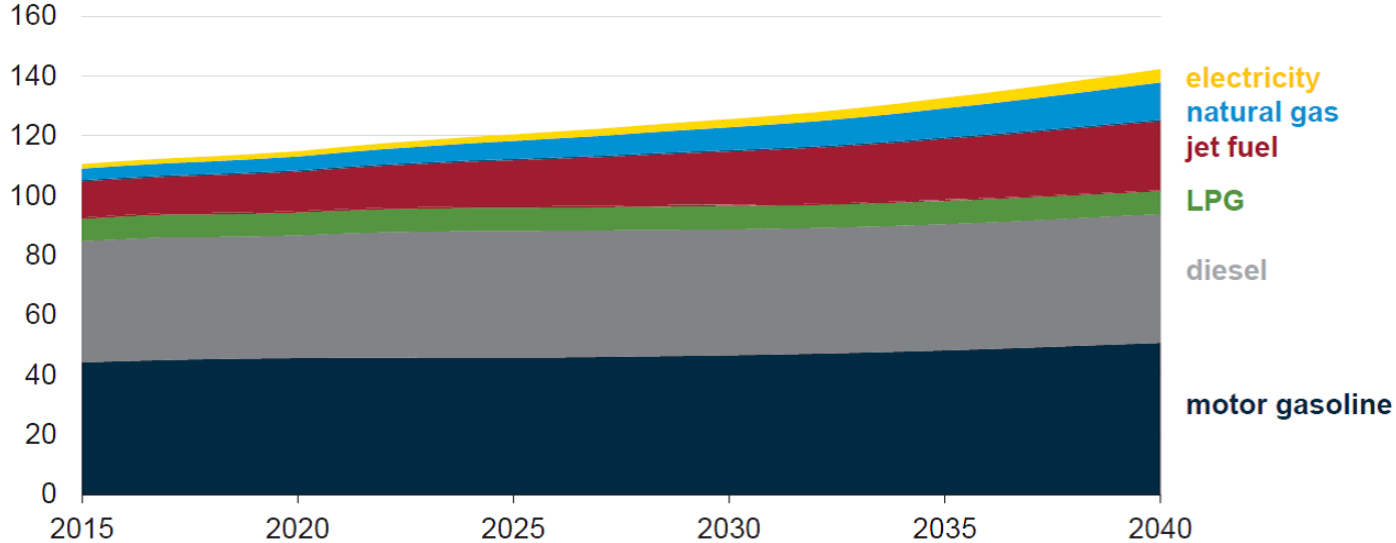
Electricity remains a minor fuel for the world's transportation energy use.....Natural gas have the potential to displace liquid fuels

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

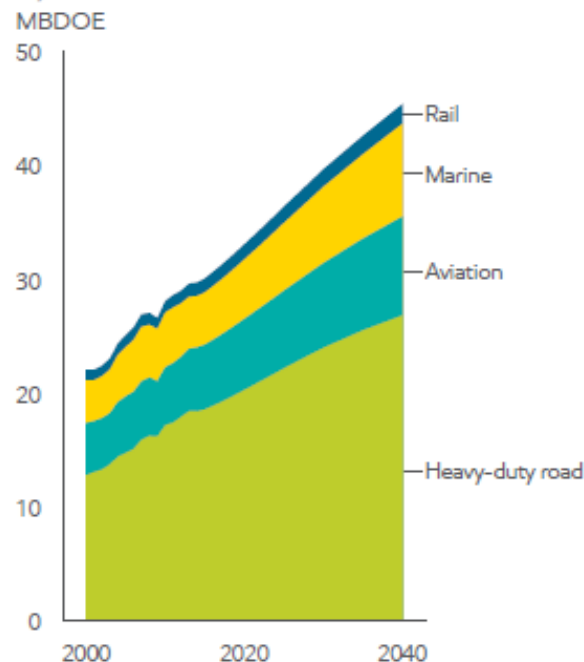


Gasoline and Diesel lead the existing Transportation fuel patterns....but
Natural Gas has the potential to contribute to future Sustainable Transport
... and address Climate Change and Air Pollution

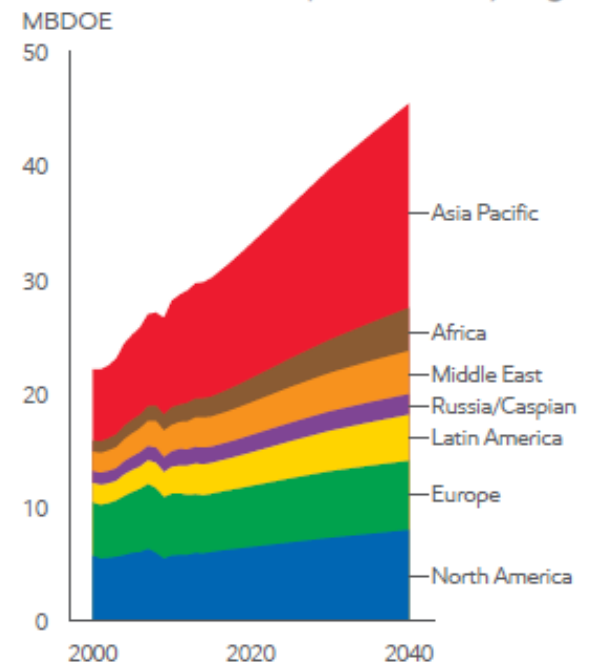
Outlook of Natural Gas in the Transportation Sector

- **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

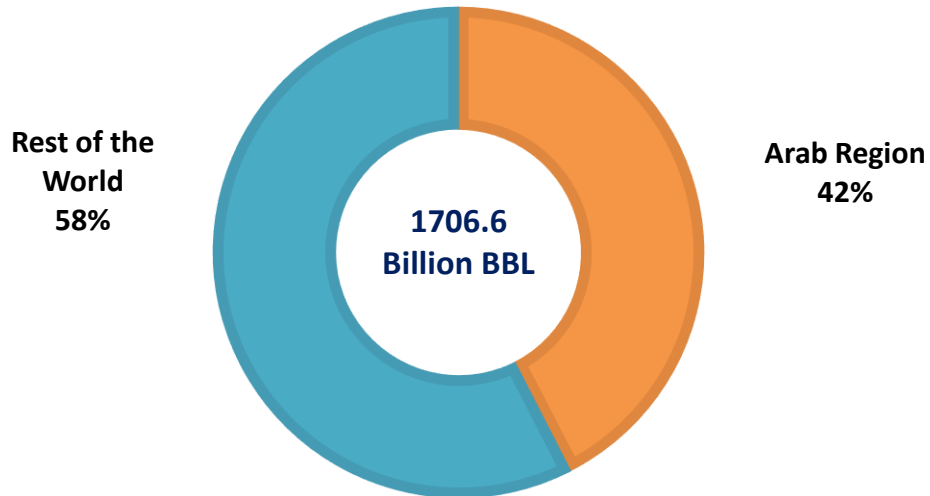
- Reduce urban air pollution and GHG,
- Reduce oil, diesel, gasoline imports or take benefit from their export revenues,
- Create jobs and strengthen the economy,
- More than 24 million NGV worldwide as of July 2017,
- More than 24,000 refueling stations,
- 2% of road transport demand (around 1% in the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

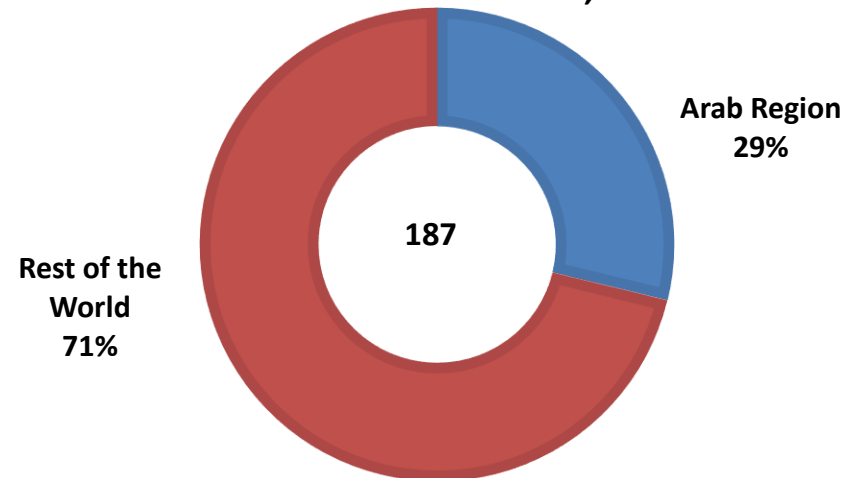
Reserves Abundance in the Arab Region

Oil Proved Reserves, 2016

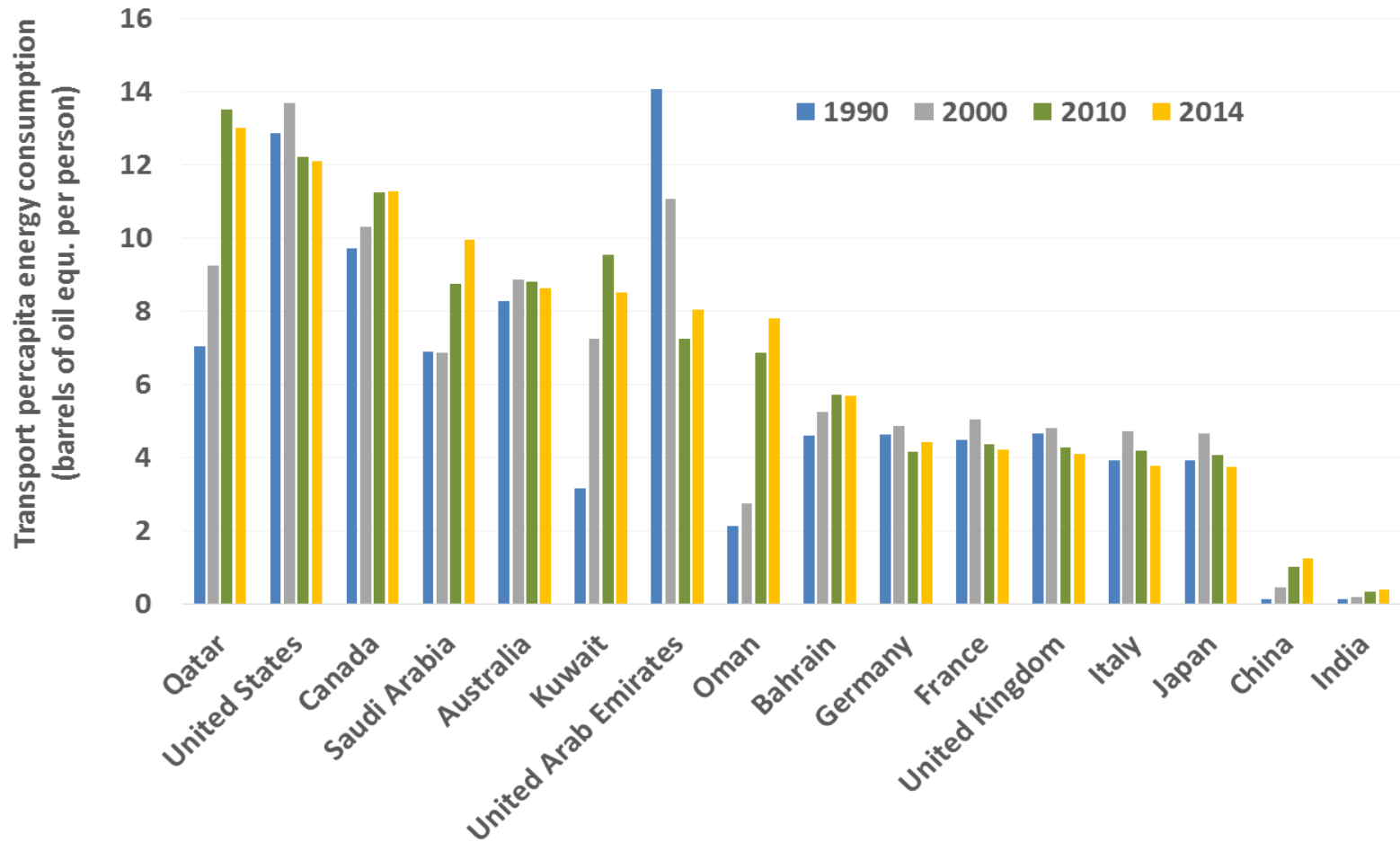


Source: BP Statistical Review, 2017

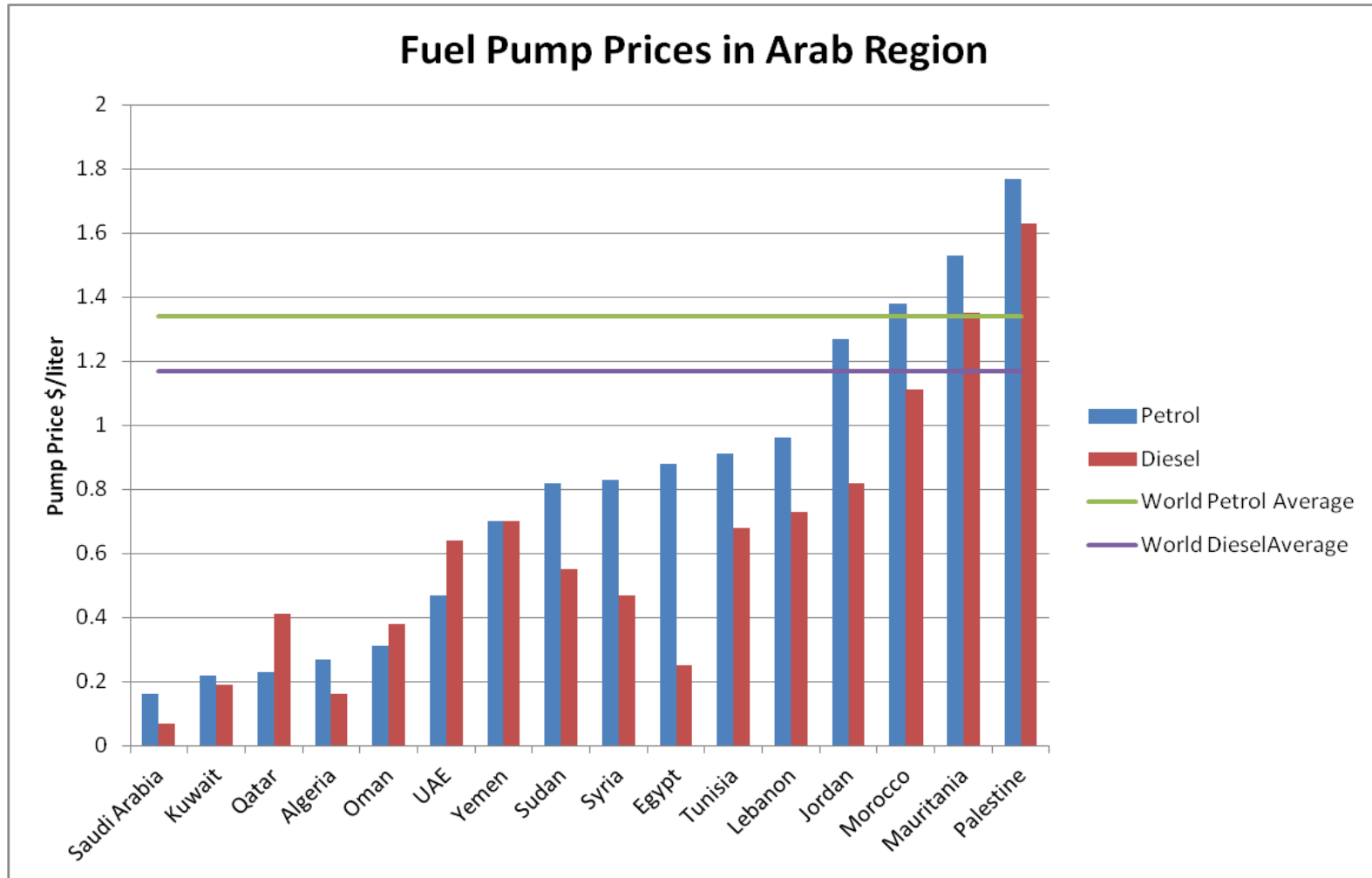
Gas Proved Reserves, 2016



The Arab Countries display high level of energy intensity



Cost and Economics



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

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