



The Role of Natural Gas in the Energy Transition

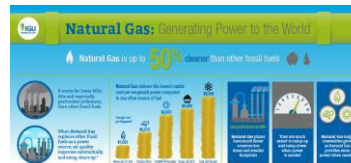
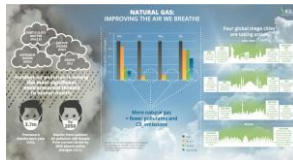
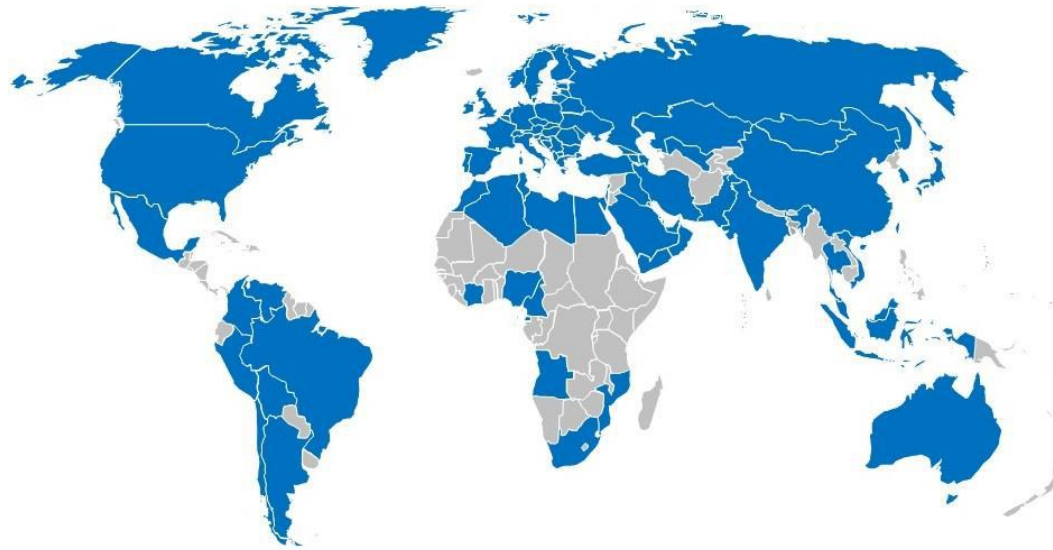


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Marcel Kramer
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International Gas Union
and
President , Energy Delta Institute

**As the ‘ global voice of gas ‘ ,
IGU seeks to improve the quality of life by advancing gas as a
key contributor to a sustainable energy future**

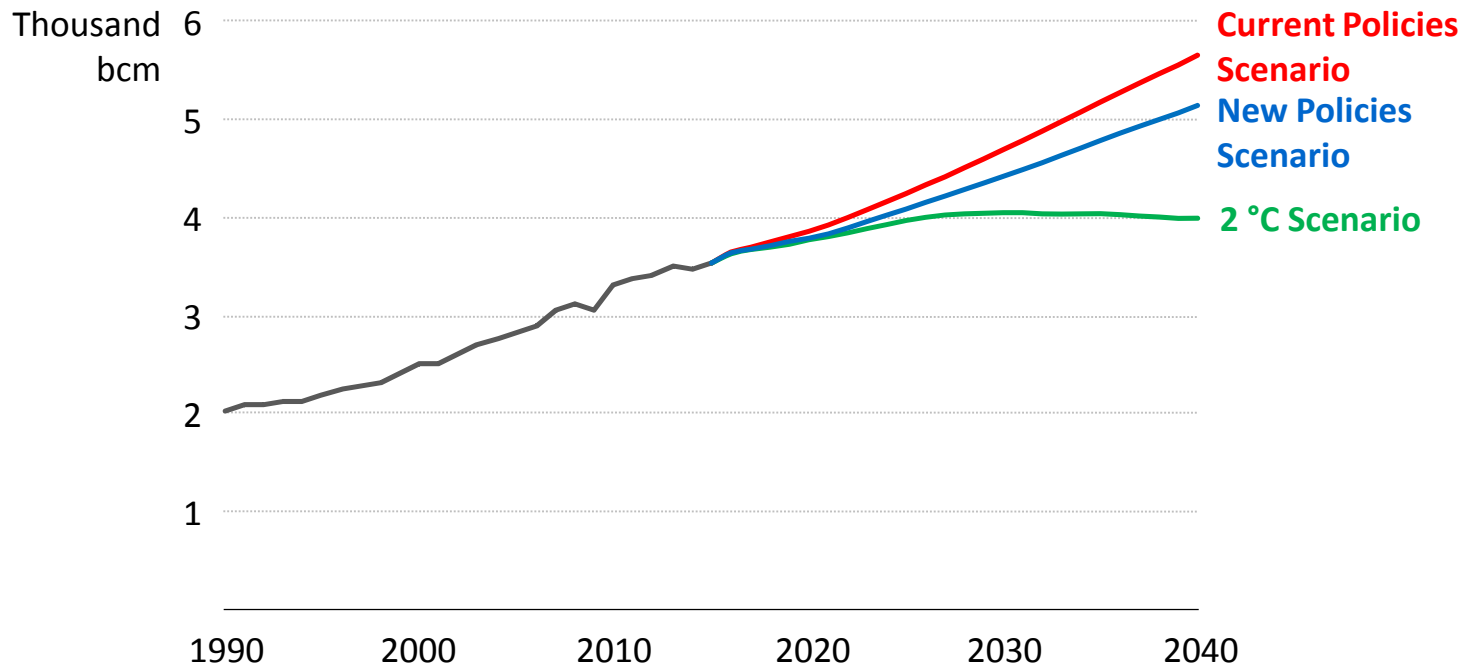


Policies aiming at climate change will strongly affect fossil fuel markets

- Growth in gas demand is expected in almost all scenarios
- The efforts to reduce carbon emissions and improve air quality represent a clear direction requiring reduced use of fossil fuels
- There are many combinations of coal, oil and gas which could make up the fossil portion of the world's energy supply under the INDC's
- The mix will vary across power, heat and transport uses and between regions
- The mix will also be driven by the relative costs of different power sources in each region as exemplified by shale gas developments in the U.S., EU carbon policies, and changing Asian and LNG demand projections
- Key drivers will be concerns over health and air quality, technological advances in the energy sector, and the continuing falling costs of renewable energy, greater efficiency, new storage technologies, higher carbon prices, and relative commodity prices

IEA : growth story for natural gas

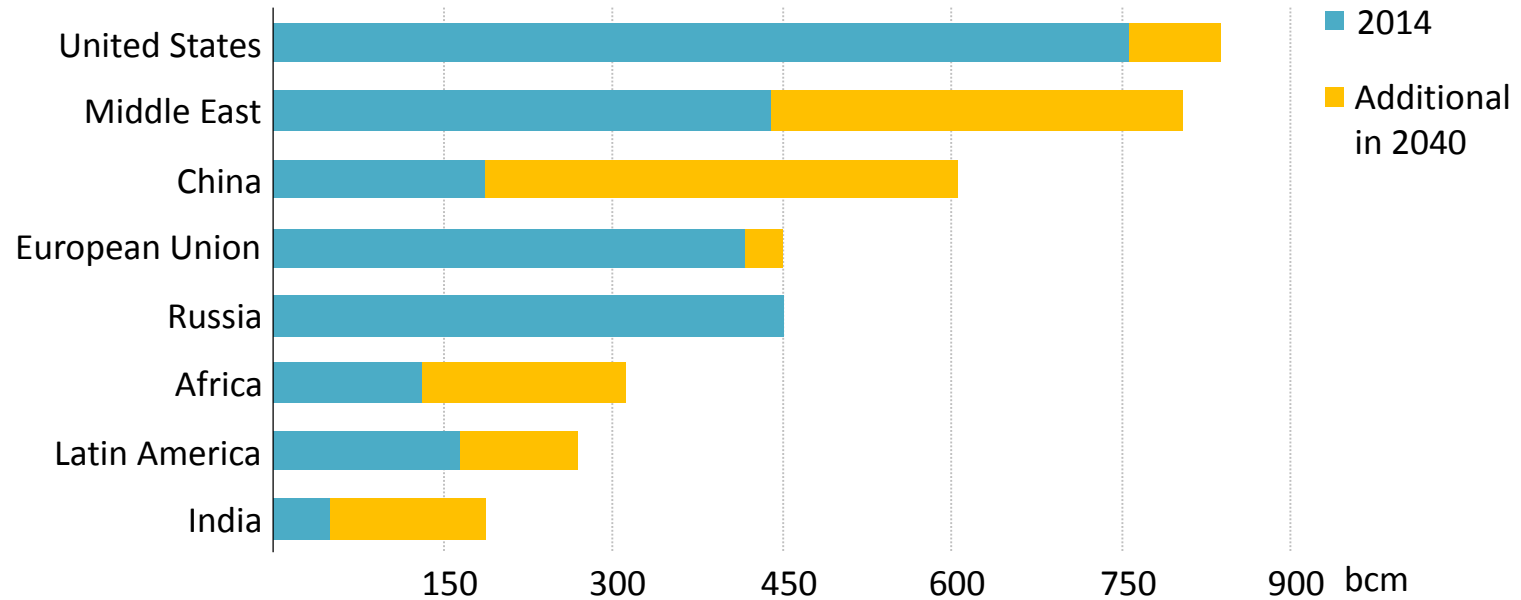
World natural gas demand by scenario



Global gas demand is projected to plateau from the late-2020s in the 2 °C Scenario

Gas demand growth: a question of geography

Gas demand by selected regions in the New Policies Scenario



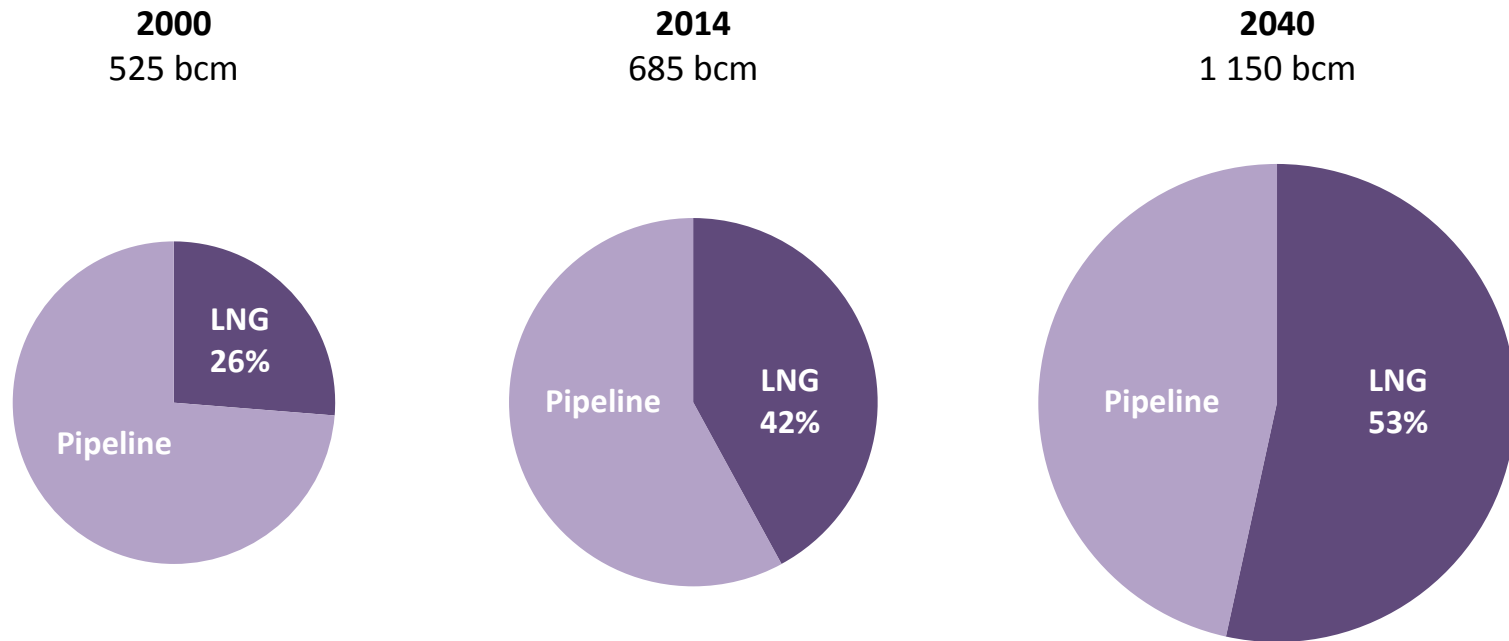
Developing countries lead the growth in global gas demand

What is needed to realize the full potential of gas as an effective partner for renewables?

- Policies reflecting the full costs of CO2 incl. health care costs
- Effective, transparent and economy wide carbon pricing instruments and stricter air quality, emissions regulations and efficiency standards
- Regulatory changes that enable the integration of energies within decentralized smart energy grids
- Well-designed capacity remuneration mechanisms (CRM) for natural gas power generation esp. in case of rapid deployment of renewable energies
- Greater financial support towards investments in innovation and technology which capture the complementarity of natural gas and renewable energy systems
- Continuous focus on the gas industry's license to operate (ensure safety, reliability)
- The transition to a more global natural gas market must be advanced (liquidity , competitiveness, security of supply, pipelines and LNG)

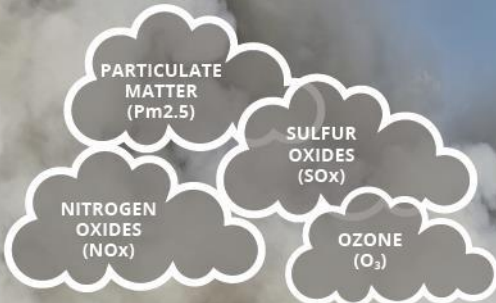
A wave of LNG spurs a second natural gas revolution, globalization of gas trade

Share of LNG in global long-distance gas trade in the New Policies Scenario



Contractual terms & pricing methods are all being tested as new LNG from Australia, the US & others collides into an already well-supplied market

Natural Gas. An agent of change in the fight against urban air pollution



Outdoor air pollution is among the most significant environmental threats to human health:

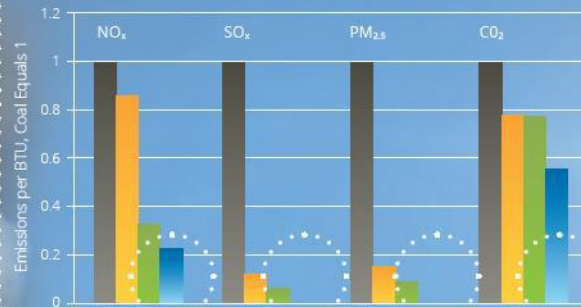


Premature deaths each year (WHO)



Deaths from outdoor air pollution will double from current levels by 2050 absent policy changes (OECD)

NATURAL GAS: IMPROVING THE AIR WE BREATHE



More natural gas = fewer pollutants and CO₂ emissions

SOURCE: EPA AP-42 Compilation of Air Pollutant Emission Factors; CenSARA Area Combustion Emissions Inventory Enhancement Project – Final Report 2011









Four global mega cities are taking action



■ Coal
■ No. 6 Oil
■ No. 2 Oil
■ Natural Gas

Natural Gas enabling a cleaner transport sector

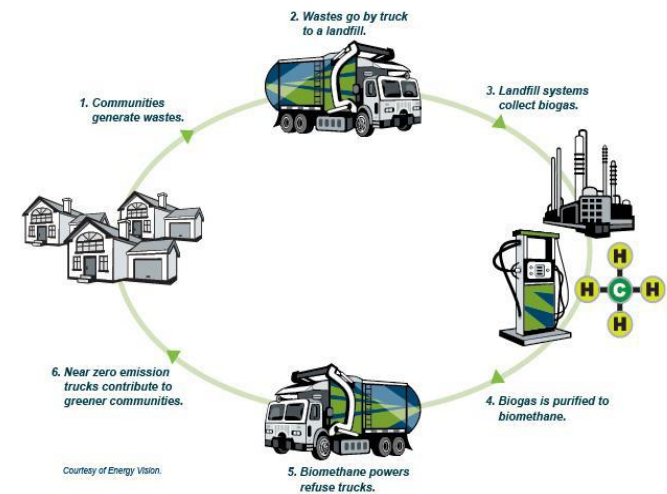
LOWER GREENHOUSE GAS EMISSIONS

	Extraction	Processing	Transportation and storage	Emissions at end use	Total life cycle
Natural gas (LNG)	 94 g/km	 25 g/km	 55 g/km	 842 g/km	1016 g/km
Diesel	 148 g/km	 132 g/km	 6 g/km	 1079 g/km	

Based on Natural Resources Canada's GHGenius model, version 3.15.
Assumes use of Westport Innovations 15 litre HD engine system.



RENEWABLE NATURAL GAS CYCLE



- The global gas industry fully supports efforts towards a sustainable energy future.
- It is a future that must consider all aspects of sustainability, economic, social and environmental.
- **There is a urgent urban air quality crisis**
- It would be extremely difficult to provide sufficient energy for rapid world economic growth while at the same time phasing out fossil energy for environmental reasons.
- Natural gas provides the fastest and most economic path to a less carbon intensive and cleaner air world.

OUTLOOK FOR GAS – demand projected to grow by 2%/year over the long term

- Expected demand growth will make gas the biggest fossil fuel in use by 2040
- LNG will play a critical role in meeting demand with annual growth rates of 4-5%
- Despite rapid deployment of renewable energies, fossil fuel market share will remain very large. In this context, gas is a destination fuel.
- Policy frameworks however need to develop in support of gas to fully capture its advantages on the road to a more sustainable energy mix

THE ROLE OF GAS IN THE ENERGY MIX

- Gas is a major contributor to reducing carbon emissions and cleaning polluted air
- Switching power generation from coal to gas has the greatest short term impact
- Gas is advancing as a transport fuel, the potential for increasing gas applications is enormous and would have a significant positive impact
- There are similar opportunities for gas in the heating sector
- Infrastructure regulations and permitting should encourage investment in gas systems which enable/accelerate more sustainable development