Global Gas Markets Supporting Growth and Sustainability

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Case Studies in Improving Urban Air Quality 2015
New York, Istanbul, Toronto, Beijing

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

- **3.7m** premature deaths each year (WHO)
- Deaths from outdoor air pollution will double from current levels by 2050 absent policy changes (OECD)

More natural gas = fewer pollutants and CO₂ emissions

### Natural Gas:
**Improving the Air We Breathe**

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<th>NO₂</th>
<th>SO₂</th>
<th>PM₂.₅</th>
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<td>Natural Gas</td>
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Four global mega cities are taking action:

- **New York**
  - 2007: D & PM2.5 above U.S. average
  - 2007: PlanyC: Making New York City air as clean as the cleanest of any large city in the U.S.
  - September 2013: 50% concentration in winter (0.1.2013 down 69% compared to 2009-2009)

- **Istanbul**
  - 1992: Annual mean SO₂ concentration 11x WHO guidelines
  - 1992: Best of most polluting lignite coal
  - 1997: Particulate matter declined to just above 50 µg/m³

- **Toronto**
  - 2004: 1.1/30 premature deaths & 5,000 hospitalizations per year
  - 2005-2014: Phase-out of coal usage in power generation
  - 2004-2014: PM10, SO₂, & NOₓ emissions from power generation declined by 99%, 91%, & 65%

- **Beijing**
  - 2013/2014: Average PM2.5 levels more than 10x WHO recommended levels
  - 2014: Premature deaths & hospitalizations reduced by 1,100 & 3,500

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Large groups cite fact’s green benefits as they argue for more favourable treatment.

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The natural gas industry is seeking to separate itself from other fossil fuels, promoting the dramatic improvements in air quality achieved by cities including New York, Toronto and Istanbul through shifting away from coal and oil.

At the international climate talks in Paris, gas producers are arguing that they should receive more favorable treatment from governments because of the environmental benefits of gas.

Large oil and gas groups including Royal Dutch Shell BV, Total and Eni have signed a statement backing efforts to curb carbon dioxide emissions, and see an opportunity in shifting power generation from coal to gas.

Coal-fired power stations release roughly twice as much carbon dioxide as gas-fired plants for the equivalent output of electricity.

The International Gas Union, whose members are industry associations and leading gas companies including Gazprom of Russia, Saudi Aramco and QatarGas, is also highlighting the benefits in terms of reduced local pollution from switching from coal and oil to gas.

An estimated 5.5bn people worldwide die each year as a result of ambient air pollution, and many of those deaths are believed to be caused by energy use.

In emerging economies including India and China, many cities suffer from choking smog that is in part caused by burning coal, oil and petrol.

Cities that have used more gas and less coal and oil have achieved large cuts in pollutants that cause respiratory illnesses, including the particulates—small airborne particles of soot and liquids—that are responsible for lung cancer, heart attacks, strokes and asthma attacks.

Mel Ydecoret, of the IGU, which launched a report in Paris yesterday setting out the industry’s case, said: “We believe that gas stands apart, and should not be lumped into the same bucket as other fossil fuels.”

The IGU argued that cities such as New York showed how urban air pollution could be tackled. In New York City, the utility Consolidated Edison has, since 2011, switched almost 1,000 large buildings from using heavy oil for heating to gas, encouraged by an initiative launched by the mayor and backed by the environmental defence fund.

Gas sales across the company’s territory have risen from 1.0bn British thermal units on peak day in 2005 to 1.6bn on a peak day this year.

Sitko Wells, of the American Lung Association, a group that campaigns to cut respiratory illnesses, said that, along with other changes including tighter laws on pollution from coal-fired power stations, the reduced use of burning oil in New York had contributed to a significant improvement in air quality.

The weight of particulate matter in New York’s air has dropped from an annual average of 17 micrograms per cubic metre in 2003-05 to 16 micrograms per cubic metre in 2012-14.

Other cities including Toronto and Istanbul have reports of similar improvements, Beijing, which suffers from notorious air quality problems, has been working to cut pollution through a series of measures including relocation of heavy industry, increased use of public transport and the conversion of all power plants downtown to gas.

By 2030, Beijing expects to derive 33 per cent of its energy from gas, and just 6 per cent from coal, said Yan Li, general manager of Beijing Gas Group.

Path Thiel, executive director of the International Energy Agency, the watchdog backed by rich countries’ governments, said in New York this week that the agency’s vision from 2015 of a possible “golden age of gas” had not come to pass.

As a fuel for power generation in Asia, he said, gas was being squeezed between renewables such as solar power that were backed by government mandates, and cheap coal. In both China and India, domestic gas production has been disappointing, and concerns about energy security and the cost of liquefied natural gas are a brake on demand.

There are also environmental problems associated with gas. Methane, the chief component of natural gas, is also a greenhouse gas, so leaks from pipelines and other equipment contribute to global warming.

Gas facilities can also emit volatile organic compounds that contribute to the formation of smog.

Scott Pearson, director of the sustainable energy division at the US Economic Commission for Europe, a policy promotion body, agreed there was a vital role for gas. “There is no plausible scenarios that doesn’t include a significant proportion of the energy mix being fossil fuels for the near to medium term.”

“Governments need to put in place policies that recognize the benefits that natural gas can bring.”
2016 World LNG Report

17 countries exported LNG in 2015

- **301.5 MTPA**
  - Global Nominal Liquefaction Capacity, January 2016

- **141.5 MTPA**
  - Under Construction, January 2016

- **890 MTPA**
  - Proposed, January 2016

- **+46%**
  - Growth Expected by 2021

**European LNG imports: +4.6MT**
- **UK +1.3MT**
- Qatar alone exported nearly one-third of global trade – 77.8 MT

4 new countries started importing LNG in 2015 – Egypt, Jordan, Pakistan and Poland

33 countries imported LNG in 2015 - Asia-Pacific (-5.1MT) and Asia markets import 71.7% of total imports

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Case Studies in Enabling Clean Energies

District Energy System Integrates Solar and Gas

- Fire Department Transportation Bureau
- FOLEO Osaka Dome City
- TANE General Hospital
- Iwasaki Energy Center (DHC Plant)
- ICC Building
- SUPER VIVA HOME Osaka Dome City
- Power Supply Area
- DHC Area
- Large shopping mall
- KYOCERA DOME OSAKA
Figure 5.11: Asia Price Formation 2005 to 2015
Outdoor air pollution is among the most significant environmental threats to human health:

- Premature Deaths in the EU (EEA)
- Total Health-related Costs associated with air pollution (EEA)

More natural gas = fewer pollutants and CO₂ emissions

Four European Cities Take Action:

- **Berlin**
  - 1990: SO₂ emissions at 2880 t/a
  - 2015: 80% reduction
  - 2016: 67% of households use natural gas

- **Dublin**
  - 1980: 50% of pollution from domestic coal
  - 1990: 100% of households use natural gas
  - 2015: “Zero smog” line drawn with 50% reduction in residential sector

- **Krakow**
  - 1990: PM₁₀ emissions declined by 50%
  - 2016: City-wide coal ban implemented by 2016

- **Rotterdam**
  - 2014: PM₁₀ concentrations exceeded EU quality limits on 109 out of 365 days
  - 2016: 50% reduction in NOₓ emissions

We refer to the IGU GSAP2014 Terrorism and Natural Gas: Case Studies in Improving Urban Air Quality 2016 Berlin, Dublin, Krakow, Rotterdam.
Required Policy Support

• Strong and predictable carbon price

• Continued market reform; clear and transparent market price signals and increased liquidity

• Continued support for free trade of LNG

• Stable and predictable regulatory frameworks