



Urban Air Quality

The world's single greatest environmental risk to health

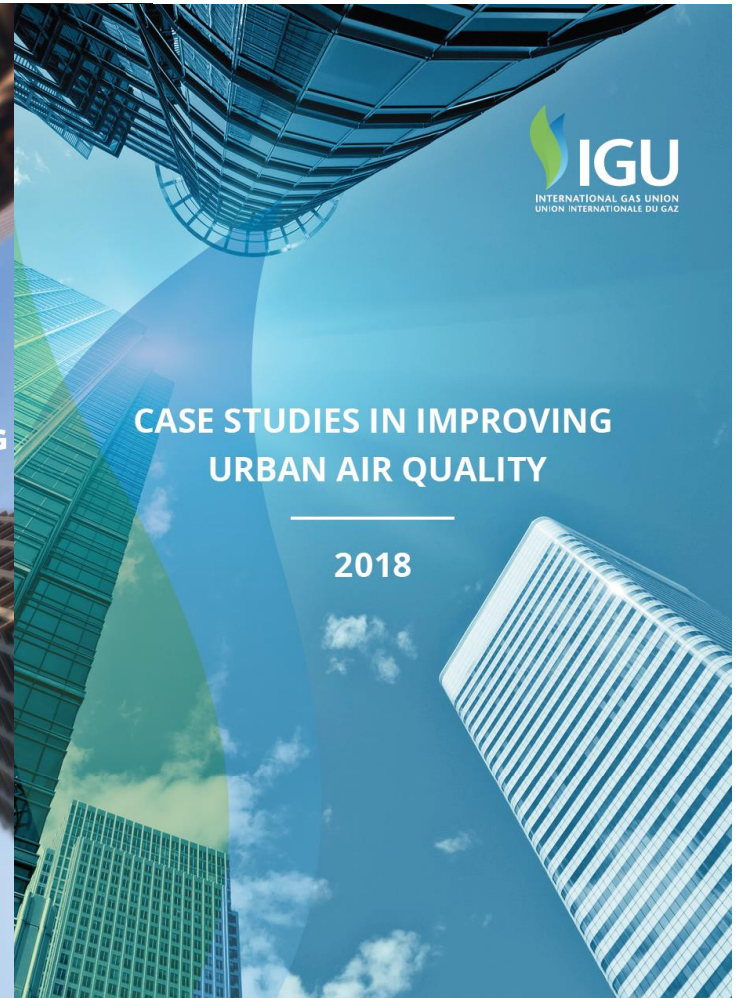
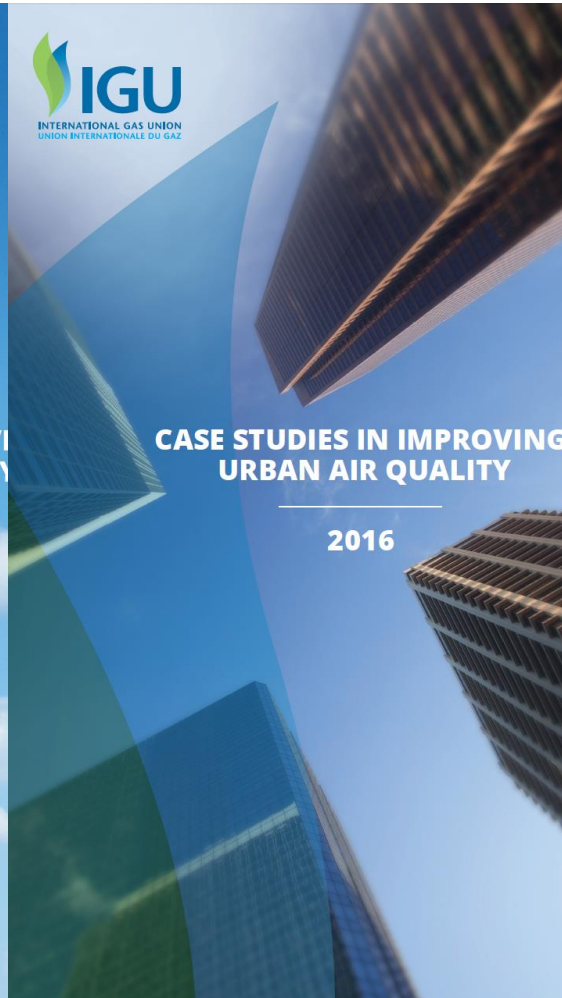
Group of Experts on Gas

United Nations Economic Commission for Europe

22 03 2018

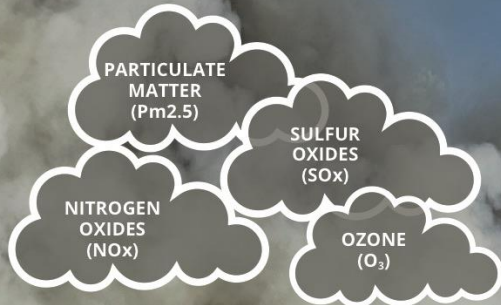


Menelaos (Mel) Ydreos
Executive Director, Public Affairs
IGU



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:

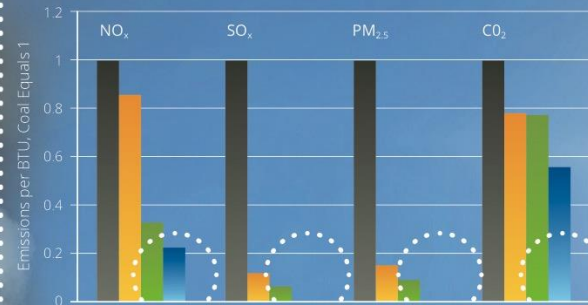


Premature deaths each year (WHO)



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



Energy. Climate summit

Natural gas industry's mission to clear the air

Large groups cite fuel's green benefits as they argue for more favourable treatment

ED CROOKS — NEW YORK

The natural gas industry is seeking to separate itself off 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 favourable treatment from governments because of the environmental benefits of gas.

Large oil and gas groups including Royal Dutch Shell, BP, Total and Reliance 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 an 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 3.7m 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, fuel 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 solids and liquids — that are responsible for lung cancer, heart attacks, strokes and asthma attacks.

Mel Ydreos, 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 dumped into the same bucket as other fossil fuels."

The IGU argued that cities such as New York showed how urban air pollution



The skyline of New York, partly shrouded in smog, 1973
PHOTO: GETTY IMAGES

can be tackled. In New York City, the utility Consolidated Edison has, since 2011, switched almost 5,000 large buildings over from using heavy oil for heating to gas, encouraged by an initiative launched by the mayor and backed by the environmental defence fund.

Its gas sales across the company's territory have risen from 1.09tn British thermal units on its peak day in 2005 to 1.68tn on its peak day this year.

Janice Nolen, of the American Lung Association, a group that campaigns to cut respiratory illnesses, said that, along with other changes including tighter curbs on pollution from coal-fired power stations, the reduced use of heating 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 microgrammes per cubic metre in 2003-05 to 10.6 microgrammes per cubic metre in 2012-14.

Other cities including Toronto and Istanbul have reported 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 2020, Beijing expects to derive 32 per cent of its energy from gas, and just 6 per cent from coal, said Yalan Li, general manager of Beijing Gas Group.

Fatih Birol, 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 2011 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 ozone.

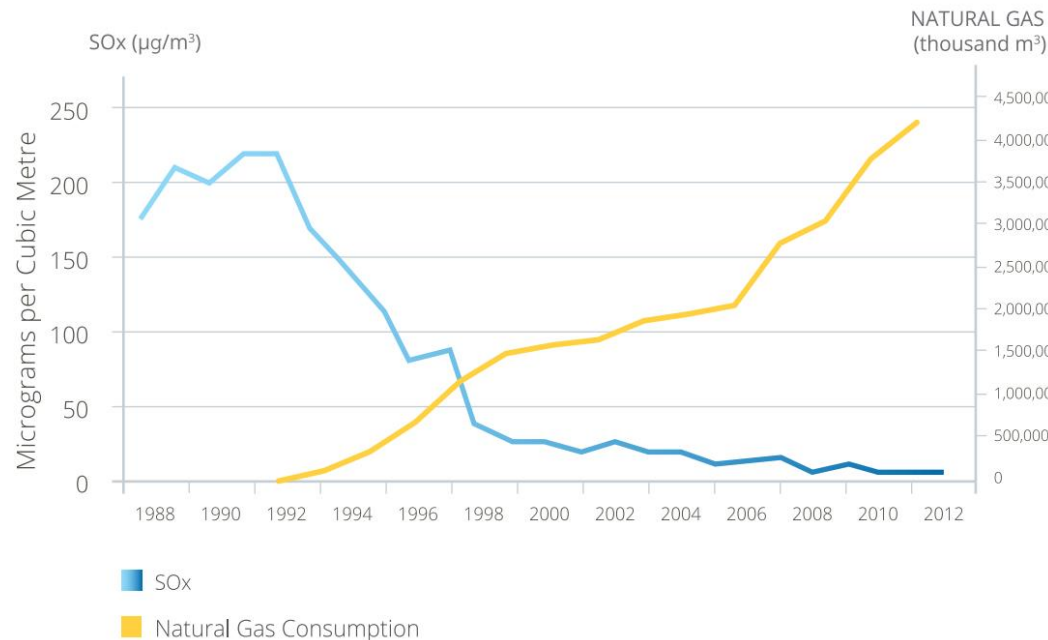
Scott Foster, director of the sustainable energy division at the UN Economic Commission for Europe, a policy promotion body, agreed there was a vital role for gas. "There is no plausible scenario that doesn't include a significant proportion of the energy mix being fossil fuels for the near to medium term."

"Governments need to put in place policies that recognise the benefits that natural gas can bring."

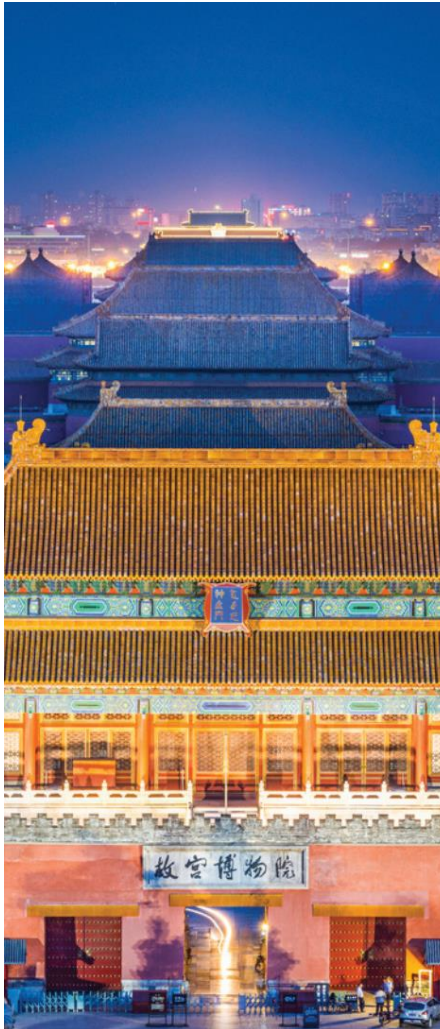
32%
The proportion of energy Beijing expects to derive from gas by 2020

6%
The proportion of energy the Chinese capital anticipates will come from coal in the same timeframe

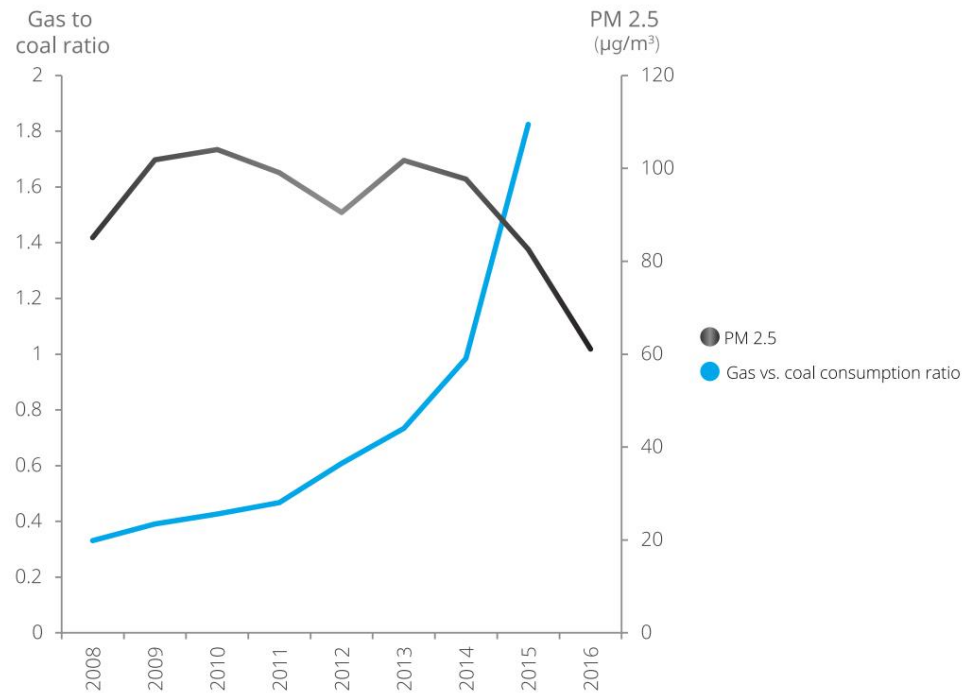
Istanbul Improving Air Quality



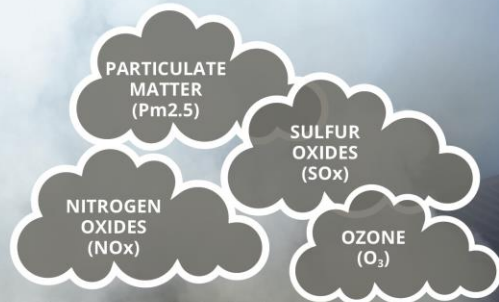
Beijing – Natural Gas improves the air quality



Beijing Improving Air Quality



NATURAL GAS: IMPROVING THE AIR WE BREATHE



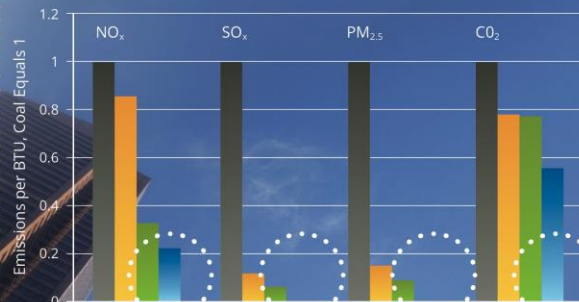
Outdoor air pollution is among the most significant environmental threats to human health:



400,000
Premature Deaths in the EU (EEA)



€940bn
Total Health-related Costs associated with air pollution (EEA)



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 European Cities Take Action



Significant improvement in urban air quality

NEW YORK



69%
SO_x ↓

NYC Converted 30% of heavy fuel burning buildings to natural gas & achieved 69% reduction in SO_x concentration within 4 years.

TORONTO



90%
PM &
SO_x ↓

Removal of coal from power generation resulted in reductions in PM₁₀, SO_x & NO_x of 90%, 91%, & 65% from 2004 levels, and reductions in premature deaths and hospitalization by 76% & 60%.

DUBLIN



90%
PM ↓

Severe pollution problem existed in the 1980's due to coal use. Increased use of natural gas (75% of residential demand) resulted in 80-90% reduction in PM emissions.

ISTANBUL



98%
SO₂ ↓

Banning lignite coal and gradually replacing it with natural gas for residential heating resulted in reduction of PM concentration levels by 50% and SO₂ by 98% (from 220 µg/m³ to 5) in under a decade.

BERLIN

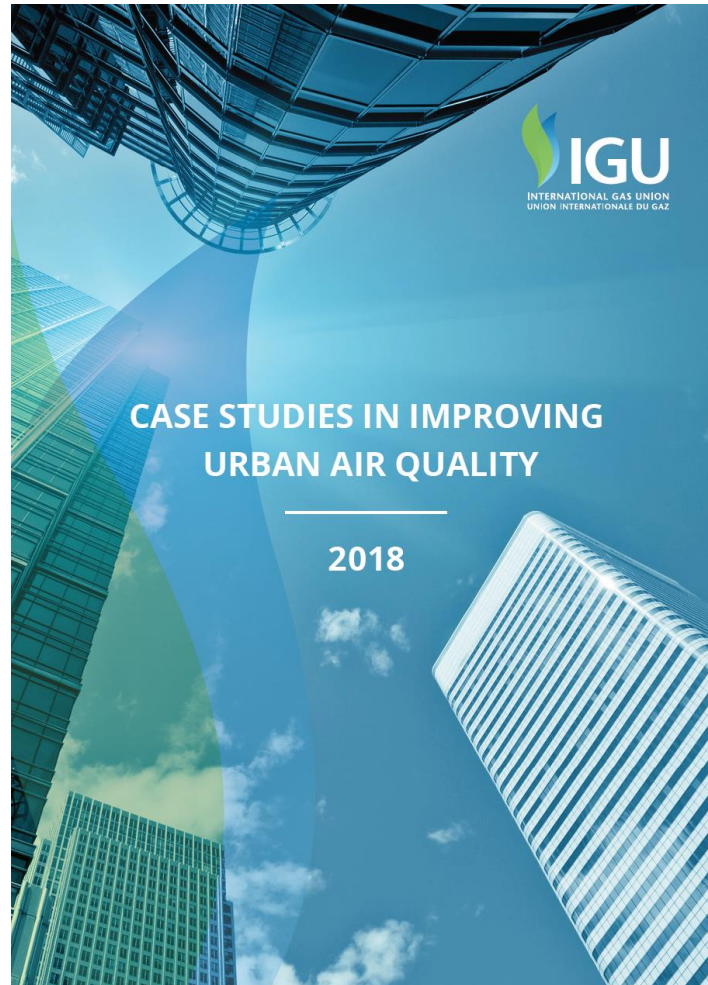


95% SO_x
83% PM ↓

1990-2012 share of natural gas in city's primary energy grew from 17% to 41% resulting in reductions in SO_x, NO_x, and PM₁₀ by 95%, 76%, and 83% from 1989 levels.

Case Studies in Improving Urban Air Quality 2018

Beijing Ürümqi Shanghai and Santiago



Beijing – Revisited



2013

City experienced a pollution crisis – dubbed “Airpocalypse”

Over 50% of days that year were ranked unhealthy or worse for air quality

2014

PM concentrations of $85.9 \mu\text{g}/\text{m}^3$ - almost 9x the WHO limit

Government announced “war on smog” & intensified anti-pollution policies

Aggressive coal to gas fuel switching

2017

PM concentrations dropped to $58 \mu\text{g}/\text{m}^3$ – 54% decrease vs. 2016

4,453 coal-fired boilers shut down

900,000 households moved from coal to gas since 2013



2012

Air quality improvement initiative launched to replace coal-fired heating with gas
Gas grew to 76% of total heating fuel in 2012-13 heating season from nearly 0%
12,900 coal boilers replaced with gas in first six months

2013

Monthly $PM_{2.5}$ concentration dropped by 62.8% vs. 2012
5 MT reduction in coal consumption
35,000-ton reduction in SO_2 & 17,000 in soot

2014

Gas largely displaced coal as dominant heating fuel
Monthly $PM_{2.5}$ concentration dropped by 75.5%
50% reduction in SO_2 since 2012 heating season
73% reduction in pollution-related lung cancer

2000

City coal boiler density reached up to 6 units per km² in downtown core
Industrial emissions: 464,000 tons of SO₂ & 141,200 tons of smoke & dust

2000-2012

First phase of coal to gas fuel switch initiative
Focus on enabling supply via transmission & distribution pipe networks
City enacted measures for replacing coal with gas boilers

2012

Second phase of policy to accelerate the switch
Developed workplan to replace remaining boilers
Established special fund for gas projects incentives
Introduced & enforced Coal-free & Mostly-Coal Free Areas

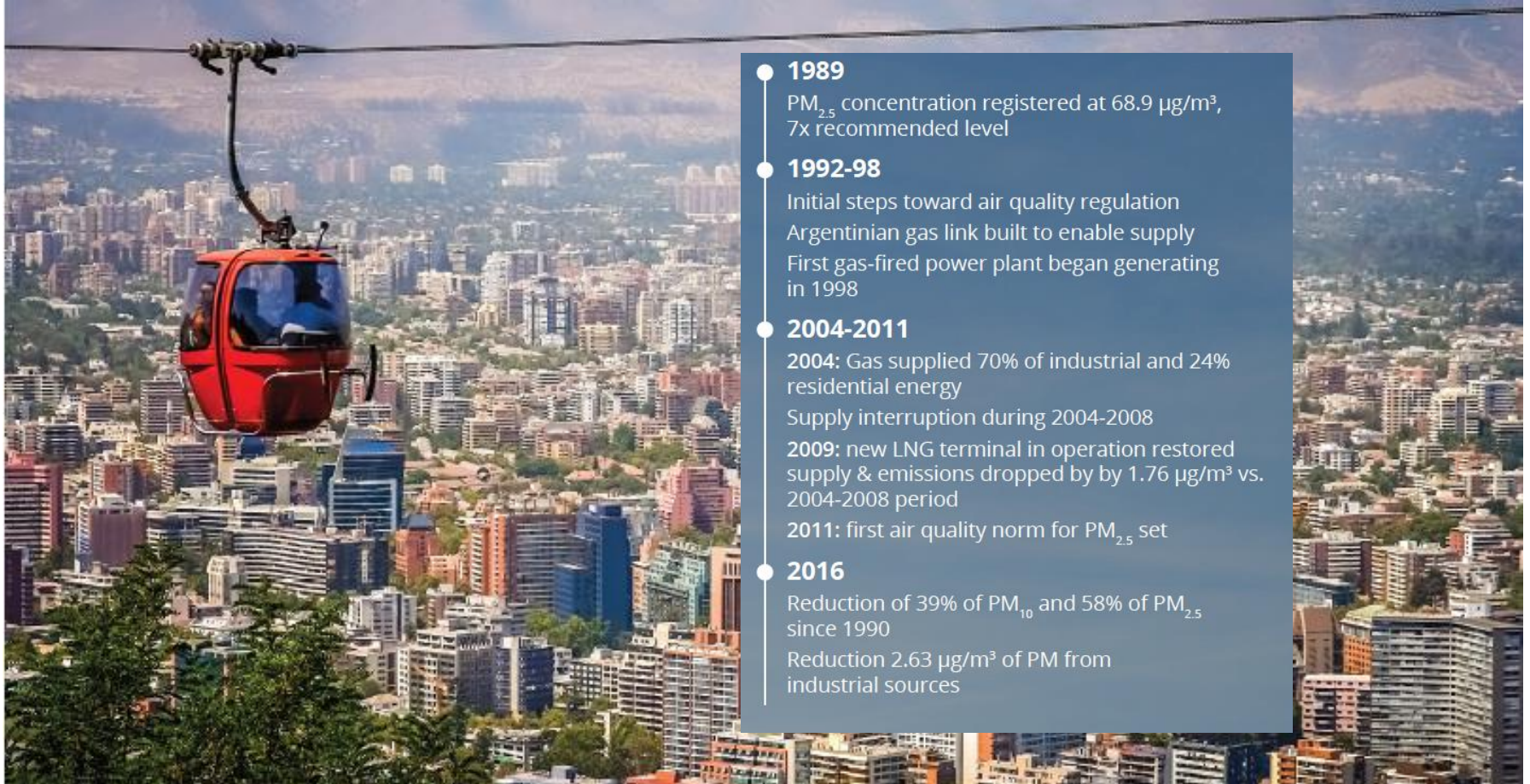
2015

Entire metropolitan area required to become coal-free by end of the year
Completed replacement of small & medium size coal or heavy oil-fired boilers & furnaces with gas

2016

Reduction of all major air pollutants
PM_{2.5} concentration improved by 15.1% vs. 2015, & 27.4% vs. 2013
PM₁₀ concentrations dropped by 14.5%, vs. 2015
Total coal to gas consumption ratio dropped from 43% to 33% (2013 vs. 2016)





1989

PM_{2.5} concentration registered at 68.9 µg/m³, 7x recommended level

1992-98

Initial steps toward air quality regulation

Argentinian gas link built to enable supply

First gas-fired power plant began generating in 1998

2004-2011

2004: Gas supplied 70% of industrial and 24% residential energy

Supply interruption during 2004-2008

2009: new LNG terminal in operation restored supply & emissions dropped by 1.76 µg/m³ vs. 2004-2008 period

2011: first air quality norm for PM_{2.5} set

2016

Reduction of 39% of PM₁₀ and 58% of PM_{2.5} since 1990

Reduction 2.63 µg/m³ of PM from industrial sources

Thank you and hope to see you at WGC 2018



**27th WORLD GAS
CONFERENCE**
WASHINGTON DC

JUNE 25-29
2018



500
SPEAKERS



12,000+
ATTENDEES



600
ORGANIZATIONS



100
COUNTRIES



40,000m²
EXHIBITION

HOST ASSOCIATION



PROUDLY SUPPORTED BY



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