

# *Meeting the Chinese LNG demand*



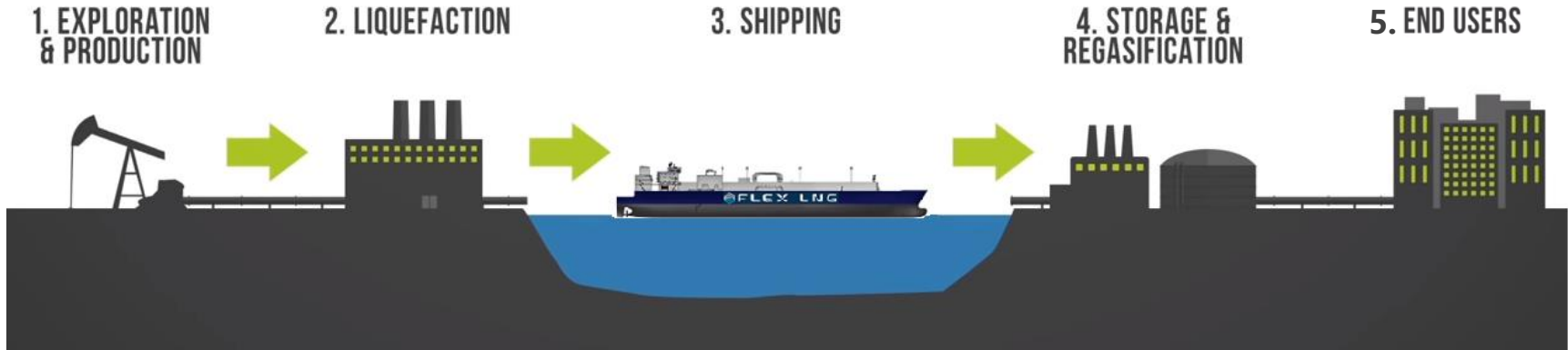
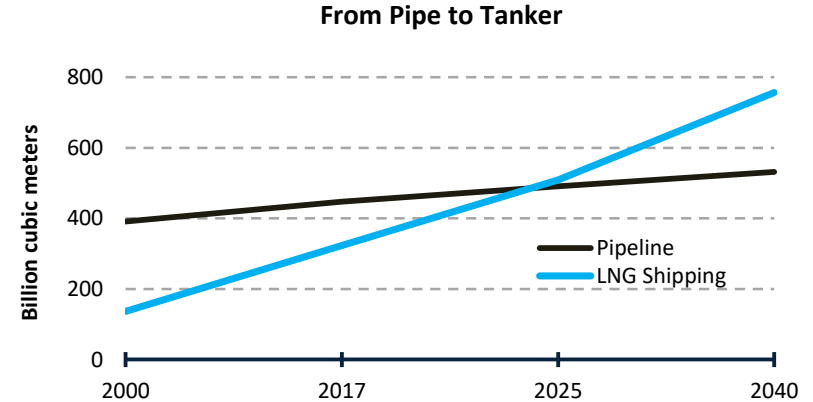
Øystein M. Kalleklev  
CEO Flex LNG Management

China-Norway Forum, November 14, 2019

# HOW IT WORKS



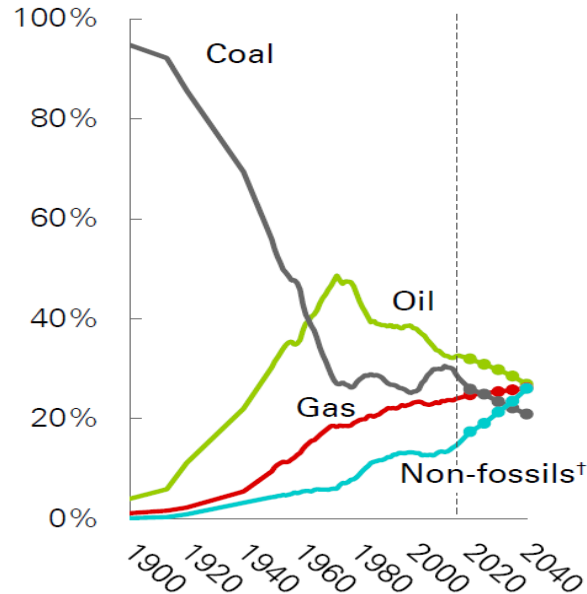
- Gas are being produced and used at different geographical locations
- LNG Shipping the most economical feasible option over longer distances and also offer destination flexibility
- Volumes freighted expected to surpass volumes piped by 2025



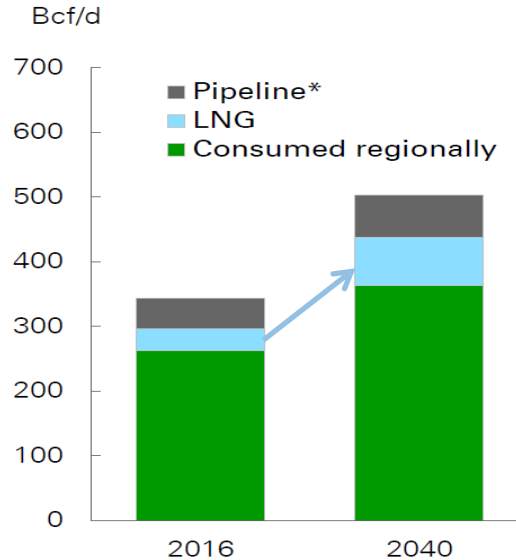
# 19TH CENTURY: COAL, 20TH CENTURY: OIL, 21TH CENTURY: GAS



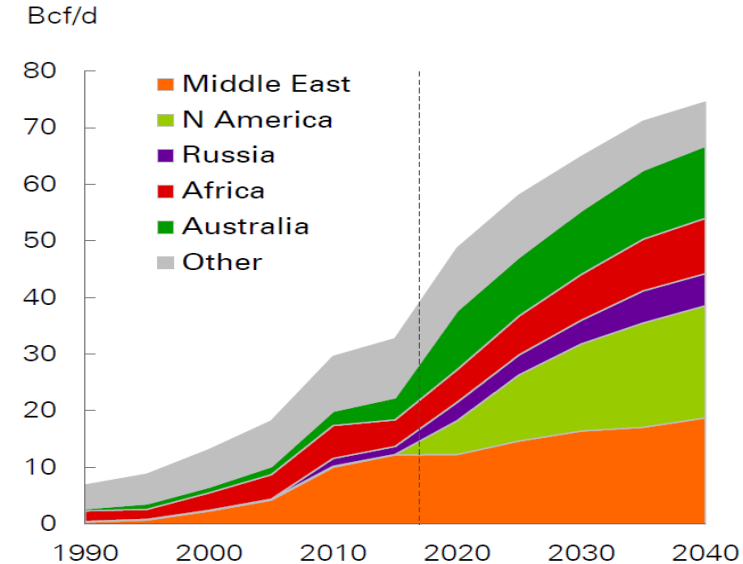
## Fuel share



## Gas sources



## LNG production

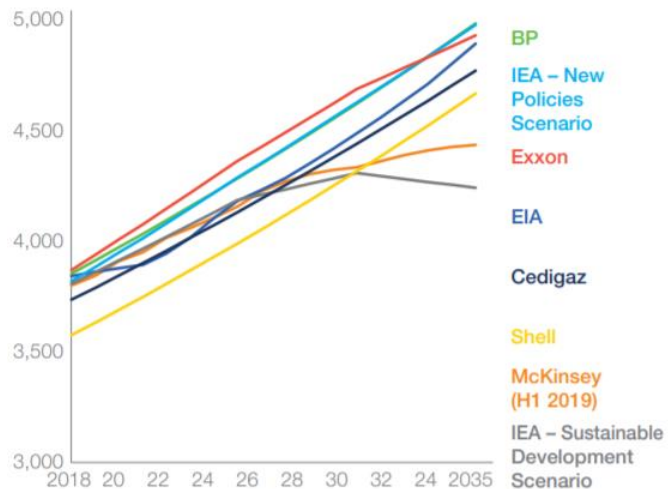


# LNG GROWING MUCH QUICKER THAN GAS



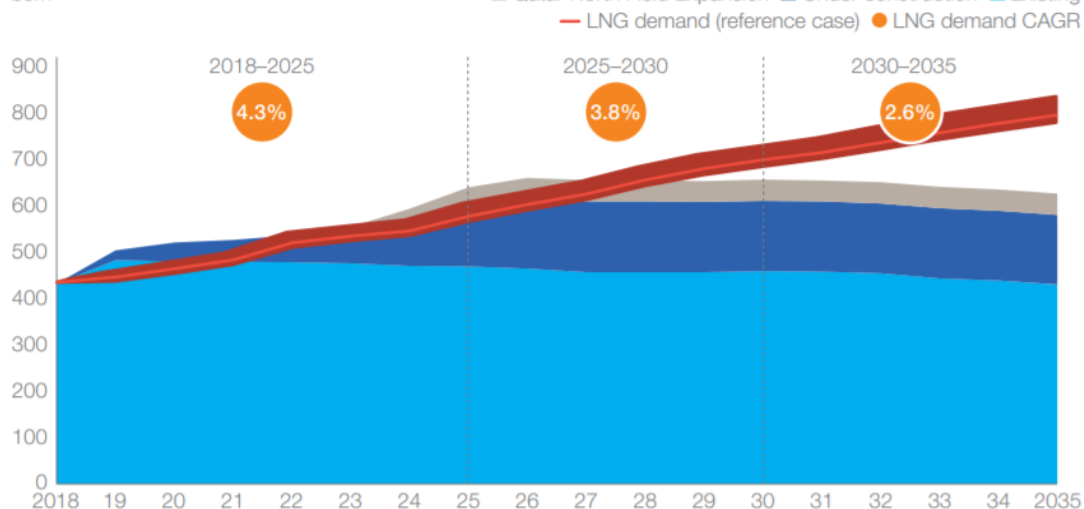
Projected gas demand

bcm



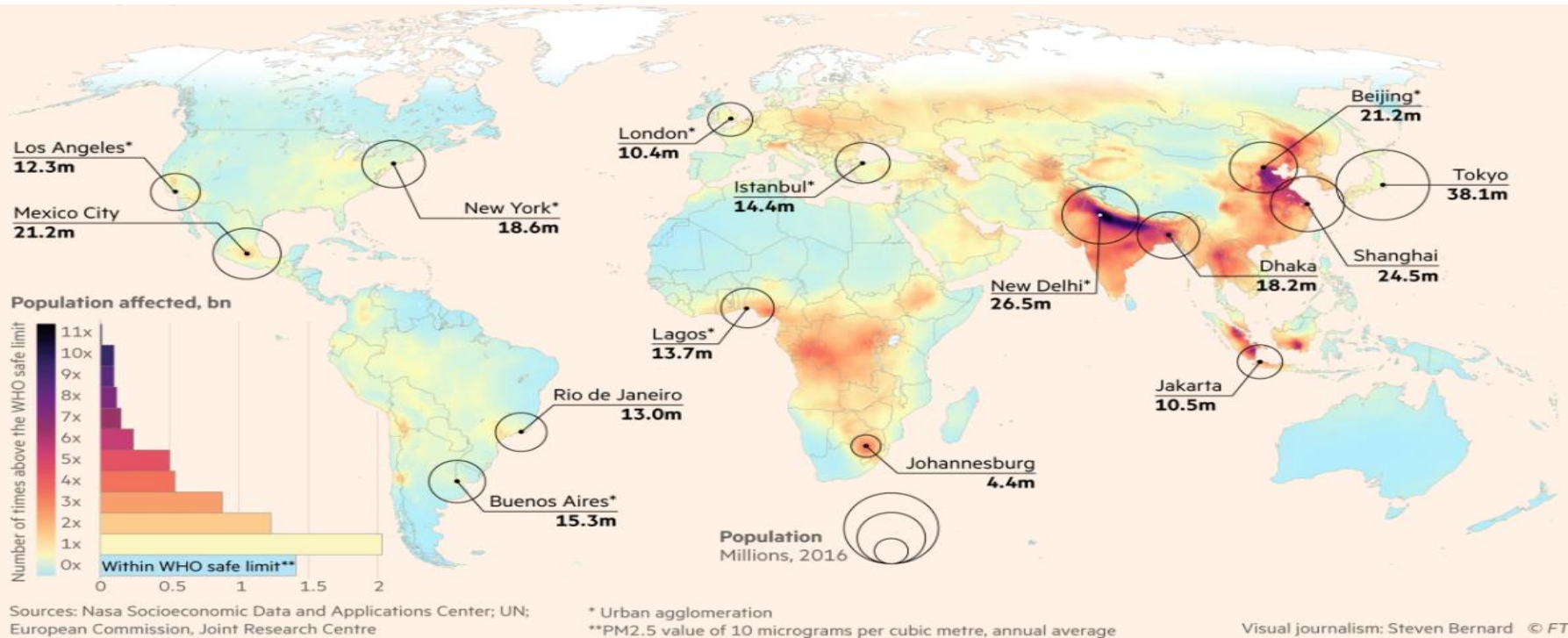
Global LNG available supply capacity and demand to 2035<sup>1,2</sup>

bcm



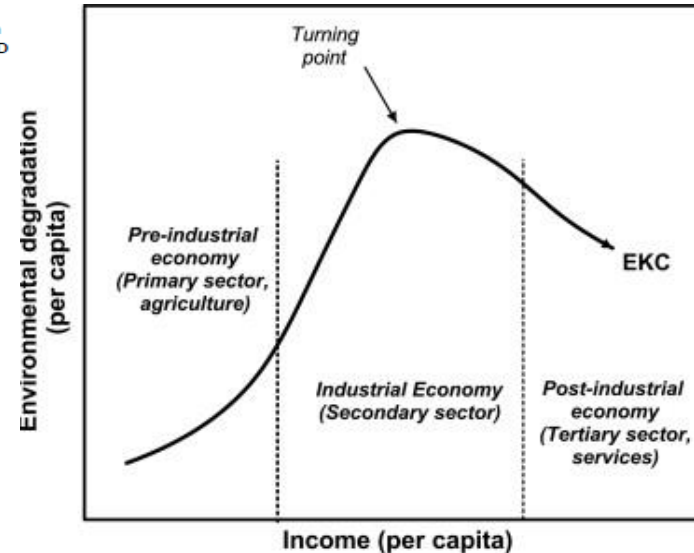
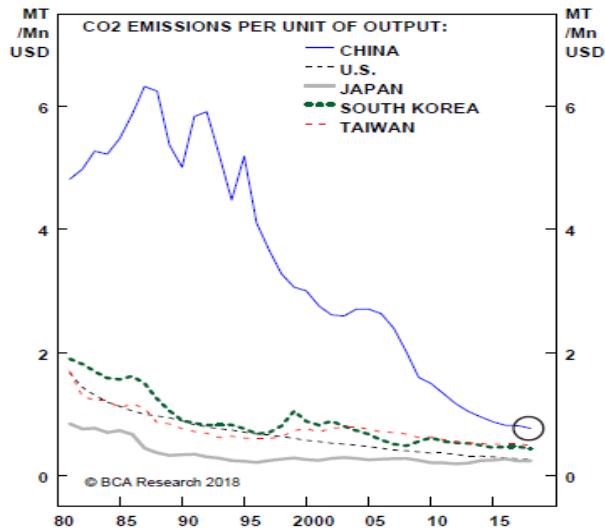
1) Source: McKinsey

# AIR EMISSIONS: A “GLOCAL” PROBLEM



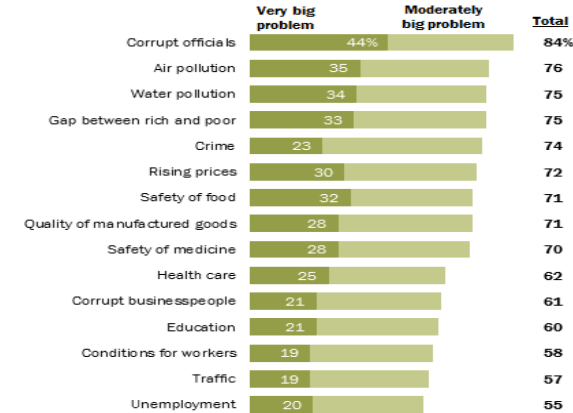
- 9 out of 10 people breathe air containing high levels of pollutants.
- 7 million pre-mature deaths every year caused by outdoor and household air pollution.

# CHINA REACHING ITS “ENVIRONMENTAL KUZNETS MOMENT”



## Corrupt Officials, Pollution Are Top Concerns

How big of a problem is/are ...



Source: Spring 2015 Global Attitudes survey. Q60a, bCHI, d-f, h-q.

PEW RESEARCH CENTER

- GDP (PPP) per capita in China at about \$18k, but at European levels in Beijing, Shanghai, Tianjin, Shenzhen, Suzhou (>\$30k)
- Economy reached an turning point at their Environmental Kuznet Curve (EKC) where air and water pollution are top concerns
- Half of public according to Pew support lower growth as trade-off for lower air pollution

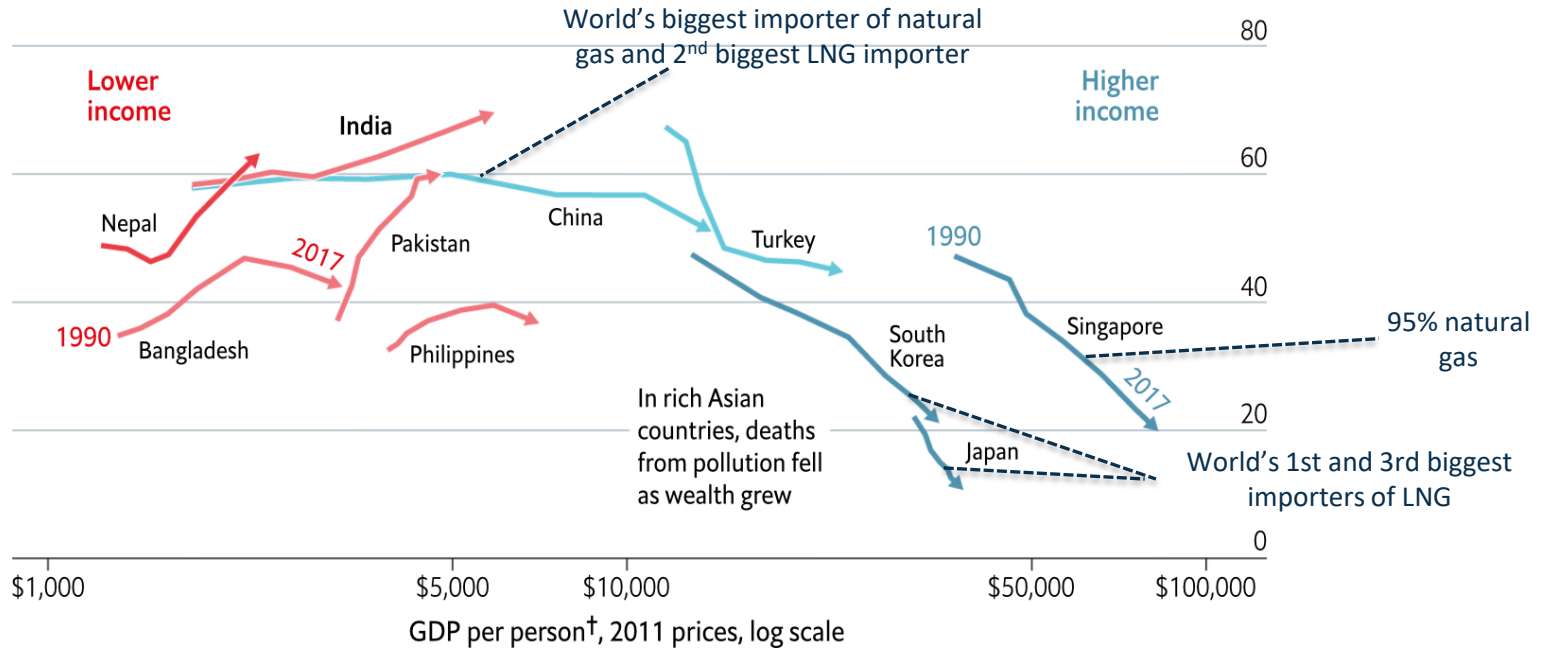
1) Source: BCA, PEW Research, Energy Policy vol 62 2013

2) The environmental Kuznets curve suggests that economic development initially leads to a deterioration in the environment, but after a certain level of economic growth, a society begins to improve its relationship with the environment and levels of environmental degradation reduces.

# CASE STUDIES: ENVIRONMENTAL KUZNETS CURVE



Excess deaths per 100,000 population attributed to air pollution\* v GDP per person  
1990-2017

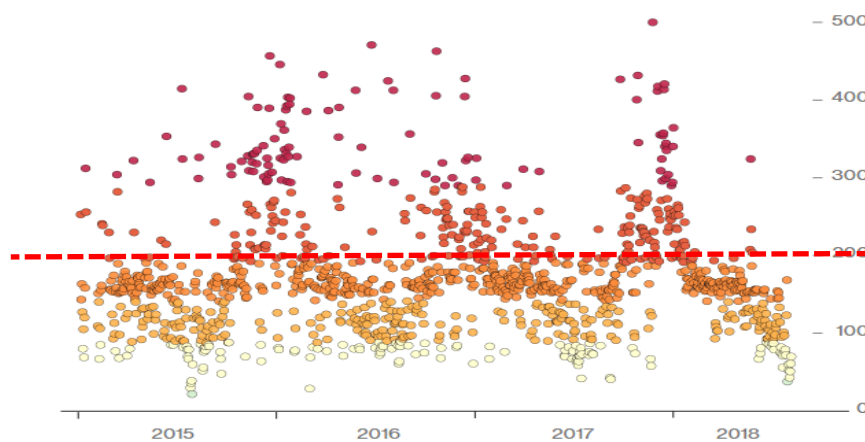


\*From ambient particles in atmosphere †At purchasing-power parity



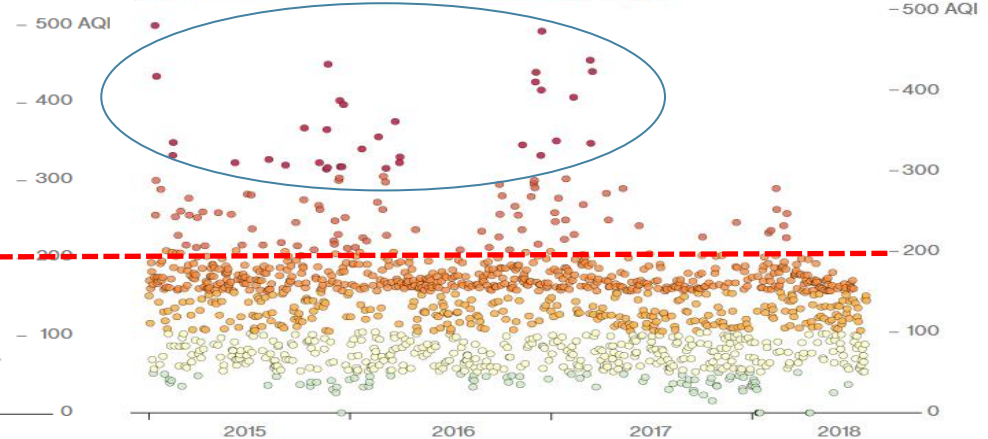
## Air quality: New Dehli

Good  Hazardous



## Air quality: Beijing

Good  Hazardous



- The number of “very unhealthy” days or worse (when levels of dangerous particles called PM<sub>2.5</sub> crossed 200) rose to 84 in New Delhi in 2017 from 66 in 2015.
- PM<sub>2.5</sub> exceeded 1,000 during Merkel’s visit (100 times WHO safe limit) similar to smoking 50 cigarettes a day
- Of the 9.7m Indians who died in 2017, 670,000 would not have perished if the atmosphere had been clean.
- World top ten most polluted cities (PM<sub>2.5</sub>) are all in India
- In Beijing they dropped to 20 days from around 43 over the same period. PM<sub>2.5</sub> down 54% Q4-17 vs Q4-16

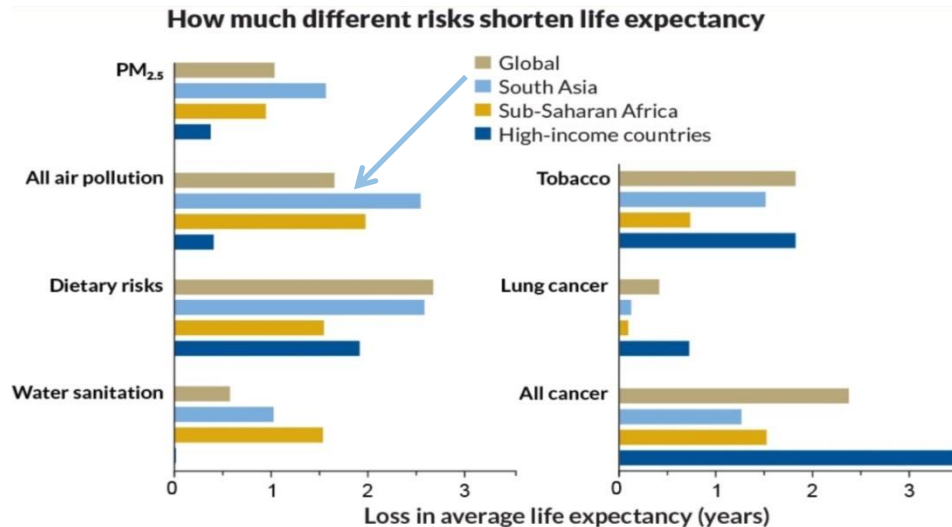
1) Source: AirVisual and Economist

2) Note: Data shows an air quality index (AQI) value derived from raw PM<sub>2.5</sub> readings.

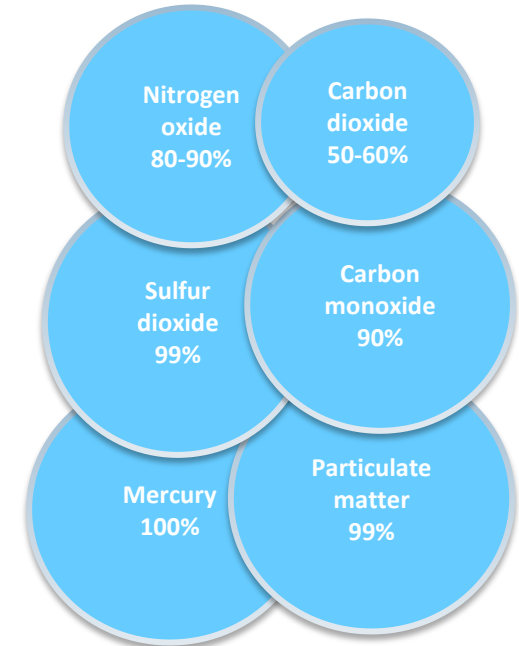
# LNG IS ABOUT MORE THAN JUST ENERGY



*"If the air pollution improves from China's level to the American EPA standard level, it would improve everyone's education by around one year" Prof. Xi Chen*

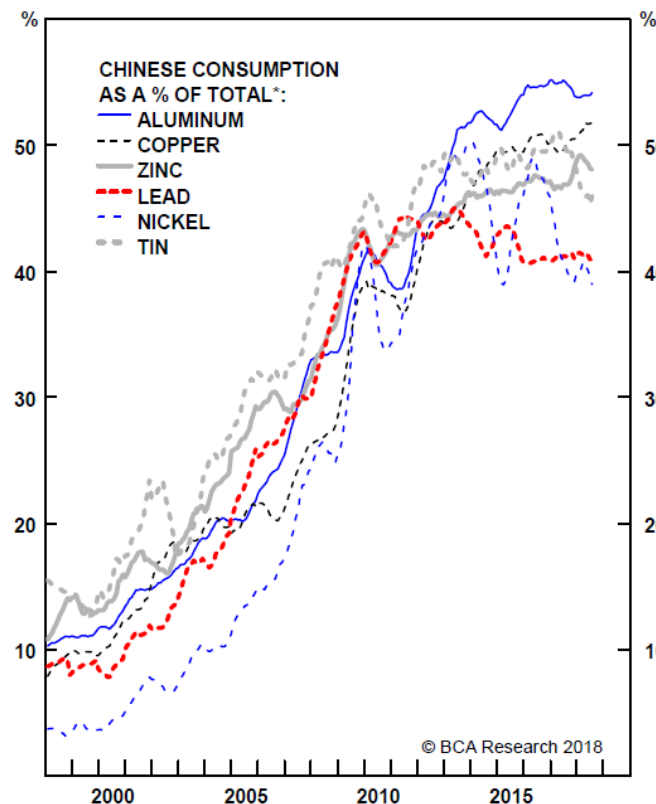


## Reduction in emissions vs coal

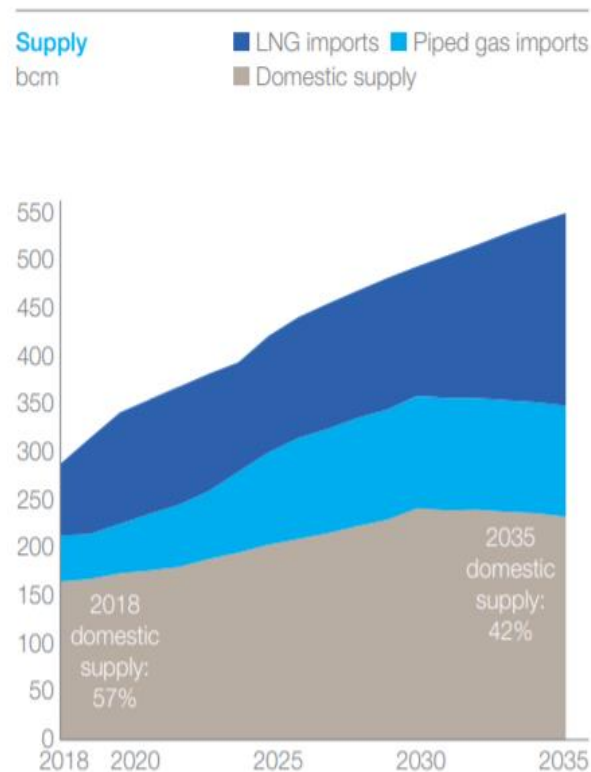
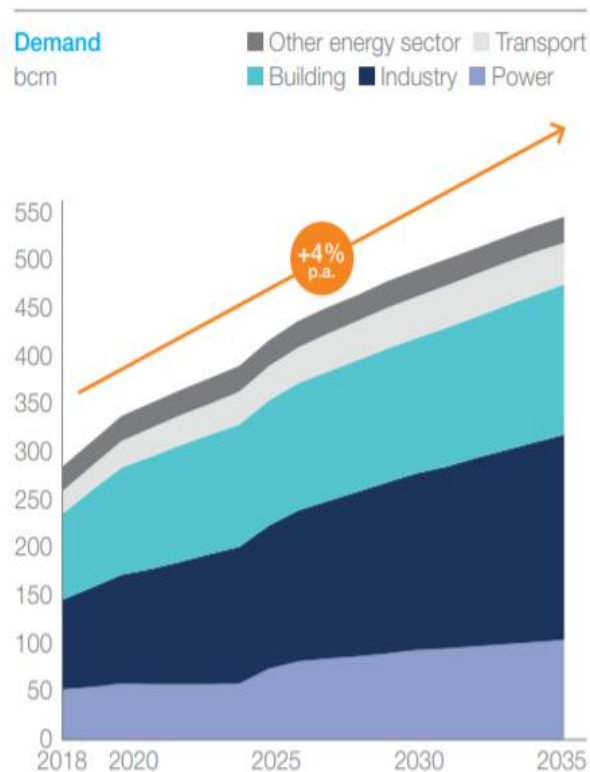


- There are about 7 million pre-mature deaths every year caused by outdoor and household air pollution
- In South Asia, air pollution larger health risk than tobacco, cancer, water sanitation and on par with dietary risk

# CHINA ALSO BECOMING THE MOST IMPORTANT GAS MARKET



1) Source: McKinsey, BCA



# MARKET FOR SEABORNE LNG TRANSPORT MATURING



**“LNG 1.0” : 2000:  $\approx 100\text{MMtpa}$**



- 1960s to mid-2000s
- Traditional liner model (P2P)
- Back2back contracts 20yr+
- Steam engine

**“LNG 2.0” : 2010:  $\approx 200\text{MMtpa}$**

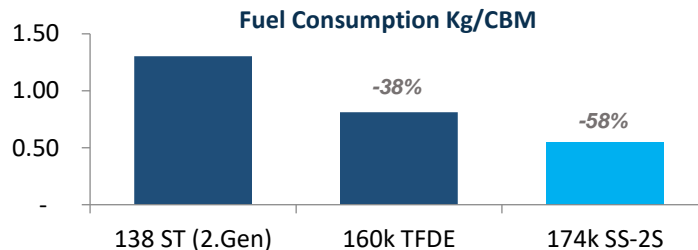


- Mid-2000s to yesterday
- Portfolio players
- Term contracts (7-15yrs)
- DFDE/TFDE engine (4 stroke)

**“LNG 3.0” : 2020:  $\approx 400\text{MMtpa}$**



- The way of the future
- Commoditization of LNG
- Shorter term contracts (1-7yrs)
- DF-2 stroke slow speed engine



# FLEX LNG WELL POSITIONED FOR “LNG 3.0”



## High Pressure

## Low pressure

### ME-GI



**Ranger (2018)**



**Rainbow (2018)**

### ME-GI with Partial Reliquefaction System



**Endeavour (2018)**



**Enterprise (2018)**



**Constellation (2019)**



**Courageous (2019)**

### ME-GI with Full Reliquefaction System



**Reliance (2020)**



**Resolute (2020)**



**Freedom (2020)**

### X-DF



**Aurora (2020)**



**Amber (2020)**



**Volunteer (2021)**



**Vigilant (2021)**

Initial Flex LNG vessels  
\$210M equity  
\$257.5m debt raised

Acquired in 2017:  
\$329m equity issued  
\$550m debt raised

Acquired in 2018:  
\$300m equity issued  
In process of securing debt financing for 2020 newbuildings



FLEX LNG



FLNG  
LISTED  
NYSE

FLNG  
LISTED  
OSLO  
OSLO BORS