

► IMPROVING AIR QUALITY FOR SUSTAINABLE GROWTH IN KOREA

In October of this year, South Korea's government unveiled a five-year, 7.2 tn won (USD6.3 bn) plan to close down old coal plants, get diesel vehicles off the road and curb polluting emissions from industrial plants, construction sites and ships.



Hee-Jin Han
Fixed Income CIO,
Eastspring Investments Korea

The problem is apparent: Seoul's fine dust concentration rate is much higher than most other developed cities. According to the 2016 Environmental Performance Index (EPI), compiled by Yale and Columbia universities in collaboration with the World Economic Forum, South Korea ranks a lowly 173rd out of 180 countries in terms of air quality. Furthermore, statistics from 'airvisual' which tracks air pollution levels, showed during one week in March 2017 three South Korean cities ranked in the world top ten worst affected by air pollution. The Organisation for Economic Co-operation and Development (OECD) reported that in 2015 South Korea's average exposure to fine-dust particles under 2.5 micro-metres in size was the highest of all OECD member nations.

PRIMER ON AIR POLLUTION

The main components of air pollution include carbon oxides (primarily from vehicular emissions);

sulphur oxides (primarily from vehicle emissions and burning of fossil fuels); nitrogen oxides (primarily the result of combustion engines such as those in automobiles); volatile organic compounds, VOCs, which are typically classified as methane (primarily produced by livestock digestion fossil fuel extraction and decomposing biomass), and non-methane (derived primarily from building materials and cleaning products); toxic metals such as lead and mercury; and last but not least, particulate matter also known as PM, which may include COx, SOx, and NOx. Particulate matter is a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye.

Through chemical reactions, sometimes from photo-dissociation by sunlight, primary pollutants can form secondary pollutants, including fine particles in the atmosphere. Getting rid of these is more complex, in part due to their size. These

2.5 micro-metre and even smaller particles, each roughly the width of a thirtieth of a human hair, have the capacity to enter deep inside our organs and even the bloodstream to cause respiratory and cardiovascular disease. According to WHO, this fine dust is the #1 cancer causing agent in air pollution.

Illnesses related to air pollution also include cardiac and respiratory disorders and stroke. According to the OECD report “Environmental outlook to 2050”, air pollution will be the biggest threat for the young-child death rate in future. Fine micron dust is being identified as an agent in an increasing number of human disabilities and serious illnesses such as mental and neurological impairment, bone diseases, reproductive defects and even diabetes.

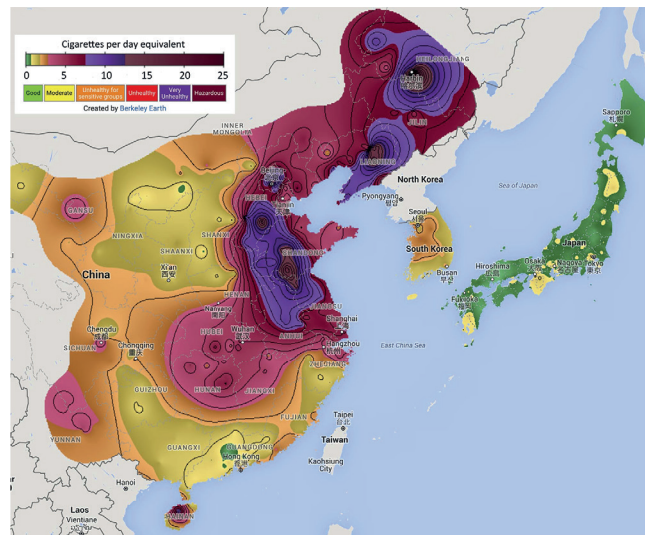
IN DENIAL?

In an estimate from South Korea’s environment ministry, China’s contribution to Korea’s PM10--particulate matters with ten micro-metres or less in size--ranges from 30 to 50 percent on average, but can reach up to 80 percent on the haziest days. According to the World Bank, only one percent of China’s 560 million city dwellers breathe air considered safe by the European Union, which the bank attributes to PM2.5-particulate matter 2.5 micro-metres or less in diameter--resulting, largely, from burning coal.

However, while China has recently decreased its dependence on coal power, Korea operates 53 coal-powered plants and intends to construct 20 more in the next five years. Although ten ageing plants will be shut by 2025, between 2005 and last year, the capacity of the country’s coal-fired power plants increased almost 95 per cent. Burning of the fossil fuel — a source of carbon dioxide emissions and smog — accounts for about 40 per cent of the country’s energy generation.

Whether China admits responsibility for Korea’s poor air quality, there is sense in the two cooperating to improve it, given their proximity and wind flows. China included an ambitious target reduction of PM2.5 in its last five-year plan,

Fig.1: Air pollution (PM2.5) as at 13 December 2015



but admitted in October that it was unlikely to achieve its clean air goals for 2017. In fact, the ban on coal-heating in northern China is now in place; yet, the replacement gas-heating system isn’t. Many provinces, including Shandong, Shanxi, Shaanxi, Hebei, Henan, and Tianjin, have issued strict regulations to prevent residents from burning coal, meaning that thousands of families, schools, and factories in northern China may be shivering this winter — probably not a sustainable model for a democratic society. However, because China is focused on becoming “beautiful”, taking a lead in AI development, and attracting investment funding in cleanup technology and alternative energy from third parties such as the ADB and state governments, it could be a useful partner.

GOVERNMENT ACTION ON FINE DUST

In 2016, the Korean government implemented a new policy to control fine dust, but its effect thus far has been limited. The Ministry of Science and ICT identified “fine dust removing technology development” as one of nine National Strategy Projects. Fine dust related technology can be broken down into four major areas (outbreak,

measurement and forecast, dust collection and reduction, protection and counter action). The plan included industrialisation of such technology and collaboration with foreign institutions. In 2014, the market size of the fine dust management environment was KRW6.2 tn (USD5.67 bn) and the export market was KRW3.3 bn (USD3 mn). Within the next 10 years, the government expects the domestic market size will triple and the export market will increase by 10 times. This may not be enough soon enough.

PRECEDENTS

While China could become a partner in resolving the Korean air pollution problem, the US case might be seen as a precedent. It began the fight against air pollution with the 1955 Air Pollution Control Act which provided funds to local and state agencies for research and training. This was followed in 1962 by the Air Pollution Control Act which required auto emissions controls; and the Clean Air Act in 1963 which authorised funding for research and training; and the 1965 Motor Vehicle Air Pollution Control Act, which set national standards for auto emissions and coordinated pollution control between the United States, Canada, and Mexico. The Environmental Protection Agency was established in 1970, and under its auspices, emissions standards were established for industries and for specific pollutants with major goals for protecting and promoting human health and public welfare. Unfortunately, less progress is evident under the current US administration.

Research in the US has shown repeatedly that the projected costs of following pollution standards often turn out to be gross exaggerations, both because the estimates are based on information from industry and because innovation ends up reducing prices. The U.S. Census Bureau conducted an annual survey of the U.S. manufacturing sector and found that the cost of reducing all forms of pollution was on average only 0.4 percent of manufacturing costs. Even the most heavily regulated industries typically devote only

Fig.2: Worldwide primary energy share (%)

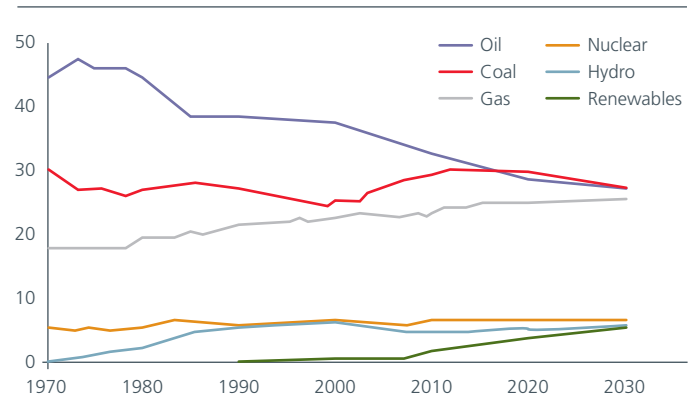
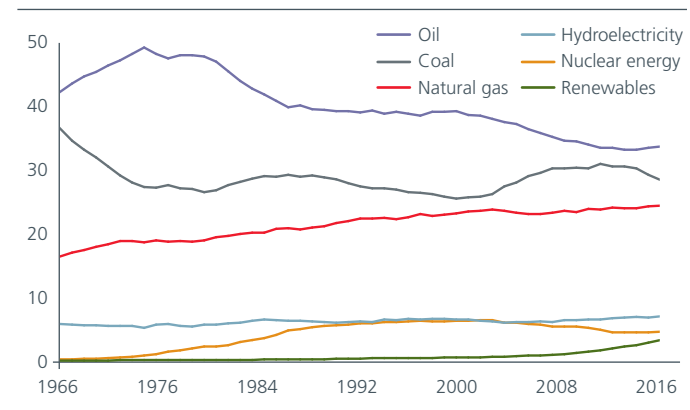


Fig.3: Shares of global primary energy consumption



about one percent of their revenue to pollution control, according to the NRDC. In addition to the savings in lives and productivity afforded by a safer environment, new technologies create net new jobs and add to GDP. The global market for environmental technologies goods and services reached USD1.05 tn in 2015 and the US was a net exporter.

It is time for Asian countries to fight air pollution, just as the United States has done. As Asian countries industrialised later, their serious pollution problems are more recent. However, they have the advantage of being able to build on the research and technology created by the US and Europe, and to pool resources for development and commercialisation behind responsible government policies and standards.

Disclaimer

This document is produced by Eastspring Investments (Singapore) Limited and issued in:

Singapore and Australia (for wholesale clients only) by Eastspring Investments (Singapore) Limited (UEN: 199407631H), which is incorporated in Singapore, is exempt from the requirement to hold an Australian financial services licence and is licensed and regulated by the Monetary Authority of Singapore under Singapore laws which differ from Australian laws.

Hong Kong by Eastspring Investments (Hong Kong) Limited and has not been reviewed by the Securities and Futures Commission of Hong Kong.

Indonesia by PT Eastspring Investments Indonesia, an investment manager that is licensed, registered and supervised by the Indonesia Financial Services Authority (OJK).

Malaysia by Eastspring Investments Berhad (531241-U).

United States of America (for institutional clients only) by Eastspring Investments (Singapore) Limited (UEN: 199407631H), which is incorporated in Singapore and is registered with the U.S Securities and Exchange Commission as a registered investment adviser.

European Economic Area (for professional clients only) and Switzerland (for qualified investors only) by Eastspring Investments (Luxembourg) S.A., 26, Boulevard Royal, 2449 Luxembourg, Grand-Duchy of Luxembourg, registered with the Registre de Commerce et des Sociétés (Luxembourg), Register No B 173737.

United Kingdom (for professional clients only) by Eastspring Investments (Luxembourg) S.A. - UK Branch, 125 Old Broad Street, London EC2N 1AR.

Chile (for institutional clients only) by Eastspring Investments (Singapore) Limited (UEN: 199407631H), which is incorporated in Singapore and is licensed and regulated by the Monetary Authority of Singapore under Singapore laws which differ from Chilean laws.

The afore-mentioned entities are hereinafter collectively referred to as **Eastspring Investments**.

The views and opinions contained herein are those of the author on this page, and may not necessarily represent views expressed or reflected in other Eastspring Investments' communications. This document is solely for information purposes and does not have any regard to the specific investment objective, financial situation and/or particular needs of any specific persons who may receive this document. This document is not intended as an offer, a solicitation of offer or a recommendation, to deal in shares of securities or any financial instruments. It may not be published, circulated, reproduced or distributed without the prior written consent of Eastspring Investments. Reliance upon information in this posting is at the sole discretion of the reader. Please consult your own professional adviser before investing.

Investment involves risk. Past performance and the predictions, projections, or forecasts on the economy, securities markets or the economic trends of the markets are not necessarily indicative of the future or likely performance of Eastspring Investments or any of the funds managed by Eastspring Investments.

Information herein is believed to be reliable at time of publication. Data from third party sources may have been used in the preparation of this material and Eastspring Investments has not independently verified, validated or audited such data. Where lawfully permitted, Eastspring Investments does not warrant its completeness or accuracy and is not responsible for error of facts or opinion nor shall be liable for damages arising out of any person's reliance upon this information. Any opinion or estimate contained in this document may subject to change without notice.

Eastspring Investments (excluding JV companies) companies are ultimately wholly-owned/indirect subsidiaries/associate of Prudential plc of the United Kingdom. Eastspring Investments companies (including JV's) and Prudential plc are not affiliated in any manner with Prudential Financial, Inc., a company whose principal place of business is in the United States of America.



A member of Prudential plc (UK) 