

## In charts: South Korea's new energy strategy which has nuclear at its core

South Korea hopes to achieve carbon neutrality by 2050 by expanding its renewable energy sources, namely nuclear power. In this article, our senior economist in Seoul looks at South Korea's journey to net-zero, and how this has been impacted by the war in Ukraine



The Kori nuclear power plant in South Korea is the world's largest fully operational nuclear generating station

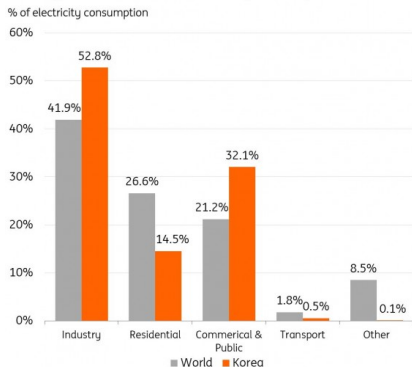
### Korea's electricity supply and demand

South Korea wants to pursue reliable and cheaper energy sources. In the following charts, we look at the reliability of South Korea's current energy supply.

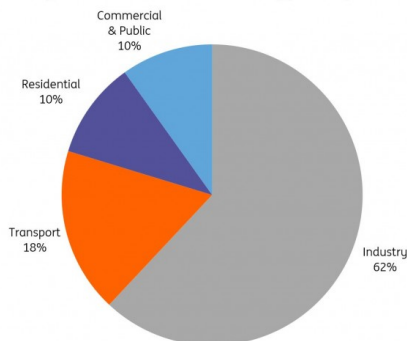
# Industry (manufacturing) consumes more than half of electricity/energy

Industry depends on more reliable and cheaper energy sources

Industry accounted 53% of electricity consumption



Industry accounted 62% of total final energy consumption

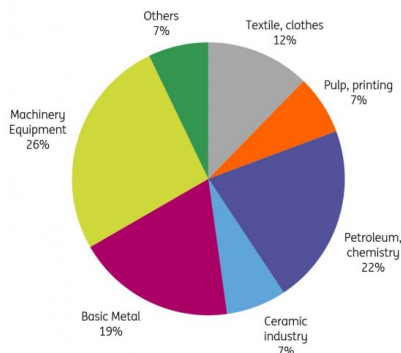


Source: IEA, Kepco (LHS). KEEL as of 2020 (RHS)  
 World as of 2019, Korea as of 2020 (LHS)

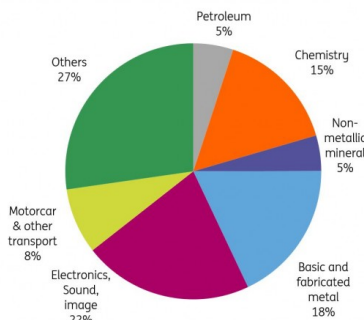
## This is to do with the structure of the Korean economy/industry

Top electricity consumer shifted from Heavy Industry to IT. Both require a steady/reliable supply of electricity

Heavy and light industries were at the top (2000)



IT (semiconductors, electronics, sound) accounted 22% (2020)

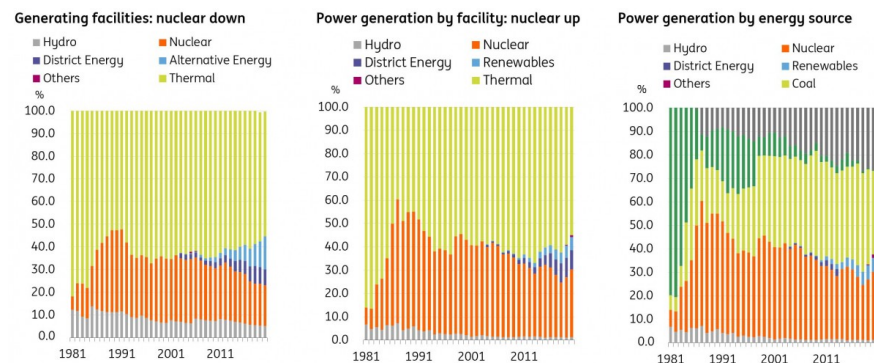


Source: KEPCO

## Thus, Korea has been highly dependent on 'reliable' conventional energy

Electricity generation heavily depend on coal, LNG, and nuclear

Renewable facilities have grown fast to 14.5%. Power generation accounted 6% as of 2020

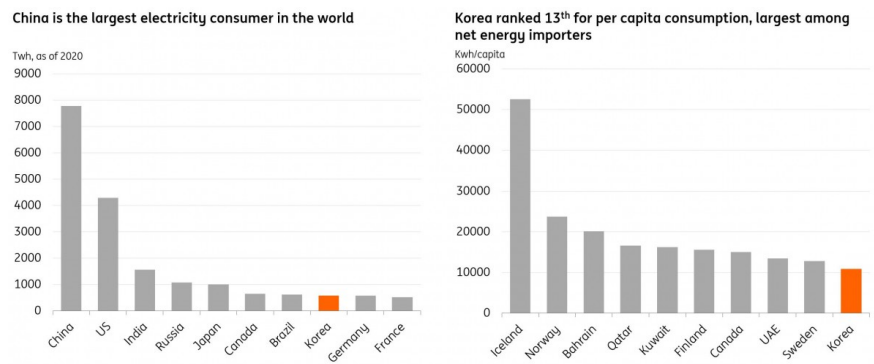


Source: KEPCO

In the next set of charts, we look at how inexpensive power is in Korea.

## Inexpensive power: electricity consumption per capita ranked 13th

Electricity is an important factor in the Korean economy, supporting the activities of industry and households

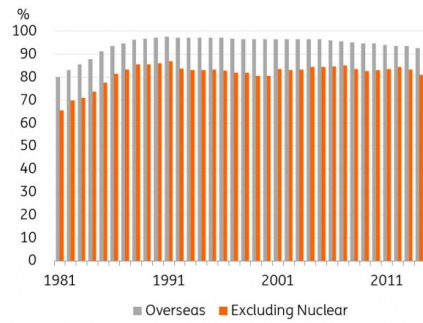


Source: BP statistical review of World Energy 2021

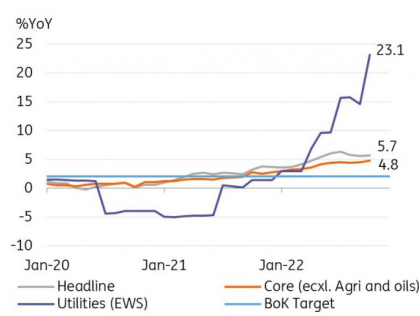
## Almost 100% overseas dependence & isolated national power grid system

The economy heavily depends on energy imports and households are more sensitive to energy prices

Overseas energy dependency rate stayed at over 90% level



Utility prices rose faster than the headline

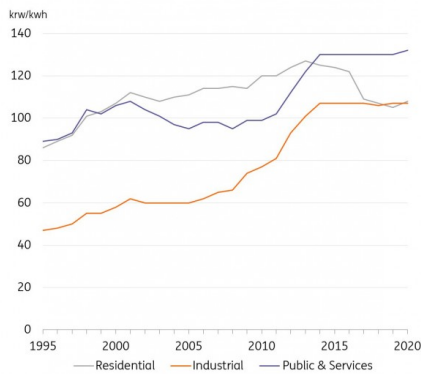


Source: KEEI and CEIC

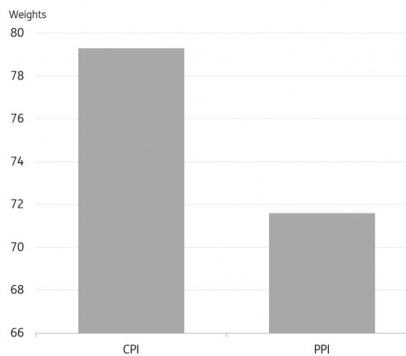
## Higher energy prices affect Korea's macro economy: inflation

Households are more sensitive to energy prices and pay for electricity on a progressive rate

Consumer prices of energy changed over time



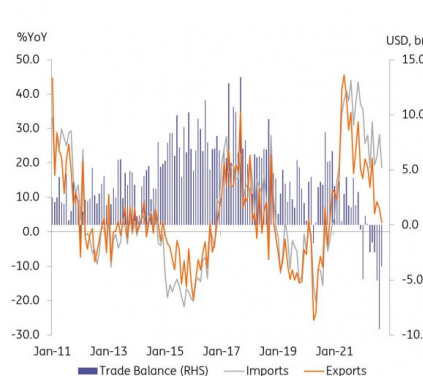
Larger energy weights for CPI than PPI



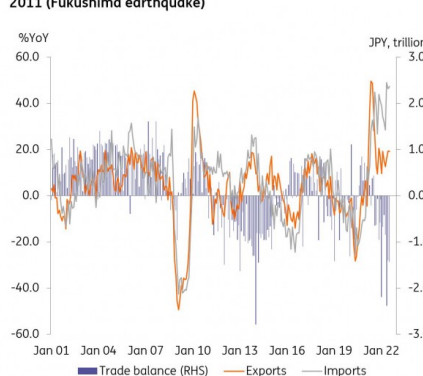
Source: KEEI, CEIC

## Higher energy prices affect Korea's macro economy: trade balance

Recording trade deficit for almost a year. Unusual!



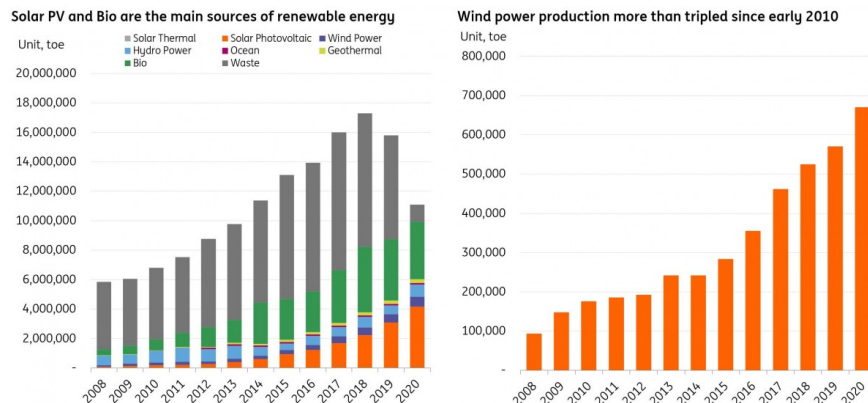
Japan: Energy imports changed the structure of trade since 2011 (Fukushima earthquake)



Source: CEIC

## Production of renewable energy (calorific unit)

Renewable production increased steadily

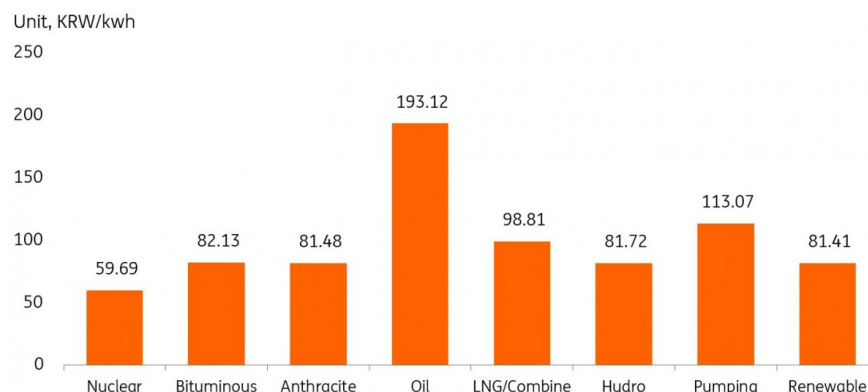


Source: Korea Energy Agency, as of 2020

Non-renewable waste data has been excluded since 4Q19

## Inexpensive power: power purchasing unit cost by energy source

Unit cost of renewable has lowered and has reached comparable levels for coal and hydro (if excluding RPS)



Source: KEPCO

Fore renewable, excluding RPS (Renewable Portfolio Standard)

## South Korea's efforts to achieve its net-zero 2050 target

### Where does it want to be?

South Korea has become the 14th country in the world to legislate a carbon target, aiming for a 40% reduction in emissions from 2018 levels by 2030 to achieve carbon neutrality by 2050

### What has it been doing to get there?

Since its formation in May 2021, the 2050 Carbon Neutrality and Green Growth Commission has implemented several measures in an effort to gradually move towards total carbon neutrality.

The Carbon Neutrality Act, for example, became effective in March 2022 and aims to facilitate the transition to a carbon-neutral society and increased green growth. Alongside legislative changes, the government has also increased its 2022 carbon neutrality budget to KRW 12 trillion from the previous year's KRW 7.3 trillion, with a newly established KRW 2.5 trillion climate fund.

Following a change of government in early 2022, progress on energy policy has come to a halt. Although the previous administration was criticised for setting overly ambitious goals and disregarding corporate voices, the new government has confirmed that it intends to stick to the original plans, with details set to be reviewed more closely moving forward.

The Ministry of Trade, Industry and Energy (MTIE) announced on 5 July that the government will resume the construction of Shin Hanul Units 3 and 4 nuclear reactors and maintain the current level of reactor capacity if safety is ensured.

As a result, nuclear will be responsible for more than 30% of power by 2030, up from 27.4% last year. In addition, the Korean government plans to create a new law for disposing of high-level radioactive waste in order to reduce potential hazards, organising a team exclusively for nuclear waste management. The revised outline, including the target for renewables, will be detailed in the 10th Basic Plan on Electricity Demand and Supply due in the fourth quarter of 2022.

## The Transition Committee's five policy guidelines

### 1. Feasible Carbon Neutrality Plan and energy mix

No change for the internationally committed carbon neutrality objectives, but the implementation plans should be amended by embracing nuclear energy in its decarbonisation efforts.

### 2. Market-Based demand efficiency

A market-based initiative to promote energy demand efficiency, and foster market principles and market competition.

### 3. Energy policy as a new growth engine

Invest in nuclear power technology and export the K-nuclear plants. as well as foster renewable technologies such as solar, wind, and hydrogen as new growth engines

### 4. Strengthen resource security

Secure a reliable supply chain of energy and core minerals and reinforce resource security.

### 5. Strengthen energy welfare policy

Provide energy welfare policies for low-income households and reduce coal power generation, under the consideration of jobs and the local economy.

## How has the war impacted the energy market?

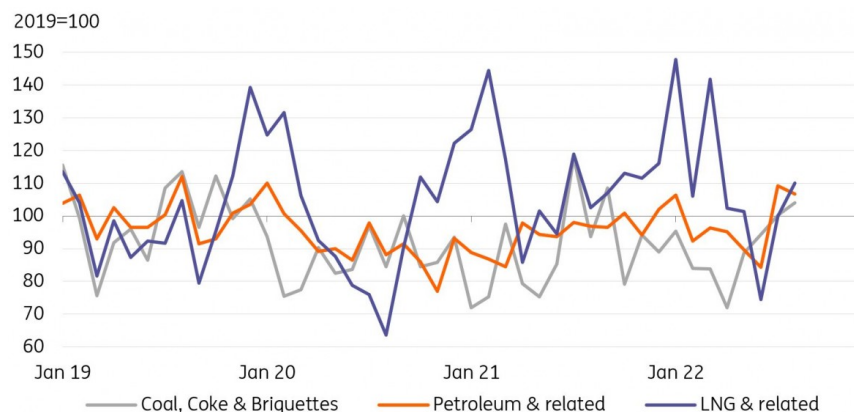
Similar to other energy importers, South Korea is suffering from the ongoing war due to high inflation and worsening trade conditions. However, as a major refining/petrochemical exporter, South Korea has significantly reduced its oil imports from Russia and this trend is likely to continue.

Meanwhile, LNG and coal imports have fallen but at a slower pace due to the high dependence on power generated by fossil fuels.

South Korea plans to expand its renewable energy sources, with the anticipated gap likely to be filled by nuclear power. Given its value as a reliable and affordable renewable energy source, nuclear power is expected to become an increasingly critical point of focus for the government moving forward.

## What's happened since the Ukraine war?

South Korea's imports of oil, coal, and LNG (in volume terms)

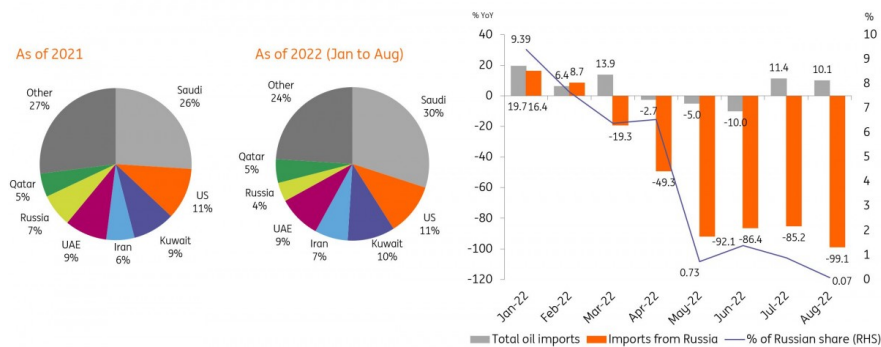


Source: CEIC

## Oil has seen the most dramatic change

Relatively wide range of oil suppliers allowed Korean importers to substitute Russian oil with alternative sources. Oil is mostly for re-export rather than domestic consumption

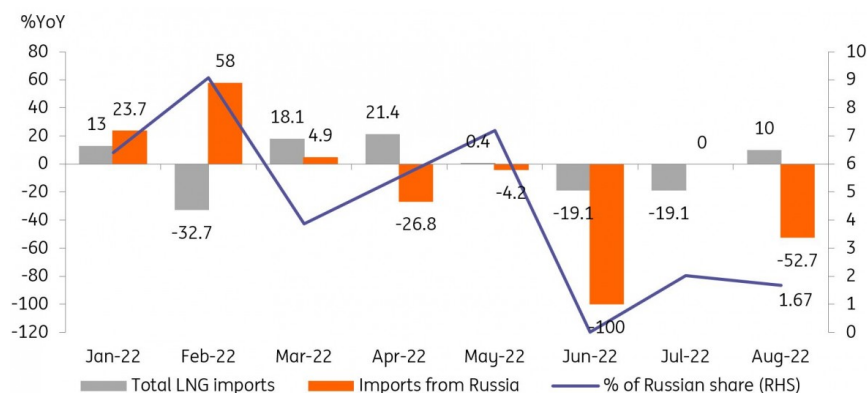
Halted Russian oil imports to avoid payment related issues with Russia (SWIFT ban)



Source: KITA (Korea International Trade Association)

## LNG: total imports volume declined -2.6% YoY due to high price

Russia's LNG import share significantly declined in 2022 and diversified imports sources 80% of LNG is provided under long-term contract

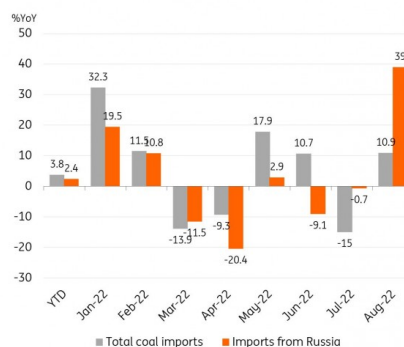
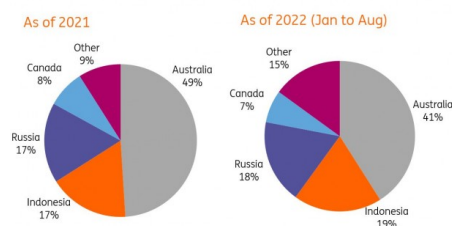


Source: KITA (Korea International Trade Association)

## Coal: Russian import share actually increased in 2022

Korea's dependence on Russian coal is higher than other commodities due to insufficient substitutes in other coal producing countries and fierce competition among importing countries

Russian coal imports surged back in August



Source: KITA (Korea International Trade Association)

### Author

**Min Joo Kang**

Senior Economist, South Korea and Japan

[min.joo.kang@asia.ing.com](mailto:min.joo.kang@asia.ing.com)

### Disclaimer

This publication has been prepared by the Economic and Financial Analysis Division of ING Bank N.V. ("ING") solely for information purposes without regard to any particular user's investment objectives, financial situation, or means. *ING forms part of ING Group (being for this purpose ING Group N.V. and its subsidiary and affiliated companies).* The information in the publication is not an investment recommendation and it is not investment, legal or tax advice or an offer or solicitation to purchase or sell any financial instrument. Reasonable care has been taken to ensure that this publication is not untrue or misleading when published, but ING does not represent that it is accurate or complete. ING does not accept any liability for any direct, indirect or consequential loss arising from any use of this publication. Unless otherwise stated, any views, forecasts, or estimates are solely those of the author(s), as of the date of the publication and are subject to change without notice.

The distribution of this publication may be restricted by law or regulation in different jurisdictions and persons into whose



possession this publication comes should inform themselves about, and observe, such restrictions.

Copyright and database rights protection exists in this report and it may not be reproduced, distributed or published by any person for any purpose without the prior express consent of ING. All rights are reserved. ING Bank N.V. is authorised by the Dutch Central Bank and supervised by the European Central Bank (ECB), the Dutch Central Bank (DNB) and the Dutch Authority for the Financial Markets (AFM). ING Bank N.V. is incorporated in the Netherlands (Trade Register no. 33031431 Amsterdam). In the United Kingdom this information is approved and/or communicated by ING Bank N.V., London Branch. ING Bank N.V., London Branch is authorised by the Prudential Regulation Authority and is subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. ING Bank N.V., London branch is registered in England (Registration number BR000341) at 8-10 Moorgate, London EC2 6DA. For US Investors: Any person wishing to discuss this report or effect transactions in any security discussed herein should contact ING Financial Markets LLC, which is a member of the NYSE, FINRA and SIPC and part of ING, and which has accepted responsibility for the distribution of this report in the United States under applicable requirements.

Additional information is available on request. For more information about ING Group, please visit [www.ing.com](http://www.ing.com).