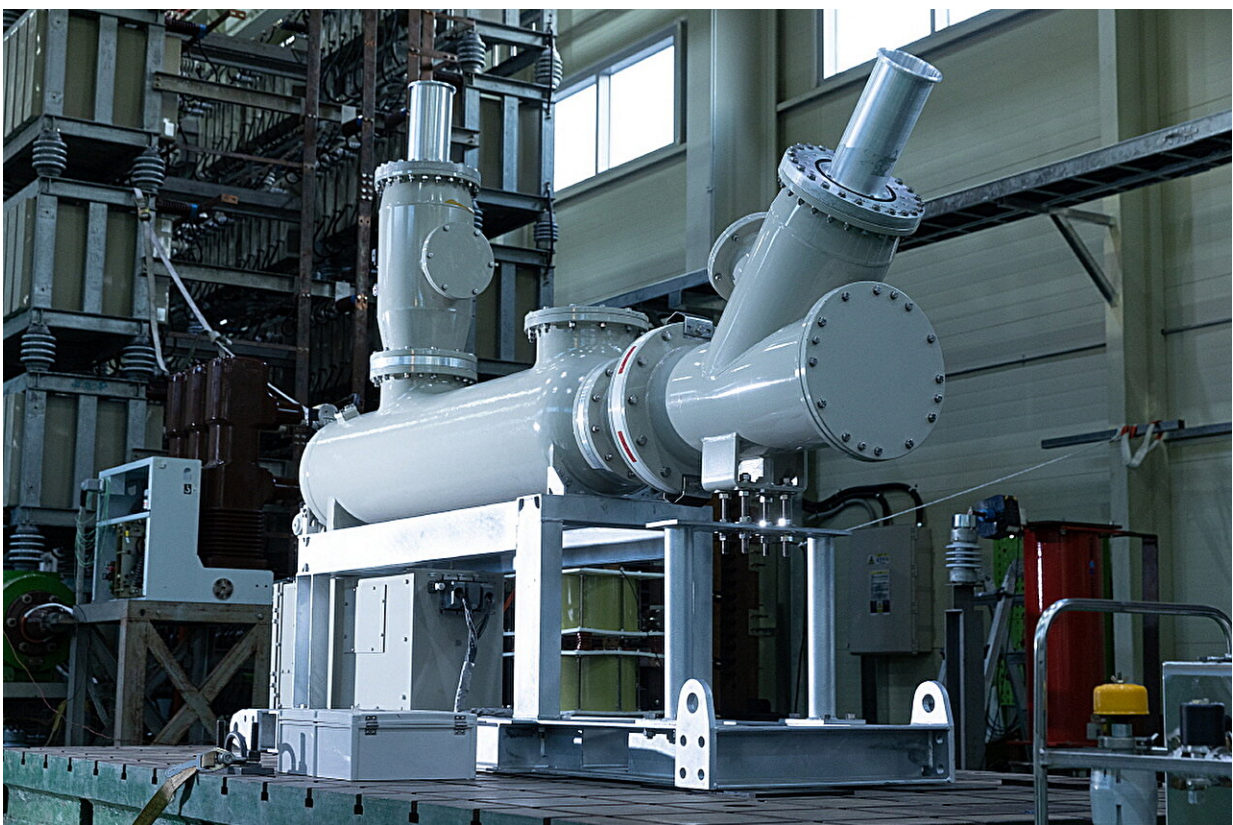


Korean scientists develop an alternative technology for 'SF6', a major culprit of global warming

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Circuit breaker for high voltage transmission using "K6 eco-friendly insulating gas," which replaces SF6. Credit: Korea Electrotechnology Research Institute

Korea Electrotechnology Research Institute (KERI) has developed a

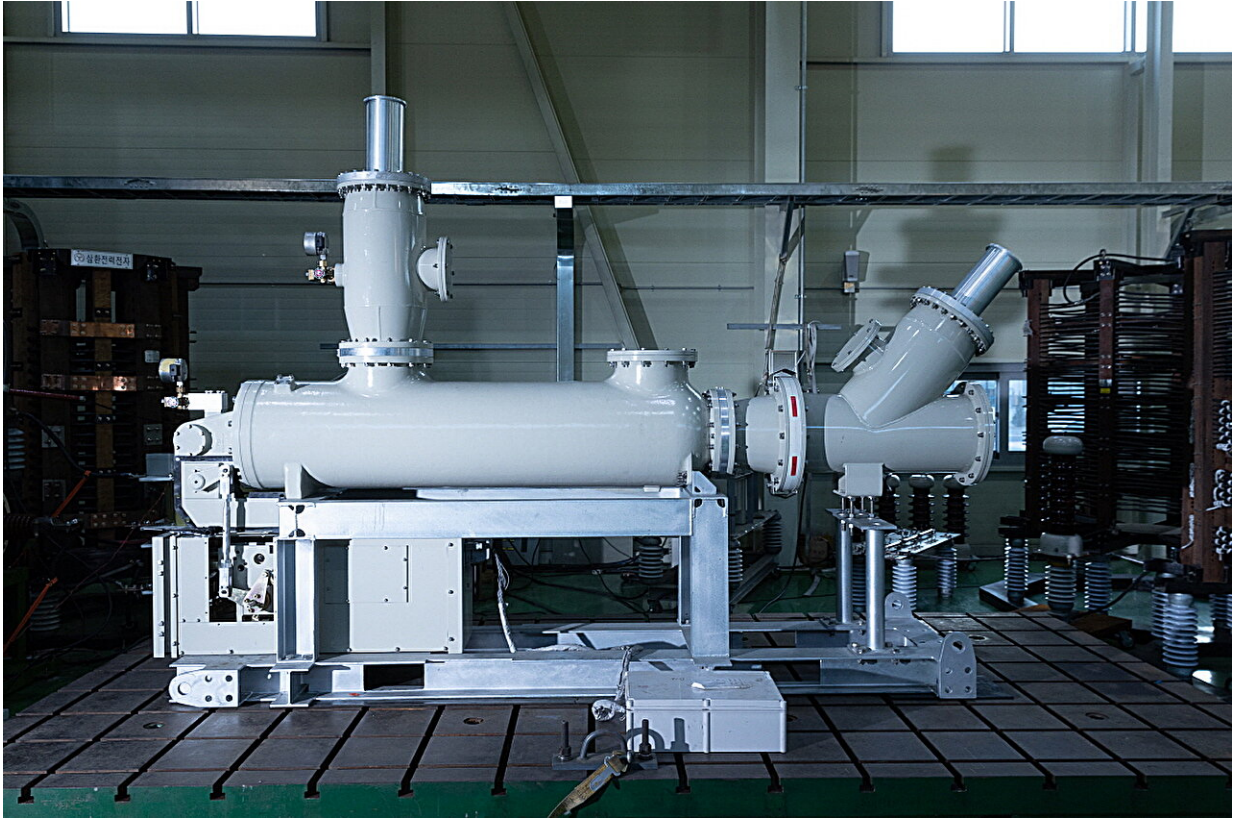
world-class "eco-friendly insulating gas" that replaces SF₆ (sulfur hexafluoride), the main cause of global warming in the field of electric power equipment, and developed a design technology to make it applicable to ultra-high voltage transmission circuit breakers.

Of course, [power devices](#) must be able to conduct electricity well but an "insulation" function to block electricity is also essential to prepare for unexpected accidents and for safety reasons. SF₆ gas offers excellent insulation and with far superior arc extinguishing performance than any other gas, which interrupts fault current in the event of a system failure, it has been used in the [power](#) equipment field for over 50 years.

However, the Global Warming Potential of SF₆ is 23,500 times that of [carbon dioxide](#), and once leaked into the atmosphere, it stays for as long as 3,200 years and has a negative impact on the environment.

In Korea, as SF₆ gas accounts for 60% of the total greenhouse gas emissions emitted by KEPCO, research on the development of alternatives is urgently needed to respond to climate crisis and achieve carbon neutrality.

Although much effort is being made around the world to develop an eco-friendly gas that can replace SF₆, it has yet to bring remarkable result, as developing a substitute gas for SF₆ is more difficult and challenging than developing new drugs.



Circuit breaker for high voltage transmission using "K6 eco-friendly insulating gas," which replaces SF6. Credit: Korea Electrotechnology Research Institute

Despite this high possibility of failure, KERI embarked on the research and development with the mission of a national research institute to respond to global carbon emissions regulations and the enormous effects expected with successful development of SF6 alternative gas.

First, among the gases currently used in industry, substances with a low global warming potential were sorted out, and the electrical and chemical properties of the selected primary candidates were closely analyzed to determine the 2nd round candidates. Then, final candidate materials were selected based on the results of insulation and explosion/ignition control performance tests, and the optimal ratio for application to power

devices was derived to develop eco-friendly insulating gas. KERI named this independently developed gas "K6"

K6 gas is environmentally friendly with a global warming potential of less than 1, and does not contain any serious toxic ingredients. The "boiling point," which is a prerequisite for applying gas to power devices, is also low (-26°C), making the gas applicable in most areas.

KERI went further to apply K6 gas to ultra-high voltage (145kV) transmission-level circuit breakers and even passed the Interrupting performance test in accordance with the international standards of International Electrotechnical Commission (IEC).

In particular, ultra-high voltage transmission circuit breakers are considered to be the most difficult areas to apply insulating gas. Based on the results of the test, KERI plans to apply K6 gas to various power devices (breakers, transformers, switches, etc.) from distribution to transmission.



KERI Eco-Friendly Power Apparatus Research Center, which developed "K6 eco-friendly insulating gas" to replace SF6. Credit: Korea Electrotechnology Research Institute

Dr. Yeon-ho Oh, head of Eco-Friendly Power Apparatus Research Center, KERI said, "K6 gas has better performance and is more environmentally friendly than other insulating gas that has been led by advanced overseas companies." He added, "As Korea has the top-tier position in export in the global power device industry, the development of K6 gas will have a huge impact not only on the environment, but also on the economic and industrial front."

Based on the achievement, researchers plan to prepare for commercialization with technology transfer to Korean power apparatus

companies. KERI is committed to contributing to strengthening the competitiveness of the domestic power apparatus industry by establishing clear design standards for the wide use of eco-friendly gas through continuous communication with the industry.

Provided by Korea Institute of Science and Technology

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