



INFORMATION ON NEW CONCLUSIONS OF DOCTORAL DISSERTATION

(Information will be posted on the Website)

Name of dissertation: Study on the roadmap for hydrogen energy conversion in gas turbine power plants, towards Vietnam's goal of net zero emissions by 2050

Major: Energy Management Code No: 9510602

Name of PhD student: Đoàn Ngọc Dương

Advisors:

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Training Institution: Electric Power University

Summary of new contributions of the dissertation

- 1. The dissertation has synthesized and systematized knowledge on the development and application of hydrogen energy to contribute to reducing greenhouse gas emissions in the energy sector, especially for power generation in gas turbine power plants, towards the goal of carbon neutrality in the world and Vietnam.
- 2. The dissertation proposes a quantitative research method to survey and evaluate the impact of new factors on the development of Vietnam's power system in the context of green transition of the global energy industry. Specifically, the new factor in this study is the replacement of a traditional primary energy (natural gas) with a new energy (hydrogen), with simulation calculations of power system expansion based on the optimal development planning problem.
- 3. The results of calculations and analysis of research scenarios show that: with the goal of achieving carbon neutrality by 2050, the roadmap for fuel conversion from natural gas to hydrogen at gas turbine power plants in Vietnam's power system in the period of 2030 2050 should be applied at a slow to medium conversion rate to optimize system costs and have

"redundancy" in applying technical and technological advances in using hydrogen in gas turbines for power generation globally.

- 4. From both the power system and plant owners' perspectives, implementing a slow to moderate conversion from natural gas to hydrogen in gas turbine power plants would be substantially more beneficial than not converting, especially when considering the social cost of CO₂. This is because fuel switching would allow power plants to continue to generate electricity to the system, avoiding the situation of "stranded assets".
- 5. The fuel conversion from natural gas to hydrogen at gas turbine power plants in Vietnam will face challenges that need to be addressed, mainly including: building and perfecting the legal framework; technical and financial support mechanisms for conversion implementation; creating and maintaining a green hydrogen supply chain in the market. These challenges require joint efforts from the electricity industry and other sectors and fields, including policy makers, power plant owners, project developers and stakeholders.

Hà Nội, April 2025

On behalf of Advisors

PhD student

PhD Dương Trung Kiên

Đoàn Ngọc Dương