INTERNATIONAL MONETARY FUND

Energy Security and The Green Transition

Jaden Kim, Augustus J. Panton, and Gregor Schwerhoff

WP/24/6

IMF Working Papers **describe research in progress by the author(s) and are published to elicit comments and to encourage debate.**
The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

2024
JAN

WORKING PAPER

© 2024 International Monetary Fund WP/24/6

IMF Working Paper
Research Department

Energy Security and The Green Transition

Prepared by Jaden Kim, Augustus J. Panton and Gregor Schwerhoff*

Authorized for distribution by Florence Jaumotte
January 2024

***IMF Working Papers* describe research in progress by the author(s) and are published to elicit comments and to encourage debate.** The views expressed in IMF Working Papers are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

ABSTRACT: The current energy crisis has raised important policy questions on how to strengthen short-term energy security while remaining firmly committed to the green transition, a challenge amplified by the recent consensus at COP28 to transition away from fossil fuels. This paper examines the historical determinants of the security of energy supply and analyzes the green transition implications for energy security. Looking back, we find that the diversification of energy trade partners, or the lack thereof, was the main factor that underpinned energy security dynamics within and across countries over the last two decades. Looking ahead, the green transition is expected to have a net positive effect on energy security provided investments are aligned to address new challenges posed by the increased reliance on renewables.

JEL Classification Numbers:	Q43, Q47, Q48, Q54, Q55, Q58, H20
Keywords:	Energy security; energy independence; green transition; climate mitigation; geo-political risks
Authors' E-Mail Address:	jkim6@imf.org; apanton@imf.org; gschwerhoff@imf.org;

* The authors would like to thank Florence Jaumotte for helpful comments, and Sneha Thube and Hugo Rojas-Romagosa for model simulations.

WORKING PAPERS

Energy Security and The Green Transition

Prepared by Jaden Kim, Augustus J. Panton* and Gregor Schwerhoff

* Corresponding author: Augustus J. Panton, International Monetary Fund, 700 19th, St. NW, Washington, DC, 20431, USA. Email: apanton@imf.org

Contents

Introduction **5**

Trends in energy security **6**
What is energy security? 6
Historical trends in diversification and political risk indicators 6

Measurement of energy security **11**
Energy security at the global level 11
Trends in country-specific energy security 13
Energy security measures and recent macroeconomic developments 16

The net zero transition: Out of existing challenges? **17**
Impact of climate policies on energy security: Channels 17
Impact of climate policies on energy security: a model-based experiment 18

The net zero transition: Into new challenges? **21**
The supply of “transition metals” 21
Electricity supply 24

Conclusion **26**

References **28**

Annex 1: The decomposition of changes in energy security **32**

Annex 2. Decomposition of energy security risk index with different political risk indicators **33**

Box
1. What is Energy Security? A review of the relevant literature 8

Figures
1: Composition of fossil fuel production by fuel and country 7
2: Political risk scores among major fossil fuel producers 9
3: Political risk and change in production in fossil fuels 10
4: Energy production by political freedom 11
5: Decomposition of global energy security risk index for productions of individual fuels 13
6: Energy security as measured by ICRG political-risks weighted country diversification indices 14
7: Energy Intensity as a magnifier of energy security risks 14
8 Decomposition of ICRG-political risk adjusted index, 2010-2020 16
9: Risks from Reliance on Russian Energy 17
10: Renewable energy use and fossil fuel imports 18
11: Global energy security in the baseline and International Carbon Price Floor (ICPF) scenarios 19
12: Global electricity generation (bar charts) and fossil fuel production (black line) 20
14: The share of the production of top three producers to global total, 2021 22
15 Supply security index for copper and nickel over time 23

以上内容仅为本文档的试下载部分，为可阅读页数的一半内容。如要下载或阅读全文，请访问：https://d.book118.com/315034024200011141