

Foreign Direct Investment and Energy Poverty in Africa: The Role of International Partnerships

Emna Kanzari

Stefano Fricano

Gioacchino Fazio

University of Palermo

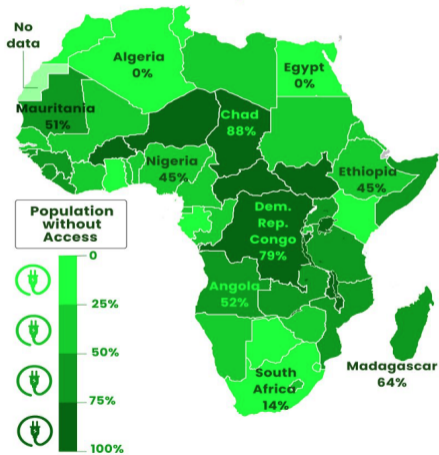
**9th AIEE Energy Symposium
(Rome, 20-22 November, 2025)**



- 1 Introduction
- 2 Literature review
- 3 Data and methodology
- 4 Results and discussion
- 5 Conclusions

Africa's Energy Poverty

Electricity Access

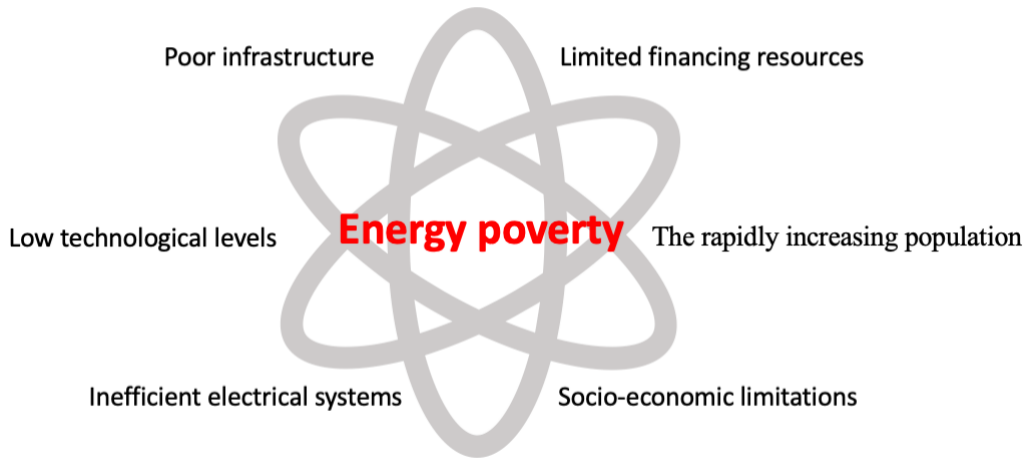


Source: African Energy Council

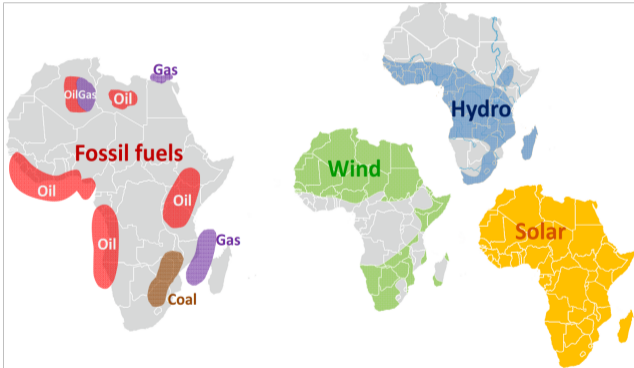
600 million Africans live in energy poverty...

Almost **half** of Africa's total population (IAE, 2025).

80%



The paradox of plenty



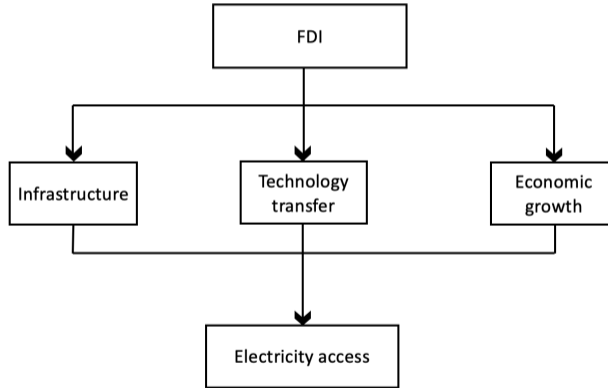
Challenges?

- Underdeveloped infrastructure
- Inadequate transmission and distribution networks
- Inefficient power systems
- Socio-economic factors

FDI?

Guideline Literature

According to different scholars (D'Amelio, et al., 2016; Nguea, et al., 2022; Aluko, et al., 2023; Nguyen & Su, 2022; Kanzari, et al., 2024¹), FDI can increase electricity connectivity through different **channels**:



¹EMNA KANZARI, STEFANO FRICANO, GIOACCHINO FAZIO, JING YU (2024). Foreign Direct Investment (FDI) Impacts on Energy Poverty in African Countries. IAAE ENERGY FORUM, ISSN: 1944-3188.

Structural Equation Model (SEM)²

The Measurement Model:

$$Y = \Lambda_Y \eta + \varepsilon$$

$$X = \Lambda_X \xi + \delta$$

The Structural Model:

$$\eta = \beta \eta + \Gamma \xi + \zeta$$

where:

Y, X: vectors of the observed endogenous and exogenous indicators

Λ_X , Λ_Y : parameter matrices specify how the observed indicators are linked to the unobserved constructs

ε and δ : vectors of measurement errors for the indicators

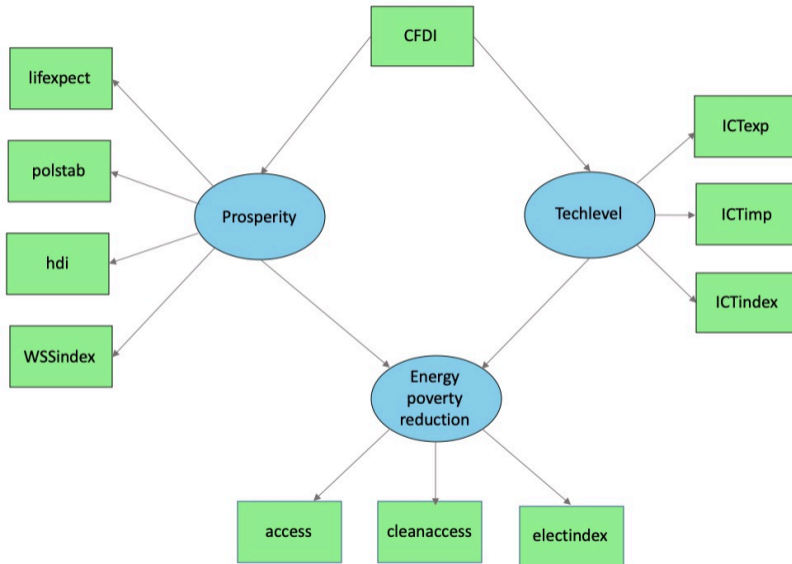
η is a vector of unobserved endogenous variables

ξ is a vector of unobserved exogenous variables

ζ : a vector of unobserved errors

β , Γ : the matrices of structural parameters to be estimated

²David Knoke, 2005. "Structural Equation Models". *Encyclopedia of Social Measurement*. Elsevier. 689-695.



Variable	Source
Chinese Foreign Direct Investment stocks (CFDI)	SAIS-CARI
Access to electricity (% of total population) (access)	World Development Indicators (WDI)
Access to clean fuels and technologies for cooking (cleanaccess)	WDI
Electricity index (electindex)	Africa Information Highway (AIH), AfDB
Human Development Index (HDI)	AIH, AFDB Socio Economic Database
Life expectancy at birth (lifexpect)	WDI
Political stability index (polstab)	WDI
Water and sanitation index (WSSindex)	Africa Information Highway, AfDB
ICT exports (ICTexp)	UNCTAD
ICT imports (ICTimp)	UNCTAD
ICT Index (ICTindex)	Africa Information Highway, AfDB

Tabela 1: The variables included in the analysis for 32 African countries (2005-2022)

Results and discussion

		Coef	OIM std. err.	z	$P > z $	[95% conf.	interval]
Structural Prosperity	cfdis	.0013399	.000209	6.41	0.000	.0009302	.0017495
	Techlevel	.0002626	.0000671	3.91	0.000	.0001311	.0003941
Energpov reduc	Prosperity	5.226521	.2835685	18.43	0.000	4.670737	5.782305
	Techlevel	2.754206	.7550298	3.65	0.000	1.274375	4.234037

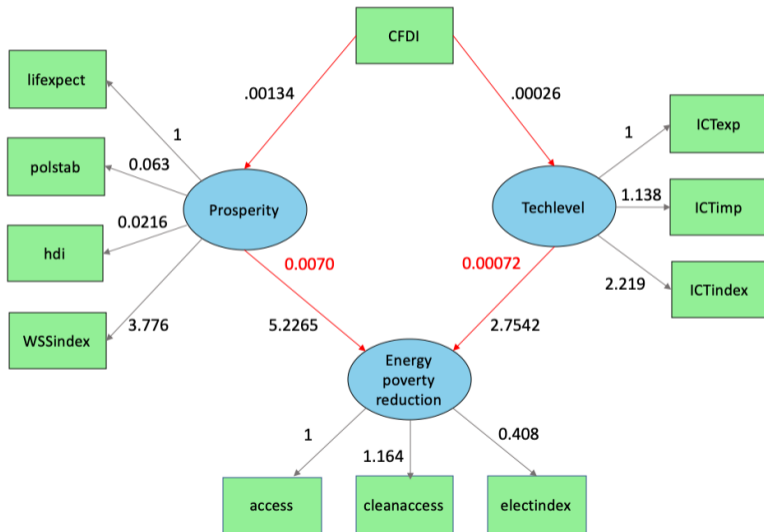
Tabela 2: SEM Results

Indirect effect from cfdis to energy poverty reduction:

Through prosperity = coef cfdis_prosperity * coef prosperity_EPR = 0.0013399 * 5.226521 = **0.007003**

Through techlevel = coef cfdis_techlevel * coef techlevel_EPR = 0.0002626 * 2.754206 = **0.000723**

SEM Path Diagram



FDI drives energy poverty reduction through two primary channels: by **enhancing national prosperity** and by **advancing technological levels**.

The findings confirm that both channels transmit the benefits of FDI to energy poverty reduction, but with different degrees of effectiveness:

- **The prosperity** channel is substantially more powerful \Rightarrow FDI's strongest impact occurs when it enhances overall development conditions insuring higher public spending on essential services.
- **Technology** is a significant, but secondary, contributor. It enables modern and efficient energy systems but has a smaller overall impact than prosperity.

Policy implications:

- The primary policy goal should be to attract and channel FDI into sectors that have the highest multiplier effects on socio-economic development.
- Policies must focus on ensuring political stability and reducing corruption to create a trustworthy environment that attracts high quality, long-term FDI particularly from **highly technological advanced countries** like **China**.
- Create policies that ensure FDI brings technology spillovers, like mandating local partnerships and investing in digital infrastructure.

Future Research: Sectoral analysis of FDI; extended approaches of SEM.

Thank you for your concern!

emna.kanzari@unipa.it

