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Dynamics of International Direct Investment in Renewable Energy and Structural Transformation in MENA Countries: Standard Evidence Using System-GMM Models and Threshold Regression (2005-2023)

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Abstract: *This research aims to measure the impact of international direct investment directed to the renewable energy sector(FDI_RE) and the possibilities of structural transformation of emerging economies, and identify the special determinants that attract this type of investment, while testing the existence of a non-linear relationship between FDI_RE and structural transformation, the research relied on a mixed methodology that combines descriptive and Standard analysis using (Panel Data) for 12 countries from the Middle East and North Africa during the period (2005-2023) and then estimate three main standard models(generalized dynamic(system- GMM) to estimate the determinants(FDI_RE) and the self-regression model of distributed data slowdowns (panel ARDL-PMG) to measure the long-term and short-term relationship, and the threshold regression model for Data(Panel Threshold Regression) to test non-linearity the results showed that the determinants of FDI in renewable energy are fundamentally different from traditional FDI determinants, as environmental policies and sustainable development goals came as the most attractive factors, superior to the market size and structure traditional infrastructure ،It was also proved that there is a long-term joint integration relationship between (FDI_RE) and structural transformation, with an elasticity coefficient of (0.437) in the long term, and most importantly, a non-linear relationship was discovered in the form of the letter S, where the impact of (FDI_RE) is not statistically significant as the ratio of its flows to GDP reaches a critical threshold of (1.83%), and after exceeding this threshold, the impact multiplies significantly coefficient(0.712) the flexibility of structural transformation increases by(67%) in countries with strong institutions compared to countries with weak institutions, and this research is the first of its kind in the MENA region, which combines the analysis of fdi_re determinants and measurement of For the first time, it provides quantifiable quantitative results that policy makers can use to design strategies to attract green investment.*

Keywords: *International Direct Investment, Renewable Energy, Structural Transformation, Threshold Models, MENA Countries, Sustainable Development, Enterprise Quality.*

Introduction

this research is an attempt to find out the impact of International Direct Investment (FDI) in the renewable energy sector, as it is the most efficient operational channel and the vital pillar of the concept of 'international investment in developing and emerging economies. international investment in clean energy is not limited to being a cross-border financial flow (Rehman Khan et al.,2022), but represents an integrated and highly complex package of foreign capital, the transfer of advanced technology, and international management knowledge; elements that are embodied institutionally through multinational

companies and their direct investments (Pla-Barber& Tobón-Orozco,2026). Based on this, this research takes the flows of green international direct investment as an applied benchmark that reflects the reality and dynamism of international investment in the energy sector, and a key driver for reallocating resources and achieving targeted structural transformation in the MENA region (Sokolova& Tretyakova,2025).

Research problem

The core problem addressed by this research is the following: the MENA region has a huge natural potential for renewable energy (the highest rates of solar radiation in the world, favorable winds in several locations), and suffers from an urgent need for structural transformation to diversify its economies and reduce its dependence on oil, but in contrast it fails to attract a proper share of foreign investments to this vital sector. in a more specific formulation, the problem can be expressed in the following questions:

1. What are the most important determinants of attracting international direct investment to the renewable energy sector in MENA emerging economies and are these limiters different from traditional FDI limiters (focused on oil and gas)
2. Is the influx of FDI into the renewable energy sector accelerating the structural transformation in these economies, or does its impact remain limited and confined to isolated projects

Research hypothesis

The research is based on the hypothesis that there is a statistically significant relationship between international direct investment directed to the renewable energy sector and the structural transformation of MENA emerging economies, and this relationship takes a non-linear form influenced by the quality of institutions.

Research objectives

This research seeks to achieve the following objectives:

1. Describe and analyze the developments and determinants of FDI in the renewable energy sector in MENA economies during the period (2005-2023), and classify these determinants into traditional and special.
2. analyzing the course of structural transformation in the sample countries, identifying the stages of acceleration and deceleration associated with foreign investment flows.
3. Estimation of the long-term and short-term equilibrium relationship between (FDI_RE) and structural transformation using (panel ARDL-PMG models of joint integration.

The importance of research

Based on the identified research gaps, the research seeks theoretical, methodological and applied contributions that can be listed as follows:

A. First: theoretical contribution

1. Expanding the Oli theory (Dunning, 2000) to include variables specific to the "green economy" that were not included in the original

formulation of the theory, such as: environmental policies, Sustainable Development Goals (SDGs), and sustainability signals sent by the host country via its international obligations.

2. Testing the hypothesis of the environmental race to the top: in the context of the emerging MENA economies, this is the first time this test has been conducted in the Arab region, which contributes to resolving the theoretical debate about whether strict environmental policies repel investments or attract them.
3. Development of the theory of structural transformation (Lewis, 1954; Chenery & Taylor, 1968) to include the renewable energy sector as a new engine of transformation in rentier economies, since the previous classical formulations focused on agriculture and industry as the main sectors in the transformation process.

B. Second: systematic contribution

1. Combining three advanced standard techniques in one study:
   a. GMM System: to address the problem of endogeneity suffered by FDI models.
   b. panel ARDL-PMG to distinguish between short-term and long-term flexibility.
   c. panel Threshold Regression for nonlinear relationship testing and detection of critical thresholds.
2. The construction of a composite indicator of structural transformation that combines the three dimensions (productive, labor, qualitative) in a weighted Index, which avoids criticism of the use of a single indicator that may be misleading.
3. The use of balanced panel data for 12 countries over 19 years (228 views), a relatively large sample that allows for robust statistical conclusions and addresses the problem of small sample size suffered by previous MENA studies.

Methodology

Research methodology: this research was based on the analytical descriptive approach and the quantitative standard approach in an integrated manner. The descriptive method was used to analyze the developments of the study variables (FDI_RE, structural transformation, and their determinants) over the time period, and the standard method for testing research hypotheses and estimating causal relationships, elasticities, and critical thresholds.

The first Part: theoretical framework and reference for research:

First: investing in renewable energy: in recent decades, the world has witnessed an unprecedented transformation in the global energy structure, driven by the accelerating pace of climate change, the international commitment to reduce carbon emissions under the Paris Agreement (2015), and the sharp decline in the costs of renewable energy technologies (IRENA, 2023). In 2022 alone, the total global investment in renewable energy amounted to

about (1.3)trillion US dollars, surpassing investments in fossil fuels for the first time in history (Bloomberg, 2023) and forecasts indicated that this figure will rise to (2) trillion dollars by 2030, with emerging economies controlling increasing proportions of these flows (IEA, 2024) in this context, international direct investment has emerged as a major channel for the transfer of technology, expertise and financing necessary for the development of the energy sector renewable energy in developing and emerging countries (Paramati et al., 2022)

Multinational renewable energy companies not only bring capital, but also transfer technical knowledge, modern management practices, and access to global export markets these investments also contribute to job creation, enhance energy security, and reduce dependence on imported fossil fuels (Wang & Lee, 2023).By contrast, the Middle East and North Africa (MENA)region remains – Despite its enormous potential for solar and wind energy, the region suffers from a clear lag in attracting foreign investments to the renewable energy sector, as the region's share of the total global investment in clean energy does not exceed(4.5%), which is a modest percentage compared to the size of its natural potential and development needs (UNCTAD, 2023). This weakness is caused by a combination of factors, the most prominent of which are(absence of incentive regulatory frameworks, poor infrastructure, low quality of institutions, continued support for fossil fuels.

The most profound problem is that the emerging economies in the region (especially the oil-exporting Gulf Arab states) face a chronic structural dilemma as a result of excessive dependence on the hydrocarbon sector as the main source of public revenues, exports and domestic output, which makes them vulnerable to external shocks and fluctuations in global energy prices (Szirmai, 2022). In addition, there is a weak structural transformation (structural Transformation), that is, the inability to move from dependence on the primary sector (resource extraction) to the high-value-added manufacturing and service sectors.

In view of the foregoing, this research is based on the integration of three main theoretical models: The Theory of attracting foreign investment (Dunning'S OLI Paradigm), Porter's environmental hypothesis (Porter Hypothesis), and the theory of structural Transformation Theory (Structural Transformation Theory) (Ajide & Lawal, 2021).And we can take it as it comes:

The theory of attracting foreign investment (Dunning's OLI Paradigm): according to the selective model developed by Dunning (1988, 2000), investments of multinational companies are attracted to countries that provide three integrated advantages: :

First: ownership Advantage: the company's ability to hold intangible assets (patented technology, international trademarks, accumulated management experience) gives it an advantage over local competitors in the renewable energy sector (Kahouli & Maktouf, 2021), as many international companies have advanced technology in the manufacture of solar panels, wind turbines and storage systems, and they do not invest in countries that do not protect intellectual property rights (Dunning & Lundan, 2008).

Second: location advantage: the characteristics of the host country that make investing in it more profitable than investing in other countries (AL Ani& Chavali,2023). These characteristics include (market size, infrastructure, political stability, availability of

Natural Resources, sunlight, wind, water) regulatory frameworks and environmental policies (Solangi& Magazzino,2025). Dunning (2000) has pointed out that the importance of each element of the site advantage varies depending on the sector and the level of development and therefore affects the renewable energy sector (Anton & Nucu, 2020).
Third: internal advantage: (: is the advantage that means in a company's preference to retain the advantage within its organizational structure (i.e. direct investment) rather than licensing or selling it to other companies (via concession or licensing contracts) in the renewable energy sector, companies tend to fully acquire projects or the overwhelming majority of shares to maintain the confidentiality of technology and prevent its leakage to competitors (Narula & Pineli, 2019).

Porter's hypothesis and the environmental"race to the top": contrary to the traditional view derived from the pollution, (Bashir,2022) Haven Hypothesis trade theory, which says that countries lower their environmental standards to attract investments in what is known as the "race to the Bottom", Porter's hypothesis (Porter & van der Linde, 1995) suggests the exact opposite: strict and well-designed environmental policies can stimulate innovation, enhance the competitiveness of companies, attract high-quality clean industrial investments the hypothesis is based on three main mechanisms (ambec et al., 2013):

1. **Innovation Impact:** regulatory pressures push companies to look for innovative solutions that reduce costs and increase efficiency.
2. **Signal effect):** countries with high environmental standards send a positive signal to investors about the quality of enterprises and long-term organizational stability.
3. **Differentiation effect**: companies operating in ecologically strict environments develop a competitive advantage in global markets that value green products in the same context, a literature has developed ("race to the top" (Vogel, 1997; Prakash & Potoski, 2017)) that shows that developed and emerging countries compete to attract green investments by raising their environmental standards, because investors in the clean technology sector prefer stable, transparent and strictly regulated environments (Anton & Nucu, 2020).

Structural transformation theory: this theory has its roots in the works of pioneers such as Lewis (Lewis, 1954) in the surplus labor model (Szirmai, 2022; Belaid & Zrelli, 2019), Chenery and Taylor (Chenery & Taylor, 1968) in Pattern analysis, and Sirquin (Sirquin, 1988) in measuring transformations, this theory suggests that economic development is accompanied by a redistribution of economic activity from the primary sector (agriculture, fishing, mining, oil extraction) to the secondary sector (manufacturing, construction, utilities) and then to the tertiary sector (highly productive services such as finance, communications, education, health and in this context rentier economies.

1. the dominance of the hydrocarbon sector on the domestic product, exports and government revenues (up to (80-90%).)
2. the weakness of the non-oil manufacturing sector, as its percentage of GDP ranges between 5-15% only in most Gulf countries.

3. the effect of the "Dutch disease" (Dutch Disease), in which the flow of oil revenues leads to a rise in the real exchange rate, which makes commercial sectors (industry and agriculture) globally uncompetitive.

Second: the theoretical relationship between FDI and structural transformation – impact mechanisms: based on the fusion of the theories of foreign investment and structural transformation, five main mechanisms can be identified through which FDI investments, especially in the renewable energy sector, move to structural transformation in emerging economies.

Based on the above, it is clear to us that these mechanisms are the causal links that explain how the flow of foreign capital can cause a shift in the structure of the economy from dependence on the primary sector to the industrial and service sectors, and we can clarify these mechanisms according to the following:

The first mechanism: technology transfer and innovation this mechanism is the most documented in the scientific research literature, as multinational companies (MNCs) have advanced technology that is not available locally, and when investing in a host country, this technology is transmitted through multiple channels, the most important of which are: (UNCTAD, 2022 and (Keller, 2004)

1. **Internal training:** training local workers on the operation and maintenance of modern technologies.
2. **Linkages with local suppliers**: requiring local suppliers to achieve certain quality and technology standards.
3. **Career mobility:** the transfer of trained labor from foreign companies to local companies (after gaining experience).
4. **Imitation:** local companies monitor the technologies of foreign competitors and try to imitate or develop them in the context of the renewable energy sector, technology transfer includes technologies for manufacturing photovoltaic solar panels, wind Turbines, battery storage systems, and smart Grids (IRENA, 2023). Some researchers have shown that the Chinese government's requirement for FDI solar companies to use a certain percentage of locally manufactured components has led to a massive technological transfer and created a domestic solar industry that competes globally.

The second mechanism: job creation and impact on the labor market: the impact of FDI on employment is divided into two effects: a direct impact (jobs created by the foreign company itself and an indirect impact jobs created by local companies supplying or servicing the project in the renewable energy sector, estimates of the International Renewable Energy Agency (IRENA, 2023) indicate that:

1. Every million dollars invested in solar energy creates about 7.5 direct jobs (compared to only 2.5 jobs in the oil and gas sector.
2. Every million dollars invested in wind energy creates about 4.2 direct jobs.

3. The percentage of indirect jobs (in supply chains and support services) is equivalent to 1.5–2 times the direct jobs.

Renewable energy jobs tend to be higher-paying than the average economy, require medium and high technical skills, which contributes to raising the level of skills in macroeconomics (improving human capital) and increasing the demand for technical education and vocational training (Szirmai, 2022). This, in turn, brings about a structural transformation of the labor market: the transition of labor from low-productivity sectors (agriculture, simple construction) to higher-productivity sectors (technical manufacturing, modern services.

The third mechanism: infrastructure development, back and front links:

1. **backlinks:** are the purchases made by the foreign company from local suppliers. A large solar energy project needs to:
    a. Cement and iron for bases and structures (local industry)
    b. Cables and adapters (local or regional industry)
    c. Transport and logistics services (local services)
    d. Excavation and land Leveling Works (local contracting)

    All these purchases stimulate demand for local sectors, encouraging their expansion and improving their quality (UNCTAD, 2022).
2. **Front links:** are products and services provided by the foreign company to other sectors of the local economy. A solar power plant that produces clean and cheap electricity can:
    a. Domestic factories supply less expensive energy, which improves their competitiveness.
    b. Desalination plants provide energy, which reduces the cost of water and stimulates agriculture and industry.
    c. It feeds the charging networks of electric cars, stimulating the electric car industry domestically.

The fourth mechanism: enhancing competition and raising productivity: the entry of a foreign company into the local market increases the competitive pressure on local companies. In order to stay on the market, domestic companies are forced to:

1. Improve its production efficiency (reduce waste, optimize production processes)
2. Investing in new technology.
3. Improve the quality of its products and services.
4. Reduce prices to compete with the foreign company.

This competitive pressure leads to an increase in the productivity of macro-factors in the economy, which is the essence of a qualitative (not only quantitative, but also qualitative) structural transformation (Aghion et al.2019) J avorcik's (2004) leading study on Lithuania showed that joint ventures between domestic and foreign companies achieve greater productivity effects than completely foreign companies, due to closer integration and coordination.

Fifth mechanism: improving the balance of payments and reducing dependence on imports: in non-oil countries from the MENA region (such as Jordan, Morocco, Lebanon, Tunisia), the oil and gas import bill is a significant burden on the balance of payments (ranging from 10-25% of the value of imports). FDI investments in renewable energy:

1. Reduces dependence on imported fossil fuels, saving hard currency.
2. Lead to the export of surplus electricity (as Morocco is doing through the Nour Ouarzazate project,and as Jordan is planning.
3. Financial resources that used to go to the import of energy are freed up, and they can be directed to the import of industrial machinery and equipment (contribute to industrialization.

This effect is known as the" resource liberation Effect", and is one of the mechanisms on which the literature on structural transformation has focused especially in the context of Southeast Asian economies (Szirmai, 2022).

The second Part: variables of the research sample

Dependent variable: structural Transformation (Structural Transformation – ST) since structural transformation is a multidimensional concept, the researcher adopted a composite index (Composite Index) combining three sub-indicators, and then standardized using the z-score method to become on a scale from 0 to 100 to facilitate interpretation.

Table (1): components of the composite index of structural transformation

The symbol	The symbol	Operational definition	Weight
ST_1	The share of the industrial sector in GDP	The share of the industrial sector in GDP manufacturing, construction and non-oil extractive industries in GDP%	0.40
ST_2	The share of the industrial sector in employment	Labor force in industry by total employment%	0.30
ST_3	Economic Complexity Index (ECI(	Measures the diversity and complexity of exports; higher values = more advanced structural transformation	0.30

Source: prepared by the researcher based on:

ST1, ST2: World Bank (WDI) (2024) and International Labour Organization (2024.
ST3: Atlas of Economic Complexity (Atlas of Economic Complexity) (2024).

Justifications for choosing weights:

1. The higher weight (0.40) of ST1 because it is the classic and most widely used indicator in the structural transformation literature (Chenery & Taylor, 1968).
2. Equal weight (0.30) for both ST2 and ST3 to reflect the importance of the labor dimension (quality of life) and the qualitative dimension (complexity of the economy.

Table (2). Basic independent variables

Measurement	The symbol	The variable

FDI flows to renewable energy projects (USD million) divided by GDP(%)	**FDI_RE**	**FDI flows to renewable energy**
Cumulative FDI balance in renewable energy (USD million) divided by GDP(%)	**FDI_RE_STOCK**	**FDI stocks up on renewable energy**

Source: preparation of the researcher based on data from:reports of the United Nations conference on trade and Development (UNCTAD) (2024) and the International Renewable Energy Agency (IRENA) (2024).

Interpreted Variables (For the Equation of Fdi_Re Determinants))

Table (3): interpreted variables proposed determinants of attraction FDI_RE))

Category	The variable	Symbol	Measurement	The expected signal
Market size	Gross domestic product per capita (PPP)	GDPpc	In constant dollars for 2015 (PPP)	+
Infrastructure	The percentage of access to electricity	ELEC_ACC	Of the population%	+
Natural resources	The potential of solar energy	SOLAR_POT	kWh/m2 / day (annual average)	+
Environmental policies	Legal framework for renewable energy	POLICY_DUM	Imaginary variable = 1 if there is a National Renewable Energy Strategy, 0 otherwise	+
SDGs goals	Progress in SDG 7	SDG7_INDEX	Composite Index from 0 (worse) to 100 (better)	+
Quality of institutions	The average of the six governance indicators	WGI_AVG	Average values (from -2.5 to +2.5)	+
Political stability	Political stability index	POL_STAB	From WGI (-2.5 to +2.5)	+
Commercial openness	The ratio of trade to GDP	TRADE_OPEN	(Exports + imports) / GDP (%)	+/−

Source: preparation of the researcher based on the data of the World Bank Group for solar energy data (Global Solar Atlas) (2024)

Control variables (to equalize the effect of FDI_RE on structural transformation)

Table (4): control variables in the structural transformation equation

The variable	Symbol	Measurement	Theoretical justification
Commercial openness	TRADE_OPEN	(Exports + imports) / GDP (%)	Open markets facilitate technology transfer and increase competition (Grossman & Helpman, 1991)
Local investment	DOM_INV	Gross fixed capital formation / GDP (%)	Public and private investment complement FDI and enhance its effects (Agenor, 2004)
Human capital	HUM_CAP	Average years of education (for the population 25 years and older)	The ability to assimilate and develop movable technology (Nelson & Phelps, 1966)

Inflation	INF	Annual inflation rate (%) (consumer price index)	Monetary instability discourages investment and hinders long-term planning (Fischer, 1993)
Population growth	POP_GROWTH	Annual population growth rate (%)	It affects the size of the market, employment and demand for infrastructure (Bloom et al., 2010)

Source: preparation of the researcher based on the data of the United Nations Development Program (UNDP) Human Development reports (2024)

Second: the proposed standard models

The first model: the model of determinants of FDI in renewable energy (Determinants of FDI_RE)

Estimation using the GMM (Arellano-Bover/Blundell-Bond) system for endogenous processing:

FDI_REit=α0+β1FDI_REi,t−1+β2GDPpcit+β3ELEC_ACCit+β4SOLAR_POTi+β5POLICY_DUMit+β6SDG7_INDEXit+β7WGI_AVGit+β8POL_STABit+β9TRADE_OPENit+μi+εit*FDI_REit=α0+β1FDI_REi,t−1+β2GDPpcit+β3ELEC_ACCit+β4SOLAR_POTi+β5POLICY_DUMit+β6SDG7_INDEXit+β7WGI_AVGit+β8POL_STABit+β9TRADE_OPENit+μi+εit*

Then:

* FDI_REit*FDI_REit*::flows to renewable energy in country i and Year t as a percentage of GDP.

FDI_REi,t−1*FDI_REi,t*−1: the first slowdown of the dependent variable (to process the time dependence).

* •μiμi: fixed effects specific to each country.

* εitεit: random error limit.

Justifications for using the GMM system:

1. Addresses the problem of endogeneity caused by the two-way relationship between FDI and economic growth (i.e., growth attracts FDI, and FDI promotes growth).
2. Addresses the time dependence problem by including the first deceleration of the dependent variable as an explanatory variable.
3. Addresses the fixed effects problem specific to each country and calculated within the error limit.
4. Suitable for panel data with an average time duration (T=19) and a sufficient number of states (N=12) (Roodman, 2009).

The second model: the model of the effect of FDI_RE on the structural transformation (linear relationship) is estimated using the ARDL model for panel data – the method of the compact mean Group (Pesaran et al., 1999):

ΔSTit=ϕi(STi,t−1−θiFDI_REi,t−1−δiXi,t−1′)+∑j=1p−1λijΔSTi,t−j+∑k=0q−1γikΔFDI_REi,t−k+∑l=0r−1ϱilΔXi,t−l′+εitΔ*STit=ϕi*(*STi,t*−1−*θiFDI_REi,t*−1−*δiXi,t*−1′)+*j*=1∑*p*−1*λij*Δ*STi,t*−*j*+*k*=0∑*q*−1*γik*Δ*FDI_REi,t*−*k*+*l*=0∑*r*−1*ρil*Δ*Xi,t*−*l*′+*εit*

Then:

* φi MITii: error correction coefficient (must be negative and significant for the presence of a common integral)
* θi θi: long-term flexibility coefficients.
* γik،ϱilγik، ρil: short-term elasticity coefficients.
* X'X': vector of control variables الرقابية(TRADE_OPEN ،DOM_INV ،HUM_CAP ،INF ، POP_GROWTH)

Justifications for using panel ARDL-PMG:: distinguish between long-term and short-term relationship, which is necessary to understand the dynamics of structural transformation (which takes a long time)

1. Works with mixed integration time series [I(0) and I(1)], which is a common case in economic data.
2. Provides consistent estimates even in small samples (T=19, N=12) (Pesaran & Smith, 1995)

The third model: the nonlinear relationship model (Threshold (Threshold Regression)
Estimation using a threshold regression model for pannel data (Hansen, 1999):

STit=μi+β1FDI_REit·I(qit≤γ)+β2FDI_REit·I(qit>γ)+θXit+εit$STit=\mu i+\beta 1FDI_REit\cdot I(qit\leq\gamma)+\beta 2 FDI_REit\cdot I(qit>\gamma)+\theta Xit+\varepsilon it$

Where:
* qitqit: the threshold variable (it can be: FDI_RE itself, the quality of wgi_avg institutions, or the level of gdppc development).
* $\gamma\gamma$: the threshold value that is estimated internally from the data (Endogenously estimated) using the sequential least squares method (Sequential Least Squares) and reduce the sum of the squares of the remainder.
• I(·)$I(\cdot)$: the indicator Function takes the value 1 if the condition is met, and 0 otherwise.
* μiμi: fixed effects specific to each country.
Justifications for using the threshold model:

1. Tests the theoretical hypothesis that the effect of FDI_RE on structural transformation is not linear, but appears only after exceeding a certain threshold (Critical Mass).
2. Sets a quantitative threshold value, for example (1.8%) of GDP, that policy makers can use as a strategic goal.
3. Addresses the problem of bias resulting from random sample splitting (ad hoc sample splitting), estimating the threshold internally from the data (Hansen, 1999; Hansen, 2000).

The fourth model: the interaction model (the modified role of the quality of enterprises)

STit=μi+β1FDI_REit+β2WGI_AVGit+β3(FDI_REit×WGI_AVGit)+θXit+εit$STit=\mu i+\beta 1 FDI_REit+\beta 2WGI_AVGit+\beta 3(FDI_REit\times WGI_AVGit)+\theta Xit+\varepsilon it$

Then
• (FDI_REit×WGI_AVGit)($FDI\_REit\times WGI\_AVGit$): variable interaction between FDI_RE flows and enterprise quality.

* If $\beta 3>0\beta 3>0$ is significant, it means that the quality of enterprises enhances (maximizes) the effect of FDI_RE on structural transformation.
* If $\beta 3<0\beta 3<0$ is significant, it means that the quality of institutions reduces (mitigates) the effect of FDI_RE (which is a theoretically unlikely possibility.

Third: diagnostic and durability tests: to ensure the reliability of the standard results, a set of diagnostic and durability tests of the models will be carried out:

Table (5): diagnostic and durability tests

The test	Purpose	Acceptable threshold
Unit root tests (ADF, PP, KPSS)	Making sure that there is no unit Root leads to a false regression (Spurious Regression)	ADF and PP: Prob. < 0.05 to reject the existence of a module root. KPSS: Prob. > 0.05 for non-rejection of immutability
Joint integration tests (Pedroni, Kao, Westerlund)	Ensure that there is a long-term equilibrium relationship between the variables	Prob. < 0.05 to reject the hypothesis of the absence of a common integral
Self-correlation test (Arellano-Bond AR (1), AR (2) for GMM models)	Ensure that there is no second-order autocorrelation in the form buffers	AR(1): Prob. < 0.05 (required), AR(2): Prob. > 0.05 (required)
Instrument health test (Sargan / Hansen J-test)	Checking the correctness of the tools used in GMM models (no over-selection)	Prob. > 0.05 for not rejecting the hypothesis of the validity of instruments
Model stability tests (CUSUM, CUSUMSQ)	Ensuring the stability of estimated transactions over time	The statistic falls within the limits of constancy (5%)
Durability tests (1) (dependent variable change)	Replacing ST1 with ST2 or ST3	Signs and semantics should remain the same
Durability tests (2 (independent variable change)	Replacing FDI_RE flows with FDI_RE_STOCK stock	Signs and semantics should remain the same
Durability tests 3 (Delete pandemic year 2020)	Revaluation of forms after the deletion of the covid-19 year	The main results should remain fundamentally unchanged
Durability tests 4 (alternative estimation method)	Using Difference GMM instead of system GMM	The results should converge with the basic ones
Durability tests 5 (Bootstrap 1000 repetitions)	Correction of deviations in small samples	Differences in transactions should be small (< 5%)

Source: preparation of the researcher based on the data of the United Nations Development Program (UNDP) Human Development reports (2024)

The Third Part: Standard Results and Their Discussion

First: descriptive statistics: before the introduction of standard models, descriptive statistics of all study variables were analyzed to understand the characteristics of the data and their distributions.

Table (6): descriptive statistics of study variables (2005-2023, 12 countries, 228 views)

(Kurtosis)	(Skewness)	Standard deviation	The minimum	The maximum	The mediator	Average	symbol	The variable

3.24	0.87	14.23	12.18	68.42	31.25	32.47	ST	Structural transformation(Composite Index)
6.21	1.84	0.98	0.00	4.28	0.31	0.76	FDI_RE	FDI_RE (%of GDP)
6.83	1.96	2.67	0.00	11.67	1.52	2.34	FDI_RE_STOCK	FDI_RE stock (%of GDP)
4.56	1.42	21,456	3,241	88,124	18,234	24,567	GDPpc	GDP per capita (PPP -$)
4.89	-1.56	9.87	62.30	100.0	98.50	94.23	ELEC_ACC	Percentage of access to electricity (%)
2.45	-0.23	0.78	4.20	7.20	5.80	5.67	SOLAR_POT	The potential of solar energy
1.58	-0.76	0.47	0.00	1.00	1.00	0.68	POLICY_DUM	Legal framework for renewable energy
2.67	-0.34	14.23	28.40	89.20	58.50	56.78	SDG7_INDEX	SDG index 7
2.89	0.45	0.67	-1.34	1.42	-0.15	-0.23	WGI_AVG	Average governance indicators (WGI)
2.98	-0.23	0.78	-2.34	1.12	-0.38	-0.45	POL_STAB	Political stability index
3.45	1.12	38.45	38.20	198.40	84.50	92.45	TRADE_OPEN	Trade openness (%of GDP)
3.67	0.89	6.78	12.80	42.30	21.50	22.34	DOM_INV	Domestic investment (%of GDP)
2.89	-0.56	2.34	4.50	13.40	10.20	9.87	HUM_CAP	Human capital (years of Education)
12.45	2.34	5.67	-4.50	34.50	4.20	5.67	INF	Inflation (%)
3.45	0.87	0.98	-0.50	4.50	1.70	1.89	POP_GROWTH	Population growth (%)

Source: prepared by the researcher based on reports: ST, GDPpc, ELEC_ACC, TRADE_OPEN, DOM_INV, INF, POP_GROWTH: World Bank (WDI) (2024). Processed using (EViews 12)

Descriptive statistical analysis:

1. **Structural transformation (ST):** ranges between 12.18 (lowest value) and 68.42 (highest value) with an average of 32.47, which indicates a significant discrepancy between the MENA countries in the level of structural transformation UAE and Saudi Arabia due to visions (2030) recorded the highest values, while Lebanon and Algeria recorded the lowest values. The standard deviation (14.23) reflects this discrepancy.
2. **FDI_RE values are very low on average (only 0.76%)** of GDP with a large variation standard deviation (0.98). The minimum of zero countries does not attract any (FDI_RE) in some years and the maximum of 4.28% Morocco during the years of the Nour Ouarzazate project this confirms the problematic of the research: fire investments in the region are still very modest.

3. **SOLAR_POT MENA countries possess enormous solar potential (average 5.67 kWh/m2/day),** but this did not translate into high FDI_RE flows, which indicates the presence of abnormal obstacles (political, institutional, financing).
4. **Wgi_avg: a negative average** (-0.23) indicates that the performance of MENA countries in governance indicators is lower than the global average, with a significant discrepancy between the Gulf countries (the highest) and some other Arab countries (the lowest
5. **POL_STAB negative value** (-0.45) reflects the relative political instability in the region especially the impact of the Arab Spring 2011 and beyond.
6. **INF an average of** 5.67% with a high standard deviation (5.67) and a maximum of 34.5% (Lebanon in the crisis years), indicates the presence of high and unstable inflation in some countries of the sample.

Second: unit root tests: to determine the degree of integration of time series and select the appropriate standard model, three unit root tests were performed for panel data: the Levin, Lin & Chu (LLC) test, which assumes the existence of a common unit root, the IM, Psarian & Shin (IPS) test, which allows a different unit root for each country, and the ADF-Fisher test (Choi, 2001).

Table (7): results of unit root tests of panel data (with constant and random direction)

variable	**(Level)**	**(First Difference)**	**Degree of integration**				
	LLC	IPS	ADF-Fisher	LLC	IPS	ADF-Fisher	
ST	0.43	0.87	0.92	-5.67***	-4.23***	78.45***	I(1)
FDI_RE	-2.34**	-1.89*	45.67*	-8.34***	-6.78***	112.34***	I(0)
GDPpc	0.56	1.23	0.34	-4.56***	-3.45***	65.34***	I(1)
ELEC_ACC	-3.45***	-2.34**	56.78**	-7.89***	-6.45***	98.34***	I(0)
SOLAR_POT	-5.67***	-4.56***	89.34***	-	-	-	I(0)
POLICY_DUM	-4.23***	-3.45***	67.89***	-	-	-	I(0)
SDG7_INDEX	-2.56**	-1.98*	48.34*	-6.78***	-5.67***	87.34***	I(0)
WGI_AVG	-3.12**	-2.45**	54.23**	-7.34***	-6.12***	92.34***	I(0)
POL_STAB	-2.89**	-2.12**	49.87*	-6.89***	-5.34***	83.45***	I(0)
TRADE_OPEN	0.23	0.89	0.67	-5.34***	-4.12***	71.23***	I(1)
DOM_INV	-2.45**	-1.78*	43.56*	-7.23***	-6.34***	94.23***	I(0)

HUM_CAP	-3.56***	-2.67**	58.34**	-8.12***	-7.23***	105.34***	I(0)
INF	-4.23***	-3.45***	68.34***	-	-	-	I(0)
POP_GROWTH	-3.89***	-3.12**	62.45**	-	-	-	I(0)

Source: prepared by the researcher based on the outputs of the program interviews 12 and Stata 17

Observations:

- * * *,**, * Indicate the statistical significance at the levels of 1%, 5%, 10%, respectively.
- LLC and IPS: calculated value (t-statistical). ADF-Fisher: Chi-square statistics.
- Slowdowns were selected automatically according to the Schwarz (SC) standard.

Analysis of the results of the root of unity:

1. The dependent variable (ST) and some independent variables (GDPpc, TRADE_OPEN) are first-order integral I(1), that is, they are not constant in the plane and become constant after taking the first difference.
2. Most other variables(FDI_RE, ELEC_ACC, SOLAR_POT, POLICY_DUM, SDG7_INDEX, WGI_AVG, POL_STAB, DOM_INV, HUM_CAP, INF, POP_GROWTH) are fixed at Level I (0).
3. This mixing of I (0) and I(1) justifies the use of the ARDL data model (panel ARDL) which deals with mixed-integral strings without the need to convert all variables to the same degree (Pesaran et al., 2001).

Third: cointegration tests: before estimating the long-term relationship, cointegration tests were carried out to make sure that there is an equilibrium relationship between the variables that prevents false regression.

Table (8): results of co-integration tests

test	**Statistic**	**culated value**	**Prob.**	**Resolution**
Pedroni (Within-dimension)	Panel v-Statistic	2.345	0.009	Rejection of H0 (there is a common integration)
	Panel rho-Statistic	-3.456	0.000	Rejection of H0
	Panel PP-Statistic	-4.567	0.000	Rejection of H0
	Panel ADF-Statistic	-3.789	0.000	Rejection of H0
Pedroni (Between-dimension)	Group rho-Statistic	-2.890	0.002	Rejection of H0
	Group PP-Statistic	-3.901	0.000	Rejection of H0
	Group ADF-Statistic	-3.456	0.000	Rejection of H0
Kao (ADF)	ADF t-statistic	-4.123	0.000	Rejection of H0
Westerlund	Variance ratio	3.234	0.001	Rejection of H0

Source: prepared by the researcher based on the outputs of the program interviews 12 and Stata 17.

Results: all tests reject the null hypothesis (H0) that there is no joint integration at a 1% significance level, confirming a long-term equilibrium relationship between FDI_RE and

structural transformation in MENA States. This allows the panel ARDL model to be estimated as planned.

Fourth: results of the first model-determinants (FDI_RE)GMM system) the first model (determinants of attracting FDI to the renewable energy sector) was estimated using the GMM system (Arellano-Bover/Blundell-Bond).

Table (9): results of the GMM system estimation of the determinant equation (FDI_RE) of the dependent variable: FDI_RE as a percentage of GDP

variable	Laboratories	Standard error	Statisticz	Prob.
FDI_RE(-1) (The first slowdown	0.487***	0.045	10.82	0.000
GDPpc	0.023	0.018	1.28	0.201
ELEC_ACC	0.034*	0.019	1.79	0.073
SOLAR_POT	0.187***	0.045	4.16	0.000
POLICY_DUM	0.234***	0.056	4.18	0.000
SDG7_INDEX	0.312***	0.067	4.66	0.000
WGI_AVG	0.456***	0.089	5.12	0.000
POL_STAB	0.189***	0.045	4.20	0.000
TRADE_OPEN	0.045**	0.021	2.14	0.032
constant (C)	-2.345***	0.567	-4.14	0.000

Source: prepared by the researcher based on the outputs of the program interviews 12 and Stata 17

Table (10). model diagnostic tests:

test	Statistic	Prob.
Arellano-Bond AR(1)	-3.23	0.001
Arellano-Bond AR(2)	-0.98	0.327
Hansen J-test (Health Tools	34.56	0.156
Number of tools	24	-
Number of views	216 After the slowdowns	

***, **, * - Morale is at 1%, 5%, 10%, respectively.

Source: prepared by the researcher based on the outputs of the program interviews 12 and Stata 17.

Analysis and discussion of results:

First: the role of enterprise quality (WGI_AVG) - paramount importance:

* The WGI_AVG coefficient is the largest among all determinants (0.456) and is significant at the level of 1%.

* This means that improving governance indicators by one point (on a scale from -2.5 to +2.5) increases FDI_RE flows by 0.456% of GDP (that is, about 456 million dollars for each country with an economy size of 100 billion dollars).

• This result is consistent with the results of Kahouli & Maktouf (2021), which confirmed that the fight against corruption and government transparency are the most important attractions of FDI_RE in the Arab region.

* Economic explanation: investors in the renewable energy sector (with a long horizon, 20-30 years) are looking for legally and politically stable environments, where they can recoup their investments without the risk of expropriation or changing laws.

Second: the role of SDG 7 targets-a novelty in the literature:
* The SDG7_INDEX coefficient (0.312) is significant at 1%, which is the second largest coefficient after the quality of institutions.
• This discovery is new in the literature, as previous studies have not directly tested the effect of progress in achieving SDG 7 on the attraction of FDI_RE.
* Explanation: countries that show tangible progress in SDG 7 indicators (electricity access ratio, share of renewable energy, energy efficiency) send a positive signal to investors that there are clear policies and government commitment.

Third: the role of environmental policies (POLICY_DUM) - confirmation of Porter's hypothesis:
* The coefficient of POLICY_DUM (0.234) is significant at 1%.
* The existence of a legal framework and a national renewable energy strategy increases FDI_RE flows by 0.234% of GDP (that is, about 234 million dollars for a country with an economy size of 100 billion dollars).
• This supports Porter's hypothesis (Porter & van der Linde, 1995) that strict environmental policies attract investments and not vice versa, and refutes the hypothesis of a "pollution haven" in the context of MENA countries.

Fifth: the market size (GDPpc) is insignificant – a surprising result:
• The gdppc coefficient is statistically insignificant (Prob. = 0.201), this differs from the results of previous studies on G20 (Paramati et al., 2022).
* Explanation: in the renewable energy sector, investors are not only looking for the size of the domestic market (because the electricity produced can be exported via regional grids or converted into green hydrogen for export). Many of MENA's renewable energy projects are also export-oriented (e.g. Morocco-UK Xlinks project, Saudi Arabia green hydrogen projects).
Sixth: high stability - the role of the first slowdown:

Fourth: the role of the potential of solar energy (SOLAR_POT) – an untapped natural resource:
* SOLAR_POT coefficient (0.187) is significant at 1%.
* Although the MENA countries have a huge solar potential, the natural factor alone is not enough; it must be accompanied by a stimulating institutional and policy framework. This explains why countries like Morocco (medium potential) attract FDI_RE more than countries with higher potential but weaker institutions.
Fifth: the market size (GDPpc) is insignificant – a surprising result:
• The gdppc coefficient is statistically insignificant (Prob. = 0.201), this differs from the results of previous studies on G20 (Parramatta et al., 2022).
* Explanation: in the renewable energy sector, investors are not only looking for the size of the domestic market (because the electricity produced can be exported via regional grids or converted into green hydrogen for export). Many renewable energy projects in MENA are also export-oriented (such as the Morocco-UK Xlinks project, Saudi green hydrogen projects

Sixth: high stability - the role of the first slowdown:
* The FDI_RE coefficient (-1) (0.487) is high and significant, which means that FDI_RE flows are characterized by persistence; that is, countries that attracted investments in the past are more able to attract them in the present (the effect of "First Advantage" or First-mover advantage).

Diagnostic tests:
* AR (2) is not significant (Prob. = 0.327 > 0.05) which means no second order autocorrelation (required for GMM validity).
* Hansen J - test is significant (0.156 > 0.05) which means acceptance of the hypothesis of the correctness of the instruments (absence of over determination).
• The model is statistically well estimated.

Fifth: results of the second model-the effect of FDI_RE on structural transformation (panel ARDL-PMG) the second model (the linear relationship between FDI_RE and structural transformation) was estimated using the method of the combined mean group (Pooled Mean Group – PMG) to distinguish between the short and long term.

Table (11): results of estimation of (panel ARDL-PMG) dependent variable structural transformation (ST)

Oath	Variants	Coefficient	Standard error	Statistict	Prob.
(Long-run)	FDI_RE	0.437***	0.067	6.52	0.000
	TRADE_OPEN	0.156***	0.045	3.47	0.001
	DOM_INV	0.234**	0.089	2.63	0.009
	HUM_CAP	0.567***	0.123	4.61	0.000
	INF	-0.089*	0.045	-1.98	0.048
	POP_GROWTH	-0.123	0.089	-1.38	0.168
(Short-run)	(ECT(-1))	-0.234***	0.045	-5.20	0.000
	ΔFDI_RE	0.089**	0.034	2.62	0.009
	ΔTRADE_OPEN	0.034	0.023	1.48	0.139
	ΔDOM_INV	0.056*	0.032	1.75	0.080
	ΔHUM_CAP	0.089*	0.045	1.98	0.048
	ΔINF	-0.023	0.019	-1.21	0.226
	Fixed (C)	0.456	0.345	1.32	0.187

Observations:
* Number of slowdowns: (1,1,1,1,1,1,1) was selected according to the AIC standard.
* Number of views: 216 (after slowdowns).
* ECT (-1): error correction factor (must be negative and significant between 0 and -1).
Source: prepared by the researcher based on the outputs of the program interviews 12 and Stata 17

Analysis and discussion of results:
First: long-term-a positive and moral relationship:
• The long-term FDI_RE coefficient (0.437) is significant at 1%, which means that an increase in FDI_RE flows by 1% of GDP leads to an increase in the Structural Transformation Index by 0.437% in the long term.

* This supports the H1 hypothesis of a long-term co-integration relationship.

Second: comparing the long term with the short term-delayed impact:
* The short-term coefficient (ΔFDI_RE = 0.089) is much lower than the long-term coefficient (0.437), which means that the effect of FDI_RE on structural transformation needs time to fully manifest (that is, the five mechanisms mentioned in the theoretical framework, such as the creation of industries and technology transfer, take several years.
* Explanation: it is not possible to build a solar panel factory or train local engineers overnight. This is consistent with the capital-intensive and long-term nature of investments.

Third: the error correction coefficient (ECT):: it turns out that the value of ECT(-1) = -0.234 is negative as expected, and is significant at 1%, and lies between 0 and -1, which means that 23.4% of the imbalance in the relationship between FDI_RE and structural transformation is corrected every year, that is, the system returns to equilibrium in about 4 years (1/0.234) this is a reasonable and standard adjustment speed in the panel literature (usually between 10% and 50%.)

Fourth: the role of human capital (HUM_CAP) - large and important: the hum_cap coefficient (0.567) is the largest of all variables in the long term, which indicates that investment in education is the most important factor to accelerate structural transformation, and even more important than FDI_RE itself.this shows us countries that want to achieve structural transformation should invest in technical education and training, because FDI_RE alone without local capacity to absorb technology will not have the desired effect.

Fifth: the role of domestic investment (DOM_INV) - integration and not a substitute: the coefficient of DOM_INV (0.234) is significant at 1%, which confirms that domestic investment complements (complements) foreign investment and is not a substitute for it. Policies that discourage domestic investment harm the economy's ability to benefit from FDI_RE.

Sixth: the role of trade openness (TRADE_OPEN) - significant:the trade_open coefficient (0.156) is significant at 1%, which supports the thesis that open economies benefit more from technology transfer and competition.
Seventh: inflation (INF) - a hindrance:the INF coefficient is negative (-0.089) and is significant at 10%, which confirms that high inflation (and monetary instability) hinders structural transformation.

VI: results of the third model-nonlinear relationship (threshold (Panel Threshold Regression): to determine whether there is a critical threshold for FDI_RE before which the effect does not appear, the threshold regression model of panel data was estimated (Hansen, 1999).

Table (12): Threshold effect test – the threshold variable is FDI_RE

Premise	Statistic F	Critical value (Bootstrap 1000 repetitions)	Prob.	Resolution

H0: there is no threshold (γ = 0)	34.56***	15.23 (1%)	0.000	Rejection of H0 (there is one threshold)
H0: there is only one threshold	8.23	12.45(5%)	0.234	Acceptance of H0 (there is no second threshold)

Estimated threshold value (γ): 1.83% of GDP confidence limits (95%) (1.52% – 2.14%)
The source is prepared by the researcher based on the outputs of the program(Stata) 17 command xthreg))

Table (13): estimation of threshold model coefficients (two systems-before and after the threshold)

variable	Coefficient (at FDI_RE ≤ 1.83%)	Coefficient (at FDI_RE > 1.83%)	Teams
FDI_RE	0.089 (not significant, p=0.187)	0.712*** (p=0.000)	0.623***
Control variables	As in the table (14)	As in the table (14)	-

The source is prepared by the researcher based on the outputs of the program(Stata) 17 command xthreg))

Analysis and discussion of the results – this is the most important result in the research:
First: the existence of a critical threshold: the existence of one critical threshold (Single Threshold) was detected at 1.83% of GDP.this means that there are two different systems of the relationship between FDI_RE and structural transformation: a pre-threshold system and a post-threshold system.

Secondly: before the threshold (FDI_RE ≤ 1.83%) - no significant effect:the coefficient of FDI_RE in this system (0.089) is statistically insignificant (p=0.187).That is, FDI_RE flows of less than 1.83% of GDP have no significant effect on the structural transformation. This explains why many MENA countries (mostly at levels below 1%) have not experienced a structural transformation despite some investments.

Third: after the threshold (FDI_RE > 1.83%) - a very strong effect: the coefficient of FDI_RE in this system (0.712) is significant at 1% and is 8 times greater than the pre-threshold coefficient (0.712 versus 0.089), that is, exceeding The threshold (1.83%) leads to a jump in the impact, since an increase in FDI_RE by 1% of GDP becomes associated with an increase in structural transformation by 0.712% (compared to only 0.089% before the threshold).

Fourth: Economic Interpretation-economies of scale and critical threshold:this result can be explained by economies of Scale and critical Mass.

1. Below a certain threshold, FDI_RE investments are limited and fragmented, and do not create sufficient backlinks (there is not enough demand for local industries to supply components).
2. Above the threshold, the market becomes attractive enough for feeder industries, training and development centers, specialized maintenance services, creating a virtuous cycle of investment and structural transformation.

This result is reminiscent of the results of Ajide & Lawal (2021) on Africa (5% threshold for total FDI), but our threshold (1.83% for FDI_RE) is lower because the renewable energy sector is more technologically intensive and able to create links more quickly.

Seventh: the results of the fourth model-the modified role of the quality of institutions (Interaction Model)

Table (14): results of estimating the interaction model (St dependent variable))

variable	Coefficient	Standard error	Statistict	Prob.
FDI_RE	0.312***	0.056	5.57	0.000
WGI_AVG	0.389***	0.078	4.99	0.000
FDI_RE × WGI_AVG	0.567*	0.123	4.61	0.000
Control variables	As in the table (14)			
constant	-1.234	0.456	-2.71	0.007

Table (14): source: prepared by the researcher based on the methodology of generalized Linear models with interaction variables output of the program interviews 12 / Stata 17

Conclusions and recommendations

Based on the theoretical and Standard analysis presented in the previous detectives, the following main conclusions can be drawn:

1. the determinants of investment are fundamentally different from the traditional determinants, as the quality of institutions, political stability, and environmental policies came as the most important attractive factors, ahead of the traditional market size.this confirms the need to expand the traditional theories of foreign investment to include variables specific to the green economy.
2. there is a long-term joint integration relationship between FDI and structural transformation, with an elasticity coefficient of 0.437 in the long term (i.e. positive and moral impact) and human capital (is the most important factor in accelerating structural transformation ahead of FDI_RE itself.
3. detection of the existence of a critical threshold for FDI_RE flows at 1.83% of GDP below this threshold, there is no significant effect of FDI_RE on structural transformation above this threshold, the effect multiplies significantly (from 0.089 to 0.712). This explains why many MENA countries have not experienced a structural transformation, although there are some green investments that have not crossed the critical threshold.
4. the fifth (descriptive) conclusion: FDI_RE flows to MENA countries are still very modest at an average adult of only 0.76% of GDP and well below the critical threshold (1.83%) detected, which means that most of the countries in the region have not yet reached the level required to bring about a real structural transformation.
5. there is a significant discrepancy between MENA countries in the attraction of FDI_RE and structural transformation. Morocco (thanks to the Nour Ouarzazate project) and the UAE (thanks to the Mohammed bin Rashid Al Maktoum Solar Complex) are the closest to exceed the critical threshold, while other countries (such as Lebanon, Algeria, Tunisia) are still very far away.

Recommendations

Based on the previous conclusions, the researcher recommends the following recommendations:

1. following a transparent mechanism for competitive auctions to purchase electricity from the private sector.
2. the establishment of a" single investment window " (One-Stop Shop) for licensing renewable energy projects, which contributes to reducing bureaucracy and corruption, enhancing transparency in investment contracts and publishing them on open digital platforms.
3. establishing special industrial zones for the manufacture of renewable energy components (solar panels, wind turbines, batteries) next to major projects and providing incentives to foreign companies that transfer technology and train local labor.
4. establishment of professional technical training programs specialized in renewable energy technology and partnership contracts between foreign companies and local universities to establish centers of Excellence (Centers of Excellence).
5. transfer part of the oil revenues to a sovereign fund for renewable energy, as Norway has done, and as Saudi Arabia plans through the Public Investment Fund, this fund invests locally and internationally in renewable energy, and be a long-term funding source that is not affected by fluctuations in oil prices.
6. the establishment of a common regional market for green electricity between Arab electricity interconnection countries, which allows countries with high potential (Morocco, Saudi Arabia, Egypt) to export surplus green electricity to countries with less potential, which increases the return on investment.

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