



UNLOCKING RENEWABLE ENERGY DEVELOPMENT TO ADDRESS CLIMATE CHANGE:

Exploration of Causal Links
Through QCA

American Evaluation Association -
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EXAMPLE FROM
THE POWER TO RENEW



AGENDA

- 1 QCA Method
- 2 Process for Applying QCA
- 3 Renewable Energy Evaluation
- 4 Theory of Change
- 5 Country Case Studies
- 6 Developing & Scoring Factors
- 7 Results and Interpretation
- 8 Some validation of conclusions

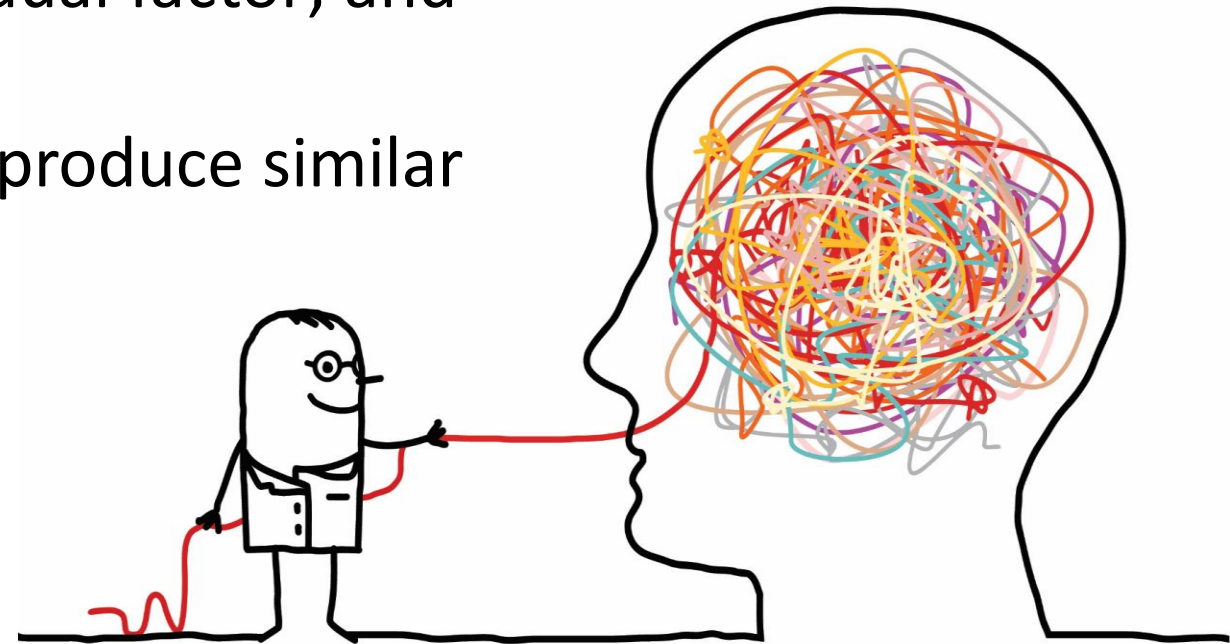
QUALITATIVE COMPARATIVE ANALYSIS

QCA is based on two primary assumptions:

- 1) change is often the result of different combinations of factors, rather than on any one individual factor; and
- 2) different combinations of factors can produce similar changes

Charles Ragin

who is credited with developing QCA



METHOD: QUALITATIVE COMPARATIVE ANALYSIS (QCA)

- Developed in the 70's, relatively 'new' in application in evaluation
- Analytical technique used for qualitative study of macro social phenomena
- An akin method to quantitative model testing (such as, structural equation modeling)
- Case-Oriented and set-theory method
- Helps identify causal patterns across multiple cases using Boolean algebra

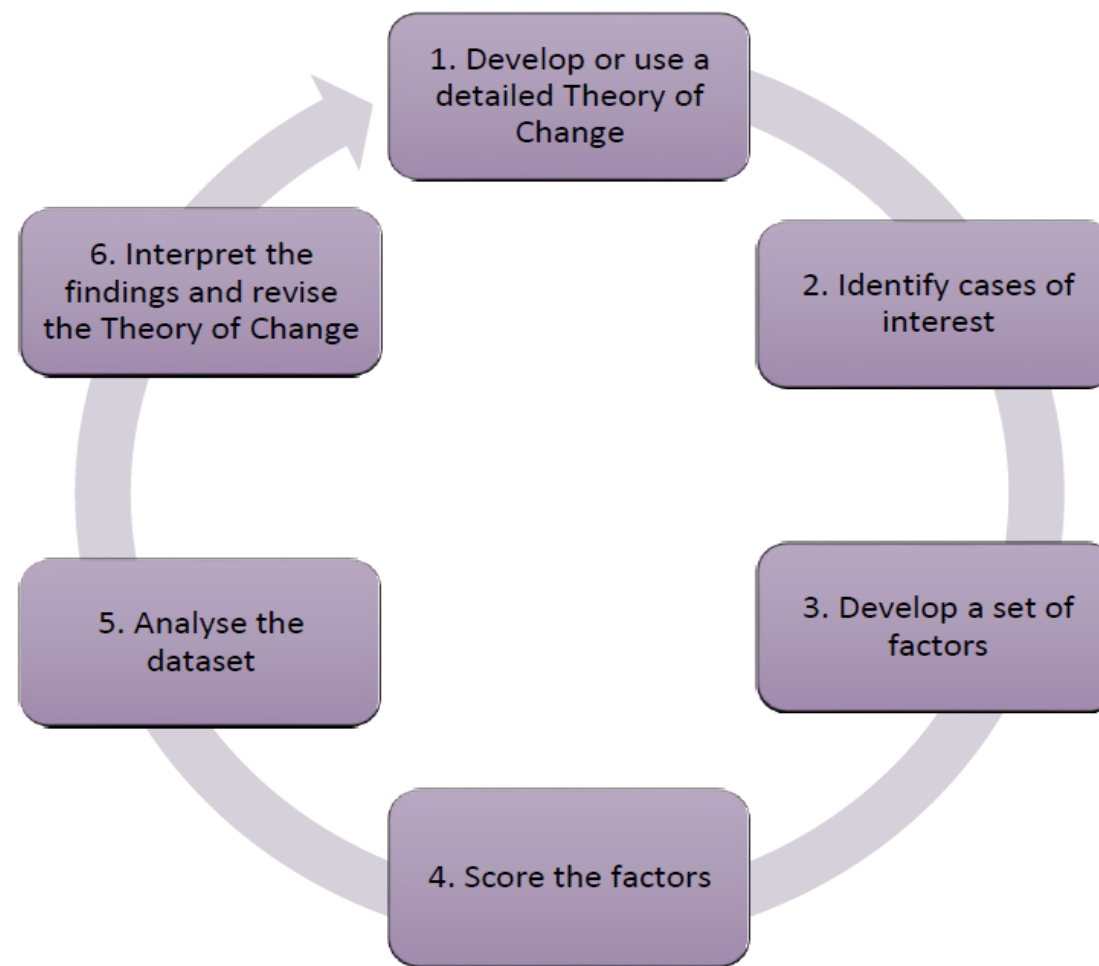
Where can QCA add value?

- Analysis of multiple cases in complex situations
- Identify causal links and explain conditions under which change happens
- Allows for generalization across a group of case studies
- Valuable for small N evaluations (e.g. 5 to 50)

METHOD: PROCESS FOR APPLYING QCA

QCA uses both quantitative and qualitative analysis

- In-depth **QUALITATIVE** understanding of cases and subject matter
- **QUANTITATIVE** generation of findings generalizable across wider population



SOURCE: Intrac

RE EVALUATION: WBG SUPPORT TO RENEWABLE ENERGY

WHY QCA?

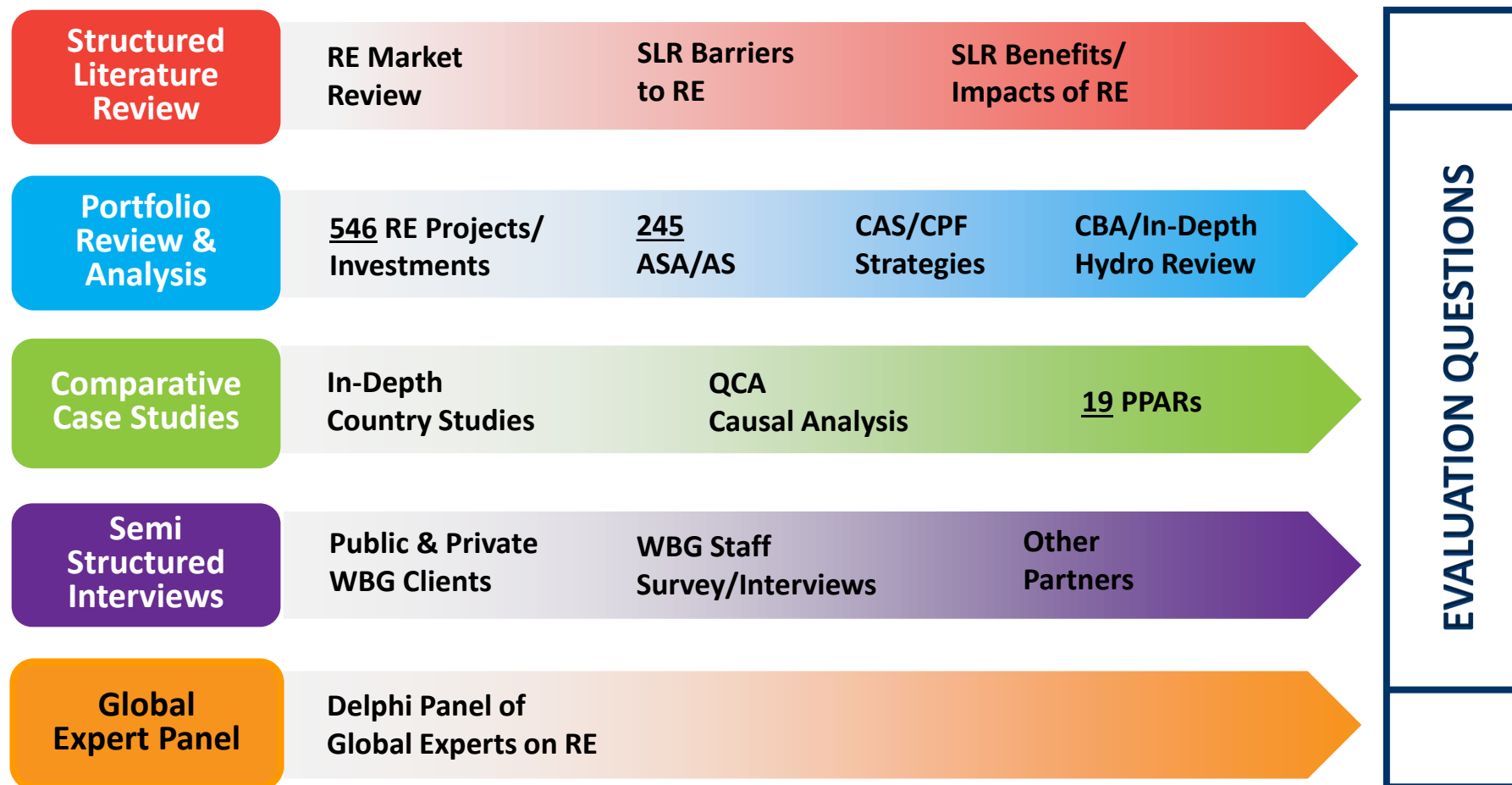
1) **Validate Theory of Change**

2) **Identify pathways for scaling-up RE investments**

- Renewable Energy (RE) can help meet **energy** demand and **environmental** sustainability
- SDGs and Paris Agreement stress RE as a **key solution**, with momentous scale-up envisaged
- Dynamically **evolving** sector expected to continue to disrupt energy sector
- Presently over **25%** of global electricity is produced from RE



RE EVALUATION: MULTI-METHOD APPROACH



RE EVALUATION: THEORY OF CHANGE

INPUTS



WORLD BANK GROUP

+ *Financing*

+ *Global Knowledge*



Partnerships

KEY TYPES OF BARRIERS ADDRESSED

1

Inadequate Policies & Regulations

2

Inability to Integrate RE to Power System

3

Insufficient Design & Technical Standards

4

Inadequate Institutional Capacity

5

Significant Investment Risks

6

Constraints to Mobilizing Financing

DEVELOPMENT OF RE

Increased
RE
Capacity & Generation



Displace
Fossil-Based
Capacity & Generation

ENERGY & ENVIRONMENT BENEFITS

Increase
Electricity
Supply to Grid

+ *Improve access to electricity*

+ *Reduce energy insecurity*

Avoid Global
Pollution

+ *Avoid local pollution*

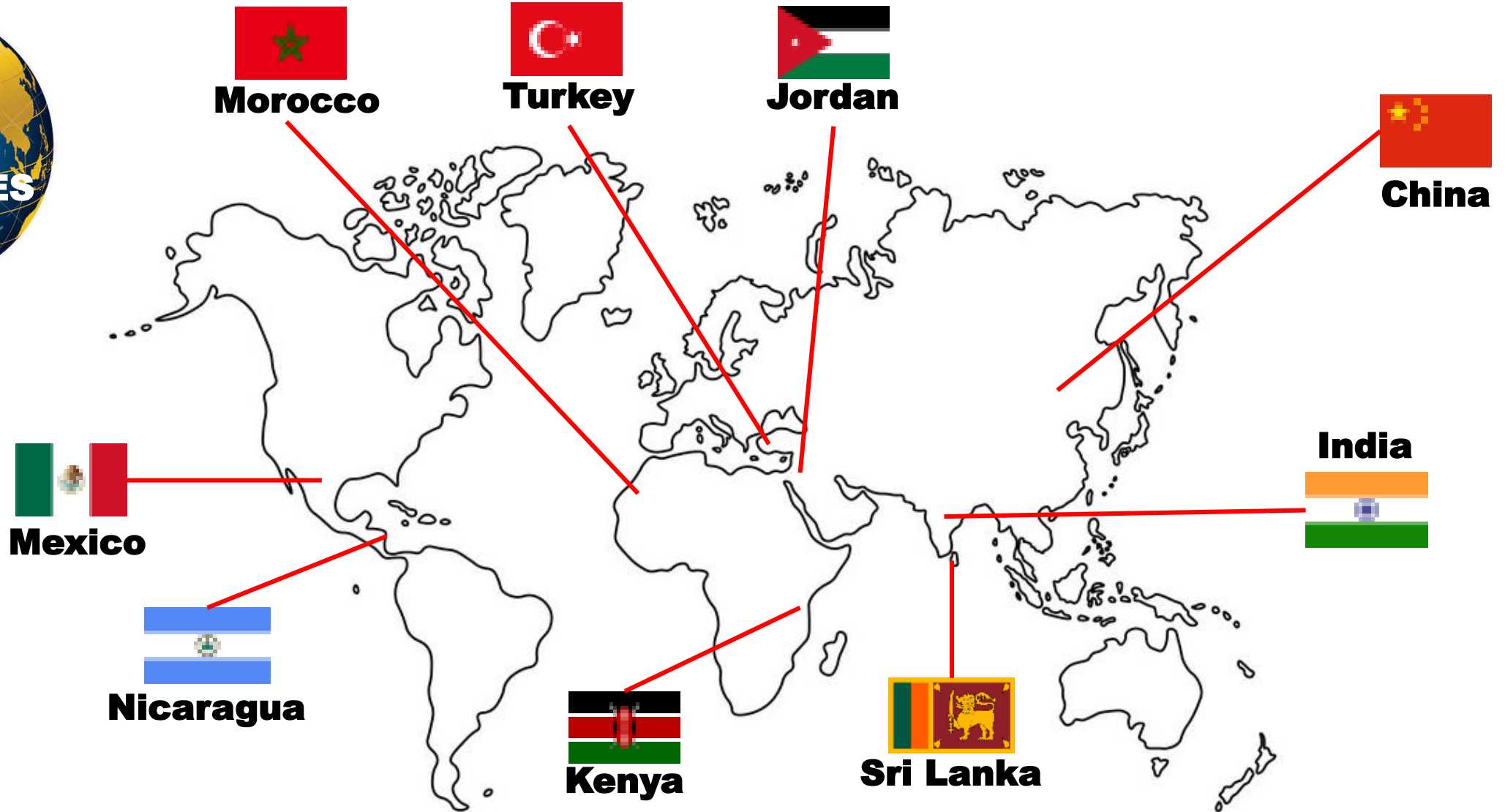
CONTRIBUTION TO BROADER DEVELOPMENT IMPACTS

- Contributes to economic growth
- Supports improvements to quality of life, including for poor
- Helps protect local & global environment

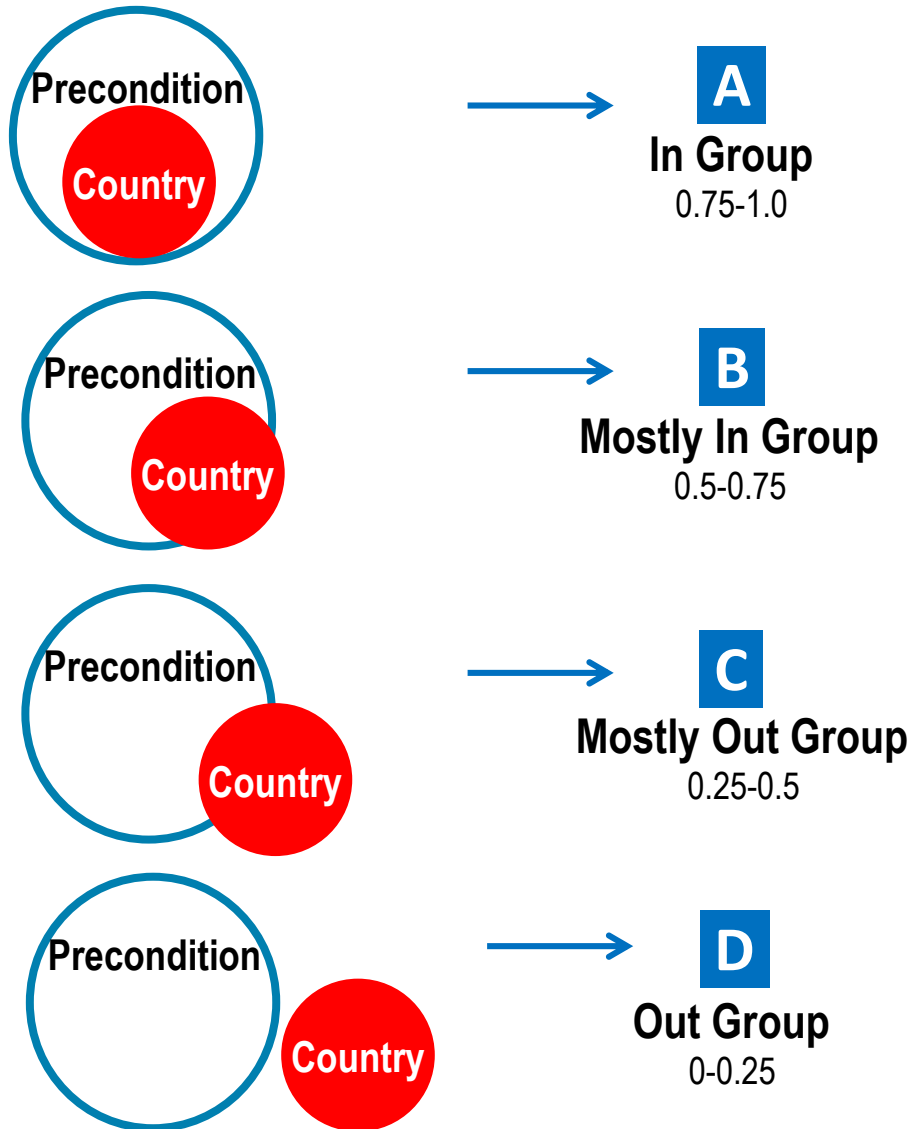


Assumed
contributions from
interrelated sectors

RE EVALUATION: COUNTRY CASE STUDIES IN EMERGING MARKETS



RE EVALUATION: DEVELOPING A SET OF FACTORS



EXAMPLE: Policy and Regulatory Framework

Substantial & adequate legal & policy framework is adopted and being enforced, w/ policy measures and regulations in place, including funding, where required to incentivize

Significant legal framework in place but w/ noticeable shortcomings in regulations & enforcement, & despite lack of policy clarity, there are some policy-based incentives available

While legal framework exists there is little clarity in implementing policies and regulations, lack of enforcement, and limited or no incentives to invest in RE

Insufficient legal & policy framework with critical shortcomings, and inadequate incentives to mobilize investments in RE

RE EVALUATION: SCORING AND CALIBRATION

Country	BARRIERS						OUTPUTS	OUTCOMES	
	Policy and Regulatory	Integration into Power Systems	Improvements to Design & Technical Standards	Strengthen Institutional Capacity	Mitigate Investment Risks	Mobilize Financing	Development of RE	Energy Benefits	Environmental Benefits
China	A (0.80)	B (0.70)	A (0.90)	A (0.90)	B (0.70)	A (0.90)	A (0.84)	A (0.79)	A (0.94)
India	A (0.85)	A (0.80)	B (0.55)	A (0.90)	B (0.60)	B (0.70)	B (0.56)	C (0.36)	B (0.61)
Jordan	A (0.80)	B (0.70)	B (0.70)	C (0.40)	B (0.60)	C (0.40)	C (0.48)	C (0.27)	C (0.41)
Kenya	B (0.70)	D (0.20)	A (0.80)	C (0.40)	B (0.60)	A (0.80)	C (0.40)	C (0.38)	C (0.30)
Mexico	B (0.70)	A (0.90)	B (0.70)	B (0.70)	B (0.60)	B (0.60)	B (0.69)	B (0.60)	B (0.69)
Morocco	B (0.55)	B (0.60)	C (0.40)	C (0.40)	B (0.60)	C (0.40)	B (0.54)	C (0.37)	B (0.58)
Nicaragua	B (0.70)	B (0.60)	C (0.40)	C (0.40)	C (0.40)	C (0.40)	B (0.64)	B (0.57)	B (0.60)
Sri Lanka	C (0.45)	B (0.60)	B (0.60)	C (0.40)	B (0.70)	C (0.40)	B (0.64)	B (0.55)	B (0.68)
Turkey	A (0.80)	A (0.90)	A (0.90)	A (0.80)	B (0.70)	A (0.80)	A (0.86)	A (0.80)	A (0.90)

PROCESS OF DEVELOPING MARIIX

1) Specialists assess and score barriers during case preparation

2) Debrief w/ case specialists

3) Calibration workshop for final alignment

RE EVALUATION: ANALYSIS AND INTERPRETATION #1

RESULTS

KEY TYPES OF BARRIERS ADDRESSED

- 1 Inadequate Policies & Regulations
- 2 Inability to Integrate RE to Power System
- 3 Insufficient Design & Technical Standards
- 4 Inadequate Institutional Capacity
- 5 Significant Investment Risks
- 6 Constraints to Mobilizing Financing

TOC Validated.
**All six barriers have
causal link with energy &
environment outcomes;**

Given validation, further adjustments to
ToC was not necessary

RE EVALUATION: ANALYSIS AND INTERPRETATION #2

RESULTS

KEY TYPES OF BARRIERS ADDRESSED

- 1 Inadequate Policies & Regulations
- 2 Inability to Integrate RE to Power System
- 3 Insufficient Design & Technical Standards
- 4 Inadequate Institutional Capacity
- 5 Significant Investment Risks
- 6 Constraints to Mobilizing Financing

**Countries that successfully
addressed all six barriers
scaled-up RE as a result**

Observed in China; India; Mexico; Sri Lanka; Turkey

WBG broadly helping client countries
reform correct barriers

RE EVALUATION: ANALYSIS AND INTERPRETATION #3

RESULTS

KEY TYPES OF BARRIERS ADDRESSED

1 Inadequate Policies & Regulations

2 Inability to Integrate RE to Power System

3 Insufficient Design & Technical Standards

4 Inadequate Institutional Capacity

5 Significant Investment Risks

6 Constraints to Mobilizing Financing

Policy & Integration were found to be essential (necessary conditions) under all successful reform scenarios

Observed in Nicaragua and Morocco

WB experienced w/ policy reforms; major challenge for IFC/private. Helped identify gap w/ Integration where WBG has more limited experience.

RE EVALUATION: ANALYSIS AND INTERPRETATION #4

RESULTS

KEY TYPES OF BARRIERS ADDRESSED

- 1 Inadequate Policies & Regulations
- 2 Inability to Integrate RE to Power System
- 3 Insufficient Design & Technical Standards
- 4 Inadequate Institutional Capacity
- 5 Significant Investment Risks
- 6 Constraints to Mobilizing Financing

Policy & Integration + Risk Mitigation was additional pathway to scaling-up RE

Observed in Jordan and Morocco

Especially mobilizing private sector investments



Renewable electricity growth still needs to accelerate significantly to meet long-term to sustainable energy goals.

This growth is possible if governments address the three main challenges to faster deployment: **policy** and regulatory uncertainty; high investment **risks** in many developing countries; and system **integration** of wind and solar PV in some countries.

Renewables 2019
International Energy Association



KENYA

- A scale-up in RE did not lead to a corresponding increase in the avoidance of CO₂
- It reflects the displacement of hydropower by geothermal
- Displacement of one renewable for another would have less incremental environmental impact!

CONTACT IEG

ieg.worldbank.org

