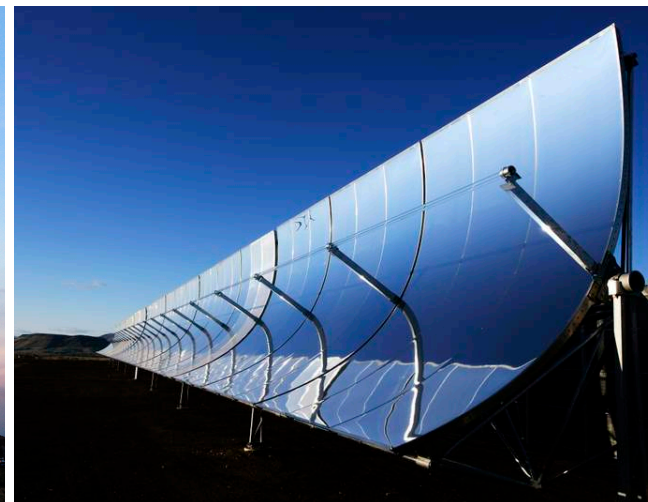


# Derisking Renewable Energy Investment

Africa LEDS Partnership meeting  
27 June 2016



# UNDP-GEF vision



*Empowered lives.  
Resilient nations.*

## UNDP Vision

**Helping countries achieve the simultaneous eradication of poverty and significant reduction of inequalities and exclusion**

## UNDP – GEF Objective

**Assisting countries to access environmental finance for sustainable development**

**Sustainable  
management of  
ecosystem goods  
and services**



**Sustainable,  
affordable and  
accessible energy  
services**



**Scaling up climate  
change adaptation  
and mitigation**



**Sustainable  
management of  
chemicals and  
waste**



**Improved water  
and ocean  
governance**



# Paris Agreement

New, global treaty where *all countries* agreed to take action on climate change in order to keep global temperature rise below 2 degrees C and aim for 1.5 degrees C

Conférence sur les Changements Climatiques 2015

COP21/CMP11

Paris France





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# **I. Utility-Scale Renewable Energy**

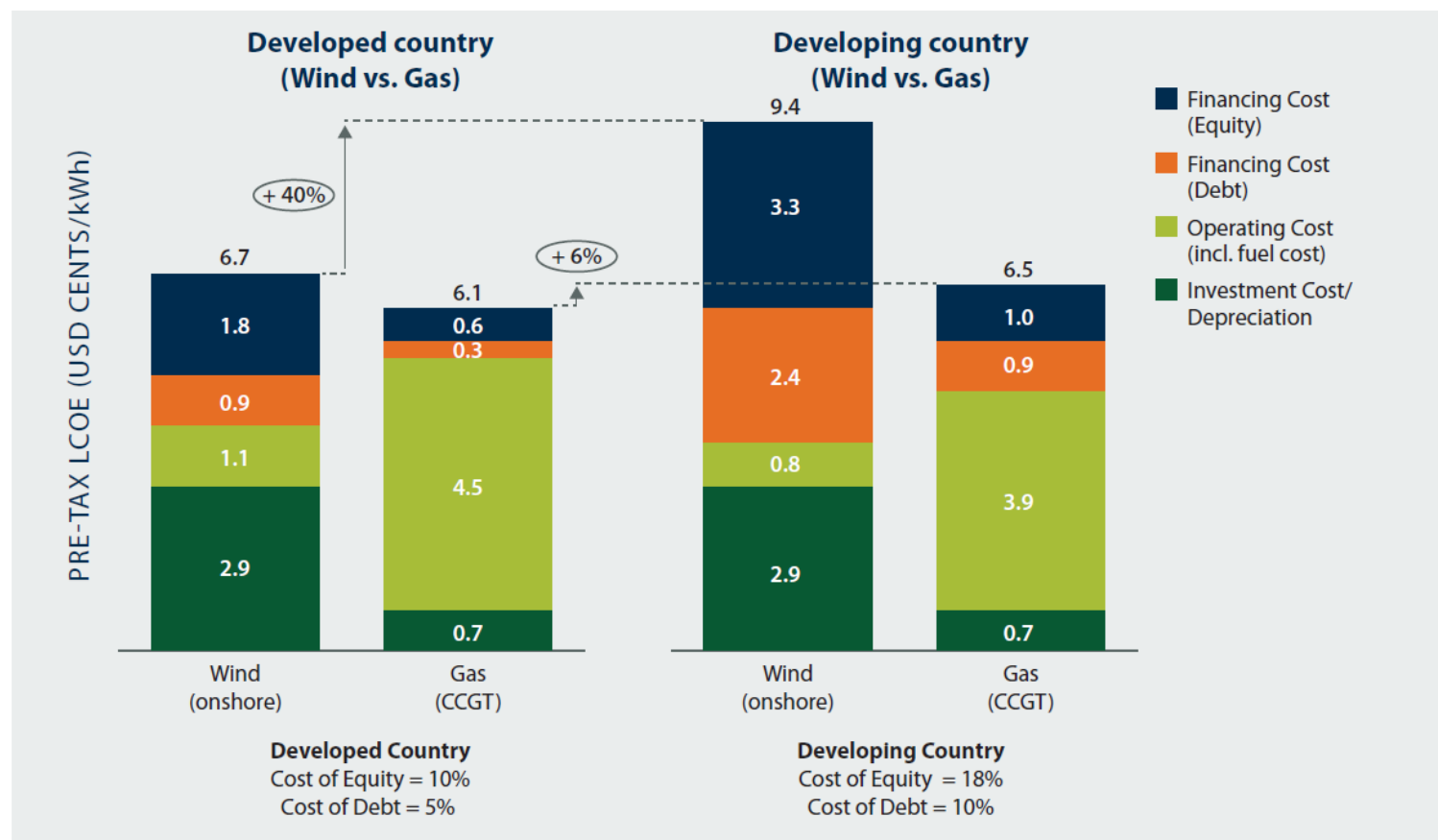
# Derisking Renewable Energy Investment

## High financing costs penalise renewable energy



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### UTILITY SCALE LEVELIZED COSTS OF RENEWABLE ENERGY VS FOSSIL-FUEL ENERGY DEVELOPED VS. DEVELOPING COUNTRIES



Source: UNDP, *Derisking Renewable Energy Investment* (2013). See Annex A of the report for full assumptions.

All assumptions (technology costs, capital structure etc.) except for financing costs are kept constant between the developed and developing country.

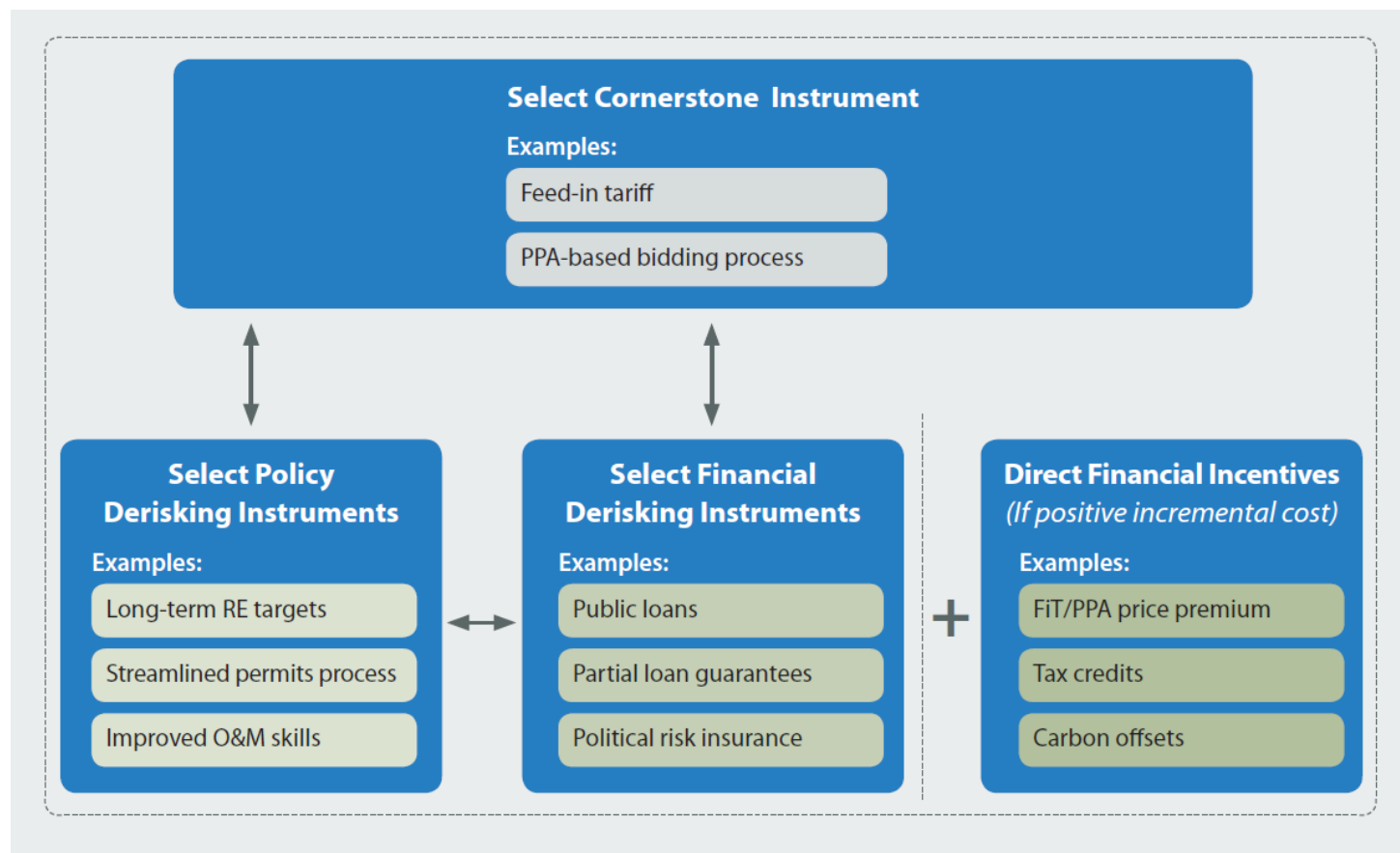
Operating costs appear as a lower contribution to LCOE in developing countries due to discounting effects from higher financing costs.

# Derisking Renewable Energy Investment

## Public instrument packages



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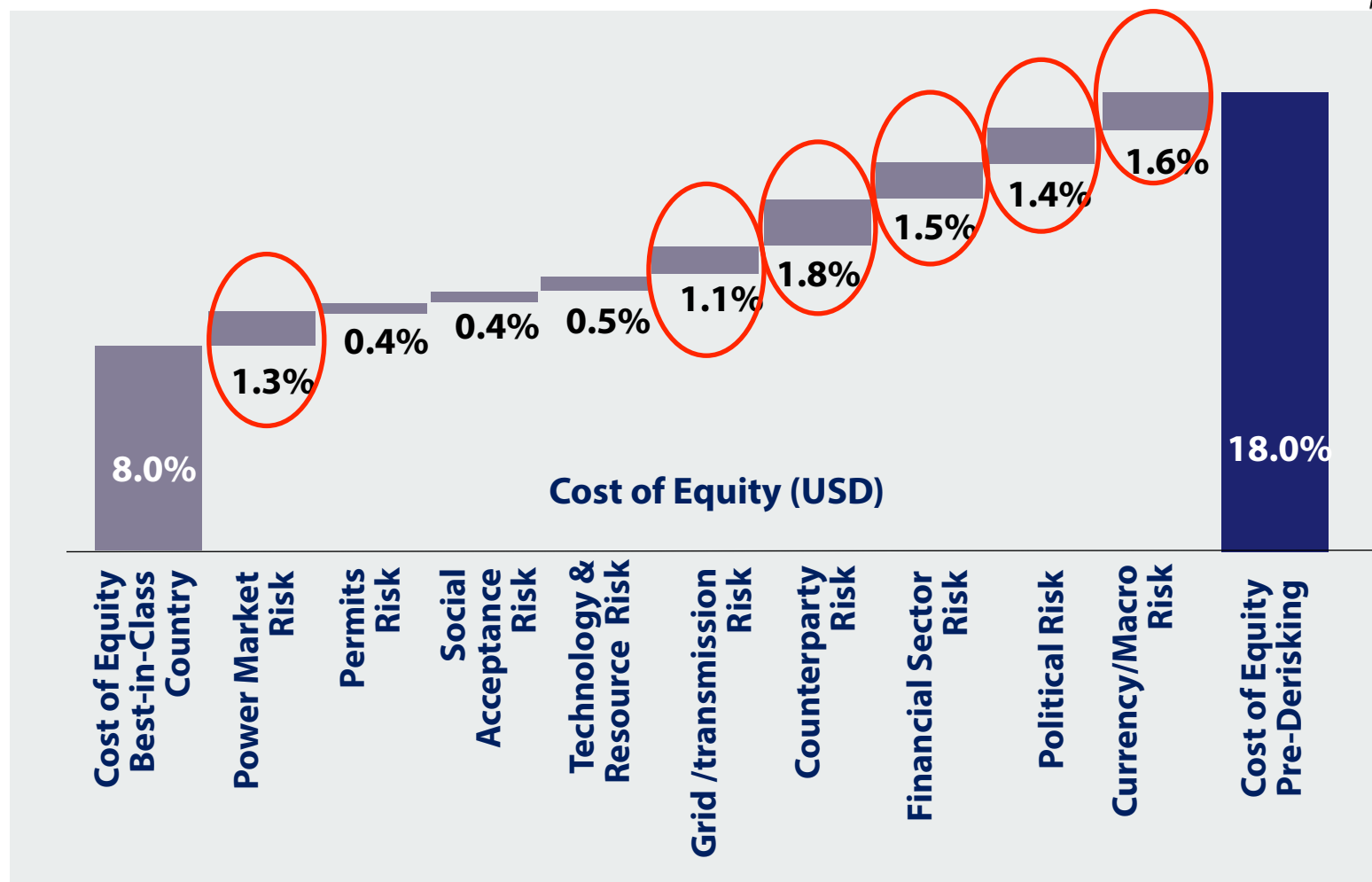
# DREI Nigeria (Solar PV, 2020 1.2GW Target)

## (1) Pre-derisking financing cost waterfall



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### PRELIMINARY FINDINGS





# DREI Nigeria (Solar PV, 2020 1.2GW Target)

## (2) Tailored public instrument package



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### PRELIMINARY FINDINGS

| RISK CATEGORY               | POLICY<br>DERISKING INSTRUMENTS  | FINANCIAL<br>DERISKING INSTRUMENTS   |
|-----------------------------|--|--|
| Power Market Risk           | <ul style="list-style-type: none"> <li>• Long term renewable energy targets</li> <li>• Regulatory framework</li> <li>• FIT/PPA tender (standardised PPA)</li> <li>• Independent regulator</li> </ul> | NA   |
| Permits Risk                | <ul style="list-style-type: none"> <li>• Streamlined permitting; one-stop shop; recourse mechanism</li> </ul>  | NA   |
| Social Acceptance Risk      | <ul style="list-style-type: none"> <li>• Awareness-raising campaigns</li> <li>• Promote/pilot community-based approaches</li> </ul>  | NA   |
| Resource & Technology Risk  | <ul style="list-style-type: none"> <li>• Resource assessment</li> <li>• Technology support (solar PV)</li> </ul>   | NA   |
| Grid/Transmission Risk      | <ul style="list-style-type: none"> <li>• Transparent, up-to-date grid code</li> <li>• Grid management/planning</li> </ul>  | <ul style="list-style-type: none"> <li>• Take or pay clause in PPA<sup>11</sup></li> </ul>                             |
| Counterparty Risk           | <ul style="list-style-type: none"> <li>• Strengthen utility's management</li> </ul>  | <ul style="list-style-type: none"> <li>• Government guarantee of PPA</li> </ul>  |
| Financial Sector Risk       | <ul style="list-style-type: none"> <li>• Domestic financial sector reform</li> </ul>   | <ul style="list-style-type: none"> <li>• Concessional public loans to IPPs</li> </ul>                                  |
| Political Risk              | NA   | NA   |
| Currency/Macroeconomic Risk | NA   | <ul style="list-style-type: none"> <li>• Partial indexing of PPA tariffs to foreign currencies<sup>12</sup></li> </ul> |



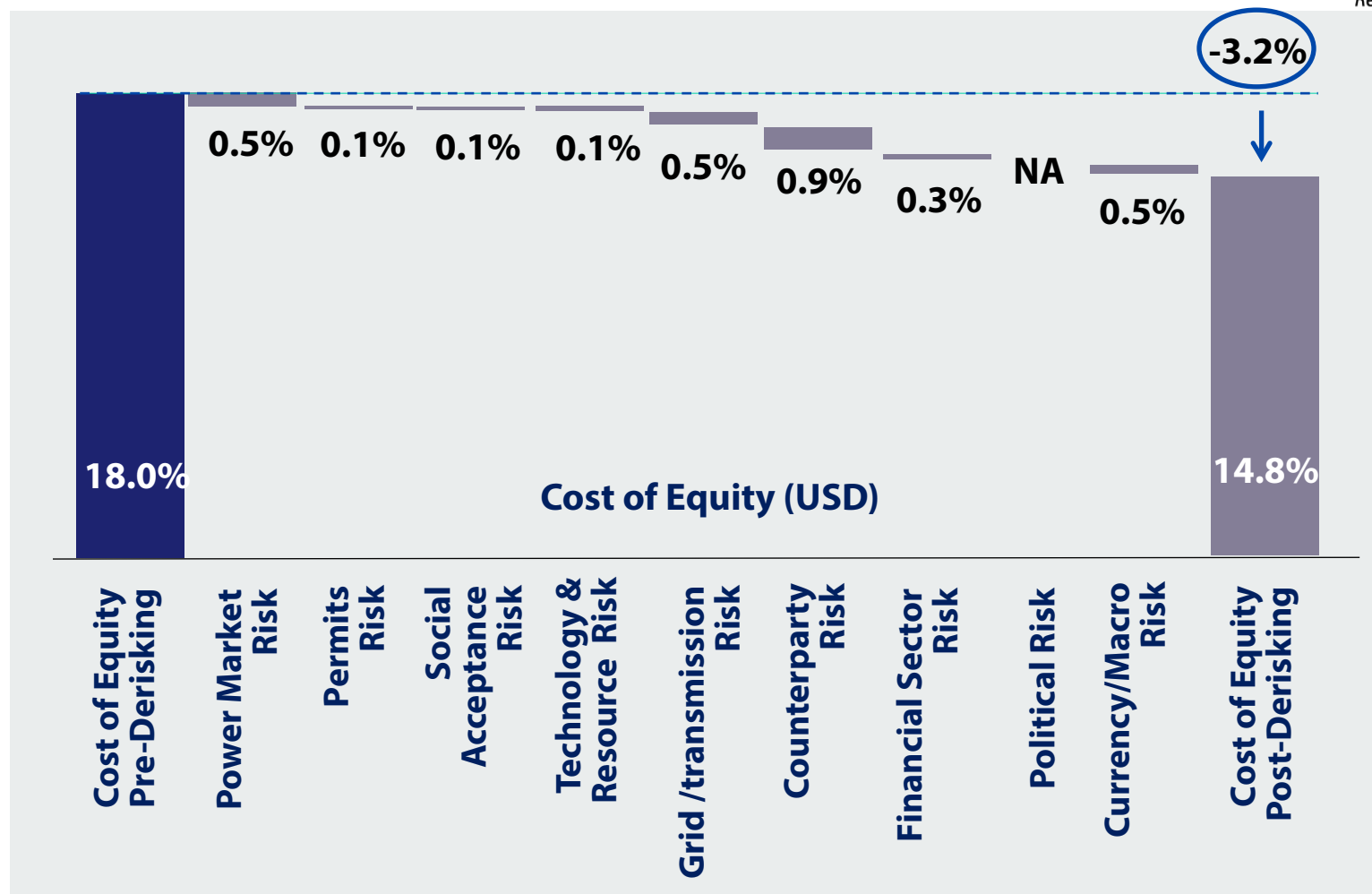
# DREI Nigeria (Solar PV, 2020 1.2GW Target)

## (2) Post-derisking financing cost waterfall



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### PRELIMINARY FINDINGS



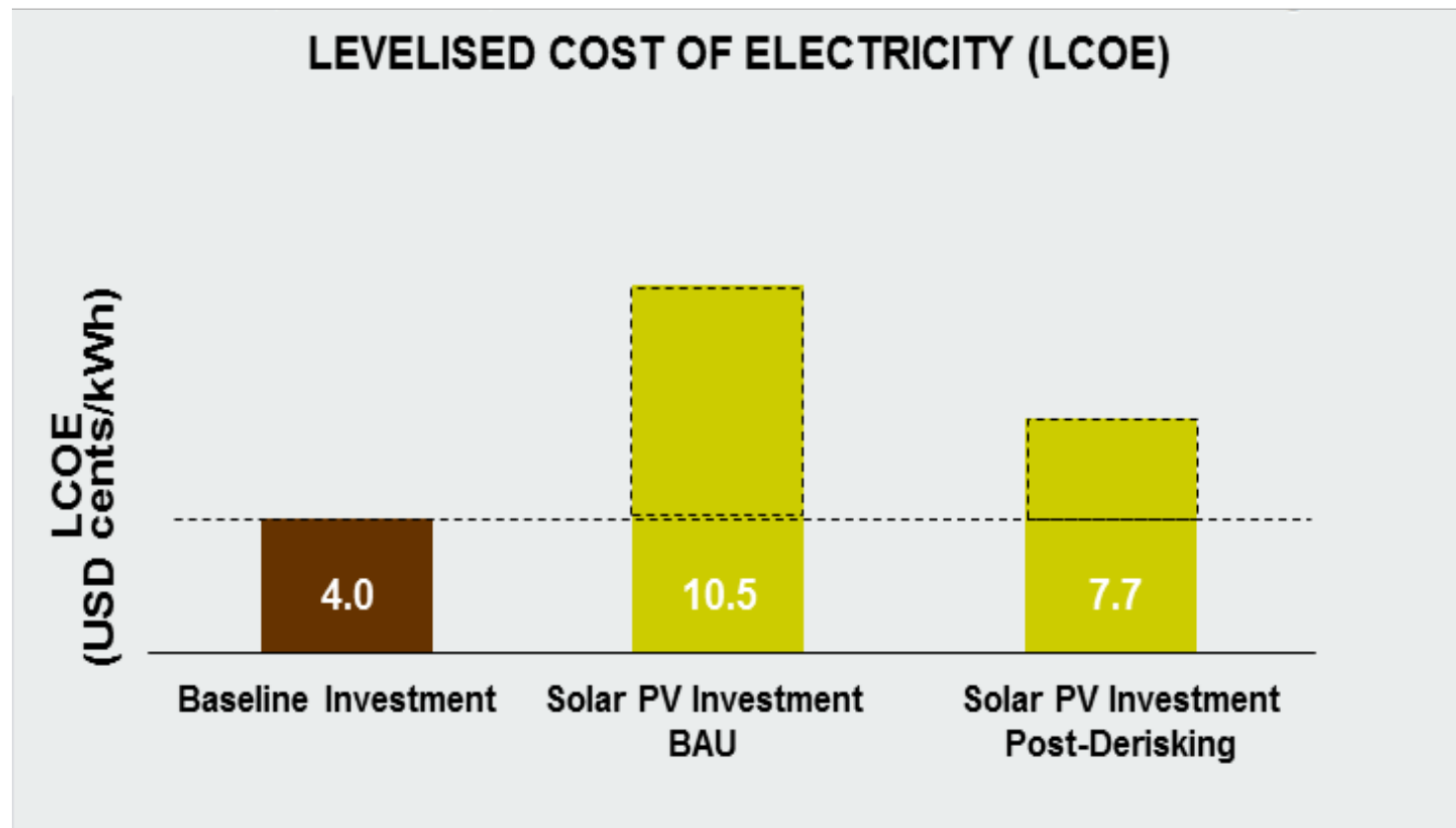
# ***DREI Nigeria (Solar PV, 2020 1.2GW Target)***

## **(3) Measuring impact – levelised costs**



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### PRELIMINARY FINDINGS



# ***DREI Nigeria (Solar PV, 2020 1.2GW Target)***

## **(3) Measuring impact – performance metrics**

---



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### PRELIMINARY FINDINGS

If **USD 301 m** is invested in public derisking measures to promote utility scale in Nigeria, this can have the following impacts:



#### **Catalysing private sector funding**

- UDS 1.869 billion in private sector investment



#### **Generating economy-wide savings**

- USD 960 million in lower premium prices for Solar PV over the next 20 yrs



#### **Better affordability for end-users**

- Solar PV generation costs decrease from USD 10.5 cents/kWh to USD 7.7 cents/kWh



#### **Benefit the environment**

- Emission reductions of 26 Mt CO<sub>2</sub>e over next 20 years



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## **II. Small-Scale Renewable Energy**

# Derisking Renewable Energy Investment

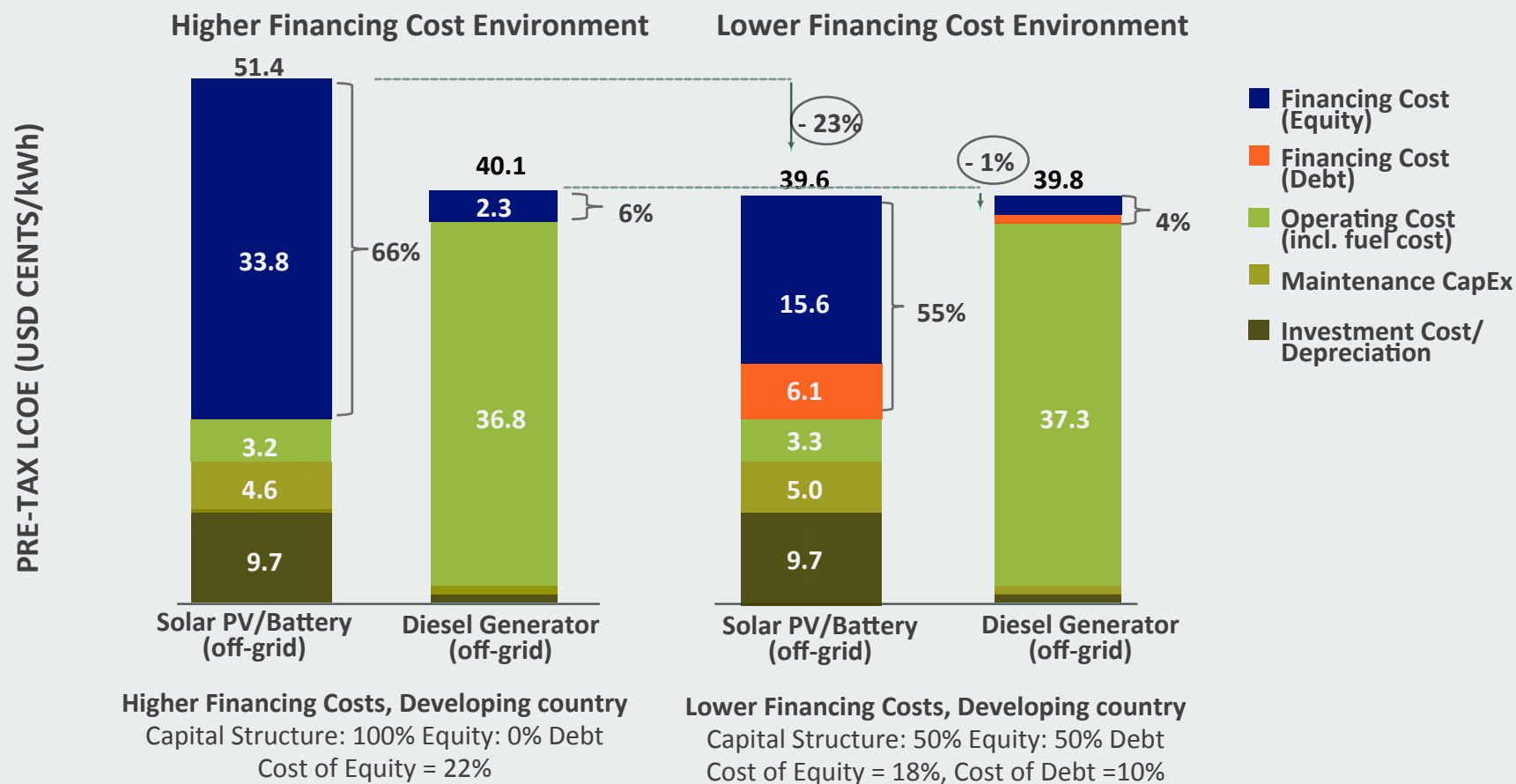
## Mini grid – impact of financing costs



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### PRELIMINARY FINDINGS

#### LEVELIZED COSTS OF OFF-GRID SOLAR PV/BATTERY VS DIESEL GENERATOR MINIGRIDS



Source: UNDP/ETH Zurich, Preliminary calculations

Generation costs only; Assumes equal annual electricity output; Solar PV/Battery System Size @25 kW, Diesel System Size @ 14 kW, Investment Life= 20 years, Replacement: Battery (5 years), Inverters (10 years), Generator (10 years), Diesel Fuel Price:\$0.81/L, Inflation:2%; Loan tenor = 10 years, where applicable

# Derisking Renewable Energy Investment

## Mini grid barrier/risk table (excerpt)



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### PRELIMINARY FINDINGS

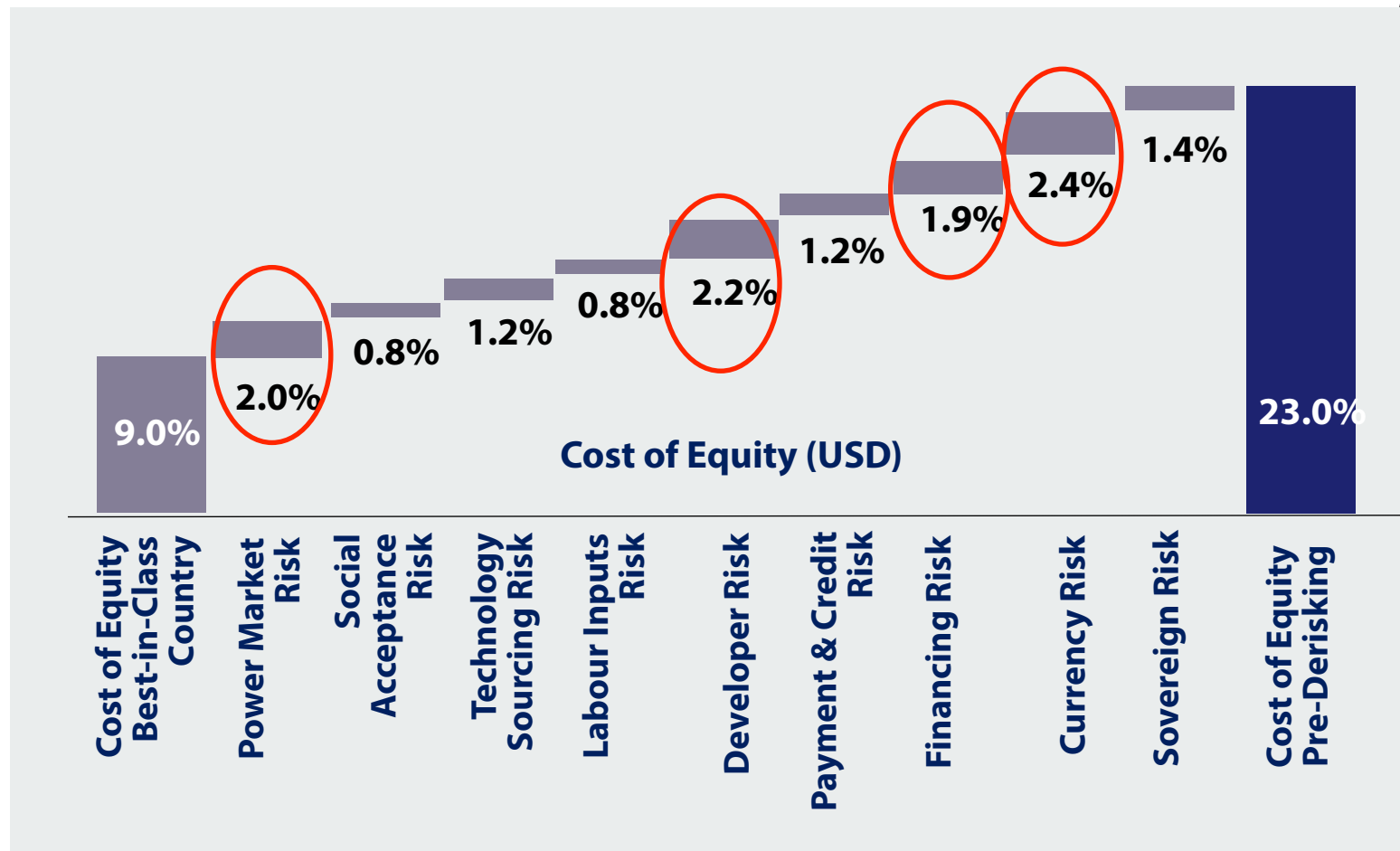
| BARRIERS             |   |   |   | MENU OF SELECTED PUBLIC INSTRUMENTS  |                                 |
|----------------------|---|---|---|--|---------------------------------|
| RISK CATEGORY        | DESCRIPTION   | UNDERLYING BARRIERS   | KEY STAKEHOLDER GROUP   | POLICY DERISKING INSTRUMENTS   | FINANCIAL DERISKING INSTRUMENTS |
| 1. Power Market Risk | Risk arising from limitations and uncertainty in the energy market (off and on-grid) regarding market outlook, access and competition | <i>Market outlook:</i> Uncertainty regarding national/state-level targets for renewable energy and electrification  | Power market-related policymakers (civil servants); legislators; regulators | Develop transparent, long-term national/(state) targets for electrification and renewable energy   |                                 |
|                      |   | <i>Market access, competition and grid expansion:</i> Limitations in ability of mini-grid developers to access the electrification market; Uncertainty regarding potential future competition in electrification; Unclear, or lack of, grid planning and expansion policies |   | Establish and build capacity of institutional infrastructure; determine off-grid service areas; define concessions; implement well designed mechanism to grant concessions; implement compensation scheme in case of grid expansion. |                                 |
|                      |   | <i>Tariffs:</i> Uncertainty or inflexibility in electricity tariff regulations for mini-grids   |   | Establish balanced and well-designed regulated tariffs, either through (i) tariff tables or (ii) price discovery via auctions.   |                                 |
|                      |   | <i>Standards:</i> Lack of clarity, uncertainty and/or inconsistent government technical requirements regarding (i) quality and (ii) grid integration  |   | Develop balanced technical standards/requirements, with active enforcement.  |                                 |
|                      |   | <i>Competing subsidies:</i> Competition from subsidised diesel and kerosene power sources; negative perceptions of mini-grid tariffs due to subsidised grid-distributed electricity   |   | Reform fossil fuel and grid-distributed electricity subsidies  |                                 |

# Derisking Renewable Energy Investment Mini-grid Kenya – financing cost waterfall



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PRELIMINARY FINDINGS







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## III. Conclusions

# Conclusions

## Key take-aways

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- A key opportunity for policymakers is to address the high financing costs for renewable energy in developing countries
- The best outcomes occur when policymakers address the risks to renewable energy investment in a systematic and integrated way
- Risks can be addressed in one of three ways:
  - Reducing risk (policy derisking)
  - Transferring risk (financial derisking)
  - Compensating for risk (direct incentives)
- Investing in derisking (risk reduction or risk transfer) is more cost effective when measured against paying direct financial incentives, such as a premium price

# Derisking Renewable Energy Investment Website, reports & financial tools



[www.undp.org/DREI](http://www.undp.org/DREI)

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UNDP, VERSION 1.0 (APRIL 2013)| 2 |  | | | | | | | | | | | | | | | | |
| 3 | **DERISKING RENEWABLE ENERGY INVESTMENT** | | | | | | | | | | | | | | | | |
| 4 | **FINANCIAL TOOL** | | | | | | | | | | | | | | | | |
| 5 |  | | | | | | | | | | | | | | | | |
| 6 |  | | | | | | | | | | | | | | | | |
| 7 |  | | | | | | | | | | | | | | | | |
| 8 |  | | | | | | | | | | | | | | | | |
| 9 |  | | | | | | | | | | | | | | | | |
| 10 | **A. OVERVIEW** | | | | | | | | | | | | | | | | |
| 11 | This financial tool supports the framework presented in UNDP's Derisking Renewable Energy Investment report to assist policymakers in selecting public instruments to promote renewable energy investment. The financial tool calculates the levelised cost of electricity (LCOE) for a given country's baseline energy mix and the LCOE of onshore wind energy, before and after the introduction of public instruments. | | | | | | | | | | | | | | | | |
| 12 | Please go to UNDP's website to download the report, latest versions of this financial tool and other materials: | | | | | | | | | | | | | | | | |
| 13 | [http://www.undp.org/content/undp/en/home/pressroom/environment-energy/low\\_emission\\_climate/related\\_documents/derisking-renewable-energy-investment/](http://www.undp.org/content/undp/en/home/pressroom/environment-energy/low_emission_climate/related_documents/derisking-renewable-energy-investment/) | | | | | | | | | | | | | | | | |
| 14 |  | | | | | | | | | | | | | | | | |
| 15 |  | | | | | | | | | | | | | | | | |
| 16 |  | | | | | | | | | | | | | | | | |
| 17 |  | | | | | | | | | | | | | | | | |
| 18 |  | | | | | | | | | | | | | | | | |
| 19 | **B. TABLE OF CONTENTS** | | | | | | | | | | | | | | | | |
| 20 | This financial tool is organised into the following eight sheets: | | | | | | | | | | | | | | | | |
| 21 |  | | | | | | | | | | | | | | | | |
| 22 |  | | | | | | | | | | | | | | | | |
| 23 | **I. Summary Outputs** | | | | | | | | | | | | | | | | |
| 24 | **II. Inputs, Baseline Energy Mix** | | | | | | | | | | | | | | | | |
| 25 | **III. Inputs, Wind Energy** | | | | | | | | | | | | | | | | |
| 26 | **IV. LCOE, Baseline Energy Mix** | | | | | | | | | | | | | | | | |
| 27 | **V. LCOE, Wind Energy** | | | | | | | | | | | | | | | | |
| 28 | **VI. Additional Data** | | | | | | | | | | | | | | | | |
| 29 | **VII. Supplementary Information** | | | | | | | | | | | | | | | | |
| 30 | **VIII. User Notes** | | | | | | | | | | | | | | | | |
| 31 |  | | | | | | | | | | | | | | | | |
| 32 | **C. IMPORTANT GUIDANCE** | | | | | | | | | | | | | | | | |
| 33 | The following modelling conventions are used throughout this tool: | | | | | | | | | | | | | | | | |
| 34 |  | | | | | | | | | | | | | | | | |
| 35 |  | | | | | | | | | | | | | | | | |
| 36 | **Input cells** | | | | | | | | | | | | | | | | |
| 37 | - Input cells require the user to enter numeric data or to select an option from a drop-down menu. | | | | | | | | | | | | | | | | |
| 38 | - Input cells are formatted in blue font. An example of the format is as follows: | | | | | | | | | | | | | | | | |
| 39 | - Sometimes input cells may be formatted in purple font. This signifies that default input data is inserted to act as an initial guide. Users are invited to input their own data. | | | | | | | | | | | | | | | | |
| 40 |  | | | | | | | | | | | | | | | | |
| 41 | **Output cells** | | | | | | | | | | | | | | | | |
| 42 | - An output cell consists of a pre-existing formula. Do NOT enter data into an output cell. If the formula is overwritten, this could compromise the financial tool. | | | | | | | | | | | | | | | | |
| 43 | - Output cells are formatted in black font. | | | | | | | | | | | | | | | | |
| 44 |  | | | | | | | | | | | | | | | | |
| 45 | **Guidance comments** | | | | | | | | | | | | | | | | |
| 46 | - The input sheets have a column with guidance comments. These comments provide explanatory notes, definitions and address common issues. | | | | | | | | | | | | | | | | |
| 47 | - The column with guidance comments is initially hidden from view. To view the comments click on the ungroup symbol (which appears as a "+" sign) in the top right-hand corner of the sheet. | | | | | | | | | | | | | | | | |
| 48 |  | | | | | | | | | | | | | | | | |
| 49 | **Checks** | | | | | | | | | | | | | | | | |
| 50 | - Check cells will appear when there is an invalid entry of some sort. Check cells are formatted in red font. If it appears, the check cell provides guidance on how to rectify the invalid entry. | | | | | | | | | | | | | | | | |
| 51 |  | | | | | | | | | | | | | | | | |
| 52 | **Protected sheets and cells** | | | | | | | | | | | | | | | | |
| 53 | - In order to ensure that the tool maintains its functionality and formulae are not accidentally deleted and/or compromised, this tool is distributed with sheets and cells in 'protected' mode. | | | | | | | | | | | | | | | | |
| 54 | To maintain sheets and cells in protected mode, the password is: UNDPDREI | | | | | | | | | | | | | | | | |
| 55 | Introduction / I. Summary Outputs / II. Inputs, Baseline Energy Mix / III. Inputs, Wind Energy / IV. LCOE, Baseline Energy Mix / V. LCOE, Wind | | | | | | | | | | | | | | | | |
| 56 | Ready | | | | | | | | | | | | | | | | |



The background of the slide is a photograph of a bright orange and yellow sun setting or rising, partially obscured by the dark, silhouetted branches of bamboo trees. The sky is a pale, hazy pinkish-grey.

# Thank you!

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UNDP Regional Service Centre for Africa  
[faris.khader@undp.org](mailto:faris.khader@undp.org)