



UNDP DERISKING RENEWABLE ENERGY INVESTMENT (DREI)  
 DERISKING MATRIX  
 TECHNOLOGY: MINI-GRID  
 KEY ASSUMPTIONS: 1. Private sector solar PV-battery mini-grid BOO  
 # RISKS, BARRIERS: 10, 23  
 UPDATED AS OF: June 2018

BARRIERS			
RISK CATEGORY	DESCRIPTION	UNDERLYING BARRIERS	KEY STAKEHOLDER GROUP
1. Energy Market Risk	Risk arising from limitations and uncertainty in the energy market (off- and on-grid) regarding market outlook, access, price and competition	<i>Market outlook:</i> Lack of political will and/or uncertainty regarding national/state targets for electrification and renewable energy mini-grid investment	Energy sector policymakers; legislators; administrators; utilities; grid operators; regulators
		<i>Market access, competition and grid expansion:</i> Limitations and inability, including due to government regulations, 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	
		<i>Tariffs:</i> Uncertainty or inflexibility in electricity tariff regulations for mini-grids	
		<i>Technical standards:</i> Lack of clarity, uncertainty and/or inconsistent government technical requirements for mini-grids regarding (i) quality of service and (ii) grid integration, should it occur	
		<i>Competing subsidies:</i> Competition from subsidised diesel and kerosene (mostly used for lighting); negative perceptions of mini-grid tariffs due to subsidised grid-distributed electricity	
2. Social Acceptance Risk	Risks arising from lack of awareness and resistance to renewable energy and minigrids in communities	Resistance by general public and local communities due to unfamiliarity with electricity and renewable energy sources; mis-information/perceptions and lack of awareness for mini-grid offerings; resistance from incumbent businesses (e.g., diesel based generation) and users (e.g., SHS), disrupted by mini-grids	General public; NGOs; incumbent businesses

\* Note: This instrument is a direct financial incentive

MENU OF SELECTED PUBLIC INSTRUMENTS			
POLICY DERISKING INSTRUMENTS		FINANCIAL DERISKING INSTRUMENTS	
ACTIVITY	DESCRIPTION	ACTIVITY	DESCRIPTION
Build political will and develop realistic and transparent targets, using multi-tier electrification indicators	Establish programmes to raise awareness and build political will with legislators (e.g., conferences, site visits, cross ministerial committees); establish/strengthen energy statistics office; pursue a tiered approach to statistics for electrification; perform initial resource inventory and mapping, including through spatial planning; formulate realistic and transparent targets by tier, technology and demographics; ongoing monitoring of statistics		
Establish regulatory approach with two, co-existing regimes: (i) light-touch (no license) and (ii) comprehensive (licensed).	<b>Light-touch regime (no license):</b> Establish simple mechanism for mini-grid developers to self-register and provide basic annual reporting; self-registered mini-grid developers have right-of-first-refusal for concessions under the comprehensive regime  <b>Comprehensive regime (licensed):</b> Establish/develop capacity of institutions (e.g., rural electrification agency, regulator); determine national/state off-grid electricity service areas; define well-designed concessions (e.g. size, years, targets, bundling) for mini-grid developers; implement well-designed mechanism to grant exclusive concessions to mini-grid developers		<b>Comprehensive regime (licensed):</b> Establish compensation scheme (e.g., per kWh) in case of grid expansion
Mini-grid developers may choose to operate under either regime. Light-touch regime does not provide exclusivity, nor access to government financing or grants (see later risk categories).			
Establish co-existing (i) light-touch (no license) and (ii) comprehensive (licensed) approaches.	<b>Light-touch regime (no license):</b> No tariff controls.  <b>Comprehensive regime (licensed):</b> Establish balanced and well-designed regulated tariffs to address monopoly risk, either through (i) tariff tables or (ii) price discovery, via auctions		
Establish co-existing (i) light-touch (no license) and (ii) comprehensive (licensed) approaches.	<b>Light-touch regime (no license):</b> Voluntary compliance with comprehensive regime standards.  <b>Comprehensive regime (licensed):</b> Develop balanced technical standards/requirements for quality of electricity and grid integration, with active enforcement		
Reform fossil fuel and grid-distributed electricity subsidies	Assessment of fuel and grid-distributed electricity subsidies; phase-out/down of subsidies*; awareness campaigns accompanying reform; design of transfer programs to vulnerable social groups		
Develop and coordinate ongoing community impact and public awareness campaigns	Public awareness campaigns; stakeholder dialogues and workshops between policy makers, NGOs, communities, community leaders and end users		
Pilot models for community involvement	Piloting of community models such as revenue sharing or small equity stakes for households, plus employment prospects for individuals.		

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3. Hardware Risk	Risk arising from limitations in the quality and availability of mini-grid hardware, as well as the customs treatment of hardware	<i>Quality of hardware:</i> Lack of access to information on quality, reliability (performance) and cost of hardware; lack of clarity or uncertainty regarding government technical standards to ensure safety of mini-grid hardware; lack of availability of warranties for components	Technology supply chain; technical regulator; customs (excise)
		<i>Availability of hardware:</i> Lack of a competitive market for buying hardware (from both international and domestic suppliers); where appropriate, lack of locally tailored hardware	
		<i>Customs:</i> Cumbersome customs/clearing process for importing hardware, leading to delays in delivery; punitively high customs tariffs on mini-grid hardware, particularly in comparison to other sectors.	
4. Digital Risk	Risks arising from use of cellular networks for remote monitoring and payments; the use of software; and abuse of consumer data	<i>Cellular networks and mobile money:</i> lack of cellular coverage in rural areas, where electrification needed; over-dependence on a single operator for reliable cell service and payment processing; lack of mobile money, or limitations relating to fees on mobile money transactions	Telecom sector policymakers; regulators; cellular network operators; software providers
		<i>Software:</i> Limited standardization of software and interfaces on mini-grid developers' back-end data and operations, and mobile money payment platforms	
		<i>Abuse of consumer data:</i> possible abuse of consumer data privacy on payments and usage; lack of understanding/clarity on uses of consumer information	
5. Labour Risk	Risks arising from the lack of skilled and qualified potential employees	Lack of a competitive labor market of educated, skilled and qualified potential employees, leading to higher costs, hiring non-local staff and suboptimal performance	Labour force; training/education institutions
6. Developer Risk	Risks arising from limitations in the mini-grid operator's management capability, and its creditworthiness and cash flow.	<i>Management capability:</i> lack of C-suite talent and experience to ensure effective execution (business planning, financial structuring, plant design (resource and demand assessment), installation, operations and maintenance), and to manage challenges (limited information, unforeseen events)	Mini-grid operator (BOO)
		<i>Developer credit worthiness and cash flow strength:</i> Inability of developer to secure low cost financing from investors due to lack of credit worthiness, or insufficient cash flows to meet investors' return requirements	

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POLICY DERISKING INSTRUMENTS		FINANCIAL DERISKING INSTRUMENTS	
ACTIVITY	DESCRIPTION	ACTIVITY	DESCRIPTION
Develop certification and standards for hardware; adopt internationally recognized standards and share best practices, where applicable	Transparently develop, update (as necessary), disseminate and enforce standards for technical performance and safety; mandate minimum warranties for components		
Ensure an open, competitive marketplace for buying hardware	Policy measures to ensure a competitive market for hardware availability; balanced industrial policy objectives, where applicable, for domestic manufacturers, with open markets for international manufacturers; government support for R&D into technical modifications to hardware to accommodate local conditions		
Streamlined and consistent customs procedures; reform of punitive custom tariff system	Reduction of customs administrative steps; public response timelines; effective and expedited recourse mechanisms. Full cost-benefit economic assessment and benchmarking of tariffs; phase-out/down of punitive customs tariffs; introduction of import tariff holidays and VAT exemptions*		
Well-designed telecom regulations enabling universal, competitive coverage and mobile money	Regulation on coverage areas and competition for cellular operators; regulations ensuring a competitive mobile money market, including reasonable fees for mobile money transactions		
Government support to form industry associations for standard-setting and sharing of best practices	Encourage engagement of MNOs, mobile money companies, mini-grid developers through industry associations, technology working groups to establish standards around the digitalization of energy services provision		
Institute balanced consumer data protection regulations	Facilitate the development of clear and transparent guidelines on data use by companies in the mini-grid ecosystem; raise awareness among consumers; government enforcement of data privacy laws		
Programmes to develop competitive, skilled labour market in renewable energy (all roles)	Apprenticeships, certificates and university programmes to build skills in renewable energy (e.g., engineering, marketing, business management)		
Government support to improve information flows and network effects	Government support for establishing industry association; government support for initial industry conferences; dissemination of top-level, national resource assessment findings; government sponsored academic studies (e.g., on demand evolution)		
		Public loans, guarantees and/or equity to mini-grid operators	Direct public loans to minigrid operator; public guarantees to commercial banks that are lending to the minigrid operator; public equity investments in minigrid operator

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7. End-user Credit Risk	Risk arising from customers' willingness, ability, and methods of payment for electricity	<i>Lack of information on end-user credit worthiness:</i> Lack of end-user credit data with which to assess the ability of end-users to pay for the initial connection fees, ongoing electricity bills and ancillary equipment (e.g., lights and appliances)	End-users (households, business, public entities); consumer finance actors (consumer banks, credit data actors, and consumer finance regulator)
		<i>Poor credit worthiness and non-payment:</i> Risk of delayed, reduced or non-payment by customers due to poor credit worthiness, lack of funds available, electricity theft and social dynamics	
8. Financing Risk	Risks arising from scarcity of domestic investor capital (debt and equity) for minigrids, and domestic investors' lack of familiarity with minigrids and appropriate financing structures	<i>Capital scarcity - liquidity constraints in domestic banking:</i> Limited availability of long term domestic loans due to high banking reserve requirements	Domestic investors (equity and debt); investor financial sector regulator
		<i>Capital scarcity - under-developed domestic financial sector:</i> Low number of well-capitalised actors (debt, equity, insurance, pensions); lack of regulatory clarity on new types of financial products	
		<i>Capital scarcity - competing incentives/ mandates:</i> existing policies incentivise or mandate domestic financial sector (banks, pension funds) to invest in alternative, competing sectors to minigrids	
		<i>Limited domestic investor experience with minigrids:</i> Lack of information, assessment skills and track-record for minigrid projects amongst domestic investor community; lack of network effects (investors, investment opportunities) found in established markets; lack of familiarity and skills with appropriate finance structures	
9. Currency Risk*	Risks arising from currency mismatch between domestic currency revenues and hard currency financing	Uncertainty due to volatile local currency; unfavourable currency exchange rate movements resulting in domestic currency revenues not being sufficient to cover hard currency debt/equity servicing; inability to economically hedge FX exposure due to illiquid FX derivative markets	Macro risk
10. Sovereign Risk	Risk arising from a mix of cross-cutting political, economic, institutional and social characteristics in the particular country which are not specific to mini-grids	Limitations and uncertainty related to conflict, political instability, economic performance, weather events/natural disaster, legal governance, ease of doing business, crime and law enforcement, land tenure and infrastructure in the particular country	Macro risk

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Facilitate growth of consumer credit data industry	Where applicable, government sponsored digital identity scheme; promotion of balanced privacy and financial regulations allowing for collection of credit data by the private sector; piloting of fintech solutions/platforms for credit data analysis		
Facilitate end-user's ability to improve creditworthiness over time	Two complementary approaches: (i) Facilitate access to consumer finance (e.g., government-sponsored digital ID scheme; general consumer finance reform; mobile money); (ii) Promote productive use of electricity (e.g., establish network of business development incubators and advisors providing training and guidance covering mini-grid areas)	Two possible approaches to address credit risk: (i) Public loans, guarantees and/or equity to mini-grid operators (ii) Government offtaker via PPA	(i) Direct public loans to mini-grid developer; public guarantees to commercial banks that are lending to the mini-grid developer; public equity investments in mini-grid developer (ii) Government enters into PPA acting as an intermediary offtaker with mini-grid developer. Electricity is then onsold to end-users. This risk transfer/financial derisking approach can be combined with a per kWh subsidy* (direct financial incentive), addressing affordability concerns
Government mandates to ensure creditworthy anchor tenants for mini-grids	Government targets and mandates require creditworthy actors, both private (e.g., cell phone towers) and public (e.g., health centres), to obtain their electricity from renewable energy mini-grids		
Reform reserve requirements for domestic lending to businesses	Balanced approach to liquidity requirements, assessing trade-offs between financial stability and renewable energy/electrification objectives		
Liberalise domestic financial sector	Liberalisation and introduction of competition into domestic financial sector; reforms to introduce and facilitate new types of finance (e.g., crowdfunding, peer-to-peer lending)	Public loans, guarantees and/or equity to mini-grid operators to address capital scarcity	Direct public loans to mini-grid operators; public guarantees to commercial banks that are lending to mini-grid operators; public equity investments in mini-grid operators
Reform financial sector incentives for investing in specific sectors	Balanced approach to incentives across all sectors; introduce incentives, targets and mandatory lending requirements for renewable energy/minigrids/electrification		
Strengthen domestic investors' (debt and equity) familiarity with and capacity regarding renewable energy minigrids	Mini-grid/electrification finance dialogues and conferences; workshops/training for investors on project assessment and financial structuring		
Government support for long term development of liquid domestic FX derivative markets	Regulatory reforms enabling derivative trading for local securities exchanges; steering of large government FX hedging contracts to domestic FX markets.	Financial products to transfer some or all currency risk to public sector	Various design options exist. One option is the government entering into an intermediary PPA with minigrid operator, denominated in hard currency, and then onselling electricity to end-users at a fixed, or more stable, domestic currency tariff. Another option are government subsidised or facilitated F/X hedging programmes (particularly for illiquid F/X trades).
		Where applicable, risk sharing products by development banks to address political risk	Where applicable, provision of political risk insurance (PRI) covering (i) expropriation, (ii) political violence, (iii) currency restrictions, (iv) breach of contract