Integration of clean tech solutions in the energy systems

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Green Power

The effects of RES integration

A multi-parametric equation

Business model convergence

Enablers and Barriers

RES: a conscious decision

A matrix of choices

Why?	How?	For whom?
Capacity additions Quick deployment Security of supply Energy price reduction Energy access CO2 footprint control Complementarity to gas	Public auctions Private auctions FITs FIPs PPAs: On-site PPAs: Wheeled Rural electrification Combined model	Central government Local government Incumbent utilities Taxpayers Large consumers Rural communities Small customers

African energy systems

Particularities

	Stable power systems	Dynamic power systems
System features	Stable power demand Optimization drivers (saving, grid stability, CO2) RES = displacement dispatch	Growing energy demand Growth drivers: demand, saving, access) RES = accretive dispatch
Enablers	Existing dispatchable baseload Wide grid geographical coverage Deep grid = reduced avg. variability Large storage	Demand side management Grid extensions required Shallow grid = instability Dispatchable generation
Barriers	Poor energy economics (pricing, demand)	Poor infrastructures

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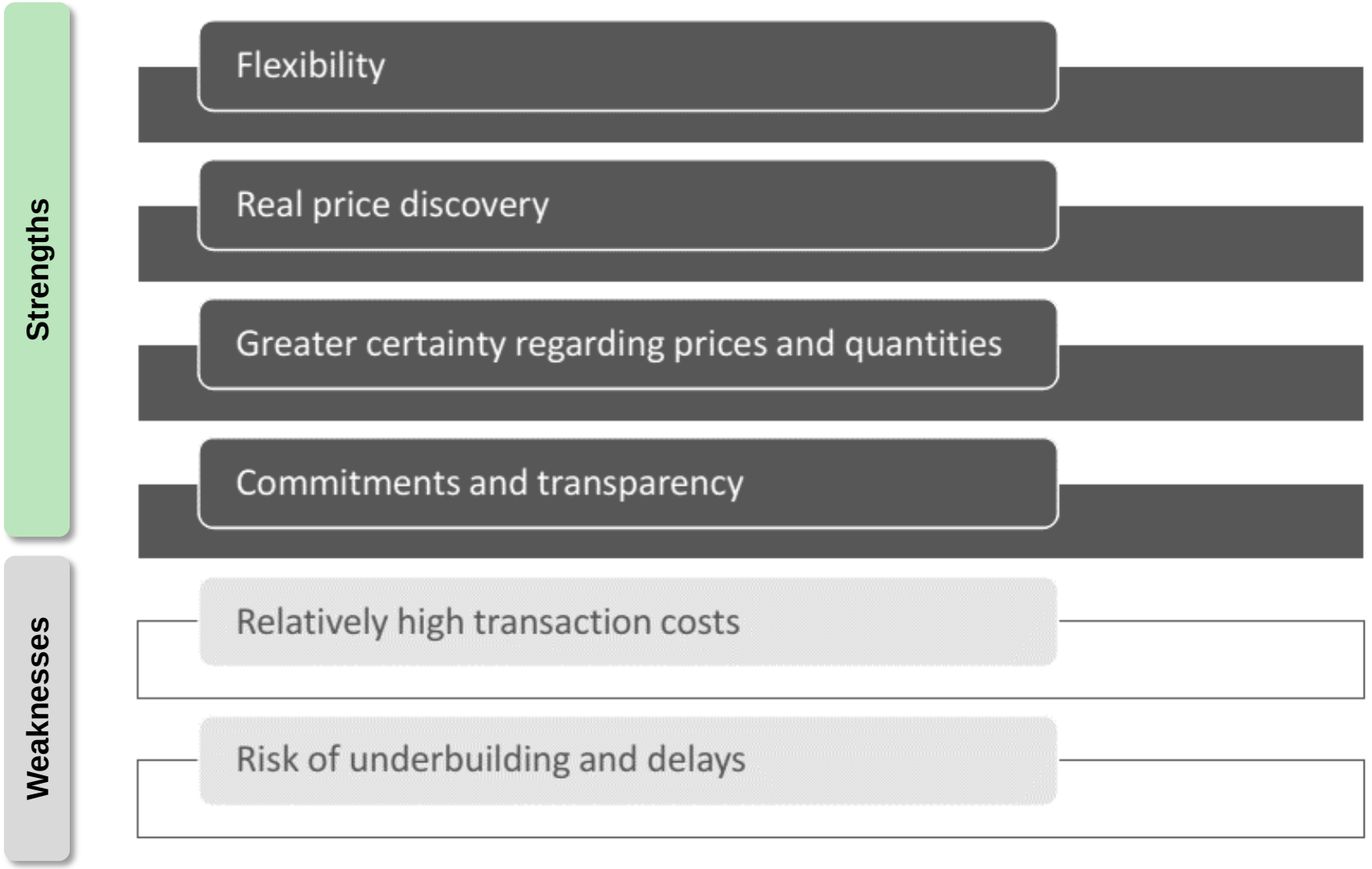
Auctions Strengths and Weaknesses



Auctions: high customisability

Many routes to the destination

Project selection	Local content	Local ownership	Financing	Revenue stream	Exit mechanics
Bidder selects	No requirement	No requirement	Same facilities available to all bidders	Fixed revenue stream	Lock-up periods
Tenderer designates	Mandatory minimum (ON/OFF)	Mandatory minimum (ON/OFF)	Bidder selects	Currency electives	Free disposal
	Scored	Scored		Inflation electives	Main sponsor PPA lockup

Feed in Tariffs: early entrants & small players

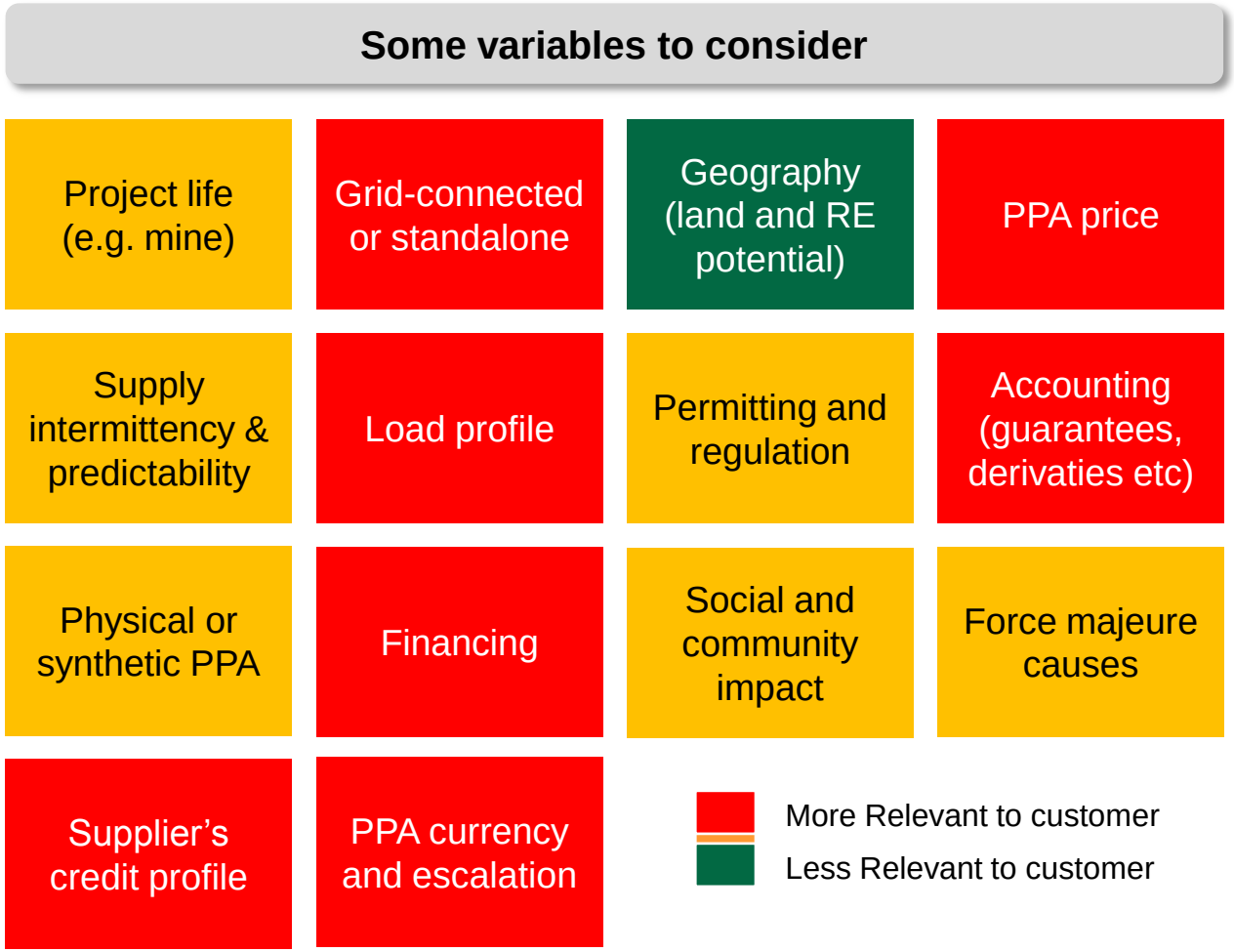
Key Characteristics

- **Set by the administration** and embedded in the law: full transparency and planning security.
- **Support levels** set **per KWh** for **each type of technology** and according to further provisions such as size and location (for wind).
- Level of support determined such as to **cover the full costs** of the RES installation.

Smaller programmes & inclusive RES market demographics

Energy supply to large consumers

Tailor made energy solutions



Mini-grid and Rural Electrification

Energy Access Solutions

Few Watts

Small Lighting Systems

<150W

Stand-Alone Systems

<1MW, scalable

Mini-grid

MWs, scalable

Grid expansion

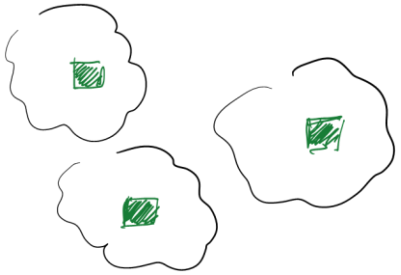
Mini Grid - Business Models

Business Models: some out of many more

Community Mini-Utility Model

Description: generation, distribution, supply to end-costumer residential and commercial

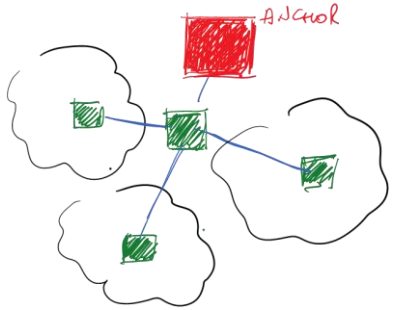
Key Challenges: siting / keep low CapEx / high tariff



Anchor + Community Mini-Utility Model”

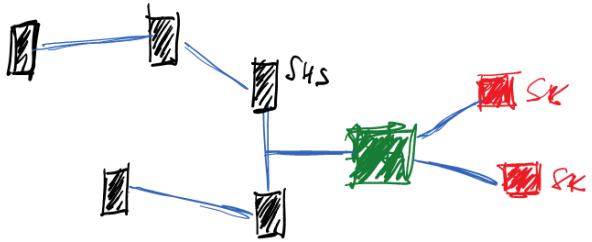
Description: generation, distribution, supply to an anchor load + end-costumer residential or commercial

Key Challenges: finding the right anchor is the major challenge



Off-grid Virtual Power Plant (+ minigrid)

Description: progressive electrification starting from SHS solutions.



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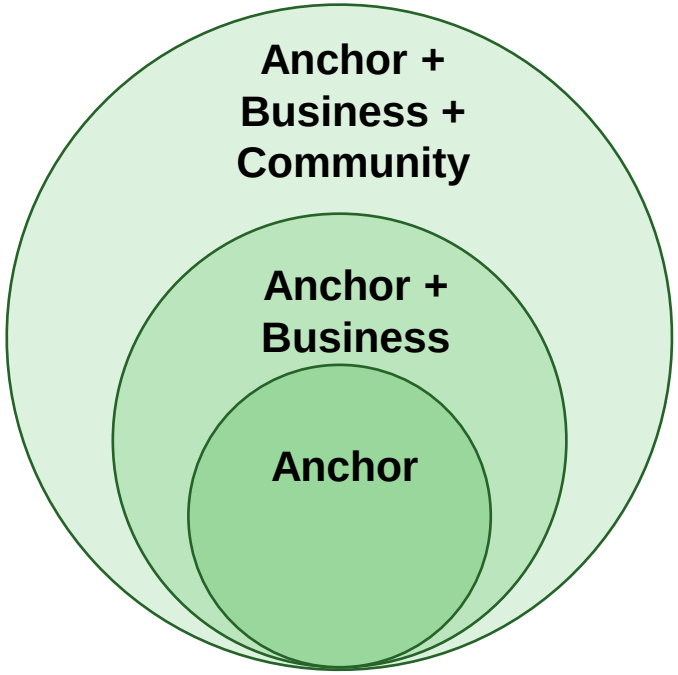
Combination of Custom PPA + Rural electrification

ABC: potential Business Model for Mini-grid Deployment



Community: Households gain access to affordable energy

Business: Electricity demand for productive use and increase operaing hours

Anchor: Large, creditworthy, cross-border:

Source: Bundesverband Solarwirtschaft e.V. (BSW-Solar): The business case of PV-hybrid Mini-grids: actors, contracts, drivers for profitability

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Enablers to Private Sector Engagement

Focus on Mini-grid and Off-grid

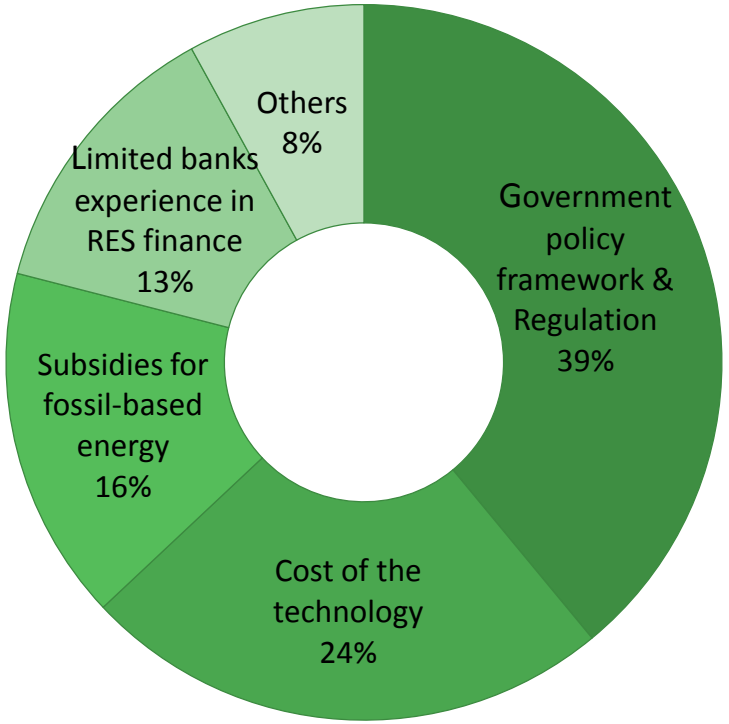
Government-side initiatives

- **Rural electrification = incumbent's CAPEX?** → Not necessarily. Issue distribution licenses to private investors & manage local utility reaction
- **Attracting private investment** → Predictable and enforceable regulatory framework, revenue streams, capital/currency controls, taxation, bankability, preemptively engage DFIs
- **Project permitting** → Servitude laws, reliable land legislation, environmental etc
- **Regulate "burning issues"** → e.g. what is going to happen when the grid reaches the micro-grid?

Private sector initiatives

- **Identify economically viable and scalable off-grid systems** → Invest in new demand identification & prediction tools, GIS mapping, wireless payment infrastructure, grid studies
- **Demand side management & liaising with financiers to stimulate access to funds** → Subsidization of basic electrical devices, micro-finance solutions
- **Promote local socio-economic development and small businesses**

Main Barriers to RES Deployment



- **Local Governments can address up to 75% of the key identified barriers**
- **Capex and O&M costs accounting for the remaining 24% - optimization potential**
- **Long term development programs envisaged by the Governments bolsters investors trust and confidence**

Source: EY, MENA Cleantech Survey