
CHALLENGES IN SCALING OF MICRO-UTILITIES
OPERATION, LEGAL FRAMEWORKS AND FINANCING

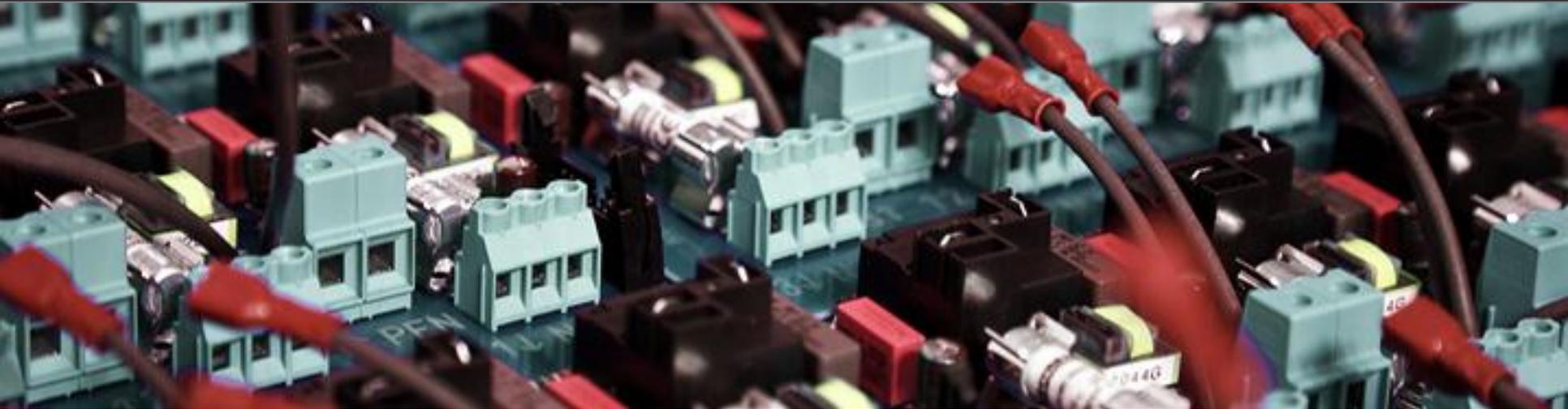
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AGENDA

- 01 Definition of Micro-Utilities
- 02 Walking down the economies of scale curve
- 03 Transaction costs in Micro-Utilities
- 04 Financing along the Micro-Utility development timeline
- 05 Conclusions and recommendations





DEFINITION OF MICRO-UTILITIES

Micro-Utilities:

- _ are often SMEs with limited financial resources
- _ Have besides financial interest intrinsic motivation to electrify rural areas
- _ Need innovative approaches to be successful
- _ Typically supply electricity to less than 5000 customers and generate revenues of below 1 M€



EXAMPLES FOR EXISTING MINI-/ MICRO-UTILITIES

Company Name	Unique selling proposition	Development Stage	Financing and ownership structure
The Power Source Group	Model adjusted to the framework in the Philippines, Community Energizer Platform TM	Large pilot villages connected, preparing for replication in smaller sites	American founders with new local investors/ shareholders
Husk Power Systems	Franchising approach for gasification plants adjusted to Indian conditions, entering into Africa	80 plants supplying electricity to 300 villages established	Mainly impact investors like Shell Foundation, Acumen Fund, LGT Philanthropy, Bamboo Finance etc.
INENSUS West Africa	PPP model adjusted to Senegalese framework, risk management model of MicroPowerEconomy, solar and small wind technology	Pilot village connected in 2010, replication in 30 more villages initiated	Joint Venture between the INENSUS GmbH and CSI MATFORCE; Mezzanine from FMO for scale-up
Wireless Energy	New demand side management approaches, adjusted to conditions in Chile	publicly funded projects, private investments planned	unknown
MFC Nyetaa	Adjusted to conditions in Mali	Currently preparing for seven village connections	Owner and Mali Folkecenter, further investors unknown
Sunlabob	PPP model for micro-hydro systems as in Laos	Pilot system installed in 2005	Equity from the owner, Triodos bank and FMO 2007
Energy for Africa	Village holds shares of the micro-utility just as the professional company.	Pilot system installed in Senegal	A medium size German utility is major shareholder

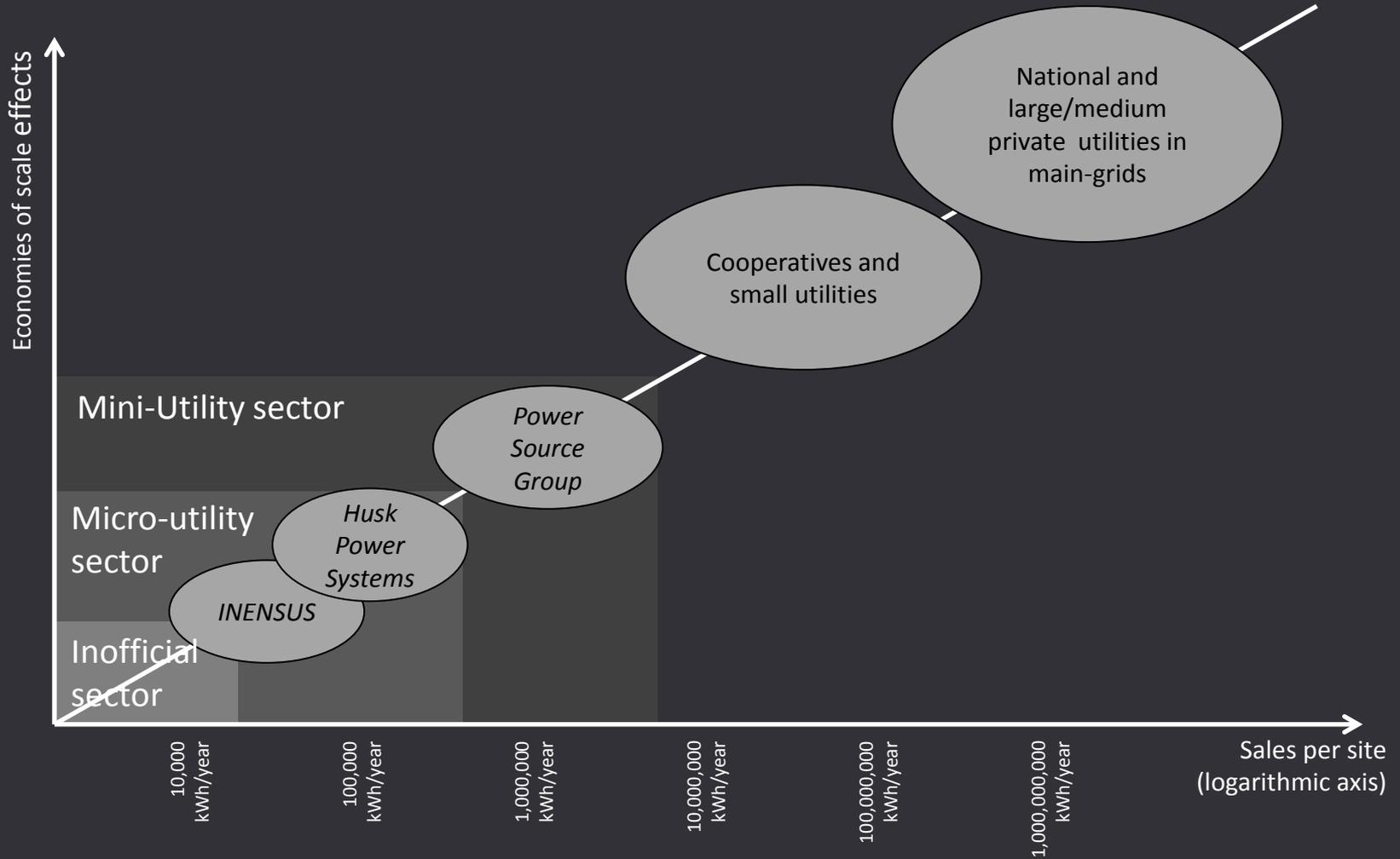
WALKING DOWN THE ECONOMIES OF SCALE CURVE



Foto: A Micro-Utility connects new customers



SMALLER GRIDS - DIFFERENT CHALLENGES





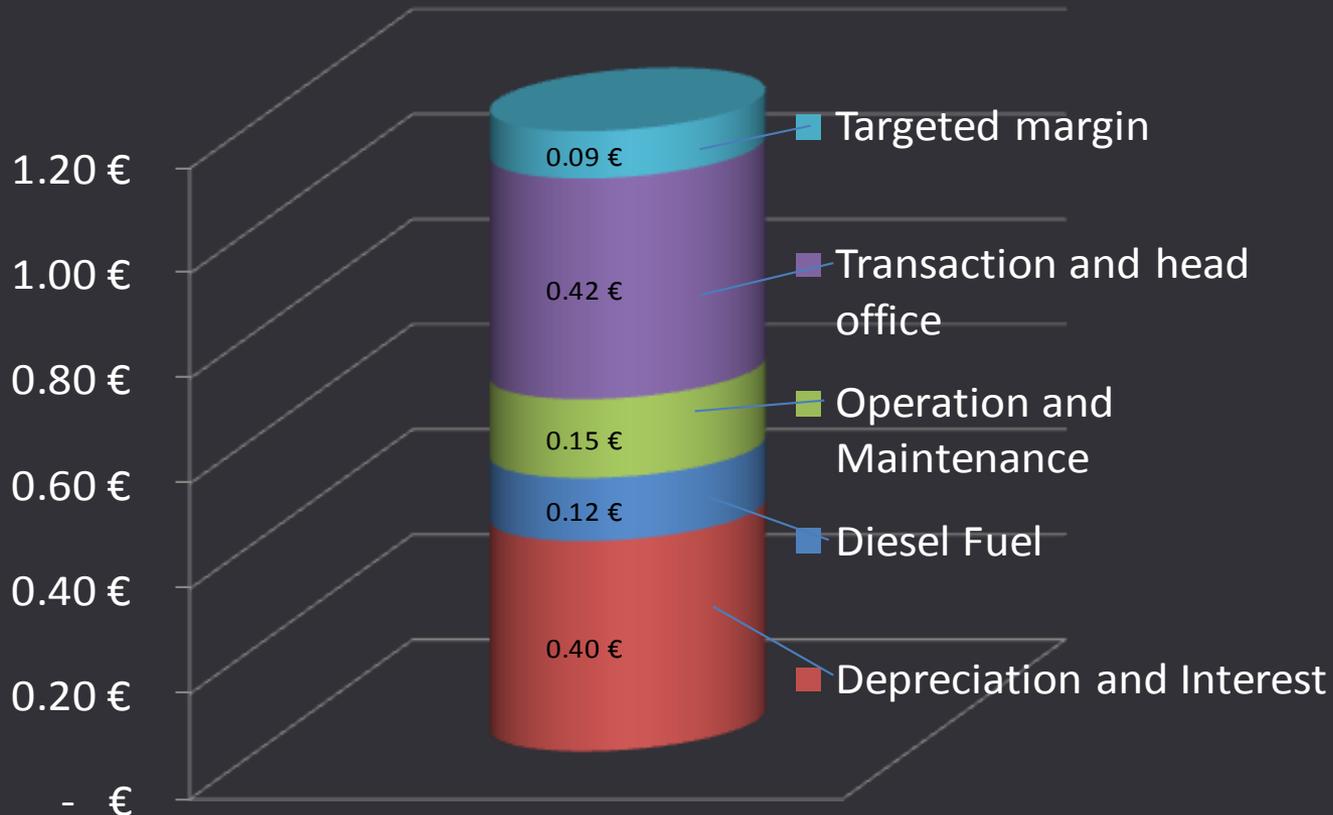
SMALLER GRIDS – DIFFERENT CHALLENGES

Decreased economies of scale effects means increased challenges in:

1. Technical system stability due to **higher concurrency**
2. Prevention of conflicts arising due to intransparent **community decision making structures**
3. Revenue stabilization due to **less divers income sources of customers**
4. Increasing operation and **transaction costs per kWh produced** requires new management approaches



COST OF ELECTRICITY PER kWh – EXAMPLE INENSUS WEST AFRICA



→ 36% of tariff are transaction and head office costs



THE TRANSACTION COST LEVER

High transaction cost lead to high electricity prices resulting in:

1. Electricity price elasticity challenge
2. Conflicts with Regulatory Authorities
3. Conflicts with willingness / ability to pay

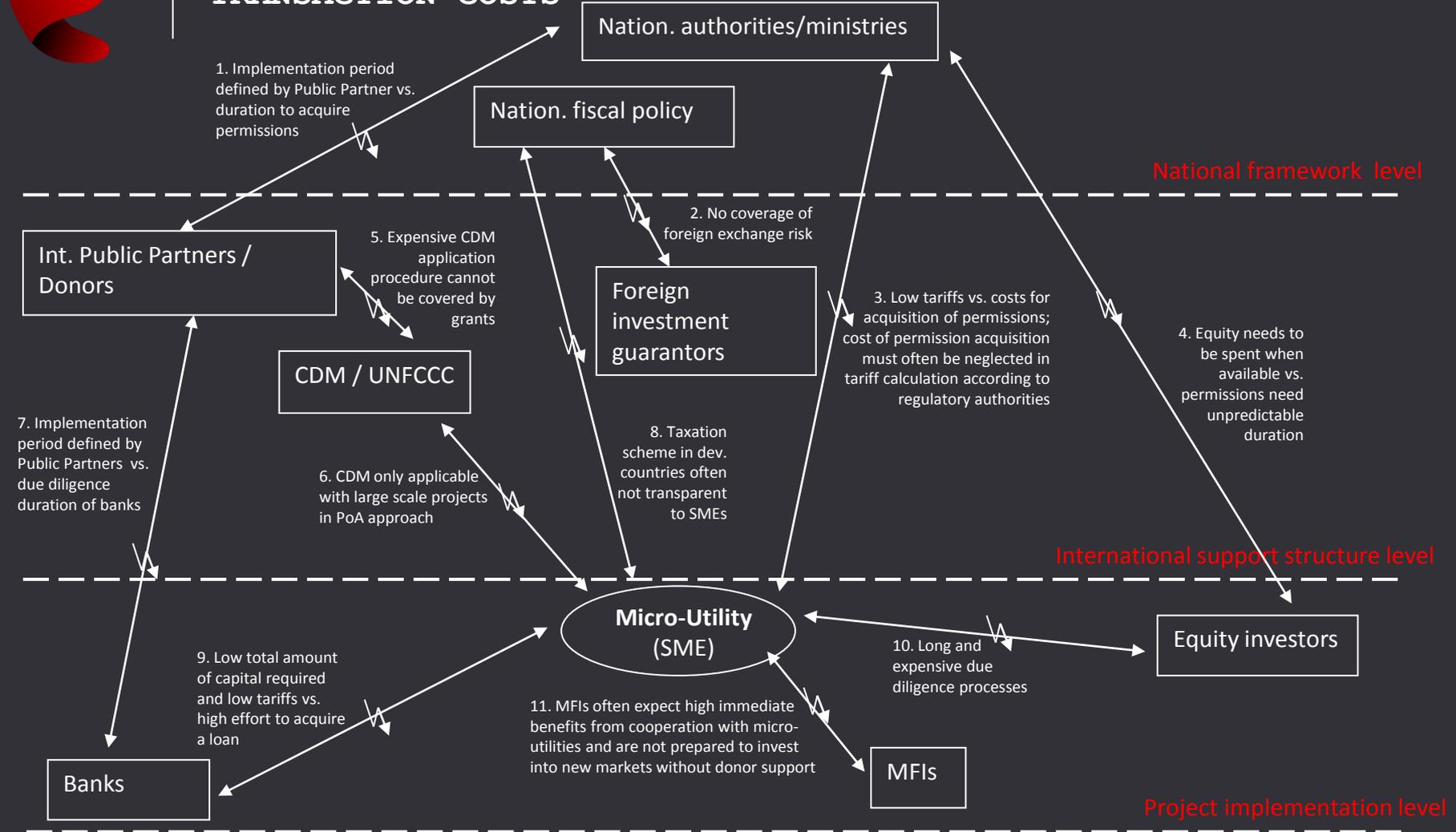
TRANSACTION COSTS IN MICRO-UTILITIES



Foto: Wind-Solar-Diesel hybrid power system with battery storage for village power supply designed and operated by INENSUS West Africa



TRANSACTION COSTS



FINANCING ALONG THE MICRO-UTILITY DEVELOPMENT TIMELINE

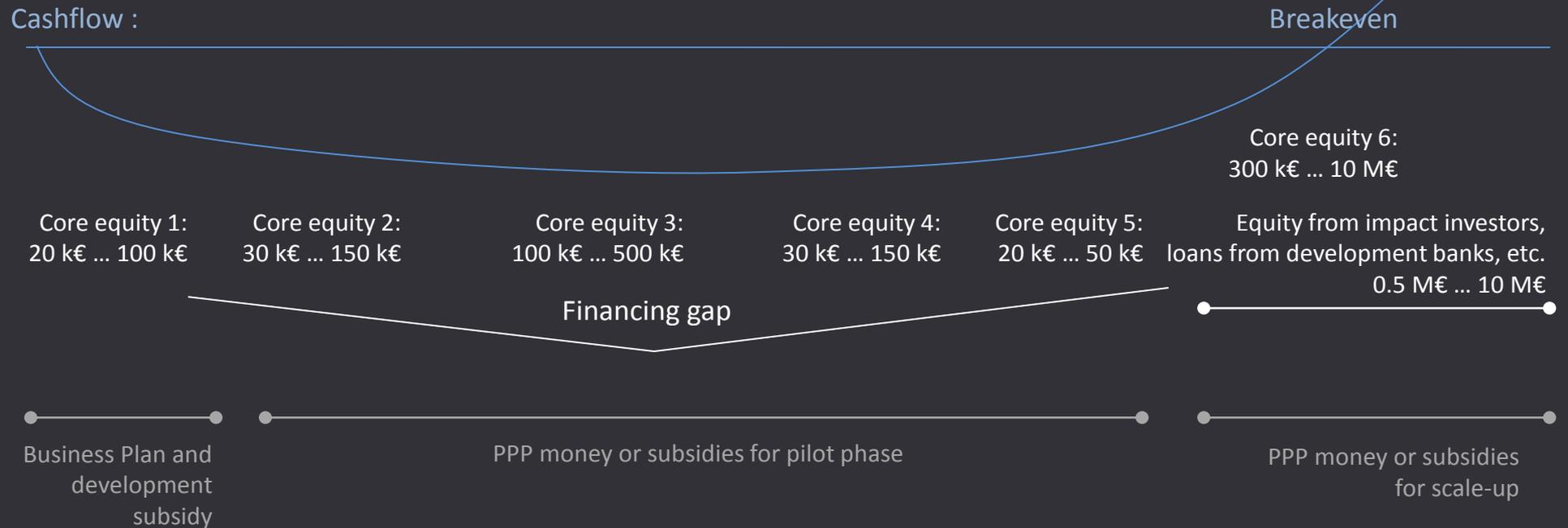


Foto: Happy electricity customers of a Micro-Utility



FINANCING ALONG THE MICRO-UTILITY DEVELOPMENT TIMELINE

Year 1		Year 2			Year 3		Year 4		Year 5		
Development of adj. model	Select village	Political framework	Company foundation and financing	Model implementation Installation	Operation, Maintenance Monitoring Due Diligence for replication		Growth of dem.	Using the political framework for replication		Scale-up	Replication



CONCLUSIONS AND RECOMMENDATIONS



Foto: Before the Micro-Utility takes over



CONCLUSIONS AND RECOMMENDATIONS

— **Transaction costs** and related **long project preparation durations** are the **main barriers** for Micro-Utility scale-up

— Two approaches could overcome the transaction cost challenge:

1. **BOTTOM-UP: Financing instruments** could be set up supporting the **company foundation and scale-up preparation phase** where most of the transaction costs occur. The financing instruments should be a **mixture of grants and early stage long term investments**, preferably equity. Long term loans should be available in local currency for reasonable interest to **reduce the foreign exchange risk** of the micro-utility.
2. **TOP-DOWN: Transaction costs** can be reduced by **coordinating** constraints of **support instruments, financing instruments and the legal framework** of the respective country. Country specific private sector electrification programs involving a number of financing and support instruments adjusted to each other might be established.

A mixture of both approaches might solve the problem. **IRENA, UN Foundation, etc. could play a central role** in the coordination process.



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