



Market development of sustainable energy services for Mozambican SME

Project of GIZ's ProEcon program

Benefits of solar leasing and energy efficiency



Content

- **Context and rationale**
- **Activities and approach**
- **Benefits, state of pilot projects**

Context

giz

ProEcon Mozambique

Improving framework conditions in the private and financial sector

Intervention area 2

- Conceptualization and implementation of Inclusive Business Models (InBM)
- Agricultural sector
- Integrated Development Partnerships with the Private Sector (iDPPs)

New service projects 2021, among others:

- **Market development for sustainable energy services for SME:**
 - Renewable energy
 - Energy efficiency
 - Complementary energy systems

como/consult

- Hamburg, Berlin, Bogota
- Management consultancy
- Organizational development
- (Green) Private sector development, sustainable energy, water, climate, good governance

- Gaia**
- Implementation partner
 - Engineering services

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GBE

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Project rationale

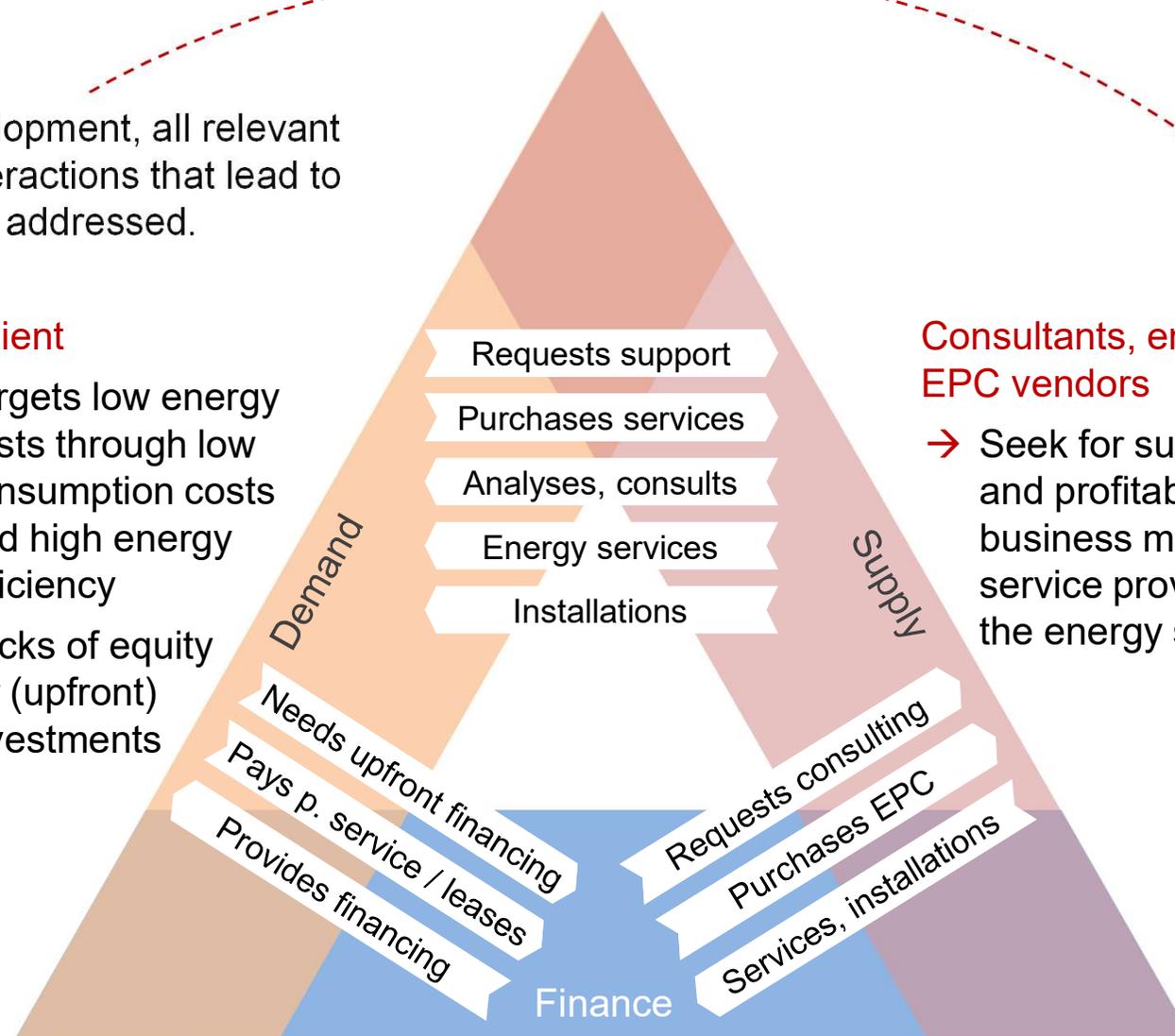
For a holistic market development, all relevant spheres necessary for interactions that lead to a growing market must be addressed.

The client

- Targets low energy costs through low consumption costs and high energy efficiency
- Lacks of equity for (upfront) investments

Consultants, engineers, EPC vendors

- Seek for sustainable and profitable business models as service providers in the energy sector



Investors

- Seek for returns
- Have to find profitable business cases

Activities (technological view), approaches, and benefits

Solar leasing

- Business models, benefits
- Approach
- Company data overview
- State of solar pilots



Energy efficiency in enterprises

- Benefits
- Approach



Complementary technologies

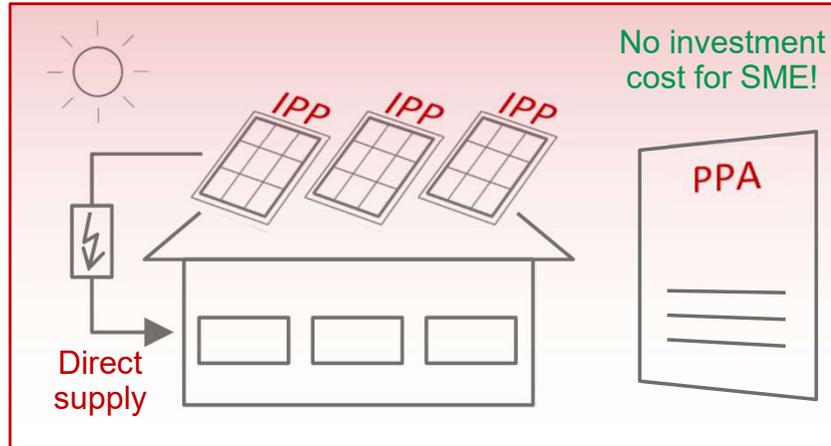
- Partners and smallholders
- SPIS*, solar drying, solar cooling

Cross-cutting

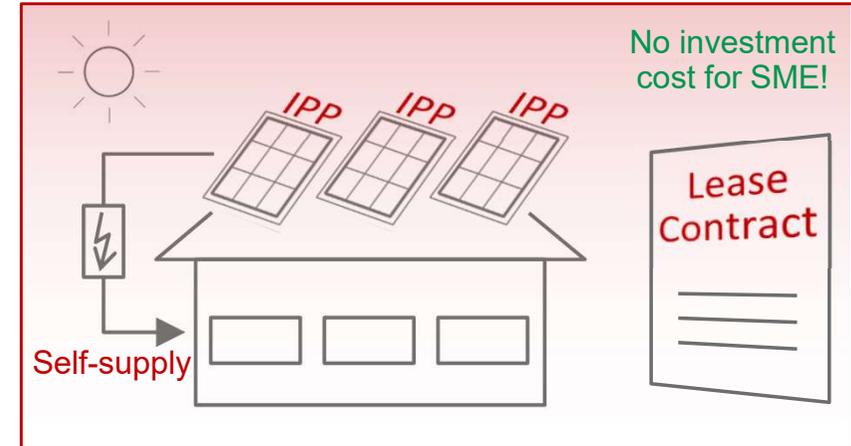
- Trainings (e.g., with energy consultants)
- Awareness creation measures, PR

The business model: Corporate PPAs / solar leasing for SME

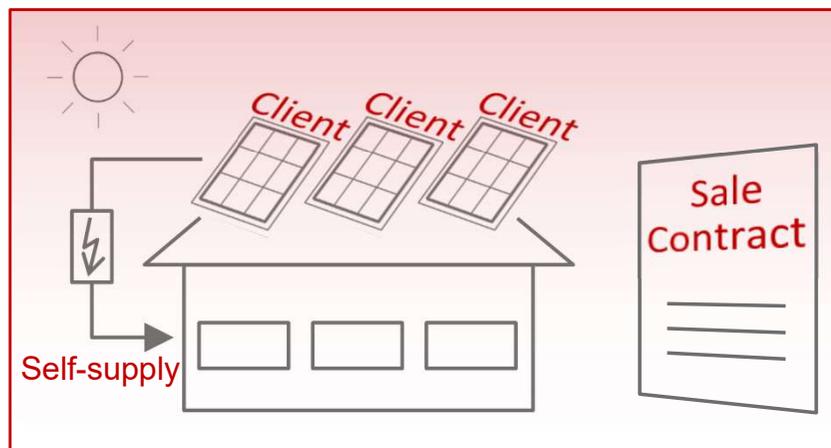
1. Power Purchase Agreement (PPA)



2. Solar leasing



3. Alternative: Purchasing the PV system

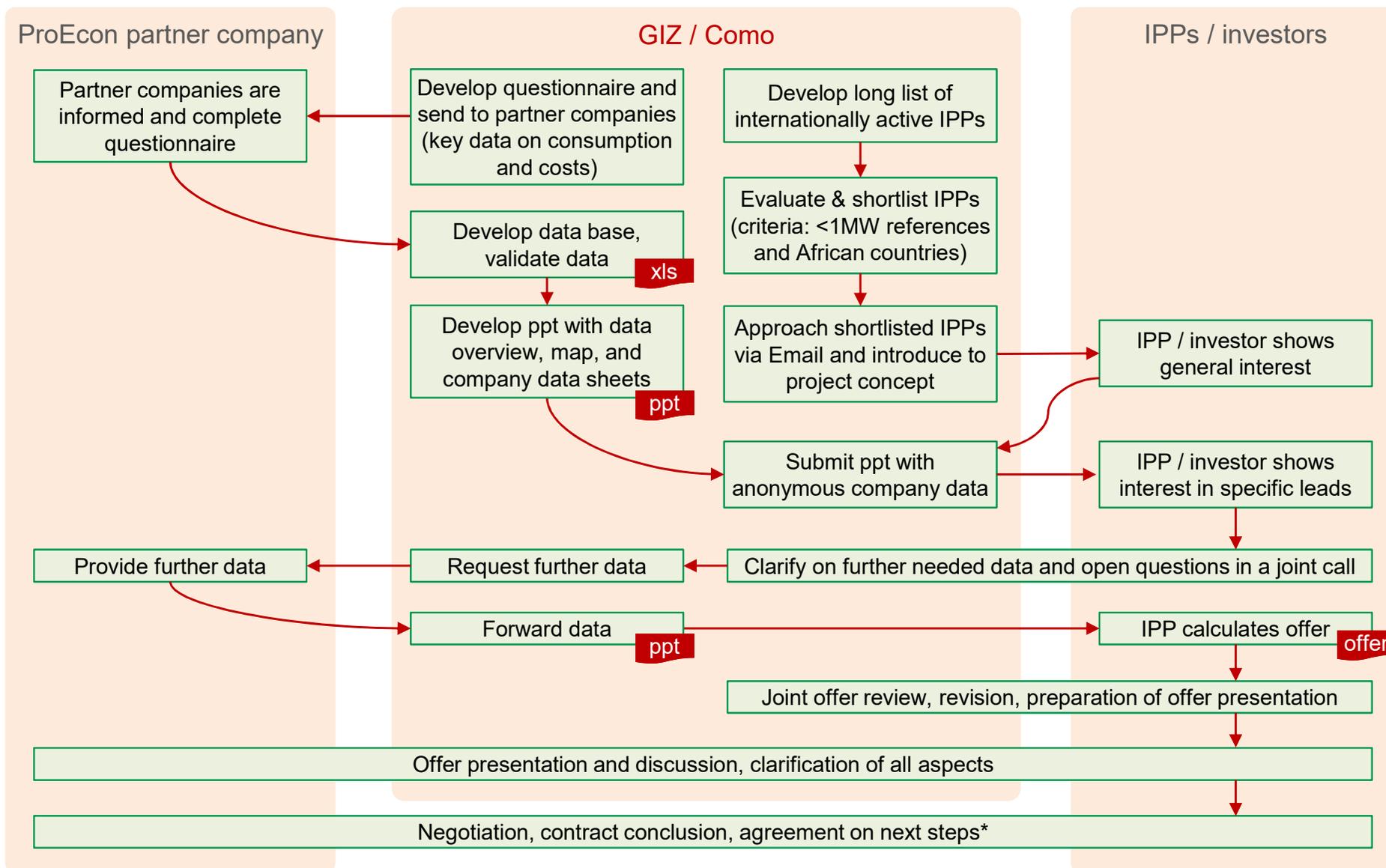


Benefits

- Lower your energy costs
- Secure long-term price stability
- Achieve reliable power supply
- Stay flexible (expand your system)



Approach: Initiating and developing the business



Company data overview: Potential solar PV and EE pilots*

Company	On/off-grid	Perform. peak (kW)	Grid outage p.w. (hrs)	Grid power p.y. (kWh)	EdM grid tariff (€Ct/kWh)	Grid working cost p.y. (€)	Total grid cost incl. perform. (€)	Diesel use p.y. (litres)	Diesel price (€/litre)	Diesel cost p.y. (€)
1	Off	162						24.000	0,94	22.560
2	On	1.640	8	6.247.980	3,91	334.974	448.881	465.766	0,96	447.135
3	On	160	8	809.376	6,88	43.393	59.030	38.462	0,94	36.154
4	On	146	3	247.860	3,91	7.562	14.299	5.692	0,85	4.838
5	On	160	2	145.195	6,88	7.784	18.488	-	0,72	
6	On	44	5	39.312	6,88	2.108	4.959	3.200	0,86	2.752
7	On	219	1	119.040	6,88	6.405	24.314	-	-	
8	On	74	2	423.259	3,91	13.768	17.347	200	0,94	188

Equals 8.34 \$Ct / 4.75 \$Ct

*Average exchange rate of May 2021 according to InforEuro (EC);
Numbers from power bills exclude VAT

3

Ownership structure

Turnover (€)

Access to forex

2017	2018	2019
1.923.697	2.592.809	3.596.477

6% forex

Electricity consumption

On- / off-grid	Grid outages	Total elec.	Grid (activa)	Energ.react.	Perdas	Diesel	Diesel	Diesel/total	Power peak
	Ø hrs p.w.	kWh p.a.	kWh p.a.		kWh p.a.	kWh(el) p.a.	liters p.a.		kW
On	8	1.214.582	809.376	247.368	17.976	-	38.462	12%	160

Electricity costs (MZN)

Working price	Perform. price	Working total	Perform. total	Energia reactiva	Perdas	Grid total	Diesel price	Diesel total	Power total	Share diesel
p. kWh	for kW peak	p.a.	p.a.			p.a.	p. liter	p.a.	p.a.	
4,78	497,03	3.868.817	954.298	353.988	85.908	5.263.011	65	2.500.030	7.763.041	32%

Complementary applications

SPIS	Solar thermal	Solar drying	Biogas plant	Briquette prod.	Cooling system	Rainwater harv.	WWTP	EE measures
y	y	y				y		y

Further info Maize production, processing (and marketing; selling to a brewery, e.g.); main consumer must be the maize mill

Fuel consumption is for generating heat to dry maize. During grid outages, client has a production standstill.

Solar leasing pilot 1 – Overview

Key data

- Client: EcoFarm Moçambique Ltd
- Investor: ecoligo GmbH (GER), ecoligo Ltd (KEN)
- System type: Solar PV rooftop
- System size: 200 kW
- Production: 310,000 kWh p.a.
- Storage: Optional, 33.6 kWh
- Contract period: 10 years
- Purpose: Powering offices, buildings, workshops

Process

- First contact in May
- First offer draft in June
- First revision July
- Final offer October
- Currently due diligence

Financial basics

- Client's EdM tariff: Medium Voltage, 4.78 Mt
- Upfront payment: 0 USD
- Monthly lease: 4,000 USD
- Lease price escalation: 2% p.a.



Solar leasing pilot 1 – Site



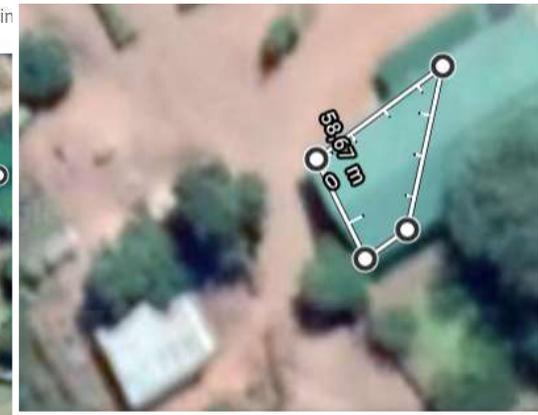
Entfernung messen
Klicke auf die Karte, um den Pfad ein



Entfernung messen
Klicke auf die Karte, um den Pfad einzufügen.



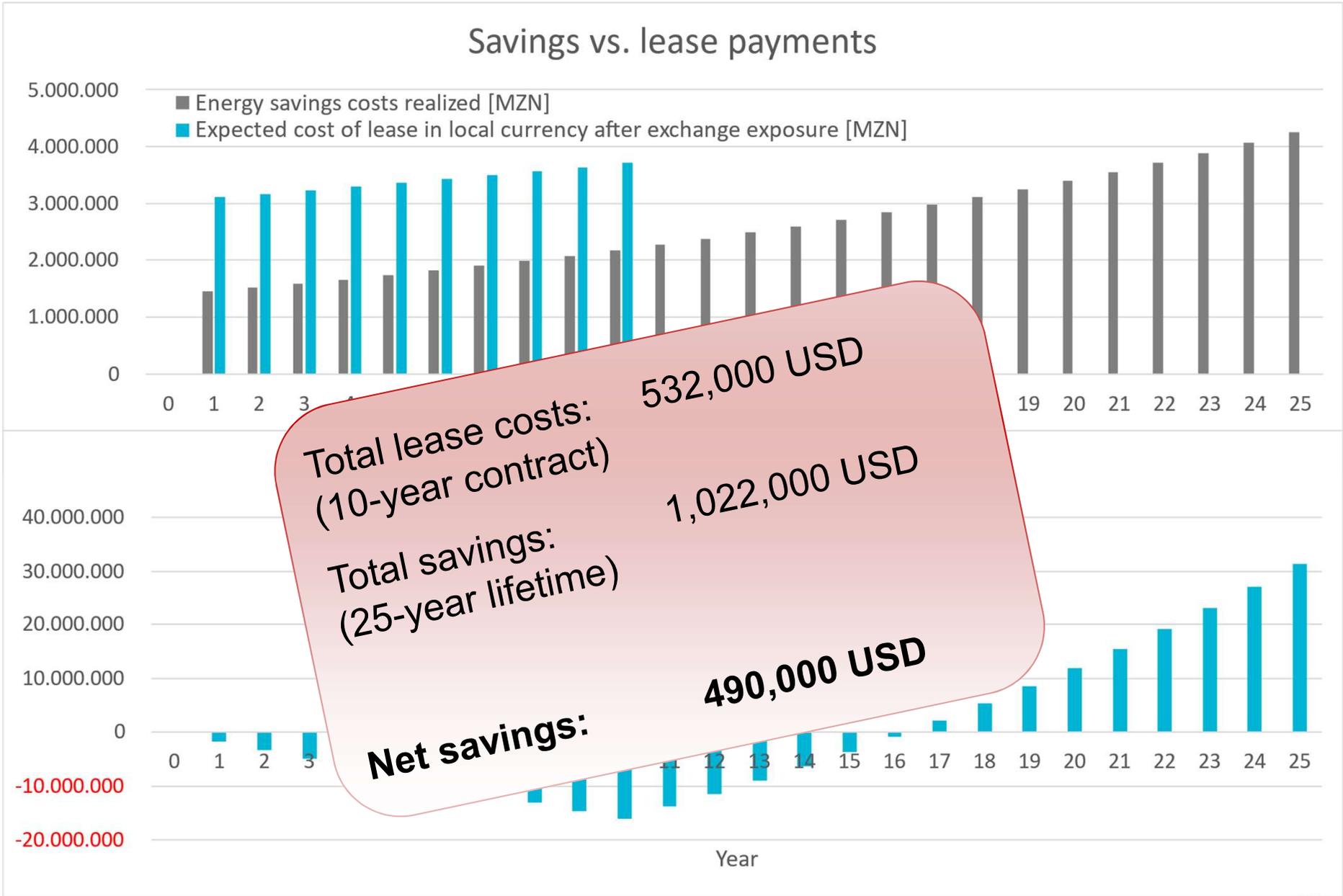
Entfernung messen
Klicke auf die Karte, um den Pfad einzufügen.
Gesamtfläche: 671,83 m² (7.231,52 ft²)



Entfernung messen
Klicke auf die Karte, um den Pfad einzufügen.
Gesamtfläche: 166,99 m² (1.797,51 ft²)



Solar leasing pilot 1 – Financial benefit

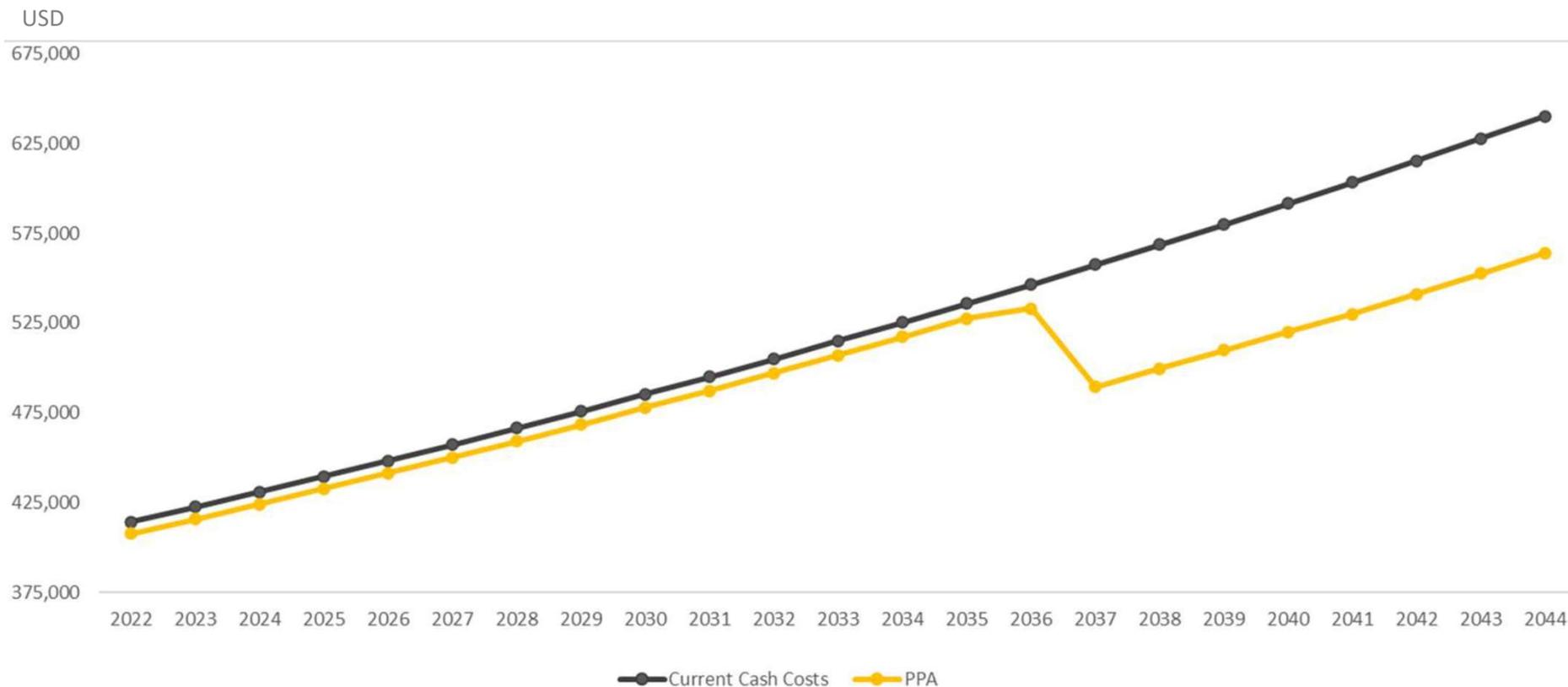


Solar leasing pilots – Further benefits

- Price security over 10 years (for solar share of consumption)
- Full service provision included in the lease rate – no risks on client's side
- Performance guarantee; Tier 1 solar components only
- At least 15 years of solar energy consumption (almost) for free*
- System is expandable
- Green energy production with a high CO₂ emission reduction
- Reputational benefits as sustainable and green-minded company
- One of the first movers in this business segment

* Costs for O&M will still occur

Solar leasing pilot – 2nd pilot (source.energia)



- Different energy consumption profile (power consumption from gas)
- Immediate savings from year one 1
- Distinct increase of savings after end of leasing contract
- Total savings approx. 850,000 USD



Energy efficiency – Purpose and leverages

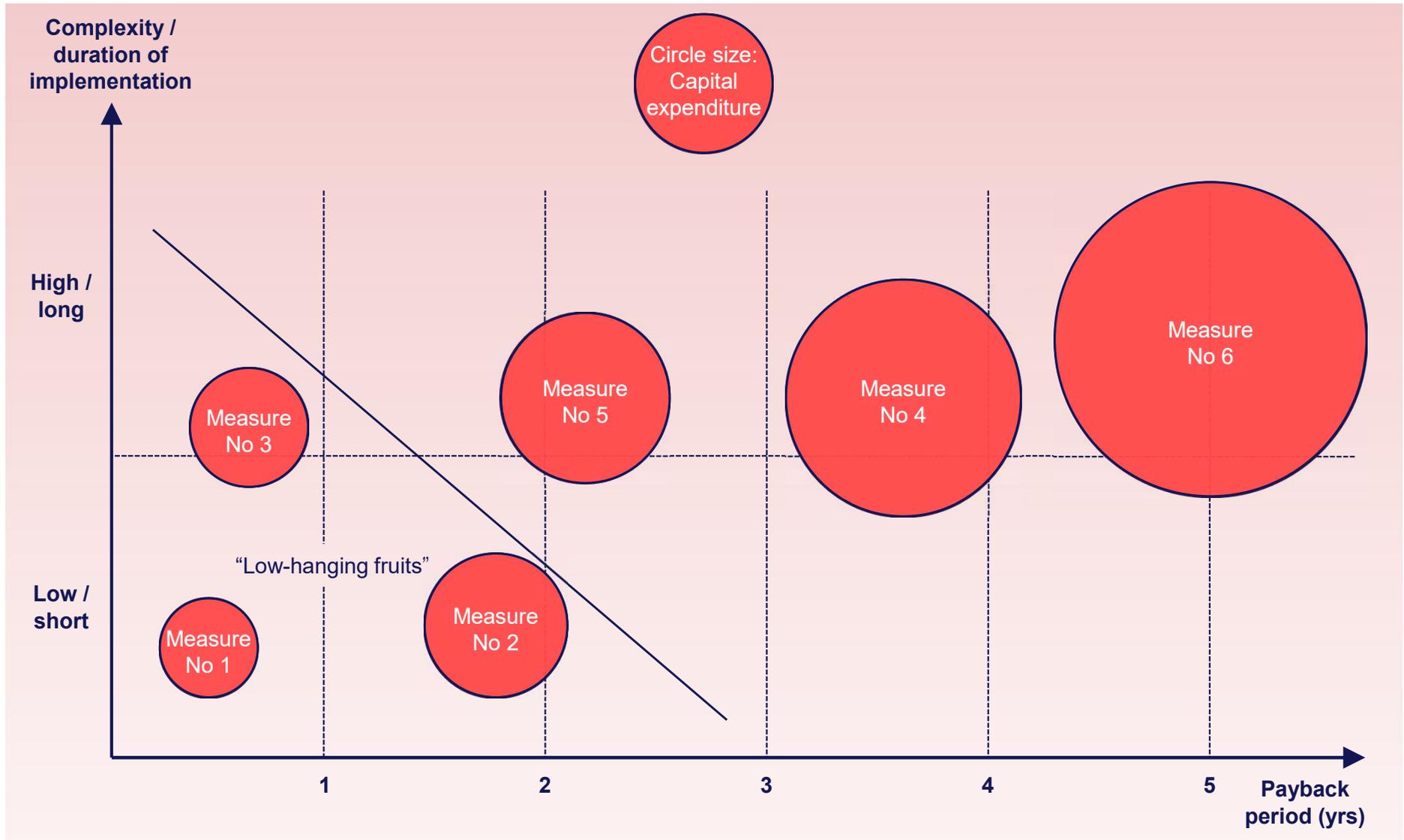
- Reduce your consumed energy that is non-productive
 - Save on your energy bills
 - Increase your overall energy performance and quality, and reliability of energy supply
 - Train your people in energy and resource efficient behavior
-

Leverages:

- **Compressed air system (leakages)**
- **Steam boiler and system (leakages)**
- **Heat loss (e.g., combined heat-power generation, CHP)**
- Furnaces
- Water pumps
- Workshop machinery
- HVAC
- Electrical motor drives
- Lighting (e.g., LED)
- Building envelope
- Generator sizing
- Power peak shaving
- Unfavorable energy supply contracts
- Energy self-supply
- Workforce's behavior



Energy efficiency – Benefits



Energy efficiency – Benefits, steel factory (Nigeria)

→ Potential annual energy savings total up to 6,14 million kWh

- Equals 19% reduction of 2015's total energy consumption

→ Potential annual energy cost savings total 131m ₦ (660,000 USD)

- Equals 59% cost reduction of 2015's total energy costs

No.	Action	Investment in Naira	Energy and cost saving potential per year	Payback time in years	Priority 1= low-cost, Short-term 2= low-cost, mid-term 3= higher investment, long-term
1	Adjust gas purchase tariff to demand	0	0 kWh 37,000,000 N	0	1
2	Elimination of leakages in compressed air system	200,000 N	213,120 kWh 4,510,000 N	<1	1
3	Elimination of steam leakages and insulation improvement	796,000 N	2,060,773 kWh 13,400,000 N	<1	1
4	Waste heat recovery from steam boiler	12,420,000 N	451,006 kWh 2,639,433 N	6	3
5	Motor and drives improvement program	4,531,000 N	106,400 kWh 2,250,000 N	2	2
6	Improve water pumping system	623,280 N	14,700 kWh 311,640 N	2	2
7	Lighting retrofit with high efficient LED	4.550.000 N	50.400 kWh 1.068.480 N	4.3	2
8	Adjust temperature for air conditioning units	0	15,491 kWh 326,860 N	0	1
9	Appropriate generator sizing	3,000,000 N	192,950 kWh 1,250,000 N	2.4	2
11	Solar-PV for base load consumption and lighting	41,700,000	0 kWh 3,333,800 N	13	3
11	Combined heat and power plant (CHP)	320,600,000 N	0 kWh 65,200,000 N	4.9	3
12	Detailed monitoring and measurement for efficiency evaluation	n/a	n/a	n/a	1
13	Awareness raising and training on energy management system	n/a	n/a	n/a	1
		TOTAL:	6,137,680 kWh		
			131,290,113 N		

Energy efficiency process

