



# Currency Risk And Mitigation For The Off-grid Sector

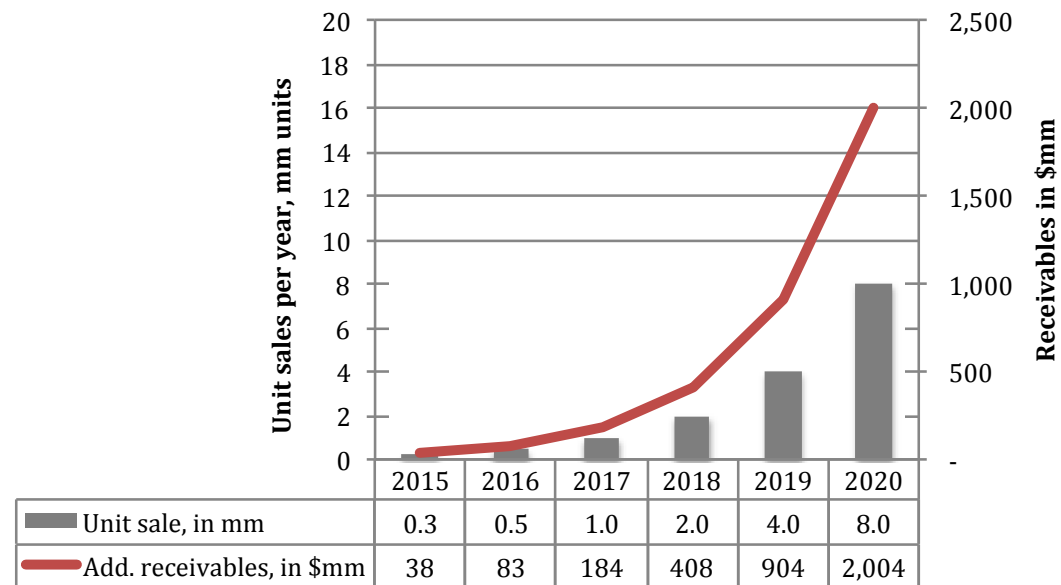
*Sustainable Energy for All – Webinar*  
*14 September 2016*

# Off-grid energy businesses (PAYG/ DESCOS) are always exposed to local currency devaluation

Consider the balance sheet of a typical DESCOS such as M-Kopa, Off.grid:electric, Fenix or Mobisol:

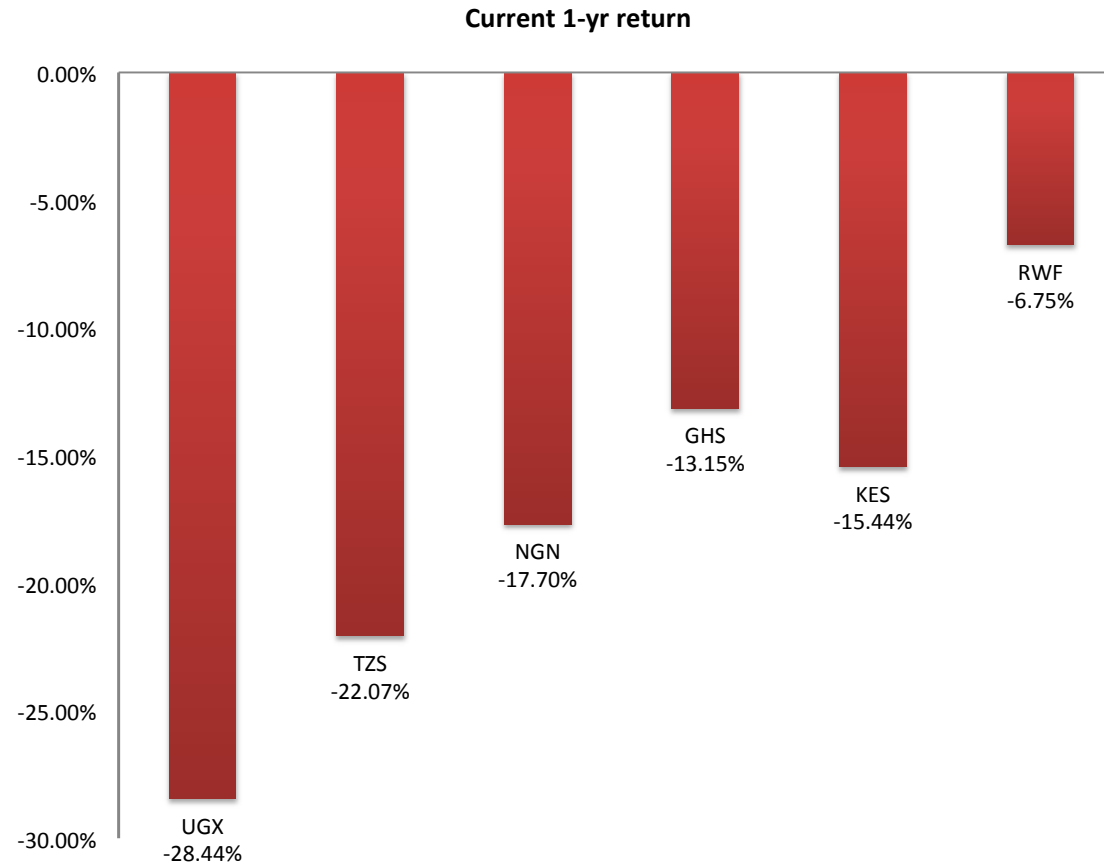
1. The largest asset on these companies balance sheet are customer receivables; expected payments on the pay-plans offered to end customers.
    - Payments are in local currency and can be up to 3-years in the future.
    - There is a limited ability to adjust existing pay-plans to inflation.
  2. The largest liability is often a loan in EUR or USD or equity invested in EUR or USD.
- ➔ DESCOS (and there investors) loose money if local currencies weaken.

# The FX exposure can grow quickly



While the sector added \$38m in LCY denominated receivables in 2015 it could conceivably add \$2bn in LCY denominated receivables per year by 2020.

# Local currencies can be weak



# Lend in local currency? Borrow in local currency!

t = 0; August 15, 2015

Assets [Present value cash in-flow]	USD denom.	LCY denom.
Cash	200	
Inventory incl. good in transit	1,563	
<i>Present value of contractual revenue</i>		7,915
<b>Liabilities [Present value of cash out-flow]</b>		
Working capital facility	2,344	
Consumer finance loan	5,541	
<i>Present value of operating costs</i>		1,500
<b>Equity</b>	293	
<b>Net position (short) / long LCY</b>		<b>6,415</b>

To borrow locally is the only way to neutralize the LCY receivable asset on DESCOS balance sheet.

*Of course a DESCOS can also sell its receivables into a separate structure – i.e. in the course of a securitization.*

t = 0; August 15, 2015

Assets [Present value cash in-flow]	USD denom.	LCY denom.
Cash	200	
Inventory incl. good in transit	1,563	
<i>Present value of contractual revenue</i>		7,915
<b>Liabilities [Present value of cash out-flow]</b>		
Working capital facility	2,344	
Consumer finance loan in LCY		5,541
<i>Present value of operating costs</i>		1,500
<b>Equity</b>	293	
<b>Net position (short) / long LCY</b>		<b>875</b>



# Higher rates, cheaper loan

FX Spot [a]	102.15	USDLCY
USD 3y benchmark yield [b]	1.25%	USD_yield
LCY 3y benchmark yield [c]	17.00%	LCY_yield
Implied 3yr-FX forward [d]	157.62	
DESCO borrowing need	2,000,000	USD_LoanNtl

	Option 1 USD Loan		Option 2 LCY loan	
Notionals	Notional loan 2,000,000	-2,000,000	Notional loan 204,300,000	-204,300,000
Loan / hedge quotes	Interest USD 9.00%	Interest USD 9.00%	Interest LCY 27.00%	Interest LCY 27.00%
	<i>DESCO pays</i> USD <i>to Investor</i>	<i>Investor recs.</i> USD <i>from DESCO</i>	<i>DESCO pays</i> LCY <i>to Investor</i>	<i>Investor recs.</i> LCY <i>from DESCO</i>
Yr 1	-180,000	180,000	-55,161,000	55,161,000
Yr 2	-180,000	180,000	-55,161,000	55,161,000
Yr 3	-2,180,000	2,180,000	-259,461,000	259,461,000
Discount Rate	1.25%	1.25%	17%	17%
PV of interest cost	-453,613	453,613	-45,141,821	45,141,821
FX Spot	1.000	1.000	102.150	102.150
PV of interest cost in USD	-453,613	453,613	-441,917	441,917
USDLCY exposure	0	0	-2,441,917	2,441,917
<b>Savings / Cost vs USD loan [1]</b>	DESCO 0	Investor 0	DESCO 11,696	Investor -11,696
<b>Short LCY / Long LCY [2]</b>	0	0	-2,441,917	2,441,917

This KES loan at 27% is cheaper than the USD loan at 9%.

- ✓ The cost of the hedge is a gain of \$11,696
- ✓ The net position resulting from the hedge for the DESCO is \$2.4m short LCY

# Borrow locally w/o local lenders

*There are only 3 practical structures*

1. USD lender offers LCY loan and enters into **cross currency swap**
2. USD lender offers LCY loan and enters into a **FX forward** contract
3. USD lender offers USD loan, DESCO deposits loan with local bank, Local bank lends against cash collateral at close to benchmark rates.

*All but the largest DESCOs will depend on USD investors' ability to arrange a "hedge" with any of the few intermediaries willing to trade in illiquid currencies.*

# Summary

- DESCO create a LCY denominated asset on their balance sheet by definition and are 'naturally' long LCYs.
  - The sector will produce several billion in LCY denominated assets (net LCY positions) per year by 2020.
- LCYs can lose value quickly and are very volatile.
- ✓ **Don't risk it**
- DESCOs should borrow in LCY to balance the LCY asset and mitigate their FX exposure
- The cost of borrowing in LCY is lower than high interest rates suggest.
- Borrowing in LCY may require working with international investors and an FX hedge provider who can 'translate' a USD loan into a LCY loan.
- There are only a few possible structures and intermediaries who provide such structures.
- ✓ **DESCOs (and their equity investors) need to build the capacity to measure and mitigate their currency risk.**
- ✓ **Lenders to DESCOs should develop capacity to lend in local currencies.**




# Appendix

responsAbility

PERSISTENT ENERGY CAPITAL

Currency Risk and Mitigation Strategies  
For the Off-Grid Energy Sector



Dirk Muench  
November 2015

*This paper is a practical guide to typical currency risks and general mitigation strategies in the energy access sector. It is intended for Distributed Energy Services Companies (DESCOs), their equity investors and lenders. The paper is based on a seminar given on 29 October 2015 at the 2015 Lighting Global/GOGLA Conference in Dubai. The seminar was sponsored by responsAbility Investments AG ("responsAbility").*

*Accompanying this paper on our website is an excel spreadsheet with tools to analyze a company's currency risk and to calculate relative costs of borrowing in different currencies and using instruments to mitigate currency risk. These tools are for illustrative purposes only and neither responsAbility nor Persistent Energy Capital shall have any liability for any results they generate. Managing currency exposure is a highly sophisticated area. Accordingly, **we advise you to seek professional advice before engaging in currency risk mitigation transactions.***

*Persistent Energy Capital provides currency risk management advisory services to its clients.*

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For more details see our 2015 report on currency risk and mitigation measures for the off-grid energy sector.

[www.persistentnrg.com/analysis](http://www.persistentnrg.com/analysis)

# DESCOs are long LCYs

## Simplified summary of assets and liabilities

t = 0; August 15, 2015

Assets [Present value cash in-flow]	USD denom.	LCY denom.	Note
Cash	200		
Inventory incl. good in transit	1,563		1
<i>Present value of contractual revenue</i>		7,915	2
<b>Liabilities [Present value of cash out-flow]</b>			
Working capital facility	2,344		3
Consumer finance loan	5,541		4
<i>Present value of operating costs</i>		1,500	5
<b>Equity</b>	293		
<b>Net position (short) / long LCY</b>		<b>6,415</b>	

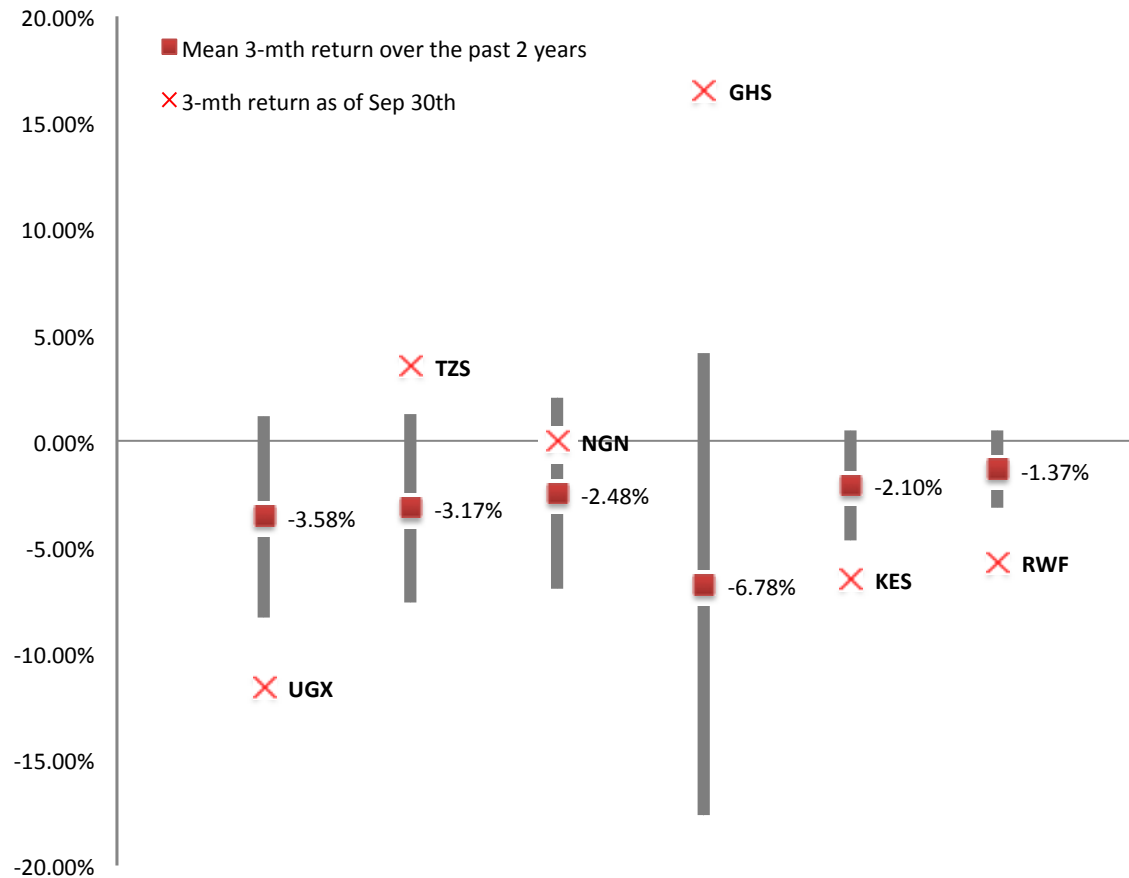
- 1 *[inventory value = 50% \* 25k \* 6mth/12mth \* \$250 per system] Assuming a 50% growth rate per year, a 6-mth inventory turn over, \$250 landed cost*
- 2 *[PV = 25k systems \* monthly payment discounted to today] Assuming a 15% local interest rate, a 36-mth payplan, and a total price of \$500*
- 3 *150% of inventory*
- 4 *~70% of PV of contractual revenue*
- 5 *Estimate for operational cost*

Generally DESCOs have only few key asset and liability positions.

By definition of the business model, DESCOs are likely to build a significant local currency asset – the receivables from customers.

➔ DESCOs are typically long LCY.

# LCYs are weak and volatile



The chart is a summary of a currencies current and past performance – return and variance.

*Read for example for UGX:*

- *Between Jun 30 and Sept 30 2015 the UGX has lost 12%;*
- *Over the last 2 years the average 3 month return of the UGX was -3.5%;*
- *The standard deviation from that mean was ~5%.*

# Net LCY positions can be costly

## Simplified summary of assets and liabilities

t = 0; August 15, 2015

Assets [Present value cash in-flow]	USD denom.	LCY denom.
Cash	200	
Inventory incl. good in transit	1,563	
<i>Present value of contractual revenue</i>		7,915
<b>Liabilities [Present value of cash out-flow]</b>		
Working capital facility	2,344	
Consumer finance loan	5,541	
<i>Present value of operating costs</i>		1,500
<b>Equity</b>	293	
<b>Net position (short) / long LCY</b>		<b>6,415</b>

KESUSD exchange rate 9/15/15	t=0	100.95
KESUSD exchange rate 8/15/15	t=1	105.02
<b>Return in %</b>		-3.88%

t = 1, September 15, 2015

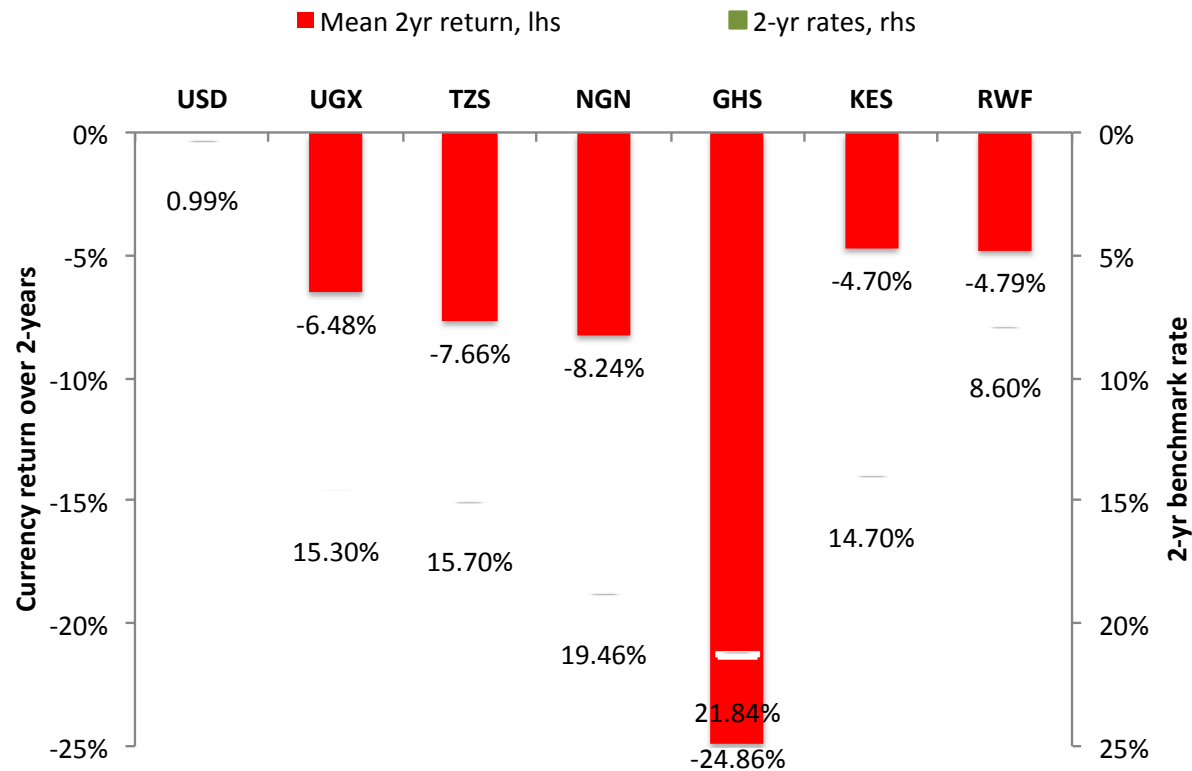
Assets [Present value cash in-flow]	USD	LCY
Cash	200	
Inventory incl. good in transit	1,563	
<i>Present value of contractual revenue</i>		7,609
<b>Liabilities [Present value of cash out-flow]</b>		
Working capital facility	2,344	
Consumer finance loan	5,541	
<i>Present value of operating costs</i>		1,442
<b>Equity</b>	45	
<b>Net position (short) / long LCY</b>		<b>6,167</b>
<b>Resulting loss</b>	-	<b>249</b>

The KES lost 3.9% in just 1-mth

A DESCO with a net LCY position of \$6.4m would have lost \$0.25m in value.

The equity position carries the risk and absorbs realized losses.

# The cost of LCY loans



The cost of LCY loans are lower than the interest rates suggest.

In general: The cost of borrowing at local market rates in LCY is the same as the cost of borrowing at market rates in USD.

*Expected US\$ cost of LCY loan  $\approx$  LCY interest rate – expected annual currency devaluation*

# A cross currency swap

FX Spot [a]	102.15	>>>>>	Quote between DESCO and Investor
USD 3y benchmark yield [b]	1.25%	>>>>>	Quote from hedge provider
LCY 3y benchmark yield [c]	17.00%		
Implied 3yr-FX forward [d]	157.62		
DESCO borrowing need	2,000,000		

	Option 1 USD Loan	Option 3 USD Loan + USDLCY xCCY swap			
	Notional loan 2,000,000	Notional loan 204,300,000	Ntl. LCY leg -204,300,000	Ntl. USD leg 204,300,000	Ntl. USD leg -2,000,000
Notionals					
Interest USD	Interest USD	Interest LCY	Interest LCY	Interest LCY	Interest USD
Loan / hedge quotes	9.00%	29.00%	29%	18.75%	1.25%
	DESCO pays USD to Investor	DESCO pays LCY to Investor	Investor recs. LCY from DESCO	Investor pays LCY to Intermed.	Investor recs. USD from Intermed.
Yr 1	-180,000	-59,247,000	59,247,000	-38,306,250	25,000
Yr 2	-180,000	-59,247,000	59,247,000	-38,306,250	25,000
Yr 3	-2,180,000	-263,547,000	263,547,000	-242,606,250	2,025,000
Discount Rate	1.25%	17.00%	17.00%	17.00%	1.25%
PV of interest cost	-453,613	-54,170,185	54,170,185	-7,899,819	0
FX Spot	1.000	102.150	102.150	102.150	1.000
PV of interest cost in USD	-453,613	-530,300	530,300	-77,335	0
USDLCY exposure	0	-2,530,300	2,530,300	-2,077,335	0
	DESCO	DESCO		Investor	
Savings / Cost vs USD loan [1]	0	-76,688		-648	
Short LCY / Long LCY [2]	0	-2,530,300		452,965	

The net effect of the trade:  
 DESCO borrows at 29% in LCY;  
 Investor lends at 9% in USD and retains a small LCY position.

- ✓ The cost of the hedge is \$77,336; the investors passed all but \$648 to the DESCO.
- ✓ The net position for the DESCO is \$2.53m short LCY
- ✓ The net position for the Investor is \$0.45m long LCY; the investor has passed a \$2.1m net position to the intermediary

# An FX forward

FX Spot [a]	102.15	>>>>	Quote between DESCO and Investor
USD 3y benchmark yield [b]	1.25%	>>>>	Quote from hedge provider
LCY 3y benchmark yield [c]	17.00%		
Implied 3yr-FX forward [d]	157.62		
DESCO borrowing need	2,000,000		

	Option 1 USD Loan		Option 4 USD Loan + FX forward		
Notionals	Notional loan 2,000,000	Notional loan 204,300,000	Notional FX fwd -204,300,000	400,000,000	-3,915,810
Loan / hedge quotes	Interest USD 9.00%	Interest LCY 29.00%	Interest LCY 29.00%	Fwd FX rate 162.5000	
	DESCO pays USD to Investor	DESCO pays LCY to Investor	Investor recs. LCY from DESCO	Investor pays LCY to Inter.	Investor recs USD from Inter.
Yr 1	-180,000	-59,247,000	59,247,000	0	0
Yr 2	-180,000	-59,247,000	59,247,000	0	0
Yr 3	-2,180,000	-263,547,000	263,547,000	-400,000,000	2,461,538
Discount Rate	1.25%	17.00%	17.00%	17.00%	1.25%
PV of interest cost	-453,613	-54,170,185	54,170,185	-249,748,223	2,371,491
FX Spot	1.000	102.150	102.150	102.150	1.000
PV of interest cost in USD	-453,613	-530,300	530,300	-2,444,917	2,371,491
USDLCY exposure	0	-2,530,300	2,530,300	-2,444,917	0
<b>Savings / Cost vs USD loan [1]</b>	<b>0</b>	<b>-76,688</b>		<b>3,262</b>	
<b>Short LCY / Long LCY [2]</b>	<b>0</b>	<b>-2,530,300</b>		<b>85,384</b>	

The net effect of the trade:  
 DESCO borrows at 29% in LCY;  
 Investor lends at 9% and retains a very small LCY position.

- ✓ The cost of the hedge is \$73,425; the investor passes this cost plus \$3,262 (in additional gain) on to the DESCO
- ✓ The net position for the DESCO is \$2.53m short LCY
- ✓ The net position for the Investor is \$0.09m long LCY; the investor has passed a \$2.4m net position to the intermediary

# A back-to-back loan

FX Spot [a]	102.15	>>>>	Quote between DESCO and Investor
USD 3y benchmark yield [b]	1.25%	>>>>	Quote from hedge provider
LCY 3y benchmark yield [c]	17.00%		
Implied 3yr-FX forward [d]	157.62		
DESCO borrowing need	2,000,000		

	Option 1 USD Loan	Option 5 USD Loan + Deposit + LCY Loan		
Notionals	Notional 2,000,000	Notional 2,000,000	USD deposit -2,000,000	Notional 204,300,000
Loan / hedge quotes	Interest USD 9.00%	Interest USD 9.00%	Interest USD 0.75%	Interest LCY 19.00%
	DESCO pays USD to Investor	DESCO pays USD to Investor	DESCO receives USD from Deposit Inst.	DESCO pays LCY to Deposit Inst.
Yr 1	-180,000	-180,000	15,000	-38,817,000
Yr 2	-180,000	-180,000	15,000	-38,817,000
Yr 3	-2,180,000	-2,180,000	2,015,000	-243,117,000
Discount Rate	1.25%	1.25%	1.25%	17%
PV of interest cost	-453,613	-453,613	-29,265	-9,028,364
FX Spot	1.000	1.000	1.000	102.150
PV of interest cost in USD	-453,613	-453,613	-29,265	-88,383
USDLCY exposure	0	0	0	-2,088,383
<b>Savings / Cost vs USD loan [1]</b>	DESCO 0		DESCO -117,649	
<b>Short LCY / Long LCY [2]</b>	0		-2,088,383	

The net effect of the trade:  
 DESCO ends up with a \$2.1m short LCY position and pays 9% USD interest and local currency benchmark interest;  
 Investor lends at 9%.

- ✓ Hedge cost is \$117,649; the Investor receives 9% fixed
- ✓ The net position for the DESCO is \$2.1m short LCY



# Hedge providers

Institution	TCX	MFX
<b>Products</b>	FX forwards and cross currency swaps, 2-7yrs, illiquid currencies	FX forwards and cross currency swaps, 6m to 7 years, illiquid currencies
<b>Risks</b>	FX and rates risk, credit risk[*] only with vetted institutions	MFX assumes credit risk, FX and rate risk is passed on to TCX or other counterparties [i.e. MFX guarantees to pay under an existing derivative contract even if the MFX's counterparty had defaulted].
<b>Transaction size</b>	\$20-30m notional (cumulative position)	\$2m+
<b>Requirements</b>	ISDA, credit guarantee from a requested counterparty (i.e. DEG/FMO) and/or cash collateral (with up to "Margin Calls")	ISDA, independent credit rating [1]; cash collateral [10% + MtM]; HUG insurance (only larger trades)
<b>Size of Institution</b>	Exposure: \$1.5bn; Equity: 500m+	Exposure: <\$0.5bn; Equity: \$50m+
<b>Typical Counterparty</b>	MFX (see below), Investors and DFIs (who are typically investors in TCX)	Investors, DFIs who can't trade with TCX directly; MFIs [2]
<b>Other</b>	Shareholds w TCX: AfD, AfDB, ASN-Novib Fund, BIO, BlueOrchard, Cofides, DBSA, EBRD, EFSE, FMO, Grameen Credit Agricole, IFC, IDB, JBIC, KfW, MFX, OFID, Oiko Credit, Oxfam, PROPARGO	
<b>Contact</b>	Harald Hirschofer	Anmol Chantan

TCX and MFX have been created to help manage currency risk in the micro-finance sector. They can already work with larger investors and MFX can, in theory, trade with DESCOS directly.