SAREP | Sahara Renaissance Project

Profitability Assessment

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IfaS

SAREP
SAHARA RENAISSANCE PROJECT

SYNLIFT
industrial products

Methodological Approach

- **Development of a prospective financial statement consisting of**
  - Standardized Balance Sheet
  - Profit and Loss Account
  - Cashflow Statement *including KPI analysis + sensitivity*

- **Analysis of development steps**
  - Reference phase 1 “Test plot” 1,000m³/d
  - Reference phase 2 20,000m³/d
  - Scale-up 2,000,000m³/d

CAPEX

Parameter	Unit	Reference	Scale-up	Maturity
Construction time	a	1	2	4
Water capacity	m^3/d	1.000	20.000	2.000.000
Water supply to Nouakchot	m^3/d	0	1.000	10.000
Levelized Cost of Water	**€/m³**	**1,14**	**0,86**	**0,53**
Cultivated Area	ha	56	1.175	112.500
CO_2 removal	tCO_2/a	4.728	99.289	9.504.025
CAPEX	**€**	**4.489.351**	**76.713.160**	**5.163.652.700**
Renewable Energy (PV+Wind)	€	1.004.400	23.645.000	1.464.078.000
Reverse Osmosis	€	2.243.000	26.790.000	2.131.500.000
Engineering	€	462.430	8.181.944	188.179.320
Irrigation System	€	482.433	9.284.870	622.126.659
Afforestation	€	297.088	8.811.346	757.768.721
OPEX	**€**	**2.461.835**	**7.910.722**	**339.876.261**
Water	€	166.633	2.422.166	132.093.732
Agro-forestry	€	103.042	2.020.025	189.834.923
Emissions	€	22.127	186.518	13.823.431
Company management	€	1.720.033	2.632.014	4.124.175
Development Costs	€	450.000	650.000	
Trade Working Capital	**€**	**2.000.000**	**13.000.000**	**420.000.000**

73%

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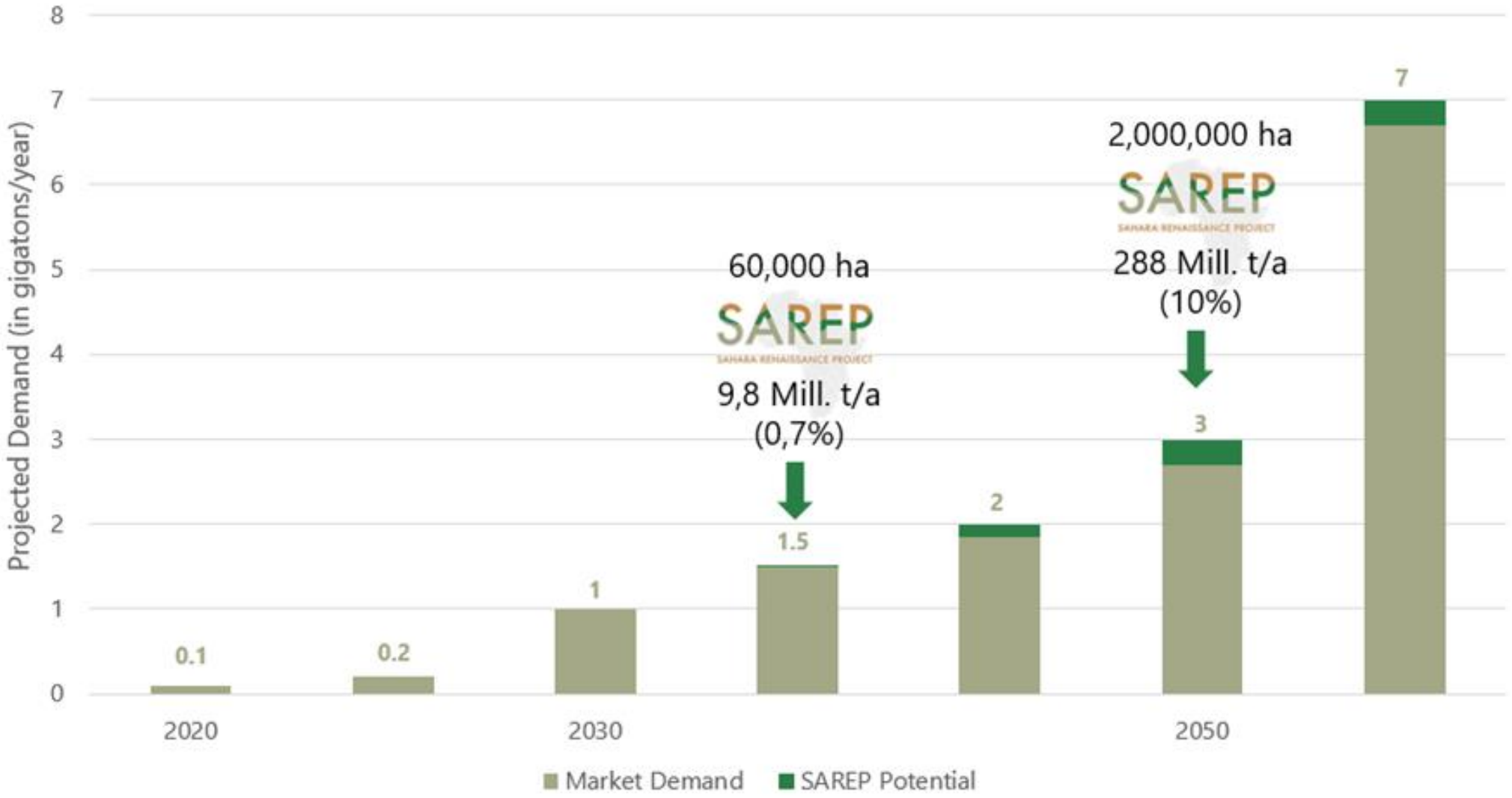
CO_2 Price Development

Source	Issuance 2020 (million t CO_2/a)	Demand 2030 (million t CO_2/a)	Demand 2050 (million t CO_2/a)	Price 2030 ($/t$CO_2$)	Market Volume 2030 (billion $/a)
Credit Suisse	282	1,000	5,000<	50-100	50-100
TSVCM	282	1,000-2,000	7,000-13,000	5-100	30-180
MSCI Trove Research	282	500-1,500	-	20-50	10-40
Bloomberg NEF	282	1,000	5,000<	47-224	190
McKinsey	282	1,000-2,000	6,000-10,000	40-80	40-80
BCG	282	500 -1,500	-	20-40	10-40
SwissRe	-	-	-	200	-
World Bank	-	-	-	61-122	-
EIB	-	-	-	250	-

Sources: Credit Suisse (2022), TSVCM (2021), Trove Research (2021), Bloomberg NEF (2022), McKinsey & Company (2023), (BCG & Shell, 2023), SwissRe (2023), World Bank (2023), EIB (2020)

CO_2 Price and Demand



Financial Assumptions

Financials		
Parameter	**Value**	**Unit**
Inflation rate	2,0	% p.a.
Equity share *(CAPEX)*	40	%
Equity rate	11	%
Loan share *(CAPEX)*	50	%
Loan interest rate *(soft loan)*	2	% p.a.
Loan period	30	a
Grant *(EIB; non-refundable)*	10	% *of CAPEX*
CO_2 Certificate Start Price	65	€/tCO_2
CO_2 Price Forecast *(12 years)*	150	€/tCO_2
CO_2 Price Increase rate	7,22%	p.a.
After forecast CO_2 Price	200	€/tCO_2
Certainty buffer	20	%
Project Emissions	Included	

WACC
5,4%

Carbon removal potential

Tree class: 31,7 cm Ø at base	Source		
Tree part	Maghembe et al (1983)	Pasiecznik, (2001) Gayathri and Uppuluri (2022)	Ohlde et al. (2019)
Stem, branches, leaves	35,9 t DM/ha*a 17,95 t C 65,88 t CO_2		
Pods		6.5. t DM/ha*a 3.05 t C 11 t CO_2	
Roots			31.8 t DM/ha*a 15.9 t C 57.2 t CO_2
Total estimated DM	**73 t DM/ha*a 36,5 t C/ha*a 134 t CO_2/ha*a**		

Removal Parameters

Removal Parameters		
Paramter	**Value**	**Unit**
Dry matter yield	57	t_{DM}/ha/a
Carbon Content	48%	
C to CO_2 ratio	3,67	
Carbon Start Price	65	€/tCO_2
Carbon Fix Price	150	€/tCO_2
Fix year	12	
Expected Inflation	7,22%	p.a.
After Fix Price	200	€/tCO_2
Buffer	20%	
Pruning	4	t_{DM}/ha/a
Pruning Start year	5	

KPI – Basis Scenario

Parameter	Unit	Reference	Scale-up	Maturity
LCoW	€/m³	0,99	0,89	0,46
ES-% reduction			10%	54%
Forestry CAPEX	€/ha	80.202	65.259	45.889
ES-% reduction			19%	43%
WACC		5,4%	5,4%	5,4%
IRR		n.a.	4,1%	5,8%
PBP	a	n.a.	n.a.	28
NPV	k€	n.a.	-1.246	205.719

Core Financials – Basis Scenario

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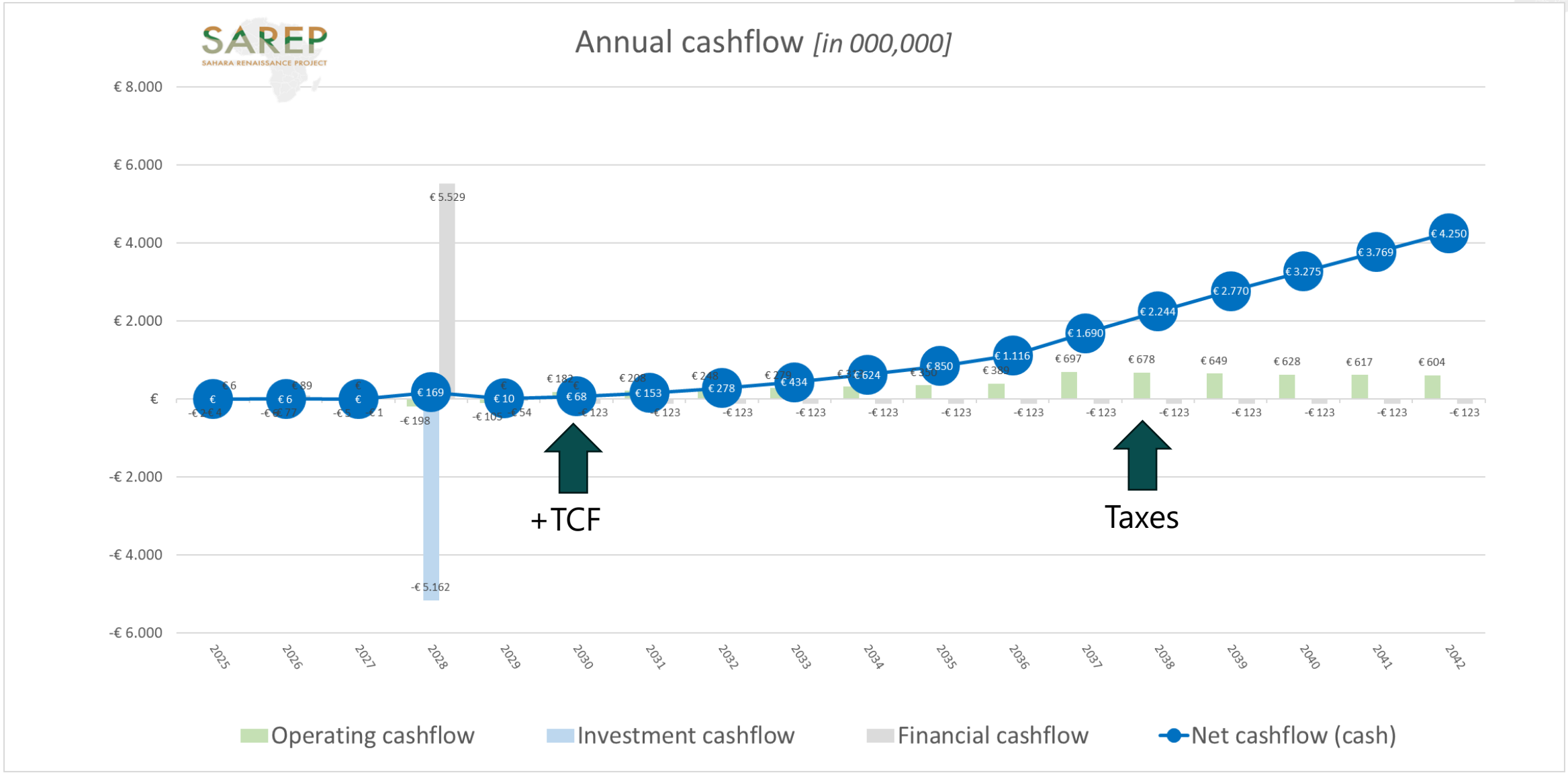
Core financials - Excerpt Y15 *[in ,000]*

	Year	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	Revenues	€ 566.337	€ 601.930	€ 650.984	€ 691.857	€ 735.659	€ 782.600	€ 832.906	€ 1.151.588	€ 1.152.043	€ 1.152.507
	Raw margin	€ 566.337	€ 601.930	€ 650.984	€ 691.857	€ 735.659	€ 782.600	€ 832.906	€ 1.151.588	€ 1.152.043	€ 1.152.507
	Raw margin (in %)	*100,0%*	*100,0%*	*100,0%*	*100,0%*	*100,0%*	*100,0%*	*100,0%*	*100,0%*	*100,0%*	*100,0%*
	EBITDA	€ 181.606	€ 208.188	€ 247.926	€ 279.163	€ 312.987	€ 349.590	€ 389.176	€ 696.729	€ 685.622	€ 674.063
	EBITDA-Margin (in %)	*32,1%*	*34,6%*	*38,1%*	*40,3%*	*42,5%*	*44,7%*	*46,7%*	*60,5%*	*59,5%*	*58,5%*
>20	*ROCE*	*-0,6%*	*0,0%*	*0,9%*	*1,7%*	*2,7%*	*3,9%*	*5,4%*	*15,5%*	*16,2%*	*17,1%*
	EBT	-€ 80.531	-€ 52.534	-€ 11.351	€ 21.359	€ 56.687	€ 94.823	€ 135.972	€ 445.120	€ 435.640	€ 425.739
	Corporate Tax	€	€	€	€	€	€	€	€	€ 15.702	€ 34.059
	EAT	-€ 80.531	-€ 52.534	-€ 11.351	€ 21.359	€ 56.687	€ 94.823	€ 135.972	€ 445.120	€ 419.937	€ 391.680
	EAT-Margin (in %)	*-14,2%*	*-8,7%*	*-1,7%*	*3,1%*	*7,7%*	*12,1%*	*16,3%*	*38,7%*	*36,5%*	*34,0%*
	Cash Flow of Operations	€ 181.606	€ 208.188	€ 247.926	€ 279.163	€ 312.987	€ 349.590	€ 389.176	€ 696.729	€ 677.771	€ 649.182
	Free Cash Flow	€ 181.606	€ 208.188	€ 247.926	€ 279.163	€ 312.987	€ 349.590	€ 389.176	€ 696.729	€ 677.771	€ 649.182
>1	*DSCR*	*1,5%*	*1,7%*	*2,0%*	*2,3%*	*2,5%*	*2,8%*	*3,2%*	*5,7%*	*5,5%*	*5,3%*
	Cash	€ 68.391	€ 153.380	€ 278.107	€ 434.071	€ 623.859	€ 850.251	€ 1.116.228	€ 1.689.758	€ 2.244.330	€ 2.770.313
	Net Fincanial Dept	€ 2.480.354	€ 2.323.141	€ 2.124.746	€ 1.893.640	€ 1.627.207	€ 1.322.638	€ 976.920	€ 322.054	-€ 315.480	-€ 926.085

Cashflow



Variant I

			CO_2 Start Price [€/t]								
			Reduction					Increase			
		IRR [%]	50%	30%	20%	10%	Basis	10%	20%	30%	50%
		5,8%	32,5	45,5	52	58,5	**65**	71,5	78	84,5	97,5
CO_2 Forecast *(12 Years)* [€/t]	Reduction	50%	75	4,0%	4,4%	4,5%	4,6%	4,8%	4,9%	5,0%	5,1%	5,2%
		30%	105	4,2%	4,7%	4,9%	5,1%	5,2%	5,4%	5,5%	5,6%	5,9%
		20%	120	4,2%	4,8%	5,0%	5,2%	5,4%	5,6%	5,7%	5,9%	6,2%
		10%	135	4,2%	4,9%	5,2%	5,4%	5,6%	5,8%	6,0%	6,1%	6,4%
		Basis	**150**	4,1%	5,0%	5,3%	5,5%	**5,8%**	6,0%	6,2%	6,4%	6,7%
	Increase	10%	165	3,9%	5,0%	5,4%	5,7%	5,9%	6,2%	6,4%	6,6%	7,0%
		20%	180	3,8%	5,0%	5,4%	5,8%	6,1%	6,3%	6,6%	6,8%	7,2%
		30%	195	3,6%	5,0%	5,5%	5,9%	6,2%	6,5%	6,8%	7,0%	7,5%
		50%	225	2,8%	4,9%	5,5%	6,0%	6,4%	6,8%	7,1%	7,4%	7,9%

Variant II

Water Demand [m³/ha/a]			IRR [%]	Growth Rate [t_{DM}/ha/a]								
				Reduction					Increase			
				50%	30%	20%	10%	Basis	10%	20%	30%	50%
			5,8%	30	42	48	54	**60**	66	72	78	90
	Reduction	50%	3.000	-1,1%	5,5%	7,7%	9,7%	11,4%	13,0%	14,5%	15,9%	18,6%
		30%	4.200	-5,2%	3,0%	5,2%	7,1%	8,8%	10,3%	11,7%	13,0%	15,4%
		20%	4.800	-8,2%	1,9%	4,2%	6,0%	7,7%	9,2%	10,5%	11,8%	14,2%
		10%	5.400	#ZAHL!	0,7%	3,1%	5,1%	6,7%	8,2%	9,5%	10,7%	13,0%
	Basis		**6.000**	#ZAHL!	-0,5%	2,2%	4,1%	**5,8%**	7,2%	8,5%	9,8%	12,0%
	Increase	10%	6.600	#ZAHL!	-1,6%	1,1%	3,2%	4,9%	6,4%	7,7%	8,9%	11,1%
		20%	7.200	#ZAHL!	-2,8%	0,2%	2,4%	4,1%	5,5%	6,9%	8,1%	10,2%
		30%	7.800	#ZAHL!	-4,1%	-0,8%	1,6%	3,3%	4,8%	6,1%	7,3%	9,4%
		50%	9.000	#ZAHL!	-7,5%	-2,8%	-0,2%	1,8%	3,4%	4,7%	5,9%	8,0%

Variant III

			After forecast fix CO_2 price [€/t]								
			Reduction					Increase			
		IRR [%]	50%	30%	20%	10%	Basis	10%	20%	30%	50%
		5,8%	100	140	160	180	**200**	220	240	260	300
Capacity Building and Training ↓	Workers Capacity [ha/person/a]										
Reduction	50%	2,0	#ZAHL!	-7,3%	-1,5%	1,0%	2,8%	4,1%	5,2%	6,1%	7,7%
Reduction	30%	2,8	#ZAHL!	-1,1%	1,4%	3,2%	4,5%	5,6%	6,6%	7,4%	8,9%
Reduction	20%	3,2	#ZAHL!	0,0%	2,2%	3,8%	5,1%	6,1%	7,0%	7,8%	9,2%
Reduction	10%	3,6	#ZAHL!	0,7%	2,8%	4,3%	5,5%	6,5%	7,4%	8,1%	9,5%
	Basis	**4,0**	#ZAHL!	1,3%	3,2%	4,6%	**5,8%**	6,8%	7,6%	8,4%	9,7%
Increase	10%	4,4	#ZAHL!	1,6%	3,5%	4,9%	6,0%	7,0%	7,8%	8,6%	9,9%
Increase	20%	4,8	-6,5%	2,0%	3,8%	5,1%	6,2%	7,2%	8,0%	8,8%	10,1%
Increase	30%	5,2	-5,0%	2,3%	4,0%	5,3%	6,4%	7,3%	8,2%	8,9%	10,2%
Increase	50%	6,0	-3,5%	2,8%	4,4%	5,6%	6,7%	7,6%	8,4%	9,1%	10,4%

Variant IV

			Water CAPEX [€]								
			Reduction					Increase			
		IRR [%]	10%	5%	2%	1%	Basis	1%	2%	5%	10%
		5,8%	3.405.381.588	3.594.569.454	3.708.082.174	3.745.919.747	**3.783.757.320**	3.821.594.893	3.859.432.466	3.972.945.186	4.162.133.052
Forestry CAPEX [€]	Reduction 10%	1.240.842.714	6,5%	6,3%	6,1%	6,0%	6,0%	5,9%	5,9%	5,7%	5,4%
	Reduction 5%	1.309.778.421	6,4%	6,1%	6,0%	5,9%	5,9%	5,8%	5,8%	5,6%	5,3%
	Reduction 2%	1.351.139.844	6,4%	6,1%	5,9%	5,9%	5,8%	5,8%	5,7%	5,5%	5,3%
	Reduction 1%	1.364.926.986	6,4%	6,1%	5,9%	5,8%	5,8%	5,7%	5,7%	5,5%	5,3%
	Basis	**1.378.714.127**	6,3%	6,0%	5,9%	5,8%	**5,8%**	5,7%	5,7%	5,5%	5,3%
	Increase 1%	1.392.501.268	6,3%	6,0%	5,9%	5,8%	5,7%	5,7%	5,6%	5,5%	5,2%
	Increase 2%	1.406.288.410	6,3%	6,0%	5,8%	5,8%	5,7%	5,7%	5,6%	5,5%	5,2%
	Increase 5%	1.447.649.833	6,2%	5,9%	5,8%	5,7%	5,7%	5,6%	5,6%	5,4%	5,2%
	Increase 10%	1.516.585.540	6,1%	5,8%	5,7%	5,6%	5,6%	5,5%	5,5%	5,3%	5,1%

Up-shot

- SAREP at scale constitutes a profitable investment option!
- SAREPs financial result oscillates from rather low (4%) to high (12%) IRR, depending on size (economy of scale) and the behaviour (development) of the most sensitive variables, with the top 3 being ranked:
  1. Yield expectation (carbon removal performance)
  2. Levelized Cost of Water *(and/or water consumption per ha/a)*
  3. Carbon certificate *(and/or commodity)* price

Green business model for climate mitigation, carbon storage, poverty alleviation, GHG neutral carbon production and food security

Thank you for your attention!

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