



Tailoring Your Technologies



SA
Canegrowers

Renewable Energy Sources

18 Million Tons Cane

1.8 Million Tons CTL

2,113 GWh

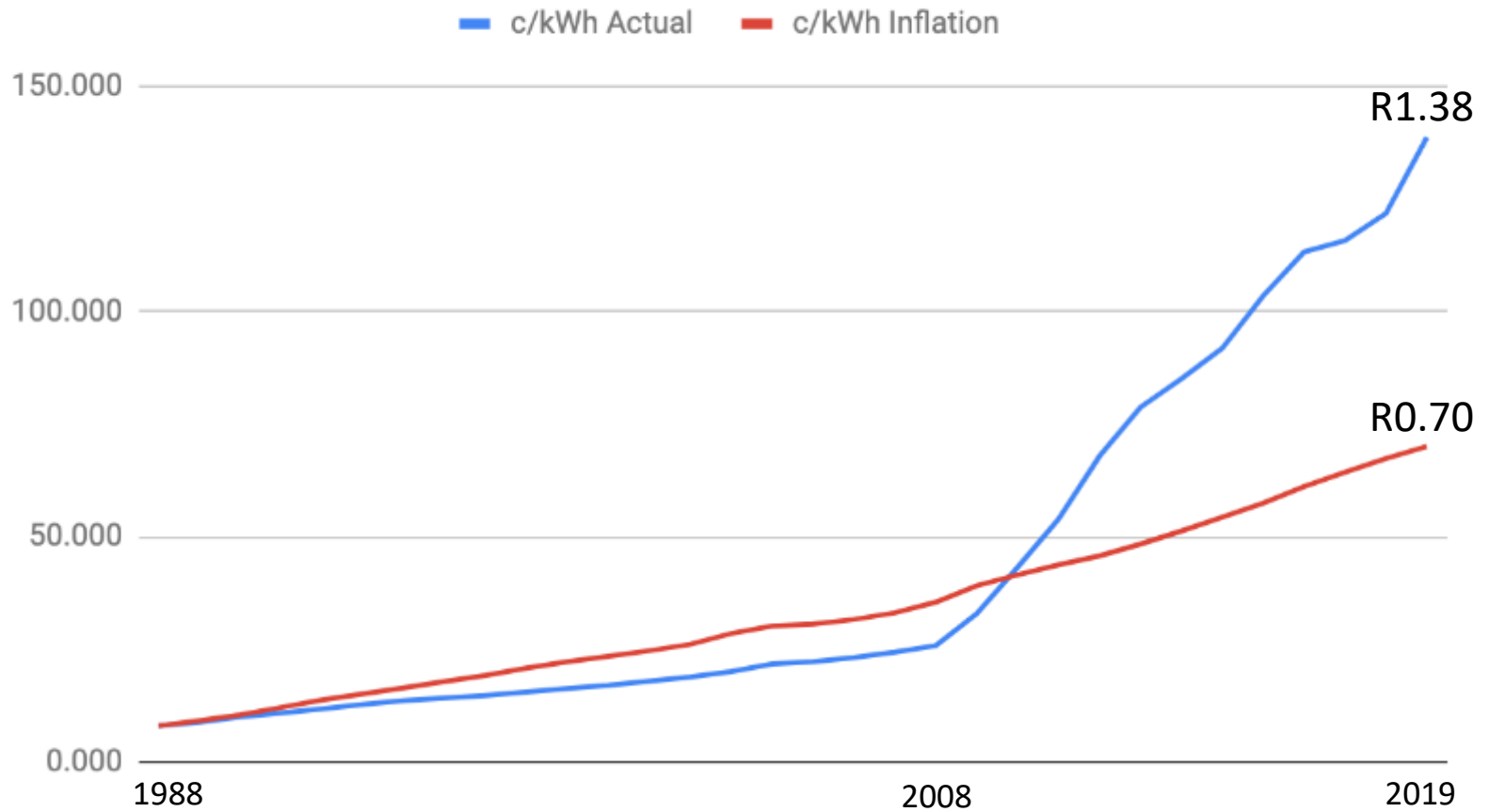
1% of Eskom Total





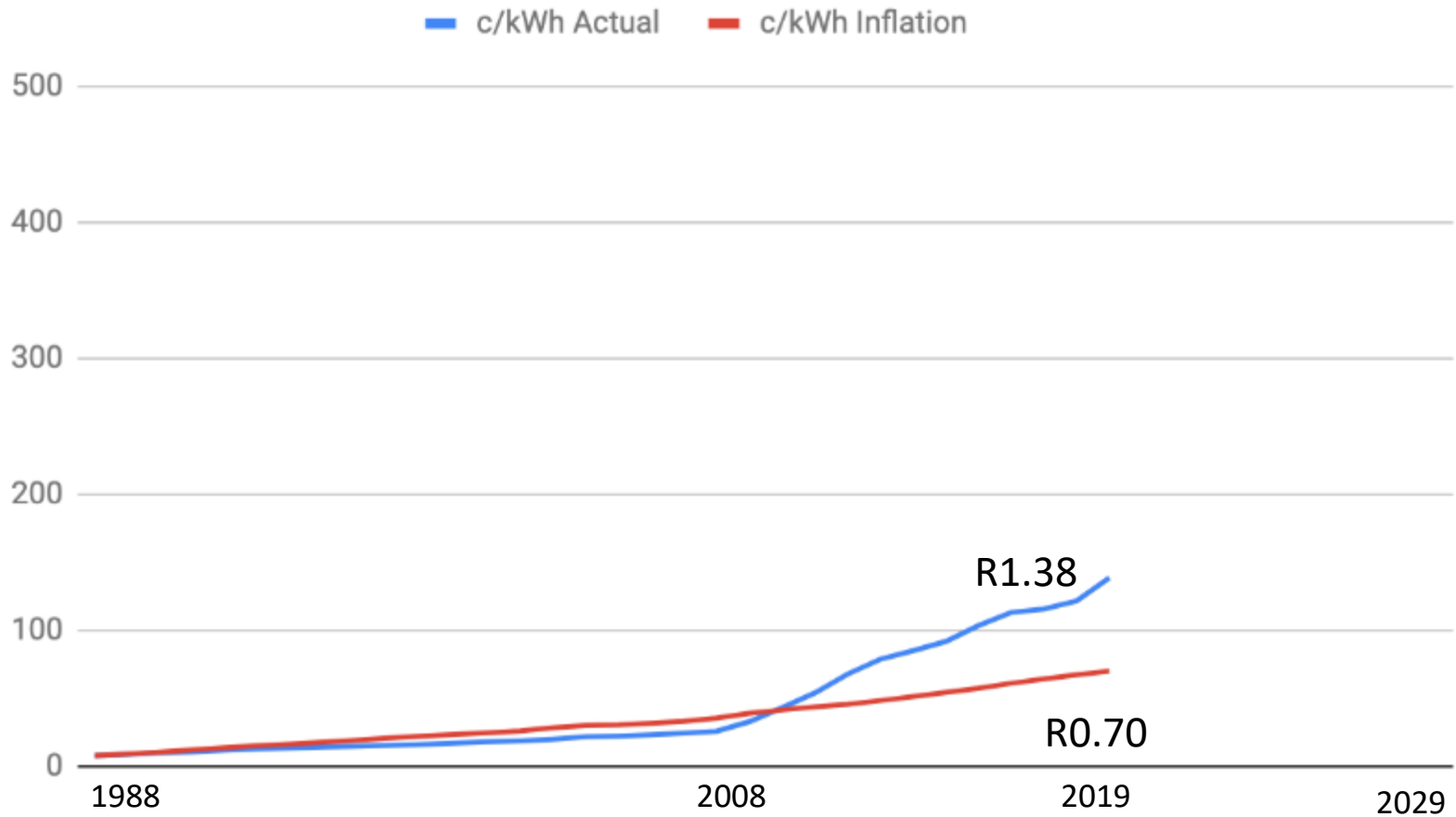
Eskom vs CPI

Price vs Inflation



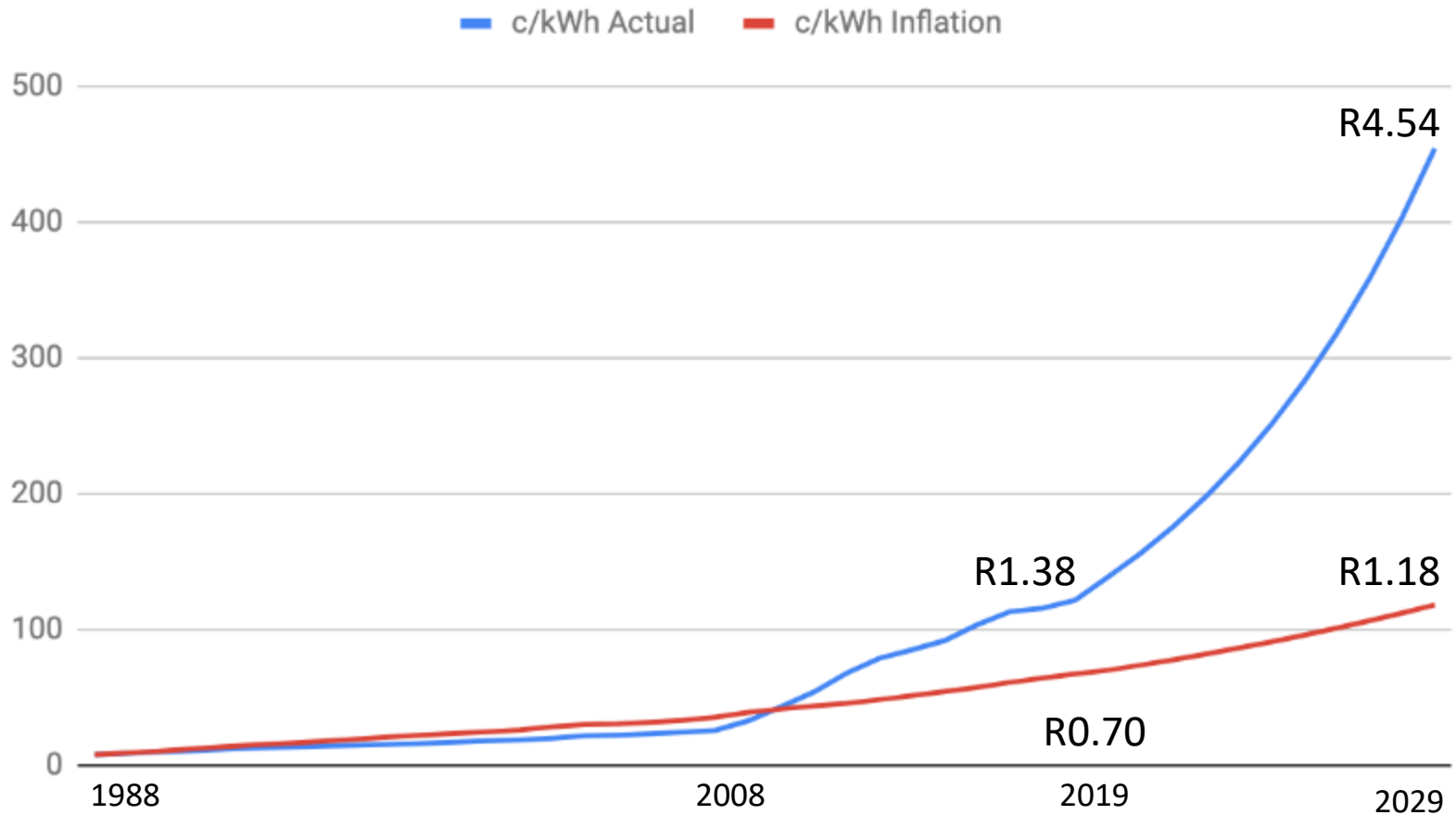
Eskom vs CPI

Price vs Inflation



Eskom vs CPI

Price vs Inflation



The Opportunities

- Reduce costs and/or increase revenue
- Produce gas, fertiliser and generate electricity
- Increase sustainability
- Protect and generate jobs



Analyse Renewables Options

- What feedstock(s) are available
- Their suitability to energy use profile
- Combinations of technologies
- Maximise benefits and minimise risks





CTL BIOGAS

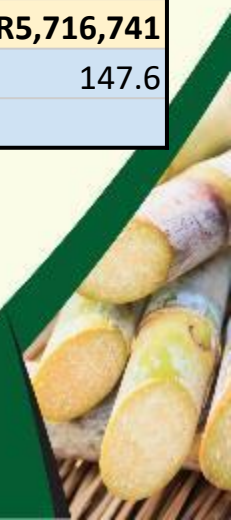


REAL SUSTAINABLE SOLUTIONS FOR ALL GROWERS



Financial Model

Biogas 1 Unit			
KRPO			
		Financial Summary and Key Figures Forecast	
Gasifier Capacity kW	24	Return on Equity	21%
Total Cost	R1,800,000	NPV	
Blended Utility Cost	R1.40	Payback Year	3
Biogas Yield (kWh's/kWp/Yy)	7500	1st Year Savings	R250,000
Eskom price increase per year	8%	1st Year Savings including depreciation tax	
AEP (yearly production) kWh / year	180,000	Annual Operations and Maintenance Included	R164,000
Operational Cost	R1,200,000	20 Year Cumulative Savings	R5,716,741
CPI	6%	Carbon Reduction per Annum (tons)	147.6
Service and Maintenance	2.0%		



Biogas Pros/Cons

- Provides base load
- Fertiliser by product
- Livestock manure/litter
- Cane tops and trash (CTL)
- Gas (energy) storage
- Continuous (cannot switch off)
- Sensitive to feedstock changes
- Cannot use woody feedstock
- Digester is “living” requiring care





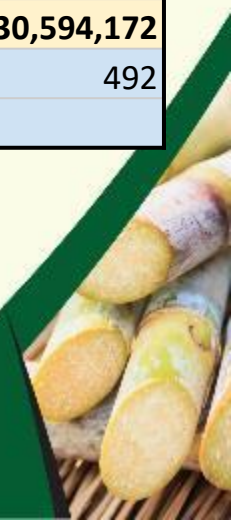
Gasification Pros/Cons

- Provides base load
- Biochar by product
- Organics, coal, plastic
- Switch off and forget
- Minimal infrastructure
- Limited storage
- Feedstock moisture below 20%
- Feedstock drying and storage
- More complex plant operation



Financial Model

Gasifier 1 Unit			
KRPO			
		Financial Summary and Key Figures Forecast	
Gasifier Capacity kW	80	Return on Equity	47%
Total Cost	R2,200,000	NPV	R29,978,172
Blended Utility Cost	R1.40	Payback Year	3
Gasifier Yield (kWh's/kWp/Yy)	7500	1st Year Savings	R721,920
Eskom price increase per year	8%	1st Year Savings including depreciation tax	R1,337,920
AEP (yearly production) kWh / year	600,000	Annual Operations and Maintenance Included	R164,000
Operational Cost	R1,200,000	20 Year Cumulative Savings	R30,594,172
CPI	6%	Carbon Reduction per Annum (tons)	492
Service and Maintenance	2.0%		



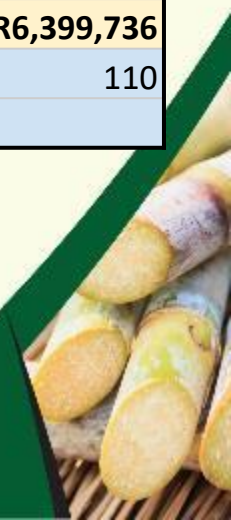
Solar Pros/Cons

- Hands-off energy supply
- Low initial CAPEX
- Good for low use periods
- Limited by daylight hours
- Limited by area and aspect
- Cannot provide base load
- Storage expensive



Financial Model

Solar			
KRPO			
		Financial Summary and Key Figures Forecast	
Gasifier Capacity kW	80	Return on Equity	26%
Total Cost	R1,040,000	NPV	R6,108,536
Blended Utility Cost	R1.40	Payback Year	5
Solar Yield (kWh's/kWp/Yy)	1679	1st Year Savings	R162,272
Eskom price increase per year	8%	1st Year Savings including depreciation tax	R453,472
AEP (yearly production) kWh / year	134,320	Annual Operations and Maintenance Included	R35,800
Operational Cost	R15,000	20 Year Cumulative Savings	R6,399,736
CPI	6%	Carbon Reduction per Annum (tons)	110
Service and Maintenance	2.0%		



Wind Pros/Cons

- Hands-off energy supply
- Not constrained by daylight
- High production variability
- High capital cost
- Storage Expensive

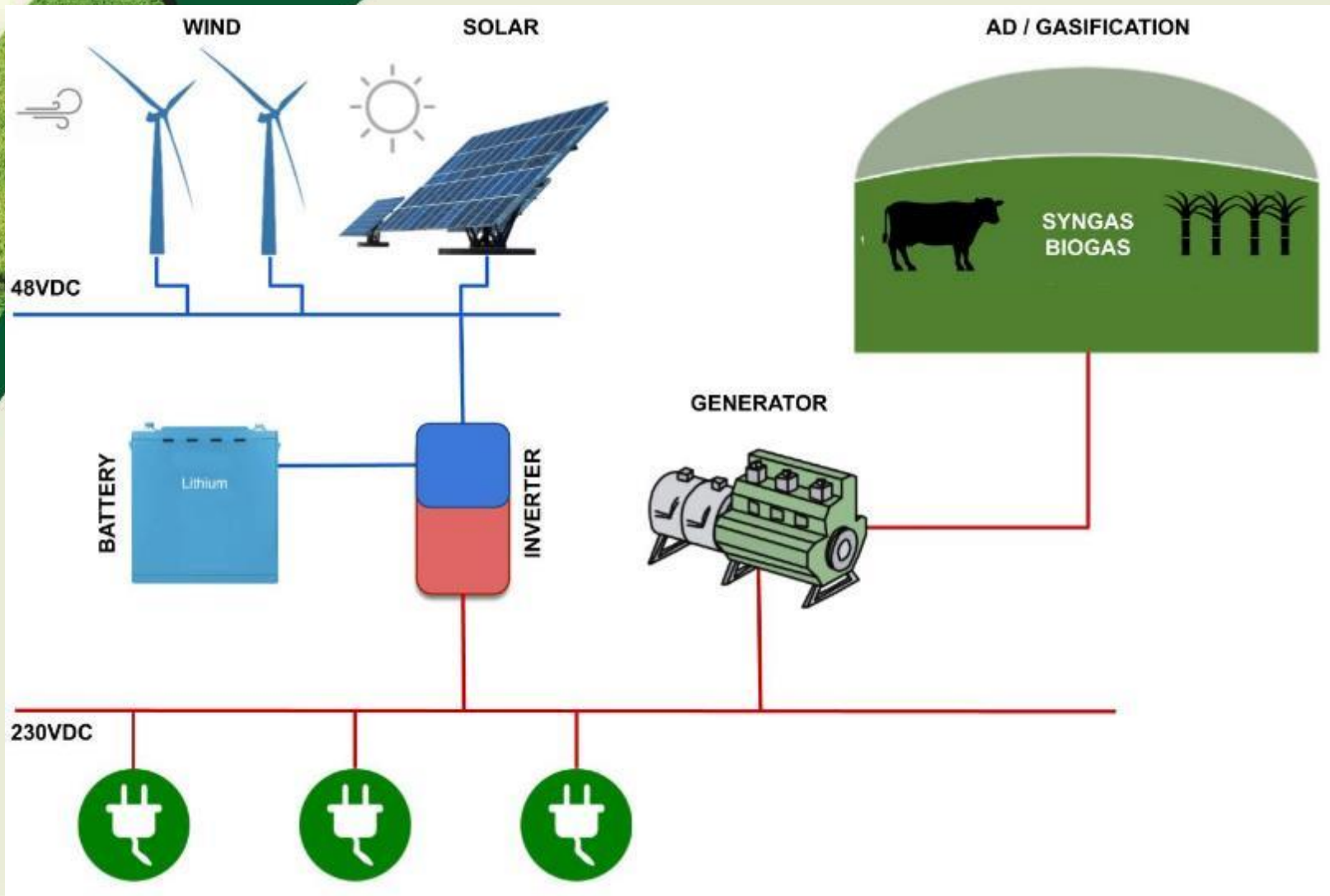


Objective

- Analyse grower feedstock availability
- Analyse energy consumption patterns
- Design optimal renewable mix
- Propose integrated solution



Renewable Energy Mix



Renewable Planning Model

Total Annual consumption	Days per annum of operation	Hours per day	Hours per annum	kW Capacity Required						
247,992	365	18	6,570	40						
	kWh Produced	Gas reqd per day	Total Gas Reqd	Nm3/ton	Tons Required	Tons / ha	Ha required			
Silage Required	250,000	648	236,520	300	788.4	80	9.9			
Livestock	Cattle	Dung (kg per day)	Biogas (l)	m3	80kw gas production per hr	Biogas required per 18 hour day	Animals to supply manure required per day	Current livestock	Current gas production capacity	
Cattle	1	29.5	1180	1.18	72	1296	1098	45	53.1	
Sheep	1	4.5	180	0.18	72	1296	7200	100	18	
Crops	Hectares	Tons / ha total	Tons / ha available	Tons Feedstock	Nm3/ton	Nm3	Biogas required per 18 hour day	Days of Operation	Hours per day possible (365 days)	
Cane Tops & Trash	213.93	110.74	11.07	2368	109	258,134	1296	199	9.82	
Maize Silage	24.083		80	1927	300	577,992	1296	446	21.99	
Feedstock Costing	Hectares	Normal cost/ha	Fallow cost per ha	Fallow cost - 2 harvests	Normal Yield (2 harvests/ annum)	Fallow yield (less inputs)	Total Tons Silage	Total Cost	kWh per annum	Feedstock cost / kWh
	9.9	23000	6500	13000	160	80	792	128,700	250,000	0.52





Thank You

Richard Howes
Innovations and Technology Manager
South African Canegrowers Association
richard.howes@saanegrowers.co.za

