

An Outlook on the Adoption of RE Solutions at South African Beverage Manufacturers



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Group

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Photo by STERG

Management Executive Career Built on Engineering Studies

- **Qualification:** B.Eng Mech; M.Sc Aeronautics; PhD Mech Eng.
- **Experience:** McKinsey management consultant (7y);
BHP Billiton – GM and VP (4y);
SAB Miller – MD Appletiser (14y);
CCBA – Director Strategy and Business Development (5y)
- **Inquiry:** Shouldn't industrial renewable energy systems be scaled?
Could trucking coal across South Africa be avoided?

Assess the techno-economic benefits of renewable and sustainable energy solutions and provide a framework for broader adoption (for the South African beverage sector)

- Develop outlooks – what, how much and when
 - Frame decision and long-term planning
- Provide case study – sector and context-specific

Recent Publications



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- To develop a transparent, replicable approach to forecasting the cost of renewable energy solutions
- To provide a framework for the adoption of renewable and sustainable energy solutions by beverage manufacturers in South Africa through cost-benefit analyses
- To model the techno-economic benefits of large-scale solar thermal energy solutions



energies

ISEC

Conference
Proceedings

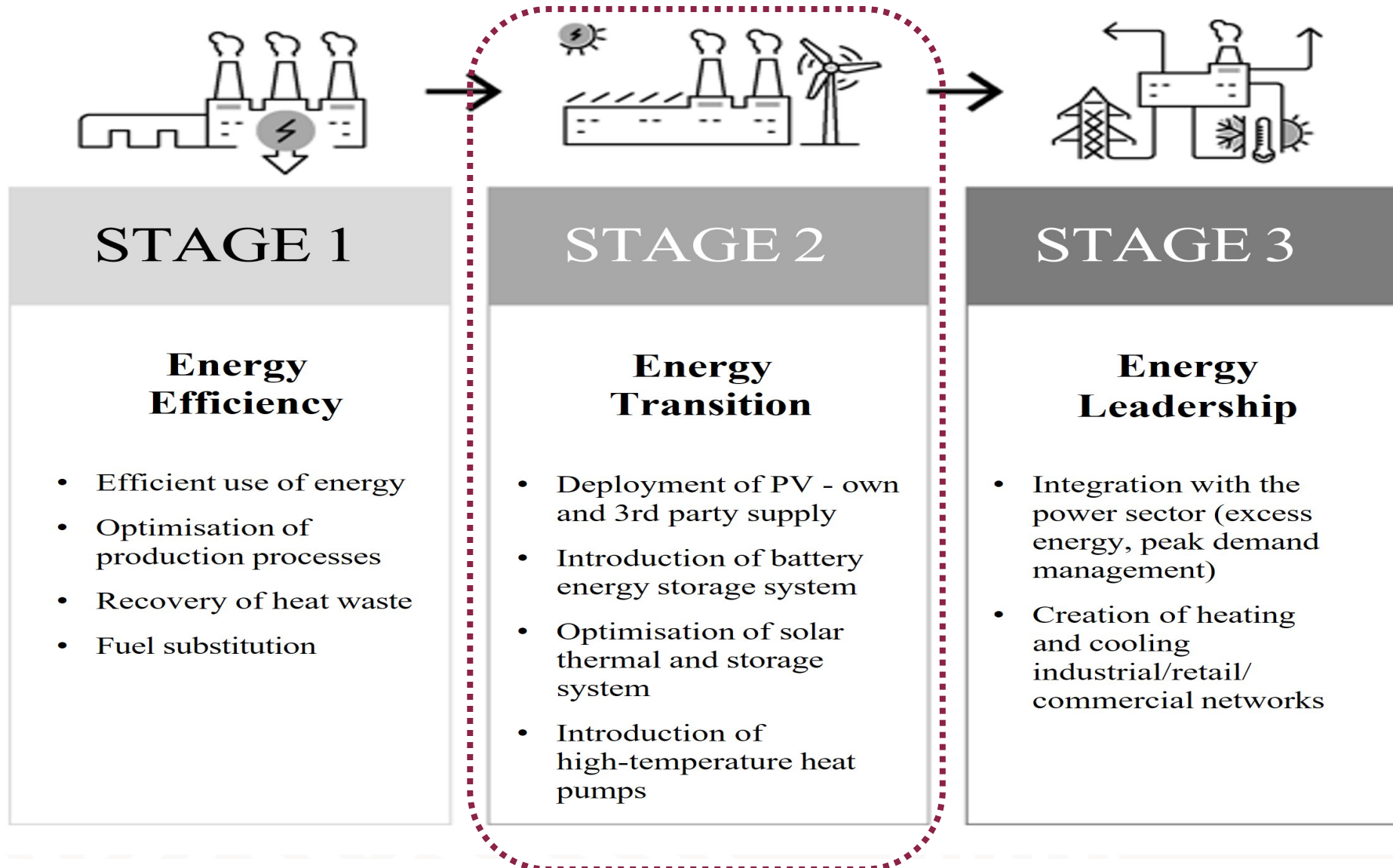


Proposed 3-Stage Framework for the Reduction of Carbon Emissions by Industry



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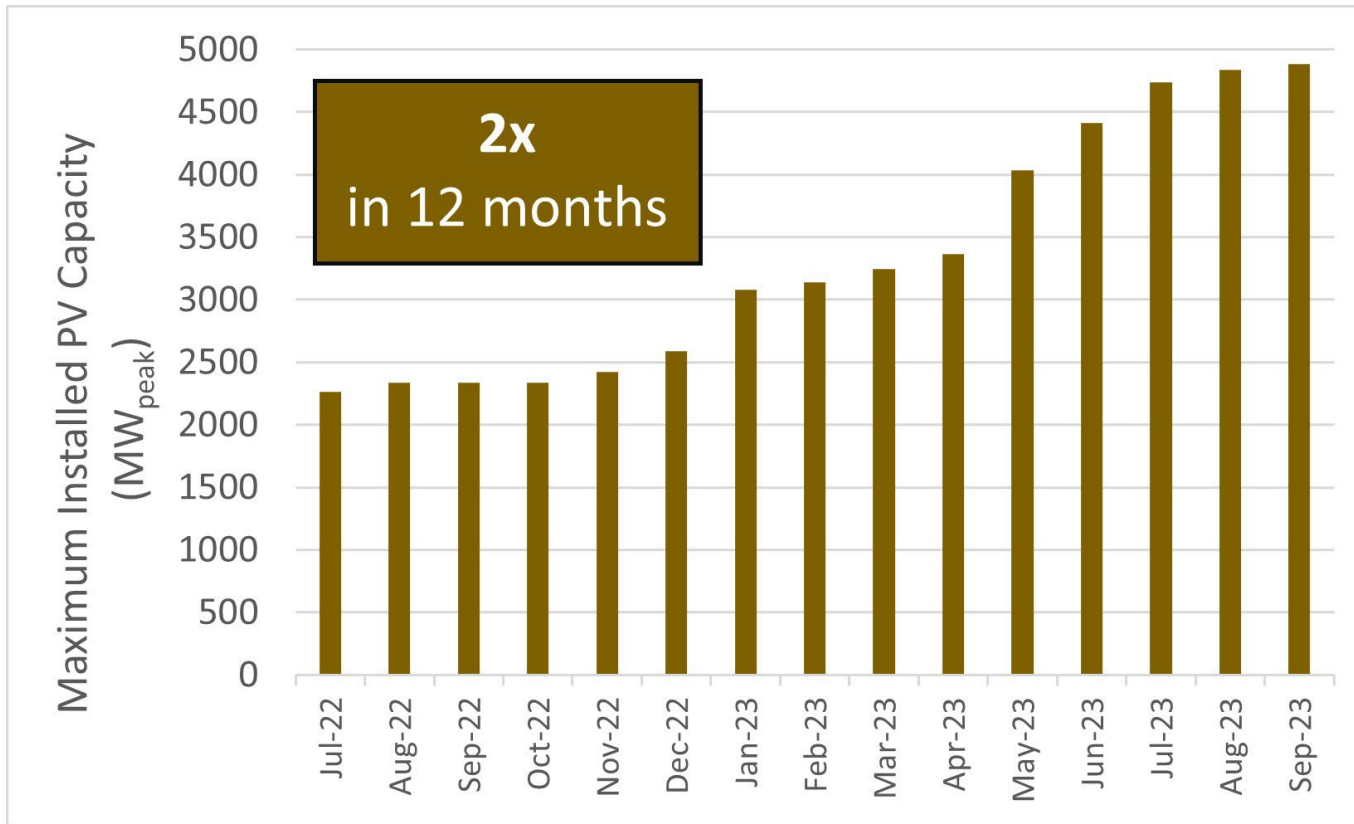
PV Adoption Accelerating in RSA while Solar Thermal Emerging Elsewhere



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PV growth driven by industry 44% of total



Heineken Sevilla
milestone

30 MW - 43 000 m²
50% solar fraction - 210 °C
€ 484 /m²

Source: Eskom PV Rooftop analysis

Significant Process Heat and Electricity usage at RSA beverages



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3020 GWh/year
62% Heat
38% Power

CO₂: 2 million tonnes



Photo of South African Breweries, Moneyweb

Beverage categories	Production	Energy	Energy	Electricity	Heat
	(mi ℓ)	(kWh/ℓ)	(GWh/a)	(%)	(%)
Non-alcoholic ready-to-drink	6 980	0.10	675	59%	41%
Sparkling soft drinks	4 400	0.06	270	75%	25%
Juices and juice drinks	670	0.13	80	50%	50%
Packaged water	510	0.05	25	80%	20%
Value added dairy	370	0.27	100	25%	75%
Others	1 030	0.20	200	60%	40%
Alcoholic beverages	5 090	0.46	2 345	31%	69%
Beer	3 440	0.40	1 360	33%	67%
Cider	600	0.25	150	25%	75%
Wine	900	0.13	120	50%	50%
Spirits	150	4.8	715	25%	75%
Total RSA Beverages	12 070	0.25	3 020	38%	62%



Solar PV and BESS Deliver Superior Returns



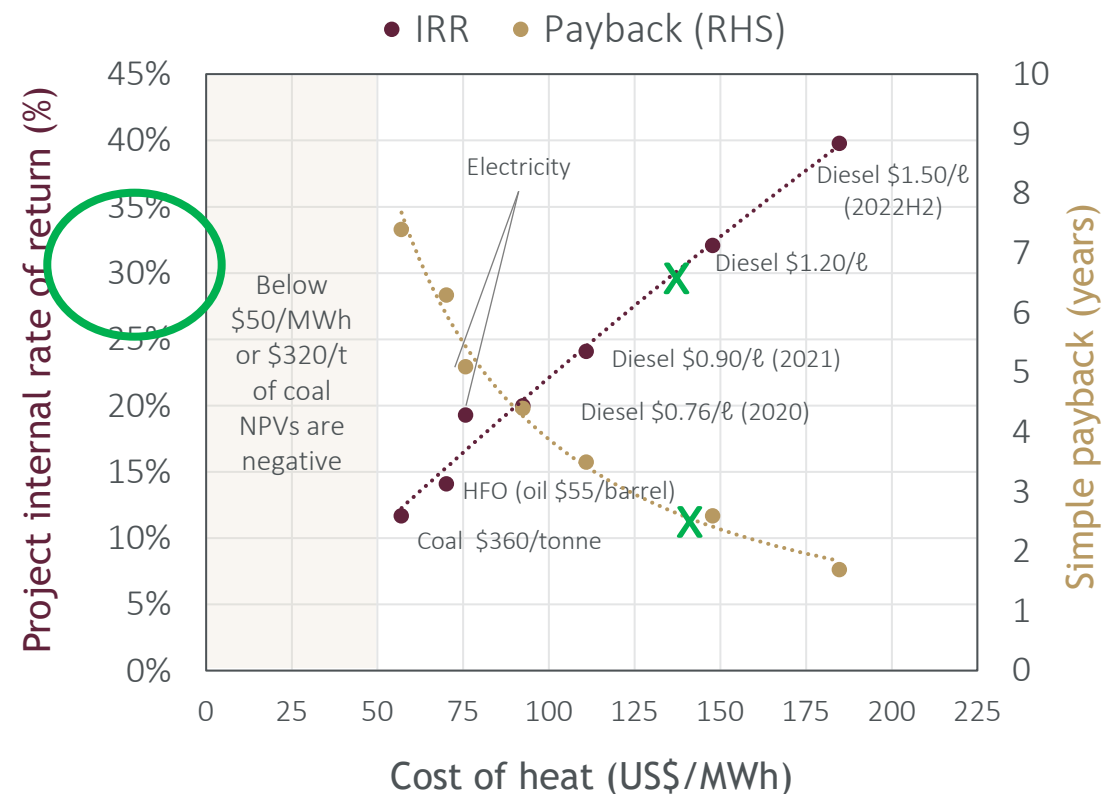
	Capex	Year-1 cost avoided	Year-1 return on Capex
	(US\$)	(US\$/kW)	(%)
2020			
PV vs electricity std tariffs	883 per kW _p	152	17%
BESS only vs peak tariffs + diesel gen	430 per kWh	111 per kWh	26%
Solar thermal energy vs coal @ US\$165/t	460 per m ²	40	5%
Solar thermal energy vs coal @ US\$300/t	460 per m ²	73	10%
Heat Pump vs coal @ US\$300/t	500 per kW _{th}	20	4%
2030 (2020 US\$ real term)			
PV vs electricity std tariffs	490 per kW _p	223	46%
BESS only vs peak tariffs	250 per kWh	107 per kWh	43%
Solar thermal energy vs coal @ US\$300/t	345 per m ²	73	14%
Heat Pump vs coal @ US\$300/t	375 per kW _{th}	neg	neg

Solar Thermal Energy for Medium Heat Competitive Against Liquid Fuels in RSA

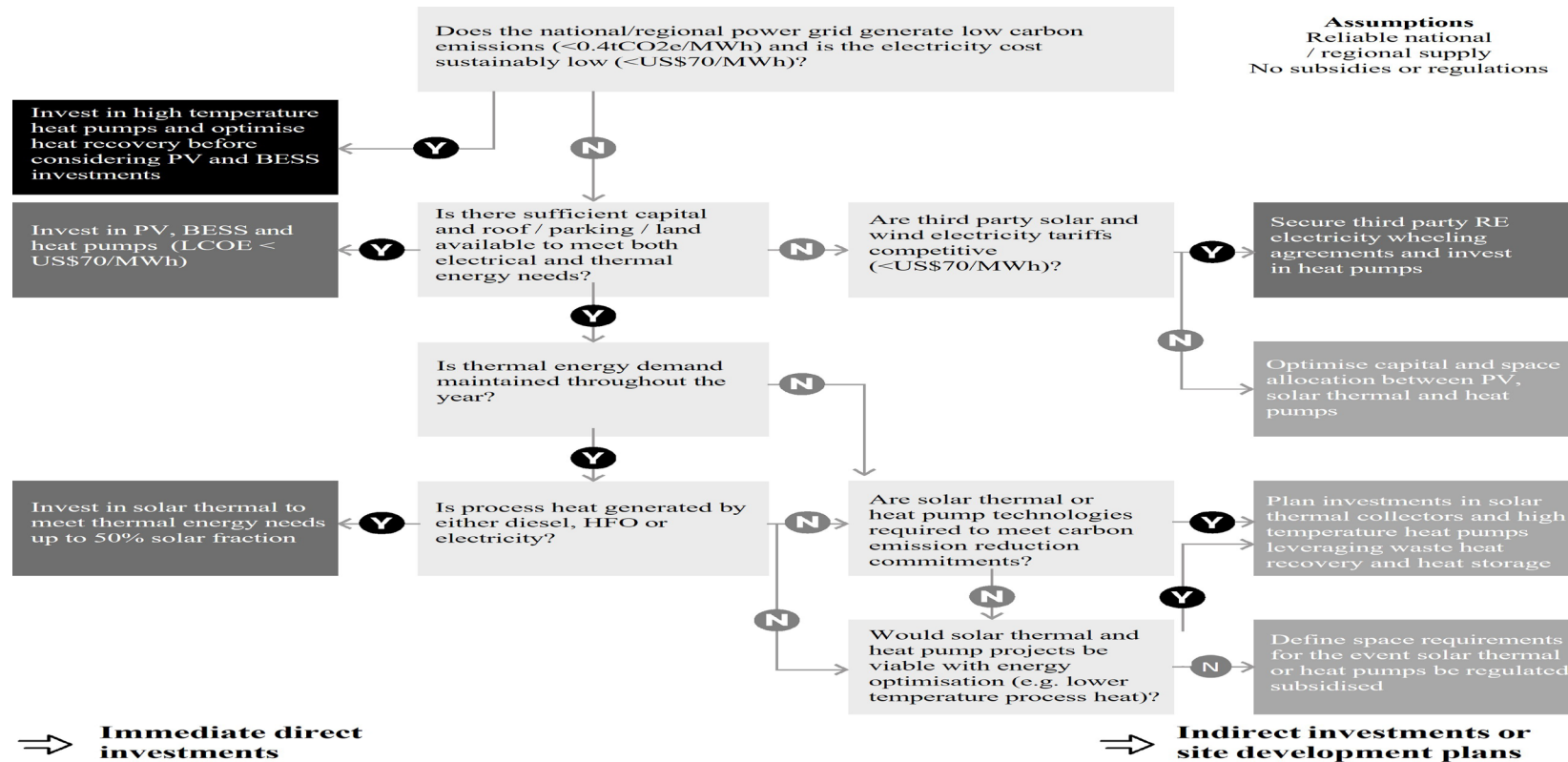
Fuel	Heat cost (US\$/MWh)
Coal (GP)	20 – 60
Coal (WC)	20 – 80
Reticulated gas (GP/KZN)	30 – 70
Solar thermal	40 – 70
Electricity (average Megaflex variable)	80 +
Heavy fuel oil	50 – 90
Diesel 0.05%	120 – 180

Real WACC @ 6.5%, opex at 2% of capex pa, collector price 277 \$/m² – 395 \$/m², economy of scale exponent 0.85, electricity tariff growth 3% real, 20 year lifetime

X Return/payback vs Petrol @ current prices



Decision Tree Used to Synthesise Findings to Guide Investment Decisions



Stage 2 decision criterion

- Grid emissions & costs
- Space availability
- Capital availability
- Third party supply
- Thermal energy source
- Operation regime
- Equipment life

Conclusions



- Industry can and should adopt RE solutions at scale.
- The beverage sector is a good starting point for electricity and heat in RSA.
- PV and BESS offer attractive and improving investment returns at low risks.
- Solar thermal energy solutions are attractive when liquid fuels are used;
however,
against cheap coal, policy, financial, and fiscal support will continue to be
necessary.

An aerial photograph of the Stellenbosch University campus, showing various academic buildings, green spaces, and parking areas. The image is used as a background for the slide.

Thank you
Enkosi | Dankie

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Faculty of
Engineering

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