

# Exxaro Energy

Driving down Cost & Emissions  
in South Africa's Mining Sector

The Exxaro logo features the word "exxaro" in a white, lowercase, sans-serif font. The two 'x's are stylized with a green dot above each letter. The logo is positioned within a circular graphic element on the left side of the slide, which consists of concentric green lines and segments.

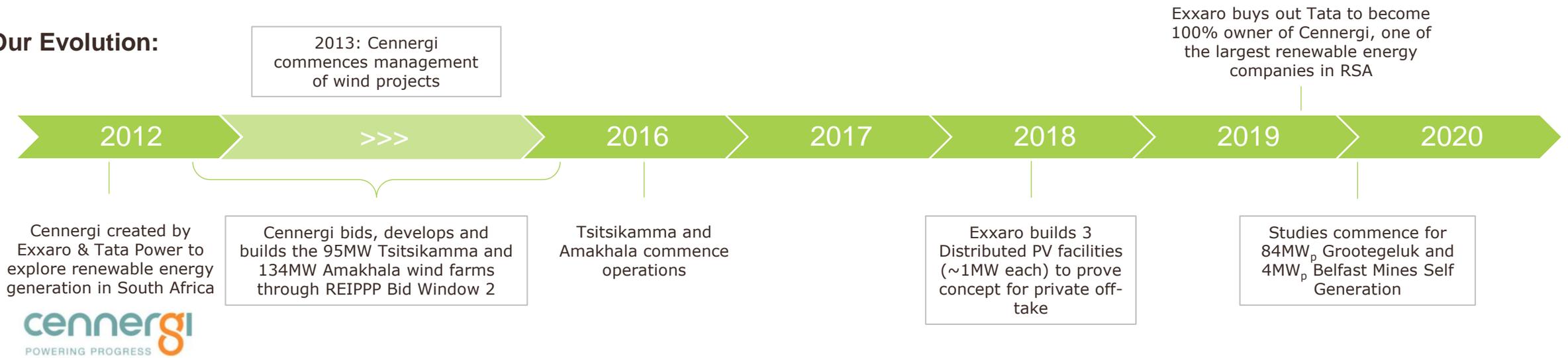
May 2021



# Exxaro Energy | Who we are

A Renewable Energy business providing Energy to the private and public sectors in select markets, leveraging Exxaro's unique networks and skill sets

## Our Evolution:



Renewable Energy solutions driving down Cost & Carbon Emissions in South Africa's Mining Sector

# Exxaro Energy | Capabilities

Experience & Networks, Cennergi & Exxaro symbiosis and Local & BEE credentials

As we are at the nexus of Energy and Mining, we are able to identify **synergies and economies of scale** through the potential combination of projects to the **benefit of all customers**

**Mining Networks**

**Government Networks**

As one of **South Africa's leading black-empowered companies** with a seat at the Minerals Council we are at the **forefront of RSA energy liberalisation discussions**

The Exxaro Group understands resources and **'speaks the language'** of mining customers. Adding Exxaro 'skin in the game' to projects **gives banks comfort, increasing bankability**

**Resource Evaluation**

**Excellence in Project Management and Optimisation**

We are renowned for our Project Management and Operations through both the Cennergi and Exxaro brands, having **developed some of South Africa's largest and most advanced mining projects**

We are driven to reduce costs and carbon footprint of our customers. Our **Own Generation projects of circa 90MW** are pathfinder projects in the South African context

**Internal Energy Requirements**

**Experience in Project Life Cycle**

Experience in **all stages of project development, ownership and management** through both our REIPPPP and community level projects

**Strong brand in both Mining and Energy**  
**100% local company with strong BEE credentials and ownership**  
**Ample opportunity for synergies to the benefit of all customers**

# Exxaro Energy | Typical Problems to Solve



**Off-grid**



**Poor grid**



**Expensive  
grid**



**Carbon  
reduction**

# Process | Cradle to Grave Solutions

Exxaro Energy manages the complexity of the project from Concept through Operations

## Project Preparation

[2] months

### 1. Requirements & Data

Customer requirements: Off-grid, Poor grid, Expensive grid, Carbon reduction.

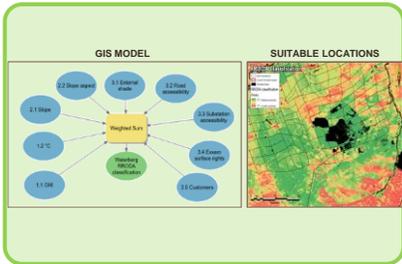
Understanding of site and load profile: Excess Energy, Peak, Min, etc.

### 2. Solution Screen

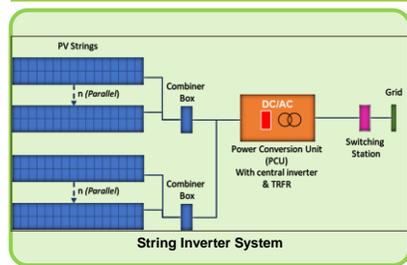
Option	Time to delivery	Expected Tariff	Ability to implement
On-site Generation: Solar PV	●	●	●
On-site Generation: Wind	●	●	●
On-site Generation: Wheel - Solar PV in x2, N Grid	●	●	●
On-site Generation: Wheel - Wind in x2, VV Case	●	●	●
On-site Generation: Wheel - REPPPP projects	○	○	○

*Illustrative example*

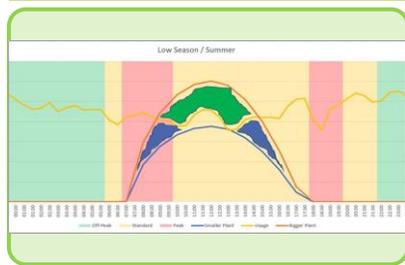
### 3. Initial Site Selection



### 4. Technology Criteria

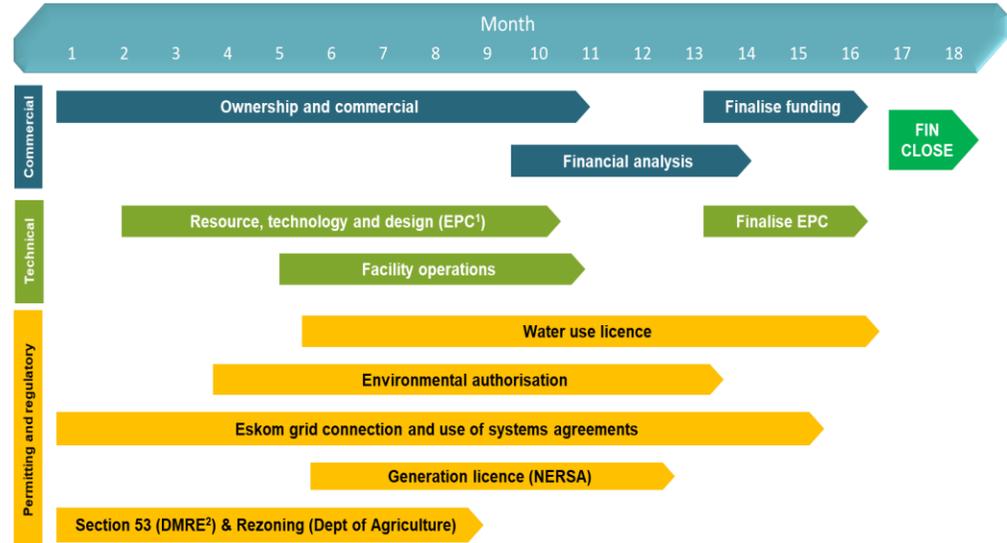
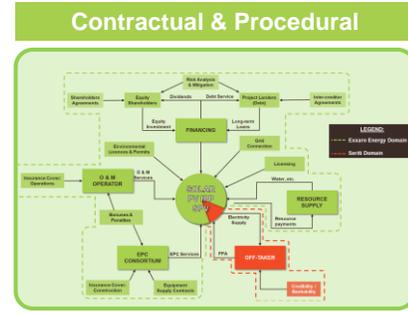


### 5. Optimisation



## Project Development

[12-18] months



## Construction & Operations

10 – 25 years

**Exxaro Energy manages the project throughout its lifespan**

# Case Study | Grootegeluk Mine

## Strategic Factors & Customer Requirements

**Characteristics:** Large, long-life mining customer supplying Matimba and Medupi power stations

**Customer Requirements:** 1. Reduce cost of electricity 2. Hedge future Eskom tariff increases 3. Future proof to allow for storage (and / or increased capacity) when cost effective / required

**Land:** Exxaro holds the surface rights.



Customer benefit:



Up to 36% reduction in Scope 1&2 emissions



c.12% electricity cost savings year 1

## Key Metrics (Concept Study)

DC Output	MW <sub>p</sub>	84
PPA term	years	20+
Life of Mine	years	40+
Construction period	months	15

**Solution Drivers**

- High local irradiation
- Customer land ownership

Optimal solution is a 'behind-the-fence' PV plant optimised for Eskom Mega-Flex shoulders and future proofed to allow for storage (and / or increased capacity) when cost effective / required

# RRODA | Proprietary Site Selection Software



POWERING POSSIBILITY

In-house algorithm allows us to quickly identify potential sites for lowest cost of energy

\* Renewable Energy Risk and Opportunity Domain Analysis

## FACTOR VARIABLES

Factor variables enable selective project goals by assessing the suitability of the non-exclusionary areas (these variables are typically weighted)

Climate (Meteorology) Criteria
Orography (Physical Geography) Criteria
Location Specific Criteria
Environmental/ Social Criteria
Regulatory Criteria

Annual Solar Irradiation	Site/ Road Accessibility	Grid Accessibility	Slope Grade	Aspect/ Orientation	Day-time Temperature	Land Use/ Ownership	Environmenta/ Social	Equivalent Sun Hours	Minimum Suitable Areas	Relative Humidity	Altitude	Cloudy Days	Dusty Days	Weather Conditions	Shading Obstacles	Land Profile	Cloud Coverage	Proximity to Mines	Telecommunications	Geotech./ Flood Risk	Distance to Cities	Water Availability	Closest Sea Port	Closest Airport	Off-taker Density	Financial Incentives	Distance to Shoreline	Electricity Price	Electricity Price Increase
24	24	22	23	10	10	9	8	3	3	4	3	2	2	2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1

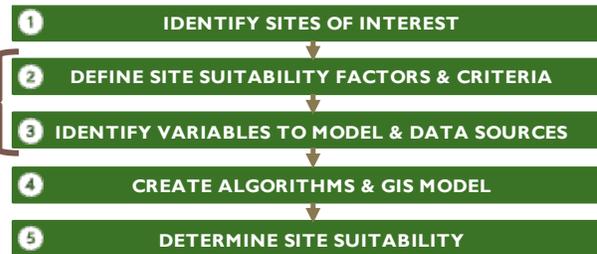
## CONSTRAINT VARIABLES

Constraint variables restrict site selection (exclusionary areas)

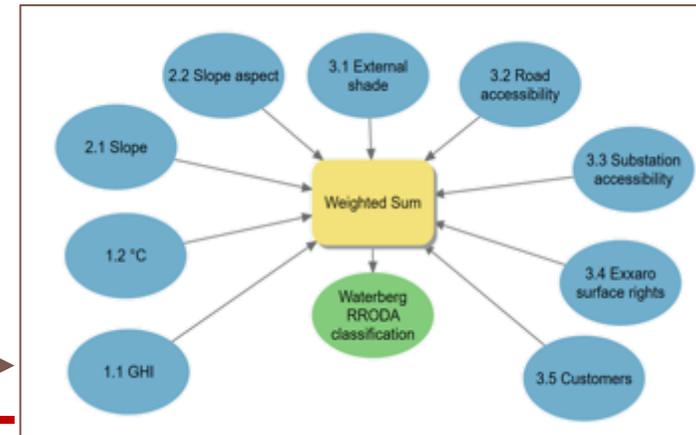
No need to assign weights to constraint variables

Urban Areas
Land Cover
Conservation Areas
Hydrographic Areas
Cultural Heritage Areas
Landscape (Scenic) Areas
Traffic Areas
Shoreline
Airports
Sandy/ Dusty Areas
Geo-hazard Areas
Hydroagriculture Areas
Quarries
Road & Rail Networks
Non-construction Areas
Flooding/ Erosion Areas

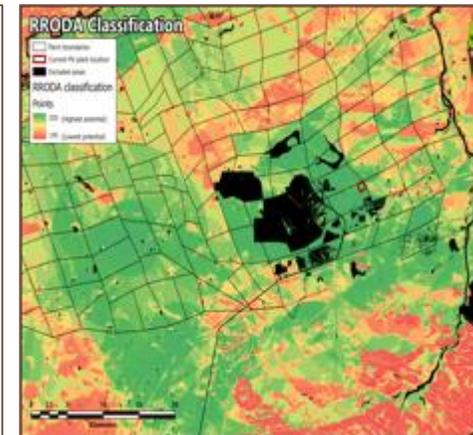
5-Step Process = Scientific Rigour



## GIS MODEL



## SUITABLE LOCATIONS



# RRODA Classification

RRODA classification

Value

355

145

--- Potentail solar areas (Exxaro surface rights)

--- GG - original looked at solar areas



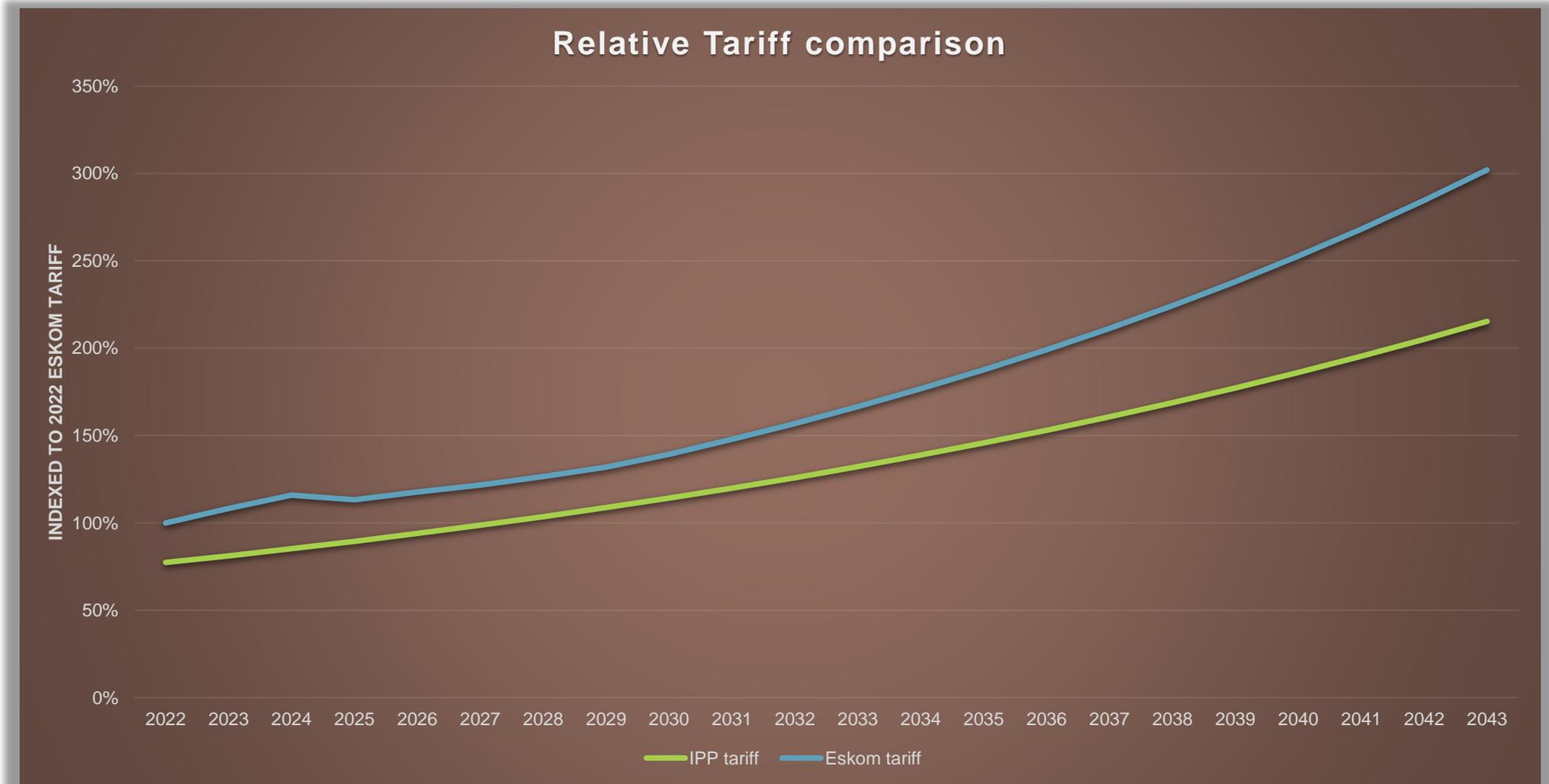
	Goedehoop	Van der Waltspan	Onbelyk	Eendrachtspan
<b>RRODA score</b>	299.53	291.11	292.79	296.47
<b>GHI</b>	3	3	3	3
<b>°C</b>	3	3	3	3
<b>Slope</b>	4	4	4	4
<b>Slope aspect</b>	4	4	4	4
<b>Shading</b>	4	3.99	4	3.99
<b>Road distance</b>	1.82	2.19	3.54	1.81
<b>Sub station distance</b>	1.03	0.36	0.002	0.84
<b>Hectares</b>	693.61	1044.83	289.65	1029.17

	Appelvlakte	Groothoek	Steenbokpan	Theunispan	Nelsonskop
<b>RRODA score</b>	310.46	319.27	313.96	307.56	326.73
<b>GHI</b>	3	3	3	3	3
<b>°C</b>	3	3	3	3	3
<b>Slope</b>	4	4	4	4	4
<b>Slope aspect</b>	4	4	4	4	4
<b>Shading</b>	4	4	4	4	4
<b>Road distance</b>	2	2.85	2.9	3.5	2.59
<b>Sub station distance</b>	1.7	1.99	1.62	1	2.09
<b>Hectares</b>	249.53	337.10	545.02	261.25	672.58



# Outcome | Greatest Savings for Customer

Long-term contractual tariff: savings from day one, increasing going forward



Eskom tariff: Forecast provided by Cresco Advisory (Pty) Ltd

IPP tariff: From Exxaro Energy concept study for Grootegeluk, increasing annually with CPI-linked escalations



**Renewable Energy solutions driving down Cost & Carbon Emissions in South Africa's Mining Sector**

# | Disclaimer

*Opinions expressed herein are by nature subjective to known and unknown risks and uncertainties. Changing information or circumstances may cause the actual results, plans and objectives of Exxaro Resources Limited (the company) to differ materially from those expressed or implied in the forward looking statements. Financial forecasts and data given herein are estimates based on the reports prepared by experts who in turn relied on management estimates.*

*Undue reliance should not be placed on such opinions, forecasts or data. No representation is made as to the completeness or correctness of the opinions, forecasts or data contained herein. Neither the company, nor any of its affiliates, advisers or representatives accepts any responsibility for any loss arising from the use of any opinion expressed or forecast or data herein.*

*Forward looking statements apply only as of the date on which they are made and the company does not undertake any obligation to publicly update or revise any of its opinions or forward looking statements whether to reflect new data or future events or circumstances.*