CRONIMET - MINING POWER SOLUTIONS
OPERATING WORLDWIDE
1. **Corporate Overview**

2. Business Model

3. Track Record

4. Target Markets

5. Contact
CRONIMET Mining AG

› CRONIMET Holding was established in 1980 in Karlsruhe, Germany

› The CRONIMET Group employs some 5,200 employees across four continents

CRONIMET Group is made of CRONIMET Holding and CRONIMET Mining

› CRONIMET Holding, with 56 offices globally, is a world leading stainless steal and raw materials recycling company

› CRONIMET Mining, established in 2004, is active across the entire raw materials value chain.
  › CRONIMET Mining entered the power and energy supply business in 2013, through its subsidiary CRONIMET Mining Power Solutions, based in Munich, Germany.
Corporate Overview
CRONIMET Mining - Power Solutions

CRONIMET Mining – Power Solutions GmbH

 › A subsidiary of CRONIMET Mining AG

 › Develops, plans, builds, finances and operates:
   › innovative captive hybrid power solutions for mining and industrial business worldwide
   › Large utility scale grid connected renewable energy power plants

 › Geographic focus:
   › MENA
   › Central & Southern Africa
   › SE Asia
   › Australia

Homepage: http://www.crm-ps.com
1. Corporate Overview
2. Business Model
3. Track Record
4. Target Markets
5. Contact
Business Model
CRONIMET Mining – Power Solutions

TURNKEY SOLUTIONS FOR UTILITY SCALE RENEWABLE POWER FACILITIES

CRM – POWER SOLUTIONS

Process Management across all Renewable Energy Sectors:
- PV
- Wind
- Biomass
- Hydro
- Geothermal
- Conventional Hybrids

Deal Flow Process Mgt.
Technical & Financial Analysis
Power System Engineering
Pre-Construction Consents

Financial Feasibility
SPV Structuring
PPA, EPC, O&M, SPA, Debt
CAPEX Financial Close

Engineering
Procurement of System Equipment
Construction
Commissioning & Testing

Monitoring
Maintenance & Repairs
Reporting
Asset Transfer
CRONIMET Mining Power Solutions supports utility providers in developing countries

› To improve the energy infrastructure
› Increase renewable energy consumption
› Satisfy energy demand

by providing them with turnkey solar PV plants at an negotiated PPA price per kWh.
Business Model
Power Purchase Agreement (PPA)

A 2 MWp PV power plant can save over USD 9.5 mill. over 20 years

PPA with Mining Company
CRONIMET Mining Power Solutions provides PV power plants for grid connected mining / industrial companies to support them

› Decrease their energy costs
› Payback time of the PV plant under 5 years
› PPA price increase after FY5 only 3.5%
› Utility prices – unforeseen development
Business Model
Products- PV/Diesel Hybrid System

CRONIMET Mining Power Solutions

Energy Cost Savings
Over 20 Years exceed
$ 52 mill.

› **Power Purchase Agreement:** an investor provides a PV Plant and sells the produced PV electricity to the end consumer at a price determined in the PPA.

› PPA price is to escalate only by the CPI rate of the country, as only increase of the O&M costs influence the PV energy price.

› Diesel price per kWh in FY1: over 140% higher than the suggested PPA price.

› In time, the energy cost savings increase immensely, as diesel fuel price rises by more than the annual CPI rate.
Business Model

Products- PV/Diesel Hybrid System (Thabazimbi)

- Speedy development and installation realization
- 60% PV penetration with passive system control
- Up to 60% diesel savings during daylight hours
- Mature technology
- Virtually no variable operating costs
- PV plant electricity is recognized by the diesel genset control system as a negative load, which reduces diesel energy output.
- Guaranteed grid stability

Guaranteed grid stability

Products - PV/Diesel Hybrid System (Thabazimbi)

Business Model

Forecast electricity price USD per kWh (Diesel)
- $0.00
- $0.20
- $0.40
- $0.60
- $0.80
- $1.00
- $1.20
- $1.40

Forecast Electricity Price USD per kWh (with PV)
- $0.50

Power AVG [kW]
- P_Gen_AVG [kW]
- P_PV_AVG [kW]
- P_Load_AVG [kW]

Up to 60% Daily Fuel Savings
1. Corporate Overview
2. Business Model
3. Track Record
4. Target Markets
5. Contact
“We sought immediate energy efficiencies”

<table>
<thead>
<tr>
<th>CRONIMET Chrome South Africa (Pty.) Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location and Deposit</strong></td>
</tr>
<tr>
<td><strong>Size</strong></td>
</tr>
<tr>
<td><strong>Resources</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Mining Right</strong></td>
</tr>
<tr>
<td><strong>Processing</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Products</strong></td>
</tr>
<tr>
<td><strong>Energy Resource</strong></td>
</tr>
<tr>
<td><strong>Energy Consumption</strong></td>
</tr>
</tbody>
</table>
Thabazimbi PV Diesel Hybrid Plant
(Project “Zimbi”)

Location: South Africa
Installed PV Power: 998 kWp
Installed Diesel Power: 1.6 MVA
Produced PV Energy p.a.: 1,800,000 kWh
Project Development: Three Months
Financing: Two Months
Construction: Three Months
Commissioning: November 2012

› The 1 MWp PV Plant will reduce the diesel consumption of the mine by 450,000 liters per year.

› Diesel price per liter (2013) = $1.20 (source: www.aa.co.za)

› Potential diesel savings per year = $540,000
Track Record
Planning – “Thabazimbi”

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**PV Plant Expense (CAPEX)**: $2.66 million

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**Solar irradiation energy yield (per year):** 1850 kWh/kWP

**1 MW of Photovoltaic (97% Availability):** x 1000 kWp

**Total Annual Electricity from PV**: 1,800,000 kWh

**Genset Efficiency Ratio (1/4 liter = 1kWh)**: x 0.25

**Annual Diesel Savings (liters)**: 450,000 liters

**Cost of Diesel / liter (2012)**: x $ 1.15 / liter

**Annual Diesel Savings ($$$)**: $500,000
Cronimet Mining – Power Solutions

› An experienced and innovative partner for energy solutions, having developed, structured, built and transferred over 20 MW of PV.

› CRM – Power Solutions management team combines transaction and advisory experience in over: 2000 MW PV, 3000 MW Wind, 500 CSP, 500 MW Hydro, 500 MW Geothermal, 500 MW Biomass, and 500 MW Waste to Power

- **Italy** - “Medicina”, 4.5 MW
  - 2011

- **Germany** - “Schierling”, 0.5 MW
  - 2013

- **Germany** - “Gut Werchau”, 7.7MW
  - 2012

- **Romania** - “Lucas”, 6 MW
  - 2013

- **South Africa** - “Zimbi”, 1MW
  - 2012

- **Germany** - “Schieben Berga”, 0.3 MW
  - 2013

- **South Africa** - “Zimbi”, 1MW
  - 2012

- **Germany** - “Schierling”, 0.5 MW
  - 2013

- **Germany** - “Schierling”, 0.5 MW
  - 2013
In 2008, fossil fuels accounted for 67% of 4,843 GW installed energy capacity world-wide. (EIA, 2011).

By 2035, 10% of coal based energy generation and 5% of the oil based energy generation will be replaced by renewable energy. (7,300 MW)

In 2008, renewable energy accounted for an estimated 18.7% of the global energy mix. This share is forecasted to grow to 31% (7,300 MW) of the global energy consumption by 2035 (IEA, 2012).

Today, approximately 50% of all newly installed capacity derives from renewable energy (IRENA, 2012).
Our target markets are: Central/Sub-Saharan Africa; South Africa; Australia, South East Asia; and the Middle East.

Over the next 10 years, the growth of renewable energy capacity will outpace conventional energy capacity.

For every 1kWp of installed PV capacity, a mining operation can save between from 450 to 680 liters of diesel per year.

“For us, every 1% improvement in productivity translates to a $170-million saving.”

BHP CE Andrew Mackenzie
An estimated 2.5 GW of captive diesel gensets are currently powering mining operations throughout our immediate target markets.

In countries that rely on fossil fuel imports, the cost of diesel energy can exceed $0.40/kWh, while the LCOE for PV is less than half the cost of diesel.

Fuel supply can be scarce, unreliable and expensive, causing blackouts and driving up operating costs.

A PV plant operates at a 98% lower cost than operating costs of a diesel genset.

Combined with a diesel genset, a PV power plant can significantly reduce the operating costs of a mine while will reducing up to 2000 tons of CO₂ per 1MW per year.
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