



## Battery Energy Storage Systems in Africa

Balama Mine,  
Mozambique

May 2022

# Solarcentury Africa – who we are and what we do

- **A leading fully integrated developer of solar & hybrid power plants**
- **One of the longest established solar companies around**
  - Solarcentury founded in 1998 and active in Africa since 2012
- **Focus on large captive power and utility scale projects, both on and off grid**
- **Unparalleled engineering capability**
  - Integrator of grid – LNG – HFO – diesel – hydro – wind – battery – solar PV systems
- **Technology and supplier agnostic**
  - Work with all Tier 1 battery and solar PV suppliers and technology types
- **Able to provide fully funded solutions under various commercial models**
- **Rapidly growing business committed to Africa**
  - African pipeline of over 60 projects representing some 2GW PV and 1GWh BESS



# The Balama Mine



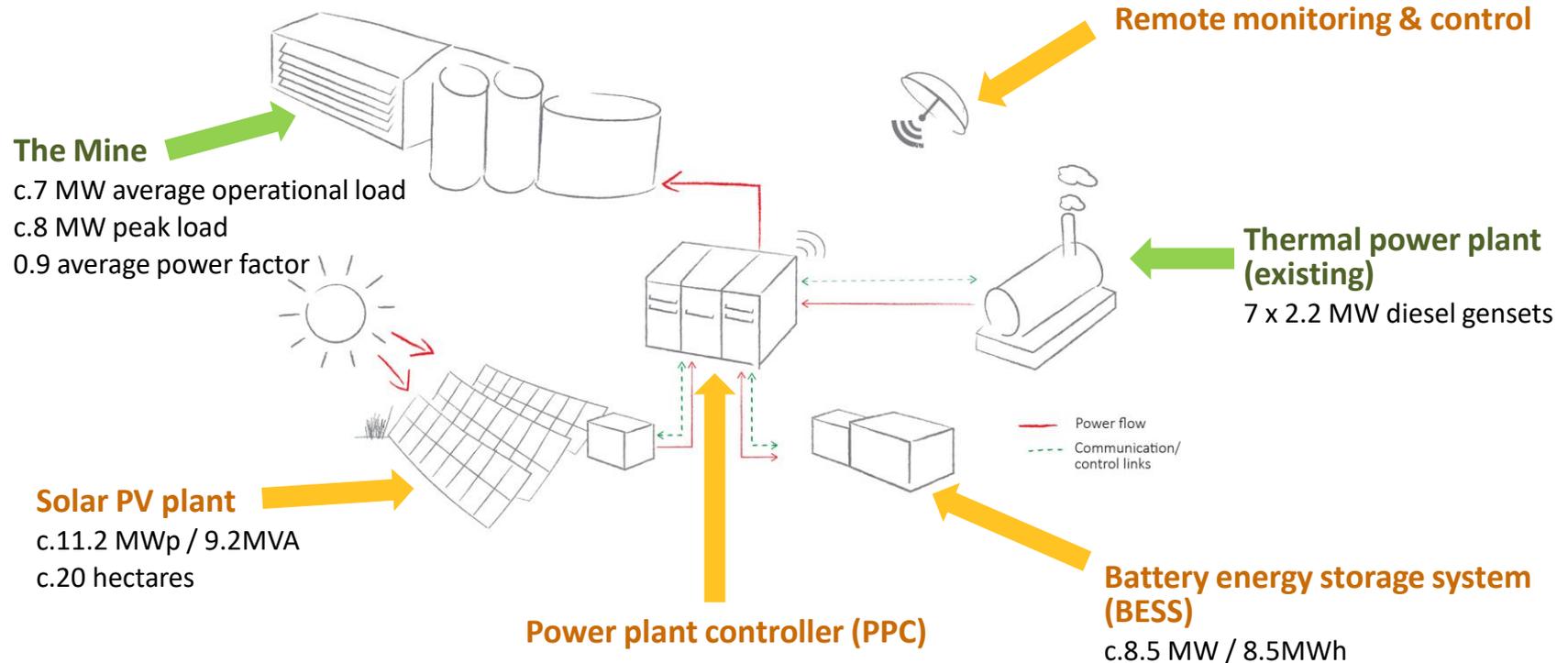
- **Approx. 265 km west of Pemba in Cabo Delgado**
- **Leading Tier 1 graphite mine supplying high-grade natural flake graphite globally**
- **Commenced commercial mining in 2019 with a life of mine of c.50 years**
- **Graphite is a key component of lithium ion batteries used in electric vehicles**
- **Owned and operated by Twigg, part of Australian-listed mining group Syrah Resources**
- **Strategy to become the leading global integrated producer and supplier of battery anode material to the growing EV battery market outside of China**

# What the solar + BESS hybrid system will deliver for Balama

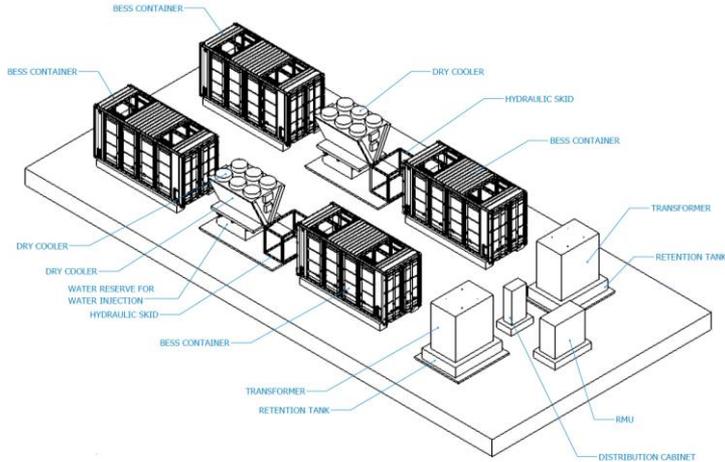


- **Delivered and operational by Q1-2023**
- **Greenest off-grid mine in Africa**
- **Fully funded solution**
- **Significant reduction in cost of power and exposure to future fuel price increases**
- **Significant reduction in CO<sub>2</sub> emissions and exposure to any future carbon taxing**
- **Strong ESG credentials for investors**
- **More 'green' graphite product, in line with increasing consumer demands in the end market**

# Our hybrid system design for Balama



# BESS specification and power plant controller design



## ➤ 8.5MW / 8.5MWh (1 hour) BESS

- Lithium ion
- Nidec Industrial Solutions / LG Chem

## ➤ 4 x 20' BESS containers

## ➤ Water cooled

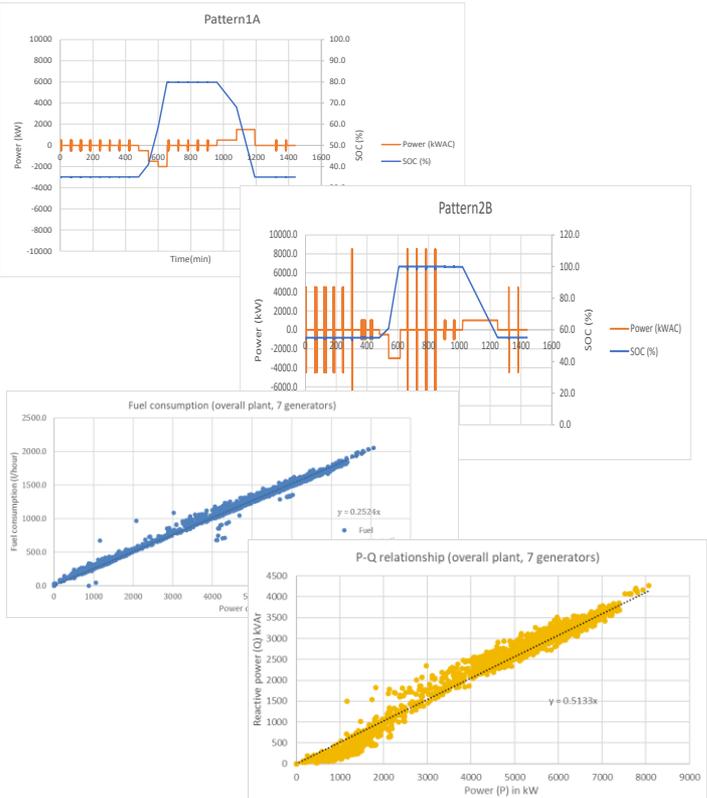
## ➤ Multi use-case flexible energy warranty agreement

## ➤ Nidec power plant controller, specified by Solarcentury Africa

- Full hybrid plant control (PV, thermal & BESS)
- Fuel optimisation
- Optimised renewable energy penetration
- Detailed operational philosophy to ensure robustness of power supply, which can improve over time

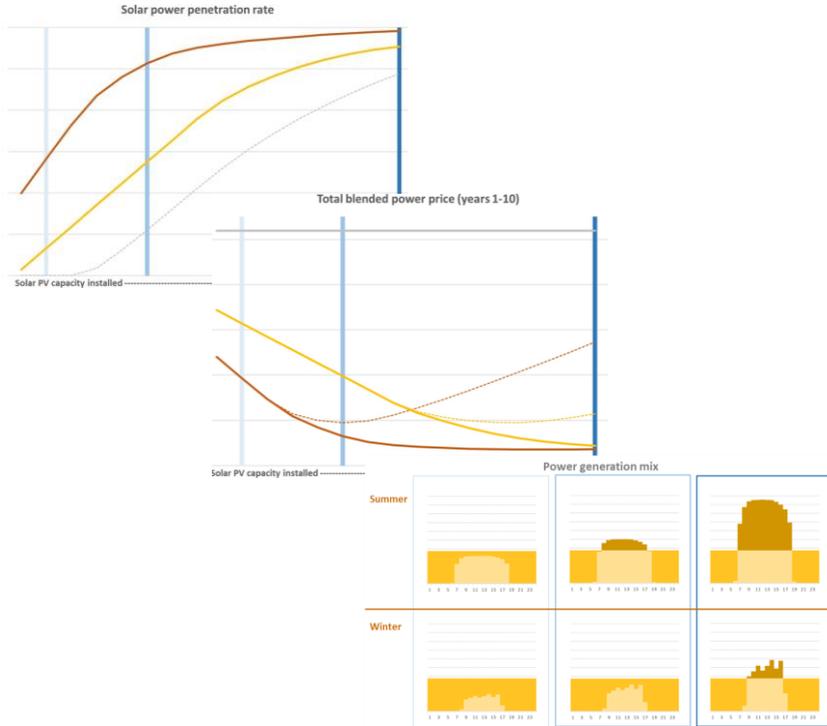


# What the BESS is being used for



- **BESS sized for both power and energy applications**
- **Grid forming**
  - Solar PV power smoothing
  - Solar PV peak shaving / energy shifting
  - Reduced solar PV curtailment
  - Thermal generator standby / reserve
  - Power quality & frequency services 24/7
- **Critically the BESS alone can meet 100% of Mine's load if needed**
- **Mine can run on 100% solar with the whole power system fully stabilised**
- **Solar PV inverters also provide power quality services at night when the Mine is running on diesel**
  - Reduces BESS operational hours

# Optimisation to best meet the Mine's aims for the project



- Maximise use of cheap renewable power
  - Minimise total blended power price
  - Reduce emissions
- ↓
- Achieved average c.35% renewable power penetration over the year
    - Corresponding decrease in diesel consumption and CO<sub>2</sub> emissions
  - Scope for Mine to improve this by changing power demand profile

