



# Reliable Renewable

Energy Solutions for Mining



Delivering quality, performance, reliability, security and savings

## Vergnet is a global renewable solutions company with a successful track record in providing high performance, reliable and affordable clean energy solutions for the mining industry.

Our renewable solutions, incorporating wind, solar PV and hybrid technology, make us a recognised partner of choice for mining companies throughout the world.

We have a 25 year experience in delivering power quality, performance and availability of supply in remote, isolated environments with extreme climatic conditions and limited electricity infrastructure.

With a strong focus on design, manufacturing and engineering innovation, we provide adaptable renewable solutions that are highly customised to both the local environment and the specific needs of our mining partners.

Our uniquely designed technology is adaptable for grid-connected and off-grid operations and has been developed specifically for extreme weather conditions including marine, salty, dusty, cyclonic, warm and cold environments.

Developing reliable, adaptable and affordable solutions that cut energy costs is at the heart of everything we do.



## SPOTLIGHT ON SOME OF OUR RENEWABLE ENERGY PROJECTS AROUND THE WORLD

### ZINC MINE

EL TOQUI, CHILE, SOUTH AMERICA

Vergnet's first wind farm in South America and comprising 6 GEV MP wind turbines in operation since 2010, the clean renewable energy produced at El Toqui contributes to power a zinc mine.

Isolated from the national electricity grid, our wind technology helps control energy costs. Our GEV MP turbines, designed to be easy to transport, install and maintain are adapted for the mountainous sites.

### IRON MINE

NOUADHIBOU WIND FARM, MAURITANIA, WEST AFRICA

Working with SNIM, Africa's second-largest producer of iron ore, we developed the Nouadhibou wind farm consisting of 16 GEV MP wind turbines.

Commissioned in 2011, the wind farm is connected to SNIM's thermal power plant and automatically adapts to grid and load configurations with annual fuel savings of 4,800 tons of fossil fuel.

Thanks to the excellent wind resource and system optimization, one wind turbine is paid back every three months.

### ISLAND POWER

TARAWA SOLAR FARM, KIRIBATI

Vergnet is providing turnkey design and construction of a 400 kWp Solar Photovoltaic project on the island of Tarawa with plans to generate 692 MWh of clean energy annually which feeds into the local grid.

To ensure the project is fully optimised with the local grid, Hybrid Wizard® manages new photovoltaic solar energy installations meeting load and grid stability requirements.

### HYBRID POWER PLANT

KIFFA, MAURITANIA, WEST AFRICA

The first of its kind in West Africa, the Kiffa Hybrid Power Plant will consist of 1.3 MWp solar PV plant combined with a 5 MW thermal plant.

Working with ABC Diesel, the solar PV farm that is currently under construction will supply more than 2,000 MWh of energy, saving almost 7,000 liters of fuel per year.

The hybrid plant will be the only generating station on Kiffa's isolated grid and will be controlled by Vergnet's Hybrid Wizard® to ensure maximum solar energy production.



## WIND, SOLAR PV AND HYBRID SOLUTIONS

Wherever your mining operation is located, our adaptable renewable energy solutions harness the power of nature to help reduce and secure your energy costs:

### WIND ENERGY

- ☞ We have installed over 900 of our medium scale wind turbines worldwide. Their rugged and reliable design has been the preferred choice to generate clean energy on several remote mining sites throughout the world.
- ☞ Available from 200 to 275 kW, our GEV MP C and MP R wind turbines are one of the best performing in the medium wind sector with strong production yields.
- ☞ Uniquely developed for extreme climatic conditions, our wind turbines are easily installed, transported and maintained.
- ☞ The perfect solution for your mining energy needs.

### SOLAR ENERGY

- ☞ Our photovoltaic solutions deliver a profitable renewable energy, compared to conventional production systems, on the operating period of the mine.
- ☞ Vergnet's demonstrated EPC and worldwide capabilities for on and off grid solar installations, combined with partnerships with Tier-1 equipment manufacturers ensure the delivery of high efficiency PV plants, able to perform in the most challenging environments.
- ☞ Ideally suited to mining environments, we have an adaptable solar solution that enables to generate clean, affordable energy, with low maintenance, tailored to your needs.

### HYBRID WIZARD®

- ☞ Our patented hybrid solution, Hybrid Wizard® is the first to maximize in real time renewable energy penetration, in any combination of wind, photovoltaic solar and battery storage, for new or existing diesel systems.
- ☞ A self-adaptive and automated solution, Hybrid Wizard® ensures cheaper electricity and security of supply for remote mining locations.
- ☞ Mining operators benefit from less fuel consumption, a lower cost per kWh and short payback time.



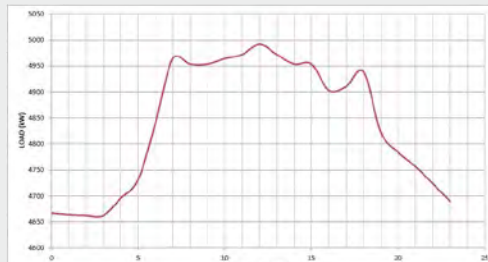
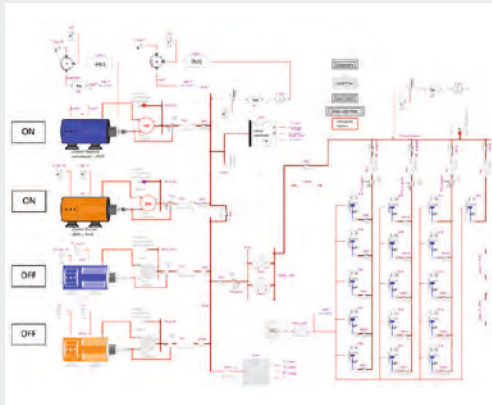
## WIND OR PV?

On commercial, industrial or remote grids, Hybrid Wizard® is able to optimize any renewable resource, to build a hybrid system which addresses the specific needs of each project. No need to choose between the Sun or the Wind, Hybrid Wizard® makes the most of locally available resources, and generates cheaper kWh, with no compromise on the supply or quality.

## AVERAGE OR INSTANT PENETRATION?

The hybrid language can be confusing... Instant penetration enables to show off nice figures, but average penetration of renewables is what really matters, as it is where you save fuel. Hybrid Wizard® has been designed with the profitability of the investment in mind, taking the challenges of remote sites into account. It enables to reach up to 60% average penetration of wind and/or PV into the grid, with a minimum use of additional enablers or storage. Thus, initial investment and maintenance costs are reduced, for a quicker ROI.

## MINING INDUSTRY



RESOURCE AVAILABLE: WIND  
 PAYBACK TIME: 3,8 YEARS  
 DIESEL SAVED: 2 320 000 LITERS/YEAR  
 LCOE HYBRID : - 20% VS ALL DIESEL COST

### 1. DATA COLLECTION

- Validation of input data with the Customer
- Validation of the Point of Common Coupling

### 2. MODELLING

- Modelling of the electrical system for simulation

### 3. LOAD FLOW AND STEADY STATE STUDY

- Identify operating limits of the renewable plant (voltage deviation,...)
- Steady-state validation of MV equipment (cables, transformers...)

### 4. TRANSFORMER SWITCH STUDY

- Validation of the transformer rating and energizing impacts (voltage drop)

### 5. SHORT-CIRCUIT STUDY

- Validation of MV equipment (cables, MV cells) in transient conditions
- Adjustment of protection settings

### 6. PROTECTION PLAN STUDY

- Definition of the protection grading curves

### 7. HARMONICS AND FLICKER STUDY

- Qualify power supply quality

## OVER 20 YEARS' EXPERTISE IN HYBRID SYSTEMS:

1992

First Wind-diesel plant

2007

First high penetration Wind-diesel plant

2011

PV-diesel plant

2014

HYBRID WIZARD®  
 Real-time hybrid solution

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