

# Technical Seminar for Cathodic Protection to GOGC Design Unit Specialists

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WITHIN THE JURISDICTION OF THE MINISTRY OF ENVIRONMENT, ENERGY & CLIMATE CHANGE



Source of Development, Supplier of Energy



## Alternative sources of CP power supply

- Engine -Generators
- Turbogenerators
- Thermoelectric Generators
- Solar Electric Power Systems
- Batteries
- Wind-powered Generators
- Gas Turbines
- Fuel Cells



## Alternative sources of CP power supply

Hybrid  
installation of  
solar power and  
wind generator





# Alternative sources of CP power supply

## Hybrid installation of solar power and wind generator

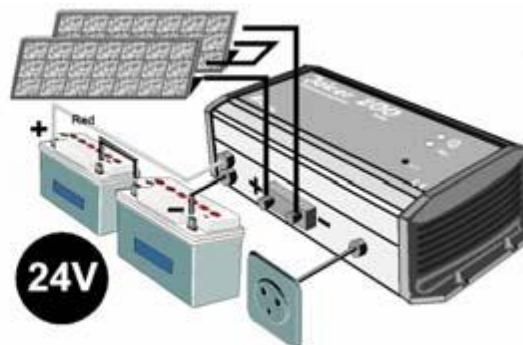
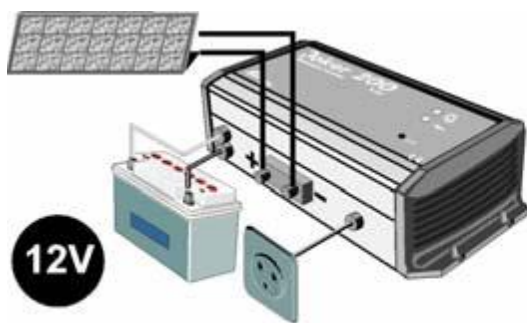
### Main Items

- Sine wave inverter (optional)
- Digital display solar charge controller
- Solar arrays
- Wind generator
- Batteries
- CP T/R unit with low no load energy consumption



# Alternative sources of CP power supply

## Sine wave inverters





# Alternative sources of CP power supply

## Sine wave inverters

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# Alternative sources of CP power supply

## Sine wave inverters

- Output voltage regulation : true sine
- Overheating protection
- Overload protection
- Short circuit protection
- *EC conformity compliance: EN 61000-6-1, EN 61000-6-3, EN 55014, EN 55022, EN 61000-3-2, EMC Directive 2004/108/EC, LVD Directive 2006/95/EC*



# Alternative sources of CP power supply

## Solar Power Charge Regulator





# Alternative sources of CP power supply

## Solar Power charge regulator

- *Digital display providing error messages,*
- *Batteries State of Charge (SOC) calculation,*
- *Pulse Width Modulator (PWM) charge control*
- *Deep discharging protection*



# Alternative sources of CP power supply

## Solar Arrays

- Monocrystalline or other high density cells
- Life time (e.g. 25 years)
- High impact resistance and protection against hail, snow, ice and storms
- Surface area and supporting structure able to withstand strong winds (min. 25 m/sec)



# Alternative sources of CP power supply

## Batteries

- *Dry type sealed*
- *Maintenance free*
- *Lead acid*
- *Sized to ensure proper operation of the Cathodic Protection System for some days to cover cases of reduced light conditions and / or solar arrays failure*



# Alternative sources of CP power supply

## Wind turbine

- Regulated according to the size and type of the batteries



# Alternative sources of CP power supply

## Risks

- Theft and vandalism
- Overload by the wind turbine can stop power
- Relying solely on solar power can stop power in case of prolonged cloudy weather



## Alternative sources of CP power supply

### Points to be paid attention

- Necessity of theft preventive systems (e.g. fencing, visible and hidden cameras etc.)
- Duly sized/designed and installed hybrid system (as relying solely on solar power can give rise to outages in case of prolonged cloudy weather)
- Correctly regulated wind turbine (using regulated brakes to avoid overloading)
- Using CP rectifiers fed directly by DC voltage power (thus doing away with inverters)
- Using rectifiers with low load self-consumption