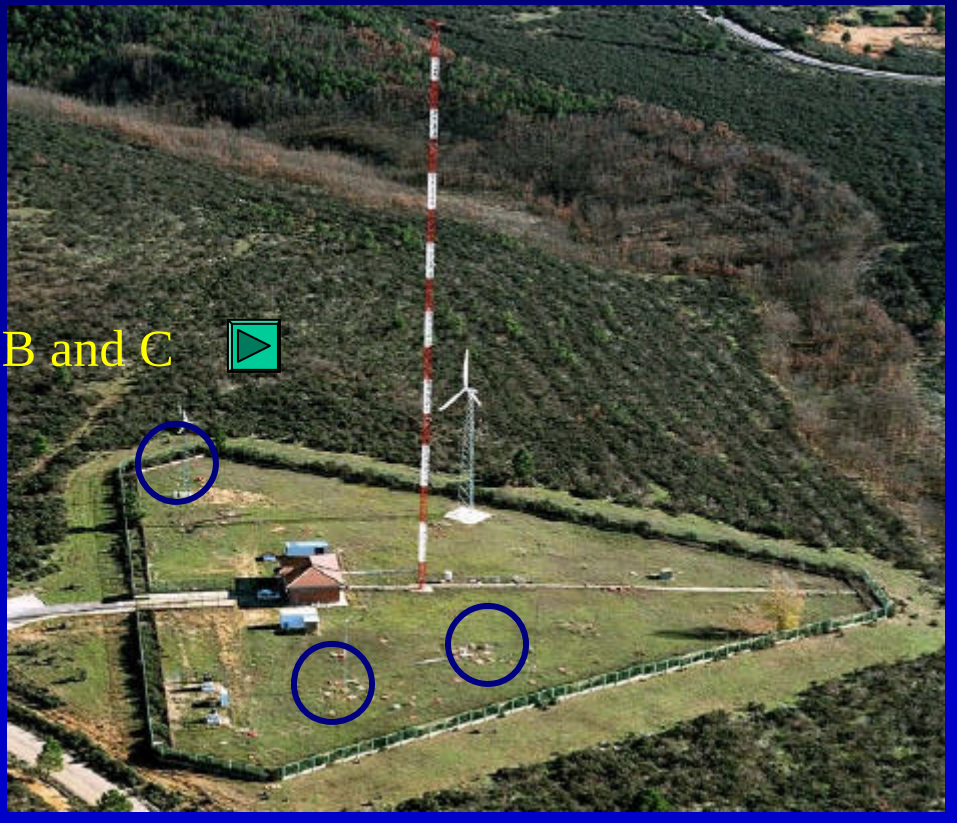
Capacities and Projects developed in CEDER

Plant diagram (I)

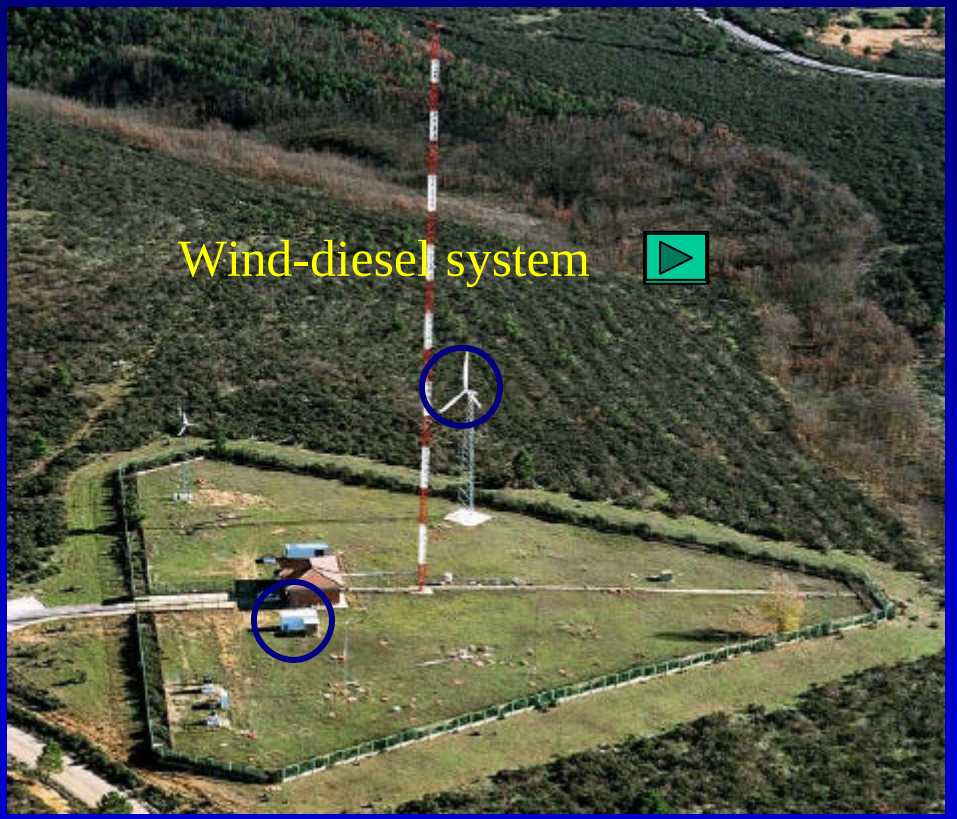
PEPA I (Small Wind Turbines Test Facility. 1st stage)

Places A, B and C



Plant diagram (I)

PEPA I (Small Wind Turbines Test Facility. 1st stage)



Plant diagram (I)

PEPA I (Small Wind Turbines Test Facility. 1st stage)

Wind pumping

Plant diagram (I)

PEPA I (Small Wind Turbines Test Facility. 1st stage)

CAPACITIES

- ✓ Characterization and development of **small wind turbines (maximum of 6 kW)**
  - ➢ **Power performance curve** certification
  - ➢ **Acoustic noise emissions** certification.
  - ➢ **Durability** certification.
  - ➢ **Safety and operation** certification.
  - ➢ Test of **components** (generator, gear box, blades, etc.)
- ✓ Collaboration with manufacturers, government, etc.
- ✓ Collaboration in the validation of **normative** for small wind turbines.
- ✓ Wind pumping.

Capacities

PEPA I (Small Wind Turbines Test Facility. 1st stage)

Batteries bank up to 300 V.

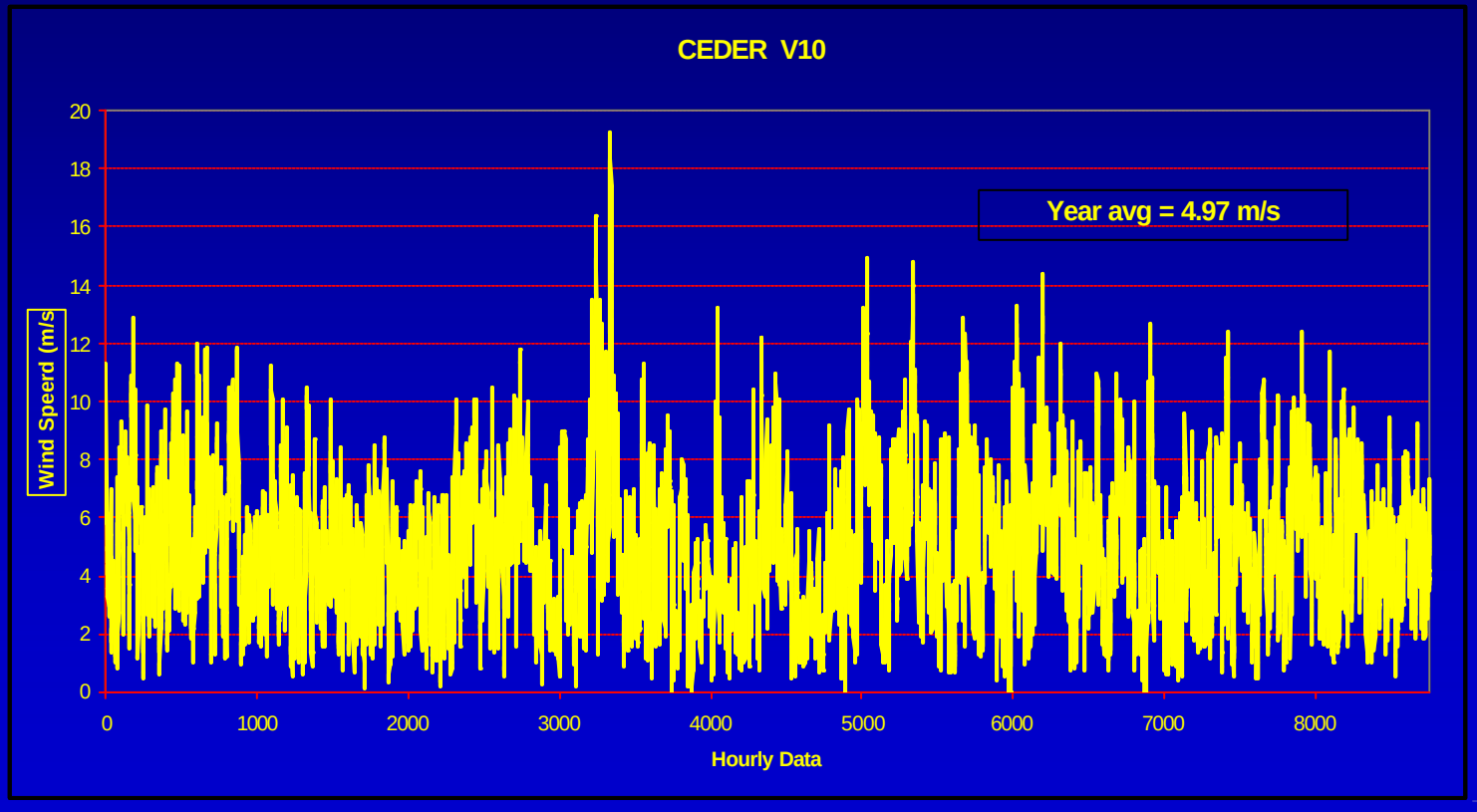
Continuous monitoring system with current capacity for 48 channels.

Charges: simulation of consumptions.

Inverters/chargers: versatility in the tests with batteries.

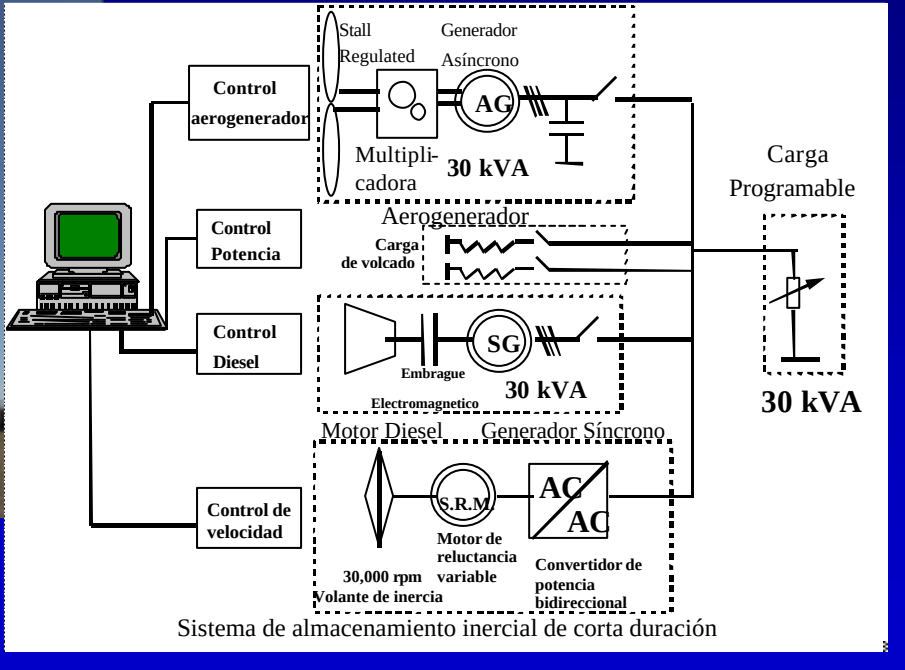
Average velocity

PEPA I (Small Wind Turbines Test Facility. 1st stage)



SEDUCTOR Project

Configuration of the wind-diesel-fluwheel system



Sistema de almacenamiento inercial de corta duración

Wind pumping

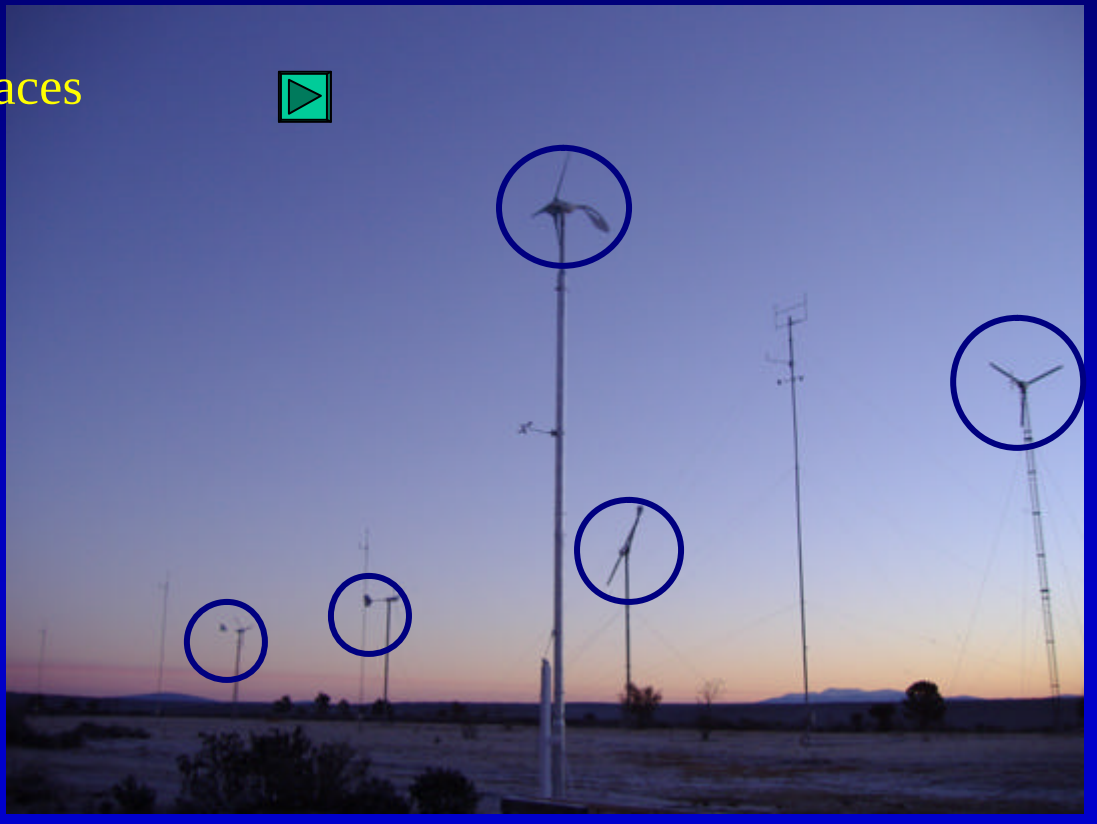
Test bed of wind systems for water pumping

- Maximum depth: 200 m
- Maximum flow: 50 m^3/h

Plant diagram (II)

PEPA II (Small Wind Turbines Test Facility. 2nd stage)

5 test places



Plant diagram (II)

PEPA II (Small Wind Turbines Test Facility. 2nd stage)

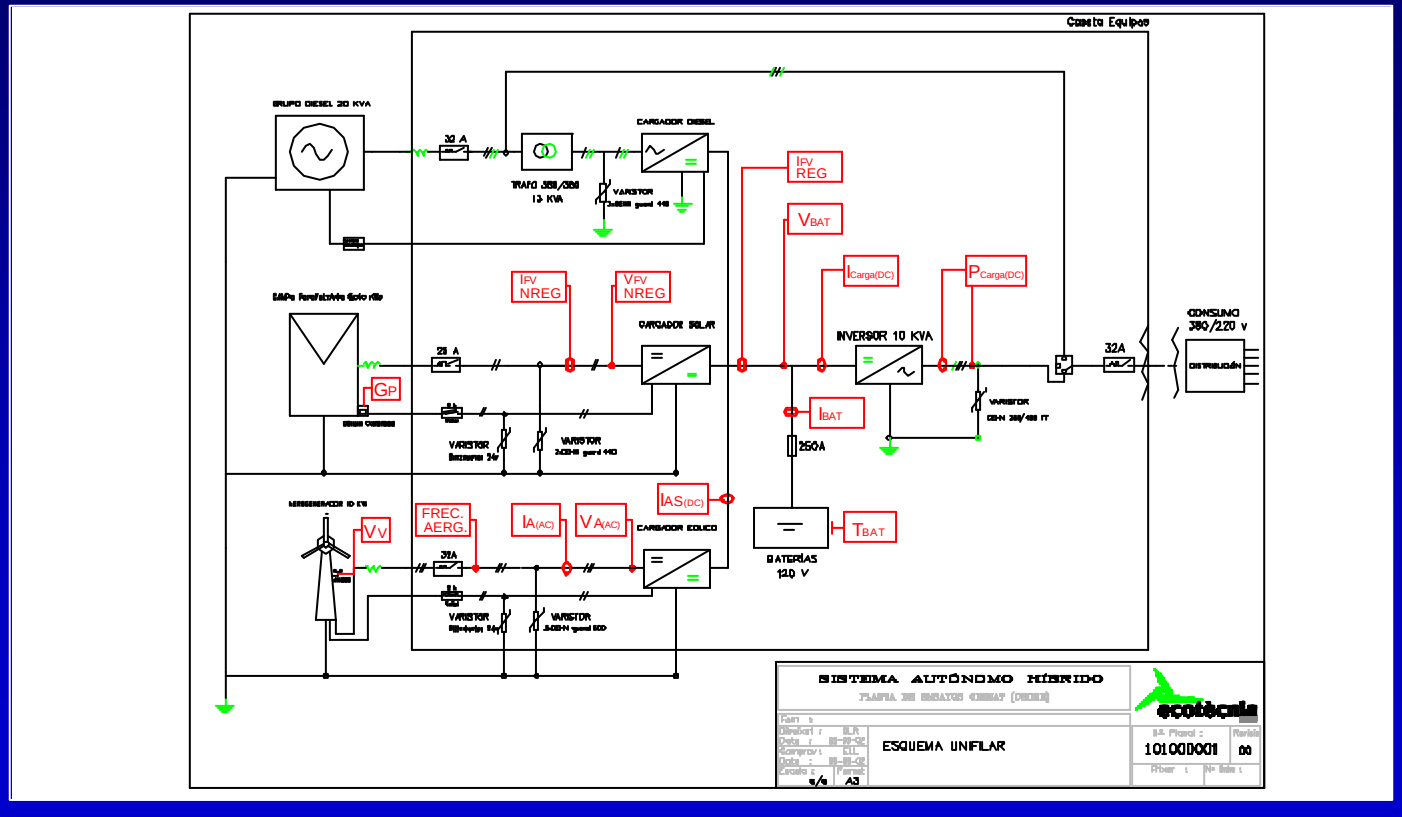
- ✓ Characterization and development of **small wind turbines (maximum of 25 kW).**
  - ➢ **Power performance curve** certification.
  - ➢ **Acoustic noise emissions** certification.
  - ➢ **Durability** certification.
  - ➢ **Safety and operation** certification.
  - ➢ Test of **components** (generator, gearbox, blades etc.).
- ✓ Test of inverters.
- ✓ Study of hybrid systems isolated and connected to weak grids.
- ✓ Possibility of increasing the test places easily:
  - ✓ Installation, design and characterization of new systems. For example: wind-hydrogen, wind-desalation.
- ✓ Studies of the quality of energy in wind turbines connected to the grid.

CICLOPS II

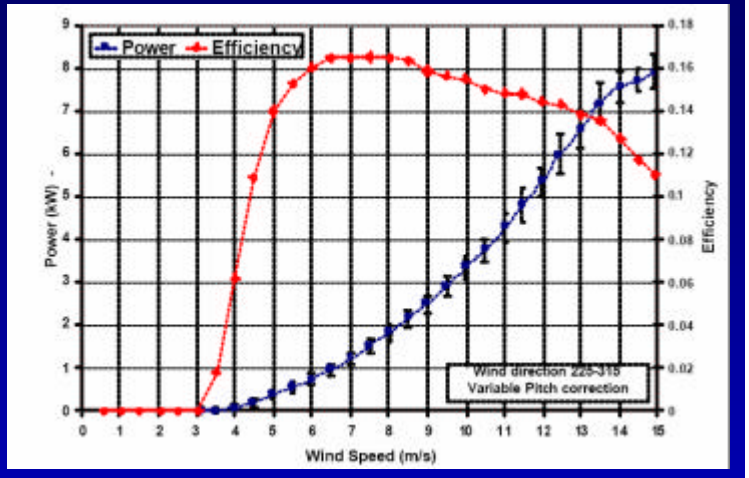
- Global system and of each of its parts characterization.
- Development of a methodology and of **design** tools. Validation with a real system.
- Development of distributed **control**, **supervisor control** and **management** systems.

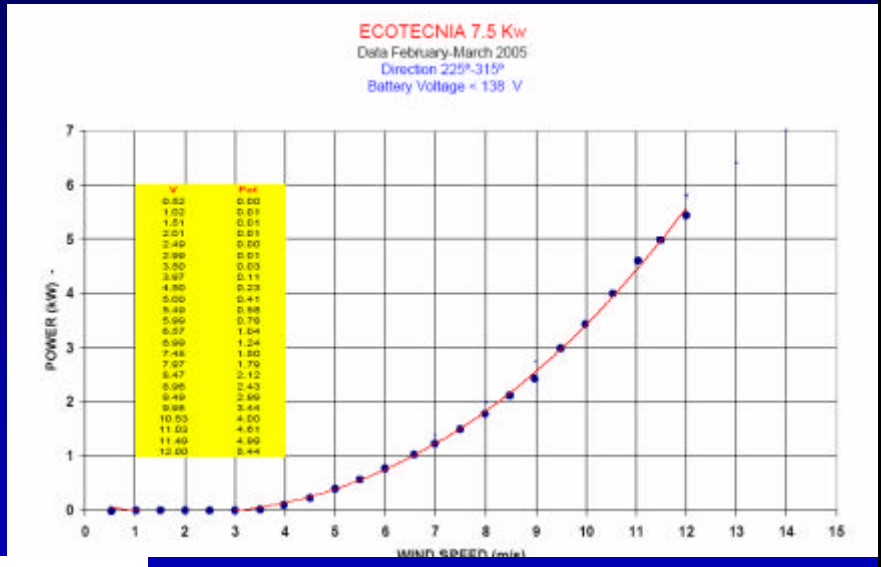
CICLOPS II

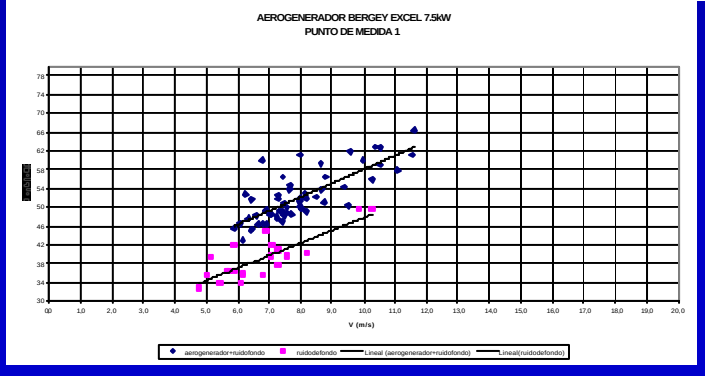
72 parameters measured



CICLOPS II

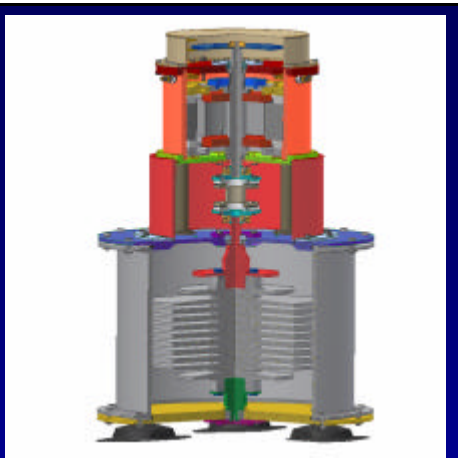

Power
Efficiency
Power (kW) -
Efficiency
Wind Speed (m/s)
Wind direction 225-315
Variable Pitch correction

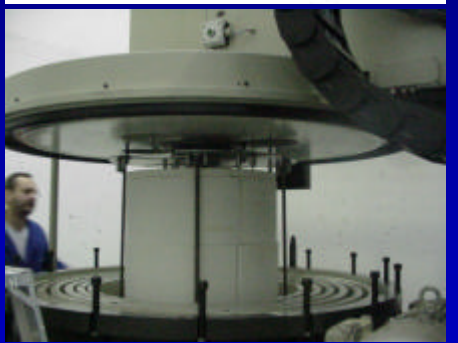

ECOTECNIA 7.5 Kw
Data February-March 2005
Direction 225º-315º
Battery Voltage = 138 V
POWER (kW) -


AEROGENERADOR BERGEY EXCEL 7.5kW
PUNTO DE MEDIDA 1
V (m/s)
aerogenerador+ruidofondo
ruidodefondo
Lineal (aerogenerador+ruidofondo)
Lineal(ruidodefondo)

FLYWHEELS

- ✓ Development of **kinetic storage with high rotational speed.**
  - ➢ Development of design and manufacture capacity of flywheels with high rotational speed with **compound materials.**
  - ➢ Development of **test procedures** with flywheels and other components at high velocity.
  - ➢ Carrying out **centrifugal tests** at high rotational velocity (up to 60,000 rpm and 120ºC):
    - ✓ Mechanical fatigue cycles.
    - ✓ Thermal fatigue.
    - ✓ Breakage.





PREDICTION OF WIND RESOURCES

- ✓ Development of **prediction tools** of wind power from wind data and wind power measured in CEDER.
  - ➢ Development of adaptation tools in complex **Prediction Numeric Models**.
    - ➢ Development of prediction models from temporal series.
    - ➢ Development of prediction models for high resolution **physical models** (MM5, WRF).
    - ➢ Development of specific tools for **micro-scale prediction**.

THANK YOU VERY MUCH FOR
YOUR ATTENTION