

## Renewable Energy

### **Biomass**

To build and set up plants to generate electricity (bioelectrical plants) in Macurije and Minas de Matahambre, both in the province of Pinar del Rio, capacity 7MWh and 3 Mwh respectively on the basis of the forestry biomass obtained from agro-industrial waste associated with exploitation of forest plantations, the industrial processing of wood harvested and the shredding of the biomass from areas infested with marabu scrub. The scope of the investment considers encouraging and exploiting energy forests guaranteeing stable and sustained supplies of the forestry biomass in demand by bioelectrical plants, as well as the acquisition of equipment and machinery for harvesting, shredding and transporting the wood waste.

Investment Type: **Joint-Venture**

Estimated Investment Amount: **Macurije 32.3 million USD & Minas de Matahambre 14.4 million USD**

**Market Potential:** Electricity will be delivered directly to the Sistema Electroenergetico Nacional at the points where they interconnect with the sawmill in order to replace imports

**Estimated Anticipated Results:** The generation capacity of the two plants annually will be 54.9 GWh. The plant's exploitation regime will be 24- hours a day, 365 days a year with a technical availability of 89%, signifying 7,008 H of generation every year. We anticipate that with the building of these bioelectrical plants, the replacing of 14.3 thousand tons of fossil fuel will annually save 7.9 million USD. The price for the sale of electricity will correspond to the purchase price of the UNE

### **Bioelectrical Plants with 30MW to 60MW capacity**

To install 30MW to 60MW capacity bioelectrical plants to generate electricity, high pressure and temperature steam, using for this the bagasse during harvest as fuel and converting it into technological steam for heating via cogeneration. The surplus electricity not used by the mill is delivered to the national electrical energy system; besides the harvest, other biomass (not sugarcane) can be used. The bioelectrical plant shall be attached to a mill and may be associated to a Production Administration Contract for that mill in order to guarantee greater amounts of biomass (bagasse) and to improve its efficiency.

Investment Type: **Joint-Venture**

Estimated Investment Amount: **Would be between 72 and 144 million USD**

**Market Potential:** The electricity produced would be destined for national consumption to replace oil imports used in the production of electricity at the thermoelectric plants.

**Estimated Anticipated Results:** Acceding to modern technologies and financing, reducing kWh production costs, increasing energy supplies guaranteed for the country and reducing local and global environmental pollution. Accelerating the rhythm of replacing electricity produced with oil consumption thereby at the same time guaranteeing payments with the value of the saved oil for these thermoelectric plants.

### **Maisi Wind Farm Project for 174 MW**

To develop a project with regional scope to install a power of 174 MW, along the coastal strip of the Maisi Peninsula. For this purpose, to set up contiguous 4 wind parks (PE), developing 2 of 51 MW on the basis of 200 m of the coastline and the other 2 of 35 MW further inland and behind the first two. Each PE of 51 MW would have 34 air generators (AG), nominal unit power of 1.5 MW and axle box height of 70 m or more. Each PE of 36 MW would have 24 units of the same power. As an option, we could install a similar range of total power using a proportional number of air generators in ranges of unit power greater than 1.5 MW. The project will include installing electrical networks and internal communications and exit substation(s) for linkage with the National Electric System network (SEN). Electricity generated is delivered by the enterprise at the interconnecting point, under a energy sale Contract (PPA) signed by UNE for a term of 20 years.

Investment Type: **100% Foreign Capital Enterprise. Under the COO contract**

Estimated Investment Amount: **Investment estimated for the 174 MW at 285 million USD**

**Market Potential:** Electricity will be generated for the Sistema Electroenergetico Nacional with the purpose of decreasing the use of fossil fuels, reducing pollutant gas emissions and contributing to the safety and energy independence of the country.

### **Banes Wind Farm Project for 102 MW**

For this purpose, to set up contiguous 2 wind parks (PE), each having 51 MW power; each PE of 51 MW would have 34 air generators (AG), nominal unit power of 1.5 MW and axle box height of 70 m or more. As an option, we could install a similar range of total power using a proportional number of air generators in ranges of unit power greater than 1.5 MW. The project will include installing electrical networks and internal communications and exit substation(s) for linkage with the Sistema Electroenergetico Nacional network (SEN). Electricity generated is delivered by the enterprise at the interconnecting point, under a energy sale Contract (PPA) signed by UNE for a term of 20 years.

Investment Type: **100% Foreign Capital Enterprise. Under the COO contract**

Estimated Investment Amount: **200 million USD**

**Market Potential:** Electricity will be generated for the Sistema Electroenergetico Nacional with the purpose of decreasing the use of fossil fuels, reducing pollutant gas emissions .