



**FIG Working Week**  
 – Bridging the Gap Between Cultures  
 Marrakech, Morocco  
 May 18-22 2011

*“Project for the development of micro-generation plants in agriculture”*

**“The best energy is the one not consumed”**



Massimiliano DE MARTIN- Italy



**FIG Working Week**  
 – Bridging the Gap Between Cultures  
 Marrakech, Morocco  
 May 18-22 2011

In our times, it is crucial to evaluate with all our skills and acumen the use of renewable power sources in order to verify the sustainability on the long run of today choice.




Massimiliano DE MARTIN- Italy



## FIG Working Week

- Bridging the Gap Between Cultures  
Marrakech, Morocco  
May 18-22 2011





ACTION

Massimiliano DE MARTIN- Italy




## FIG Working Week

- Bridging the Gap Between Cultures  
Marrakech, Morocco  
May 18-22 2011



Type of plant

- . Process: Biomass fuel plant – droppings from poultry farms;
- . Electric power output: 50 kW of electricity. All the energy produced will be sold to the GSE under the "all-inclusive fee";
- . Thermal power available: 120KW of heat in the form of hot water used by the air-air heat exchanger to desiccate the biomass;
- . Consumption of biomass fed into the furnace: 300 kW/h;
- . Heat power: 2.1 kW/kg of dry matter;
- . Burned excrement: 145 kg/h of bedding "as is" which for 8.000 hours per year means 11.600 quintals per year;
- . Hours of operation expected: 8.000 hours per year
- . Mobile grate combustor with automatic unloading of ash, lined with high-strength refractory material;
- . Heat exchanger air/air (no water consumption) in special steel with high resistance to corrosion at high temperatures;
- . Turbine and induction motor;
- . Inverter to stabilize the frequency;
- . Combustion and operation control panel with connection for remote control;
- . Connection to network via inverter
- . Network protection system;
- . Fully automated continuous operation;
- . Plant dimensions: 2.75 x 3.75 x 3.95 (height)
- . Storage dimensions: the company already has the manure heap;
- . Transport from manure heap to desiccation/burner unit: as per the maneuver spaces shown in the drawings.

Massimiliano DE MARTIN- Italy





**FIG Working Week**  
- Bridging the Gap Between Cultures  
Marrakech, Morocco  
May 18-22 2011

**Biomass used**

- . droppings from poultry farms possibly supplemented with other biomass available on the farm;
- . The main purpose of the plant is to dispose of biomass;
- . For this reason we have chosen a micro-cogeneration plant - only 50kW/h - dimensioned for the production of the single farm;
- . No need to travel (0 kilometer) to get the supply of biomass to burn.



Massimiliano DE MARTIN- Italy



**FIG Working Week**  
- Bridging the Gap Between Cultures  
Marrakech, Morocco  
May 18-22 2011


**Description of intervention**

- . Permissions and technical documentation for compliance with legal standards (opinion of the Town Council, the Local Health Unit and the Fire Brigade);
- . Construction works: plant protection canopy, plant positioning platform, handling areas;
- . REI 120 wall separating the storage/desiccation area from the combustion plant (Fire Brigade requirement);
- . Installation and testing of cogeneration plant and biomass storage/desiccation plant;
- . Verification of compliance with legislation, correspondence of certification (emissions, noise) to real conditions;
- . Decommissioning and restoration of the area create no problem since it consists of parts made of iron and a pit in reinforced concrete



Massimiliano DE MARTIN- Italy





## FIG Working Week

- Bridging the Gap Between Cultures  
Marrakech, Morocco  
May 18-22 2011

Emissions


Compliance with the parameters of Legislative Decree 152 "Environmental Code" is guaranteed and monitored continuously.

Although low power, the high temperature combustion of biomass can achieve a high combustion efficiency with low emissions of dust particles, SOx, NOx and CO.

Fine dust

This subject is extremely complex and meant for experts. We emphasize that:

- the proposed system reduces the production of other systems with much higher flow rates and pollutant values;
- the amount of emissions is very limited, slightly higher than that of methane, particularly when compared to fossil fuels.



Massimiliano DE MARTIN- Italy



## FIG Working Week

- Bridging the Gap Between Cultures  
Marrakech, Morocco  
May 18-22 2011

Pollution from transportation of biomass

Absent

Complies with the limit < 55dB. It is in the interest of the company, considering the activity it carries out and the visitors at the stables.

Water consumption

For this reason - as well as for loading - it was decided to locate the plant partially underground.

Ash

Approximately 25%. After analysis and authorization, we believe the ash can be scattered on the land.

Noise pollution

None



Massimiliano DE MARTIN- Italy

**FIG** Marrakech WW2011

**FIG Working Week**  
 - Bridging the Gap Between Cultures  
 Marrakech, Morocco  
 May 18-22 2011

*Considerations: Many farms have problems in the disposal of manure, particularly after the Nitrates Directive came into force to protect against groundwater pollution. This precludes spreading it in the fields*

*Proposal to use this manure as fuel to produce 50 kW/hours of power and 120 kW/h of heat to be used to dry the stocks and produce hot water*

*The Plant model is particularly suitable for farms with waste processing. Moreover it can arouse a lot of interest from the scientific community*

**PROSPETTO IMPIANTO** | Scala 1:100

**PIANTA IMPIANTO** | Scala 1:100

Massimiliano DE MARTIN- Italy

**FIG** Marrakech WW2011

**FIG Working Week**  
 - Bridging the Gap Between Cultures  
 Marrakech, Morocco  
 May 18-22 2011

**Points of Strengths**

- The farm uses only the waste coming from its agricultural activities as fuel (without outside input)
- Energy efficiency of the system is high: 26% power efficiency and 56% thermic output
- Well tested technology (based on a moving-grill burning chamber, an air-to-air heat exchanger and a turbine)
- analyses conducted on tests done to verify both the functional aspects of the burning and the environmental ones
- All the environmental aspects are better managed

Massimiliano DE MARTIN- Italy



**FIG Working Week**  
 - Bridging the Gap Between Cultures  
 Marrakech, Morocco  
 May 18-22 2011

**Environmental aspects**

- Emissions are well below the legal limits thanks to the safety of the plant
- No use of water
- Land use extremely limited (150 square meters including the place where manure is stored and dried)
- Easy to run, as it is all automatic (the manure is just stored directly in proper spaces for drying, thereby avoiding the need for transport to special dumps)



Massimiliano DE MARTIN- Italy



**FIG Working Week**  
 - Bridging the Gap Between Cultures  
 Marrakech, Morocco  
 May 18-22 2011




Massimiliano DE MARTIN- Italy








Marrakech WW2011

## FIG Working Week

- Bridging the Gap Between Cultures

Marrakech, Morocco  
May 18-22, 2011

*Now it has become our ethical duty to return, if possible, everything we have taken from nature and its rules: its balance.*

*The culture of the surveyor to create beauty.*

Thank you very much




Marrakech WW2011

Massimiliano DE MARTIN- Italy