



Castiglione Fiorentino plant, Arezzo – Tuscany – Italy  
 Total area: 2350 m<sup>2</sup>; Total photovoltaic modules: 1408; Power rating: 352.00 kWp; Expected annual production: 441 927 kWh;  
 Reduction in CO<sub>2</sub> emitted into the atmosphere: 234.22 Tons; TEP reduction: 82.64 Tons

#### Solarys offers investors profitability and technological competence

The second ABB partner is Solarys, a company based in Arezzo set up in 2007 by Michele Burbi, now Managing Director and our reference person, and Alessio Mezzanotte, who were then joined by Iacopo Magrini, who subsequently moved to Graziella Green Power as CEO.

The company operates in the field of design engineering and site management, dealing with both commercial and financial aspects. Solarys proposes investment plans, clearly outlined in terms of capital required and expected returns, for large-scale projects, which Solarys develops independently, integrating engineering skills and economic-financial competences.

#### The structure of Solarys

Solarys has a turnover of approximately 7 million euro with 15 collaborators organised into two areas of competence:

1. technical-administrative, under the responsibility of Michele Burbi and consisting of engineers and administrative-financial specialists in project finance
2. technical-operational, managed by Alessio Mezzanotte and consisting of technical personnel with competences in several sectors (town planning, regulations and standards, electrical and construction site skills, site foremen).

#### The “Find-pro” strategy guarantees attractive proposals and minimises financial risks

According to the “Find-pro” strategy (Full Indirect Procurement) Solarys deals with all the aspects concerning work order management but does not undertake purchase of the material, which is left to the client company. It is a sustainable growth business model. Not dealing with the purchase of materials means avoiding large investments of capital and being able to take on sustainable financial commitments using existing credit lines.

In addition, by not undertaking resale of the material used, Solarys eliminates a mark-up in the price chain, consequently making the project more competitive and attractive for industrial investors.

#### A race against time

The Photovoltaic Park of Malalbergo, the largest photovoltaic installation in Tuscany, began operation in February 2011 over an area of approximately 26 hectares in the municipality of Cortona. A power of approximately 10.5 MW is installed, equivalent to the requirements of roughly 5500 households, and the consequent reduction in CO<sub>2</sub> emitted into the atmosphere is equivalent to 7200 tons / year.

Construction of the plant was not without obstacles: having defined the project, all the necessary materials had been put on hold and a deposit had been paid, given that connection to the grid was expected in the following six months.

Only one month after beginning work, the “Romani” Ministerial Decree was published, which was literally a bolt from the blue.

The Decree brought forward the grid connection deadline in order to benefit from the incentives, anticipating by three months the date of completion of the work originally planned by Solarys. The implications were serious: without the incentives, the overall profitability would be badly jeopardised.

Having overcome the initial temptation to abandon the project, the time schedule (GANTT) was completely revised and drastically accelerated.

Several suppliers had to be changed because not all of them were able to anticipate delivery of the materials by such a large margin. The gamble paid off, however: the installation was connected to the grid two days before the deadline established by the Decree, three months prior to the date originally fixed for completion of the works.

Several manufacturers were willing to accept the drastic reduction in production times; these included ABB, which involved Marostica factory (298 combiners), the Frosinone factory (moulded-case switches TMax T8, 2500 A), the S. Palomba factory (modular circuit breakers S 200 and modular equipment for DIN rail – relays, contactors and timers) and the Garbagnate Monastero factory for the switchboards assembling.

This partnership to solve an extremely delicate situation consolidated relationship between Solarys and ABB, which is now an automatic reference for all new projects, also abroad. The lesson learnt from the experience was not to be tempted by opportunities which are apparently advantageous in terms of price but do not take into account even more important values, such as the time and effort spent by the sales personnel and ABB’s reliability, flexibility, speed of reaction and custom component capability.

ABB

Low Voltage Products division

[www.abb.com/solar](http://www.abb.com/solar)

Case note

## Italian photovoltaic excellence has its origins in Tuscan gold jewellery making



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The close partnership between two companies from Arezzo town, one with its roots in the gold jewellery sector, combined with a highly successful collaboration with ABB, has resulted in design and construction of the most important photovoltaic parks in Italy. ABB, Graziella Green Power and Solarys are an unbeatable trio.

#### Graziella Green Power: a renewable energy specialist

The first of the two ABB partners we interviewed, in the person of the CEO Iacopo Magrini, is Graziella Green Power, a company belonging to a group with origins very distant from the renewable energy world.

In 1958, under the name Graziella Group, a very young Graziella Buoncompagni, now Honorary Chairman, began to produce gold jewellery in a small workshop in Arezzo.

The success attained over the years and the determination to diversify the company’s activities led to the establishment of Graziella Holding, which currently comprises companies operating in very different markets:

- jewellery and accessories (perfumes, eyewear);
- real estate;
- hotels and catering;
- production of electricity from renewable sources.

Malalbergo plant, Cortona – Tuscany – Italy  
 Total area: 256 511 m<sup>2</sup>;  
 Total photovoltaic modules: 47 916;  
 Power rating: 10 500.38 kWp;  
 Expected annual production: 13 456 000 kWh;  
 Reduction in CO<sub>2</sub> emitted into the atmosphere: 7200 Tons;  
 TEP reduction: 3100 Tons



Ottana plant, Bolotana – Sardinia Region – Italy  
 Total area: 404 500 m<sup>2</sup> or 45 ha; Total photovoltaic modules: 103 240; Power rating: 24 879.6 kWp; Expected annual production: 40 000 000 kWh;  
 Reduction in CO<sub>2</sub> emitted into the atmosphere: 20 000 Tons; TEP reduction: 7480 Tons

Approximately 100 million euro have been invested in the latter sector over the last three years.

In particular, Graziella Green Power has been operating in the photovoltaic sector since 2010, it employs a staff of over 30 with a turnover of almost 20 million euro and produces approximately 100 MW/h of electricity via its 30 operational sites. The target for 2013 is to become the first private operator in Italy, running its own plants with installed power of over 60 MW, equivalent to the domestic electricity requirements of approximately 45 000 households, roughly the number of households in the town of Arezzo.

The first plants were constructed in Tuscany, but the field of action has since then been extended to Basilicata and Sardinia Regions to facilitate site management and servicing.

#### A winning organisation

Graziella Green Power has skilfully integrated the functions of two main elements necessary for success of the photovoltaic sector in Italy, with the aim of supplying its customers with complete turnkey plants: on one hand, an investment fund to ensure the availability of capital and, on the other hand an EPC (Engineering Procurement & Construction) to supervise all the design and construction phases of the production sites.

In addition, to guarantee capital investment, Graziella Green Power builds its own plants, directly supervising management and purchase of the materials and consequently being able to benefit from the margin that normally goes to the EPC, offering to young people qualified employment and developing significant in-house competences.

#### The importance of tailored solutions

Over the time, collaboration with ABB has gained in strength on some specific topics. First and foremost, the relationship of cooperation developed with the representative of the ABB sales network, which has guaranteed appropriate support for technical, logistical and management aspects, for pinpointing suitable products (and, where necessary, tailored solutions according to the needs of Graziella Green Power) and for other non-secondary aspects, such as payment terms. Secondly, the ability of ABB to develop custom products that meet project needs, with the end objective of ensuring maximum cost control. Lastly, timely interventions aimed at solving problems generated also by non-ABB components have proved to be particularly valuable.

#### Custom switchboards from Marostica

The ABB factory in Marostica has purposely modified the standard series of combiners (field and string control switchboards in DC) to meet a series of specific needs. In fact, combiners had to be compatible with Graziella Green Power proprietary system, which manages remote monitoring of the photovoltaic panels; minimisation of the number of combiners, and consequently their costs, was also necessary while maintaining the same overall performance. For this purpose the standard capacity of the ABB combiners to manage up to a maximum of 16 strings was brought to 24 strings, increasing the rated current to 200 A from the usual 128 A and studying new solutions to guarantee inclusion of the components in the standard switchboards and to ensure correct dispersion of the greater amount of heat produced. Data relating to the strings transmitted on Modbus line have been used to manage alarms for malfunctions of each individual string, to enable the entry of maintenance teams to the installations and to control safety cameras. In addition, it has been possible to correlate performances of the solar panels with radiation conditions identified by weather stations mounted on the installations. Lastly, availability and management of the huge quantity of data collected, has enabled Graziella Green Power to constantly widen the company know-how, to the advantage of its personnel and market success.

This line of combiners, originally produced as a custom solution, was subsequently introduced by ABB in the market as a standard solution.

#### The custom combiners in detail

In field and string control DC switchboards, certified and compliant with IEC 61439-2 Standard, the following ABB components have been used:

- Gemini series switchboards, size 6.
- Fuse holders E90 PV at 1000 V.
- Terminal blocks at 1000 V.
- Switch disconnectors TMax T3D 200PV, with maximum rated voltage of 1100 V.
- Surge protective devices OVR PV.

#### ABB products in Graziella Green Power photovoltaic installations

On average, each installation consists of nine electrical substations, each one with a transformer, a low voltage general switchboard provided with an auxiliary switchboard, and medium voltage switchboards. In all the switchboards of each substation, Emax E3 2500 A - 3200 A air circuit breakers are installed, according to the types of inverters mounted downstream in the installation. The auxiliary switchboards comprise various ABB components:

- moulded case circuit breakers TMax XT
- modular miniature circuit breakers S 200
- DIN Rail components including contactors and relays

#### Sardinia: home to one of the most important photovoltaic parks in Italy

In the industrial area of Bolotana in the province of Nuoro, in the very heart of Sardinia, one of the biggest photovoltaic installations in Italy has been constructed (400 000 m<sup>2</sup>) with an overall power of approximately 25 MW. The area is adjacent to an important Terna Company node for the transmission of electricity, a high performance HV/MV transformation substation, originally designed for a large industrial area. The installation comprises over 103 000 panels, 750 km of electrical cables and 25 000 supporting poles. The overall production of electricity is just under 4 MWh. Running and maintenance of the system is simplified by modular division into 24 sub-sections. Graziella Green Power assessed the feasibility of the project on the basis of the information provided by Solarys on construction techniques, timescales, estimation of human resources and economic-financial analysis; as project manager and EPC, Graziella Green Power appointed Solarys which accepted an order double the size (the PV park covers an area of approximately 70 hectares) of the largest installation ever constructed previously.

For two months, simulations were performed to identify the site time schedule, personnel requirements were analysed (it was decided to use local labour instead of the company's own resources, despite the obvious difficulties in coordination and adaptation to different work methods) and every logistical implication was assessed together with the geographical location of the installation on an island, when summer maritime transport is unfavourable to cargo, as tourist flows are given priority. To address any logistical difficulties about product supplies, having assessed the immediate availability of the materials in situ, extra products had to be purchased to cover possible emergency situations.

The design was carried out in partnership by Graziella Green Power and Solarys, which independently supervised also purchases programming and overall general site preparation.