

Executive summary (English)

Golf Club Le Fronde is located west of Turin, about 28 km from the city centre at the entrance of the Susa Valley (location of the 2006 Olympic Winter Games), and more precisely at a latitude of 45° 04' 08" north and longitude of 7° 25' 05" east in the municipality of Avigliana (Turin). The golf course offers amazing views of the Saint Michael's Abbey, the monument symbolic of the Piedmont region dating back to the 10th century and one of the finest religious complexes in the Alps. The abbey is perched above the entrance of the valley and was a place of transit for pilgrims between Italy and France and a source of inspiration for Umberto Eco's famous novel "The Name of the Rose". The Avigliana Castle, one of the oldest castles in the Piedmont region, dating back to the year 1000, can also be seen. It is now unfortunately in ruins. The Abbey of Sant'Antonio di Ranverso is located at the beginning of the Susa Valley. About one kilometre away is the Natural Park of the Lakes of Avigliana, a popular nature park established in 1980 to preserve the territory affected by the climate changes of the latest glaciations. The golf course also borders the Amphitheatre of Rivoli-Avigliana moraine that bears witness to the withdrawal of the Wurmian glacier. The area is located 380 m above sea level and covers an area of 60 ha, on which a 50 ha golf course is situated. The golf course lies on the northern slope of Mount Cuneo, a moraine mountainous landscape separating the valley from the two lakes of Avigliana. The site has 18 holes with a Par of 71 and was constructed in 1974 according to a design by John Harris and Marco Croze. The layout of the holes took into consideration the type of landscape and places of scenic interest with views of the Avigliana Castle and Saint Michael's Abbey. In doing so, 144 bunkers belonging to a Nobel plant for the full-cycle production of explosive material operating on a continuous basis from 1872 to 1965 were either demolished or buried. The ruins of the factory are one of the most representative examples of industrial archaeology in Piedmont. Some remnants, such as chimney stacks, water towers, turrets and underground bunkers are still recognizable today, although they are masked by the vegetation and landscaping. The plant was bombed heavily during World War II, and unexploded bombs had to be removed during the golf course's construction in the Seventies. This is the only example in Italy where an industrial area having a high environmental impact has been converted into a green space with sports facilities. The holes follow the profile of the surrounding hilly landscape and, together with the golf course premises, have replaced the dynamite factory's buildings and structures, of which some remnants attributable to industrial archaeology are still present on the territory, except for premises which were renovated and assigned to offices and/or warehouses. In particular, the golf bag storage area was created by restoring a building of the Nobel Dynamite Factory, and some well-preserved sentry-boxes are still present along the golf course. The environmental improvement achieved through the golf course's creation is also seen in the fauna species recorded in the area. Amongst the species of major significance are various species of amphibians, including the salamander (*Salamandra salamandra*), birds, like the European green woodpecker (*Picus viridis*) and the Great spotted woodpecker (*Dendrocopos major*) and raptors like the buzzard (*Buteo buteo*). There are also mammals: the European hedgehog (*Erinaceus europaeus*), European badger (*Meles meles*) and European roe deer (*Capreolus capreolus*). The Club was awarded "Committed to Green" certification in the Energy category in 2012 and in the Landscape category in 2013.

Nature

The 18 holes are constructed on a moraine hill. Inside and outside the golf course is the woodland typical of this foothills area, with a mix of oak-hornbeam trees and chestnuts. The area has numerous surface water tables. On the golf course there is a pond with cattails, a wetland used by various bird species that stop in this aquatic environment, in particular the grey heron (*Ardea cinerea*). Other common bird species include the common chaffinch (*Fringilla coelebs*). Among the mammals, in addition to the above-mentioned species, there are the red fox (*Vulpes vulpes*), European mole (*Talpa europaea*) and eastern cottontail (*Sylvilagus floridanus*) which was introduced for hunting purposes and has proliferated in the area. The wooded areas inside are connected to the perimeter woodland. However, there is no space to further enlarge the habitat fragments inside the golf course. The wooded areas crossing the course have a good diversity of trees and underbrush, small areas left to natural grass, which is cut twice a year. The stretches of woods from holes 2 to 6 are of particular importance. Only native species are planted and white pine (*Pinus strobus*), black locust (*Robinia pseudoacacia*) and northern red oak (*Quercus rubra*) are being gradually removed. The ponds are partly covered by vegetation; interventions are

implemented only on the playing areas. Unfortunately, pond sliders (*Trachemys scripta elegans*) are present, following their release by private citizens into the environment.

A tree survey has been carried out, reporting 3,500 plants on the club's grounds. A census has been taken for internal use showing the species present and 1,200 cards have been created for the plants monitored through a specific management plan. The arboreal park is monitored on a daily basis to assess the stability and safety of the plants. Some Turkey oaks (*Quercus cerris*) deserve special attention considering that they are hundreds of years old.

The site is not included in any protected areas, but the Natural Park of the Lakes of Avigliana is just over a kilometre away as the crow flies.

Significant shade created by the tall tree species and the northern exposure of Mount Cuneo, as well as the general weather conditions do not allow conversion to warm-season turfgrasses; therefore, the species and cultivars present are the only ones possible under such environmental conditions. *Agrostis stolonifera* and *Poa annua* were established on greens and collars (1 ha), as well as on tees (1 ha). *Lolium perenne*, *Poa annua* and *Cynodon dactylon* are present on fairways (10 ha). In the semi-rough, *Lolium perenne*, *Festuca arundinacea* and *Poa annua* are primarily found (2 ha).

Because treatments are extremely limited, various species of butterflies and wild flowers can be found on the golf course, including various types of orchids. In the areas where orchids grow, sign posts have been installed and the area has been delimited with white circles on the turfgrass.

Water

The site is located in a Pre-Alpine area and sees average annual rainfall (average of the last 30 years) of 917 mm with variable maximum temperatures ranging from +6 to +28°C and minimum temperatures from -3 to +16°C. The local climate sees ample rainfall and not extreme temperatures. This means that there is no great need for the artificial water supplied by the irrigation system.

The area is fed by two wells and two rainwater catchment areas. Despite this, in the three years under consideration (2011-2013) the average volume of water used on the golf course amounted to 59,500 m³, with average consumption of 1,190 m³/ha. This is significantly lower than the average of other golf courses in the Po Valley (1,339.9 m³/ha). (Golf Courses and Traditional Crops: a Comparison of Inputs - P. Croce, A. De Luca and M. Mocioni – European Turfgrass Society Conference – Pisa 2008). Club House fresh water consumption is stable at 2,000 m³/year, but shower water consumption has been halved thanks to the replacement of the shower heads and the installation of faucets with aerators. Water use in the Maintenance facility is variable, but extremely limited (from 56 m³ in 2011, to 179 m³ in 2012, from 131 m³ in 2013) due to the creation of water fountains along the course in order to reduce the sale of bottled water and plastic consumption.

The irrigation system is computer controlled with regular hardware and software maintenance.

The following actions have been taken to correctly limit water consumption:

Controlled growth and development of *Poa annua* (species sensitive to thermal stress)

Intensification of turfgrass aeration to reduce ground compaction and thatch development (coring, slicing, verticuttings and topdressings).

Watering times and volumes calculated based on visual inspection and weather station data.

Use of wetting agents.

Reduction of non-irrigated areas (non-irrigated rough).

Ornamental areas are irrigated through a drop system.
Immediate repair of leaks.

Energy

The club has adopted an energy-saving policy for both renewable and non-renewable energy sources. Approximately 27% of the electricity used comes from renewable sources. The results obtained in the last three years are more than satisfactory.

The policy consists in the following actions:

installation of motion sensors in the toilets;
timers for outdoor lights;
energy-saving light bulbs and LED;
installation of solar thermal panels for hot water production;
installation of five condensing boilers.

Thanks to these interventions, gas consumption was reduced by 30% (starting from 2010).

Electricity comes from the public power grid (ENEL), 27% of which is from renewable sources. From 2011 to 2013, the consumption of energy from renewable sources (the 27 %) decreased by 21% (from 81,596 kWh to 64,242 kWh). The remaining 73% is non-renewable, but a significant reduction was seen from 2011 to 2013 with a percentage again of 21% (from 209,815 kWh to 165,192 kWh). As regards the consumption of hydrocarbons, substantial reductions were recorded in the three-year period under consideration (diesel 17.5% and petrol 25%). Methane gas consumption from the public gas network and used primarily to heat the Club House and the Maintenance Facility remained substantially stable (-1%).

An initial impulse to diversify renewable energy sources was given in 2011, when the first solar heated collectors were installed for hot water production.

The club has focused on replacing petrol machines with equivalent diesel vehicles (proportion today 71% diesel and 29% petrol). All golf carts are electric and all staff members have participated in training courses organized by IGF to learn how to use energy more responsibly.

Supply Chain

The club adopted a policy to reduce waste production and increase the use of recycled materials. Drinking water vending machines have been replaced with fresh water fountains and during a Committed to Green competition all members were provided with refillable metal bottles. In some competitions, prizes and gadgets include local products and old advertising banners. Recycled plastic fences have been used and this strategy will be further developed, including for other golf course equipment.

The Golf Club management team's purchase policy and strategy favours local companies in the Susa Valley, and in any case, in the Turin area. The management team also selects suppliers based on their environmental certification (ISO 18001 – ISO 14001).

Plants and bushes are purchased from local nurseries. Food and beverages also come from local suppliers. Out of about 90 suppliers, 33 are located within a radius of 30 km and 34 within 100 km.

The amount of products used on the turfgrass has been significantly reduced in the three-year period under consideration. It must also be taken into account that semi-rough and rough receive no maintenance operations except for cutting. In particular, the quantities of nutrients were reduced to a minimum, as follows:

N –8% increase on tees, 36% reduction on greens and 31% on fairways.

P –82.5% reduction on tees, 10% on greens and 83% on fairways.

K –61% reduction on tees, 38% on greens and 61% on fairways.

As regards pesticides, only products approved by the Ministry of Health are used. Their use depends on the environmental conditions and type of surface (no treatments are applied to rough, only herbicides on semi-rough, no herbicides and only occasionally insecticides on greens). More specifically, the following reductions have been obtained over the last three-year period:

Fungicides: 37% reduction on tees, 12.5% on greens and 58% on fairways.

Herbicides: Stable on tees, no application on greens and 15% reduction on fairways and 53% on semi-rough.

Insecticides: Stable on tees and greens (but in both cases with only one kilo of active ingredient used) and reduced to zero on fairways (-100%).

Moreover, all growing practices to reduce the incidence of pathogens have been implemented, such as:

Thatch aeration and control

Dew removal

Poa annua control with mechanic and physical practices (irrigation)

The use of plastic, and bottles in particular, has been reduced through the installation of fresh water fountains along the course and the provision of refillable aluminium bottles to players. Waste is sorted (paper, organic, plastic, glass, non-reusable) as per the instructions of the municipality of Avigliana. On the golf course, separate collection of plastic is promoted. Plastic bottle caps are collected separately for charity. Targeted battery collection sorting is in place. Clippings are not collected (natural disposal), except those on greens, which are manually distributed on semi-rough.

Pollution Control

The club has an extremely rigid policy on preventing and avoiding the pollutants to be released in the soil and in the environment, for both golf course maintenance and Club House and Maintenance Facility management. For example, the few pesticides applied on the golf course are approved by the Ministry of Health and the least toxic products are selected.

Run-off water and most of the groundwater from drains are captured by two basins. No chemical and biological analyses are done on output water (basin overflow), but only visual inspections.

The water used in the Club House and in the Maintenance Facility is treated according to the law and, therefore, before being disposed in the sewage system, is sent first to the septic tank. Water used to wash machines is separated from biological materials and mineral oils.

Pesticides are stored in a separate and isolated building with a waterproof covering fully compliant with all applicable laws. The garage where machines are housed is covered and closed. Packages of pesticides, exhausted mineral oils, batteries, petrol and diesel fuel filters, and cooking oils are disposed of according to the law and are temporarily stored in appropriate recipients and containers.

Fuels are stored in aboveground tanks as provided for by law. The storage area for lubricants and batteries is fitted with specific barriers to avoid the dispersion of liquids into the environment.

The distribution of any type of substance on the golf course (fertilizers, pesticides, chemical products, topdressings, etc.) is done according to weather forecasts and prior monitoring of turfgrass conditions in order to maximize the effectiveness and avoid repeating the operation. The banks of the water basins are considered buffer zones and are therefore not treated with chemicals and they are only mowed. The same applies to secondary rough.

The club joined the Progetto Scuola (School Project) and the "Porte Aperte allo Sport" initiative (Sports Open House). A variety of tournaments are held every year for charity in support of various associations. An

agreement with the municipalities of Avigliana and Buttigliera Alta is being signed to encourage water disposal from Mount Cuneo through the creation of a collection system. Access to the golf course is granted to local residents. Various organisations are given the opportunity to organize cycling, running and horse riding races. Thanks to the above-mentioned project, many students from Avigliana and Buttigliera Alta schools have been given the opportunity to discover golf.

The club employs local residents and has 13 employees, including secretaries, maintenance personnel, caddie master and two golf professionals. The club regularly organizes training courses on health and safety at the workplace, incident, emergency and waste management. Staff are encouraged to take courses organized by the Italian Golf Federation.

The club was recognized in the "Energy" category in 2012 and "Landscape" category in 2013 of the annual awards, following the "Committed to Green" project.

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A degree thesis was written in 2005 entitled: "Inquadramento storico e territoriale, analisi dello stato di fatto, ipotesi di sviluppo" (Historical and territorial context, analysis of the actual state, proposed development) by Fingolf. The thesis provides a detailed analysis of existing conditions and proposals for requalification and development for the eastern area of the Nobel Dynamite Factory by two construction engineering students from the Turin Polytechnic. The goal is to identify possible areas for residential development bordering the golf course, keeping the characteristics of the territory in mind. The club has an archive of materials on specific research concerning the dynamite factory conducted by students of the Technical Institute Ferrari of Avigliana. Some surviving buildings of the Nobel Dynamite Factory have been renovated and devoted to the club's activities.

On the occasion of the "Committed to Green" competitions, the prizes consisted in tree species to be planted along the golf course. The club website contains information on the environmental certifications received. The certifications are exhibited on tables in the Club House lounge. Information sheets are available on the most significant trees.

Nordic walking courses were organized on the golf course in 2012. The website is up to date and devotes an entire section to the environmental specificities of the GC Le Fronde.

Documentation Reviewed

- Action Plans and Project Proposals
- Awareness Raising Materials
- Certification Report
- Emergency Incident Plan
- Environmental Data
- Environmental Policy
- External Surveys and Reports
- Internal Reports
- Minutes of Meetings
- Training Log

Conclusion

Le Fronde GC has been paying great attention to environmental problems for several years. In this respect, the golf course is of considerable importance, because it is located in a unique context due to its previous destination of use (Nobel Dynamite Factory) and bears witness to an environmental conversion that is unprecedented in Italy. The Golf Club management team is strongly committed to achieving a sustainable approach for maintenance practices, and satisfactory results have been attained in the last few years. The low consumption of fertilisers, pesticides and water put the club at the forefront in the Italian golf landscape.

Certification Highlights

This is the only example in Italy of conversion to green space for sporting facilities of an industrial area with a high environmental impact. The area, where explosives were tested, is now covered with turfgrass and tall trees.

The site has historical and social roots dating back to 1872 and has industrial archaeological artefacts of great interest (bunkers, turrets, chimney stack and water tank). The club was recognized in the “Energy” category in 2012 and “Landscape” category in 2013 of the annual “Committed to Green” awards. The progress achieved over the last three years in terms of water supply, fertilizers and pesticides are significant and undeniable.