

# Small hydro aesthetics

**P. Giacomelli**

STUDIO FROSIO

Via P.F.Calvi, 9

25125 Brescia

ITALY

Tel. +39 0303702371

Fax. +39 030396143

e-mail: paola.giacopelli@studiofrosio.it

## 1 Foreword

As an architect I work for Studio Frosio, independent consulting engineers that are active in the field of small-hydro, and I also deal with the architectural aspects.

In order to face the puzzling problem of how to “dress” a plant, even before choosing either the style or the materials to use, it is necessary to decide which cultural model we should refer to.

The first and more immediate model is the one represented by the early-20<sup>th</sup> century great power plants, which are the expression of great productive power, the celebration of man’s mastering over nature, the monuments of a new Era.

These buildings were to mirror monumental grandeur in their form, to amaze common people, to be worshipping places for a technology in the hands of “the happy few.” In fact they will be defined as “cathedrals of science” for the cult of a new knowledge. It is not a case if the formal type of these buildings looked back at models such as the castle and the cathedral, which still are in the common opinion the symbols of grandeur, wealth, safety, and worshipping.

If such is the cultural model, we could assume that the existing relation between the small hydro plant and the big one is the same as, in religious architecture, the relation between the *pieve* (small mountain church) and the great cathedral.

In *pievi* we can find the same spirit that is at the base of the building of a cathedral as a place of worshipping and of celebration of a faith, which is the expression of values shared by a whole community.

On the other end, from an aesthetic point of view, small churches imply a simple form, probably due to both the smaller importance of the customer and the budget available. However, while cathedrals, owing to their grandeur and wealth, are appreciated for the building skill that has preserved them for centuries up to now, small churches, owing to their simplicity and essentiality, have been able to keep and to convey the religious spirit that inspired their construction.

If we leave the great rivers, ideal places for “science cathedrals” and we go along the small streams, suitable for small hydro plants, we can see other kinds of buildings exploiting their moving power: water mills.

Such a plant is usually “naked”, essential, without any formal decoration.

Yet the view of a mill immediately conveys a positive value because its form is its function, it represents harmony with nature, aware and integrated employment of the environment, an important balance on which the survival of a community depends.

Looking at a mill our thought runs to bread, synthesis of basic natural elements such as earth, fire and water and the symbol of man’s harmonious life in nature.

This is certainly the model mirrored by small hydro plants, which are an example of “ecosustainable development”. Such a development doesn’t mean exploitation but improvement of resources with positive effects on all the surrounding elements, both social and environmental.

In fact small hydro plants have a great environmental function: they supply clean energy and, at the same time, they also act as a precious environmental guard through the constant monitoring of river flow and river banks, etc. There is no supremacy of man over nature, but harmonious and peaceful coexistence.

Therefore, if a mill, which is a building simple and easy to be perceived, has been appreciated throughout the centuries because its form directly hints at its positive function, even a small hydro plant, in order to be appreciated from an aesthetic point of view, should first of all be recognized by a community as an element bearing improvements both for environmental quality and precious clean energy. The community should feel proud for having such a plant in its area and should advocate the greatest visibility for it.

The designer’s task is to give form to these values so that these buildings should appeal to the public opinion as a place for clean energy production, to be appreciated for the positive values they bear. For these reasons making a plant recognizable is one of the purposes of an architect designing a small plant.

A “beautiful” plant could be the plant that conveys a meaning through its own form<sup>1</sup>, which belongs to the category of the “beautiful”<sup>2</sup>, just as mills had been conceived.



*Fig. 1. – Outside of an old mill.*

## **2 The beautiful plant**

Once established the important role that a small hydro plant carries out in guarding and preserving natural environment, we could state that the designer, trusting in a widespread cultural consent, should only “dress” his small plant with a suitable garment, choosing the styles and materials he considers most fitted. In any case he should make it recognisable so as to show the positive values it implies.

But reality is different. While realizing a small plant in the Alps mountains in an area which is highly protected as a national park, the Authority in charge of the permissions gave order that the plant would be as little recognisable as possible. As a consequence of this the penstock and all the electrical connections were underground, the building dressed up as a mountain cottage, like the other buildings on the slopes.



*Fig. 2. – Outside of Saviole hydro plant in Adamello natural park.*

When the building was finished it proved to be well proportioned and properly set in the environment. During the opening ceremony it was highly appreciated and the most frequent compliment was “nobody could even think that a hydro plant is there”.

The task to make it as little recognizable as possible was perfectly fulfilled. As a matter of fact it is an architectural fake to deceive the viewer.

The plant, if perceived as such, is seen as something dangerous, being different from the untouched environment the park is expected to protect. For this it must be concealed, its presence must be ignored. We must face a culture that thinks that a small hydro plant is something dangerous and ugly, to be concealed in any way, disguising it in an architectural form considered positive by the public opinion. One sees a mountain cottage and he thinks of flocks and country life.

If, as in this case, a pleasant building that shows proper style and materials, skilfully built and harmoniously set in the environment, has been concealed to prevent a negative reaction due to its recognised function, it means that an architect will never be able to make a beautiful plant unless its function is previously seen as positive.

Only in this case the existence of the plant will not have to be justified and ignored or concealed. In case of a positive acceptance of hydro plants, the words “Hydro Plant of Savioire” on the front would have been enough to increase the architectural value of the building.

### 3 The “unlighted” example

Before or at least while designing, it is necessary to create and spread out the knowledge of the positive values of a small plant.

This exigencies is shared by the public customer when he has to reach public consent, as well as economic profit. As an architect I have worked on a project which is innovative, not so much for the form given to the power station, since the old building has been kept, as for the visibility it was given with a didactic purpose. The restoring of the hydro plant in Gardone V.T. implied very complex works which moreover allowed the restoration of the underground water pipes in the area. The customer, a public and private company, wanted the works to be permanently visible and perceivable by local people so that everybody should be aware of the positive effects the plant would have for the whole community. The task has been carried out creating a didactic exhibition of explanatory posters set in relevant places aiming at showing the water flowing up to the power station. Here there is a room with posters, photographs of the area before and after the works, designs of the old turbine and of the new one, and also the viewing of a video that gives account of designing choices, the restoring work process, the benefits of renewable energy in general and of this plant in particular. Another step in this cultural process was the cooperation to the editing of a book about the history of the old canals in Gardone V.T. which ceased to be used when the plant was restored.

This text is significative because it places the restoring of the plant in people’s historical memory, not only giving information about the existence of the plant in Gardone V.T., but also narrating the history of its restoring. It must be said that in this case the restoring works have been the starting point for improving a difficult environmental situation, spoilt by canals that are not in use any more, uncontrolled draining, old rights.



Fig. 3. – Exhibition of explanatory posters in Gardone Val Trompia power plant

This didactic project has been developed in schools too as the local authorities decided to deal with the theme of renewable resources giving to the local schools an interactive CD, in which the project of an ecosustainable city is simulated.

Basis has been set in order to allow future generations to look at a small hydro power plant and, recognizing it as such, to get a positive feeling. Only in this case an architect could work on his art with an unbiased mind.

## **4 Constant designing principles**

Stated that the building of a plant must be recognized as such, we will try to point out the constant projecting principles of small hydro plants, those aspects which condition projectual choices and how they have been dealt with in some actual cases.

A list of the main projectual themes the architect has to face while considering the formal aspect of the power station could be as follows:

- **Safety**
  - As they are unguarded buildings it is necessary to reduce the possibility of breaking in as much as possible. Hence the use of small windows or protected ones if they can be easily reached, or the moving of the windows to inaccessible places.
  - It is better to separate the different rooms: turbine room, electrical boards room, transformer room, net connecting room, following as much as possible the principle according to which “water below, electricity above” a safety measure for possible extraordinary floods.
- **Accessibility**
  - The necessity to create an access to the turbine room suitable for a possible moving of machines also in the future implies the creation of a door big enough for a truck. The use of a bridge-crane determines the vertical development of the building.
  - It is necessary to make a special independent access to the measure room.
  - A way must be provided to reach the trash-rack cleaning machine in order to allow the removing of waste.
- **Volumes**

This plants are defined as small hydro because of the installed power, but also the spaces are very small and especially designed for the installed machinery.
- **Costs**

Accounts must balance. Very often refined and expensive technologies must be used either to exploit not perfectly suitable resources or to maximize poor resources. Little is allowed for not profitable expenses.

## **5 Small hydro examples**

### **5.1 Esenta plant**

The building of a new hydro plant is therefore the occasion for searching for a new peculiar and recognizable form.

The Esenta plant is situated in the country near the lake of Garda where water canals have paved the way to a positive attitude towards small hydro plants. Undoubtedly water is useful only if it is canalized and regulated. In this case there is a strict link between the hydro plant and the regulation used in agriculture: the background is quite fit for the plant to be given a positive environmental value. During the projecting phase no building type was imposed and this has allowed the realization of a building that shows, through its complex form, the great technological and constructing effort that is to be found inside.

The projecting choices characterising this building are:

- interweaving the volumes of the three main buildings having different functions and realized in different materials; the three main buildings, the turbine room, the transformer room and the measure room, have been realized as independent buildings. The turbine room is partly underground, with a southward access, along the tailrace channel. The measure room is at an upper level, with a northward access along the main public road. The transformer room is underground and completely apart;
- placing of the windows only on the side facing the canal to avoid breaking in;
- eliminating the bridge crane. Putting the turbine room partly underground has allowed the exploitation of the ground morphology and the assembling of the machines with the only use of the mobile crane from the upper road.



*Fig. 4. – Outside of the hydro plant in Esenta seen from the south.*

The absolute freedom allowed, unable the architect to design a building tailored to the machinery, with small but functional volumes, perfectly integrated in a landscape that required a high quality building.

Any designing choice in small hydro plants meets different exigencies. In this case, for example, the choice to put the turbine room partly underground meets the necessity of the production connected with the position of the turbine, the necessity of reducing the noise emission as much as possible, as it is situated in a residential area and, last but not least, the architectural exigencies.

## **5.2 Rino plant**

The power plant of Rino is located in a completely different area, in a mountain region close to the border of a national park.

Anyway the building is immediately recognizable as a power station because of its peculiarities like the big main door, the windows located in inaccessible positions, the well defined different volumes corresponding to the different functions.



*Fig. 5. – Rino power plant.*

### 5.3 Casnigo plant

The urban background in which the Casnigo plant is located is a low quality highly populated industrial area. In this building, still under construction, the different volumes are immediately identified. There are small windows to avoid breaking in and a big main door facing a wide yard.



*Fig. 6. – Casnigo power station.*

## 6 Conclusions

Small hydro power plants undoubtedly belong to the category of the useful, their positive effect on the environment is certain and their contribution to a sustainable development is essential.

Probably since common people reject whole technology as the main cause for environment disasters and as a symbol of an inhuman way of life opposed to the country pastoral one, also small hydro power plants are not appreciated by public opinion.

Small hydro power plants architecture, to be such, has to produce recognizable objects. But if a negative feeling is associated to these works, it will be hardly able to produce objects felt as beautiful.

Therefore it is necessary to re-educate people and make the community aware of the highly positive value of such a plant for the local community, the nation, and the environment.

Only within this culture architecture can express itself over and around the technological bounds that become recognition elements that belong to a category that is beautiful because it is useful.

### The Author

#### Paola Giacomelli

Born in Brescia Italy in 1971

After humanistic studies at secondary school, she attended university and she took a degree in Architecture at Politecnico in Milan.

She has been working at Studio Frosio since 1999 as architect of the team in charge of the design of new small hydro plants and of the restoration of the old one.

---

<sup>1</sup> According to Hegel in a beautiful work the spirit realizes the reconciliation of meaning and form.

<sup>2</sup> Kant and Plato