

Beyond Energy Action Strategies



D.3.1.c – Business Plan of CMM - ALTENER

Title of the project: Low Impact Hydropower plant
Location: Civo Municipality (IT)



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1 Summary of the Project/Project at a Glance

(Nature of the business, the location, resource requirements, volume of business, a brief on market justifying the project, financial highlights)

Civo is a mountain town in the province of Sondrio (Lombardy) with 1.113 inhabitants, located at 719 meters above the sea level. Due to the return of immigrants, which still have in Civo their holidays houses, during summertime Civo population raises to 3.500 inhabitants. This increase of population means a rise in energy and water demand during, moreover in summer time.

Furthermore, the presence of several water losses in the old water pipeline and the construction of a new hospice require a general refurbishment and modernization of the aqueduct, offering the occasion to implement a low impact hydropower plant on the aqueduct pipeline, in order to optimize the economic expense.

The project foresees the implementation of a low impact hydropower plant on the aqueduct, producing RES energy and guaranteeing a fixed rent for the community for the forthcoming 50 years.

The area involved by the project has an altitude range from 550 MT above sea level for the basin of load interruption to 1045 m s.l.m for the water source of Poirà.

Through the provision of a store tank, the power produced will be maximum during nighttime and lower during daytime. The proposed generation system of a small flowing water hydropower plant will include a water turbine model pelton 6-jet positioned on the municipal aqueduct, with a rated output of 56,58 kW, producing 396.592,74 KWh per year.

Considering data above mentioned, the annual rent for Civo is estimated in about € 80.000 for the forthcoming 20 years.

The project implementation will take 180 days to be completed and costs € 950.000 (€ 600.000 for the pipeline refurbishment and € 350.000 for hydropower plant).

The realization of the plant will involve municipal and provincial roads having impact on site viability in order to access to the site for the transport of the work materials (pipes, building material, and electromechanical devices) and the transmission and distribution of electricity produced.

The project represents a best practice for the valley, which could facilitate the implementation of similar plants in several close municipalities. In fact, Valtellina Valley is famous for its abundant presence of water.

Unfortunately, in the past, most part of energy and profit originated benefit overall private companies. In this case, the natural resource of water would be exploited to direct benefit of the local community, limiting the impact on the environmental contest.

2 Details of the Proposed Project

(Requirement of fixed capital and working capital, the cost of project and means of finance. Step-by-step description of the process, plant capacity, expansion plans and quality control procedures etc)

The total amount of about € 950.000, include the implementation of following works:

1. rationalization and upgrading of intake structures
2. implementation of a pipeline from the intake structures to a new tank load distribution, distant about 150 meters from the intake works

3. reconstruction of the distribution pipeline to the fraction of Roncaglia di Sotto in connection with the construction of the new Health Care Residence
4. reconnection of existing distribution pipelines to the new basin
5. moving of the new tank lift station to the storage basin called "Ores"
6. replacement of conduct "FS - Morbegno" from Poirà to Balestro locality with the laying of pipeline;
7. construction of a building for the hydroelectric power plant in Balestro at an altitude of 640 m above sea level;
8. construction of a drain tank adjacent to the plant building in location Balestro;
9. rebuilding of pipeline from the locality "Balestro" to "S. Biagio"

The work schedule foresees:

- 90 consecutive days for the realization of the storage basin in Poirà and for central and restitution buildings;
- 90 consecutive days for the realization of the aqueduct works;
- 90 days for the connection works (for both, those managed by the municipality of Civo and those managed by ENEL, the company of the electricity grid)
- 20 days for testing and commissioning of the plants;

The works will have a completion time of 180 days.

The plant has a rated output of 56,58 kW. Considering the altitude gap from the source to the plant of 392,5 meters and a flow rate of 20 liters per second, it is foreseen an annual average production of 396.592,74 kWh.

The project, affecting local drinking water supply networks of Civo and Morbegno municipalities, will take 180 days to be completed and costs € 950.000 (€ 600.000 for the pipeline refurbishment and € 350.000 for hydropower plant).

The current "all-inclusive rate" paid by the national energy management agency -GSE – enables an annual income of € 80.684,46 (€ 86.853,81 less € 6.169,35 for rent and management costs)

The initial investment capital will be provided by the local authority for water management (ATO) for the part concerning the pipeline refurbishment (about € 600.000).

As respect the financing sources for the low impact plant, it was initially stated an agreement among CMM and Civo municipality, notwithstanding the agreement is under discussion and at the moment different options are under examination: the first one involve an energy cooperative, or other private funds (eg. Esco) enabling a PPP, the second one foresees the attempt to obtain public funding thanks to the recent national law for energy investment reserved to smaller municipalities.

Recently, it vanished the possibility to obtain national funding because of the scarce funds available. Different private funding solutions are at the moment under examination, in order to find out the most convenient solution in term of cost-effectiveness for the Civo community.

Furthermore, the cost-benefits analysis is strongly affected by the possibility offered by the current national law subsidizes for RES selling, through the payment of favorable rates depending on the kind of RES (wind, solar, water) and the valuated power of the plant.

Regarding the plant of Civo, the valuated "all-inclusive rate" is of 0,219 € per kWh as incentive for hydropower plant paid by the national energy management agency -GSE - of about € 86.853,81 for following 20 years, and for the subsequent 30 years the rate would be of 0,11 € per kWh.

3 Internal aspects

(Describe the strengths and weaknesses)

The implementing low impact hydropower plant on the municipal aqueduct is suitable for providing clean energy and improving the supply of drinking water.

Indeed, the abundant water presence in the area is useful to this scope. The natural resource will be exploited to direct benefit of local community, producing RES and limiting the impact on the environmental contest, differently from what it has been done in the past by the private investor interested only in profit gain.

The implementation of the plant will guarantee a consistent saving for municipal balance due to the providing of energy for public use such as road lighting, town hall and schools, and guaranteeing an annual revenue for the forthcoming 50 years, thanks to the current national subsidies for RES selling called “all-inclusive rate”.

At this regard it is important to notice that, current public subsidies for RES will probably end in December 2015. In fact, in order to begin works it is needed an upgrading of the present authorization for the water abduction of 6 liter per second only to water for potable uses. The new authorization should allow an abduction of 20 liters per second, permitting the water use also for energy purpose.

The upgrading of the present authorization requires an administrative procedure 18 months long, which should end in October 2015. Notwithstanding, it is sufficient a little administrative accident to extend the duration and delay the start of works, causing the loss of subsidizes “all-inclusive rate” and forcing to recalculate the financial plan of the plant.

Finally, the plant implementation needs to operate in natural mountain context.

At this regard, it has been carried out careful analysis about environmental aspects, obtaining the project approval by the “authority for architectural heritage and landscape” and assuring a minimum impact on landscape. Thus facilitating the following implementation of similar projects in the surrounding area.

4 External environment

(Describe the threats and opportunities)

In order to implement the project the Municipality of Civo should invest about € 950.000.

At the moment, local entities are obliged to limit expenses for investment because of the “Stability Pact”, a national law imposing a spending review with the aim to decrease the public expenses in order to improve the total national public debt.

In order to overcome this barrier, Civo municipality asked and obtained € 600.000 from the local authority for water management, for funding the water pipeline refurbishment .

Regarding the remaining € 350.000, it was previously stated a formal agreement with CMM that is now under discussion, in order to find alternative and maybe most favorable funding.

At this regard, Civo applied unsuccessfully to a national grants for RES production plant and it is now evaluating several option of PPP with local ESCOs or energy provider companies in order to find out the most convenient solution.

Furthermore, in order to avoid the loss of current subsidizes for RES selling (the so called “All-inclusive rates”), plant should be operative within the end of current year, implying the acquisition of needed permits for water abduction in time. At this regards, the company selected for work implementation will be asked to go hard and finishing works in time.

“All-inclusive rates” would allow an annual income for the community of about € 86.853,81 for the forthcoming 20 years (0,219 € per kWh), and of about € 43.625,20 for the subsequent 30 years (0,11 € per kWh).

In addition, the plant would be a good occasion to refurbish the present water pipeline and improve the public service thanks to UV system which guarantees better sanitary conditions, and the implementation of new water reservoirs, systems of automatic adjustment of water levels and the remote control.

5 Market Potential

(Introducing a new product to the market requires an analysis of the external factors that may affect a successful business case. The business model environment can be described by a number of forces that will influence the competitiveness of the business on the short and long haul –Key trends, industry forces, macroeconomic forces, and market forces-. Provide a note on marketing strategy, potential customers, competition, market size and future prospects)

The Authority for Electricity and Gas in Italy promotes the development of competition in the power market (Law n. 481/1995). Following EC legislation (Directive 2001/77/EC and Directive 2009/28/EC), is set to reach a 20% share of energy from renewable sources by 2020. Nevertheless, The Italian Environmental Law 152/06 identifies the fields of application of reserved flow and the allocation of competences. For example, prior to 2013, hydro plants under 1 MW were guaranteed a minimum tariff for their electricity production, while plants 1-10 MW sold their energy at the hourly zonal price.

The area, in Sondrio province, has about 2.2 GW of hydropower plants, approximately 18% of the overall national hydropower capacity. 2.16 GW is big hydro schemes, owned by four companies, A2A, Edipower, Edison and Enel. Differently from this, there are another significant number of oldest and small plants with capacities of less than 10 Megawatt in place, which are owned by municipalities and require modernization. Moreover, in the recent years the demands for the development of hydropower is significantly increased, leading to increasing applications for new hydropower facilities, in particular for small and micro hydropower stations.

Due to capability to be emission-free of electricity generation of hydropower, the requirement to reduce greenhouse gas emissions acts as a strong driver for the modernization and development of new plants. Thus, the substitution of hydropower for electricity generation will save 100 times less CO₂.

6 Risk analysis

(Emphasis on those elements that are threats to the project with an important impact)

The main risks able to affect the project are identified as follow:

- Delays

Delays due to administrative procedure or to different aspects, can affect the financial viability of the project, in reason of the denied possibility to access to favorable incentive such as the “all-inclusive rates”

- Geological / Hydrological

These risks will depend on the construction site and on the whether/environmental conditions. Indeed, flaws in the underlying rock structure may cause problems in implementing project, increasing costs. Furthermore, the hydrological risk should be considered also because the hydropower production will depend also on water supply.

- Economic / Financial

The financial viability could be affected by changes regarding cost or revenues divergent from those supposed. In this case, it will necessary to revise the financial plan of the project, considering new funding options

- Political

The energy policy at national level could change and modify the current subsidizes system, in case the profitable viability of the project could be undermined.

7 Financial Analysis

(This section should provide a basic financial assessment of the project including the expected IRR and payback period as well as data on expected capital costs, depreciation (25%), operation and maintenance costs and expected revenues. Full financial spread sheets showing IRR calculations and cash flow can be included in the annexes.)

Following the IRR of the plant:

Alternative investment choices

IRR method

	HP3	CM	CIVO
Purchase cost of the plant	-€ 950.000,00	-€ 475.000,00	-€ 475.000,00
Cash flow 1st period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 2nd period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 3rd period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 4th period	€ 80.684,46	€ 32.273,78	€ 48.410,68

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Cash flow 5th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 6th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 7th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 8th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 9th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 10th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 11th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 12th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 13th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 14th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 15th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 16th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 17th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 18th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 19th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 20th period	€ 80.684,46	€ 32.273,78	€ 48.410,68
Cash flow 21st period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 22nd period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 23rd period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 24th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 25th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 26th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 27th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 28th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 29th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Cash flow 30th period	€ 37.455,85	€ 14.982,34	€ 22.473,51
Flows accumulated for the period	€ 1.988.247,71	€ 795.299,09	€ 1.192.948,63
Internal Rate of Return	5,68%	3,12%	8,81%

The plant will produce 396.592,74
KWh pwer year

Annual gross sales € 86.853,81

Annual fees and maintenance costs -€ 6.169,35

total € 80.684,46

	HP3	CM	CIVO
cumulative cash flow 15 years	€ 1.210.266,90	€ 484.106,76	€ 726.160,14
cumulative cash flow 20 years	€ 1.613.689,20	€ 645.475,68	€ 968.213,52
cumulative cash flow 30 years	€ 1.988.247,71	€ 795.299,09	€ 1.192.948,63

kWh produced 396.592,74

all inclusive rates 0-20 years 0,219 €/kWh € 86.853,81

energy sales tariff 20 - 50 years 0,11 €/kWh € 43.625,20

The project have a total cost of investment of € 950.000, with a foreseen annual net financial income for first 20 years of about € 80.684,46 thanks to the energy selling with the “all-inclusive rate” a national subsidizes to promote the production of RES. After that, the following 50 years annual revenue should decrease at € 43.625,20 (minus annual fees and maintenance costs).

Annual revenues of the project are calculated considering the annual production of 396.592,74 kWh, sold at 0,219 € per kWh for the first 20 years and at € 0,11 per kWh for the following 30 years.

The payback period of the plant should be of about 11 years.

7.1 Cost

(Capital cost, Cost for studies and other initial promotional costs , Cost of raw materials, utilities, manpower, repairs and maintenance, selling and distribution expenses, administrative expenses, interest on loans availed, depreciation and any other expenses – fixed cost and variable cost)

a. CONTRACT VALUE	
Works amount less costs of security	€ 681.025,62
Amount paid security direct	€ 28.376,07

total	€ 709.401,69
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b. AMOUNTS AVAILABLE TO ADMINISTRATION	
VAT (10%)	€ 70.940,17
Technical costs preliminary draft - final and enforceable - specialist relations -Works direction and Security	€ 102.000,00
Charges on technical costs (4%)	€ 4.080,00
VAT on technical costs (22%)	€ 23.337,60
Connection to electric power	€ 5.000,00
overheads and contingencies (4.5%)	€ 31.923,08
various and rounding	€ 3.317,46
total	€ 240.598,31

TOTAL COST OF THE PLANT	€ 950.000,00
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The total cost of the plant is of about € 950.000:

- € 600.000 for the pipeline refurbishment,
- € 350.000 for implementing the hydro plant.

>> See annex for the detailed costs table of the project.

7.2 Income

(Sales, cost of manufacturing, contribution, tax liabilities, repayments, retained profit/loss)

The project foresees an annual net financial income for first 20 years of about € 80.684,46 thanks to the energy selling with the “all-inclusive rate” a national subsidizes to promote the production of RES. After that, the following 30 years annual revenue should decrease at € 43.625,20 (minus annual fees and maintenance costs).

Annual revenues of the project are calculated considering the annual production of 396.592,74 kWh, sold at 0,219 € per kWh for the first 20 years and at € 0,11 per kWh for the following 30 years.

7.3 Feasibility assessment

(IRR, NPV, payback period, benefits of the project)

The project presents a positive financial viability, in fact the IRR results positive also considering the average rent offered by national government securities (about 1,45%). Furthermore, fixed annual revenues imply a relatively short pay-back period of 11 years, guaranteeing a sure income for the municipality for about 50 years.

Positive effects of the project should also consider the added value given as good practice to local inhabitants and neighbor towns, able to facilitate the reply of similar actions in the region.

Furthermore, annual revenues will benefit a local community, which could invest income in social or environmental activities benefitting all citizens.

7.4 Sensitivity analysis

(Sensitivity analysis on important parameters with a great impact to the project financial feasibility)

The most important parameters to consider for the financial feasibility of the project regards the possibility to achieve the current subsidies for RES called “all-inclusive rate” which foresees a really favorable selling rate for RES produced for a long period (50 years).

In case of accidents which could undermine the possibility to obtain the named incentive, the financial viability of the project should be recalculated considering the new selling price of energy produced.

7.5 Social benefits and Public support

(Please identify and rate the positive impacts of the project and provide an alternative scenario of feasibility analysis including public support if needed to achieve a reasonable Return on investment)

Social benefits of the projects include the good example offered by a public entity toward citizens, deciding to invest in RES and local development with a long term perspective, benefitting the whole community.

Furthermore, the project is connected to another one which foresees the refurbishment of a public building with high valuable environmental standard. The project aims to develop a hospice, offering at the same time a public service and new jobs opportunities. Needed funds for project implementing (about 4 million euros) have been collected among local savers, thanks to the implementation of a strong activity of stakeholder involvement which guaranteed a real public support.

The hydropower plant project idea stemmed grew from the exigence to comply the fire prevention laws for hospice, which required a higher water flows than those available and obliging to implement works on the water pipeline. In addition to that, the pipeline refurbishment was needed also considering several other difficulties such as the service interruption during summer for excessive demand.

These preconditions, bring to take into consideration the opportunity to improve the financial viability of total works by investing in a hydropower plant on the aqueduct.

That said, the social benefit of the project should consider also the context of intervention which involves a little town municipality of 1.107 inhabitants and the effort made to improve the local carbon footprint and at the same time offering several occasion of economic development.

The project represents an ideal good practice to widespread and to propose in similar contexts.

8 Implementation roadmap

(Use a Gantt chart to show the timeline for key activities and milestones throughout the project implementation phase.)

The work schedule foresees:

- 90 consecutive days for the realization of the storage basin in Poiria and for central and restitution buildings;
- 90 consecutive days for the realization of the aqueduct works;
- 90 days for the connection works (for both, those managed by the municipality of Civo and those managed by ENEL, the company of the electricity grid)

- 20 days for testing and commissioning of the plants;

The works will have a completion time of **180 days**.

9 Conclusion

(Is it a good or bad idea? Why should investors put their money in this project?)

The project results in line with current eu political trends (namely Eu2020 strategy) which foresee the increasing importance of energy role and promote investment in clean and sustainable energy.

Hydropower is a well-known and tested RES technology, which avoid risks connected with technology uncertainty.

Furthermore, the hydropower plant project is connected with the improvement of water providing public service and the implementation of a new hospice, thus facilitating the public support of the investment.

In addition to that, the project investment plan presents a good financial viability, assuring a fixed income for the community for following 50 years and the availability of clean RES for public uses.

In conclusion, the project can be considered a really good idea, and its promotion should be widespread also in different community with similar contexts.