Certification for HydrO: Improving Clean Energy

CH_2OICE PROJECT
Do the right choice

Newsletter
n. 2
March 2010

www.ch2oice.eu

CH_2OICE Project: one step ahead

The hardest part is behind us. Now we are able to distinguish "basic" renewable energy from energy produced without any negative environmental impact. In the first of these Newsletters we summarised the framework for regulation and the review of relevant technical literature, carried out in the first months of the project (documents are freely downloadable from www.ch2oice.eu). Following this, a detailed methodology was created for the assessment and the certification of hydropower plants producing energy without detrimental effects on the water course, or threatening its obtainment of "good status".
The next step is to test the methodology on existing plants, which will enable us to refine it before making it available for use.

Over the following months, we need to work out how to market "greener" energy and what benefits could be offered to those choosing CH_2OICE certification. This work has already begun in Italy and Slovenia, where the partners are working on the structure and on the rules that will govern the independent bodies, responsible for issuing the hydropower label in these countries. These bodies will be made up of CH_2OICE partners and representatives of environmental interest groups.
Credibility is obviously a key issue for the CH_2OICE label. We aim to create a product that will have a genuinely positive effect on the environment and will therefore be highly respected by both environmental interest groups and hydropower producers.

At the moment the challenge is finding a market for CH_2OICE certified energy to interest producers in applying for the certification. Taking into consideration the great number of conflicts connected with the building of new hydropower plants it seems that at least a few customers should be interested in buying "green energy", including households, enterprises of the "green economy" and those who strongly promote the environmental respect in their marketing strategy.
The success of CH_2OICE certified energy on the market will depend on two closely-linked issues. First, the effectiveness in the communication of the difference between CO_2 emission free energy and energy produced through processes that have a very low environmental impact. Second the genuine interest of existing "green energy" labels to have a tool for refining their own classification, CH_2OICE would not enter the market as a "new label", but would be used by other companies as a means of better defining the "sustainability" of electricity products.
All CH_2OICE partners will do their best to fulfil both conditions and hope to find a positive answer from green energy label management bodies.

Giulio Conte, *Ambiente Italia*


CH_2OICE Workshop at GREENERGY EXPO, November 26, 2009, Milan (Italy). *Photos by Alessandro de Carli*

Summary

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Slovene and Italian methodology for hydropower certification

The general methodology for hydro power plants (HPP) certification, elaborated by CH_2OICE partners and discussed by all relevant stakeholders, was described in the first number of the Newsletter "Do the right choice" (June 2009). The aim of this article is to describe the operational methodology, defined for 2 partner countries (Italy and Slovenia), the backbone is the same, but some differences are present in the two national procedures. During the year 2010 these methodologies will be tested on several HHP in order to finalise the operational methodology. The CH_2OICE certification methodology will primarily refer to existing plants. However, to allow a wider use of the results of the project, the issue of new hydropower plants authorization will be considered. Following the same logical approach used for the certification of existing plants, a set of guidelines will be produced, to be used by decision makers during planning and authorization procedures and by plants proposers in their EIA and SEA studies.
In order to be certified, a given HPP has to commit to carry out appropriate measures in order to mitigate its impacts on specified environmental objectives, in such a way to fulfil predefined environmental targets and prescriptions. These measures have to be described through a specific management programme, based upon a dedicated environmental study, supported mainly by existing data, but, when necessary, complemented by ad-hoc assessment/monitoring. The realization of both the environmental study and the management programme must be supported by public consultation (local stakeholders as environmental NGOs, anglers, citizens associations, etc.); both documents must be approved through an auditing process.
The involvement of local stakeholders must be ensured along the whole certification procedure and, when completed, during the lifespan of the label (a first consultation phase should be carried out when carrying out the preliminary environmental study). A report on the public consultation will have to be provided to the auditing team; it will be up to the auditors to evaluate if integrations/amendments are needed. Management procedures and especially possible environmental compensation/restoration measures (measures directly compensating the stakeholders are not allowed) should be decided taking also into account also suggestions from local stakeholders. The public must then be granted the possibility to comment on the fulfilment of the measures that the certified plant operator commits to carry out. In order to be certified, a given HPP can go through standard or simplified procedure (see figure 1).

Simplified procedure

A simplified procedure is foreseen for some types of hydropower plants (HPPs in sewage and aqueduct networks), operating in totally artificial networks and not entailing direct or indirect impact on water related ecosystems. It requires only the description of the system and proof of fulfilment of the above conditions and of specific prescriptions, instead of the detailed environmental analysis, related management programme and stakeholders involvement. There are also types of plants (HPPs exploiting the ecological flow release) not admitted to simplified procedure at this stage, but for which further information has to be produced in the national testing phase. All the other types of plants have to follow the standard procedure.

Standard procedure

Standard procedure is described in 6 main steps. At first environmental study with assessment of the environmental status of the affected ecosystems and analysis of pressure factors have to be done. The goal of this activity is to define, how is the present status of the affected ecosystems (quantitative data wherever possible); to compare it to set environmental objectives and, based on modelling and/or on expert judgment, determine what are the main pressure factors causing these impacts.
In general, the assessment of the environmental status must be carried out at water body scale, local scale and basin scale. Criteria (environmental quality elements) to be considered at the different scales are those for which objectives are defined.

"The CH_2OICE certification methodology will primarily refer to existing plants."

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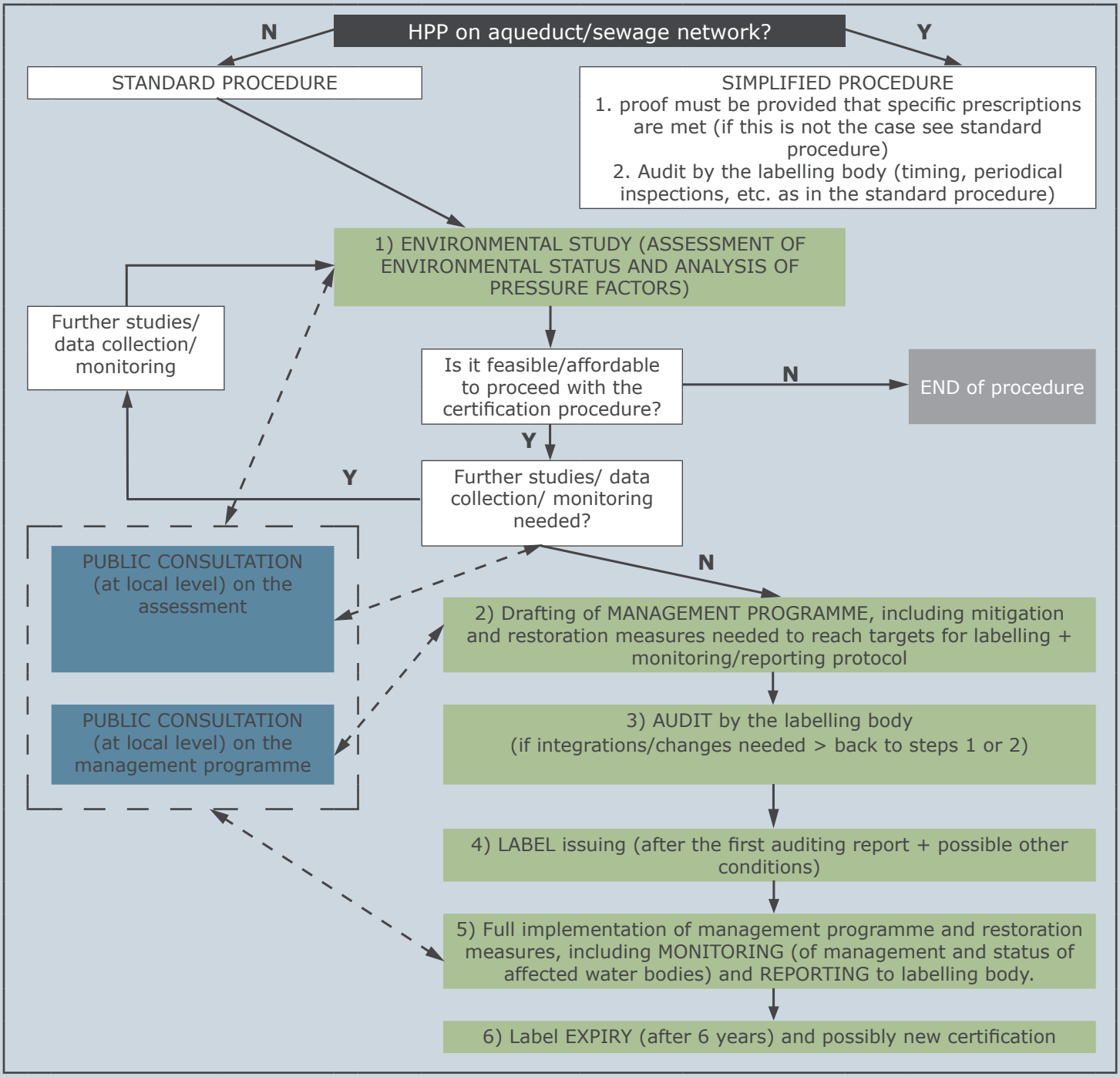

Figure 1 - Flow chart summarizing the steps of the general certification procedure.

"A simplified procedure is foreseen for some types of hydropower plants (HPPs in sewage and aqueduct networks) operating in totally artificial networks and not entailing direct or indirect impact on water related ecosystems."

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At all scales the assessment must be carried out for all reaches of the impacted streams separately, whenever pertinent.
Reaches of the impacted rivers (area) are: river section from the end of a reservoir upstream (in the direction towards the source of a stream) or from the dam upstream if there is no reservoir (u); body of water, either natural or man-made, used for storage, regulation and control of water resources (r); river section from the dam downstream (in the direction of the current in a river or stream) to the inflow where abstracted water flows back to the river (b); river section downstream from where the inflow of abstracted water is back to the river or downstream the dam if there is no abstracted channel (d). During the activities of the WP 3, potential impacts, mitigation measures and objectives need to be meet by certification for each section separately nevertheless of type of HPP were identified (i.e. in Slovenia 10 types of HPP were recognized).

Objectives are defined separately for natural water bodies, for heavily modified / artificial water bodies and for small streams, additionally prescriptions (related to pressure factors) for certification are defined.

The assessment should be based mainly upon existing information at basin scale, together with information/data at more local scale specifically produced for certification purposes when needed. Further knowledge must be incorporated in the (re) labelling process and in the management procedure of the plants when it becomes available. This fosters a progressive improvement and, at the same time, gives the possibility to define compensation measures even without waiting for a complete institutional fulfilment of the WFD.
HPPs included in a cascade system managed in an interconnected fashion (not necessarily by the same operator), can in general be certified each one separately (in specific cases whole system can be certified). Nevertheless, it is necessary to describe the whole system, the impact of the single plant on the system, and to justify that the improvement in the certified plant is not compensated by worsening the impact of the others.

Specific contents of the environmental assessment can be summarized as follows:

- description of the plant, including maps, pictures and relevant operational data;
- present status (and tendency when possible) for all environmental criteria defined in the national methodologies (see chapter 5 of Slovenian version or chapter 4 of Italian version, available on www.ch2oice.eu) and all pertinent scales and stream reaches;
- for all criteria not already fulfilling environmental objectives indicated in the methodologies and based upon the potential impacts matrix (an example is provided in Annex 1 to Slovenian version), analysis of all pertinent pressure factors, in order to define which have to be considered in the management programme. The same matrix structure has to be used to summarize the results of the assessment, indicating for each "cell" where a potential impact is indicated, whether the environmental status is already satisfactory. If there is a lack of information, the impact can be ascribed to factors not related to the HPP, or the specific pressure has to be mitigated/compensated.
- specific chapter describing the outcomes of the preliminary public consultation process;
- (if possible) preliminary cost estimate for the whole certification process (including implementation of measures).

Environmental study will allow to define the "responsibilities" related to the plant to be certified, and to identify the appropriate mitigation and/or compensation measures to be integrated in the management programme (see figure 2).
Second step of procedure is drafting of a management programme, including management protocols and proposed structural and restoration measures needed to reach targets defined for label compliance. Based upon the previously described environmental assessment (step 1), a coherent set of management and/or restoration measures have to be defined, judged appropriate to fulfil the objectives for label compliance. These measures will have in any case to include the prescriptions. The management programme must also define a monitoring plan, in

"Standard procedure is described in 6 main steps: preliminary environmental studies, management programme draft, Audit, Label issuing, Monitoring and Label Expiry."

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Water Body, Downstream	Outlet Structures	Hydropeaking	Bedload Management	Fine Sediments Management	Management Of Fish passes
Phytobenthos		total lack of data			
Macrophytes		negligible impact (main pressure not related to HPP)	negligible impact (main pressure not related to HPP)	negligible impact (main pressure not related to HPP)	
Fish Fauna		impact to be mitigated	impact to be mitigated	impact to be mitigated	negligible impact
Benthic Invertebrates		impact to be mitigated	impact to be mitigated	negligible impact	
Water Quality Gen. Conditions		already GOOD status		already GOOD status	
Morphological Conditions	negligible impact	negligible impact	impact to be mitigated	negligible impact	

Figure 2 - Example (based on a simplified matrix) of summarized results of the environmental assessment for one of the impacted reaches downstream the plant release section.

order to follow the implementation of the measures and their effects.

Only measures on the affected water bodies has to be considered (compensation on other water bodies is not allowed). Measures have to be defined as quantitatively as possible and in such a way that their implementation can be objectively monitored. These are selected taking into account:

- the results of the preliminary environmental assessment (the programme focuses only on structural/management aspects/variables estimated to have a significant impact on at least one environmental criterion);
- possible mitigation measures, guidelines, references and, in general, sound and scientifically backed good practices, to be critically adapted to the specific situation;
- modelling and expert judgement in order to support the assumption that the proposed measures are expected to reach the targets (appropriateness of the approach followed will be verified in the auditing phase);
- public consultation (possibly supported by previous action plans, e.g.: defined in the framework of a river/basin/lake contract).

The Management program needs a description of all foreseen structural and management mitigation and, if any, compensation measures, making reference to the results of the environmental study and clarifying estimates (and related assumptions) in terms of their environmental effects; a clear timing for their implementation must be included. Moreover the management program asks a monitoring protocol, related to progress of implementation of the management programme and to resulting ecological improvements; this must be designed in order to integrate, when needed, monitoring already carried out by public administrations. A clear definition of data and information, that will be periodically reported to the labelling body (this aspect will be further detailed at the end of WP5) is requested. The transparency and public availability of data concerning plant management must be guaranteed; some information can be directly made available (e.g. through the producer's website), other can be provided by request, but in general the producer willing to certify his plant commits to complete transparency of information towards the auditing body and to availability to provide to the public any information required, excepted when confidential (due to concurrency reasons or to security of electric system, to be duly justified); (this aspect will be further detailed at the end of WP5). Finally, the

"The impact analysis must be carried out at three different scales: local, water body and basin scale."

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management program have to collect comments on the programme (if any) raised by local stakeholders during the public consultation process.
The documents produced in steps 1 and 2 must be verified by auditors accredited by the national labelling body (the final decision is up to the management board of the national labelling body). In case deficiencies are highlighted, previous steps must be followed again.
Next step is about lebel issuing. The certification can be issued after the first auditing report and possibly when further conditions are fulfilled (e.g. first monitoring campaign, structural measures completed …). Labelling fees must be defined in order to support the labelling body and the general methodology does not envisage a fixed restoration fund. After the testing phase (WP4) the general methodology will be reviewed to better define this point.
Monitoring and periodical reporting to the labelling body must be carried out following the protocols defined in the management programme. Local stakeholders must have the possibility to comment on the actual implementation of the management programme and on possible new impacts. Obligatory monitoring will be defined in management plan for each HPP. Results of monitoring should be sent to labelling body at least once a year and made available to the public. The main prescription is that monitoring for selected parameters (critical parameters in terms of HPP impact) should be done in time of low flow in the period when the aquatic and terrestrial ecosystem is under the highest pressure.
The duration of the label is 6 years, after which a new certification procedure has to be followed to keep the label. This should take into account the "progressive" approach previously described and all new sources of information/knowledge about the system. In case of non compliance with the agreed management programme (check on annual basis) the label can be withdrawn.

The Slovenian and Italian methodologies are available in the download area of www.ch2oice.eu.

See in the following pages the main characteristics of the hydropower plant chosen to test the methodology:

- Italy: San Colombano, Malga Ghega and Moso;
- Slovene: Možnica, Doblar 1 and 2 and Gradišče.

Natasa Smolar-Zvanut and Sabina Blumauer, *IzVRS*

Andrea Goltara and Bruno Boz, *CIRF*

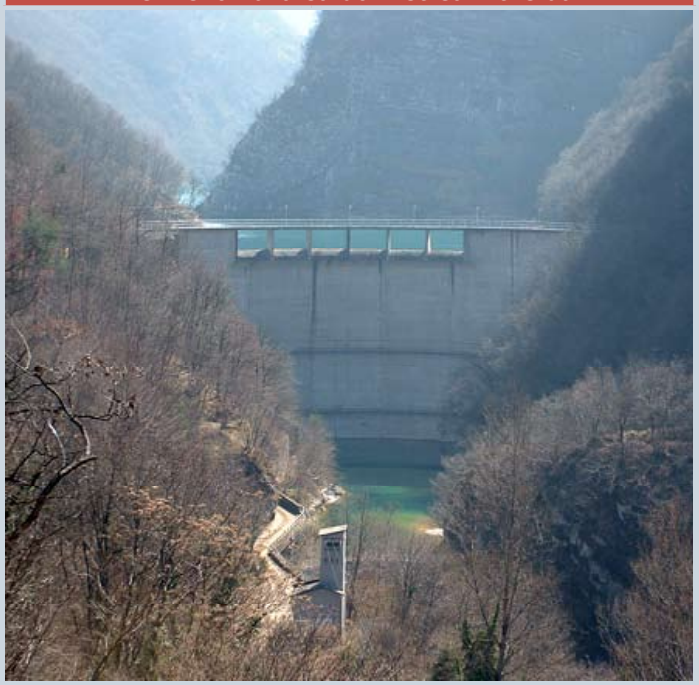
"The duration of the label is 6 years, after which a new certification procedure has to be followed to keep the label."

S. Colombano Hydropower Plant, Italy

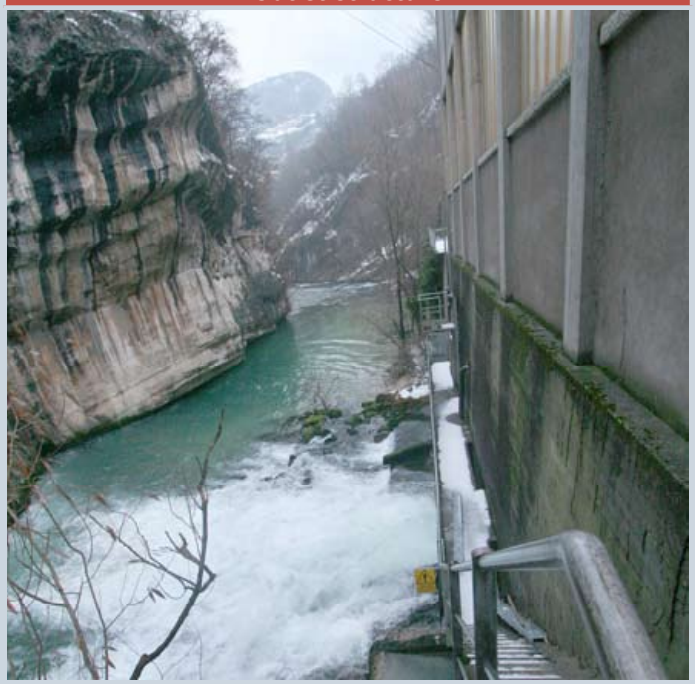
Characteristics	
Location	Province of Trento, Northern Italy
Owner/manager	Dolomiti Energia SpA
River	Leno di Vallarsa
Catchment area	84 km^2
Main river basin	Adige
Plant type	Storage
Type of structure	concrete arch dam
Date of complition	1965
Dam's height	37 m
Total reservoir volume	2,6 Mm^3
Backwater length	approx.1,5 km
Top width	82,6 m
Maximum gross head	52 m
Bypassed reach	560 m
Rated flow of the plant	5,5 m^3/s
Installed rated capacity	2,5 MW
Average yearly production	5,8 GWh

Location of San Colombano Hydropower Plant (Image from the web-gis of Adige River Basin Authority)

River Leno Vallarsa downstream the dam



Outlet structure



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Malga Ghega Hydropower Plant, Italy

Characteristics	
Location	Province of Bolzano, Northern Italy
Owner/manager	Göge Energia Srl, SEL SpA
River	Rio di Malga Ghega + Riobianco
Catchment area	8 km^2
Main river basin	Adige
Plant type	Run-of-the-river
Date of complition	2009
Intake structure	1987 m. a.s.l
Outlet structure	1.382 m. a.s.l
Total head	605 m
Average flow Rio di Malga Ghega	about 320 l/s
Diverted flow	
minimum diverted flow Dec. – Mar.	5 l/s
average diverted flow	193 l/s
maximum diverted flow	450 l/s
Ecological flow	
continuous release	25 l/s
addtional release	20% of the natural flow
Installed rated capacity	1.185 kW
Average yearly production	8*10^6 kWh

Location of Rio di Malga Ghega Hydropower Plant (Image from the web-gis of Adige River Basin Authority)

Detail of the inlet structure

Bypassed reach

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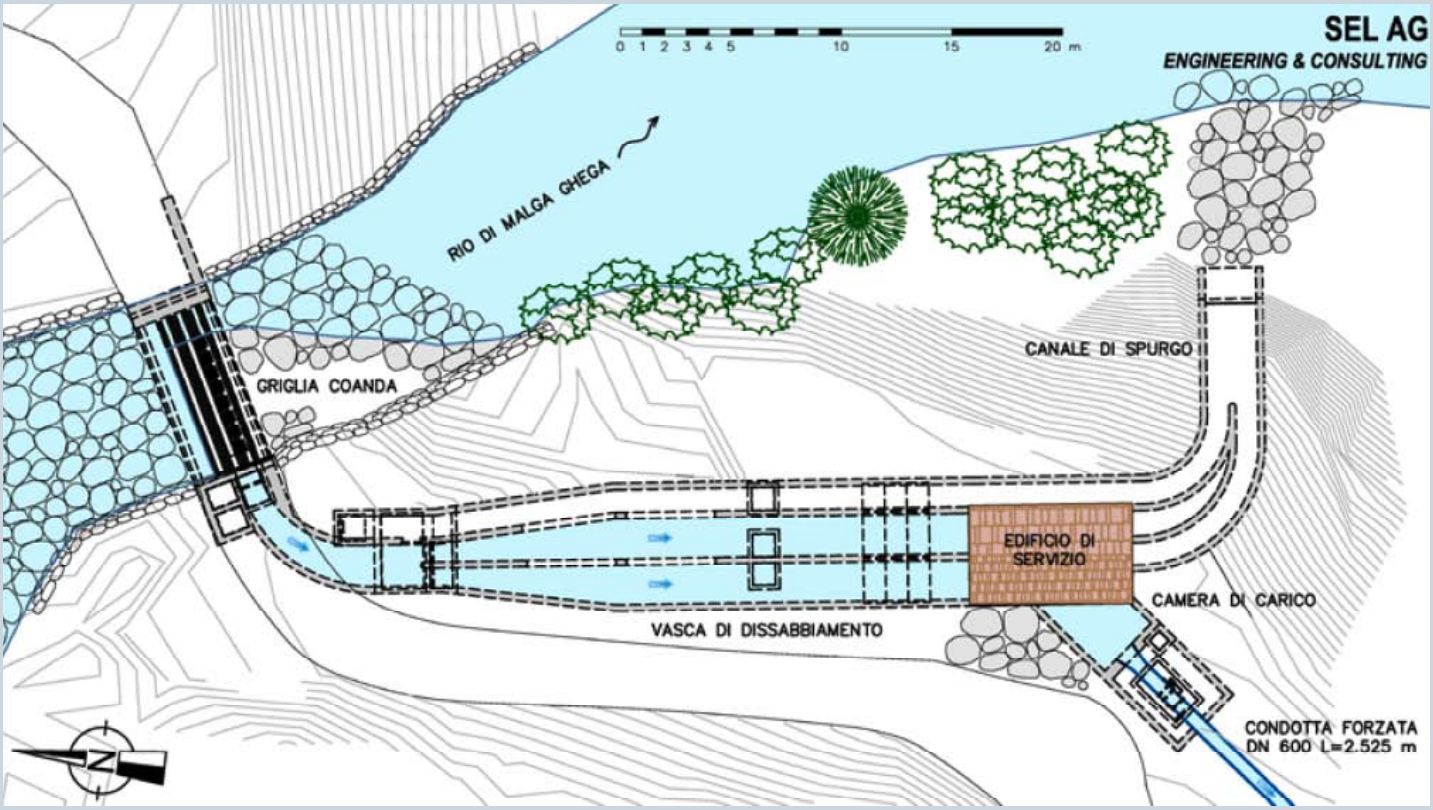
Panoramic view of the inlet structure

Hydropower plant layout



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Moso Hydropower Plant, Italy

Characteristics

Location	Province of Bolzano, Northern Italy
Owner/manager	Enerpass Società Consortile Arl
River	Passirio
Catchment area	8 km^2
Main river basin	Adige
Plant type	Run-of-the-river
Date of complition	2008
Intake structure	930 m. a.s.l
Outlet structure	674 m. a.s.l
Total head	258,5 m
Average flow River Passirio	about 8 m^3/s
Diverted flow	
minimum diverted flow Dec.- Mar.	n.a.
average diverted flow	5,25 m^3/s
maximum diverted flow	12 m^3/s
Ecological flow	
continuous release Dec. - Mar.	600 l/s
additional release	15% of the natural flow
Installed rated capacity	13,3 MW
Average yearly production	100*10^6 kWh

Location of Moso Hydropower Plant (Image from the web-gis of Adige River Basin Authority)

Outlet structure

Bypassed reach

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Turbine

Inlet structure

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Možnica Hydropower Plant, Slovenia

Characteristics	
Location	Slovenia
Owner/manager	SENG, HSE group
River	Koritnica
Catchment area	37,7 km^2
Main river basin	Adriatic river basin
Plant type	Run-of-the-river
Date of complition	1911
Intake structure	569,50 m. a.s.l
Outlet structure	503,50 m. a.s.l
Total head	66 m
Average flow river	3,0 m^3/s
Diverted flow	
maximum diverted flow	2,74 m^3/s
Ecological flow	
continuous release	200 l/s
addtional release	all flows which are higher than 2,74 m^3/s
Installed rated capacity	0,530 MW
Average yearly production	2.300 MWh

Location of HPP Možnica

Powerhouse of HPP Možnica

Intake structures of HPP Možnica on the river Koritnica

River Koritnica downstream the dam

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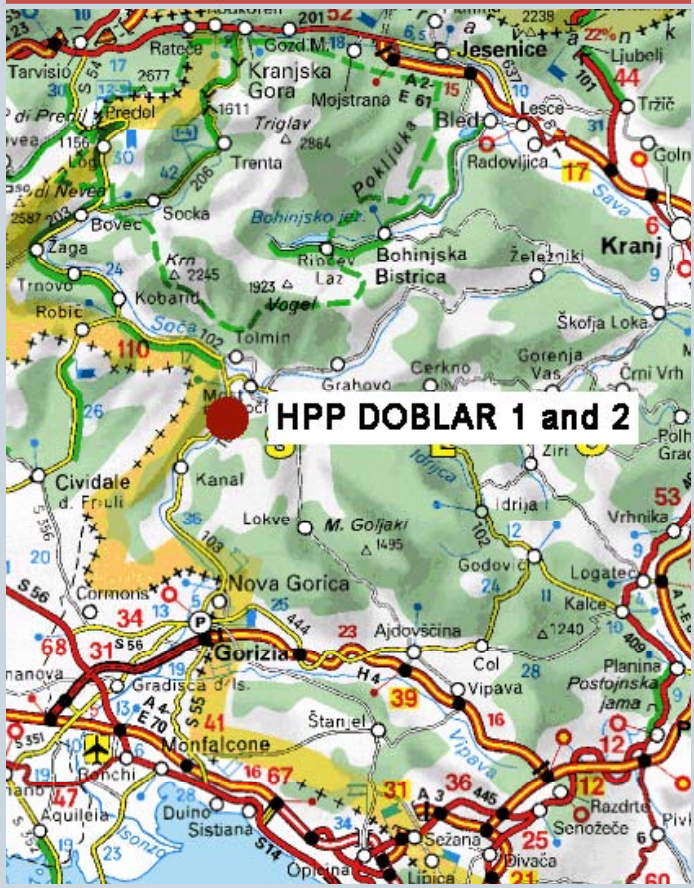
Doblar 1 and 2 Hydropower Plant, Slovenia

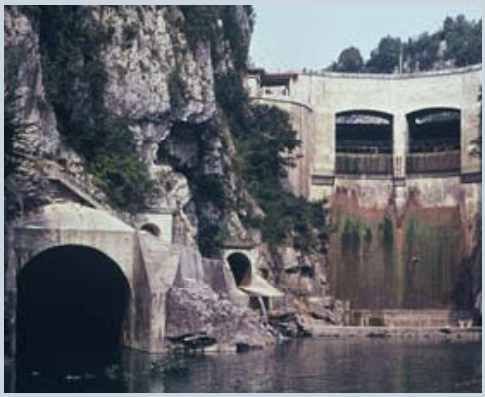
Characteristics	
Location	Slovenia
Owner/manager	SENG, HSE group
River	Soča
Catchment area	1244 km^2
Main river basin	Adriatic river basin
Plant type	Storage
Date of complition	Doblar 1: 1939 Doblar 2: 2002
Intake structure	153,00 m. a.s.l
Outlet structure	106,00 m. a.s.l
Total head	47 m
Average flow river	80 m^3/s
Diverted flow	
maximum diverted flow	Doblar 1: 96 m^3/s Doblar 2: 105 m^3/s
Ecological flow	
continuous release *1 Oct. - 31 May* *1 June - 30 Sept .*	 0,800 m^3/s 1,000 m^3/s
addtional release	all flows which are higher than 200 m^3/s
Installed rated capacity	Doblar 1: 30 MW Doblar 2: 40 MW
Average yearly production	Doblar 1: 150.000 MWh Doblar 2: 199.000 MWh

Location of HPP Doblar 1 and 2



Turbines of HPP Doblar 2

Doblar dam on the river Soča



Soča river downstream the Doblar Dam

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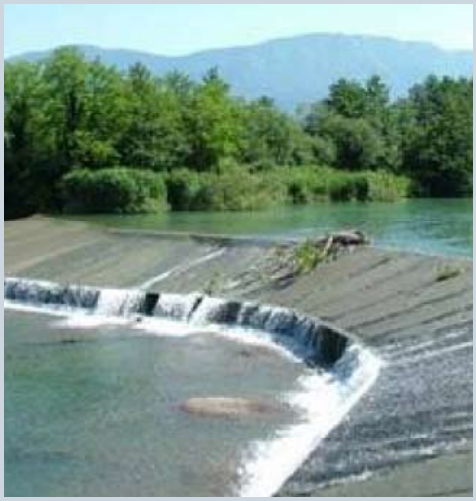
Gradišče Hydropower Plant, Slovenia

Characteristics	
Location	Slovenia
Owner/manager	SENG, HSE group
River	Vipava
Catchment area	472,5 km^2
Main river basin	Adriatic river basin
Plant type	Run-of-the-river
Date of complition	1922
Intake structure	52,25 m. a.s.l
Outlet structure	49,30 m. a.s.l
Total head	2,9 m
Average flow river	13,96 m^3/s
Diverted flow	
maximum diverted flow	12 m^3/s
Ecological flow	
continuous release *1 Oct - 31 May* *1 June - 30 Sept*	 0,400 m^3/s 0,600 m^3/s
addtional release	all flows which are higher than 12 m3/s of the natural flow
Installed rated capacity	0,150 MW
Average yearly production	550 MWh

Location of HPP Gradišče

Dam for HPP Gradišče on the river Vipava



Vipava river downstream the dam for HPP Gradišče

Turbines of HPP Gradišče

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CH_2OICE news and events

CH_2OICE at Hydro 2009 - International Conference and Exhibition in Lyon (France), October 27.

All CH_2OICE partners participated in the most important international event concerning Hydropower, the International Conference and Exhibition HYDRO 2009, held in Lyon from 26 to 28 October 2009. During the conference a short presentation of the CH_2OICE project was given by Gema Sanbruno of ESHA.

CH_2OICE workshop at GREENERGY EXPO in Milan (Italy), November 26, 2009.

In the framework of Greenergy Expo 2009 – one of the most important national exhibitions on renewable energy that took place in Milan from 25 to 28 November 2009 – CH_2OICE certification methodology, detailed for the Italian context, was presented. More than 50 people took part in the event, above all representatives of local public administrations (Regions, Regional Environmental Agencies, Provinces) and energy enterprises. During the meeting representatives of the Italian Regions Lombardia and Piemonte, the two Regions most interested in Hydro power production, reported their view on Hydro power plant licensing and re-licensing.

www.greenergyexpo.eu/it_gee/conf_2009.asp?fiera=HYE.

European Environment Agency International Workshop How can we define the "environmentally compatible potential" for small-scale hydropower? 27 November 2009, Brussels, Belgium.

The European Environment Agency supported by its European Topic Centre for Air and Climate Change (ETC/ACC), organized a stakeholder consultation with the aim of defining a methodology for evaluating the environmentally compatible potential for small-scale hydropower in Europe. Giulio Conte, CH_2OICE project coordinator, gave the following presentation: "The "Green Hydro" approach - does this provide the answer to defining good practice?".

The workshop was held to discuss the results of a study on European small hydropower energy potential. The study is downloadable from:

air-climate.eionet.europa.eu (ETCACC_TP_2008_16_pots_re_energy_techn.pdf).

CH_2OICE meeting at TEHNOLOŠKI PARK LJUBLJANA, Slovenia, December 1, 2009.

The programme of the meeting included the presentation of Slovene methodology for hydropower plants certification, hydropower producers point view on certification strategy and on the necessary conditions to be successful in the implementation of CH_2OICE certificate. Furthermore Hydropower companies gave a presentation of the certificatification achieved for their hydropower plants. Representatives of Hydropower producers, Ministry of the Environment and Spatial Planning, Ministry of the Economy, Environmental Agency of the Republic of Slovenia, the Institute for Nature Conservation of the Republic of Slovenia and NGOs participated in the discussion .

CH_2OICE at Jornadas de la Ingenierìa del Agua in Madrid (Spain)- October 27-28, 2009

During the Jornadas de la Ingeniería del Agua 2009, held in Madrid from 27 to 28 October 2009, UPM (Universidad Politécnica de Madrid) gave the following presentation about the aims of CH_2OICE project "Criterios para la cercification ambiental en la production hidroeléctrica".

The Jornadas de la Ingeniería del Agua involved Public bodies, Universities, Research Centers, Services enterprises, Construction enterprises, Consulting enterprises. For further information: www.jia2009.es.

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SHORT NEWS about Waters and Renewables

For a sustainable development of hydropower in France.

Within France Environment Round Table, «Grenelle de l'environnement», aiming to define the key points of government policy on ecological issues, a Hydroelectricity convention is being developed. This document tells how hydropower and environment will be developed together. It will hopefully be signed in the next few weeks by the State, unions, employers, NGOs and local authorities.

For further information:

www.developpement-durable.gouv.fr/Double-enjeu.html

Transparency tool in Water Management in North Italy.

The Autonomous Province of Trento (Northern Italy) made available, on his web site, a database collecting all the water derivations (including HP). This is a useful instrument of knowledge and transparency for HP operators and also for the public. For more information:

www.territorio.provincia.tn.it/portal/server.pt?open=514&objID=21174&mode=2

WFD: closed the consultation period for the RBM plans in Italy.

A key component of the Water Framework Directive is the development of river basin management plans whit the active involvement by interested parties. On the 22sd of January 2010 was officially closed the consultation period on river basin management plans in Italy. By March 22 the adopted plans should be submitted to the European Commission.

National forecast reports on renewables.

By December 2009 each Member State shall notify to the European Commission a forecast document indicating expected transfers of shares of renewable energy (import needs and export availability) as statistical transfers or joint projects. The documents are available at http://ec.europa.eu/energy/renewables/transparency_platform/forecast_documents_en.htm

No EIA for specific small hydropower plant in Lombardy (Italy).

The new Environmental Impact Assessment Act of Lombardy Regional Administration (L.R. 5/2010) establishes that all the hydropower plants built on drinking water supply network, on artificial channels and on the minimum water release, and small power plants without diversion built on weirs are excluded from EIA procedure (except for the ones in protected areas). This seems to be coherent with CH_2OICE proposal of a simplified valuation for this kind of plants. For further information: www.regione.lombardia.it

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Partners

Ambiente Italia (AI), Italy *www.ambienteitalia.it*

Centro Italiano per la Riqualificazione Fluviale (CIRF), Italy *www.cirf.org*

World Wide Fund Italia (WWF Italia Onlus), Italy *www.wwf.it*

Associazione Produttori Energia da Fonti Rinnovabili (APER), Italy www.aper.it

Studio Frosio (FROSIO), Italy *www.studiofrosio.it*

LIMNOS Company for applied ecology Ltd (LIMNOS), Slovenia *www.limnos.si*

Institute za Vode Republike Slovenije (IzVRS), Slovenia *www.izvrs.si*

Holding Slovenske elektrarne d.o.o. (HSE), Slovenia *www.hse.si*

Institute for the Promotion of Environmental Protection (IPVO), Slovenia
www.ipvo.si

Slovenian Small Hydropower Association (SSHA), Slovenia *www.zdmhe.si*

European Small Hydropower Association (ESHA), Belgium *www.esha.be*

Comité de Liaison Énergies Renouvelables (CLER), France *www.cler.org*

Universidad Politécnica de Madrid (UPM), Spain *www.upm.es*

Regional Environmental Center for Central and Eastern Europe (REC), Slovakia
www.rec.org

With the collaboration of:

Swiss Federal Institute of Aquatic Science and Technology (EAWAG)
www.eawag.ch

Association for environmentally sound electricity (VUE)
www.naturemade.ch

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