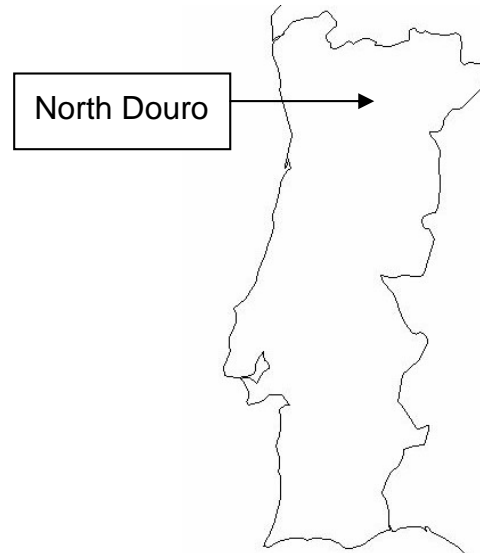


Planning for Small Hydro

North Douro (Portugal)

GENERAL ASPECTS

The North Douro is the heart of the Port Wine country, entered on the World Cultural Heritage list of UNESCO and with many designations to protect its natural heritage and landscape. It is a plateau with deeply incised valleys leading down to the Douro.



BACKGROUND

Development of small hydro in Portugal has been held back by a number of problems, including the prohibitive cost of network connections for small units, the insufficiency of the hydraulic resource in relation to the cost of investment, and the impact on the flora and fauna. The time delay in obtaining all the permissions from the relevant ministry can be very long indeed – up to 9 years to get authorisation being routine.

Portugal is however trying to stimulate small hydro production in order to contribute to meeting its Kyoto targets and a new law was passed in 2002 designed to reduce the formalities needed for plant with a power below 150kW and to promote innovation in turbine design in order to aid connection to the low voltage network. A key element in this is the reduction of costs of small hydro. An association of seven local authorities in the North Douro, centred on the town of Vila Real, set up an energy agency in 1996 using European Union funding under the SAVE programme. This agency covers an area of 1204 km² and has a population of 112,700. The local authorities in this area were interested in its small hydro potential which it felt could be coupled with the restoration of small historic mills in the area for tourism purposes, thus providing a supplementary economic motivation for developments.

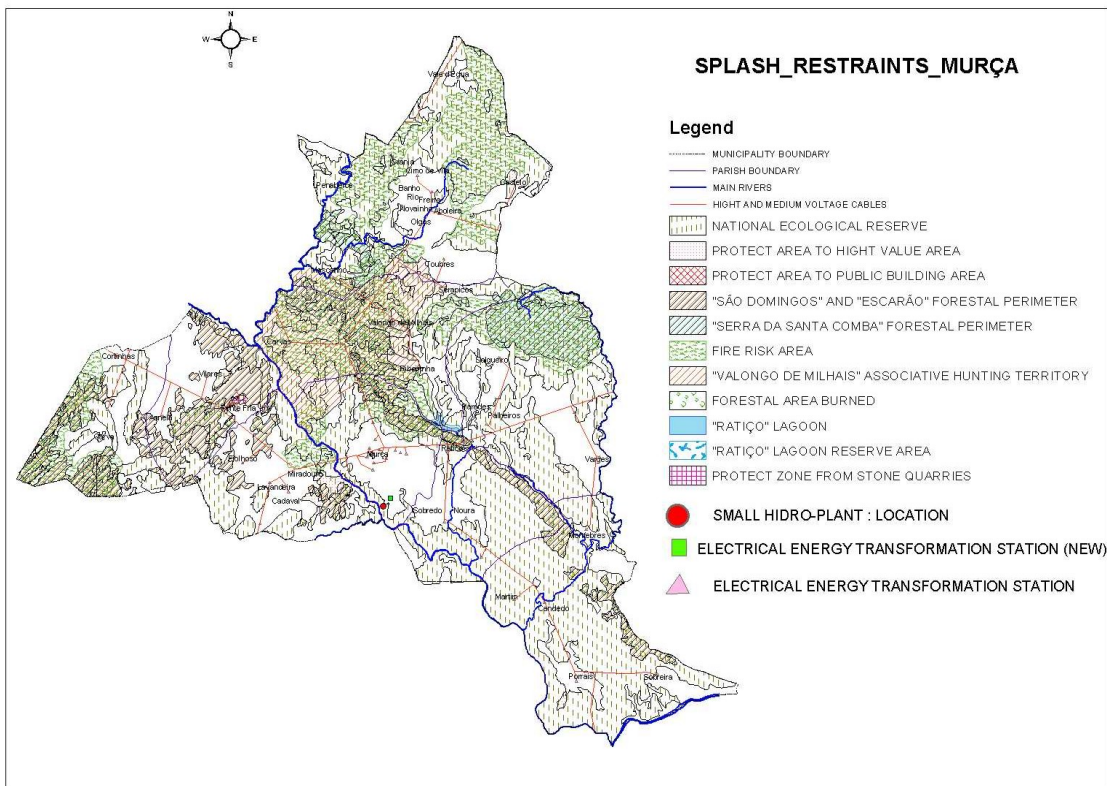


Mill, Caminho Jardim Ponte, Rio Teixeira

It was felt that the development of a spatial plan covering this issue could integrate all the locations with economic potential and contribute to the reduction of all the costs involved; feasibility studies, costs of maintenance and investment etc.

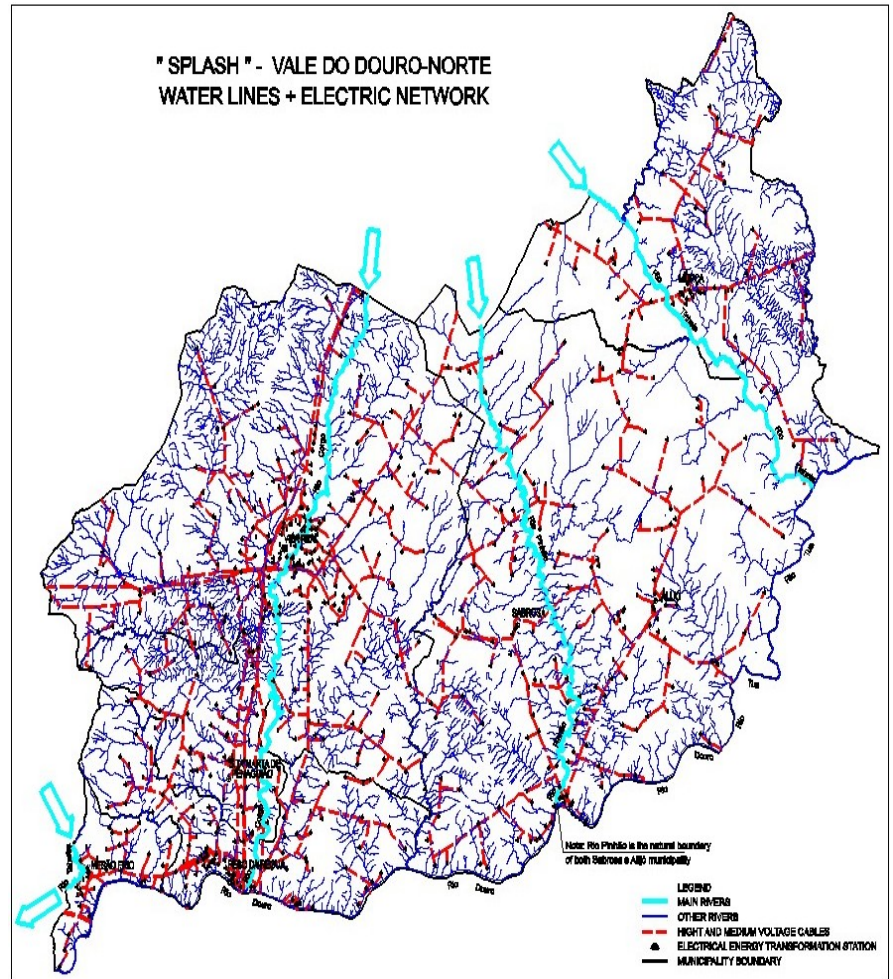
ACTION

The Energy Agency prepared a small hydro spatial plan in collaboration with the partner municipalities. The objective has been to identify potential sites and potential constraints. To support this, a GIS based sieve map has been prepared identifying all the principle constraints. In practice development is restricted to four main rivers flowing down to the Douro which are blessed with a year round flow – this area has a Mediterranean climate and so water flow in rivers and electricity demand do not coincide (maximum demand in summer due to air conditioning, maximum supply in winter due to peak rainfall). A sieve map was prepared for each municipality using data provided from the plans and information on the main protective designations, and information on the medium and low tension grid. (see below)



Four key licences are needed to develop a small hydro in Portugal, for hydraulic works, electrical establishment, use of water and operation.

The cost of these licences and taxes means that it is not worth considering a licence for very small sites. Basic taxes of 3,400 euros plus inspection fees of 500 euros must be paid in addition to the costs of any impact studies or work on the preparation of any permits required.



In addition other significant barriers affect small hydro in Portugal. The cost of connection to the network is high, and small projects are generally looked down on by the major decision making bodies which find large projects easier to manage from the financial and technical point of view. Finally the environmental impact of a small hydro is often considered high, like that of a large hydro, and significant mitigation measures are often required which cannot be justified economically.



Antonio Guedes mill, Rio Teixeira

The area had a number of advantages. While it has a very varied and interesting flora and fauna, including the Alvão Natural Park, it also has a number of natural barriers along the rivers, many old mills already linked to the low tension network and an electrical network already covering a good part of the area, easy access to potential hydro sites, four small rivers with all year round flow, and some sites which already have pre feasibility studies which have not been implemented. In addition, the Vale do Douro Norte region is unusual in that the rivers concerned have little or not value for fisheries, and so this factor is not a constraint.

A study of the mills in the region identified 27 former mill sites, 15 on the River Pinhão,, 6 on the Rio Tinhela, and 6 on the Rio Teixeira. It was decided to prepare feasibility studies on 4 mills in the area which would act as pilot studies for others on the four main rivers concerned. These studies would ensure that the projects were viable, that external factors were fully taken into account in the decision making, and that a number of locations identified were related to the development involved and the investment costs. The four sites demonstrated the range of sites available:



Restored mill leat at Mesão Frio , Rio Teixeira

Location / River	State of Mill	Electricity network	Head (m)	Flow (m3/s)	Power (kW)	Investment costs. (€)	Production (MWh)	Income (€)	Pay-Back (yrs) *
Cabril / Tinhela	ruined	Medium tension nearby	6,0	4,0	180	411,500	750	55,000	4.4
Mesão Frio / Teixeira	restored	Consumers and low tension nearby	5,3	1,3	50	144,000	200	17,000	5.1
Esteva / Pinhão	restored	Connected to low tension and medium tension nearby	10,5	2,4	177	369,500	610	45,700	5.3
Tourinhas / Tourinhas	ruined	Low tension nearby	70,0	0,3	140	313,000	540	48,000	3.9

*(Investment/Income includes a 40% grant to investment)



Esteva Mill, Rio Pinhao

The combined proposal and pre-feasibility studies were presented in a study published in draft in February 2005 and were put out to consultation with the interested parties concerned.



Ponte Parada, Rio Pinhao,

EVALUATION

This project approached the problem of a spatial plan from a different angle than the others. It started on the principle of interesting the local authorities concerned in four pilot projects to demonstrate to them the viability of small hydro as a means of local economic regeneration and restoration of their local heritage. Using these as examples, it is intended to promote the concept of an integrated strategy for the restoration of mills as small hydro sites and tourism resources among the local authorities in the region. The sieve map process has been used for the four pilot projects and worked through in terms of appraising the proposals impact. It is now hoped that further projects will be promoted as the new spatial plan will be able to identify each new proposal in a context, thus reducing the costs of feasibility and impact studies, enabling banking finance to be more easily obtained, and easing the permit process in the permitting authorities.

It remains to be seen whether this approach is more successful, and in particular whether, as hoped, this actually reduces the burden of the delays inherent in the authorisation process by obtaining an approval for a programme of small hydro at one time. The sites are relatively large compared with other case studies, with capacities in the range 50-180kW. Payback is in the 7-10 year range, but this is significantly reduced when the available grant aid is taken into account so the financial incentive to develop is significant.

FURTHER ACTION

After publication of the feasibility studies it is proposed to prepare an inventory of sites and organise them into groups or classes. With this information there will be the wherewithal to identify a programme of investment and bring investors together for a larger scale development. This will involve regular meetings with key decision makers in the region in the municipalities and districts and the publicizing of the results already obtained.

CONTACTS

Americo Pires

AREVDN

Av. Carvalho Araujo, 7.

5000-657 Vila Real

PORTUGAL

Tel: +351 25 9309 731

Email: arevdn@amvdm.pt

Gabriela Prata-Dias

CEEETA

Rua Dr. Antonio Candido, 10-4º

1050-076 Lisboa

PORTUGAL

Tel: +351 21 319 4850

Fax: +351 21 314 0411

Email: gdias@ceeeta.pt

Assistance provided by CEEETA.

Photo credits: CEEETA.