Electricity production from drinking water supply systems in mountain areas in France

Rhônalpénergie-Environnement, France

Summary

Is it possible to produce electricity from drinking water supply systems in mountain areas? In order to answer this question, a programme of studies and analyses of the conditions of implementing such equipment has been initiated in 1999 in four European regions (France, Switzerland, Portugal and Austria). This project made it possible to develop a software of technical and economic pre-sizing which aim is to measure opportunity to install a turbine in a drinking water supply system (or at the exit of wastewater treatment plants).

End-user area		Target Audience		Technical	
	New buildings		Citizens		Energy efficiency
	Refurbishment of buildings		Households		Heating
	Transport and mobility		Property owners		Cooling
	Financial instruments		Schools and universities		Appliances
	Industry		Decision makers		Lighting
	Legal initiatives (municipal regulations, directives, etc)		Local and regional authorities		CHP
	Planning issues		Transport companies		District Heating
	Sustainable communities		Utilities		Solar energy
	User behaviour		ESCOs		Biomass
	Education		Architects and engineers		Wind
	Other		Financial institutions		Geothermal
			Other		Hydro power
					Other

Context

Since the beginning of the industrial revolution, the use of hydraulic force to produce electricity has been an essential motor of the industrial and economic development in the large Alpine Valleys. During the last decades the impacts of hydraulic power plants on the environment and on the landscape have tended to discourage the development of this form of energy. Moreover the most interesting sites are already equipped. However hydraulic energy, that is both clean and renewable, still has considerable potential for development under certain forms.

One of the main possibilities is the equipping and exploitation of water networks that already exist or which are to be create (drinking water, wastewater, irrigation water). Thus a programme of studies and analyses of the conditions of implementing such equipment has been initiated in four European regions.

Objectives

This action is aimed at bringing to the fore the potential of electricity production from drinking water conveyance or at the exit of wastewater treatment plants in mountain regions.
Developing and diffusing a method of technical and economic pre-sizing starting from the analysis of reference sites and allowing to measure the opportunity to install a turbine in a drinking water network (or in the exit of wastewater treatment plants).

Process

These four regions have the particularity of having developed large scale production of electricity on supply routing networks for drinking water, wastewater or on irrigation networks:
France: Rhône-Alpes region
Austria: Styria region
Portugal: Madeira region
Switzerland: canton of Geneva

The European Thermie program started in September 1996 and was completed at the end of 1999. Several feasibility studies and operations have since been realised in the Rhône-Alpes region. This action is divided in three main parts:

1st part: Analysis of reference operation of electricity production from drinking water supply systems or at the exit of wastewater treatment plants in various regions (Madeira, Styrian Region (Austria), Canton of Geneva, Rhône-Alpes Region).

2nd part: Working out of a method for a rapid, technical and economic pre-evaluation of an electricity production from drinking water conveyance or at the exit of wastewater treatment plants thanks to the analysis of the 1st part.

3rd part: Testing of this method with representative owners in the Rhône-Alpes and Styrian Regions. All the 25 evaluation pre-studies of turbines producing electricity from drinking water supply systems will be carried out in these two regions.

These 25 pre-studies allowed the optimisation of the method settling and made numerous owners aware of their potential of hydroelectric production.

Financial resources and partners

Total budget: 182 k euro; Rhône-Alpes Region subsidy: 39 k euro; European Commission: 137 k euro.
The partners were European Commission (Programme Thermie); Regional Energy and Environment Agency of Rhône-Alpes: Rhônalpénergie-Environnement (France) Main contractor; Regional Council of Rhône-Alpes; Energy Agency of Styria: LandesEnergieVerein (Austria); Regional Energy Agency of Madeira (Portugal); Cantonal Energy Office of Geneva (Switzerland)

Results

A total of about 40 feasibility studies were realised over the last 5 years, for a 1.5 MW (non exhaustive) potential of electricity production.
Currently 3 small plants are in study in Rhône-Alpes (average power of 50 kW).

Consultants specialised in microhydraulic are now able to widen their sphere of activity to the technique of production of electricity from drinking water supply system. The main advantage of this technology comes from the fact that it has absolutely no environmental impact (using existing water supply systems), has a low cost (for the same reason) and produce a completely renewable source of energy.

Lessons learned and repeatability

The positive aspect of project implementation is that the elaborated method of pre-sizing has been well developed and is very required in France. The main difficulty was to find interesting sites. For this reason the sensitising of potential owners were primordial.

This kind of project has a high level of replication mainly in mountain areas, but also anywhere else (cities) concerning the use of wastewater treatment plants.

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Printed reports or other literature available:
Title: 1. Electricity production from drinking water supply systems in mountain areas (brochure in French, English, German)
2. CD ROM: software of technical and economic pre-sizing
3. Final report (Thermie)

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