Setting the stage for a new kind of research
The social construction of Green Electricity Standards in Switzerland

Bernhard Truffer, Swiss Federal Institute for Environmental Science and Technology (EAWAG)

Abstract

The present paper focuses on problem identification and set-up of a transdisciplinary project, which aims at defining environmental criteria for Green electricity in a liberalized market environment. The project was developed after a careful problem analysis related to the development of sustainable operation modes of hydropower plants and the potential role of environmental sciences. The analysis showed that there are strong conflicts between major stakeholder groups, but that there is also considerable room to break up the conflict lines. So there was a need for initiating and moderating a dialogue between the stakeholders and to develop new science based tools and concepts for the actualization of sustainable hydropower operation modes.

This task has gained in urgency, as since the 1990s, the economic context of hydropower use changed fundamentally because of market liberalization being applied in most countries of the world. This new institutional setting has considerable risks from an environmental point of view, but it also opens up new opportunities for the development of sustainable hydropower use by having access to the Green Power market. Successful product differentiation will, however, depend on a credible communication of environmental benefits of renewable energy sources. This credibility may only be reached if the criteria are scientifically sound, if they are accepted by major stakeholder groups, and if the chosen criteria are verified through third party certification. This problem identification led initiators of the Ökostrom-project opt for a reflexive and participatory set-up of the project.

1. Introduction

Markets for green products have received considerable attention in many countries recently. Organic food, for instance, is gaining ever more important market shares and other product sectors are following suit (Villiger, et. al. 2000). The liberalization of electricity markets has opened up the possibility for electric power companies to differentiate their products in the market place, too. Green Power products have been developed by conventional electric utilities as well as by newly founded Green Power marketers and traders (Loskow 1998, Holt 1997). As in many other Green Goods markets, quality control is a key factor for success. As a consequence, a number of certification initiatives have emerged recently (Markard and Truffer, 1999). They aim at assessing and communicating the environmental benefits of Green Power products. Today, about half a dozen labeling schemes exists world-wide.

Hydropower has an ambivalent position in the context of the electricity generation systems, which are included in Green Power products. This ambivalence is reflected in the kind of criteria, which have been used in order to identify Green Hydropower plants: The Californian Green-e label, for instance, originally sets a limit on capacity at 30 MW for run-off river plants. In Canada, the limit was set at 20 MW. In Germany two labels are currently under discussion which opt for 10 MW res. 5 MW. Other labels, such as the Swedish Brå Miljöval, have no limit on capacity or plant type, but restrict Green Power production to plants, which were built before a specific construction date (e.g. 1996 in Sweden). Neither capacity nor construction date have a direct impact on river ecology, though. There is a pressing need for an environmentally motivated and scientifically derived criteria set, which defines, in a credible and transparent way, what environmentally benign operation of hydropower could mean and what consumers are actually paying for. Recently, all these labeling initiatives have reconsidered their approaches towards hydropower and are developing more adequate certification criteria.

2. The political debate on Green Hydropower in the alpine countries

One major reason for the long search for credible criteria is associated with the environmental characteristics of hydropower plant operation. Electricity from hydropower plants creates no air pollution, no nuclear waste and virtually no CO_2 release. Furthermore, it is extremely energy efficient and energy from storage plants is instantaneously available at the moment of demand. Nevertheless, the construction and operation of hydropower plants is also associated with local impacts, which may be quite severe: extinction of fish populations, loss of aquatic habitats, sinking ground water levels and deterioration of landscapes.

This double characteristic of a globally preferable and locally destructive energy system has gained high political relevance in many countries of the world. The effects are quite pervasive especially in the alpine region in central Europe, where most of the rivers have been dammed for hydropower generation. In Switzerland, this situation led to a deep divide between environmental organizations and utility operators (Truffer, 1999). In the 1980s the conflicts escalated in public protest movements against new dam projects. A new and more severe water protection act was passed in a popular vote in 1991. This victory of the environmental organizations was followed by a long period of agony in the field of sustainable hydropower operation.

One reason for this contradiction has to be seen in the long term licensing. The renewed water protection law demands, for instance, minimum flow requirements, but its application is tied to a new licensing process of power plants. For the majority of the plants this renewal is due 40 years from now. Furthermore, market liberalization has changed the whole economic context of hydropower use quite dramatically. Most of the dam projects have been put aside and some existing hydropower plants are threatened by closure, if no supporting actions are taken.

The heated political debate about hydropower is not is restricted to the alpine mountain valleys of Switzerland, however. Free flowing rivers are of prime importance for mountain ecosystem stability and for tourism, in general. The alpine countries have identified this as a crucial common issue. Also on a global scale, the issue is of considerable importance. Recently a joint commission of the World bank and the IUCN (International Union for the Conservation of Nature) has been founded which aims at developing sustainable dam construction and operation rules (IUCN and WB, 1997).

3. Defining new roles for a research institution: The Green Hydropower Project

The analysis of the political background situation and the future challenges led a project team of social and natural scientists to set up a transdisciplinary project to develop an eco-label for Green Hydropower plants (Truffer et al, 1998). This research group was motivated by the recent experiences in environmental sciences and engineering and their transfer into real world contexts at EAWAG. Since three decades the institute has been successful in advising governments about technical water protection measures, such as water treatment plants or lake oxygenation and in doing research in water related research areas. In recent years, however, EAWAG recognized that the conventional role of a scientific institution, which produces basic research for ever more sophisticated end-of-pipe technologies was becoming problematic. Recently, environmental problems have become more and more defined by complex cause-effect relationships. Furthermore, solutions have to be developed for complex institutional settings. Finally, solutions to the environmental problems have to be defined by explicitly taking value considerations into account.

Given the lack of scientific background for Green Hydropower certification and the highly politicized context of hydropower regulation, a detailed pre-study was started. A team of natural and social scientists carried out extensive interviews and discussions with major stakeholder groups. By this, the problem could be substantially narrowed down and a first constituency was formed. This constituency brought together individuals and institutions form the major interest

parties. Both plant operators and environmental organizations made clear that there was an urgent need, to find new and less antagonistic ways for dealing with the public image and the environmental impacts of hydropower plants. Green Hydropower was seen as a potentially beneficial but highly uncertain opportunity. Furthermore, it was clear that none of the traditional conflict groups could take the lead in trying to overcome the dilemmas. A scientific research institute could therefore try to play the role of a independent, although highly involved moderator of the conflict resolution process.

These findings let to the definition of the following goals for the Green Hydropower project were fixed:

- A certification procedure for hydropower plants had to be developed, which should take global and local aspects into account and respect the high complexity of the ecological and the political situation of hydropower operation. This procedure should be adapted to the specific political and ecological context of Switzerland, but should be applicable in an international setting as well.
- The substantial uncertainties with regard to the future market conditions of the green power market should be reduced, as far as possible by defining a number of social science research projects.
- A broadly based support network should be put in place, creating a constituency where the highly conflictive and value laden decisions could be taken, involving all the major interest groups.
- Finally, the whole project should create a context in which high level social and natural scientific research projects could take place.

The Green Hydropower project is currently encompassing about 20 individual research projects. They are divided into four working groups, which tackle specific problem areas: One group focuses on developing new tools for determining minimum flow regimes. This group encompasses projects on fish and benthic ecology and its interaction with habitat and hydrology, sediment transport, modeling of hydropower impact on temperature regimes and the transport of chemical substances. A second working group analyzes adverse effects of hydropower on flood plain ecosystems. Exchange processes between ground water and riparian ecotones, the distribution of benthic organisms and terrestrial vegetation, as well as the importance of sediment transport are analyzed. Results of these two groups are fed into the assessment group, which develops a tailor-made certification procedure for hydropower plants. This group has to specify a scientifically sound, credible and effective procedure which is adapted to different types of hydropower plants and which guarantees a transparent and fair procedure for every plant. The fourth working group concentrates on the market and politics side of Green Power products and develops marketing strategies, analyzes learning processes on the consumer side and looks at complementary policy measures to enhance the effectiveness of Green power markets. The project management reports to an external governing board, with representatives from electric utilities, environmental organizations and the environmental sciences. The governing board decides on the strategic development of the project.

A pilot study of the Green Hydropower project was carried out between April 1997 and April 1998. Since then, the project started with a case study, which will end by April 2000. The goal of this phase is to develop a comprehensive assessment procedure, which will be applied to first hydropower plants in the course of summer 2000. Following this project phase, the scientific projects will continue by focussing on specific research issues, and the certification of concrete hydropower plants will be scientifically accompanied.

5. Lessons learned

The Green Hydropower project outlines a promising way to mitigate the ecological impacts of hydroelectric power supply, by defining and implementing criteria for a sustainable operation of hydropower plants. The development of an eco-label for Green Electricity, furthermore, is a market oriented, innovative and efficient approach for supporting renewable energy supply under conditions

of competitive electricity markets. The eco-label is likely to have significant influence on product design in the electricity supply business. Furthermore, the label enhances market transparency and strengthens customer demand. As a result, this may show beneficial effects for the local environment of hydropower plants and, on a global scale, enhance future perspectives for a more sustainable energy supply.

On the other side, the Green Hydro project faced the challenge of integrating different stakeholder interests in a highly conflictive political environment. The liberalization of electricity markets was taken as an opportunity to break up old conflict lines. Defining the Green Hydropower project as a joint endeavor of social and environmental scientists, engineers and stakeholders turned out to be a creative and promising approach.
All the involved parties contributed essential elements to the solution of the problem: Environmental scientists defined a scientifically sound assessment procedure and developed tools to evaluate and simulate the effects of environmentally optimized operation modes. Social scientists aimed at reducing uncertainties and at sketching strategies with regard to Green Power market development. Stakeholder groups developed a common understanding of the problems and defined creative solutions. The process of mediation and conflict resolution was made possible by the support of business consultants. The research network (led by EAWAG, in our case) had a unique role to play in that it could provide a platform for discussing highly value laden criteria as a non-dependent actor. By this we do not mean that scientists are a priori more objective but that they do not have to take one of the positions of the interest groups.

With regard to the solution of pressing environmental problems, we may conclude that Green Power markets need a scientifically sound and broadly accepted quality assurance tool. Within our Green Hydro project, we endeavor to develop such a tool and to make it operational, even though the political environment is conflictive. Green Power markets may prove to be an effective means to promote renewables and thus to contribute to a more sustainable system of energy provision. Therefore, this kind of project will have a positive impact on the development of a more sustainable energy future.

The actual product (the eco-label) may however be not the most important achievement of the project. At a much more fundamental level the development of widely accepted standards is at stake: what is a system of environmentally sound electricity generation and how could we describe a preferable energy future. These standards may not be predefined by experts which base their decision on purely objective truths. They have to be defined and agreed upon in joint learning processes of a broader range of societal actors. This means that the standards are socially constructed. A research institution striving for objectivity and truth has a definite role to play in such construction processes. For this, however, it has to be prepared to be involved into the ongoing learning processes and it has to clearly communicate the limits and uncertainties of their knowledge and be very explicit about where value judgements have to be made by the involved parties.

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