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Green Electricity in Switzerland:

Insights in market development and eco-labelling.

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Abstract

As in many other European countries, Green Electricity is an emerging product in Switzerland as well. Although the market is yet to be liberalised, more than 80 of the 1200 Swiss electric utilities offer some sort of Green Electricity product to their customers. Successful utilities like ewz or the municipal utility of the city of Berne have reached customer response rates of up to 4 %, while still maintaining cost-based pricing, i.e. charging their customers price premiums of 500-800 % per kWh. While most of the products still rely on mainly photovoltaics, some utilities have started to introduce mixed Green Electricity products also including wind power. With a share of 60 % in the Swiss generation mix, hydropower will clearly be the next issue to emerge. This, however, causes controversial debates, because while being renewable, hydropower is not considered environmentally benign by all the stakeholders, and unlike with new renewables (solar, wind, biomass), there is little room for new hydropower generation facilities in Switzerland. A labelling scheme that is being developped by a newly founded organisation ("Association for environmentally friendly electricity") will tackle that issue. The labelling organisation has evolved from a broad stakeholder involvement process, that included environmental NGOs (like WWF Switzerland), scientific organisations (like the Swiss Federal Institute for Environmental Science and Technology, EAWAG), Green Electricity providers (like ewz), renewable energy lobbyists, government bodies and others.

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1 Introduction

Switzerland has a population of about 7.1 million people. The specific electricity consumption was 6.960 kWh per capita in 1997 (BfE 1999a, p. 24). Its electricity system is mainly based on hydro and nuclear power. The annual production is about 60 TWh, the consumption about 49 TWh. Hydro power accounts for about 57 % of the power supply, another 40 % are nuclear and about 3 % of the electricity is generated from fossil fuels (BfE 1999a, p. 3). New renewable energy sources like solar power, wind or biomass play a marginal role in electricity supply, covering only 0,026 TWh or 0,04%. Electricity from waste incineration, landfill gas and waste water purification contributes another 0,68 TWh (BfE 1999b, p. 47).

Due to its central geographical location on the borders of France, Italy, Germany and Austria, Switzerland has traditionally been strongly involved in international electricity trading. Cross-border trades amount to about 1/3 of the total domestic generation (20 TWh), with a slight net export in summer.

As for the industry structure, there are about 1200 electric utilities, many of them small to very small municipal or local utilities. Many of the small utilities are only distributors, while some of the larger utilities are vertically integrated from generation through transmission to distribution. The high voltage grid is until now owned by the 6 major utilities (Ueberlandwerke), but there are plans to form a national grid company.

Compared to many other European countries, Switzerland is lagging behind in the process of electricity market liberalisation. Switzerland is not a member of the European Union, hence it does not automatically apply EU legislation. A draft Swiss Electricity Market Law has been presented by the federal government in February 1998 (see Energiegesetz 1998) and has caused vivid debates since then, mainly on the issues of stranded investments and the competitiveness of hydropower. The current draft foresees a stepwise liberalisation process that starts with the large consumers (>20 GWh) and reaches the household level after 6 years.

This, however, will not be enacted before a referendum about energy taxes takes place on September 24, 2000. The referendum will be on two popular initiatives (Solar-Initiative and Energie-Umwelt-Initiative) and the two corresponding proposals of the Swiss government (cf. Bundesbeschluss 1999a, b). The latter suggets a two-step approach to energy taxation: First, to introduce a tax on non-renewable fuels of 0.3 Rp/kWh (or 0,2 EUct/kWh) that shall be used to support new renewable energy sources, energy efficiency and renewal and maintenance of existing hydropower plants. In a second step, an ecological tax reform is to be implemented including an energy tax of max. 2 Rp/kWh (1,3 EUct). Compared to other countries, these are rather low levels of taxation, but still there is substantial opposition to these proposals from industrial associations.

In the present paper we will first reconstruct the diffusion path of Green Power products in Switzerland. In this analysis it becomes clear that quality assurance and credibility of claims are key for the success of a further market expansion. In chapter 3 we will analyse the

development of a broadly supported Green Power labelling scheme in Switzerland, which is shall be launched by early summer 2000. In the concluding chapter, we will summarise the developments in the Swiss market regarding more general questions of Green Power market development.

2 Phases of Green Power Market Development in Switzerland[3]

The development of the Green Power market in Switzerland can be interpreted in terms of the diffusion of a product innovation. As Rogers (1995) has shown, the diffusion of innovations in social systems can be described as following a sigmoid curve. Villiger/Wüstenhagen/Meyer 2000, p.32, have extended this analysis to describe the market penetration of green product innovations in the food, clothing and electricity sectors (see fig. 1).[4]

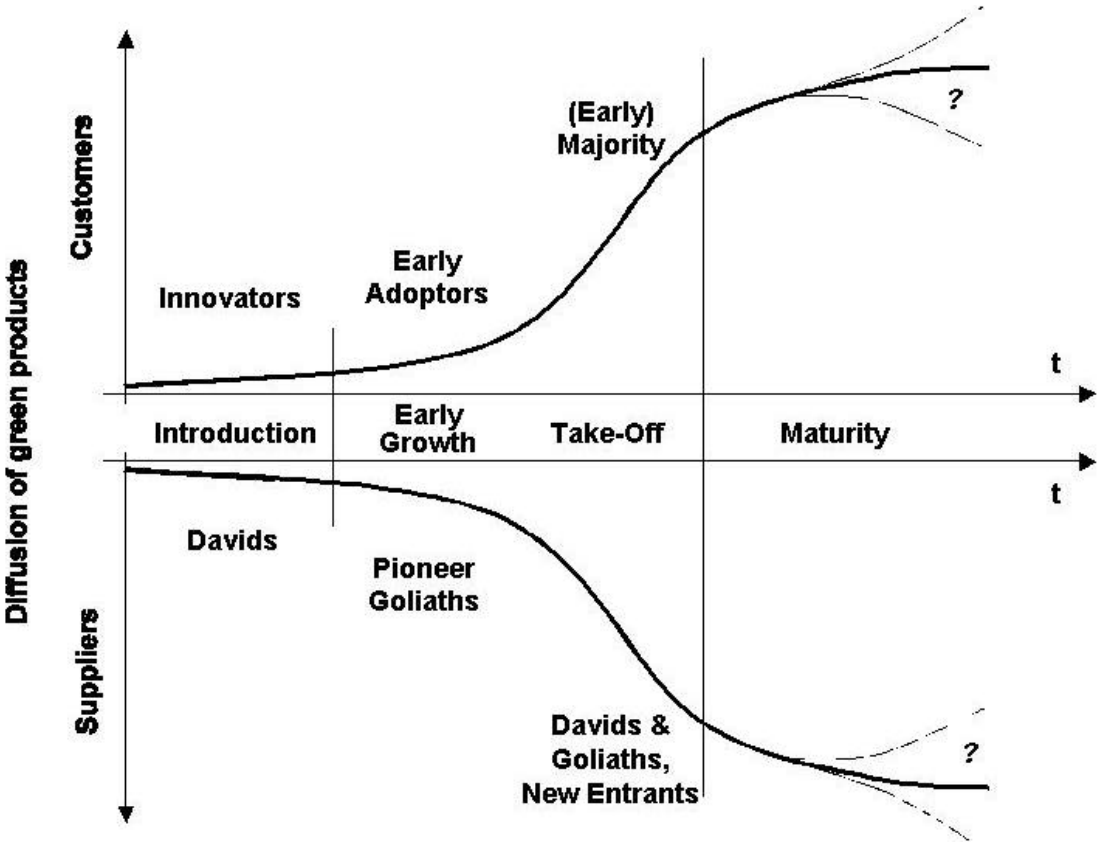


Fig. 1: Diffusion of green products over time among customers and suppliers

(Source: Villiger/Wüstenhagen/Meyer 2000, p. 32)

Following their terminology, the development of the green market can be divided into four phases: introduction, early growth, take-off, and maturity. The development of the Swiss Green Power market shall be described along these lines, analysing the major suppliers,

[3] unless indicated otherwise, information in this chapter is mainly based on Wüstenhagen (2000).

[4] see also Holt/Wiser 1999, p. 8, for an application of the diffusion curve to Green Power demand in the US, and Nordmann 1997 for a combined model of diffusion on the customer and supplier sides of the PV market.

consumers, market share, prevailing products and degree of market liberalisation in each phase.

2.1 Introduction Phase (Late 80ies to early 90ies)

The cradle of the Swiss Green Power market is located in the late 1980ies/early 90ies. In this introduction phase, the main actors were committed private persons – like technology enthusiasts or environmentally conscious homeowners –, as well as grassroots movements like the “Appenzellische Vereinigung zur Förderung umweltfreundlicher Energien” (Association for the promotion of renewable energies in the canton of Appenzell, founded in 1991), who started experimenting with the use of solar energy. Some early pioneers among the electric utilities like Elektra Birseck Münchenstein (EBM) joined them in their efforts by promoting voluntary contributions of household customers to the establishment of new PV generation facilities within their programme "Sonnenstrom für jedermann" (Solar electricity for everyone). Other utilities like Industrielle Betriebe Burgdorf chose to use a feed-in tariff for the promotion of renewables that was financed by a charge paid by all consumers. Besides these bottom-up initiatives of the smaller utilities, the industry's "Goliaths" did not pay much attention to the use of new renewables.

The typical Green Electricity customers in this phase were highly environmentally aware, "dark green" consumers, who had a very low price sensitivity and were ready to take significant efforts to get to their products. The market share in this early phase was little more than zero.

2.2 Early Growth (Late 90ies)

In the late 1990ies, there was a significant expansion of the Green Power market in Switzerland. A number of committed municipal utilities like Elektrizitätswerk der Stadt Zurich (ewz, municipal utility of the City of Zurich), who have taken a more marketing-oriented approach to promoting Green Electricity, have been important actors in this phase. There also was a joint effort to promote solar power products in a programme called "Solarstrom vom EW" (Solar power from your local utility), supported by the Federal Energy Agency and the Association of Swiss Electric Utilities (VSE). Until today, 80 utilities have set up Green Power offerings within this programme,[5] most of which are dominated by PV products, with prices per kilowatt hour that are 600 % to 800 % higher than the price of ordinary electricity. This shows clearly that these products have – until now – not been intended to reach the mass market but rather to serve a small market niche of price-insensitive, dark green consumers. Nevertheless, it is amazing to see how many consumers do buy solar power at these high prices. ewz at Zurich alone sells solar electricity to 5'500 customers and has installed 1.6 MW new PV generation capacity within the last three years through its Green Power programme. Overall, about 20'000 households in Switzerland cover part of their electricity consumption by solar electricity provided from their local utility. It is estimated that the 1999 sales of solar electricity products in Switzerland were about 2'000 to 2'500 MWh/a (Linder 1999, p. 25). The share of participating households ranges from almost zero to 4.4 %, and the market share within the supply areas of utilities is still below 1 % (cf. Wüstenhagen 1998, Linder 1999). Despite the high prices, the low market share can also be

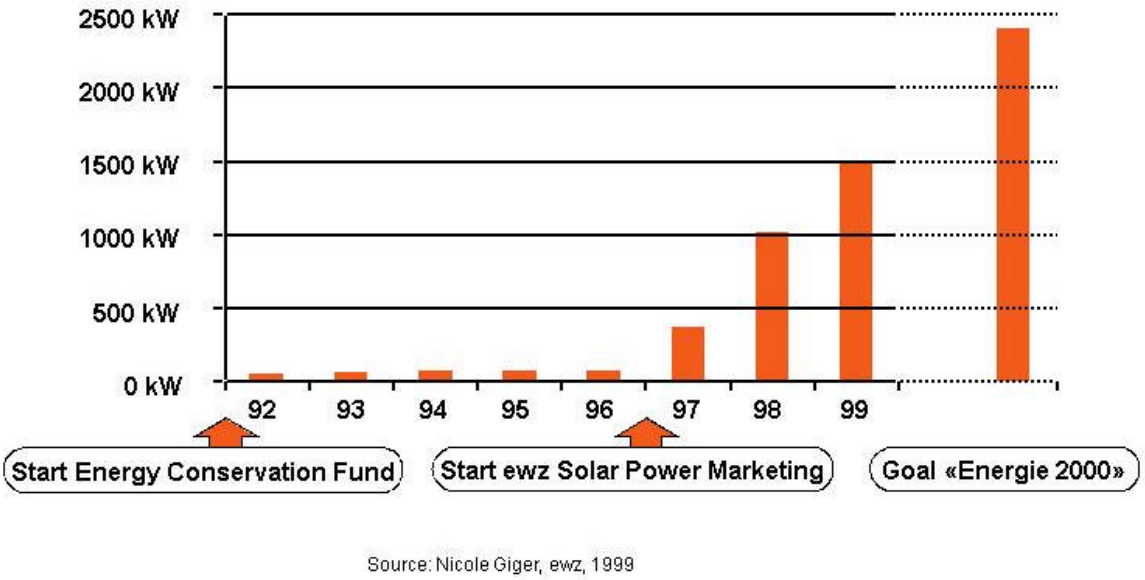
[5] see http://www.strom.ch/erneuerbar/sonne/stromew.htm for a list of suppliers

attributed to the low marketing (communication) intensity of most of the programmes and to the mere fact that they have been introduced only recently. For example, a survey among customers of 10 solar power providers in Switzerland showed that 70 % of the customers have never heard about the green offering of their utility (Linder 1999).

There are some examples, however, of more proactive and professional approaches to marketing, which might be first signs of an upcoming take-off phase. Such examples include different aspects of the marketing mix, such as product design, pricing and communication. As for product design, some suppliers start to experiment with mixed Green Electricity products, including other (cheaper) forms of renewable energy like wind power (e.g. Elektrizitätswerk der Stadt Bern, EWB) or small hydro (e.g. Industrielle Betriebe Burgdorf, IBB). These products are, however, still far from being competitively priced, although some utilities start to include state subsidies to lower the price for PV products. As for communication, ewz has committed itself to event marketing, co-operating with organisers of popular events (like the annual Street Parade) to buy part of their electricity from photovoltaics and using this as a marketing platform for their solar power product. Another smart example is the partnership between Juvent SA, a windpower subsidiary of BKW Energie AG, with Fromagerie Spielhofer SA, a small producer of dairy products, who has launched a cheese branded "Eolienne" (wind cheese) – the brand being owned by the utility.

It can be concluded that during the early growth phase, utilities have had some success in increasing the level of PV capacity in Switzerland, but the growth is still on a rather low level. Nevertheless, the consumer-driven offerings have caused a significantly stronger growth than what had been achieved with years of direct public policy support before. This can be illustrated by the case of the city of Zurich, where a public support scheme has led to few growth in the years of 1992 to 96, and substantial progress was caused by the introduction of the solar power marketing campaign thereafter (cf. fig. 2).[6]

[6] The column on the right indicated the political goal for PV capacity that had been set by the Swiss government within the programme "Energie 2000" in the early nineties. It can be seen that the traditional public policy support before the introduction of the solar power marketing campaign has failed to come close to that goal by any means.



Source: Nicole Giger, ewz, 1999

Fig. 2: PV capacity in the city of Zurich before and after launching the solar power marketing campaign

(Source: Giger 1999)

2.3 Take-Off (Early 00s)

The turn of the century has also marked a change for the Green Power market in Switzerland, that can be expected to grow significantly during the coming years. We want to touch briefly upon three aspects of this beginning take-off phase: A growing interest among business customers (B2B, Business-to-Business Marketing), the emergence of competitive Green Electricity products including hydropower, and the development of an eco-labelling and certification scheme.

Apart from a continuing move through the diffusion curve among private customers, Green Electricity starts to become an attractive option for businesses as well. Due to the higher consumption level of businesses, this might give a strong impetus to the early Green Power market. The motivation for a business to buy Green Electricity can be threefold (cf. Truffer 1998, Wüstenhagen 2000, pp. 135-139). One option might be for the company to improve its environmental performance by purchasing Green Power. This can be interesting if a company has introduced an Environmental Management System that implies a need for continuous improvement. An example is the former telecommunications monopolist Swisscom who purchases a part of its electricity from ewz's solar power offering. Another option might be for business customers to use the Green Electricity purchase in their marketing mix as part of a differentiation strategy. The above-mentioned wind cheese is a prime example of this sort of motivation. For this option to be attractive for business customers, a Green Power supplier has to increase the visibility of the purchasing decision, for example by creating a brand or logo that can be used in the customer's marketing materials. Fig. 3 shows an example from the UK: The Renewable Energy Company provides

the customers of its "Ecotricity" product (in this case a printing company) with a logo that they can use in their marketing materials.

Fig. 3: Increasing the visibility of Green Power purchases is crucial in B2B marketing

(Source: The Renewable Energy Company, UK)

A third option is that the business customer buys Green Electricity as part of a defensive strategy to safeguard against critical stakeholders from the environmental community. The Green Power purchases of customers like Zurich Airport or its Los Angeles counterpart as well as Toyota Motor Company in the US can probably be assigned to this category.

Another indication of an upcoming take-off phase is the emergence of competitive[7] Green Power products, as opposed to the offerings of monopolists in the early growth phase. A prime example of such a product has been the launch of "Pure Power St. Moritz" by Rätia Energie AG in April 2000, as well as the announcement of Kraftwerke Oberhasli (KWO) that they intend to market their hydropower under the brand "Grimselstrom" that indicates the geographical area of origin. These examples might be weak signals for a move towards a merger of tourism and electricity marketing. The fact that these branding strategies have been announced while the legislator intends to wait for another six years to full market liberalisation reflect the international orientation of the Swiss power suppliers, who will try to market their electricity on the liberalised markets in the neighbouring countries, mainly Germany and Italy. The examples mentioned here also show another tendency in Green Power marketing which is that the previous focus on pure solar (or pure new renewable) products is shifting towards an inclusion of (existing, large) hydropower. Such an inclusion provides both opportunities (in terms of lower costs and high availability) and threats for the development of the Green Power market (in terms of a low credibility of products from existing plants – the "old vine in new bottles" issue). Possible responses would be minimum requirements for new renewables content in green products or additional criteria that restrict the inclusion of hydropower to environmentally benign facilities. Both issues are currently being discussed in the development of a Green Electricity labelling scheme in Switzerland (cf. chapter 3). A credible and widely accepted eco-labelling scheme is important to secure a smooth transition of the market as it grows from the enthusiastic niche consumers and suppliers to the wide field of the mainstream market.

[7] By competitive products we mean products that are aimed at customers on a liberalised market and are designed to give the company a competitive advantage. It is of course difficult to distinguish competitive and non-competitive offerings in the transition phase.

2.4 Maturity (2005 ff.)

It is too early to predict how the Green Power market is going to develop after passing today's Take-Off phase. Comparing to countries that are further down the liberalisation road like Germany or the US states of Pennsylvania and California, very different scenarios seem possible. In a pessimistic view, inspired to some extent by the current market development in Germany, the Swiss Green Power market might split up into a large segment that is covered by plain hydropower with no environmental value added, and a small premium segment of new renewable products, that is heavily dependent on public policy support. The development in some US states gives rise to more optimism. For Switzerland, we think that a rational way of dealing with hydropower is key to such a positive development. If the majority of suppliers recognises the need to provide products that are at the same time cost-competitive (i.e. in the range of 10-30 % percent price premium rather than today's 600-800 %) and provide a clear added value in terms of environmental improvements and/or new renewable generation capacity, then this might well result in a market share of (mixed) Green Electricity products in the 20-30 % range. This would also give substantial impetus to the development of the energy market for new renewable energies. Again, labelling is a crucial factor to bring this about, because it provides guidance both to the product designer and to the consumer.

The following table summarises what has been said in this chapter about the four phases of Green Power market development in Switzerland.

Phase	Time	Suppliers	Consumers	Market Share	Products	Market Li-beralisation
Introduction	Late80ies, Early 90ies	Private Persons, Grassroots, Early Utility Pioneers	Technological Enthusiasts, Dark Greens	close to zero	PV	no
Early Growth	Late 90ies	Mainly Municipal Utilities	Environmentalists and Early Followers, Urban People	<1 % (participation rate up to 5 %)	PV, some wind, some renewable mix	discussion starting
Take-Off	Early 00s	dto. plus New Entrants	Early Majority, Light Greens, B2B	3-5 %	renewable mix incl. some hydro; pure hydro (mainly for export)	in progress
Maturity (optimistic scenario)	2005 ff.	Utilities & New Entrants	Late Majority	20-30 %	renewable mix incl. certified green hydro	completed
Maturity (pessimistic scenario)	2005 ff.	Utilities & New Entrants	as in Take-Off	stuck at 3-5 %	pure hydro with low credibility vs. high end new renewables	completed

Fig. 4: Overview on the phases of Green Power market development in Switzerland

3 The development of a Swiss Eco-label for Electricity

Given the highly controversial assessment of the environmental qualities and impacts of hydropower and some credibility deficits of the electric power industry, an environmental labelling scheme is likely to become a major factor for the future development of Green Power products. By the end of 1999, a private organisation had been founded with the aim to develop a broadly accepted quality standard for Green Electricity in Switzerland. The "Association for Environmentally Friendly Electricity" (Verein für umweltgerechte Elektrizität, VUE) comprises representatives of electricity producers, marketers, environmentalists and consumers in its board of directors. Thus far, the principles of environmental certification had been set up and published (see Kiefer 2000). A pilot certification program with about 6 utilities and different generation technologies is currently under way and it is planned to launch the label in early summer this year.

3.1 The Swiss labelling scheme

The Swiss Green Electricity concept is restricted to renewable energy sources and includes a two-level approach: An eco-label for power plants which meet highest environmental standards ("level 1") and a product declaration just in order to distinguish renewable sources from non-renewable generation technologies ("level 2"). The scope of certification is focused at two points in the production chain: first at the individual power plant and second at the electricity product, which is offered to the customers.

Green Power plants, which are certified according to level 1 are considered as ecological leaders and have to fulfil additional environmental benefits: It has to pass below a certain threshold regarding its life cycle characteristics.[8] Beyond that global evaluation, eco-leaders have to meet certain local minimum standards. PV-plants have to be build on existing buildings or wind turbines are restricted to certain areas. In the case of hydropower there is a more complex differentiation to be applied: Green hydropower plants have to meet a set of basic criteria and have to additionally invest into environmental improvements in the context of their Green Power certification (Bratrich et al. 1999).

The basic criteria are arranged into 5 management topics and also 5 different environmentally relevant areas, see figure below. During the pilot phase the basic criteria will now be tested and adapted in order to make the evaluation scheme both, ecologically sound and suitable in practise.

[8] Life cycle characteristics are measured following the Ecoindicator 99 methodology with a hierarchist weighing of the individual impact areas. Proposals for a threshold are at 30% of the value of a modern gas and steam power plant, see Frischknecht and Jungbluth (2000).

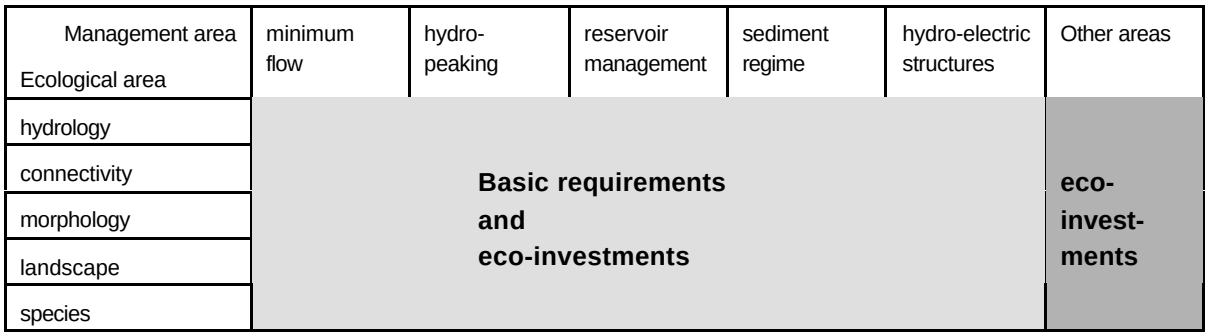


Fig. 5: Structure of labelling requirements in the case of hydropower

Plants which do not opt for a level 1 label may choose the “level 2”- product declaration as renewable energy in order to differentiate from fossil fuel or nuclear energy sources. Concerning hydropower, the declaration relates to net energy production, i.e. losses and non-renewable energy input for pumping storage plants are excluded.

All certified power plants (level 1 and level 2) beyond a capacity of 10 MW are expected to implement an environmental management system within a 5 years period.

As for the huge potential of hydropower to be marketed as Green Electricity, the Swiss eco-label also asks for a minimum share of “new” renewable energy within every certified Green Power product (“support model”): Within 5 years after certification, every Green Power supplier has to assure a minimum of its electricity to be derived from biomass, solar or wind energy. At the moment, there is a minimum of 0,5% under discussion, which would be about 10 times higher than the average in Switzerland, cf. chapter 1.

The current concept of the Swiss Green Power label represents the endpoint of a long and difficult negotiation and development process among the different stakeholders. We would now like to turn to the essentials of this process.

3.2 Overcoming the social dilemma in the case of hydropower?

Electricity generation from hydropower has a Janus face characteristic. Being renewable, CO_2-free and highly energy efficient from a global perspective, it causes quite severe local impacts on aquatic ecosystems and landscape. With more than 80% of the potential which is geographically available in Switzerland currently used, hydropower generation quite early had to face rising opposition from environmentalists claiming not to further exploit the resources but to mitigate already existing impacts.

In the 1980s the conflicts escalated in public protest movements against new dam projects. Finally, the renewal of the Swiss water protection law in 1991 - backed up by a popular vote - set up more severe requirements for the use of hydropower. Although now seeming the ecological situation to be on a better way, the new law turned out to be a phyrrus-victory for the environment. Its restrictions intervened in existing water use rights and therefore in fact could not be applied until the concessions expired and had to be renewed. As for those renewals in most cases there are still more than 40 years to go, the environmental situation remained nearly unchanged. Moreover, the conflictive positions of industry and

environmentalists hardened. Consequently, the public image of hydropower in Switzerland got rather worse over time and the ecological problems remained unsolved.

With upcoming market liberalisation, now there is a significant cost pressure on electricity supply and the marketing of Green hydropower seems to be a promising strategy in order to realise higher prices in the new, green market segment. Credibility of environmental claims is one of the major issues to tackle for electric utilities when entering into the Green Power market. Environmental organisations, on the other hand, have a highly credible image in the public, at least as far as ecological standards are concerned. In order to push forward ecological improvements, they are furthermore interested in Green Electricity products to be marketed successfully and the know-how of the electricity industry to be mobilised.

In this situation, a broadly supported eco-label can be both, a powerful, credible marketing tool for electricity suppliers and a means for the environmental upgrading of certified power plants. Despite the existence of a potential win-win situation, the development of a common labelling standard has to face several barriers which require some further analysis.

The decision options of electricity industry actors and environmental organisations can be described according to the ideas of game-theory, cf. eg. Rasmussen (1989). For a qualitative analysis of the pay-offs see the figure below.

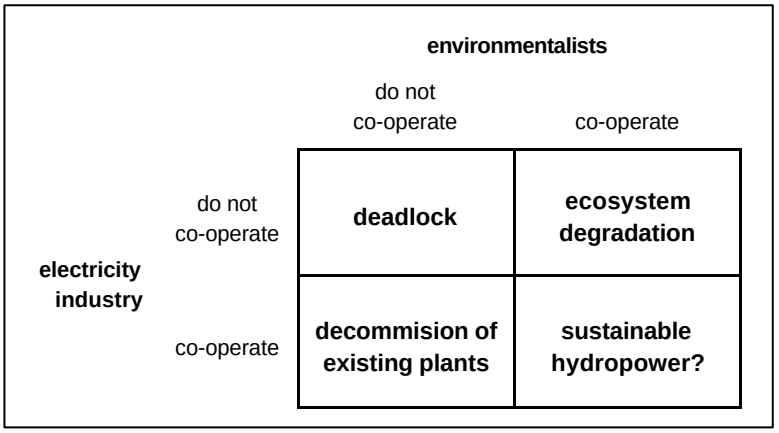


Figure 6: Eco-standards for hydropower: The dilemma situation in Switzerland

As long as both actors do not co-operate, there is virtually no chance for a common standard and the status quo remains unchanged (“deadlock”).

If the environmentalists co-operate, i.e. accept a lower standard while the producers follow the hard line a higher economic benefit for the industry will result – to the disadvantage of the environmental situation (“ecosystem degradation”). The opposite holds true for environmental organisations not agreeing in a compromise and industry withdrawing. Due to high environmental standards some power plants may not be able to economically reimburse investments for ecological improvements (“decommission of existing plants”).

In case of a bilateral co-operation there might be a positive payoff for both players which can lead to a common standard for sustainable hydropower. Albeit this situation being pareto-efficient it will not be achieved as long as both sides strive for a maximisation of individual benefit. Individual calculation in this case results in a preference for non-co-operative behaviour. Such existence of dominant strategies leads to a pareto-inefficient result which

from literature is known as the “prisoners‘ dilemma”, see Hohmann/Pies 1991, pp. 609. The deadlock situation may remain stable as long as the interests within each group are relatively homogenous and the players cannot communicate.

In Switzerland, the process to overcome this dilemma was initiated by pioneers from both sides, the municipal utility of Zurich (ewz) and the World Wide Fund for Nature (WWF). Decisive was the awareness that a success of a label can only be achieved by mutual cooperation. The initiative was backed up by a research project of the Swiss Federal Institute for Environmental Science and Technology (EAWAG) aiming at the development of scientifically based criteria for sustainable hydropower.

At the beginning of 1998, a working group “Green Electricity label” was established and the EAWAG project started. A private company (Kiefer & Partners AG), being financed by ewz and WWF, got the responsibility to set up a business plan for the label. Project members of EAWAG increased the acceptance of the evaluation procedure in a number of negotiation meetings with all relevant stakeholders. After another year of mediation as well as research concerning the criteria to be applied for hydropower plants, the association for environmentally friendly electricity (VUE) could be founded. Although the final design of the label is still under way there are some lessons learned from the process so far.

The stakeholder involvement turns out to be essential for the process of standard development. Eco-labelling generally has a potential to lead to a win-win situation for all market actors involved: producers & suppliers, consumers and environmental organisations.

Moreover, labelling has the potential to set up a constructive mediation process and to overcome former conflictive interest positions. The Swiss experience underlines, that is crucial to early address the different stakeholders and to explicitly integrate the relevant groups in the standard development process. As soon as major interests are partly neglected or violated there is a danger of either small uptake of the label or even a counter-productive development of alternative and then competing certification schemes as it happened in the German market, cf. Markard/Rothenberger/Truffer 2000. In this case the promotional function of eco-labelling may be weakened with a negative influence on the Green market remaining rather in its infancy.

On the other side, a consensus oriented labelling strategy with a broad stakeholder involvement has to take high efforts into account. Especially the basic and the final design phase may require a lot of time and financial resources. In Switzerland, the demand of time had been considerable. Furthermore, the evaluation criteria as well as the certification procedure became more complex, which may be of negative influence with regard to the public perception and understanding of the label.

Finally, in the case of Green Power, not only the procedural design of label development was essential for a co-operative solution, but also the initial constellation of involved actors and the emerging market environment: The exogenous change of market conditions created a strong incentive to overcome some old entrenched conflict lines. Furthermore, the involvement of two more or less independent organisations assuring scientific credibility (in case of EAWAG) as well as professional label implementation (in case of Kiefer & Partners) was quite important for the negotiation process among the stakeholders.

3.3 European perspectives of eco-labelling

Given the experiences that could be gained in the Swiss labelling initiative, what lessons should be learnt for a future European label? As the electricity market is not of mainly national importance any longer but becoming a European issue, Green Electricity labelling in future will play an international role. Ongoing liberalisation and the European internal market for electricity will promote cross-border power trade of Green Electricity. Moreover, ambitious aims for the support of renewable energy sources pressure for a common definition of Green Power. This is particularly true for the implementation of quota-based support schemes and for tradable Green Power certificates. Finally, common definitions are also required for defining exceptions in the use of ecological taxes on energy.

The different labelling schemes throughout Europe have to be prepared in order to respond to this challenge. The need for a European harmonisation of Green Power standards will therefore rise.

For a European Green Power labelling standard, a variety of intensity levels of harmonisation can be identified, depending on market needs and market actors' willingness to link existing national certification schemes (Markard and Truffer, 1999)

- A common label is established with uniform criteria design and certification procedures: "Euro-Label for Green Power"
- Basic criteria are defined which have to be fulfilled by individual labels. Additionally, these labels will adapt additional requirements depending on the specific national or local priorities: "Common Basic Criteria"
- Only common rules for the procedures which determine national criteria are spelled out: "Common Principles"
- There are no common standards for the labels, neither for criteria nor for procedures. But the different labels are mutually recognised at a bilateral level: "Bilateral Recognition"

From present point of view, a co-ordination initiative for Green Power issues seems to be suitable for the implementation of common principles on Green Power generation, products and certification procedures. This assures minimum standards and as well allows co-existence of different national requirements. Existing labels could jointly come together under a European umbrella and will obtain an international platform. Especially producers or Green Power providers will have much more easier access to a certified product and can minimise effort for labelling.

As an accompanying measure, a European disclosure standard could be suitable including the declaration of power sources and its shares in electricity products. This would certainly help to widen public interest for these issues, without dealing and discussing every detail of minimum standards from the beginning.

As a first step into that direction there is a NGO-initiative forthcoming which lately held a meeting on Green Power standards in Brussels. It brought together more than 30 participants, mostly environmental NGO's, which agreed on a common "starting point" for a European Label and a couple of working groups. The process is to be continued the next months with intensifying discussion and further meetings.

4 Conclusions and further research

This paper has given an overview on the development and current trends on the Swiss Green Power market and the development of an encompassing Green power labelling scheme. It could be seen that while there are a number of similarities with other countries, the Swiss case shows some particular aspects:

- The Swiss electricity market is being liberalised at a much lower pace than many of the EU countries. This provides the suppliers with more time to experiment with Green Power products while still being protected from new competitors, at least in the retail market. Given the experience from other countries like Germany, this might significantly increase customer loyalty of the Swiss suppliers and make it difficult for new suppliers to successfully enter the Green Power market when it is finally liberalised.
- Looking at the relatively high response rates of the very expensive solar power offerings of many Swiss utilities, it can be estimated that willingness to pay (WTP) for Green Electricity is higher in Switzerland than in other countries, which might partly be due to the high income of average Swiss households. Another indication for this are results of market research studies from the city of Zurich, which show much higher WTP than customers in the UK or German markets (cf. fig. 7). However, this has to be further verified due to the limitations of this sort of quantitative, somewhat hypothetical market research and the fact that consumers' preferences (and hence WTP) will co-evolve with new offerings on the liberalised market.

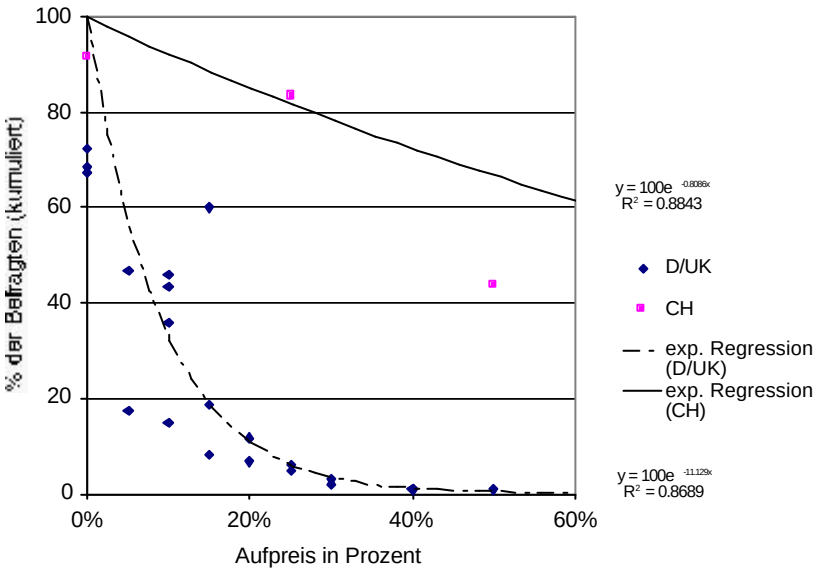


Fig. 7: Stated willingness-to-pay for Green Electricity in Germany, UK, Switzerland (household customers)

Source: Wüstenhagen 2000 based on data from RMS 1999, Wortmann et al. 1996, Infas 1998, MORI 1996, ipso 1996[9]

[9] The percentages on the y-axis refer to all respondents, not only to those who have stated a willingness to pay more for green electricity. The y-intercept of the curves has been fixed at 100 % (cf. Farhar 1999 for a similar analysis of US market research).

- Finally, the high share of hydropower clearly differentiates Switzerland from most of the central European electricity markets. Unlike in coal-based systems like Germany, the UK or many states of the US, renewable energy or low CO_2 emissions alone are not a Unique Selling Proposition (USP) for Green Power in Switzerland, with its hydro-nuclear electricity supply system. This has to be taken into account by the marketers in their product design as well as by the labelling organisation in working out the criteria for Green Power certification. However, it might also include the opportunity to marketers to provide a product range that includes both low-cost, nuclear-free electricity (level 2 of the label) and higher-value products with new renewables and dark-green hydropower (level 1), and hence address the different needs of consumers.
- The mediation effects of a broadly accepted label are not only useful to reach consensus in this particular issue. Moreover, as the various interest groups realize the benefit of a common action and discussions, positive perception for future co-operation will be the consequence. Therefore, spill-over effects far beyond the label development process are possible.

As for further research, the Centre for Energy Policy and Economics (CEPE) of the Swiss Federal Institutes of Technology together with EAWAG and IWOe-HSG have launched a research programme on a number of issues in Green Power marketing, with a particular focus on customer demand for Green Power and the issue of green hydropower. The research questions that are being investigated in the coming months include a two-year project to analyse the demand of household consumers for Green Electricity, combining qualitative (focus groups) and quantitative research methods (conjoint analysis). This will also provide new insight into customer motives and attitudes around the issue of Green Electricity (including hydropower) and interesting facts about successful product design for competitive Green Electricity products. We plan to do this research in a comparative manner in Switzerland and Germany, and it would be interesting to extend it to other countries as well. As for the development of an assessment procedure for green hydropower, an application of the standards to plants and products outside Switzerland will be pursued very actively.

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