Pricing Strategies on the Way to Ecological Mass Markets[1]

Rolf Wüstenhagen

IWÖ-HSG, University of St. Gallen, Tigerbergstr. 2, CH-9000 St. Gallen, Switzerland
rolf.wuestenhagen@unisg.ch • www.iwoe.unisg.ch/institut/rwu.htm • www.oekostrom.eawag.ch

Contents

1. Some empirical evidence about pricing of green products in Switzerland

Like in many other industrialised countries, greener products have recently been gaining increasing attention in Switzerland. The prime example is the food sector with its intensive eco-competition between the large food retailers.[2] Textile is another industry that knows certain efforts of companies to offer green products that increasingly find their customer demand.[3] And most recently, the formerly monopolistic electric power industry has entered the scene and starts experimenting with

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[2] See Belz 1998 and Villiger 1998 for overviews and interpretations.

[3] See Hummel 1997 or Meyer 1999 for details.

green products and corresponding marketing activities.[4] Rather than investigating the whole range of marketing activities for green products, this paper focusses on pricing as one element of the marketing mix. After giving some empirical evidence for green pricing in the Swiss food and electricity sectors (1), it will compare this with theoretical insights about determinants (2), signalling functions (3) and strategies for pricing (4). Finally, the scope for alternative pricing strategies in the electric power sector will be estimated (5) and some general conclusions will be drawn (6).

1.1 Green electricity products

As of July 1998, 23 Swiss utilities had introduced some kind of green electricity products. Most products have their origin in solar (photovoltaic) electricity generation. In the meantime, however, the pure solar power products have been followed by wind- and biomass electricity. About half of the utilities deliver some kind of eco-electricity mix, stemming from different kinds of power generation. There is two different concepts for such mixes: the majority provides a ready-made mix of wind and solar (**all-in packages**), whereas some leave the choice up to the customer (**modular kits**). The most sophisticated concept of a modular kit is Industrielle Betriebe Burgdorf's SOWIWA (solar-wind-water) concept. Here, consumers can choose between solar electricity at a price premium of 90 Rp./kWh,[5] wind energy from the Jura mountains at an additional 15 Rp./kWh or electricity from existing local small hydro power plants at a small price premium of 5 Rp./kWh.

In a summer 1998 survey, the author has investigated the pricing for 21 of the 23 Swiss green electricity products.[6] The result can be seen from fig. 1: The price premium for Swiss green electricity products is obviously substantial. It ranges between 90 and as much as 775% of the price for ordinary electricity. Pure wind energy products are the cheapest, with about 90 % price premium. Those utilities delivering pure solar electricity charge their green customers on average 380-775 % more than the usual rate. The price for all-in packages varies heavily, from about 100 % to 700 % price premium, mainly due to the production cost of the available electric resources. In absolute terms, the most expensive product is priced at 1.60 CHF/kWh (or 1.40 CHF/kWh premium), whereas the cheapest offers are around 0.38 CHF/kWh (or 0.18 CHF/kWh premium) for wind electricity. Both the single-technology as well as the mixed products are obviously cost-plus rather than competitively priced. To understand these numbers correctly, it has to be noted, however, that the utilities usually do not ask their customers to switch completely to green electricity. Rather, they have the opportunity to choose, which share of their electric consumption they want to

[4] See Wüstenhagen 1998a for details.

[5] 1 CHF = 100 Rp. = 0.61 ECU = 0.72 USD = 1.21 DEM (as of September 29, 1998)

[6] Preliminary results, including more details about the applied methodology, have been presented at the 4th European IAEE/GEE Conference „Energy Markets: What's New?", Berlin, 9-10 September 1998 (see Wüstenhagen 1998a). The paper on hand provides updated data with 21 of 23 utilities responding until September 1998.

cover with green electricity. Thus the resulting additional monthly or annual costs for customers are in a much smaller percentage range (in the order of magnitude of about 10-20 %).

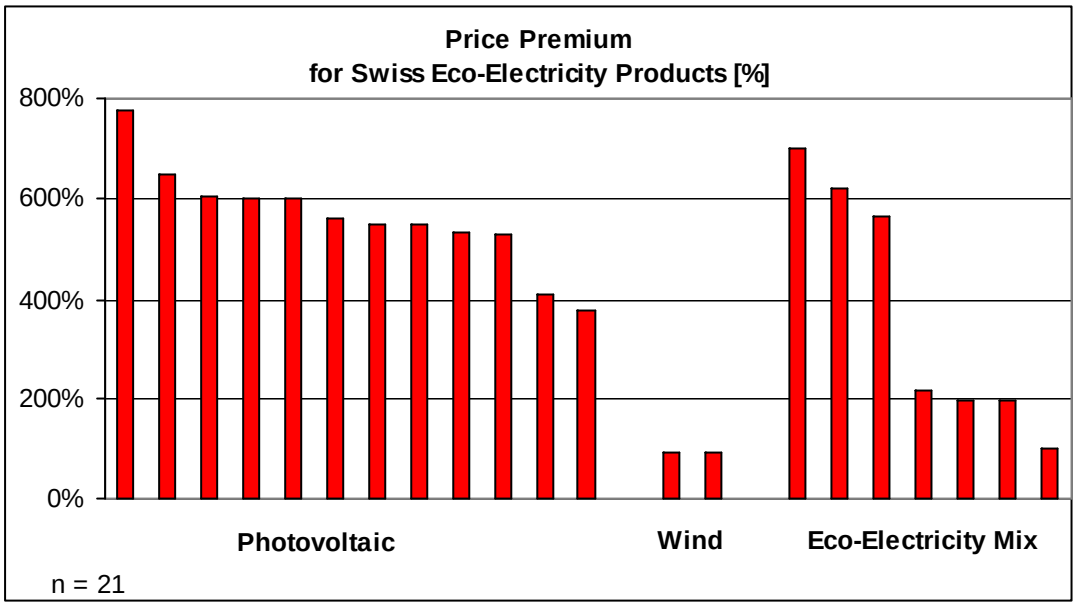

Fig. 1: Price Premium for Swiss Green Electricity Products (Source: Wüstenhagen 1998a)

Due to this possibility for customer choice, two measures for the market share of these products have to be distinguished: the **participation rate**, that indicates how many of the households in the supply area of a green pricer decided to buy some green electricity, and the **actual market share**, that provides information about the share of the overall electricity consumption (in kWh) or electricity sales (in CHF) covered by green electricity in that area. In these terms, participation rate for the investigated green electricity products is between 0.02 and 2.60 % of a utility's customers, with an average of 1.00%. Actual market share, on the other hand, provides smaller numbers, usually in the range of 0.01 to 0.07 % of the overall electricity consumption covered by a utility. In monetary terms, these numbers will rise to about 0.10 to 0.40 % of the turnover in most of the cases and 1.80 % at particular smaller utilities, thanks to the high prices of the green products.

1.2 Organic food products

For organic food products in Switzerland, a price survey has been conducted by Rouhani (1998). He investigated the prices for four product segments in shops of five different food retailers in the city of St. Gallen. All the data was collected in the week of August 3-8, 1998, in order to avoid a distortion of the results due to seasonal price changes, which usually mainly affect fresh fruit and vegetables.[7] Aggregate results for each of the four product segments are shown in fig. 2. Among the investigated products, the price premium is highest for vegetables with about 102 % and lowest for dairy products with less than 17 %.[8] Also within the different product groups, there are considerable differences, which according to Rouhani are mostly a result of the products' corresponding

[7] cf. Rouhani 1998, p. 25
[8] cf. Rouhani 1998, p. 38

production costs.[9] A special feature in processing organic food products is that retailers have to treat them separately from conventional products on each stage of the production process. This rises the associated logistics costs, especially for highly processed products, and may thus - besides other factors - explain differences like that between pasteurised milk (10.16 % average price premium) and bio-yoghurt (21,43 %).[10]

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Fig. 2: Price Premium for Swiss Organic Food Products

Comparing the different retailers supplying organic food, Rouhani concludes that presently all of them follow high pricing strategies that bear the full costs of the respective products. As one company, Coop, is the market leader for organic food products and keeps innovating new products, this company also plays an important role for setting prices, and smaller competitors often adapt to Coop's price level.[11]

Comparing the food and electricity markets, it becomes clear that even the most expensive organic food products are pretty cheap compared to the average green power offerings. As the most widely applied pricing principle is obviously cost-plus pricing, this seems to be a direct consequence of higher production costs, which are to a large extent a result of higher labour intensity in organic farming as well as in building photovoltaic power plants.[12] However, cost-plus pricing is considered as being somewhat outdated by modern pricing literature,[13] and so the following chapter 2 will go into detail about other possible determinants of pricing strategies.

[9] ibid

[10] cf. Rouhani 1998, p. 28

[11] cf. Rouhani 1998, p. 40

[12] Typical labour intensity of photovoltaics is about 3.3 jobs per GWh, that is about 60 times more than in typical conventional power technologies. Mistakenly, this is often directly used as an argument for higher employment effects of PV production (cf. Wüstenhagen 1997).

[13] cf. for example Dolan/Simon 1996, pp. 37 f.

One more insight from the comparison of the two markets is that there is obviously some correlation between prices and market shares of green products. Whether this is a causal relationship and whether this seemingly linear relationship may occur in other forms, will be discussed in more detail in chapter 3. For the time being, fig. 3 gives a graphical representation of the relationship between price premium and market share of the average Swiss green power product, and bio-milk and bio-yoghurt as two examples of food products.

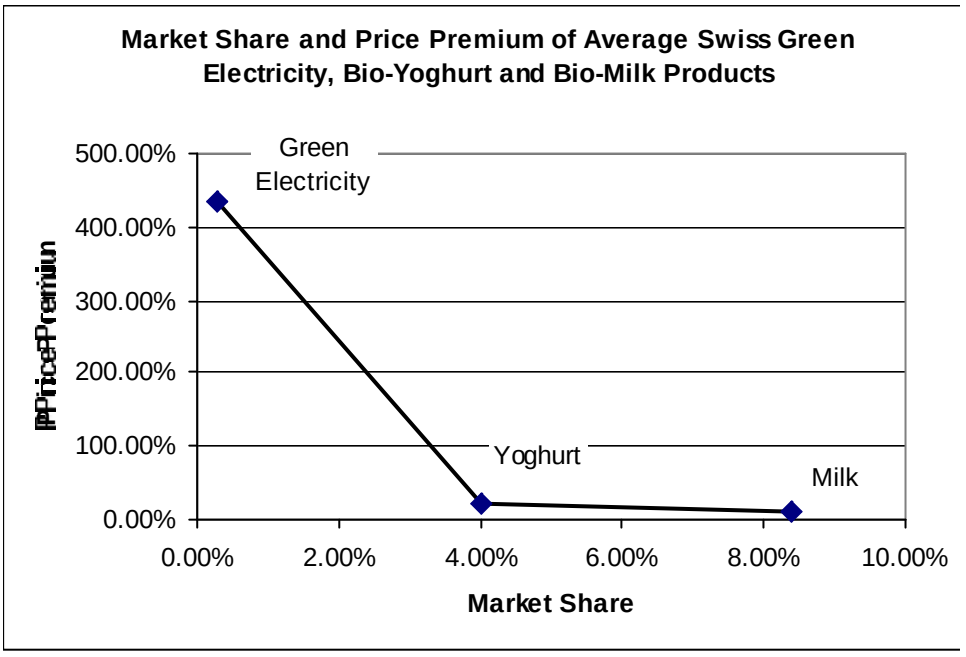

Fig. 3: Price-Response Relation for Different Eco-Products in Switzerland (Source: own representation, data from Wüstenhagen 1998a and Rouhani 1998)

2. Determinants of pricing

For decades, accountants throughout industries in general and electric power industry people in particular have shared the assumption that costs are **the** factor influencing product pricing. Ultimately, however, pricing in a market economy is basically a matter of supply and demand, and it is the customer who has to pay a price. Hence marketing people have pointed out that customer value of a product and competitive influences are other central factors determining prices. These three factors shall be discussed in some detail, particularly with regard to green electricity.

2.1 Cost

Prices have traditionally been calculated as „cost-plus" prices, e.g. an „adequate" profit margin has been added to the production cost of a product. The formerly regulated monopoly of electric power retailing is an especially good example, because tariffs usually had to be approved by authorities based on a cost statement. Also the pricing of the newly issued green power products in Switzerland (cf. 1.1) resembles this mentality, with one slight but important difference: There is no longer an aggregation of all costs that is split to one uniform price per customer, but different products are priced differently. This sort of price customisation is new to the electric power industry.[14]

To get a clearer picture of the role that costs play in pricing, it is useful to think of cost-based price floors.[15] This term indicates that costs are useful in determining lower limits for pricing, whereas upper limits are determined by customer value (respectively their willingness to pay) and competitive reaction. Price floors can be further differentiated by time horizon:[16] In the long run, no company can achieve average prices for the whole product range that are below full costs.[17] For short-term price floors, on the other hand, fixed costs become irrelevant. Any price above variable unit costs contributes to covering fixed costs in the short run.[18]

To determine an „optimal" price, it is important to define the company's objective in advance. The classical economist view is that this is profit maximisation. Meffert/Kirchgeorg, however, argue that from an ecological point of view, achieving a high market share for eco-products should be the goal.[19] Following this view, sales volume maximisation should be aimed at. However, in a broader understanding of environmental products, this does not necessarily have to be true. Take eco-efficient services like leasing of office machines as an example: increasing prices and thus profits and at the same time decreasing sales volume (of the physical products) is well in line with a purely economist view as well as with the environmental standpoint. The same applies to energy efficiency services like contracting: Earning their money by saving a customer 1000 kWh in his annual consumption may give an electric power company a better environmental and economic

[14] See Dolan/Simon 1996, pp. 115 ff., for a broader elaboration on price customisation, including an instructive example of amazing price variations of a single soft drink product around Bonn's main station.

[15] cf. Dolan/Simon 1996, pp. 38 f.

[16] ibid.

[17] Talking about *average* price for the product *range* here already indicates the possibility for cross-subsidisation within and between product ranges.

[18] Just think of an airline or tourism organisation that sell excess capacity to last-minute customers, or see the hotel example in Dolan/Simon 1996, pp. 38 f. for illustration.

[19] Cf. Meffert/Kirchgeorg 1998, p. 341

performance than selling 1000 kWh of cost-intensive solar power, depending of course on price sensitivity and profit margins for the two products.[20]

One more point should be made regarding costs. To most people, it seems clear that costs are the only „objective" basis for prices. This is however, only true to some extent, as costs are largely socially constructed. As long as we look at a single-product company with well-established production capacities and customer relations, this may not be so obvious. But as markets are liberalised, electric utilities start introducing new products, and then there is large scope for distributing costs like R&D, market introduction, overhead etc. over more or less units of the new product or even between old and new products. An example of St. Galler Stadtwerke illustrates this:[21] When introducing their solar power product, they priced it on the basis of full costs and were quite astonished about the fact that this did not lead to competitive pricing. Talking to some of the competitors, it became clear that those included neither the considerable marketing efforts for product introduction into their cost calculation nor did they charge their customers an appropriate risk premium that would have reflected the fact that they made 20-year contracts with their PV suppliers while customers are allowed to cancel their contract almost immediately. The competitors, however, did not at all see this as price dumping but rather argued that the green marketing efforts were to be seen as learning processes to adapt to a more customer-oriented, liberalised market and hence should not be assigned to the products, but rather to, say, a strategic reengineering process.

As a conclusion from these considerations, we have seen that costs play one role among others in price determination. It is certainly important for a company to have a good understanding of their costs in order to be aware of price floors, but to be able to maximize either profit or market penetration of green products, additional information has to be available on the value these products provide their customers with and what the competitors do or are likely to do in reaction to the company's own pricing strategy.

2.2 Customer Value

In his decision to buy or not to buy a product, the customer compares the value the product creates for him in a given situation with the price he has to pay. The condition for him to buy it is that the value (in monetary terms) is higher than the price, and among several alternatives he will choose the one with the highest net value for him, i.e. the greatest difference between perceived value and perceived price.[22] The highest price a customer would pay is also known as his willingness to pay. Aggregating different customers' willingness to pay leads to so-called price-response curves, which show the (expected or experienced) sales volume depending on alternative prices (cf. chapter 3

[20] Assessing the overall environmental impact of this clearly depends on where the saved money goes, whether for example people use saved money from energy efficiency services for long-distance flights in their holiday etc.

[21] cf. Schimmel 1998

[22] cf. Dolan/Simon 1996, p. 25

below) There are different methods to find out about price response,[23] such as expert judgment, customer surveys (including conjoint measurement as a particularly sophisticated tool),[24] price experiments[25] and analysis of historical market data.

As for green electricity, it seems obvoious that these products do not provide the average consumer with any particular extra-value in terms of the physical product (such as e.g. greater reliability), which consists of essentially the same electrons coming out of the wallsocket.[26, 27] It does, however, provide the consumer with the good feeling of „having done something for the environment", which can - depending on the customers preferences and the design of the other elements of the marketing mix - be extended to a high prestige.[28] Another facet of the product is the investment character of the payment: The green power customer can interpret his purchase as providing venture capital for the development of renewable power plants, and - again depending on how this is communicated and how the product is designed in detail - thus he can perceive himself as a part-owner of a certain new production facility.[29] Thus customers with a high valuation of environmental problems or those who like to see themselves as progressive donors may attribute a much higher value to buying green power products than what equals their physical value.

Another point shall be made here, that is especially relevant before market introduction of a product, i.e. in the stage that many green electricity products are still in. Knowing more about customer values does not only help to set the right price to a given product, but may also be used in designing the product in a way that results in an optimal combination of features that create a high value while still keeping costs in acceptable magnitudes. This principle is known as **target costing** or target pricing,[30] and it is the logical consequence of recognising that it is not „objective" cost that

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[23] cf. Dolan/Simon 1998, pp. 48 ff.

[24] See for conjoint measurement Trommsdorff 1994, part III.8.3, Dolan/Simon 1996, pp. 54 ff., Hockerts 1995, pp. 53 ff., all with further references.

[25] A classical price experiment would be to sell the same product in different geographical areas at different prices (cf. for example Dolan/Simon 1996, pp. 69 ff.). A kind of price experiment is also Industrielle Betriebe Burgdorf's SOWIWA offering, that gives consumers the choice to buy green electricity from three sources at significantly different prices and reveals a classical price-response curve (see below fig. 4).

[26] For another view on the following reflections, see also Truffer 1998.

[27] It is interesting to see how in the electric power industry and even more in others like the food industry, there still is a need to be able to grasp a physical product. Bankers, brokers, insurance people, or software producers on the other hand have already some habit in working with more virtual products, and a recent EPRI research project on the emerging „Power Marketers" in the U.S. indicates that future growth in the electric power industry will shift to such intermediary services like risk management, financing, trading rather sticking to the more or less saturated physical kWh-market (cf. Sioshansi/Altman 1998, pp. 247 ff.).

[28] Some blasphemers compare this „pay-for-good-consciousness" aspect in green electricity marketing - following historic concepts of the catholic church - to indulgence...

[29] Another way to look at this is that the border between production and consumption is getting less distinct. Not only can consumers feel like part-owners of production facilities, but they have the chance to actually *become producers* themselves. The consequences of this trend on pricing should be reflected in more detail. One of the impacts will be that make-or-buy decisions become more relevant, even down to the consumer level.

[30] cf. Dolan/Simon 1996, pp. 63 ff., with an instructive case study about product design under target pricing in the textile machinery industry.

determines price, but that there is scope for the company to design a product in order to create the highest value for a targeted customer segment. Applying this to the green electricity market may e.g. lead to offering „blends“ rather than pure and very expensive PV products (cf. below, 5.1.1).

2.3 Competition

Another factor that influences pricing is the competitive situation in the relevant market. A monopolist can clearly set higher prices than a company whose customers have a bunch of attractive alternative offerings to choose from. Nonetheless, market liberalization in the electricity sector does not have to mean the starting signal of an ultimate price erosion with no escape for whomsoever. Again and with amazing virtuosity, marketing specialists provide a whole string of ways to prevent the market from becoming as transparent as all the deregulators would like it to be. With this perspective, all kinds of positioning strategies aim at nothing else than restoring something similar to a monopoly situation at least for a certain product or segment, thus enabling the company to skim off more of the consumer surplus due to its „unique selling proposition“.[31]

Despite these opportunities to escape from too fierce competition, a company‘s pricing strategy depends to some extent on what its competitors do. The St. Galler Stadtwerke case above has shown that it is difficult for a single company to charge their customers significantly higher prices for a product that is cheaper elsewhere, even if it seems obvious that the whole industry does not make a profit at that price level. In more competitive market environments and less negligible market segments, such situations may end up in ruinous price wars.[32]

Looking at eco-products adds another dimension to competition as a driving factor behind pricing. Companies offering greener products must also take the price levels of their conventional counterparts into account, concerning both „non-eco“ products offered by the company itself and eco- and „non-eco“ products offered by competitors.[33] The answer to this more complex challenge is usually to price eco-products above conventional products and to adapt to some sort of industry-specific price level for eco-products (cf. the examples given in chapter 1). The following chapter will go a bit more into detail about these unwritten rules and investigate the concepts of consumer behaviour that underlie them.

3. The ambiguous signalling function of prices

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[31] cf. Trommsdorff 1993, p. 95, with further references.

[32] See Dolan/Simon 1996, pp. 90 ff., who suggest as a remedy „managing competitors and industry profitability“ and hence „boosting the industry IQ“, concepts that are well in the tradition of Schneidewind‘s (1998) „enterprise as structural policy actor“ but might not make the heart of a neoliberalist economist beat faster.

[33] cf. Meffert/Kirchgeorg 1998, p. 339. Once again it can be pointed out that besides products from other companies and the competition between eco- and non-eco products, make-or-buy alternatives may gain relevance through new decentralised technologies like do-it-yourself solar collectors or home-grown vegetables in the food sector.

[Will customer demand for green products rise or fall with lower prices?]

Usually, consumers are expected to prefer cheaper products to more expensive ones. This is due to the fact that the price represents the sacrifice that the consumer has to make in order to get a product, and that he seeks to achieve high value for the lowest possible cost. There are exceptions from that rule, however, and the following chapter will have a look at both sides of the medal.

3.1 Prices as cost signals

As indicated in chapter 2.1 above, there usually is a negative relation between price and demand. Consumers either have a limited willingness to pay for a certain product (maximum price) or they demand a smaller amount of a good depending on its price. While this can be represented by discrete price thresholds on the individual level, it can be seen as a continuous price-response curve on an aggregated level. As an example, in fig. 4 we have a graph that gives the demand for the three type of green electricity offered in Industrielle Betriebe Burgdorf's above mentioned SOWIWA programme, dependent on the corresponding prices. It can be seen that electricity from local small hydro power plants, for which IBB charges a premium of only 5 Rp./kWh to its usual tariff of about 20 Rp./kWh , has a fairly high sales volume of 129'600 kWh, whereas there is far less demand, namely 9'700 kWh, for the highest-priced solar electricity at 90 Rp./kWh additional cost. Wind power is in between the two other product alternatives in both price and demand.

Fig. 4: Price Response Curve for IBB's SOWIWA green electricity products (Source: own **Error! Reference source not found.** representation, based on data from Blättler 1998)

While one has to be cautious in putting too much interpretation in this small-scale price experiment, especially because it is not sure that consumers perceive the three product alternatives as being fully comparable, it certainly gives an illustration for the general rule that demand usually increases with decreasing prices.

For pricing to become relevant for the final purchasing decision, the consumer has to be aware of the actual price. This is not self-evident, as consumers can impossibly use all available information in a purchasing situation, and hence price knowledge is often very low.[34] From a consumer behavioural perspective, price is a so-called chunk, i.e. one among a few key informations that help the consumer to efficiently process information about a product.[35] There are several product specific and situative factors that influence the probability for price to play a decisive role for a consumer, such as involvement, frequency of the purchase, perceived risk, brand image, etc.[36] It seems though difficult to say what the exact influence of each of these factors is in a given situation.[37] For the electricity sector in particular with its - until now - low-involvement product with practically no purchasing decision to take except turning on the switch, price knowledge was - not quite surprisingly - found to be very low.[38]

3.2 Prices as quality signals

According to Okko Müller, member of the board of directors at UNILEVER N.V., pricing for eco-products is as simple as that: „Where eco-products can be produced at lower cost (eg. due to economical equipment and cheaper packaging), they can just as well be offered at a lower price.“[39] Findings in consumer behaviour research, however, suggest that things are more difficult, mainly because there is a link between **price** and perceived **quality**. Kroeber-Riel (1991, p. 151) points out that consumer demand may rise with increasing prices. This is the case when the consumer can demonstrate his financial strength by consuming expensive products, thus enjoying prestige. Going back to the American social scientist Veblen and his „theory of the fine people“ (Veblen 1899), this demand increasing influence of high prices is called the „Veblen Effect“. We may well hypothesise that this effect plays a certain role in explaining the high demand for solar power among, for example, well-off intellectuals in the city of Zurich. Fig. 5 gives a speculative graphical illustration of the price-response curve for electricity including the Veblen Effect.

[34] cf. Trommsdorff 1993, p. 97
[35] cf. Trommsdorff 1993, pp. 97 ff.
[36] cf. Dolan/Simon 1996, p. 76, with further references.
[37] cf. Dolan/Siomn 1996, ibid, and Trommsdorff 1993, p. 97.
[38] cf. Truffer 1998, p. 9, with further references.
[39] cf. Müller 1992, p. 323

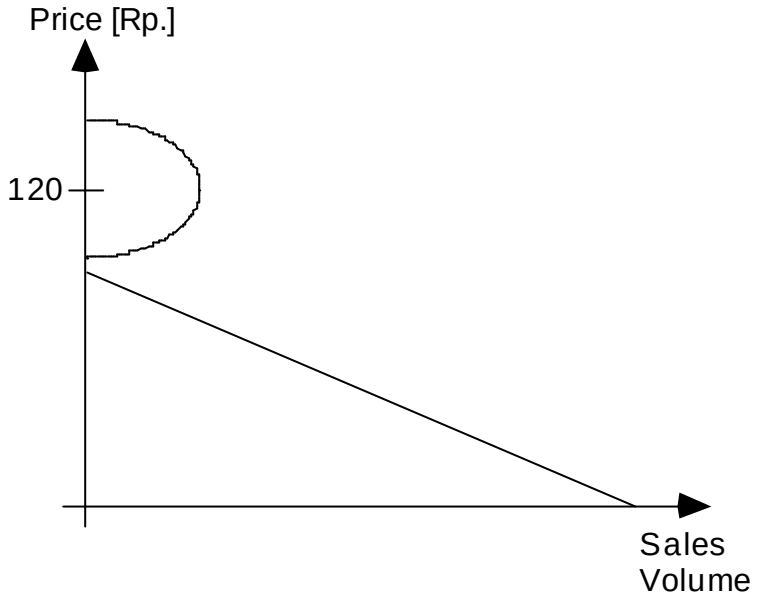

Fig. 5: Speculative Price-Response Curve for Electricity in Switzerland (Source: Wüstenhagen 1998, inspired by Leibenstein 1966)

This curve has a „classical" shape in the lower price range, with demand increasing as price decreases. In the upper price range, however, price decreases may lead to either a lack in credibility or reduce the product's attractiveness for demonstrative consumption, both resulting in decreasing demand.

Besides this special case of demonstrative consumption, there is a relation between price and perceived product quality. This is mainly the case in the absence of other information to judge the product quality - a rather relevant case with environmental product features in general and intangible products like green electricity in particular. The effect of price on perceived quality has been demonstrated in a classical experiment by McConnell (1968, p. 441)[40]: 60 experimentees were asked to judge the quality of three beer „brands", which were basically identical except in price. A significant majority judged the quality of the most expensive beer as most positive and the least expensive as most negative. Other information to help judge product quality may above all be brands, labels or information about product tests.[41] Moreover, the importance of price for judging product quality increases when consumers perceive a high uncertainty, a wide range of quality differences between products or when the risk of taking a wrong decision is high (i.e. when the expenses for that purchase are high).[42]

As a consequence, companies offering green products risk losing their actual customer segment of eco-pioneers by price cuts that either fail to provide the opportunity for prestigious consumption or waken doubts about the ecological quality of their products. This may be (partly or more than) offset by higher sales to more price sensitive customers but as the eco-pioneer segment with its low price

[40] quoted from Kroeber-Riel 1991, p. 305.

[41] cf. Kroeber-Riel 1991, p. 306

[42] cf. Trommsdorff 1994

elasticity and possible opinion leader function is attractive, companies might be hesitant to take the plunge and „leave the eco-niche".[43]

A particular problem that rises from the price–perceived quality conclusion occurs with green electricity products. As it has been argued above, the high price of photoltaic power can be supposed to have a strong influence on customer value of that product. It is hard to argue, however, that this substantial price premium reflects any reasonable superiority in product quality of PV generated power to, for example, other renewable energy sources. The fact that PV power is up to seven times more expensive than electricity generated from biogas, wind, wood, or hydro power plants may correspond to slight environmental advantages,[44] and maybe more than slight advantages in the public image, but the obvious reason is rather an inferior production technology. Thus if the goal is getting most environmental benefit - and not just customer value in terms of prestige etc. - out of the money, rational green power marketers should have an active interest in influencing customer preferences in order to be able to perceive environmental product quality in a more objective sense. This can for example be done by transparent product declarations or labels by independent organisations.[45]

4. Alternative pricing strategies to achieve sustainable mass market penetration

Until now, we have focussed on rather static aspects of pricing, including the three main poles that influence pricing (cost, customer value, and competition) and the ambiguous signals that are received by customers from prices, namely cost and quality. As this paper aims at developing ways to successfully lead eco-products from small niches to larger market shares by means of pricing, a dynamic component has to be introduced. This can be done by looking at two basic pricing strategies that can be pursued introducing a new product on the market: Skimming versus penetration pricing strategy.

4.1 Skimming pricing strategy for eco-products

A skimming pricing strategy means to introduce a product at high prices and reduce them later. This gives the company the opportunity to maximise profits by skimming off the high willingness to pay of early pioneers among their customers shortly after market introduction of their product and attract larger market segments thereafter through subsequent price cuts. Thus they can use their competitive advantage to achieve quick pay-back of, for example, R&D costs. This strategy is wide-spread in a number of markets, such as home electronics or books. For eco-products, it is

[43] cf. Villiger/Wüstenhagen/Meyer 1999 for a broader elaboration of this argument.

[44] The author acknowledges that compared to some examples of the given energy technologies, such as the controversial Chinese Three-Gorges-Project or other giant hydro projects, the environmental advantage of PV is probably more than slight. Nonetheless, even PV - like many of the other technologies - might lose its environmental innocence beyond a certain penetration rate, hence the difference is gradual and not as categorical as the price difference tends to suggest.

[45] Cf. Grasser/Kiefer 1998 for current activities to establish an electricity label in Switzerland.

somewhat difficult to judge whether pricing strategies that may seem like skimming to some are perhaps simply cost-driven. There is, however, some evidence that at least in some segments of the Swiss food market, skimming pricing is a usual practice, especially where price sensitivity of customers is known to be low.[46]

To fully understand the impacts of a skimming pricing strategy for eco-products in the context of „conventional" alternatives, it might be useful to look at research on pricing's impact on competitive positioning. Dolan and Simon (1996, pp. 87 ff.) point out that in markets with several segments or price tiers, there is what they call a „fence" between the tiers. This means that price cuts within a tier are usually more probable to affect demand in that tier than attract previous customers of other segments. What is interesting is that they point out the asymmetric nature of that invisible fence, i.e. customers are more likely to „trade up" from the lower segment to the higher price tier as a consequence of price cuts in the premium segment than vice versa.[47] If this insight can be transferred to eco-products, then it would favour a skimming price strategy with later price cuts, because this way the company can both profit from the higher willingness to pay of eco-pioneers and hope to attract new customers from lower market segments in a later stage, whereas the pioneers may be immune against competitive pricing of eco-products which would require „trading down" for them to buy these cheaper products.

It can be concluded that for a company which does not want to change the world but rather likes to earn comfortable profits without taking the risk of losing their traditional customers, skimming pricing seems to be the strategy to choose. Such a strategy is well in line with well-established views in the heads of most company decision makers as well as their customers. It may, though, fail to transform the market in a more profound way. Whether this is feasible by other means, shall be looked at below.

4.2 Penetration pricing strategy for eco-products

The other basic strategy for the pricing of new products is penetration pricing strategy. Its main idea is to enter the market with competitive prices to quickly gain market share and hence be able to realize economies of scale that decrease costs for production, distribution etc. Another aspect may be to reduce the attractiveness of that market segment for potential competitors.[48] The long-term profitability of this strategy clearly depends on several factors, such as a sufficiently large segment of price sensitive customers that can be attracted by low initial prices, the probability for realisation of economies of scale and the feasibility of later price increases, depending among other on competitive reaction.[49] A special danger lies in the price–perceived quality relation discussed above, and in the

[46] E.g. this seems to be true for the Swiss food retailer Migros and their high-priced organically grown vegetables (cf. Rouhani 1998, pp. 35, 40, 42).

[47] cf. Dolan/Simon 1996, p. 87

[48] cf. Meffert/Kirchgeorg 1998, p. 341.

[49] cf. Rouhani 1998, p. 18, with further references.

relative price perception of customers. By offering prices that are below the economic value of a product, the company risks to establish a price threshold that might be difficult to cross later.[50]

Despite these risks, there are a couple of remarkable success stories about penetration pricing strategies. Intel's fabulous growth, according to Dolan and Simon (1996, pp.34 f.), is perhaps one of the best-known examples of such a low-price-fast-growth strategy. Green electricity might be a possible field of application for penetration pricing, especially as far as photovoltaics is concerned. With its still low production capacities and expected potentials for economies of scale, this technology might profit from low introductory prices that allow for quick market expansion. Sacramento Municipal Utility District (SMUD) is a Californian utility that gives a hint on the feasibility of that strategy. According to Program Manager Donald Osborne, due to their aggressive market introduction programme for PV electricity, SMUD has recently been able to cut PV investment cost to 5'000 $ per kW, which is about 28 % below the U.S. average and more than 50 % below prices on the Swiss market.[51] For the year 2002, they expect to cut costs even further to less than 3'000 $ per kW, which equals electricity costs of about 30 to 40 Rp./kWh or 0.20 to 0.30 $/kWh. This is still higher than electricity from most conventional sources but much closer to competitiveness than today's prices as they can e.g. be observed in current solar power prices for end-users in Switzerland (see 1.1). Hence, given the higher value that „clean" energy from PV seems to provide to certain customers,[52] PV could get competitive with SMUD's penetration pricing strategy for a number of applications.

5. Scope for green pricing strategies in the power industry

The previous sections of this paper have shown that besides today's agenda-dominating, though somewhat uninspired cost-plus pricing, a bunch of other options for green electricity pricing are at least conceivable. How realistic such conceptions are depends again on the scope that cost structures, customer value and competitive environments open up. These shall be investigated in the following chapter. In a slightly simplified way, the questions raised here can be described as: „To what extent will future production costs allow for lower prices?" and „To what extent will future customer values and competitive environments allow for higher prices?"[53]

5.1 Production cost of green electricity products

As introduced above, cost is the first major factor influencing pricing. To estimate future green electricity price development, the impact of four factors on future production cost development will

[50] Cf. Dolan/Simon 1996, p. 287, who point out the possibility to note prices as „special introductory prices" as a way to mitigate this.

[51] For SMUD and U.S. average figures cf. Osborn 1998, for Swiss figures cf. Linder 1998.

[52] The fact that PV does not necessarily have to be cheaper than other energy sources due to its superior acceptance is reflected by Osborn's statement: „PV has to be **affordable**, i.e. not cheaper, just not too expensive."

[53] Or, in other words: Chapter 5.1 will explore future price floors, whereas 5.2 and 5.3 rather deal with future price caps (or profitability floors).

be looked at: product characteristics (5.1.1), technology development (5.1.2), overhead (5.1.3), and comprehensive eco-strategy (5.1.4).

5.1.1 Product characteristics („blends“)

In a Summer 1998 market survey,[54] Swiss green power marketers have been asked what they consider necessary preconditions for future price reductions. Most of those expressing any idea were thinking of technology development, but did not mention an idea that would be useful in a much shorter term, and is already realised by U.S. and German green power marketers such as Green Mountain Energy Resources Inc. or NaturEnergie AG:[55] Selling „blends“ of different renewable energy sources rather than focussing only on very expensive photovoltaics. This is especially effective when „new“ and „old“ renewables are combined, as both together form a powerful portfolio in which they complement one another. Fig. 6 gives a comparison of the two types of renewable energy resources by a number of economic, technical and environmental criteria.

	new renewables	**old renewables**
example	*photovoltaics*	*large hydro power*
actual production capacity	low	high
growth potential	high	low to zero
actual production cost	medium to very high	competitive
future cost development	decreasing	stable to increasing
investment cost	high to very high	high, but mostly sunk costs, some power plants already fully depreciated
variable cost	low	low
availability	single plants: very low, in a larger network: low to medium	very high
dispatchability	low	high
modularity (suitability to decentralized production)	high	limited
perceived environmental performance	high	disputed
environmental hot spots	few, maybe land use	local impacts, land use, biodiversity

Fig. 6: Qualitative comparison of „new“ and „old“ renewables

One has to be careful in interpreting this table of course, in that it compares apples to pears to some extent. Customer value for new renewables seems to be clearly higher than for old renewables, because paying for the development of new power plants includes the „venture capital

[54] cf. Wüstenhagen 1998a

[55] Cf. their homepages at http://www.choosewisely.com, and http://www.naturenergie.de

effect“ mentioned above, whereas paying more for the electricity produced in existing power plants might be seen as buying the same old vine in more expensive bottles. However, if like in Switzerland, buying a mix of new renewables and old hydro provides the customer with the possibility to declare the electric power he purchases as practically CO_2- and nuclear-free, customer value may again rise.

Another point is that even among new renewables, there are considerable variations in production costs. Options like wind, biomass or geothermal electricity generation are much cheaper than photovoltaics is today. Thus providing a mix of these will allow to reduce costs and to provide green electricity at prices that are attractive for larger market segments.

It is, however, crucial to find some generally accepted standards in the provision of eco-electricity mixes. Otherwise, products would no longer be comparable for customers and hence industry credibility would suffer. Credibility is seen as being of key importance also by the green power marketers themselves.[56] Means to achieve it include well-known and widely accepted eco-labels, transparent communication and product declaration, and finally norms or legal standards that give official definitions of what can be part of an eco-electricity mix.[57] Additionally, it is clear that coherent environmental standards have to be met by the old renewables or whatever else is used to „fill up“ the mix in order to secure credibility of the whole product.[58]

5.1.2 Technology development

As it was indicated above, technology development might be another driver to increase the scope for cost-induced price reductions. According to fig. 6, this is particularly true for „new“ renewables, where sales volumes are still low and production technology is less mature. In trying to find out about quantitative magnitudes of cost decrease potentials, it is difficult to distinguish wishful thinking of industry lobbyists from realistic scenarios.[59] Rather than adding on more to the existing scenarios here, we will confine ourselves to quoting a study on solar energy that was assembled by a Swiss bank.[60] In this report, Figge/Butz draw the attention to the fact that demand elasticity for this technology may be rapidly increasing as prices decrease across a threshold that they see in the order

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[56] cf. Wüstenhagen 1998a, p. ###

[57] The need for clear eco-standards is also a lesson that can be learned from the Swiss food sector, where both a well-known eco-label („Knospe“) and recently a legal definition in a federal ordinance („Bio-Verordnung“) do exist and help the consumers to wade their way through the shopping jungle.

[58] This is a major reason for the Swiss Federal Institute for Environmental Science and Technology (EAWAG) to investigate criteria to be met by hydropower in eco-electricity products, a task that has been largely neglected by existing labels in other countries (cf. Truffer et al. 1998 or their project homepage at http://www.oekostrom.eawag.ch/).

[59] This is of course no peculiarity of the renewable power industry. In his speech on the 1998 IAEE/GEE European Conference, Peter Tempest, President of the World Oil Council and former employee of Shell‘s well-funded scenario development group, frankly admitted that this division had some problems in refuting claims that they were an extension of the company‘s marketing department. According to Tempest, their demand forecasts used to be of the „one goes up, one stays the same, and you can choose the one in the middle if you like“-type.

[60] cf. Figge/Butz 1998

of magnitude of about 2‘000 to 4‘000 $/kW. It is awareness for the possibility of such kind of discontinuous development rather than certainty about PV cells being the successor designate of recent breakthrough products like cellular phones[61] that seems to be adequate in such a situation. And enthusiasm about the appealing PV cells with a touch of high tech should at least be coupled with a clear view on alternative technologies that might as well contribute to a (economically) reasonable green power mix. One major candidate with good prospects for further technology development are fuel cells which permit to simultaneously produce heat and power and can not only be used for mobile applications like car engines but also for decentralised home systems. Whether or not they will be eligible to green power schemes is another topic,[62] that may depend on whether they are fuelled with fossil energy like oil or with renewable fuels, or even whether they are fit into some system of renewable hydrogen production.

When thinking about technological drivers for cost reduction potentials on the level of electricity **products**, one should also mention the distribution level rather than just generation. Cost reductions on that level could result from avoided transmission and distribution costs thanks to bringing resources closer to the customer. While transmission networks must be considered as fixed costs in the short term, a long-term view might lead to different results. This has been discussed in the Least-Cost Planning literature for a long time, and experiences a certain renaissance under the heading of „distributed resources“ in the new world of deregulated markets.[63] As deregulation will increase transparency for the different elements of electricity costs, there may be a better competitive position for „regional eco-products“ in the electricity sector as well.[64]

5.1.3 Overhead

As overhead costs are especially relevant when new products are launched and fixed costs have to be split on only few customers, seeking for possibilities to reduce these costs seems worth thinking about. One way to achieve this may be to realise the marketing activities necessary to introduce green power products within a network of co-operating companies. The co-operation of seven Swiss municipal utilities for commercialisation of energy efficiency services might be a good

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61 which is suggested by Figge/Butz 1998, pp. 8 f.

62 There is currently a debate whether or not combined heat and power generation shall be eligible to the Swiss eco-label for electricity (cf. Grasser/Kiefer 1998). On the one hand, they produce considerable CO_2 emissions by using fossil fuels, on the other hand they are most often the less CO_2 intensive option compared to separate generation of heat in a boiler and electricity elsewhere.

63 Cf. Lovins‘ 1976 classical paper on „soft energy paths“ as one of the roots of LCP, Hennicke/Seifried 1996 for an updated overview, or Lovins/Lehmann 1998 for a recent effort to provide for connectivity between old insights and timely wording. Even the neoclassical faction has recently discovered the relevance of the topic, cf. the special issue of „The Energy Journal“ on distributed resources (Energy Journal 1997).

64 This argument can only be mentioned briefly here, and the author is of course well aware that there is a risk to over-simplify the economics of networks, especially with regard to transport costs, when using the metaphor of „regional products“ in the context of electricity. For those willing to bear the risk inherent in that analogy, Hofer/Stalder 1998 provide more insight on regional eco-products in the food sector.

step to that direction.[65] Another way is to collaborate in bringing about an eco-label for electricity, which reduces risk for the new products by setting up generally accepted standards and prevents competitors to offer dubious products that contribute to an erosion of customer confidence. This road has been chosen by some of the solar power pioneers in the Swiss market like the municipal utilities of Zurich and Berne, EWZ and EWB. At the same time, a standardised eco-label splits the cost to open up the market between the green power marketer and the labelling institution, with positive consequences for both of them.

5.1.4 Comprehensive eco-strategy

As we proceed further into the world of „soft factors", a further source for cost reductions lies in bringing marketing activities for green electricity in line with the overall business objectives and strategy of the company. Again an example from the food sector: One of the reasons for Swiss food retailer Coop's is its comprehensive strategy that has facilitated identification of the employees with their company. A special effect is that thanks to their successful range of organic food products (Coop Naturaplan), Coop - the „eternal number two" in the Swiss market - has been able to gain market shares against his major competitor Migros, which increased employee motivation further. This seems to have resulted in a self-reinforcing positive feedback loop, including higher attractiveness for interesting customer segments, good public image and so forth. On the other hand, a number of electric utilities seem on a downward spiral with negative public image, poor customer relations, unmotivated employees etc. For them, taking green electricity as a starting point for redefining their entire business strategy might be a promising option. Whether the establishment of the power industry will succeed in that task or whether motivated newcomers will beat them to it, is of course an open question.[66]

The reason for positive economic effects of a comprehensive eco-strategy can be seen in a combination of lowering transaction costs as an internal factor (shared basic beliefs, few cognitive dissonance among employees)[67] and higher credibility at customers and other stakeholders (such as banks, environmental and consumerist NGOs, media) as an external factor.

Another success factor is to set comprehensive objectives, like for example providing the „premium" segment with expensive solar power, the more price sensitive "M Budget"-kind of people[68] with „light green-no nukes" power, and the rest with some sort of mix in between. If the company continues to deal with electricity from environmentally worse-performing sources like coal

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[65] cf. Interessengemeinschaft EDL 1998

[66] Cf. Wüstenhagen 1998b for more reflections on the issue whether structural change towards sustainability is more likely to come from old-established *Goliaths* of an industry or from highly motivated, yet less powerful *Davids.*

[67] Another notion to express this is of course organisational culture, cf. Seidl 1993 for an early overview on the relationship between organisational culture and successful environmental management, and further references.

[68] „M Budget" is the low-priced economy brand of the Swiss food retailer Migros.

or nuclear power, the role of these products within the whole product line has to be defined transparently.

5.2 Customer value: Willingness to pay higher prices, increasing appreciation of power product quality

In Chapter 5.1, we have reflected on some facets of lowering the future price floor of green power products on the cost side. This shall now be complemented by a few thoughts on scope for price cap-leverage on the customer value and competitive sides.

As for the customer, increased value of and thus willingness to pay for green electricity products might either result from different **product design**, from **changed preferences** or from a **better communication** of the product, its price, and its value by the company. To learn more about the value that the design of a green electricity product and certain of its elements (price, brand, technologies involved, reliability, production location, accompanying services etc.) delivers to its customers, a conjoint measurement analysis should be performed.[69]

A change in preferences can be induced by public education programmes about electricity and sustainability issues, but can just as well be supported or even initiated by the company itself as part of their marketing activities. An example is Industrielle Betriebe Burgdorf's SOWIWA programme that gives customers a choice among different forms of electricity, thus rising awareness for electricity production in general and at the same time signalling different levels of production cost for particular renewable energy technologies.

Finally, better customisation of price to customer value can also be enhanced by the way that pricing is communicated. Communicating exorbitantly high unit (kWh) prices as it is quite usual today is a good means to establishing cognitive dissonance among consumers and thus make them think about their electricity consumption. As useful as this might be for long-term preference shaping, as deterrent is it to those who are not prepared to get highly involved in purchasing greener electricity, but who might still be willing to switch to easy-to-consume product offerings. The same effect as is achieved today by selling a few kilowatt hours of extremely expensive solar power and a larger amount of plain system power at usual price may also be achieved by offering a light-green ready-made mix, priced 10-20 % above market level. This would provide cognitive relief to customers and - at least in the short term - increase chances for higher market penetration.

5.3 The competitive side

Thinking about price competition among providers of green electricity products may seem a bit early at least in Switzerland, where the end-user market is expected to be opened to competition not before 2007. Nonetheless, competition as a limitation to high prices already exists beforehand, as

[69] Cf. Dolan/Simon 1996, pp. 54 ff. for an example of conjoint measurement application to product design in the automotive industry. The author does not know about any applications of that method in the electric power industry to date.

first suppliers of solar power in Switzerland are thinking about lowering their prices by including subsidies of the local government into their price calculation.[70] Such activities might induce public expectations for price cuts to those charging their customers „true prices", which may not be easy to escape from.

As compared to conventional electricity products, competitive situation for green electricity might improve over time, as ecological tax reforms find more and more supporters and the Kyoto treaty includes mechanisms that will shift the relative price levels in favour of renewables. On the other hand, their are also countervailing tendencies, such as the expectations for price decreases that are associated to market liberalisation, and oil prices that have reached an all-time low and thus make things difficult for competing energy sources. It can though be estimated that these tendencies might be suited to delay better competitiveness and are thus important factors for timing strategies, but that very low (fossil) energy prices will not be sustainable in a CO_2-constrained world in the medium an long term.

6. Conclusions

This paper aimed at giving some insights about pricing strategies, their determinants, their impacts, and their potential to achieve ecological mass market penetration in the electricity sector. As we have seen, cost is not the only factor determining pricing strategies, but rather knowing their cost situation is a starting point for a company to set a price floor. Profitability can be increased if prices are brought closer to the value that a product provides to its customer. And knowledge about the value that different product features deliver to the customer can be combined with information about price-response curves to tailor a product to both maximum value creation and competitive cost (target costing). Competitors play the third role in conceiving and implementing pricing strategies, in that their possible reaction has to be taken into account in evaluating the profit and market penetration impacts of a pricing strategy.

While usually decreasing product prices leads to increasing demand, there is one exception to that rule, that might play a major role in the context of eco-products in general and green electricity in particular. Price also has the character of a quality signal for the customer. This means that, especially in a situation of lacking other information about the product, price decreases can result in doubts about product quality, hence decreasing sales, especially in quality sensitive customer segments. Whether such decreases are offset by increasing sales volume in price sensitive segments has to be examined in the situative context, taking possible feedback effects such as possible opinion leadership of the quality sensitive pioneers into account. The dilemma could perhaps be overcome

[70] Personal communication of a marketing manager of a Swiss utility, Basel, July 30, 1998.

by introducing different eco-products for the different segments, but this may cause difficulties in positioning.[71]

Both costs and the ambiguous perception of prices by customers have to be taken into account when deciding about skimming or penetration pricing as a dynamic market entry strategy. For both causes, skimming is clearly the most widely applied strategy in eco-product pricing. Penetration is somewhat more unconventional, and certainly irritating to the classical eco-segment, but may provide significant potential in terms of boosting sales volume of eco-products, given that economies of scale can be expected and there is a situation of sufficient production capacities or at least these are being built up. This could for example work in the case of photovoltaics. Penetration pricing in this case may though well mean pricing below initial production costs, but probably not below pricing of conventional electricity, as price differences nowadays are remarkable. Given the higher value that many customers seem to attribute to this electrical resource, this is not a major problem, solar electricity being able to open up a class of its own in the market. It should be pointed out that these are, however, qualified hypotheses based on anecdotal evidence and analogies, which need further empirical foundation.

Eventually, green pricers can be advised to find out more about what provides value to their customers, define their objectives clearly (e.g.: profit or penetration), and streamline strategy (pricing and general marketing) along the objectives set. One of the decisions to take is whether niche segments or mass market penetration are aimed at. The company must be aware of the consequences: Skimming the high willingness to pay of a few eco-sensitive customers is easily done, but targeting the mass market with environmentally advantageous innovations risks to both lose that comfortable niche and fail to achieve the rest who may interpret such products as „stuck in the middle“ or „neither fish nor fowl“.[72] A key element to avoid this is not to establish the new product as a premium product but rather to define the standards anew and put conventional products into kind of a taboo position. Besides pricing, the whole marketing mix must be tailored to that task. The implications could be that pricing is no longer communicated per kWh but e.g. as a monthly flat rate that includes energy efficiency services. Hence consumers could be charged higher unit prices but would not mind because the pure kWh are bundled with services that create an adequate value to customers. Finally, this would mean the ecological variation of the delicatessen-type of pricing: low sales volume in physical terms, but high profitability. A concept that both environmentalists and shareholders would be happy with.

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[71] Just recently, Swiss food retailer Migros has run into serious difficulties with its two-tier eco-product range, being accused to deceive their customers by a large consumer organisation (cf. Städler 1998, p. 1).

[72] This argument is further developped in Villiger/Wüstenhagen/Meyer 1999.

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