

## **Wolfgang Berger: Photovoltaics in Europe in the year 2020. Utilities, sustainable development and culture.**

### **Introduction**

At this stage it seems advantageous to summarise the study as well as draw conclusions from the insights obtained. Thereby, particular reference will be made to utilities as important players in the energy field. Notwithstanding the awareness of notable uncertainties surrounding forecasts, particularly at a time troubled by change for change's sake, an attempt has been made to sketch the future of PV in Europe over the next 20 years. However, especially in times of rapid and profound change, we feel the need to find our bearings. From a positive point of view it may seem worth-while to consider the future of a renewable energy technology which promises to potentially make a notable contribution to environmentally friendly energy supply in the long term. Its very dynamic development in the 1990s reinforces such hopeful consideration. Still, we cannot but regard the results of this study as clues and signposts emanating from a seemingly vast reservoir of potential realities that may unfold ahead of us.

Responsibility rests with man who has to give thought to building a future based on sustainable development. Delphi-Studies may be considered as a contribution to this end. They are a tool and an exercise to develop awareness of important issues. In mirroring the mindsets of people, and mindsets bring forth future decisions, they may sometimes delineate the future development better than mere mathematical models, particularly when complex matters have to be explored.

Amongst the new energy technologies, PV can certainly be regarded as unique for the wide range of energy and non-energy benefits which it can offer in a combined way. Increasing awareness of its attractiveness and advantages has led to continuously growing application levels over the last 30 years. In the 1990s, diffusion accelerated markedly, with some European countries (Germany, Switzerland, the Netherlands, Italy) having played an important role. However, Europe's south, receiving notably more sunshine than Europe's central and northern parts, has not yet converted this natural advantage into corresponding PV capacities, i.e., there is a "high potential - low adoption paradox".

The significant growth of PV applications has been greatly spurred by large scale photovoltaic programmes (LSPPs) implemented by governments, regional bodies, municipalities and utilities from industrialised countries and adopted by a range of entities, particularly by private house owners. Hence, PV receives support from a wide range of players, and this has contributed to its wider spread. The LSPPs discussed in this study (see also Appendix) have a very limited impact in terms of their contribution to the total electric generating capacity of a country. The share remains well below the 1%-level. Thus, the programmes cannot but be perceived as mere catalysts with which the diffusion process may approach the critical level of adoption necessary for initiating a self-reinforcing spread of PV systems. Hence, despite the rapidly growing number of installations, the weight of PV in national energy balances will remain negligible over the next few years.

Clearly, utilities, as long-established operators of power plants and transmission and distribution systems, are essential agents of the integration of PV in energy supply systems. Should LSPPs pave the way for a notable contribution of PV to electricity supply, utilities would certainly be affected by such a development. Therefore, they need to understand the

possible implications of these programmes, both as opportunities and constraints, to define the utilities' role properly in this dynamically emerging field of electricity supply.

The rise of new renewables induced by two oil crises and an ongoing lack of public confidence in nuclear, poses challenges for utilities. The use of these costly new technologies, among them PV, is in many cases not yet counterbalanced by an adequate return on investment. Also, the long-established centralised supply structures of the past, based on large power plants and extensive transmission and distribution networks, contrasts with the application of renewables which are mostly used in small and distributed systems. Hence, utilities would have to undergo profound changes in their supply set-ups by widely adopting renewables.

Choosing a 20-year-forecasting-horizon, the question arose how to examine the role of utilities in the context of PV and LSPPs within this Delphi-Study. The four utilities Enel (Italy), Union Fenosa (Spain), E.ON Energie (Germany) and Bewag (Germany) were selected in a systematic way according to specific criteria, like ownership structure (privately versus publicly owned utilities), size (installed power plant capacity), geographic aspects of their supply areas (urban / rural characteristics; local / regional / national / international scale of main activity; level of global solar radiation; level of economic development). As intended, the companies show some diversity with regard to these criteria. Another essential criteria for their selection was the availability of LSPPs within their supply areas.

A number of questions in the Delphi-Study explicitly relate to these utilities. In addition, a wider range of issues is addressed in the questionnaire sent out to the expert panel: the future energy world in the context of PV in general, a prognosis about the diffusion of PV in Europe and in the four selected utility supply areas, ways of application of PV, sustainable development and development in general in the context of PV, solar radiation and PV, and behavioural potential of the adoption of PV. A summary of the main findings is presented in the remainder of this chapter. Insights obtained from literature reviews complement the results.