

DSM AND CUSTOMER SERVICES IN COMPETITIVE ELECTRICITY MARKET IN FINLAND

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SUMMARY

The restructuring of distribution companies in Finland and increased competition in electricity markets has had a strong influence on the applied DSM. The traditional DSM activities have to be re-evaluated because increased mergers and changes in utility ownership decrease the motivation of utilities and increase uncertainties in the economic benefits of DSM. On the other hand the utilities are diversifying and developing different types of products and customer services. Potential future electricity products especially related to power quality are discussed.

ELECTRICITY MARKET ACT

In Finland the electricity markets have been opened for competition through the Electricity Market Act (effective June 1, 1995). The deregulation was performed step by step so that first customers above 500 kW were allowed to change their supplier in November 1995. Since November 1, 1998 all the customers including even the low voltage domestic ones have been able to change their supplier.

According to the Electricity Market Act the generation and electricity supply is subject to competition, while transmission and distribution networks remain natural regulated monopolies. Transport charge varies only by time and voltage level and is not dependent on transportation distance (point tariff). Distribution companies are divided on accounting basis to sales and distribution activities. The companies lost their franchise right in sales and have to compete on equal terms with other suppliers. (See figure 1.)

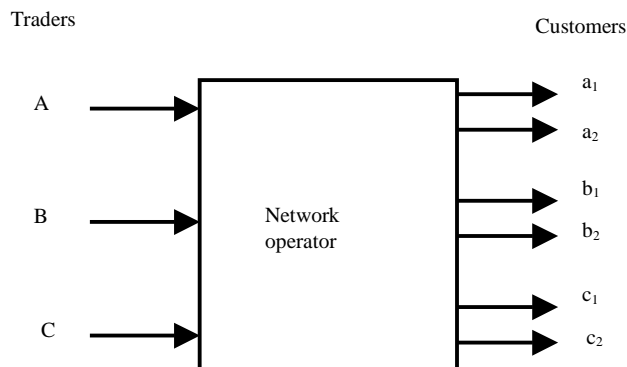


Fig. 1. Traders and customers in free market conditions. [1]

The efficient function of the electricity markets is supervised by government authority, the Electricity Market Authority. It is an independent expert subordinate to the Finnish Ministry of Trade and Industry. It began its work in August 1995. The Authority acts as the regulator in the electricity market and its' principal task is to promote the efficient function of the electricity markets and to monitor transport tariffs (i.e. fees for transmission and distribution) under the conditions of reliability and economic efficiency. Further the Authority has the following tasks

- to promote the development of the electricity markets
- to grant licences to network operators and construction permits for transmission lines of 110 kV or higher voltages
- to monitor compliance with the conditions on which licences and permits are granted
- to oversee the operation of networks and ensure that the provisions of the Electricity Market Act are complied with
- to advise other authorities, companies and consumers in matters relating to the Act
- to compile the data required for monitoring

THE EXPERIENCE OF THE RETAIL COMPETITION

The experience with the competition has shown the need for retail suppliers to win volume in low margin commodity markets. Like in many other commodity markets with large turnover, power retailing experiences a slim gross margin and an even slimmer operating profit margin. Customers have selected their power retailer based primarily on unit price and retailers cut costs to offer attractive unit prices. It is expected that the prices become even.

In this situation the distribution companies have to find new products and services that guarantee their success in the deregulated electricity markets. Distribution companies are developing also non-traditional non-electrical services and products. The aim is to be more customer oriented and to strengthen the relationship between the utility and the customer. The customer is also aspired to be serviced by a more comprehensive way. As an example distribution companies are developing to summer cottage owners a service package which involves in addition to the traditional services of a distribution company the control of

summer cottage temperature, house-burglary, the reading of kWh and water meters etc.

Despite that the distribution companies are developing new non-electrical services and products there are also new non-traditional traders of electricity in the deregulated markets. Oil companies and stores have started the function as retail suppliers of electricity.

Demand Side Management (DSM) is usually a utility (or sometimes governmental) activity aimed to influence energy demand of customers (both level and load variation). Typical ways to realise DSM are direct load control, innovative tariffs and different types of campaigns. [2], [3] The restructuring of utilities in Finland and increased competition in electricity market has had a strong influence also on the DSM applied. Traditional co-ordinated ways of planning and management (IRP, Integrated Resource Planning) are no more possible due to the conflicting interests in generation, network and supply business and increased competition between different actors in the market. Costs and benefits of DSM are divided to separate companies, and different types of utilities are interested only in those activities, which are beneficial to them. On the other hand, due to the increased competition, the suppliers are diversifying, and partly DSM based, different types of products and increasing number of customer services are available.

NEW SERVICES TO CUSTOMERS

Strategy elements for utilities

For utilities to become competitive in these changing markets, they have to rethink their business strategies and re-focus the development of their products and services. This includes:

- the development of products and services must be part of a larger information process whose design must provide the knowledge necessary to differentiate the commodity based services
- create customised enhanced services
- increase operating efficiencies in core operations so as to drive down prices and costs

Integrated Energy Solutions is the combination of product and service offerings to fulfill customers' total needs for energy, as illustrated in figure 2. [4] Integrated Energy Solutions offer an increased market identity and allows for a better approach with attractive customer classes.

In a competitive environment it is necessary to understand each customer's contribution to the utility company's profit, how exposed the customer is to competition, how loyal the customer is and which factors are critical to influence the loyalty. The objective of this strategy is to develop tailored products and services for most profitable customers of the most vulnerable to competition.

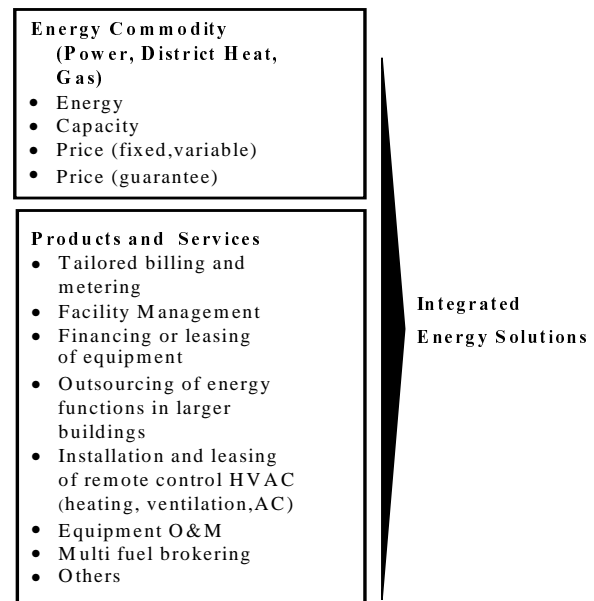


Fig. 2. The customers' total needs of energy are fulfilled by the combination of product and service offerings.

Identification of possible new products and services

Some illustrative products/services has been identified: [5]

Utilisation of Internet for

- home made energy audits and cost/benefit analysis
- general information to customers
- price and contract information

Bundling of value added services with other services, such as

- communication services to customers
- security and remote control services (holiday houses etc.)
- energy audit combined with equipment safety test (for insurance companies)

Submetering schemes, such as

- billing services to customers having several consumption points or subcontracts
- services to analyse and advice customers (either by utilising conventional remotely read hourly meters or by installation of extra metering equipment)
- rental of portable meters

Utility owned equipment/leasing, such as

- stand-by diesel-aggregates for customers to be used by both customers and utilities
- Worry Free Programs for heating, domestic hot water production or air conditioning (leasing including maintenance). May be third party financed

Green energy concepts like

- green pricing through different types of contracts
- electric heating and use of wood for heating as a green product (different types of products can be defined)

The utilisation of two way communication for meter reading, innovative pricing and energy management at customers

- utility can combine pricing with the assistance of the customers to benefit pricing by using energy management systems
- the use of system in load control and demand side bidding schemes

POWER QUALITY PRODUCTS

The power quality products represent one possibility in developing new products. In this connection the power quality is understood as the properties of voltage and current.

Traditionally utilities have offered all the customers adequate quality and no differentiation has been needed or offered. Though some important, typically customers of large-scale process industry and hospitals have had special, tailored power quality solutions.

Nowadays the electricity should be seen more as a product having certain quality. One speciality of this product is that the quality varies so that at one specific place the voltage varies from time to time and at certain moment the voltage varies in different parts of the network. The power quality is always a local property of the network and is determined by the local network conditions and the local use of electricity.

The network owner offers at the customer's supply terminals a power product of certain voltage and frequency. The customer is interested in the quality of the voltage. On the other hand the network owner is interested in the quality of the current the customer is taking from the network or passing to the network. (See figure 3.)

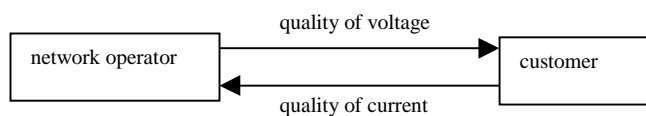


Fig. 3. The quality of voltage and current seen by the network operator and the customer.

The customers are always connected to the network of the local network operator. The distribution of the electricity is not open for competition. The retail suppliers sell the electricity and according to the law the customers can buy the electricity from any of the traders. This means that the trader and the customer can geographically be situated far away from each other. The trader can be the local distribution company, a distribution company situated on the other side of Finland or abroad or some other company like oil company.

When having an increased number of actors in the electricity markets one question of power quality products is

whose products (network operator / trader / quality consultant) power quality products could be. (See figure 4.)

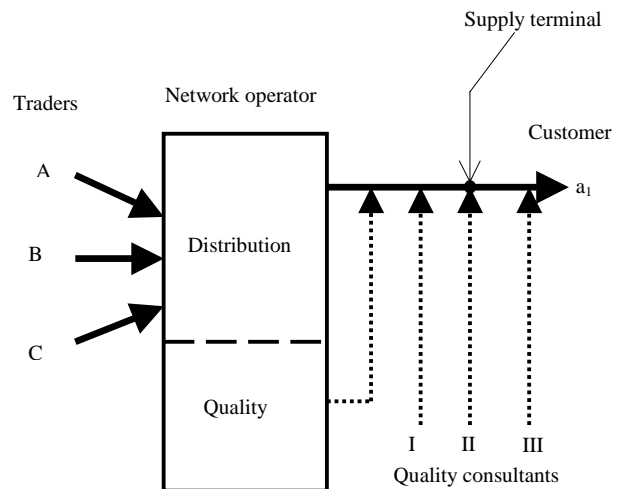


Fig. 4. The traders, network operator and quality consultants seen by the customer a₁.

The power quality products could be the products of network operators, because the network operators

- have the best local know-how of the network properties
- have the local know-how how the power quality of a sensitive customer is affected by the neighbouring customers
- have electrotechnical skills to work with power quality issues
- have the responsibility to develop the network and thus they have also the control how the dominant local power quality will be developed in the future
- can perform power quality solutions that affect not only a single customer but groups of customers (traditional development of the network and in the future power quality parks)
- can perform power quality solutions as well on their own network as on the customers' network

On the opposite the network operators may not be interested in differentiating the power quality because according the Electricity Market Act they have a responsibility to treat customers equally. If a network operator is marketing products of better quality there might rise a question is the rest of electricity of poor quality. The concentration to the power quality products is naturally also a question of manpower. On the other hand because the suppliers are operating in the competitive environment and because especially they have to find new products the traders should be interested in the power quality products.

As a results of the aspects given above the power quality products will suit well to the network operators' menu. A practical solution to this question could be an arrangement where several network operators have a quality consultant company in common. Then the power quality professional-

ity is concentrated in one company which have active relationships to several network operators.

The power quality can be improved by many different means and in different parts of the network. (See figure 5.) The power quality can be affected e.g. by means of restructuring the network (for example meshed network / radial network, new lines, strengthen lines) and different electrical devices like filters, capacitors, transformers. In the future the development of custom power and energy storage technology enables new interesting methods for improving the local dominant power quality and for tailoring power quality products along the customers' needs. [6], [7] The limit between the traditional development of the network and power quality improvements is not unambiguous but related to each other. This leaves the question how the costs of power quality products are divided in a fair way without a single clear answer.

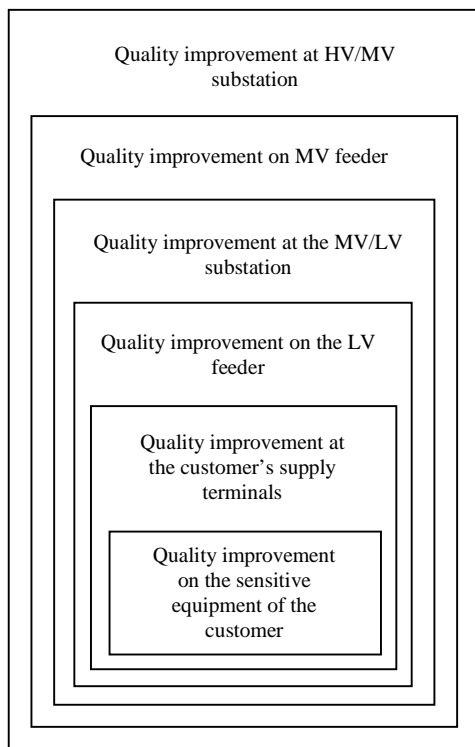


Fig. 5. Quality improvements at different points of the distribution network.

The customer groups to whom to market various power quality products has to be found and determined. Especially in industry there is an increased awareness of the importance of power quality. Poor power quality can result in very substantial costs to operation. These include lost productivity, labour costs for cleaning and restart, damaged or poor quality products, delays in delivery, reduced customer satisfaction, and possibly even damage to production equipment. Increasingly the industry is realising that electricity should be viewed as one among many commodities vital for their business. As such it should be subject to the same demands concerning quality control, reliability of supply, etc. as any other commodity.

Thus large-scale industry and e.g. hospitals are typically customers to whom the importance of power quality is essential and traditionally these customers themselves have know-how to require a certain power quality. On the opposite households represent customers to whom an additional, costly power quality is not easily justified.

Small and medium scale industry and the service sector have needs to define the needed power quality more precisely. Typically these customer groups do not have skills to specify their own power quality needs. Power quality products marketed to e.g. farming, offices, schools and department stores can be developed. The power quality products can also be part of a larger product package.

Though certain customer groups have similar demands and expectations for power quality the power quality products always require tailoring along the customers special needs and the local network conditions. (See figure 6.) The products can be planned to fulfill power quality requirements of not only one single customer but also a group of customers.

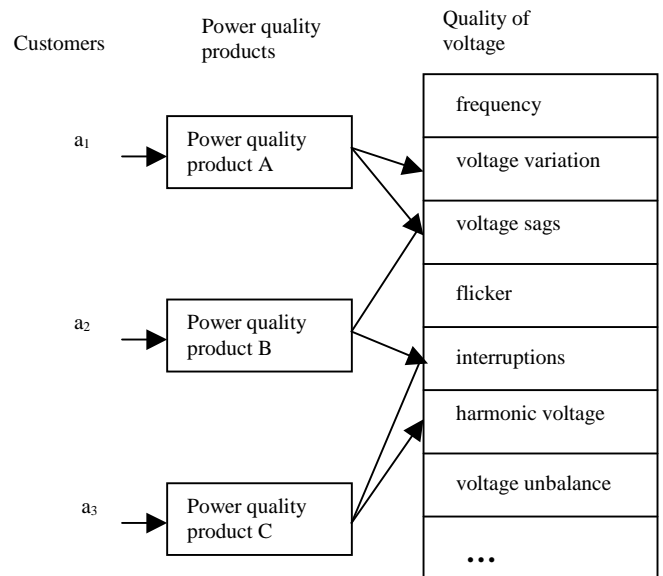


Fig. 6. The tailoring of power quality products along the customers' needs.

CONCLUSIONS

Power quality issues are of increased interest. The free electricity markets have had a strong influence on the applied DSM and in the changed situation distribution companies are developing new products and services to differ from other companies. Also power quality can be seen as a new area of products and services.

Because the power quality is always a local property of a network and because the power quality issues need electrotechnical skills the power quality products could be the products of the network operator. From the customer groups the small and medium size industry and service

sector do not have themselves know-how to determine the needed power quality. Thus they will represent an important customer group of power quality products and services. Though certain customer groups have similar demands for power quality these products need always tailoring along the local network properties and the customers' special needs. In the future as well as traditional technology and new technology (custom power) offer interesting tools and solutions to modify the distribution power quality as well as to a single customer as groups of customers.

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