

# ***NORWAY'S NEW ENERGY ACT***

## **LESSONS SO FAR**

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**by**

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# Norway's New Energy Act: Lessons To Date

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## Abstract

This paper gives an overview of the development of the electricity market in Norway since the new energy act came into force 1 jan. 1991.

The electricity market in Norway is the most liberal one in europe when it comes to customers right to buy power from the supplier who make the best offer.

Brokers and traders can also operate quite freely but need a license.

Transmission and the distribution networks operate as a "common carrier" and are regulated by The Norwegian Water Resources and Energy Administration (NVE).

To adjust this paper to further development in the norwegian regulation system, an update will be done when major changes occur.

## Background for the new Energy Act.

A lot of work at various levels lies behind the formulation of Norway's new Energy Act (Ot.prp. nr.43 (1989-90)). The legislation has established the basis for the country's new regulatory system. The environment into which the act was introduced included several particular characteristics. These included, among other things:

- Changes in the demand for electricity. During the last few years — in particular 1989 and 1990 — the electricity market changed from a situation which was characterized by rapid growth in demand and interest in the development of new supply to a situation in which the focus has been on the sale and purchase of "spot" electricity at low prices. (The spot market has increased due to "mild" winters, "wet" years and a slowdown in the norwegian economy.)
- Increased attention on requirements for efficiency in production and returns on investment in the Norwegian economy.
- Changes in the attitudes in governance towards greater deregulation and more competition. In the case of the Energy Act, this is reflected in a study which recommends that competition replace the previous emphasis on politically administered control.
- Increased interest in market-oriented sale and purchase of electricity.

Deregulation and more competition does not necessarily include changes the basic goals for the electricity industry. The main goals are still to insure a socially rational use of all energy resources and to reduce geographical price differences to consumers. The societal goals of the new Energy Act can be broken down into the following points:

- To reduce the price differences between different geographical regions and to reduce discrimination between different customers.
- To increase the customer's efficient use of electricity.
- To take better advantage of the variations in hydro power production from year to year.
- To encourage efficiency in the local utilities
- To develop the least expensive hydropower projects before those which are more expensive.
- To attain more efficient power production.

After a long period of price increases, the tariffs for household and agriculture customers have decreased slightly since 1991. The main reasons for this have been the introduction of the new energy act which created more competition and the slowdown of the norwegian economy.

### **Means and measures for stimulating the necessary changes**

The ways in which Norway will try to achieve the societal goals outlined above have been radically changed. These changes include:

- Reduction of the number of electricity utilities. Merging of utilities must be voluntary and driven by the market. The Norwegian Water Resources and Energy Administration (NVE) has already begun to see tendencies in this direction. ( Some utilities have formed new sales or purchasing organizations.)
- Development of a reasonable number of independent buyers and sellers of electricity with the intention that there be a comprehensive electricity market which crosses the boundaries of the traditional service areas. New actors in the market place and active consumers are the key for opening up the traditional market. The development of a national market place is seen as very important.
- Elimination of the old strong connection between large customers and the local utilities who have been the only supplier of electricity in a given area. Customers can now buy from the supplier who has the "the best offer".
- Ensure that local utilities do not discriminate against remote suppliers. The network must serve remote suppliers the same way and on equal terms as his "own" supply.
- Establishment of an efficient regulation system for the transmission- and distribution system as natural monopolies.

As these points illustrate, the Energy Act aims at establishing a more market-based electricity sector. In this connection the three following principles are important:

## **1. Independence**

An emphasis on independent, competitive actors, which can choose the supplier who can best serve their needs. In a market characterized by competition this should be the common case. But contracts signed before the new energy act was implemented, can set restrictions to trade this way. As a general rule such contracts should be renegotiated.

## **2. Anti-discrimination**

Access to, and use of the networks should be based on the non-discriminatory conditions implicit in the concept of the "common carrier." Among other things, this means free access to the electricity pool. Discrimination in access to the network will mean lost opportunities in the realization of an efficient market.

## **3. Simplicity**

The price and tariff system must be simple enough that bidding for and transport of electricity will not become a bottle-neck. In this connection, complex billing systems can be seen as a barrier to end-users who wish to participate in the market.

## **The basis for administration**

The role of NVE is to regulate the network as a "natural monopoly," and at the same time insure rational sale and purchase of electricity in an effective market. This is an formidable assignment when seen from the perspective of the existing ownership structure, the various levels of transmission system, etc.

The Energy Act requires that the electricity utility industry should be divided into the two following groups:

*Monopoly based utilities portion* (transmission of electricity) which are to be placed under direct public regulation.

*Competitive activities portion* (production and sale/purchase) which are to operate using according to conditions, subject to the usual regulations for other sectors of the economy.

The reason for this division is that the market and competition are the most effective principles around to which organize production and sale/purchase. The Energy Act encourages the electricity utilities to organize themselves, as much as possible, according to market based principles.

To insure that the actors behave in harmony with the societal goals introduced in the Energy Act, a new market license is introduced. This has, as its goal, to protect the customer's interests through:

- insuring the economically rational sale and purchase of electricity in an effective market.
- regulate the transmission and distribution network as a natural monopoly.

NVE issues these licenses.

### **NVE and regulation of the network.**

The network is difficult to organize as a true market since it is a natural monopoly; i.e. the costs which are necessary to deliver a given amount of electricity to a set number of customers would be dramatically increased if there were several parallel networks instead of a single integrated system. In this sense, competing systems would be quite costly. Thus, the pricing for the delivery of electricity can not be turned over to the market. Rather, it must be regulated in order to arrive at an acceptable and socially optimal result.

Monopolies, left to themselves, have the tendency to build in extensive profits. In addition, because of the lack of competition one can question the internal efficiency of a monopoly.

In the electricity sector, the preponderance of network owners are also producers and/or sellers of electricity. Thus, they can potentially be suspected of administering the network so as to exclude other actors from the market. In addition, there is the potential of the use monopolistic control, through different forms of cross subsidizing or through the establishment of unreasonable conditions, which will reduce access to the network.

A major administrative job for NVE is to develop methods for overseeing the network. We do not want to develop a system of administration based on detailed centralized steering of investment and maintenance costs. Such a system would be unnecessarily complex and costly. At the same time, it would not guarantee an effective network or the desired social benefits. We will therefore develop a model which will:

- establish a framework which will motivate efficiency and responsibility
- control key variables such as prices, equal access and the quality of delivery.

It is important that NVE insure that network owners do not set conditions which exclude actors from the network and the market. In relation to this, NVE has established the following principles as the basis for its control of the network.

- There must be open access to all actors based on non-discriminatory conditions and tariffs.
- Network owners must, through their tariffs and access fees, generate the revenues needed to cover necessary maintenance expenses and insure a return on investment.
- Development and maintenance of the networks must be based on an evalua-

tion of the least costly alternatives.

- Customers must be insured of an acceptable quality of delivery, either through formal regulations or special agreements between the network owner and the customer.

NVE has developed its own guidelines for tariffs in the regional and the local networks based on these principles.

### **Transaction charges**

The network owners very soon implemented a special transaction charge for remote suppliers.

Transaction charges, should they become too large, could effectively eliminate participation in the market. These costs can include two elements. The first of these is a fee which the owner of the network attempts to charge the pure delivery customers. The second type is an indirect cost associated with complex tariffs and conditions which result in long and difficult negotiations — potentially involving several network owners — before an agreement can be established.

NVE has found that it is necessary to establish a well defined ceiling on transaction fees. The ceiling is established at NOK. 5000/customer/year. However, the rule recognizes that only extraordinary costs can form the basis for a special transmission fee.

### **Tariffs for network services**

The tariffs for the electricity network can be modeled upon those which have been established in other parts of the social infrastructure, i.e. in the postal and telephone services. Customers pay a price that is formally established and provides simple handling routines regardless of how long and difficult the route of the letter or the phone call through the system. Without such simplicity, we feel that the market will not function effectively. In the transmission network the entry/exit fee system was established on 1 May 1992 and the regional and local networks will establish this type of fee system during 1992.

The entry/exit fee system will build on the following points:

- clearly defined access points where direct exchanges between producers, or users and network owners take place.
- transmission fees — which are separate and independent from power contracts — calculated on specific exchange points.
- transmission fees in the various networks must be coordinated and they will be announced for various network levels. The prices that the network users pay at the connection points will cover their obligations for transmission of electricity in the Norwegian network.

- there will be costs associated with both the entry of power into the network and its exit.
- the tariffs should, as much as possible, reflect the true system cost in the network and should include both a power and load component.
- transmission fees will account for losses in the network. Marginal losses are included in the power component and will be calculated in relation to the spot market price. Production which reduces losses will be credited to loss reductions.
- transmission fees can be adjusted according to transmission quality.

## **The transmission network**

The transmission network ties the country together in an interconnected grid system. There are abundant possibilities for the exchange of power with our neighboring countries. The function of the transmission network is not only to transfer power from point A to point B. The network allows Norway to avoid the expensive development of parallel electricity networks and allows for the distribution of electricity in a system that can be plagued by unstable supply conditions. The electricity network can be seen as a basic element in the countries infrastructure which insures a secure and effective access to electricity.

Since the transmission network is a fixed physical entity, and since it is a monopoly, the prices which are set for transmission through the network should be based on physical, not contractual conditions.

As mentioned above, an entry/exit fee system has been developed for the transmission network. The tariff system has been developed as follows:

- |    |                    |                    |
|----|--------------------|--------------------|
| 1. | Variable component | (energy component) |
| 2. | Fixed component    | (load component)   |

The energy component will insure that the costs to society are taken into account. It will reflect the load on the network. The load component must be neutral as possible in relation to the overall operation of the general Norwegian electrical system.

### *1. The variable component is divided in two.*

The first part is based on calculations of marginal losses for three different tariff periods, a winter day, a winter night/weekend and summer. The fee is calculated by multiplying the percent of loss by the spot market price.

The second part is the capacity component, or "bottle neck" fee. The fee will be added to the price of all electricity that passes through a bottle neck.

The variable component of the tariff covers normally only 20-30 percent of the total costs

in the transmission network.

## *2. Fixed component.*

The coupling fee will be determined by the installed load and use, while the residual component will be paid according to the net transmission between the transmission network and the subordinate networks. Roughly stated, one can say that the coupling fee reflects the commercial access to the network, while the energy component gives physical access to the subordinate networks. Both tariffs give the same access to system reserves in the case where a unit of electricity falls out.

The fixed component will cover the remaining costs in the network.

## **The regional and distribution network**

Under the current time plan of NVE, entry/exit fees will be put into effect in the regional and distribution networks as soon as possible, after 1 May 1992 and before 1 January 1993.

## **Price statistics**

The preparatory work for the new Energy Act, Ot.prp 43, discusses comparative efficiency analyses as a means of encouraging utilities to be efficient. Using both economic theory and the experience from other countries which have established this form of monopoly control as a starting point, it is believed that some form of price control will be the most realistic solution. NVE is currently cooperating with the Center for Research in Economics and Business Administration in order to examine the efficiency of the Norwegian utilities and investigate the optimal way to control key data.

NVE has collected information on transmission tariffs from 200 utilities. The price statistics show a considerable variation — from 4 to 30 øre/kwh based on 4000 hours of use in the distribution networks. The average price in the distribution network is 14 øre/kwh. For the regional network the prices vary from 2,3 to 8 øre/kwh.

Some of the price differences, however, are partially the result of natural differences in the networks. In many situations they have resulted from price calculations that ignore regulations and, for example, reflect a high demand for returns on investment. In addition, there are problems in reporting. Many utilities have simply reported the difference between the price they pay to purchase electricity and their sales price. This difference can contain costs which should not really be included, for example the cost of street lighting. Another problem is that these tariffs are not cost based, as they should be. NVE will only accept these types of tariffs in exceptional cases in 1992.

## **Complaints**

NVE is given the authority to pass judgements when there is disagreement on the conditions of a contract or when there are different interpretations of the methods used to calculate transmission fees and capacity, such as in the case of Buskerud Energi. It must



be noted that this authority will only be used as a last resort. In the majority of cases it is assumed that the actors will negotiate without the need of outside intervention. In more difficult cases NVE will attempt to mediate between the concerned parties and in some cases NVE will dispense judgements which are intended to resolve the disputes.

NVE has already made decisions in four different cases where the network owner's tariff has been reduced because we found that the basis for calculation was not in accordance with the regulations. All of these decisions are being reviewed by the Ministry of Petroleum and Energy. In the one case where the Ministry has issued a judgement — the case concerning Buskerud Energi — they found in favor of NVE.

The network owned by Buskerud Energi is an integrated network with both production and distribution. This has led to a complicated partitioning issue in relation to the division of costs between transmission and production. In this case, NVE emphasized that the establishment of the entry/exit fees will probably solve several of the basic fee problems which exist in the network. Further, NVE suggested that Buskerud Energi should take into account different qualities of transmission.

NVE gets daily inquiries from actors in the market. Through dispensing advice and guidance NVE has successfully resolved several cases without formal complaints. Advice and guidance are very important functions for NVE in this area. For several of the actors the transition to a market based system is quite dramatic. Because of this it is important that they have access to information.

## **Market**

A free market and competition does not mean that the electricity sector is left completely without governmental control. There are many characteristics of production and sale which indicate that without clear rules and without a determined framework, the sector will develop towards a de facto monopoly through vertical and horizontal agreements and understandings. At the same time, a market can not develop in a situation where there is excessive oversight by central/local authorities or politicians. The market must have a framework and general rules that encourage economically viable solutions. Within these conditions, the actors must behave as independent units with a great degree of freedom to choose solutions.

The electricity market is based upon some central conditions in order to encourage real competition:

- trade must be based on the existence of a reasonable number of actors such that no single actor can unilaterally influence the price level. The actors must take the prices as given and accommodate themselves to them.
- purchasers must have the freedom to choose the supplier which makes the best offer. In the same way, the producers must have the freedom to choose the purchaser who is willing to pay the highest price. Inflexible obligations can not exist between the actors.
- good information on prices and delivery conditions in the market must be

easily accessible.

- generally there should be no hindrances to sales/purchases. In addition, actors should offer differentiated supply choices which take into account the needs of the various actors.
- there must not be any start-up or access restrictions.

Today, these conditions are difficult to achieve. This is, to a large degree, due to the sector's history which is characterized by completely different opinions as to how to optimize the use of electricity. Among other things, there was formerly a requirement that local utilities had the exclusive responsibility for meeting the demands in its service area and there was well developed, centralized control. In addition there were a collection of investments for which, today, there is little willingness to pay. All of this has resulted in many problematic contracts which mean, in practice, that there are many local markets, i.e. closed sale and purchase systems where the actors can be committed to contracts from local producers and where prices are relatively high.

Such systems imply that the production and sale of electricity occur for the most part in a closed geographic area. An obvious characteristic of a closed system is that there are mutual ownership interests, i.e. the common ownership of a wholesale and a distribution utility. This contradicts the notion that all buyers and sellers in a market should be independent. In such a situation the interests of the owners will determine the conditions under which power is sold.

Closed systems are also often characterized by the existence of long term contracts which contribute to fixed commitments. Of course, a "closed" system can lead to reasonable electricity tariffs. One reason to keep such systems is that the reasonable prices will be maintained within the geographic area which benefits the local customers. Other closed system were caused by historical or site construction conditions. An example of the latter case is the extremely expensive construction projects where the resulting electricity "must" be sold above market price. When one is protected from competition, one can "avoid" potential debt problems associated with such construction projects.

If these "closed" systems continue to exist, the market will not function in the way that the authorities have intended. There is no guarantee that a closed system will provide customers with reasonable prices. In addition, such systems illustrate a lack of legitimacy in the functioning of the market. It is therefore very important for the authorities to create support for the argument that a national market is the best way to sell energy.

It is important to remember that the Norwegian Energy Act has not established measures to dramatically change utility ownership structure or organization as in, for example, England. The changes in England have been done in cooperation with a comprehensive privatization of the power sector. By contrast, the changes in Norway are only based on rational market principles.

The current organization and ownership structure are not well adjusted to the market situation which the Energy Act establishes. The act does not provide any requirements

here aside from that organizations should establish themselves in a free environment. In practice, this means that today's vertically organized units, their vertical commitments and the potential for "closed" sale/purchase systems will continue exist far into the future.

### **The market place and the need for the establishment of a "new" pool.**

The power market lends itself to the establishment of an organized market place where sales transactions can take place. The authorities see it as important that this form for transaction be further developed since an organized power exchange will set important elements of a market based system into place.

Before such an exchange is seen as attractive by the various actors it must, first and foremost, reduce the transaction costs related to the traditional forms of trading. Currently, actors use large amounts of resources to renegotiate contracts. With the use of an exchange they should easily be able to buy or sell the energy which they need.

The electricity pool and the Ministry of Petroleum and Energy are cooperating on the preparation of a new contract market for the future delivery of electricity, a so-called futures market. The negotiations in this market will occur in a sales center which stands between buyers and the sellers, and contracts will be easily transacted after all of the contract relationships are standardized. This will give actors great possibilities and flexibility in the adjustment of the volume established in the contracts to their needs.

In a market the actors must accept a certain risk in the form of potential price changes. However, in the proposed market based sale/purchases system for electricity there will not involve any form for transmission risk, with the exception of the risk of technical failures. The element which will direct the flow of electricity will simply be the willingness to pay.

The recognition that actors are subject to only price — and not transmission — risks can stimulate two different types of markets:

- The financial market
- The physical market

As a point of departure, all types of contracts are based on the idea that actors will insure both delivery and price. This is because there has traditionally been a large amount of risk aversion in the electricity sector. In the new regime, aside from technical problems, there will be no form of transmission risk. Through analyses that the pool has done it was found that there is extra capacity in the Norwegian electricity network even, in extreme situations. Assuming the rational behavior of the actors the only form of risk that they will be subject to is price risk. Actors must therefore adapt to operating based on financial principles.

In the new system one can always find or transmit the electricity which one wants. The price will, however, vary. This can mean that one buys all electricity on the physical market as spot electricity and insures the price on a **financial market** through the purchase or the sale of futures, options etc. The difference between a financial and a physical market will be that in the physical market the electricity will be delivered while

in the financial market one will insure a particular price.

The **physical market** will be the same as the current electricity pool market constituting the physical delivery of the commodity. The exchange should have a clearing function which uncouples buyers and sellers and thus simplifies transactions. In addition, the market will have a well adjusted transmission billing system. The entry/exit fee system described above insures this.

The "closed" sales and purchases systems can be a hinderance to a market based system so long as those actors stand outside the system. This, along with the threat that other will refuse to participate, can mean that the exchange will not achieve the critical mass which is needed in order for it to function. However, the "closed" system will have actors who will pressure the utility towards participation in the "open" market. The end-users, who are not committed to a "closed" system in the same way that wholesale and distribution utilities are, can benefit from "open-market" participation. The end-users can therefore, in principle, open up the system by going to other suppliers in order to cover their needs. The "closed" systems will, in this way, be opened and must adjust themselves to the demands of the market. In addition, the establishment of the entry/exit fee system will lead to the renegotiation of existing agreements.

If the exchange is attractive to a broad enough sector of actors then it will attain an acceptable level of sales and purchases. Traditionally, the sales of the electricity pool have constituted about 10% of the total Norwegian market. This has largely been spot electricity. One expects that this portion will eventually increase as actors begin to see the benefits of covering their needs by purchasing directly on an exchange.

In the market there will always be different actors with different estimates of risk. They range from the risk avoiders to the risk seekers. One must pay attention to this in the development of the form of sales and purchases. In order that the actors can adjust themselves to the risk they must be introduced to idea of a portfolio, that is actors need to insure themselves against risk with different types of contracts. These can range from bilateral, long-term contracts to spot electricity. There will always be a certain demand for access to longer-term, secure contracts as a basis in one's portfolio.

### **The new actors**

The market-based electricity system has resulted in the establishment of electricity brokers and traders. Those who want to set up such companies need a license . NVE issues these licenses and up till now there are four companies.

There will always be the demand for information and advice as to how one should behave in a free market. A number of smaller and medium actors — which have limited resources and expertise within their organizations — will have the immediate need of such services. Larger organizations will also need information and consultant services as a portion of this strategic planning.

There will also be a need for active participation, for example different types of electricity trading and companies which operate on the market purchasing and selling electricity.

Such actors have a very central role in the development of an effective electricity market, because they take advantage of the free access to the networks, the possibility to compete for customers and the market's reasonable electricity prices to service customers who are "committed" to the "old" price-structure. In the newly deregulated market there will be imperfections which will be exploited by these energy traders. Here "taking advantage of the old situation," weakness in the market-based electrical system and "capturing" of customers is believed to be beneficial in the short term. Norgeskraft A/S, which is a pioneer in the area, has already won over 30 customers with a total sales of 400 GWh. This has also resulted in downward pressure on the market. As an example one can point to the city of Trondheim where the prices for a special group of end-users, commercial organizations which consume at specific levels, have fallen 10 øre/kWh since in the last six months.

Such organizational forms, when seriously undertaken, will be positive in the development of an effective and efficient market.

### Conclusions :

The progress of transforming the electricity market an efficient market based on competition , has been a success so far. Both pace and development have met the expectations set both by government and politicians . The competition between producers on one side and the distribution utilities competition for not losing customers, are real and escalating. The market opportunities in general and the risk for losing customers have led to a more emphasis on reducing cost and more focus on being competitive. The following facts are clearly for NVE and the actors :

- Supply-side has overcapacity - almost no new investment in new hydro-power.
- Strong pressure on government for export of hydro - power.
- Local overcapacity in the T&D-system and local inefficiency.
- Strong pressure on price-decrease to large customers. A lot of these customers have renegotiated their contracts . Very often the results are price reductions in the range of 20-40%.
- More complains on tariffs for the distribution network services then anticipated. These development can indicate that prices still are too high or that network-owners still use the access to the network in a discriminating way.
- Price increase to the residential customers have stopped - the general effects of the new energy act may be the main reason.
- Dividing the customers into two separate groups:  
*Captive and non captive* have been more apparent and so have the advan-

tage and disadvantage when it comes to sharing benefits of the new energy act. There must be a system that ensures that the captive customers will have their "fair" share . So far just a small group of the residential sector have had tariffs that benefit from the favorable excess supply situation in the last couple of years.

- Revise the "old" pool so it can be an effective marked-place for all actors.