

Working Paper No. 9/03

**Management, Technology and Regulation:
The hydro-power sector in Norway**

by

Grete Rusten, Kjell Sunnevåg

INSTITUTE FOR RESEARCH IN ECONOMICS AND BUSINESS ADMINISTRATION
BERGEN, JUNE 2003
ISSN 0803-4028

© Dette eksemplar er fremstilt etter avtale
med KOPINOR, Stenergate 1, 0050 Oslo.
Ytterligere eksemplarfremstilling uten avtale
og i strid med åndsverkloven er straffbart
og kan medføre erstatningsansvar.

Abstract

This article is a theoretical and empirical discussion about regional effects of foreign direct ownership, and the connection with firm strategies, technological innovation, and regulatory change. Empirical evidence is from Norway's hydropower sector, in which foreign ownership has played an important role since its inception. Ownership is a "hot issue" after deregulation in the 1990s. Organisational theory and economic geography literature form the basis for the theoretical section.

The paper is based on a study for the Ministry of Petroleum and Energy on the implications of future regulatory changes on the hydropower sector. The study followed a request from the EFTA Surveillance Authorities to the Norwegian Government for information about the structure and regulation of the energy sector.

Key words:

Hydropower Norway Deregulation Technology change Regional effects

Introduction

The last two decades, we have witnessed an international thrust towards liberalization of formerly heavily regulated markets. The energy markets in general, and electricity markets in particular, represent no exception. In 1991, Norway was the first country in Northern Europe to liberalize its electricity market. Gradually, the other Nordic countries have joined this liberalization process, and are now part of a common Nordic electricity market.

Prior to the liberalization, national policy goals with respect to energy, the environment and the different uses of water, e.g. recreational viz. power production, were achieved through the use of a monopoly market structure combined with public ownership. Public ownership in generation, transmission and distribution was totally dominating and supplemented with the use of state intervention and heavy regulation.

Different approaches can be used to describe the European liberalization process. In relation to the Northern European electricity markets, one may as one important factor choose to emphasize the technological development that allowed long distance transmission and central coordination of a large network in an efficient manner, technologically and contractually. Secondly, the realization that the natural monopoly characteristics of electricity transmission and distribution not necessitated public ownership of electricity generation, resulted in a policy of vertical disintegration between generation and transmission/distribution. Finally, but not least, one may emphasize the increasing pro-competitive pressure represented by the European internal market and European competition policy - in all markets, not only electricity generation.

An important part of the liberalization process has been to define the role to be played by the former publicly owned incumbents in a deregulated market. In the U.K, liberalization went hand in hand with privatization (Vickers and Yarrow, 1988). In Norway, public ownership is still an important feature of the liberalized energy markets. The state and municipally owned companies continue to operate, but are subject to competition from privately controlled companies.

In understanding the Norwegian energy sector, it is, however, important to realize that distinction between company ownership and ownership to the underlying resource – i.e. waterfalls. The weight put on the former has been lessened through the liberalization process, whereas the latter is still considered an important feature. The flaw of the regulatory regime is, however, that private companies are treated differently from public companies with respect to the right to dispose the underlying resource. This is the background for the current pressure on the Norwegian authorities from the EFTA surveillance authority to review the current rules. The challenge of the last phase of the liberalization process is to impose regulations that are neutral with respect to competition between public and private companies.

The literature dealing with the regulatory paradigm shift has mostly been dealing with legislative and economical issues and little on the geographical outcome of these processes. We are here showing how deregulations in combination with technology developments have effected the geographical division of labour and thereby functional roles of different locations. In what way are deregulation, organizational transformations and changes in technology changing the economic geography? The paper will especially explore the hydropower sectors regional role, noting its evolving nature over time and the role of the legislation to influence on these effects.

The empirical evidence refers to Norway's hydropower sector, in which foreign ownership has played an important role since its pioneer days at the beginning of the 1900s. Ownership has again become a "hot issue" since the energy market was deregulated early in the 1990s. The role of government as an owner is being questioned, together with the implications if foreign ownership again finds an interest in hydro-resources as energy producers. Organisational theory and economic geography literature forms the basis for the theoretical section.

The paper is based on a study we did for the Ministry of Petroleum and Energy about the hydropower sector in Norway and possible implications of future regulative changes in hydropower management. The need for documentation came from a request by the EFTA Surveillance Authorities to the Norwegian Government for information about the structure and regulation of the energy sector (SUNNEVÅG **et al.**, 2002).

The paper is divided into three parts. The first provides a theoretical discussion about the relationship between organisational models, ownership and location. A section discussing different aspects about ownership and regional effects follows this. The third section presents the industrial history of the Norwegian hydropower sector, discussing the way this industry has been shaped by changes in ownership, technology and regulation. This includes the way firms use territory at the local level, and the way qualities from different locations are combined.

Organisational models, investment strategies and location

The kind of businesses a community has depends on the composition of resources and the way firms have organised their activities. Organisations differ in matters of history, culture,

size, and geographical division of labour. Some major forms can be identified: (1) *functional organisational models*, (2) *divisionalised organisational models*, and (3) *divisionalised organisations with a holding company* (RUMELT, 1974). A traditional functionally organised firm is usually a single-sector business located at one address. This was the dominant organisational form up to around 1920 (CHANDLER, 1977). Division of labour and standardising of activities (de-skilling, and automation) in parts of the production process, as well as new transport and communication technology, opened new ways of spreading activities geographically.

However, divisionalised enterprises are often characterised by units that are geographically split and in some cases diversified by product. Holding companies refer to head offices responsible for financial issues and long term strategies, while daily operations are controlled from managerial units elsewhere (RUMELT, 1974). Being geographically spread enables the company to combine qualities such as natural resources, labour, infrastructure, regulation, financial support, and market conditions from different places. Some places become attractive because of new technology and product innovations. Geographical division of labour became a way of spreading risk, and at the same time co-ordinating activities from different geographical areas. Sometimes, production and head office were separated. Within the Norwegian energy sector for instance, one of the major companies in Western Norway, BKK, has its hydropower plants located in several smaller communities in Hordaland, while the head office and net division are located in the “regional capital”, Bergen.

The geographical division of labour develops as a result of different processes, such as green field developments, mergers, acquisitions, growth, rationalisation, and close downs. These

processes create changes, which have implications both on the individual firm as well as on the sector as a whole.

The head office is the functional unit responsible for major decisions and essential strategies within a company. Head offices normally have a central location in Norway. Of Norway's 100 largest firms in 2000, 70 have their head office in the Oslo area (SUNNEVÅG **et al.**, 2002). The head office is sometimes located where the company was originally founded, in other cases it has been relocated. A location in a larger urban city will give close access to customers, suppliers, business partners and competitors. Some companies also emphasise the need to be close to decision-makers in major companies and governmental bodies. A location separated from the production units will give a more "neutral position" and the ability to make more independent decisions than if the different units are located together (MASSEY, 1984).

Larger companies, more units, and geographical and industrial diversification that in some cases may cross national borders will often lead to an internal division of labour. Complexity, disintegration and specialisation of functions often hallmark these companies. They also require certain external qualities for their operations. This is a reason why many head offices are established in, remain in or move to the larger metropolitan areas (RUSTEN, 1990).

The address of the head office is sometimes a result of relocation, in reality an adjustment of one or several earlier historical location decisions. Holding companies that are geographically separated from the operating units, and merging parties that either locate their head offices together or move to a new location are examples of location decisions. The choice of location

may also be a result of the power structure between the merging partners. Our discussion of the spatial and organizational context refers to functional levels, roles and ownership

We have referred to cases where the head office is geographically located either together with or separated from other units of the organisation. In addition, there are cases where the company operates with head offices on different geographical levels (YEUNG **et al.**, 2001). This is usually the case for corporate headquarters and divisionalised organisations, or head offices of subsidiaries. There are several reasons for spreading the power structure within the organisation. Sometimes it is not practical to have all management and administration located at the same place because the distance to production units or markets becomes too large. It may be more important that the divisional head office is strategically located near the production unit or nearby competitors. An example among the major players in the energy related sector is Norsk Hydro, a conglomerate with its divisional headquarters for oil and gas in Bergen (Norway's second largest city, and second most important oil company location), and with its corporate head office included the top management controlling the hydro power plants located in Oslo. The daily operations and maintenance team for the power plants are however located at Rjukan one of Norsk Hydros first plants a remote village a 3 hours drive from Oslo.

Brand and image are sometimes a factor in choice of location. An example is the Swedish-owned bank Skandiabanken, which has seen the value of having an address in Norway, although they are a Net-bank. Similar "symbolic" addresses are also found among British companies that have business in the United States. In this way, trust is established based on who you are and where you are located. Similar judgements about image might also be relevant for the energy sector. For example, an energy supplier in Bergen persuades the

inhabitants to buy electricity based on the rain that falls over the city (this city is well known for its rain) even if all plants are located in rural area other places in the county or even further away. A common reason for having several head office units is that they might cover different areas of production or geographical markets (e.g., the section about the subsidiaries' position within the company).

The role of the head office

A head office has different roles that vary according to need, whether the company has chosen to have the operations in-house or buy services from others. In some companies, all levels of activity are internally integrated. Other companies have chosen organisational models where the head office is focused around the strategic core, and all other activities are either decentralised to the divisions or outsourced. The top-level headquarters in these organisations have the responsibility to raise capital and manage budgets and accounts, and have the superior control and decision-making responsibility. Other operational components of policymaking or services needed to run the business are either taken care of by other parts of the organisation or bought from others.

According to a recent international study, which included 600 companies in seven countries (Germany, Netherlands, France, United Kingdom, USA, Japan and Chile), head office strategy shows a growing tendency to trim corporate head offices and give the subsidiaries more responsibility. Consequently, external linkages become more complex and the requirements for infrastructure become higher (YOUNG *et al.*, 2000). The New Economy has by no means eliminated the need for meeting face-to-face; rather, the horizon of contact has been widened. The need for a central location is strengthened further by the fact that the business acquires well-qualified and specialised staff and becomes more oriented towards

international markets. In Norway, only the larger cities, especially the Oslo area, have the needed qualities (RUSTEN **et al.**, 1999).

Ownership changes

In a discussion about how organisations are geographically shaped and the regional effects of mergers and acquisitions, it is relevant to focus on direction (where the head office is located), distance (which units and localities change owners), and amount (the number of units and localities), before and after these processes.

Change in ownership and regional effects is often discussed by using the label *external control* (LOVE, 1989; MASSEY, 1984). However, whether the control can be defined as external is dependent on geographical level (RUSTEN, 1990). For example, a company with its production units located away from the head office (e.g., region or county) and externally controlled from a local or regional level, may be considered domestically owned and labelled locally owned in relation to the home country.

It is often wiser to have a centralised control structure in those cases where the different units are integrated in the same value chain, than in cases where the corporate is a conglomerate with firms in different unrelated businesses. Different layers of ownership can be a solution in cases with subsidiaries in several countries. Multi-regional companies often choose to place the head office in a country's major city (EVANS, 1973; RUSTEN, 1990; YEUNG et al, 2001).

The subsidiaries' internal status

A study of foreign-owned companies in Norway indicates that many of the subsidiaries have a relatively autonomous status within the company (RUSTEN **et al.**, 1999). The investment motives, which in many cases are market-motivated, provide the main explanation. An orientation towards Norwegian customers makes it important to know local requirements and tastes, and buying, or merging with, a local company is often a suitable way to obtain this knowledge. These take-overs seldom lead to situations where the foreign corporate places its own personnel in key positions.

In principle, the way a business develops its sourcing activities after a foreign take-over can take different directions. However, changes in ownership may sometimes lead to changes in suppliers. The local content of goods and services can be weakened in cases where sourcing is carried out at the corporate head office located elsewhere. This may lead to loss of activities, key personnel, and other staff in the local unit. Internal local level resources, including knowledge and human capital, may be drained and moved out. Therefore, take-overs might have a negative regional impact. The opposite is the case when the corporate transfers competence and other resources to the local firm. The outcome of a change in ownership is dependent not only on the actors and strategies, but also on what the locations in question can offer. Positive external effects, such as links to local suppliers, will usually have a better chance to develop in larger urban areas with a differentiated and relatively extensive supply of goods, services, and labour compared with that available in smaller areas.

Regional effects

Regional effects depend on different factors: the companies' strategy and organisation, and the conditions connected to the location. This section will discuss goods and service purchasing and the need for competence especially connected to R&D. Rural areas will be more sensitive to changes in firms sourcing activities than urban areas.

Several studies have concluded that locally owned firms are more likely to purchase goods and services from local suppliers than firms which have the head office located elsewhere (FIRN, 1975; BRITTON, 1976; LOVE 1989). Who is the decision-maker and where the decision-making takes place influence the choice of suppliers. If this is at the head office, it is unlikely that they will have the local company in mind. Changes in the control structure because of a take-over may therefore weaken the local network of suppliers.

Recent studies of foreign ownership in Norway show that these companies have a relatively autonomous status (RUSTEN *et al.*, 1999; JAKOBSEN *et al.*, 2003). We also found in another study that subsidiaries with an autonomous position can play a more important role in processes of innovation and growth within the regional economy than their counterparts (JAKOBSEN and RUSTEN, 2003). The Norwegian market is often the main target. In some cases, the companies have a special technological responsibility within the corporate. In most cases, the linkages to suppliers in the host country are relatively strong.

The exceptions are some of the companies based on hydropower resources located in one-company towns (JAKOBSEN *et al.*, 2002). The need for local suppliers is also less important for these companies where the production is relatively standardised, compared with cases where goods are tailored to meet specific needs.

Cases where take-overs are purely a strategy to place capital without active engagement in production detail usually weaken host country ties. We found that these corporations often gave the subsidiaries a free hand to keep and further develop already existing relations.

A general observation is that companies will search more widely for goods than for services. Sophisticated sourcing has become very important as competition becomes fiercer. Information and communication technology is an important tool in finding suppliers that can deliver to an acceptable price and quality. Searching for service suppliers seems to be different. A study among 416 manufacturing firms in Norway showed that relatively few relied on service supplies outside their own region and preferred a nearby alternative whenever this was possible (RUSTEN, 2000). Some base their decision on a strategy to do business with locals to support the local industry, of which they are a part. Emphasising the factors just mentioned clearly limits the process of searching. Consequently, the use of advanced business services is seldom thoroughly evaluated, so long as the supplies adequately meet expectations. For projects that require engagement of consultants, nearness is an important quality, but not necessarily in a geographical sense: even more important are social relations, earlier experience, references from board members, business colleagues, or customers (RUSTEN et al., 2002).

R&D Competence

The final aspect of regional effects that we address in this paper concerns R&D. According to the literature, the most common organisational solution for R&D is a home-base location (BEHRMAN and FISCHER, 1980; PORTER, 1990; FORS, 1996). However, this varies if such activities also take place in the subsidiaries.

The arguments for having a centralised R&D-solution are connected to economies of scale, scope, or a combination of the two. Centralisation makes it easier to control and protect this competence. Geographical proximity to the headquarters also reduces transaction costs between the company's strategic, financial and innovative core. The question is what the regional implications might be for host country developments in cases of foreign ownership. Obviously, it is likely that a company will involve R&D resources from the host country if their subsidiary in that country is involved in decision-making, or will be part of the project.

There are organisational models in which R&D is decentralised to adjust products or processes to local conditions, or where specialisation is based on local qualities (FORS, 1996). Decentralised R&D may include competence that benefits operations elsewhere in the organisation. Again, the way direct investment take place influences the way the company will operate this part of the business.

Head office location and regional effects in the hydropower sector

Norwegian engineers were pioneers in the development of industrial plants that based resources on hydropower. In 1885, the Laugstol paper mill was based on hydropower, only three years after electricity was delivered to common households. In 1885, 30 small privately owned power stations delivered light to factories and private homes (VOGT, 1971). By the end of the 1800s, hydropower resources brought Norway's industry into a very favourable position. The production of energy became the basis for the pulp and paper industry, chemical industry (such as calcium carbide, fertilisers), and metallurgical industry (such as aluminium, magnesium, and silica). In the period from 1905 to 1929, power-intensive industries together with shipping became the two most important sectors in the economy (HANSEN and SELSTAD, 1999). The investors were mainly foreigners, English, French, German, Canadian,

Swedish, and Danish. Foreigners had seen the value of Norwegian hydropower resources, and this peripheral country of Europe became a major supplier to the Industrial Revolution's major countries (HANSEN and SELSTAD, 1999). Later, technology intensification and increased international competition altered the structure within the metallurgical industry both in Norway and abroad. Economies of scale caused capacity to be concentrated in large production units, and those unable to afford upgrading were forced out of business. The role of foreign ownership in industrial towns and in Norway as a whole is shown in Table 1. Affluent hydropower resources meant and still mean much to the Norwegian economy.

Table 1.

These resources also became an important part of the infrastructure of the country. By 1920, 64% of the population lived in housing with electricity, among the highest percentage in the world. However, most units built for general public supply were smaller than those required for industrial purposes. General supply was a local responsibility (municipalities, counties, and joint projects between communities). Projects for power-intensive industries generally became the responsibility of the industry itself, as an integrated part of factory projects. Private contributions, apart from industry, were limited, and mainly concerned with smaller local power plants in rural areas.

State ownership of water resources commenced in 1907 with ownership of the first waterfall. Some years later, debate about the State's role as an owner and actor in the development of the energy sector began. The largest State-owned projects were carried out in 1913 to secure electricity for larger populations in the Oslo area. Because of the recession, few hydro plants were built between 1920 and 1940 (VOGT, 1971).

Regulation and regional effects

Speculative investors, Norwegians and agents acting on behalf of foreign companies, targeted hydropower resources in the period from 1890 to the Second World War. This was the background for a legislative act in 1882 to stop these speculative investments. The Norwegian parliament also set apart some capital to obtain control of the rights to the waterfalls. When the Act was passed in 1917, it was written in a way that adequately safeguarded the interests of the State and the public. This included provisions on pre-emption rights, licences of limited duration, and the right of reversion to the State when a licence expires. The normal length of a contract is 60 years. The right of reversion means that the State takes over a waterfall and any hydropower installations free of charge when a licence expires. Pre-emption means that the State, county or municipality has a right to enter into the purchase agreement instead of the purchaser, but with the same rights and obligations as set out in the contract. Pre-emption rights and the rights of reversion to the State apply only in the case of private ownership (MINISTRY of PETROLEUM and ENERGY, 2002).

The first version of the Act to regulate the rights to waterfall resources with the rights of reversion was only intended to regulate foreign investments. However, in the revision of the law in 1909 the regulations also included Norwegians.

In the discussion of regional effects that arise from the law, we especially note instructions about public concern. They can be divided into three categories: (a) measures to avoid damage or inconvenience, (b) infrastructure developments or engagements in social issues, and (c) industrial funds. Examples of matters included in contracts that concern damage are construction of salmon leads, and repairs to banks around dams and rivers. The earliest contracts also required the use of Norwegian citizens in the workforce (found in a contract

from 1948). There are also contractual requirements about development of infrastructure such as roads and bridges, medical services, education and church premises for workers during the construction period, and those to be handed to the community after this period. Newer contracts, for instance one in 1994, contain other types of commitments such as nature conservation, and items of archaeological value.

A requirement for contractors' payment of a yearly fee to the regional government or local municipality, referred to as Industrial Funds, is contained in the Industrial Concession Act. This capital is set aside for a fund that benefits the municipality where the power plant is located. According to the Act, the fund shall preferentially be used to support local industrial-development projects. Income from the benefits of this fund has brought several rural municipalities to an economically favourable position.

Technological changes, co-ordination and regional development

A hydropower plant is linked to its site of production, as both dams and the energy plant are immobile. In addition, the machinery has a long lifecycle, normally 60–70 years. The central and regional electricity network has also been finished. Therefore, the infrastructure for this sector is more or less geographically cemented. The operating costs for hydropower production are low, while development of these units requires high, long-term investment. During the early years, Norway obtained capital from abroad. Later, development was based on Norwegian money from the State and existing companies in the sector.

A geographical division of labour marks the energy sector. Changeover from single- to multi-location plants generally weakens local external effects in many localities. The reason is the feasibility of locating operational control units, maintenance, and administration together,

rather than having these units geographically separated. The largest and newest hydropower plants are usually located in remote mountain areas distant from settlements. Therefore, for these installations, it is less likely that manpower, goods and services can be covered locally.

Presently, most of Norway's waterpower resources are regulated for existing hydropower projects and new projects are limited for nature conservation reasons. Therefore, an increase in energy production has to be based either on imports or on other energy sources, such as natural gas (HOPE **et al**, 2002).

The discussion so far has shown that regional effects connected to the hydropower sector depend on several conditions. They are connected to external conditions such as the resource base, legislation and markets, as well as conditions connected to firm structure and strategies. In addition, regional effects depend on technology in relation to production, distribution and communication. The influences on the geographical pattern for this sector can be summed up as follows:

- Stage 1 Clustering of hydropower plants and energy intensive manufacturing production (early development in the beginning of the 1900s).

- Stage 2 Proximity to a waterfall is no longer a necessary condition for the energy intensive sector, thanks to new transmission technology (from the 1950s).

- Stage 3 Deregulation of the energy market, including electricity meant for other Nordic countries. This leads to technological upgrading of some plants to be able to

adjust to shifting demand and reliability requirements. At the same time, the market is split between production and distribution operators (the 1990s).

Stage 4 Market concentration through mergers and acquisitions leads to fewer locally owned energy production plants. The State-owned Statkraft becomes a major player in this market (from the late 1990s).

Localisation, structure and ownership

Most of the hydropower plants were developed after the Second World War (VOGT, 1971). According to The Norwegian Water Resources and Energy Directorate (NVE), Norway has 588 production units owned by 164 different companies. Statkraft owns 27 per cent, and the 10 largest companies 67 per cent, of the production capacity. As much as 66 per cent of production is located in rural municipalities, in most cases controlled from head offices located elsewhere (SUNNEVÅG, **et al.**, 2002).

The energy sector employed 16 209 in 1999, and additional employment arises from suppliers. The net and distribution parts count for nearly half of total employment, and are the part of the industry experiencing most cuts in staff. In recent years, employment within the production units has been more stable; indicating that rationalising these operations has been completed (SUNNEVÅG, **et al.**, 2002). Production units are found mostly in rural areas. The Statistics of Norway data from 1995 to 2000 divided into regional categories are shown in Table 2.

Table 2.

According to these figures, decrease in employment between 1995 and 2002 was fairly dramatic with an decrease between 20-22% in all regional categories. However, for several reasons it is expected that the loss of jobs will show a more dramatic trend in coming years. Firstly, mergers will lead to rationalisation of staff. Secondly, there will be more competition within the energy sector because of deregulation forcing companies with a relatively large administration to cut down on staff. The reduction of 17% in employment in the net divisions from 1998 to 1999 illustrates that these processes have already begun (SUNNEVÅG *et al.*, 2002). It is reasonable to believe that private ownership (including foreign investors) will force this sector to tighten their number of staff. We will probably find that the major cuts will occur in urban areas outside the major metropolitan areas. As shown in Table 2, staff in rural areas have already been reduced to the extent that they are unlikely to be affected by future mergers.

The major centres of expertise within this industry experienced a five per cent growth in staff numbers between 1998 and 1999. If this trend continues, larger urban areas will strengthen their relative staff number positions within the energy sector. Further, larger urban areas will host most of the corporate head offices, thereby controlling much of the activities in this sector elsewhere.

R&D

The strength of this industry will continue to be dependent on technological development. Internationally, Norway is at the forefront in R&D of hydropower technology, for construction, production, maintenance, and upgrading of existing power plants. Maintenance and upgrading have been less affected by who the owners of these units are. Norway has

expertise in hydropower logistics and knowledge about these energy markets. This is knowledge that is not easily moved and should be developed further in the country. In addition, Norway has been among the pioneers in developing underwater cable technology. The future situation for electronic surveillance and automation systems is different, as Norway is only one of several other leading countries in this field.

When the sector experienced fewer new projects during the 1990s, R&D activities were reduced and the large companies that used to build dams and tunnels have moved on to other sectors, such as road building. Kværners turbine production has been sold to General Electric. Although production has remained in Norway, the market is now global. ABB and Siemens are still dominant players as producers of el-components in the Norwegian market (HOPE **et al.**, 2002).

Norway's major R&D institution is located at its major technological university in Trondheim and has been co-financed by suppliers and producers from the sector as well as receiving considerable governmental funding. This joint effort was realised as an alternative to individual R&D units in different companies. Foreign ownership has not affected development of R&D projects in Norway. For instance, NEXANS, a subsidiary of Alcatel, together with the R&D institution Sintef, in Trondheim, played a central role in development of a milieu for marine cables. This technology is internationally recognised and is delivered to the energy and offshore industry worldwide. Choices of technology for Third World projects, the major export market, appear to be related to the national location of the financing organisations (SINGH **et al.**, 2001). Therefore, ownership may play a role in development of these technologies.

Conclusion

Traditionally, energy intensive industries were located near waterfall resources. Improvement in the transmission of electricity, with reduced loss, made it possible for these industries to choose other locations. Therefore, these technology developments weakened competence clusters for the energy and process industries. New developments in the energy sector also led to remote control. Mergers and acquisitions bring administrations from different units together. Consequently, many production sites are controlled from head offices located elsewhere. For example, technological command of Norsk Hydros energy plants is based on one unit placed near one of its oldest production sites, but top management is placed at the corporate headquarters in Oslo. Maintenance teams travel to the different sites and do necessary repairs and upgrading when needed. Similar organisational models characterise other major players.

Concentration, triggered by the deregulated market, has increased the number of production units controlled from head offices located in other regions. Remote control and co-ordinated maintenance, production, purchasing and sales are all elements that characterise the changes taking place. Under these circumstances, ownership, whether foreign or domestic, does not make much difference. In any case, the units are owned outside the local community. This industry is experiencing many mergers and acquisitions and this will imply some cut downs on duplicated functions.

Of greater importance is the question of regional implications for head office activities, in those cases where take-overs means that ownership moves abroad. What are the regional implications of being externally owned by Statkraft, the largest company in the Norwegian

market and State-owned, or another Norwegian owner (in many cases with the head office located in another region), or foreign ownership?

Will the effects of external ownership be affected by how dominant these actors are? According to Porter (1990), presence of many foreign firms in a host country, from the viewpoint of that country, is a sign that its economy is weak. Domestically owned companies appear to have the strength to protect their market position against foreign competition. These arguments, in our view, do not fit well in a context where a national alternative does not exist. It is also important to keep in mind that Porter based his arguments on observations of larger economies. However, markets in small countries may be too small to cover production costs. A country of Norway's size will have these kinds of limits. These characterised the early pioneer years of this sector, when the country lacked both capital and competence to be able to utilise fully its hydropower resources.

One must not forget that foreign companies may play a positive role as a contributor to productivity improvements and technological innovations. Again, this will be of value to smaller countries with limited internal capacity. A relevant example is the role international competence has played in the development of the offshore petroleum sector, especially during the first years. During the 1990s, most countries have been open to FDI and many, including Norway, have a policy to stimulate these investments. In relation to the economy of the host country foreign investments have direct and indirect effects.

FDI can be considered a logical consequence of an international orientation of the economy. International orientation includes cases where Norwegian companies locate abroad. FDI can be a problem if the result is to dominate a country's economy. In the long term, this may have

a bad impact on the ability to form a robust and independent industrial policy. The introduction of a revised Industrial Concession Act that is more neutral to type of ownership will make Norwegian waterfall rights more attractive as an investment object for investors outside the country. An interesting question, under such circumstances, is what the organisational implications of take-overs will be for those subsidiaries involved. This will probably depend on the strategy behind the investment. If the main purpose is to invest in a company that will remain, and mainly serve the Norwegian market, it is probably less likely that the take-over will have any dramatic effect on the units in Norway. On the other hand, if the purpose is to combine hydro energy with other forms of energy sources, it would be better to control the different production units from an integrated base. If these technical solutions mean that management and product development have to move, this will depend on the existing competence base of the investing company. If the investor has no previous knowledge of hydropower technology, but wishes to invest in this sector, it seems logical to choose a centre of excellence model by giving the subsidiary much of the responsibility for this field of business. This organisational form could also mean that the Norwegian unit has the authority and responsibility for decisions on behalf of the corporate, eventually also on behalf of similar units in other countries (e.g., becoming entitled as a Nordic head office). This role could be delegated to the Norwegian unit because of its existing expertise, which is not easily built from the ground up or moved elsewhere. The links to SINTEF Energy Research in Trondheim will probably be an important element in such a decision.

If there is a situation where the foreign company already has competence in this field of technology, it may be feasible to gather the expertise in one location. However, the way this will influence the position of the Norwegian head office will depend on whether this unit, or the one abroad, is favoured. If the foreign resource centre is favoured, this will lead to

downscaling of the Norwegian head office, at the same time probably weakening the ties with suppliers and R&D institutions in the country. However, the production units are glued to the resource base no matter who owns the premises. The head office and technical expertise are located in urban areas. Therefore, possible changes to the Industrial Concession Act will only have limited effects on rural areas, although there may be a more open question about how this will influence the centrally located units. Our suggestion is that neither of these locations will experience dramatic changes, again because the competence is considered unique and valuable and is hard to move.

A further element that should be considered is distance to the parent company. It becomes more important to keep existing units in those cases where the parties are far apart, compared with cases where the parent company is situated in a setting similar to that which characterises the subsidiary (RUSTEN **et al.**, 2000; YEUNG **et al.**, 2001).

The discussion of foreign ownership across sectors (RUSTEN **et al.**, 1999) and of the energy sector in detail both lead to the conclusion that the implications of foreign compared with Norwegian ownership are not great. The crucial factor is whether the take-over implies a duplication of competence rather than representing a new field of technology for the company.

Finally, we should mention the symbolic value of ownership. In the debate about the future for Norway's waterfall resources, from time to time we hear the expression "selling the family silver". At the same time, head offices have become strong symbols for regions and have often been used as a measure of a city's economic role. This was an important subject in some of the classical head office location studies (HOOVER and VERNON, 1959,

AHNSTRÖM, 1973). The strategies of the firm and new organisational forms will challenge the location of the head office and other units. These organisational forms will mean that some places will strengthen their positions, while others will weaken. The map will therefore have to be drawn again.

References

- AHNSTRÖM, L. (1973) *Styrande Och Ledande Verksamhet i Västeuropa*, Handelshøyskolen EFI, Stockholm.
- BASSETT, K. (1984) Corporate structure and corporate change in a local economy: The case of Bristol, *Environment and Planning A* 16(8), 879-900.
- BEHRMAN, J. N. and FISCHER, W. A. (1980) *Overseas R&D Activities of Transnational Companies*. Oelgeschlager, Gunn & Hain Publishers, Cambridge, MA.
- BEHRMAN, J. N. and GROSSE, R. E. (1990) *International Business and Governments. Issues and Institutions. I: Critical Issues Facing The Multinational Enterprise*, University of South Carolina, Columbia, SC.
- BENITO, G. R. G. (1999) Industrial clusters and foreign companies – centers of excellence, in PEDERSEN, U. H. (Ed) *Centres of Excellence in Multinational Firms*, Macmillan, London.
- BRITTON, J. N. H. (1976) The influence of corporate organization and ownership on the linkages of industrial plants: A Canadian enquiry, *Economic Geography* 52(4), 311-24.
- CHANDLER, A. D. (1977) *The Visible Hand. The Managerial Revolution in American Business*. Harvard, Belknap.
- EVANS, A. W. (1973) The locations of headquarters of industrial companies, *Urban Studies* 10, 387-95.
- FIRN, J. R. (1975) External control and regional development: The case of Scotland, *Environment and Planning A* 7(4), 393-414.

- FORS, G. (1996) R&D and technology transfer by multinational enterprises: The Industrial Institute for Economics and Social Research, Stockholm
- GREEN, M. B. and MACNAUGHTON, R. B. (1997) *The Location of Foreign Direct Investment*, Aldershot, Avebury.
- HANSEN, J. C., and SELSTAD, T. (1999) *Regional omstilling: Stukturbestemt eller styrbar?* Universitetsforlaget, Oslo.
- HEDLUND, G. (1993) Assumptions of hierarchy and heterarchy, with applications to the management of the multinational corporation, in GHOSAL, S. and WESTNEY, D.E. (Eds) *Organization Theory and the Multinational Corporation*, pp. 211-36, St. Martin's Press, New York.
- HILL, S., and MUNDAY, M. (1995) Foreign manufacturing investment in France and the UK: A regional analysis of locational determinants, *Tijdschrift voor Economische en Sociale Geografie* **86(4)**, 311-27.
- HOOVER, E.M. and VERNON, R. (1959) *Anatomy of a Metropolis: The Changing Distribution of People and Jobs within the New York Metropolitan Region*, Harvard University Press, Cambridge, Mass.
- HOPE, E., OSLAND, O., SANNARNES, J.G., SINGH, B. and SKJERET, F. (2002) *Rammebetingelser for norsk kraftnæring*. Institute for Research in Economics and Business Administration, report, 03/02, Bergen.
- JAKOBSEN, S-E. and RUSTEN, G. (2003) The autonomy of foreign subsidiaries: an analysis of headquarter-subsidiary relations. *Norsk Geografisk Tidsskrift – Norwegian Journal of Geography* **57(1)**, 20-30.
- LOVE, J. H. (1989) External takeover and regional economic development. A survey and critique, *Regional Studies* **23(5)**, 417-29.

- MASSEY, D. (1984) *Spatial Divisions of Labour: Social Structures and the Geography of Productions*, Macmillan, London.
- PORTER, M. E. (1990) *The Competitive Advantage of Nations*, Macmillan, London.
- RUMELT, R. (1974) *Strategy, Structure and Economic Performance*, Harvard University Press, Boston.
- RUSTEN, G. (1990) Hvorfor Omlokalisere Hovedkontorer? En Studie av Hovedkontorflyttinger i Norge 1967–1987. *Geografi i Bergen* 148. Institutt for geografi. Norges Handelshøyskole og Universitetet i Bergen, Bergen.
- RUSTEN, G. (2000) Geography of outsourcing: Business service provision among firms in Norway, *Tijdschrift voor Economische en Sociale Geografie* **9(12)**, 122-34.
- RUSTEN, G., JAKOBSEN, S.-E. and KVINDE, T. (2000) Foreign direct investment and regional effects: The case of Norway, *Samfunns og Næringslivsforskning* WP 60/00.
- RUSTEN, G., KVINDE, T. and JAKOBSEN, S.-E. (1999) Internasjonalt eierskap i norsk næringsliv - Omfang og effekter nasjonalt og regionalt, SNF Rapport 24/99.
- RUSTEN, G., GAMMELSÆTER, H. and BRYSON, J.R. (2002) The difference that geography makes to the acquisition of service expertise: some evidence from Norway, Working Paper No. 61/02, Institute for Research in Economics and Business Administration, Bergen.

- SINGH, B., NORDÅS, H. K. and KNUDSEN, A. (2001) NDF and the energy sector: A sector study with project evaluations, CMI Commissioned Report, (internal doc. Nordic Development Fund).
- SUNNEVÅG, K., RUSTEN, G. and SØRGARD, L. (2002) Harmonisering av hjemfallsvilkår og konsesjonslengde: Skattemessige og næringspolitiske aspekter, Samfunns- og Næringslivsforskning Rapport 20/02.
- VICKERS, J. and YARROW, G. (1988) *Privatization*. Cambridge, The MIT Press Massachusetts, Cambridge.
- VOGT, J. (1971) *Elektrisitetslandet Norge. Fra Norsk vassdrags- og elektrisitetsvesens historie*. Universitetsforlaget, Oslo.
- YEUNG, H.W., POON, J. and PERRY, M. (2001) Towards a regional strategy: The role of regional headquarters of foreign firms in Singapore, *Urban Studies* **38,1** 157-83.
- YOUNG, D., GOOLD, M. G., BLANC, R., BÜHNER, R. COLLIS, D., EPPINK, J., KAGANO, T. and SEMINARIO, G. J. (2000) *Corporate Headquarters: An International Analysis of Their Roles and Staffing*, Ashridge Strategic Management Centre, London.

Table 1. The number of employees within domestic owned and major foreign owned firms in Norway, 1996

| Industry | <i>Municipalities with industrial towns</i> | | | <i>Total number for Norway</i> | | |
|---|---|------------------------|-----------------------------------|--------------------------------|------------------------|-----------------------------------|
| | Domestic owned 2) | Majority foreign owned | Percentage majority foreign owned | Domestic owned | Majority foreign owned | Percentage majority foreign owned |
| Extraction of petroleum and mining (NACE 10-14) | 967 | 501 | 34.1 | 14061 | 3919 | 21.8 |
| Manufacturing (15-37) | 46459 | 4860 | 9.5 | 217480 | 38427 | 15.0 |
| Construction (45) | 8012 | 278 | 3.4 | 74910 | 7909 | 9.5 |
| Whole- and retail sale (50-52) | 18609 | 629 | 3.3 | 210604 | 33461 | 13.7 |
| Hotels and restaurants (55) | 5075 | 91 | 1.8 | 51148 | 4363 | 7.9 |
| Transport (60-63) | 5349 | 56 | 1.0 | 48629 | 3977 | 7.6 |
| Real estate and business Services (70-74) | 6178 | 656 | 9.6 | 92567 | 27929 | 23.2 |
| Sum | 90649 | 7071 | 7.2 | 801455 | 27929 | 14.5 |

Notes: 1) Comparable data on the sectors: agriculture and fishing (1-5) financial services (65) and public administration (75) are not available

2) The category “domestic owned firms” include employment in foreign minority share owned companies

Table 2. Energy sector employment (Source SSB, Arbeidsmarkedsstatistikk)

| | 1995 | 1999 | 2000 |
|-------------|-------|-------|-------|
| Rural | 6993 | 6222 | 5469 |
| Urban | 4871 | 4147 | 3895 |
| Large urban | 8545 | 7575 | 6742 |
| Sum | 20409 | 17944 | 16106 |