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The Negotiated Political Economy of a Heavy Industrial Sector: The Norwegian Hydropower Complex in the 1970s and 1980s

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What effect does a sector-based negotiated economy have on industrial transformation, and what are the institutional mechanisms involved in negotiated sector-regulation? These questions are tentatively answered through an analysis of the political economy of one of Norway's most important industrial sectors: the hydropower and energy-intensive industry. The study focuses on factors that have allowed the sector to continue to expand throughout the 1970s and 1980s in spite of failing economic return and extensive political opposition. The over-expansion is explained through the partial closure and self-referenciality found in the sector's regulatory system, which provides it with relative autonomy in relation to its economic and political environment. It is suggested that the pattern found in the hydropower and energy-intensive sector may be typical of heavy industrial sectors in modern economies.

A key question addressed in this article is why a heavy industrial sector in a country that formally is committed to regulated but market-based economy can maintain stable activity, or even continued expansion through decades despite failing profitability in social economic terms, and despite failing political legitimacy.

This problematique is addressed and illustrated through a case of Norwegian energy-intensive industry. After rapid growth in the 1950s and 1960s, this heavy industrial complex was able to continue expansion in the 1970s and early 1980s in spite of saturation of export markets, and in spite of a unisonous critique from leading national economists. The continuation of this expansive programme was only made possible by extensive buffering against market forces and systematic over-investment in electricity production based on public funding.

Neither neoclassical economics nor Keynesian macroeconomic theory can account reasonably well for this type of sectoral economic development. Our argument in this paper is that the above mentioned problematique may most accurately be dealt with within the perspective of negotiated political economy.

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We shall therefore start out with a few general remarks on this perspective as a theoretical introduction to the more specific question of the political economy of adaptation in heavy industry. This question will then be addressed through the presentation of a model of the interplay of political/institutional and economic factors at the sectoral level.

The second part of the article applies the model of sectoral negotiated political economy to the Norwegian hydropower and energy-intensive industrial complex, hereafter called the 'hydropower complex'. This industry produces a large number of electrochemicals and electrometals, some of them with large shares of the world market, and is one of the core industrial complexes of the country. The size and scope of this industry makes for numerous ties to politics and public administration. Its role as a major employer, and a dominant one in several regions not the least, makes for extensive linkages to political and administrative bodies at the municipal, regional and national levels.

Large size and close ties with public authorities at several levels are probably characteristics that fit heavy industry in a broad sense. General aspects of the analysis presented here may therefore also be relevant to other industries within this category.

Negotiated Political Economy: A Perspective on Sector-Adaptation

A. *General Remarks on Negotiated Political Economy*

The study of adaptation of heavy industry at the sector level confronts us with a number of institutions and decision-making structures that are unaccounted for in the mainstream of economic analysis: The interrelationship between public and private actors, and between markets and hierarchies found in decision-making in heavy industry, transcend the basic assumptions of both neoclassical economics and Keynesian macroeconomic theory in a number of ways.

On this basis we have been led to explore more integrated politico-economic approaches, with less strict assumptions about rationality and economic system autonomy. Broadly speaking, our approach falls within the Scandinavian tradition of politico-economic analysis called 'Forhandlingsøkonomi' or directly translated: 'negotiated economy'. Since political and governmental decision-making plays a major part in the analysis, 'negotiated political economy' may probably be a more suggestive English translation.

The negotiated political economy perspective refers to an organization of decision-making where a major part of the allocation of resources is undertaken through institutionalized negotiations between a number of

interlinked decision-centra across the boundaries of economic–political and administrative systems. Negotiated political economy can thus be seen as a theoretical expansion to deal with typical 'post Keynesian' problems of economic governance.

The negotiated political economy shares the Keynesian critique of neo-classical economics of lacking concepts for understanding basic economic imbalances, but rejects the solution of macro-economic rational management as too simplistic. It basically argues that the Keynesian analysis of market deficiency can be transferred to the political and administrative systems as well. This tradition therefore argues that we have to do with imperfect markets regulated by imperfect political and administrative systems, where regulatory structuration by one system over another also has its costs in terms of new imperfections.

We are thus left with institutionalized mixes of politico-economic governance, where outputs are no longer determined by a priori set rules, but result from negotiation processes across ideal-type institutional boundaries. Negotiated political economy thus deals with economic governance resulting from mixtures of elements of ideal-type governance systems such as markets, politics and public administration. Decisions no longer result from logics of 'pure' institutional types, but from negotiated mixes, where no clear a priori theoretical normative standards have crystallized.

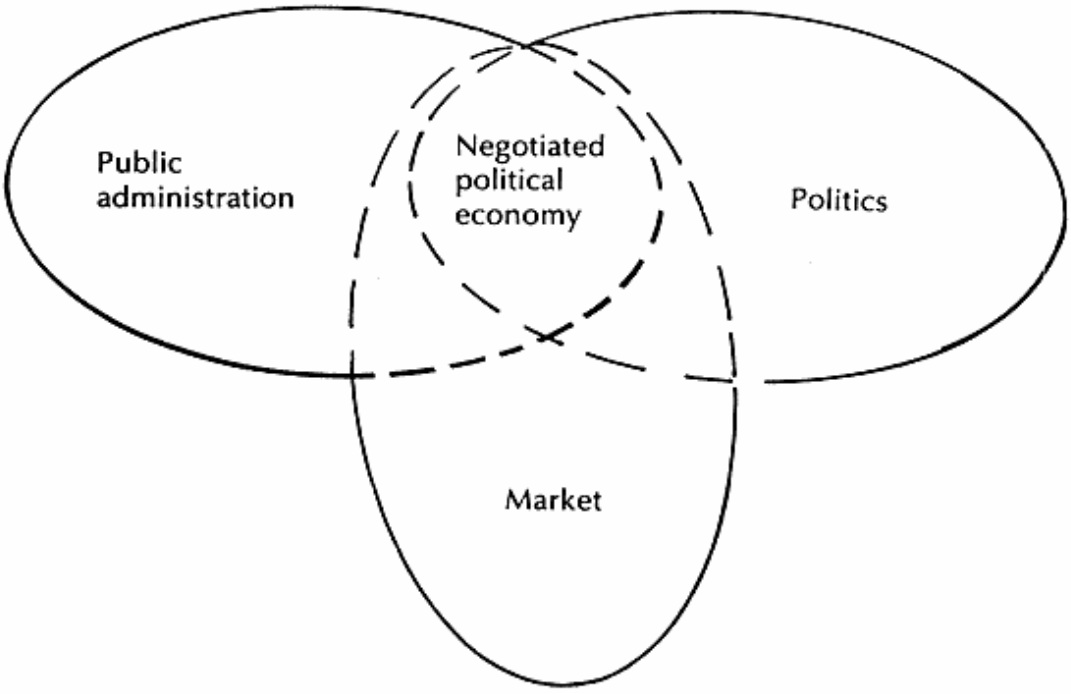


Fig. 1. Negotiated Political Economy.

In a number of ways the critique of economic analysis put forward by the negotiated political economy tradition resembles challenges from the large corporatist literature that focusses on the role of interest intermediation in political governance. This literature sees alliances between peak associations representing labour and capital, and the state as key institutional mechanisms behind the politico-economic steering of a number of European countries (Schmitter 1979; Cawson 1985). Generally, however, the implications of this perspective for economic governance were left unspecified as this literature concentrated mainly on political aspects. A possible exception is Winkler (1976), who developed a theory of correspondence between market centralization and corporatist forms of governance.

The Scandinavian tradition of negotiated political economy and its theory of internal and external pervasion of steerage systems (Hernes 1978; Olsen 1978) bring out a more comprehensive typology of the interrelatedness of markets, politics and public administration. Problems of rationality and sub-optimal behaviour of political and administrative systems are shown to exist both at the input and output side: On the input side market power can often be shown to spill over into political and/or administrative power as well. Thus, rather than being a corrective mechanism for market deficiency, the political and administrative systems may reinforce biases by allowing powerful groups to appropriate the state apparatus in order to have it pursue regulatory policies that favour their interests.

On the output or implementation side, a realistic assessment of such issues as organizational inertia, the autonomy of bureaucracy and the penetration of political interests, again makes it hard to accept ideal type models of economic politics.

B. *Negotiated Political Economy at the Sector Level*

The existence of a negotiated political economy on the sector level implies that there are sector-specific institutional mechanisms that shape the distributive and allocative outcomes of the sector economy. As a consequence the exchange between the sector and other economic arenas will be institutionally mediated. No general equilibrium of the neoclassical type across sector markets can be expected. Nor can we expect politically governed societal reallocation to take place according to national political or macroeconomic preferences, as sector institutions only allow the state limited de facto influence on sectoral decision-making.

The phenomenon of sector-specific organization and autonomous policy-development has been widely discussed under several labels: In the US literature under the label of 'iron-triangles' and 'sub-governments' (Lowi 1964; Adams 1982; Gais et al. 1984). In Britain similar phenomena have been described under the heading of 'policy communities' (Richardson and

Jordan 1979). Relating to the above-mentioned corporatist perspective, Cawson (1985) has referred to sectoral autonomy with the term 'meso-corporatism'. Scott and Meyer (1983) have tried to capture similar aspects of governance under the label of 'societal sectors'. In the Scandinavian literature the concept of 'the segmented state' has been designed to highlight sectoral autonomy (Egeberg et al. 1975; Olsen et al. 1978). Space does not allow any further discussion of the nuances of these perspectives. For this, the reader is referred to Midttun (1987). Here, we shall draw freely on elements from several of these perspectives, relating them to our model of the political economy of heavy industry.

Both through the organization of the sector itself, and through the channelling of general political and administrative interests, heavy industrial sectors are liable to provide a strong sector-oriented institutional basis. In this way, heavy industrial sectors will typically have a negotiated relationship to their economic and political environment, where 'terms of trade' rely on the 'bargaining position' of sectoral institutions.

The strong bargaining position of heavy-industrial sectors relies on a number of factors such as: size, industrial focus, vested interests, employment, localization, and the sector's role in national political compromises.

1. *Size.* Large-scale heavy industry is often of such a size it has direct national significance through the national macroeconomic preferences that are linked to the sector, e.g. national financial or employment considerations. At the local level, employment may be completely dependent upon large local cornerstone enterprises that stand out as worthy of support on welfare-political grounds because of their decisive influence on the local economy.

2. *Focus.* Sectors are in many cases supported, not because this secures optimization of general societal goals, but because the existence of a heavy industrial sector stands out as a realistic *carrier* of such preferences. The basis for general political mobilization for selective public sector support may therefore rely on the role of the sector as a *focus* for articulation of political preferences, even if these preferences could be better met through other activities. In other words, through the existing productive activity and distribution of resources, the sector may stand out as a more concrete and credible realization of political preferences than hypothetical future projects, even though these may theoretically be shown to give higher return in terms of economic payoff and welfare.

3. *Vested Interests.* National and local actors that harvest special privileges from existing industrial activity will furthermore see themselves served by the fulfilment of general societal goals through *existing* activity. Other

activities that may supposedly give larger economic and welfare advantages, probably give less attractive distributive outcomes for existing interests, and therefore remain unsupported by these. Potential beneficiaries from hypothetical alternatives are of course seldom organized, and thus cannot voice their claims.

4. *Local Employment.* As already noted large industrial firms may stand out as carriers of local employment. The local community therefore has vested interests attached to the continued existence of an industrial sector, as far as it represents the only current employment alternative. In a territorially-based parliamentary system with over-representation of district interests, strong local preferences may easily win over general and weaker held national interests. The aggregation of preferences in this kind of system may in other words easily achieve a least common denominator character rather than aiming at a common global optimum. Local and regional interests in alliance with existing industry may thus achieve priority because of their bargaining power due to concentrated one-issue political effort, in spite of suboptimal outcome from an economic efficiency and national distributional equality point of view.

5. *National Compromise.* Selective national support for heavy industrial sectors may also relate to political compromises at the national level. Maintenance of stable activity in a core industrial sector may be a prerequisite for national politico-economic consensus, in spite of the fact that this may imply a net economic and welfare loss when compared to alternative industrial investments.

In sum, these factors allow mobilization of resources and legitimacy around existing sector activity, even when this conflicts with market economy and general administrative and political norms. The existence of a strong sector-oriented institutional basis thus implies that a generalized exchange relationship (Levi Strauss 1969, Marin 1985) is established around vested interests and the economic and political transactions, where public investment and other types of support are exchanged against stable industrial development. The effect is a stabilization of traditional distribution and interaction patterns which gives the sector a relative autonomy vis-à-vis its economic and political environment.

C. *The Dynamics of Sectoral Negotiated Political Economy*

If we assume that a sector over time will have external economic and political incentives for growth and contraction – for instance as a consequence of a product cycle for core sectoral products, innovation, substitution, new preferences, change in international competitiveness, etc., it will face periodic demands for change. The existence, on the other side, of

a sector-oriented institutional basis implies delayed change. We are thus faced with a tension between market demands and a sectoral institutional set-up that has structural similarity to Marx's famous discussion of the relationship between the forces of production and the conditions of production at a macro level which he has formulated as follows in the 'Critique of the Political Economy':

> Auf einer gewissen Stufe ihrer Entwicklung geraten die materiellen Produktivkräfte der Gesellschaft in Widerspruch mit den vorhandenen Produktionsverhältnissen, oder was nur ein juristischer Ausdruck dafür ist, mit den Eigentumsverhältnissen, innerhalb deren sie sich bisher bewegt hatten. Aus Entwicklungsformen der Produktivkräfte schlagen diese Verhältnisse in Fesseln derselben um. Es tritt dann eine Epoche sozialer Revolution ein. Mit der Veränderung der ökonomischen Grundlage wälzt sich der ganze ungeheure überbau langsamer oder rascher um (Marx 1919).

Here Marx describes a sequence where the relationship between the economy and institutional structures goes through several phases. From being 'forms of development' in one phase, the superstructure changes to become 'chains' for the forces of production in another phase, until the chains are finally broken, and the superstructure 'falls over'.

Transferred to the sector level, the Marxian model of economic institutional dynamics predicts that we are likely to get an institutional lag in the adaptation of sector industry to new economic and political preferences, due to selective institutional support and the institutional 'lag' that is built up around sector arenas. The lag, and its consequences for sectoral adaptation, will vary with sector resources and degree of integration and autonomy of its institutional basis.

In the face of new needs for change the consequences for core sector actors will be decisive for whether the sectoral institutional basis will be mobilized for or against change. If new economic and political demands outside the sector run contrary to established distributive decision-making and cognitive patterns, vested sector-interests are likely to mobilize the resources of sector-institutions against these demands, leading to an entrenchment against their implementation. Industrial change, or adaptation to new economic or political conditions, will therefore in many cases depend on parallel reorganization or institutional change.

The outcome of an ideal-typical sectoral adaptation can be schematically described as in Figure 2. The thin dotted line and the fully drawn line represent the growth rates of sectoral activity over time, through an increasing, then stabilizing, and declining expansion phase, finally leading to contraction of the sector industry.

At the basis of the model is the idea of a product cycle for core sector products, assuming processes of innovation, substitution, the development of new preferences, etc. The thin hatched line shows a hypothetical development under an ideal-type liberalist governance and market structure

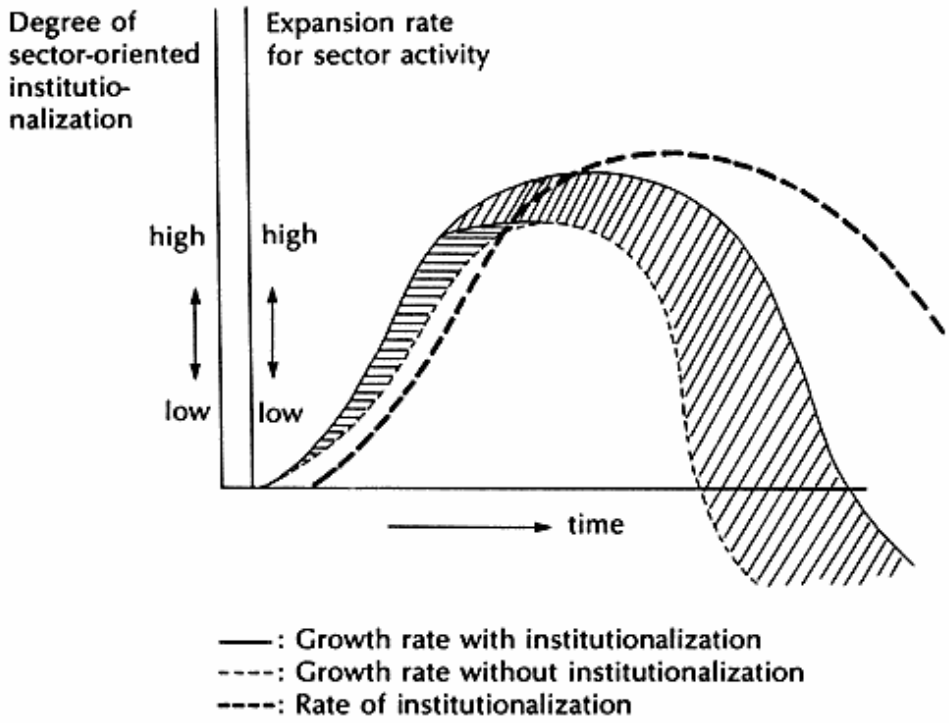


Fig. 2. Outcome of an Ideal Typical Development of Sector Economy and Sectoral Institutionalization.

where the sector adapts directly to sector-external preferences throughout its life-cycle. The continuous line represents the development under a negotiated political economy, assuming the emergence of a sector-oriented institutional basis. The thick hatched line represents the development of sector-oriented institutionalization, here considered as the sum of different institutional elements.

The figure should be read as a heuristic presentation of the main features of a model of sectoral adaptation with institutional lag under an ideal-typical development for a heavy industrial sector. Depending on specific economic and political conditions, the elements in Figure 2 would have to be modified to fit empirical reality.

The main idea behind the model is that sector-oriented institutionalization entails that the sector, in an expansive phase, is able to increase its expansion through an efficient institutional basis. The expansion is represented by the hatched area 'a'. Because of the institutional lag built into sector-oriented institution, the sector is likely to continue its expansion beyond sector-external economic demand. During a phase with market signals calling for contraction or stabilization, the existence of a sector-oriented institutional basis therefore implies that necessary change is delayed because of norms, decision-patterns and interests linked to a

traditional sector development. The hatched area 'b' represents this 'over-expansion' compared to an ideal-type liberalist or optimal sectoral development from a national economic point of view.

This article claims that much of the expansion of Norwegian hydropower construction and energy-intensive industry in the 1970s and 1980s represents an over-expansion of this type. A number of studies of metal industry in Europe and the USA show similar results (Altschull 1980; Harvard Law Review 1982; Eussner 1983; McManus 1983, 1984, 1985; Tsoukalis & Strauss 1985).

In the long run, however, one must assume that a constant negative exchange relationship between the sector and its environment eventually lead to an erosion of its institutional basis. In this situation established sectoral interests are likely to run into conflict with other interests and institutional systems that compete for the same resources. This competition is, moreover, likely to weaken the internal structure of sector institutions. In this way the sectoral institutional basis will slowly 'fall over' and we will get a de-institutionalization to the effect that sector expansion culminates, and the sector economy again adjusts to external economic and political demands.

In a situation with eroding competitiveness, the growth of new sectors and sector-specific institutionalization may exert a destabilizing pressure on old sector institutions. The pressure exerted from new sectors depends on the extent to which it is, and defines itself as competing with the old, in terms of resources, focus, values and cognitive framework.

The integration of a sectoral institutional complex is also constantly challenged by membership held by sector actors in other types of institutional systems. A sector-oriented institutional complex is not a system of actors with exclusive sector membership, but consists of actors with complementary institutional adherence to other institutional systems, like the national or regional political arenas and general rules and norms of public administration, of economic markets and court systems. A well functioning sectoral complex presupposes that actors with complementary institutional memberships have primary loyalty to sector values, and follow procedures that secure 'sector-friendly' outcomes. Following a weakening of the sector's economic and political exchange with its environment, change in sector-oriented institutionalization may therefore take place by the activation of cross-sectoral institutional networks with competing goals and orientations, where sector actors participate. When the extent of cross-sectoral orientation and of decision-making increases, sectoral institutional systems will corrode over time.

1. *Changing Causal Relationships Over Time.* The model of sector-oriented institutionalization and institutional lag contains a causal structure with two

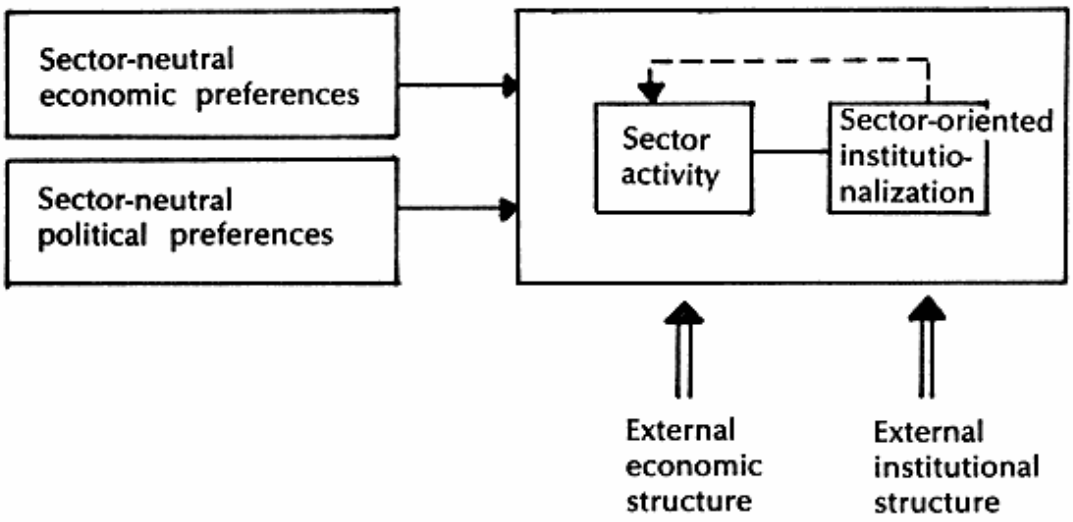


Fig. 3. Causal Structure of the Model of Sector-Adaptation and Institutional Lag.

main elements: sector-neutral economic and political preferences; and a sector-specific institutional element. Sector-external economic and institutional structure outside the sector is included as exogenous variables (see Figure 3). This article concentrates primarily on internal sectoral political and economic processes, and therefore takes factors outside the sector as exogenous givens. The model implies changing causal relations between sector-neutral economic and/or political preferences on the one hand and sector institutions on the other, throughout the development of a sector:

- In the early phase of sector expansion, we will assume that sector-neutral economic or political preferences are the main driving force. As sector-oriented institutionalization generally is a product of an existing economic activity, specific sector orientation only emerges as a consequence of externally motivated expansion.
- In the late growth phase our model predicts that external demand and sector-oriented institutions mutually reinforce each other. In this phase, sector institutionalization has already developed and supports externally driven expansion.
- Finally, in a phase with diminishing economic demand and political legitimacy, sector-oriented institutions are the driving force in any expansion that may occur, or in any delay that the sector shows in adapting to changed economic conditions. Sector institutions are thus capable of prolonging sector expansion beyond external economic and political demand, and in this way create a lag in sector adaptation.
- As the economic basis crumbles, and this persists over a long period, we have assumed that the institutional 'superstructure' of the sector will be weakened, to the effect that sector-neutral economic and/or political

preferences again become central driving forces in the adaptation of sector activity.

To sum up: our model predicts that sector-external economic and political preferences are dominant in the early phases of growth and late phases of decline, while sector-specific institutional elements dominate in the period in between.

We shall expand on this dynamic model through the following analysis of the political economy of the Norwegian hydropower complex in the 1970s and early 1980s, giving a more detailed description of processes and structures in negotiated political economy at the sector level. In this period the Norwegian hydropower complex was faced with extensive economic and political demands for change. In line with the model of sector-based institutionalization it met those demands with considerable ability to pursue internally generated programmes and to buffer itself against external factors. We are thus concentrating on a late phase of sector development, where the transition from expansion to stabilization in the dynamic development of a sector is problematized.

The Norwegian Hydropower Complex

It was the harnessing of its vast hydro-electric resources that allowed Norway to take a leap into industrialization in the early decades of this century. Hydropower development in this period was usually part of extensive vertically integrated production, including simultaneous command over capital, patents, and energy resources (Hodne 1975). The end products, including a broad spectrum of electrochemicals and electrometals, with production far exceeding the national market, involved extensive foreign investment and technology.

The first wave of hydro-based industrialization was stopped by restrictive national legislation in the aftermath of the dissolution of the Swedish–Norwegian Union in 1905, and the economic stagnation of the 1930s. The next expansion of the hydropower complex came after the Second World War, when hydropower and attached energy-intensive industry were given the role of a dynamic growth centre of the Norwegian economy. Together with the Merchant Marine, this industry also became the main source of badly needed foreign currency.

As opposed to the expansion around the turn of the century, the new post-war hydropower boom was based on extensive public engagement. Restrictive nationalistic regulation along with the lack of private investment capital, the takeover of German industrial holdings in Norway, and the political dominance by the Labour party, made for a new publicly dominated institutional regime.

As a result of the extensive post-war expansion the hydropower sector, by the end of the 1960s had built up a well-integrated institutional complex linking actors from political, administrative and market arenas into a highly operative formal and informal decision-making network. The sector also had close ties to national corporatist networks and to regional politics. In the late 1970s only the industrial part of this complex[1] accounted for 40 percent of Norwegian exports (excluding shipping and oil); it stood for 10 percent of industrial employment, and 12 percent of the gross industrial product (NOU 1979:49).

The existence of sector-oriented decision-making systems can be identified through a number of factors (Ekeberg et al. 1975; Olsen 1978):

- that there exist clearly delimited decision-making arenas;
- that these arenas include participants across ideal-type liberalist arenas, which means that political, market, and administrative systems do not act autonomously, but are coordinated through cross-cutting sectoral membership;
- that participants in the sector-arena(s) share certain basic notions and priorities, which, however, does not mean that they necessarily agree;
- that sector-specific interaction, decision-making, and problem-solving rules and routines are shared among core sector-actors;
- that as a result of the above-listed criteria, the degree of cooperation, agreement and coordination across sectors is limited when contrasted with the degree of coordination within the sector.

Identifying decision-making networks or arenas is often a convenient starting point for delineation of sector-complexes in cases where decisions are public. In such cases decisions are generally open to public insight, and the actors are relatively easily identifiable.

Sector decision-making in the Norwegian Hydropower Complex was organized through five decision-making arenas, two mainly political, and three markets with varying degrees of politicization. The two political arenas were (1) decisions about concessions for hydropower development, based on the concession laws from 1917 and (2) decisions about the long term energy policy, presented in Government White papers about twice in a decade.

The three markets were: (1) The market for electricity for general supply, (2) the market for electricity for energy-intensive industry, and (3) the market for occasional power. These markets varied from heavy politicization, in the case of the market for hydropower to energy-intensive industry, to the more competitive market for occasional power, with the market for general supply somewhere in between.

The close coupling between these arenas, and between actors with roles in the interface between politics and economy, allowed considerable

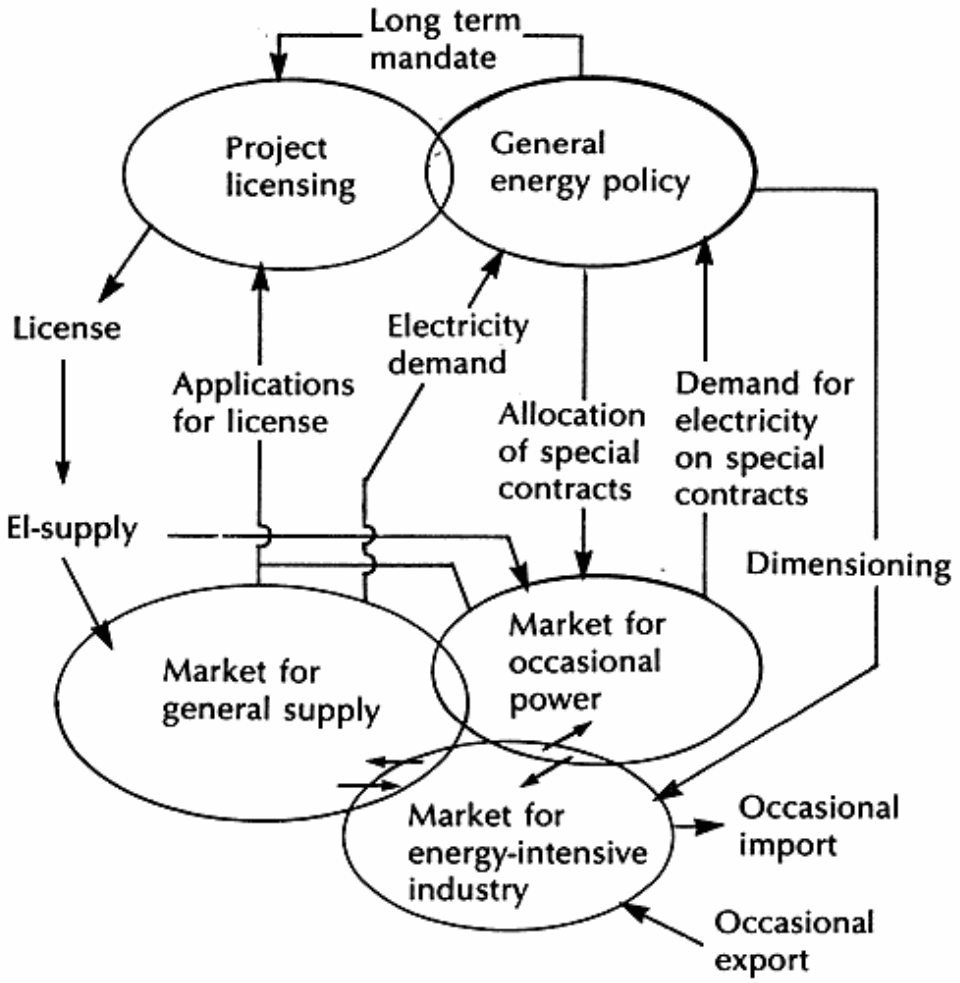


Fig. 4. The Five Decision-making Arenas in the Hydropower Complex.

politicization of the economy, as well as extensive influence from market actors on administrative and political decisions. As indicated in Figure 4, market supply and demand were negotiated through political processes and administrative licensing, and special contracts were provided to energy-intensive industry. The dimensioning of the market for occasional power, which was supposed to function as a buffer against yearly variations in rainfall, was also undertaken on a political basis.[1]

The core actors in this system were: the Norwegian Hydropower and Electricity Board, a state agency with broad mandates to pursue, regulate and coordinate hydropower production and distribution; a number of regional and local public energy companies; the Ministry of Industry, through its offices for hydropower and state industry; major private, state and semi-stage energy-intensive companies, counting many of the largest companies in the country; and the Committee for Industrial Affairs in the

national assembly. Together these actors combined financial and operational control, administrative competence and political legitimation sufficient to design, legitimate and implement extensive sector programmes.

This core network was supported by a strong industrial interest organization with major influence on energy policy within the Norwegian Association of Industries, and likewise by influential trade unions within the National Federation of Trade Unions. The decentralized localization of both industry and hydropower plants also secured the sector broad regional political support. In addition came ties with major technical-industrial research institutions like the Norwegian Technical University, the Institute for Atomic Energy, and the Norwegian Council for Technical and Natural Science Research.

The core members of the sector-complex shared a common expansive and technocratic orientation. Sector decision-making was, until the late 1970s, dominated by engineers, with little regard paid to the relationships between costs, prices and consumption. Electricity-supply was seen as a question of provision of sufficient quantity to meet a demand based on de facto falling prices (due to lack of sufficient adjustment for inflation), regardless of an extensive gap between consumer prices and long-term marginal costs of hydropower.

The expansive orientation was embedded in sector-policy right from the beginning of its second expansive period after World War II. During the 1950s and early 1960s the hydropower complex was given a political mandate for implementing an extremely expansive programme of hydropower construction and raising of energy-intensive industries. Promising export markets, need for foreign currency, and electrification of the remaining parts of the Norwegian countryside, were national goals of high priority that motivated this programme. A quote from the Committee for Forestry and Watercourses (the later Committee for Industry) from 1955 may serve to convey the spirit:[2]

> The Committee pronounces its satisfaction with the strong increase in hydropower-construction that has taken place since the war, an expansion that lies considerably above the programme that was put up in 1947. The Committee also underlines the importance of keeping up continued hydropower-construction at the highest possible level . . .

After rapid growth in the 1950s and 1960s, major parts of this extensive programme were kept up throughout the 1970s and early 1980s in spite of fulfilment of the national goals that motivated it, in spite of the saturation of export markets for energy-intensive products, and in spite of a unisonous critique from leading national economists.

The economic over-expansion is indicated by a comparison of market prices and production costs for the three hydropower markets. As can be seen from Figure 5, the state hydropower projects[3] have cost far more than

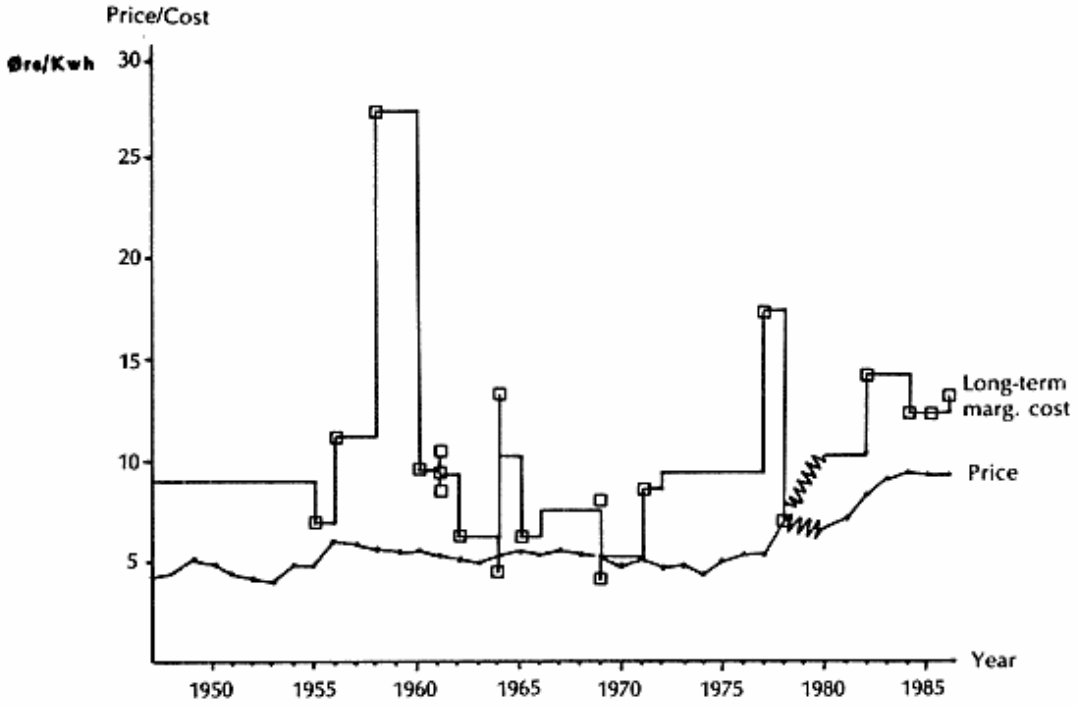


Fig. 5. Cost and Price Development for Hydropower for General Consumption (in fixed 1979 Norw. kr.).

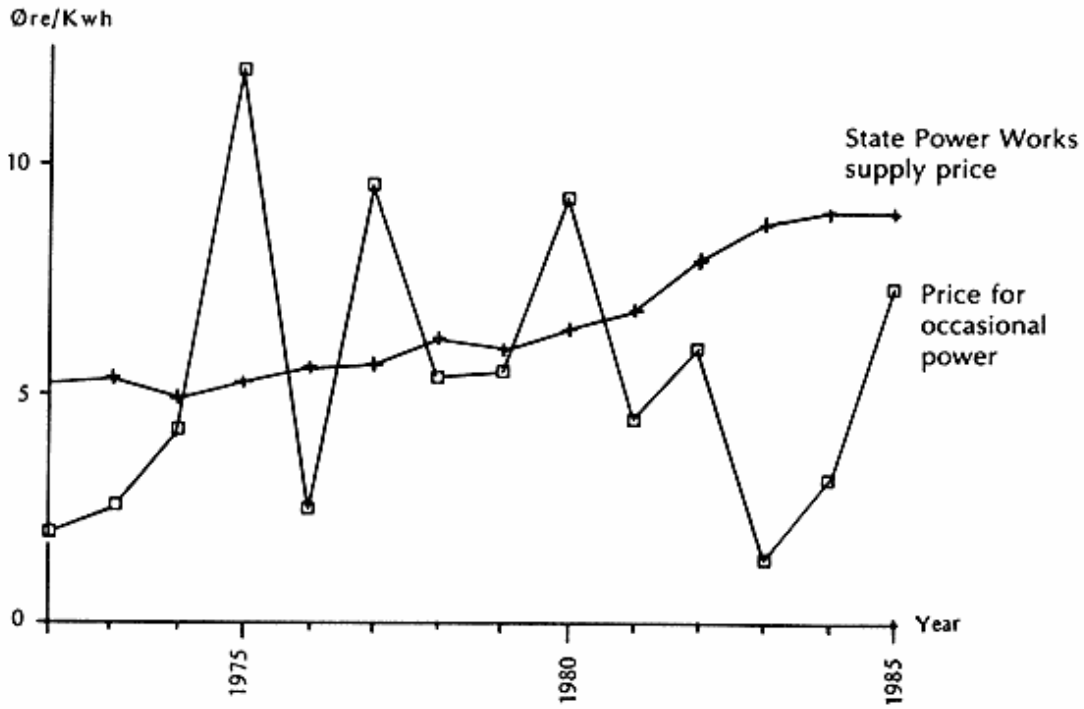
the price paid by general consumers. Furthermore, the projects have been developed in an almost random sequence when it comes to costs, which indicates the low cost-sensitivity of the hydropower complex.

The over-expansion was reinforced by an extensive market for occasional power, with spot prices far below the price for firm power in the other markets (see Figure 6). This price difference between the politicized firm-power markets and the relatively competitive market for occasional power is in itself an indicator of over-expansion. A large margin of occasional power was kept up throughout the 1970s and early 1980s as a buffer against dry years, in spite of considerable increase in water reservoirs, and in spite of increased import possibilities.

A. *The Lack of Cost Control*

The buffered economy of the hydropower complex not only implied large transfers to the sector, but also resulted in weak economic steerage, probably as a consequence of a lack of focus on economic constraints.

Calculations made for the hydropower projects of the State Power Works in the 1970s show an average cost overrun of 56 percent[4] (Midttun, Riise and Raaholt 1986) (cf. Table 1). Comparative overruns are also documented for the projects of the County Power Works (NVE 1986).



Sources: Samkjøringen: *Annual Reports* and NVE (1984)

Fig. 6. Price Development in the Market for Occasional Power.

At the firm level the weak economic steerage is reflected in both project-planning and in the controlling of the construction work. The expansive mandate and the free access to economic means made for a technologically oriented project management with little weight on economizing. Furthermore, the planners were usually too optimistic with respect to geology, and were generally reluctant to adapt to new political and economic changes that the sector faced in the 1970s and 1980s.

Table 1. Cost Overruns as a Percentage of Budgets Presented to the Storting for Projects of the State Power Works in the 1970s and early 1980s.

Projects	Production in GWh	Cost overruns in percent
Leirdøla	465	32
Grytten	503	72
Skjomen	1200	51
Folgefonn	1260	17
Eidfjord	2456	72
Ulla-Førre	5663	95
Average		57
Average corrected for production		74

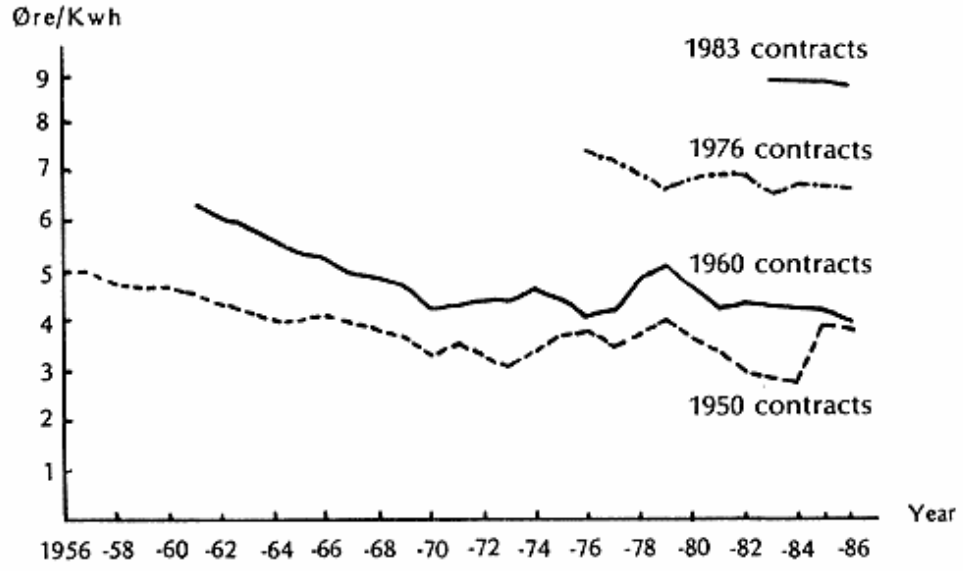
The sizeable cost overruns for hydropower projects in the 1970s and early 1980s do not only mirror weak economic steerage by the power companies, but also low cost sensitivity in the political and administrative decision-making system. In particular, they reflect the lack of cost-oriented information systems and the weakness of public accounting and budget routines.

The implications of adjusting electricity prices to accommodate the cost overruns would have had dramatic consequences for the expansion of the hydropower complex, both in terms of demand failure and in terms of the competitiveness of hydropower vis-à-vis other energy carriers.[5]

The explanation for why economic consequences of this type have not had greater impact is to be found in the ability of the hydropower complex to buffer itself against economic market demands. Selective provision of information and decision-making procedures has given the system a one-sided focus on hydropower. The close coupling to public budgets and a large portfolio of old cheap hydropower projects have together contributed to decouple prices from costs in such a way that the complex has been able to secure itself sufficient demand for future expansion.

B. *The Indirect Subsidization of Energy-Intensive Industry*

The market for electricity to energy-intensive industry has been heavily subsidized in national economic terms. Prices have in fact been falling in real price terms throughout the 1960s and early 1970s, and are still considerably below prices for general consumption (see Figure 7). This has of course



Sources: St.prp. No. 6 (1982-83) and NVE (1982-86)

Fig. 7. Price Development on Contracts to Energy-intensive Industries from the State Power Works (in fixed 1979 Norw. kr.).

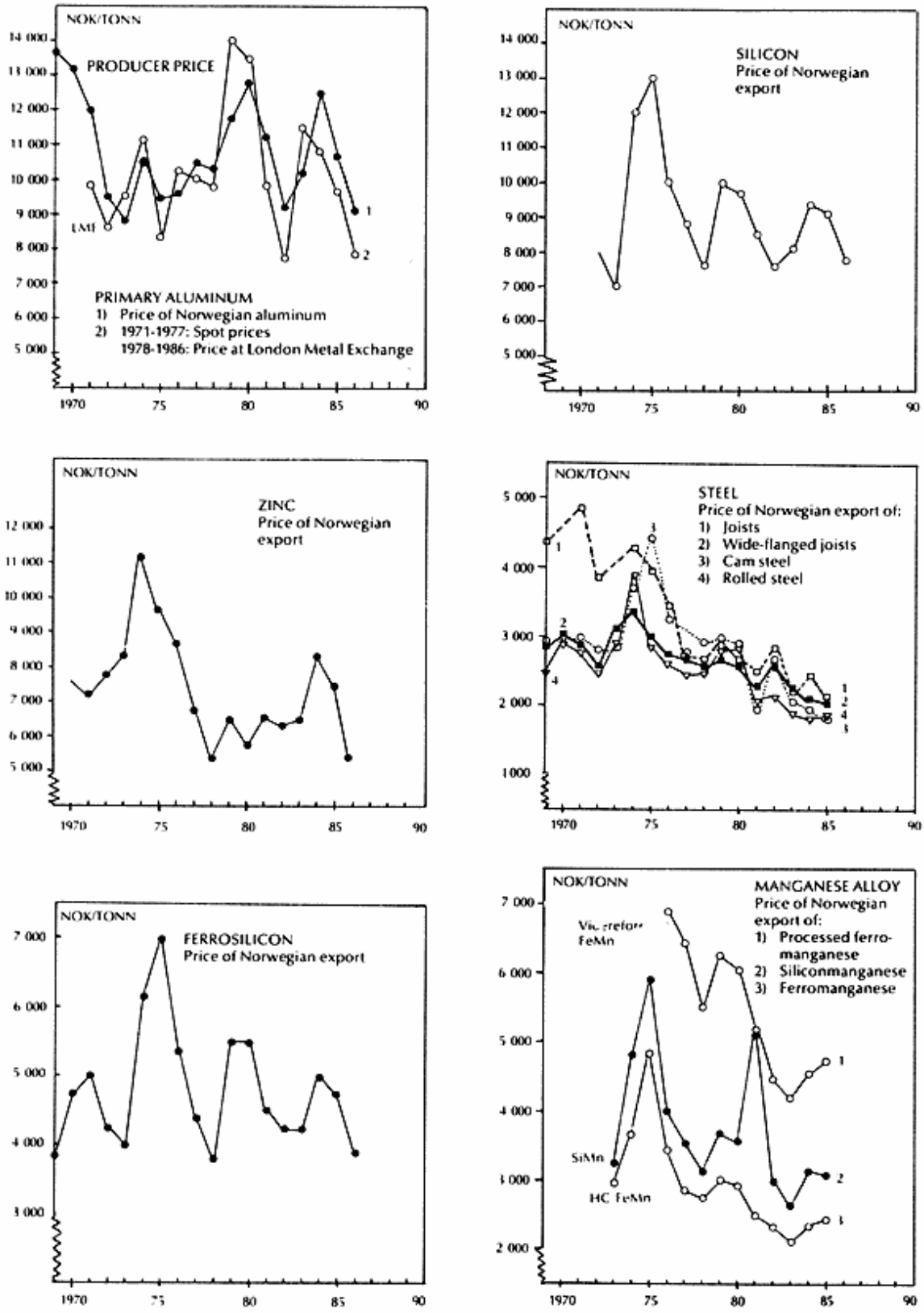


Fig. 8. Price Development for Energy-intensive Products (The prices are in 1985 Norw. kr adjusted for inflation through the Norwegian consumer price index. *Sources:* Norwegian Central Bureau of Statistics and London Metal Exchange).

Table 2. Net Income Including Depreciation for Energy-intensive Industry with Existing Energy Prices (in mill. kr.).

	1981	1982	1983	1984	1985
Steel	−101	−96	20	87	104
Aluminium	640	224	1392	2417	1366
Ferro	123	49	394	716	468
Carbides	78	67	77	87	75
Miscellaneous	92	76	238	395	376
Sum	832	320	2121	3702	2389

resulted in comparatively high profitability and relative over-expansion of energy-intensive industry. As for many raw materials, export markets for energy-intensive products are characterized by great price fluctuations (see Figure 8). An evaluation of the profitability of this sector therefore has to rely on data over a certain period of time.

The following analysis is comparative static, and based on economic results, depreciation and energy consumption for energy-intensive industries. A five-year period, from 1981 to 1985, is considered to include results from various phases of the business cycle.

As can be seen from Table 2, existing energy prices give the industry as a whole a positive result, including depreciation. It is only the steel subsector that in 1980 and 1982 ends up with a negative result. The variations in net income with a factor from 1 to 10 between high and low points in the business cycle, however, clearly indicate the sensitivity of this industry to fluctuating market prices.

Raising prices to official long-term marginal costs gives dramatic changes in results (Table 3). As we are maintaining the actual volume of production and business cycle development, Table 3 is directly comparable with Table 2. All major subsectors within the industry would have considerable losses.

Table 3. Net Income Including Depreciation for Energy-intensive Industry with Energy Prices According to Official Long-term Marginal Cost (in mill. kr.).

	1981	1982	1983	1984	1985
Steel	−256	−323	−263	−206	−204
Aluminium	−115	−984	−319	399	−778
Ferro	−278	−535	−448	−358	−681
Carbides	38	−6	−15	−37	−61
Miscellaneous	9	−49	82	161	95
Sum	−602	−1896	−963	−41	−1629

Table 4. Net Income Including Depreciation for Energy-intensive Industry with Energy Prices According to Official Long-term Marginal Cost + 25 percent Cost Overruns (in mill. kr.).

	1981	1982	1983	1984	1985
Steel	−309	−394	−349	−301	−308
Aluminium	−453	−1453	−941	−336	−1548
Ferro	−454	−753	−758	−771	−1117
Carbides	18	−35	−51	−87	−114
Miscellaneous	−42	−108	12	62	−20
Sum	−1240	−2744	−2087	−1433	−3107

With the exception of the aluminium industry at the top of a business cycle, the industry would be losing money throughout the whole five-year period.

If we include a cost overrun of 25 percent of official long-term marginal cost (only half of the cost overruns found for the 1970s), the losses become formidable (see Table 4).

Through cheap electricity transfer to energy-intensive industry, the internal resource transfer within the hydropower complex has implied a displacement of large parts of the 'ground rent' from the electricity-producing unit to the energy-intensive industrial part of the sector. As we have seen from Tables 2–4, this has been a sine qua non for the economic survival of the industry. These extensive transfers are only understandable against the background of historical ties between hydropower production and energy-intensive industry, the central role played by this industry in the Norwegian economy, and the public ownership of hydropower production.

The over-expansion of the hydropower complex during the 1970s and 1980s, according to marginalist economic criteria, is explainable in terms of our model of sector-based institutional lag. Having reached a level of saturation from a national economic point of view by the end of the 1960s or early 1970s,[6] the complex was able to continue its expansion by securing economic transfers and structuring markets. Although national goals and interests or regional distributive fairness originally motivated the massive post-war public investment, and continually were evoked in the defence of sector-interests, sector-specific biases in public support and subsidies cannot be accounted for by such arguments when alternative investments, subsidies and support programmes can be shown to give much higher payoff in terms of these goals.

One of the institutional bases for this expansive policy was the extensive sector-endogenous planning and implementing control, with the Hydropower and Electricity Board in a monopoly position in forecasting future energy consumption. This model monopoly allowed the complex to go a long way in substituting market forces with its own goals, and securing

consensus around these goals by reference to forecasts produced by its own expertise. The expansive orientation is clearly illustrated in forecasts from the early 1970s (see Figure 9) that implied an ambitious expansive programme towards the year 2000, with a more than doubling of the existing electricity consumption by that year. As we have seen, these forecasts were based on highly unrealistic price assumptions and the continuation of this expansive programme was only made possible by extensive buffering against market forces. The close ties between sector policy and the interests of national corporatist networks both on the labour and capital side, was also a central asset in mobilizing political support.

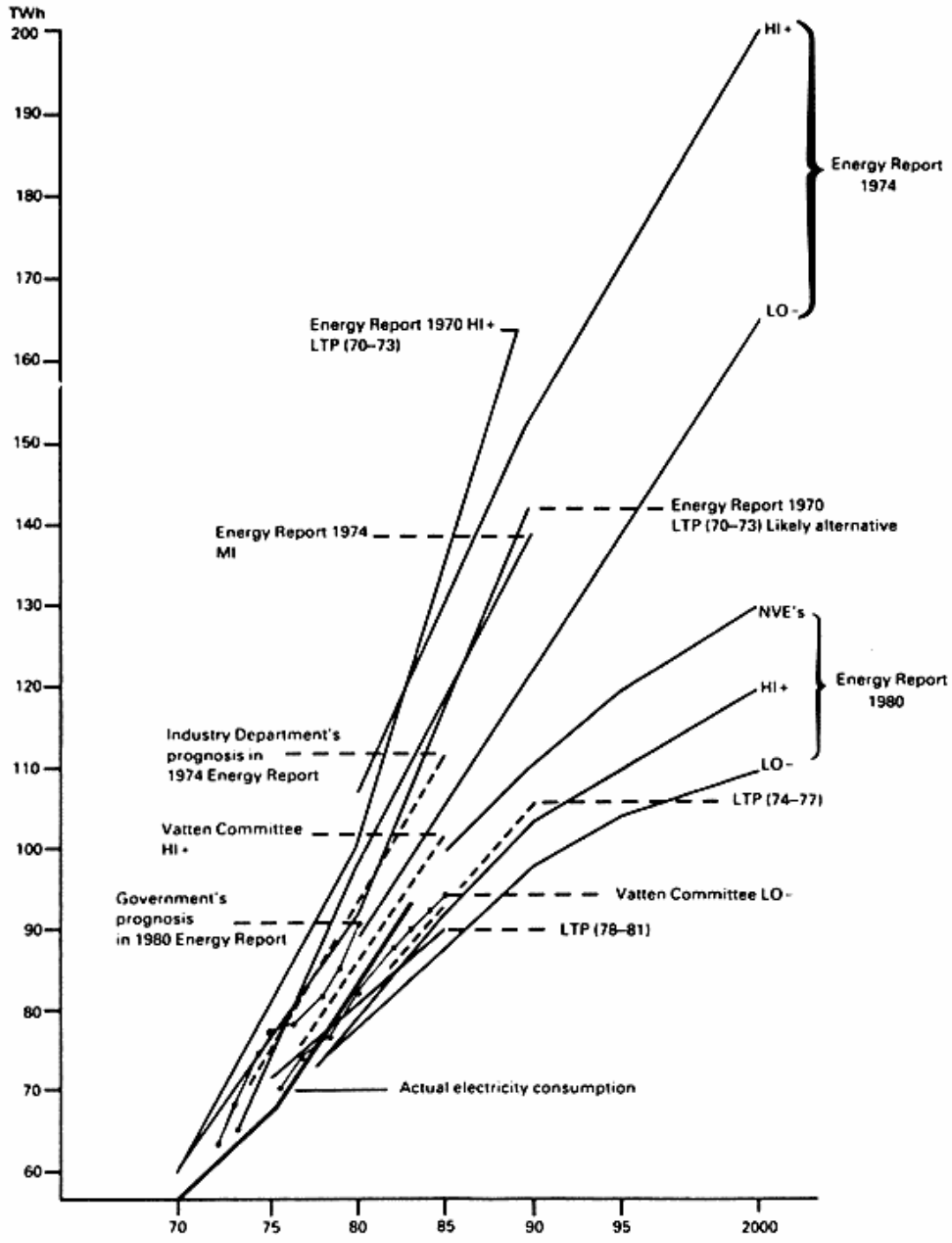
Up until the end of the 1970s the complex had also profited from favourable public interest rates on invested capital that implied 0 or negative deflated interest. The capital intensity of hydropower projects, and the negligible variable costs of operating hydropower-based electricity generation made this an essential element in the hydropower economy.

C. *Restructuring of Sector Institutions*

Our model of sector-based institutional lag implies, as already mentioned, that a long period of negative economic development will eventually also have its effect on the stability and reproduction of sector institutions as well as on the autonomy of sector policy. In our analysis of the hydropower complex we do indeed find a number of events that contributed to restrict sector autonomy and that led to limitations for the continuation of the expansive sector programme.

The reorganization of the energy administration by the establishment of the Ministry for Oil and Energy implied a termination of the close administrative ties between energy policy and industrial policy. Electricity policy was now taken over from the Ministry of Industry. The new ministry also gave Norwegian energy policy a broader focus, and electricity policy, which up to the end of the 1970s had been the dominant element, now had to find its place within a broader framework that also included oil policy, energy economizing, and a number of alternative sources of domestic energy supply. Sector institutions were thus challenged both through formal reorganization of ministerial mandates, and through policy reorientation in Norwegian energy policy, mainly as a result of the growth of the Norwegian oil sector. These two changes were supported by the increasing dominance of economists that took over the role previously held by engineers as the energy-policy expertise.

The institutional autonomy of the hydropower complex was also challenged by the new policy area growing up around environmental and resource questions. The creation of the Ministry of Environment in 1972, implied a consolidation of a number of fragmented organizations with environmental and resource-policy mandates. The result was an increased



KEY:

LTP = Long-term programme of the government
LO– × Lowest alternative
HI+ = Highest alternative
MI = Middle alternative
TWH = Terawatt hours = 10^9 Kilowatt hours
SSB = Central Bureau of Statistics

Fig. 9. Electricity Forecasts in the 1970s and Early 1980s.

ability from the environmental authorities to institutionalize their own planning and decision-making procedures on the traditional domain of the hydropower complex.

The breakthrough for a more autonomous environmental policy at the ministerial level took place against the background of a rapidly growing environmental opposition throughout the 1970s. In some cases, this opposition was closely allied with local communities that were affected by hydropower construction. This opposition was primarily oriented to specific hydropower projects, and therefore mainly affected the concessionary arena, but it also gradually came to affect the shaping of the general energy policy.

The hydropower complex was also shaken by internal institutional change in the 1980s. The reorganization of the Hydropower and Electricity Board in 1986, resulting in the establishment of the State Power Works as a separate company, marked the termination of a 60-year-old tradition of an integrated organization of regulative and productive activity. The political economy of the hydropower complex since the Second World War was based on the hydropower producing unit subsidizing its customers, whether they be the general public or energy-intensive industry. The reorganization of the State Power Works, and hence a weakening of its liability to continue this subsidization, weakens a crucial link in the traditional sector policy.

As a result of institutional reorganization, the hydropower complex also lost its model monopoly, and was faced with increasing problems of legitimating its traditional expansive policy. Throughout the 1970s a number of competing energy-forecasting groups emerged, challenging the model monopoly of the hydropower complex. The complex was now gradually being confronted by well-articulated demand forecasts based on model simulations.

The modelling competition in the last part of the 1970s culminated in the establishment of an energy Forecasting Committee under the newly established Ministry of Oil and Energy. This marked the end of the overall responsibility of the Hydropower and Electricity Board, and the Central Bureau of Statistics took over as the leading modelling institution.

The shift in modelling hegemony and the change to econometrics that followed resulted in important readjustments of future energy-consumption forecasts for the late 1970s and early 1980s (see Figure 9). While the lowest and highest forecasts for the year 2000 in the early 1970s had been 160 and 203 TWh, the new forecasts made by the energy Forecasting Committee for the 1980 Energy White Paper varied from 111 to 125 TWh.

Together these factors represented a significant pressure against the legitimacy and decision-making capacity of the hydropower complex. One may today observe a certain fragmentation of its five decision-making arenas, and a loosening of the traditionally strong ties between them,

parallel to the rise of conflict of interests between the constitutive actors of the complex.

What has enabled the hydropower complex to nevertheless keep up much of its traditional policy is its close ties to national corporatist networks and its ability to mobilize local political support. After pressure from the labour movement and organized capital, the Industrial Committee has on several occasions saved continued expansive sector policy from the marginalistic economic attacks from the new oil and energy administration and the economics profession. Being able to point to local jobs and projects has been a major asset in mobilizing this support.

Concluding Remarks and General Implications

A. *Institutional Lag and Sector Adaptation*

The study of the Norwegian hydropower complex illustrates that sector-based institutional networks may have considerable impact on a sector's adaptation to its economic environment. In this case an expansive programme of hydropower construction was kept up for 10–15 years by price subsidies, artificially high demand forecasts, and suboptimal economic behaviour from major electricity companies.

We have found the main explanation for this over-expansion in the ability of this heavy industrial complex to institutionalize autonomous sector-oriented decision-making, allowing it to pursue and legitimate internally-generated strategies. The basis for this autonomy lies on the one hand in the organizational resources that large industrial complexes command, and on the other hand in their ability to present themselves as carriers of general national economic and welfare goals. Through semi-autonomous self-governance, the sector has been able to develop a negotiated relationship to its environment, where market signals, political preferences, and administrative decrees have been mediated by sectoral institutions.

We have previously pointed out that most actors in the hydropower complex have formal role memberships in liberal and territorial institutional arenas such as markets, public administration, politics or the legal system. Sector-oriented institutionalization has therefore led to a sectoral negotiated order imposed on the top of territorial and ideal-type liberal institutional arenas, but without necessarily formally negating liberal constitutional arrangements, although development of new sector institutions, may also result. What successful sectoral autonomy thus implies is that sector-oriented, rather than territorial or liberal ideal-type networks and orientations function as the basis for actual decision-making.

In this way the strength of sectoral autonomy depends on the extent to which sectorally integrated decision-making overrules other institutional

roles carried by the decision-makers. With a negative exchange relationship between the sector and its economic and political environments, sector-oriented decision-making contradicts both the outcomes and to a certain extent procedures of liberalist ideal-type models of governance, which may constitute a role conflict for actors with roles in both systems. In this role conflict lies also the semens of deinstitutionalization of sectoral complexes and change in sector performance.

This is illustrated in our study of the Norwegian hydropower complex, where recent institutional changes indicate that there are also limits to how long a negative economic balance and failing political legitimation can continue without affecting the institutional stability of even a well-integrated industrial complex. In the long run, we have observed that a negative exchange with the rest of society has contributed to undermine the legitimacy of the hydropower complex, and weaken established transaction patterns, as well as the authority of core actors within the complex. This has also entailed weakened national support, and has opened up for reform and industrial reorientation.

Throughout the 1970s and 1980s the complex has shifted from internally-governed decision processes between relatively coordinated actors within the complex, to a mode of decision-making where contradictions within the complex have become more and more open, and where the actors to an increasing extent have activated competing roles in bordering decision systems. Both external and internal pressure has gradually introduced more global preferences in sectoral decision-making, and hence changes in distributive and allocative patterns. However, in accordance with what our model leads us to expect, this change has been considerably delayed by a sector-based institutional lag, manifested through the bargaining power of sector institutions.

B. *Towards a General Model of Sectoral Adaptation: Hypotheses for Future Research*

The negotiated political economy perspective, and its specific application in our model of institutional lag, deviates from traditional models of economic adaptation since institutional variables are given a prominent role. However, it should be noted that our model is a modification rather than a negation of economic analysis, as we are seeking combined politico-economic explanations where both economic and political or institutional factors are included, and where their role as dependent and independent variables also changes over time.

The above discussion has concentrated on adaptation of heavy-industry sectors, and has departed from an ideal-type liberalist adaptation as a baseline model. In this way, institutional factors have mainly had the function of delaying change. The choice of baseline model probably over-

emphasizes and idealizes the market factors in economic change. Furthermore, the choice of a mature heavy-industry sector also probably serves to overemphasize negative consequences of sector-based institutionalization.

As pointed out by Streck (1987), among others, highly institutionalized labour co-determination and lifetime employment rights has had positive effects on the adaptation of Swedish and parts of the German car industry. A stable and well-qualified work force has allowed the car industry in these two countries to position themselves in a comparatively secure niche in the world market for expensive high quality and high performance cars that has yet remained unchallenged by the Japanese. Countries like Italy and Great Britain, with a more liberalist labour-market policy, have had a harder time adjusting to the Japanese challenge.

Furthermore, in a number of sectors today, we see public institution building initiated up front, before the productive economic investments. Information technology is a case in point, where large national research programmes, infrastructure investments, public organization, and provision of funds have been initiated to stimulate weakly developed industry. Such measures are seen to be necessary for the survival of national industry in highly oligopolized international markets.

In terms of our model of sector adaptation, both the car industry and the information technology sector suggest that there is no necessary positive correlation between economic liberalism and successful sector adaptation. The car industry example illustrates that sector institutions in some cases are valuable assets in sectoral adaptation even at a mature stage of an industry, although this may possibly be restricted to high quality niches, and be less true for market segments where price competition is stronger.

The information technology example shows that sector-oriented institutionalization may be a driving force even in the initial sector expansion; though under an assumption that it will sooner or later pay off, and that economic incentives will eventually take over as motivating factors (see Figure 10). What will be the effect of sector-oriented institutions in a future phase of a downturn of the product cycle is too early to say. We can envisage both developments of institutional lags and of market-oriented winding up of sector production.

In the continuation of this line of reasoning, we may envisage several improvizations over the model of institutional and economic dynamics presented in Figure 2 to include a number of trajectories of institutional and economic dynamics. The development of a typology of such trajectories for different sectors, and their politico-economic characteristics, as well as a discussion of the conditions under which different trajectories appear and their consequences for industrial adaptation and industrial policy, seems to us to be one of the challenges to research in the negotiated political

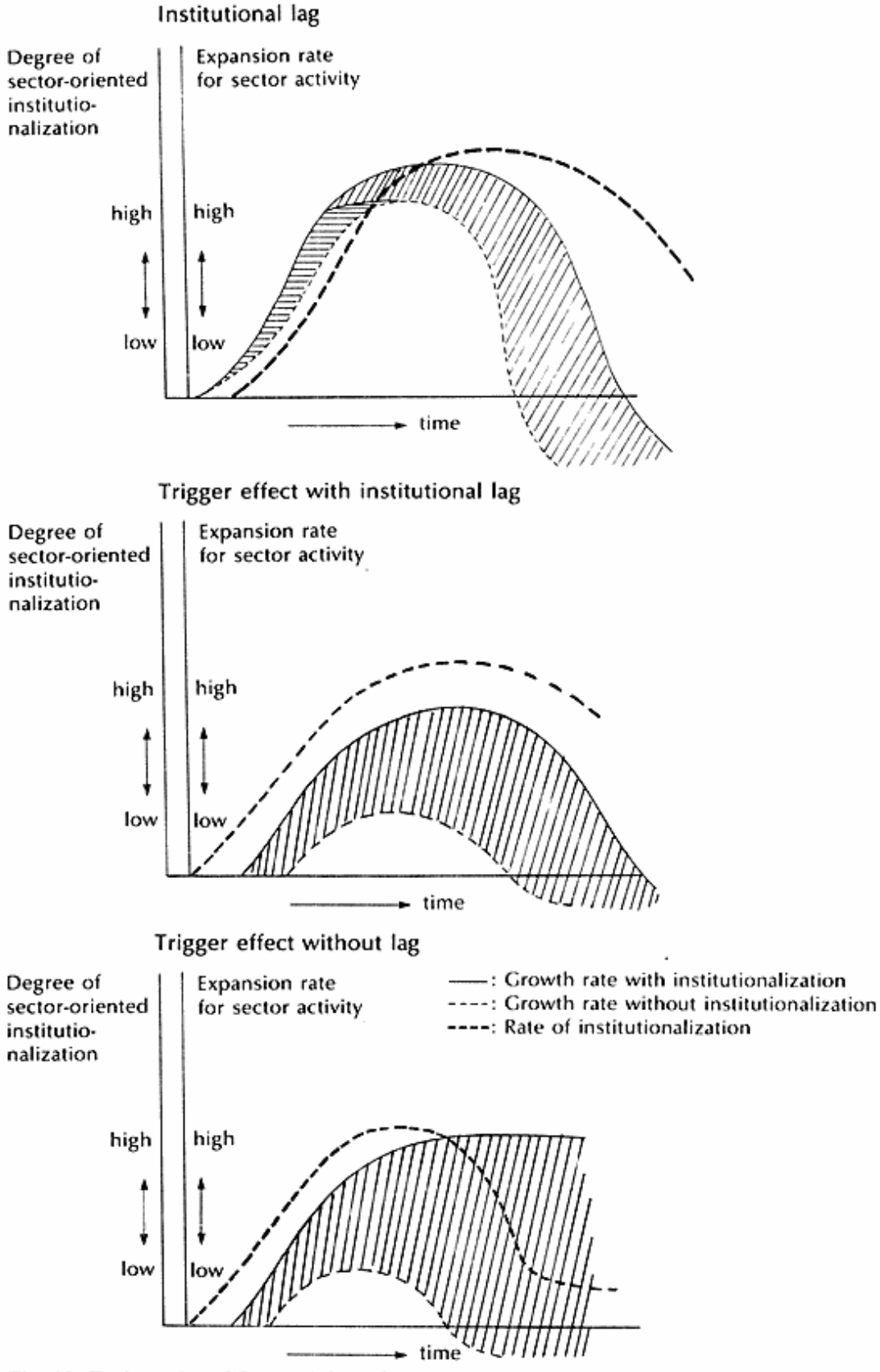


Fig. 10. Trajectories of Sector Adaptation.

economy tradition. Clearly, such a typology would also have to relate to different institutional, political, and economic macro-conditions characteristic of national states.

I am grateful for valuable comments to my work on sectoral negotiated economy from Professor Tom Burns, University of Uppsala, Professor Tore Hansen, University of Oslo, Director Kjell Haagensen, Norwegian State Power Works and Professor Arild Underdal, University of Oslo.

NOTES

1. Excluding the construction and operation of hydropower plants.
2. Quoted from the proceedings of the Committee (Innst. S. nr. 184) in 1955, and translated by the author of this article.
3. Based on long-term marginal cost calculation with a calculated rent of 10 percent. Sources: Ranberg (1981) and NVE (1982, 1984, 1986).
4. Since large projects have the greatest overruns, the weighted average overruns are 74 percent.
5. With a price increase of 4 percent per year in real terms, it would take 12 years before demand reached the new cost level. With low economic growth, expansion of electricity production would not be necessary in about 12 years, according to estimations of the Government energy-prognosis committee (for further details, see Midttun 1987).
6. By then the national goals of electrification and rebuilding of the Norwegian post-war economy had been achieved, and there were signs of saturation in global energy-intensive markets.

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