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Governance for Sustainability (G-FORS)

Norway National Report

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Preface

This is the National Report on the case studies carried out in Norway for the G-FORS project (Governance for Sustainability).

The report is written by Martin Hanssen, Elin Kittelsen, Jan Erling Klausen (team co-ordinator) and Marte Winsvold. Gro Sandkjær Hanssen has participated in the empirical investigations. The report is structured according to the project template.

The case study on the SEA directive is Molde new hospital, a municipal planning process involving two rounds of SEA. Furthermore, three case studies have been conducted on Emissions Trading. Each of these deals with one individual enterprise subsumed under the Norwegian Quota Trading system in 2005-2007.

Oslo, April 2008

Hilde Lorentzen
Research Director

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Prosjektet G-FORS – *Governance For Sustainability* gjennomføres i årene 2006-2009. Det finansieres gjennom EUs 6. rammeprogram, under "priority 7 – Citizens and Governance in a Knowledge-based Society". I alt 12 partnere fra 10 land deltar, herav 10 akademiske institusjoner.[1]

Prosjektet tar utgangspunkt i en oppfatning om at bærekraftig utvikling i byer og regioner bare kan oppnås ved å anvende et bredt spekter av kunnskapstyper på en effektiv måte. Spørsmålet er hvordan ulike styringsformer påvirker dette. Markeder, hierarkier og styringsnettverk kan på forskjellige måter regulere strømmen av kunnskap inn i beslutningsarenaene. Hvordan veies for eksempel økonomisk og vitenskapelig kunnskap opp mot hverandre, når beslutninger skal fattes? Hvilket rom skapes for lokalkunnskap? Hvilke kunnskapsformer blir dominerende, og i hvilken grad legges det til rette for refleksjon rundt kunnskapsbruken?

Den empiriske delen av prosjektet består av case-studier. Disse case-studiene tar utgangspunkt i tre EU-direktiver med relevans

[1] Deltagende institusjoner er de følgende: Technische Universität Darmstadt (Tyskland), Institute for Regional Development and Struktural Planning (Tyskland), Politecnico di Milano (Italia), University of the West of England i Bristol, universitetet UEHR Athens, universitetene i Twente (Nederland), Gøteborg og Warszawa, Centre for Regional Studies of Hungarian Academy of Sciences i Pecs, Ungarn, organisasjonen EUROCITIES, Metropolregion Hannover (Tyskland) og NIBR.

for miljøspørsmål. Hvert nasjonalt team har analysert to eller tre case.

- I hvert land er det gjennomført en case-studie av prosesser hvor direktivet om Strategisk konsekvensutredning er aktualisert (direktiv 2001/42/EC). Dette direktivet er implementert i norsk lovgiving gjennom planlovens bestemmelser om pliktig konsekvensutredning i arealplansaker.
- Det andre tematiske området for case-studier er handel med klimakvoter etter kvotedirektivet (direktiv 2002/358/EC). Både EU og Norge har etablert kvoteordninger, hvor visse virksomheter underlegges kvoteplikt. Dette innebærer at de må beregne og rapportere sine utslipp av CO_2 årlig, og levere inn et tilsvarende antall kvoter til Kvoteregisteret.
- Det tredje tematiske området er luftforurensing i form av partikkelutslipp, som reguleres av flere direktiver herunder direktiv 99/30/EC.

Det norske caset om SEA-direktivet har analysert prosessen med plan- og konsekvensutredning for Molde nye sykehus. Det ble gjennomført i en konsekvensutredning av fire alternative beliggenheter for sykehuset, og Molde kommune vedtok å gå inn for alternativet Hjelset, som var i tråd med anbefalingen i konsekvensutredningen. Det regionale helseforetaket (Midt-Norge) vedtok imidlertid at de ønsket et annet alternativ; Øvre Eikrem. Dette alternativet var også lagt til grunn i en avtale som var inngått mellom ordførerne i Molde og Kristiansund. Molde kommune gjennomførte en ny prosess med konsekvensutredning og kommunedelplan for Øvre Eikrem, og dette alternativet ble vedtatt sommeren 2007. Et krav fra en aksjonsgruppe om at det kun bør være ett sykehus for Molde og Kristiansund har ikke fått gjennomslag. Finansiering og realisering av sykehuset er ikke avklart ved avslutning av case-studiet.

Case-studien indikerer at ulike premisser for beslutningene har lagt til grunn ulike kunnskapsformer, og at disse har blitt båret inn på beslutningsarenaene på ulike måter. Konsekvensutredningene representerer en hierarkisk regulert kunnskapsstrøm, hvor et spesifisert kunnskapsinnhold delvis bestående av ekspertkunnskap, delvis av lokalkunnskap, har blitt brakt inn i beslutningene via en fastsatt prosedyre. Dette står i kontrast til avtalen mellom

ordførerne i de to byene, som har blitt brakt inn via uformelle forhandlinger. Argumentet om "ett sykehus" er brakt inn via argumentasjon, men har blitt avvist. Analysen viser hvordan beslutningsprosessen har vært preget av denne vekslingen mellom prosedyre, forhandling og argumentasjon, og hvilke konsekvenser dette har hatt for bærekraft og demokratisk legitimitet.

Det norske caset om handel med klimakvoter har fokusert på tre bedrifter som har vært omfattet av den norske kvoteordningen i 2005-2007: Kalkprodusenten Verdalskalk, sementprodusenten Norcem Brevik AS og energiprodusenten Trondheim Energi Fjernvarme AS. I utgangspunktet skulle kvoter tilsvarende 95% av bedriftenes utslipp av klimagasser tildeles gratis, og denne beregningen skulle baseres på historiske utslippstall for referanseperioden 1998-2001. Kvoteloven og tilhørende forskrift åpnet imidlertid for å legge til grunn utslippsestimater i tilfeller hvor en bedrift har gjennomført en betydelig omlegging av produksjonsteknologi etter referanseperioden, eller i tilfeller hvor produksjonen i referanseperioden var atypisk. Verdalskalk hadde forholdsvis lav produksjon i referanseperioden, og søkte derfor om å legge til grunn estimater. Dette ble avvist, siden produksjonen i referanseperioden ikke ble vurdert som tilstrekkelig atypisk. Bedriften fikk dermed underskudd av kvoter, og valgte å kjøpe. De to øvrige bedriftene fikk til dels store overskudd av kvoter. Grunnen til dette, var at de hadde lagt om produksjonen til bruk av biobrensel i perioden etter referanseårene, noe som reduserte de kvotepliktige utslippene. SFT valgte å tildele dem kvoter uten å ta hensyn til disse omleggingene, ut ifra den vurdering at noe annet ville være det samme som å straffe en ønskelig omlegging. Begge fikk dermed betydelige overskudd av kvoter.

Case-studiene fokuserer delvis på samhandlingen mellom SFT og den enkelte bedrift i forbindelse med rapportering av utslipp og tildeling av kvoter, delvis på de bedriftsinterne disposisjonene som følger av kvoteordningen. Analysen identifiserer vissedilemmaer knyttet til en insentivbasert ordning som kvotesystemet. Kalk og sement produseres av det samme mineralet, og produksjons-metoden er også langt på vei lik. Siden prosessbaserte utslipp av CO^2 er vanskelige å hindre, må reduksjoner i klimagassutslipp skje ved omlegging av energibærer. Men siden kalk i motsetning til sement har svært høye krav til renhet, er ikke omlegging til biobrensel like aktuelt i kalkproduksjon som i sementproduksjon.

Dette forklarer langt på vei at Verdalskalk kom langt dårligere ut enn Norcem. Kalk er imidlertid et essensielt produkt, som uansett må skaffes til veie, og kvoteordningens funksjon blir dermed mest å redusere lønnsomheten ved produksjon i Norge.

Analysen viser hvordan kunnskap om produksjonsteknologi, politiske prosesser, administrative ordninger og markedsmessige forhold har blitt lagt til grunn for kvoteordningens funksjonsmåte, både i bedriftene og i SFT. Kvoteordningen fremstilles ofte som en markedsbasert samordningsform, men analysen viser at den i like stor grad kan oppfattes som hierarkisk regulering. Samtidig er det observert betydelige innslag av forhandling – særlig i forbindelse med utformingen av ordningen og den første tildelingen av kvoter – og argumentasjon, ikke minst rundt metodikken for utslippsmåling.

Bedriftene som omfattes av ordningen står overfor et valg mellom markedsmessig og teknologisk tilpasning. Bedrifter med underskudd av kvoter kan velge å dekke inn kostnadene gjennom økte priser, redusert produksjonsvolum eller nedleggelse av virksomheten. Teknologiske endringer kan rette seg mot reduksjon av prosessutslipp eller endring av energibærer. I dette strategiske valget skjer det et samspill mellom teknologisk og markedsmessig kunnskap, som i utgangspunktet omfatter alle relevante kunnskapsformer. SFTs vurderinger baseres derimot i hovedsak på et formelt regulert sett av premisser og kunnskapstyper, nemlig de som er nedlagt i kvoteordningens styrende dokumenter.

Summary

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The G-FORS project has been carried out in 2006-2009, funded by the EU 6th Framework for research.[2] This national case study report from Norway reports on case studies on the implementation of the SEA directive (directive 2001/42/EC) and the directive on Emission trading (directive 2002/358/EC) in Norwegian legislation.

The Norwegian SEA case study concerns the planning process with SEA for Molde new hospital. A small town located on the north-western coast of southern Norway, Molde's existing hospital was deteriorating. The Regional Health Authority for Central Norway decided to commence planning for a new hospital, and asked Molde to provide an appropriate site. Molde implemented an SEA process involving an assessment of four optional locations. The SEA was approved by the municipal council, concurrent with a decision for the location recommended by the SEA. The Regional Health Authority however decided that they wanted another location, one that was closer to the city centre of Molde. This decision was in line with an agreement between the mayors of Molde and the neighbouring town Kristiansund. A second SEA was prepared to assess this other location, and it was accepted by the municipal council along with a municipal plan for the area. An action group promoting the construction of one

[2] Priority 7 – Citizens and Governance in a Knowledge-based Society

common hospital for the two towns has been unable to gain support, despite the fact that the two towns are located less than one hour's drive from each other.

The analysis carried out in accordance with the G-FORS conceptual framework shows that three themes, containing various knowledge forms, have been filtered into the decision-making process via specific governance arrangements. The two SEAs produced a mixture of expert and local knowledge, which was filtered into the decision-making process through a formalised, hierarchical procedure. The agreement between the two mayors, which was adopted by the Regional Health Authority, can be said to represent "strategic" institutional-political knowledge and was filtered into the process by means of network bargaining. The argument for "one hospital" can be said to represent medical-administrative expert knowledge, and it was unsuccessfully furthered by means of arguing network governance.

The Norwegian case study on the emissions trading directive deals with the Norwegian national emissions trading system which was in force in the period 2005-2007, and three of the 51 enterprises subsumed under this system. These three enterprises are *Verdalskalk*, a chalk producer in central Norway; *Trondheim Energy Remote Heating*, located in Trondheim, and *Norcem*, a cement producer in southern Norway.

The enterprises subsumed under the emissions trading system were to be allocated allowances based on historical figures on actual emissions in a reference period. Due to certain clauses in the allowance trading act, however, most of the enterprises were actually granted allowances based on estimated emissions. Because *Norcem* and *Trondheim Energy Remote Heating* implemented the use of quota exempt biofuels, they acquired a substantial surplus of allowances. *Verdalskalk* could not however use this option, due to the purity requirements pertaining to chalk production. As a consequence, Verdalskalk received a smaller amount of allowances than it needed, and had to buy allowances on the market.

In the analysis, the allowance trading system is seen as a composite of various governance modes. Elements of hierarchical regulation have to a great extent supplanted the marked-based elements of the system, although market-based coordination is still to some extent present. Also, elements of network arguing and bargaining

have been observed. The system for the reporting of emissions and the allocation of allowances represent a hierarchical mode of knowledge filtering, whereas the decisions made in the internal hierarchies of the enterprises to a great extent are based on market knowledge.

1 The legal and institutional setting in the member state for the selected case studies

1.1 SEA

1.1.1 The Norwegian Spatial Planning System

Spatial planning in Norway is regulated by the Planning Act (PBA). All land use must be approved in accordance with this act before development can take place.

The general rule for land use planning pursuant to the PBA, with very few exceptions, is that this is the competence of the municipalities. Land use planning also takes place on the County level, but this quite rare and there are no strong directions for municipalities to follow this planning. Planning is based on the principles of local governance by elected representatives with broad participation and transparent processes.

Some of the planning pursuant to this act is carried out by the Central government. This can take place in two ways. Firstly, the Ministry of the Environment may issue "National policy provisions" for planning. Secondly, the ministry may in some cases assume for itself the authority to produce a municipal plan, following the regulations for local planning. The Ministry of the Environment is authorised to settle conflicts between the municipalities and certain public bodies (e.g. central government representation regionally) in cases where these submit formal objections to issues in a plan.

County Plans and Municipal Master Plans are long-term, comprehensive development plans for the territory under the jurisdiction of the respective council. Such plans cover all aspects of local development with a view to coordinating physical, economic, social and cultural activities within the area.

Municipal master plans have a separate and binding land-use plan for the total area under council jurisdiction. The land-use plan is the basis for preparation of local zoning plans that will detail land-use, regulations and legal rights needed for plan implementation.

1.1.2 SEA in Norwegian Planning

This section contains a short overview of the requirements and guidelines for Strategic Environmental Assessment (SEA) in Norway, and the status of the implementation of European Directive 2001/42/EC. Only the sector overreaching approaches to the issue are included. Requirements and guidelines addressing only certain kinds of policies, plans and programmes (PPP) have been left out.

SEA has been defined as "the formalized, systematic and comprehensive process of evaluating the environmental impacts of a policy, plan or programme and its alternatives".[3] The European Directive narrows and specifies this concept.

Central government (national) level

A government Administrative Order requires that documents presented to parliament and cabinet shall be made subject to environmental assessment (EA) of significant environmental effects. The Public Administration Act, which covers all public decision-making except that by the parliament and the courts, states that any proposal shall be as informed as possible. But these laws do not fit the definition of SEA presented above, because they do not describe a "systematic and comprehensive process". It could be contended that general norms for such processes held by modern democracies are sufficient to be labelled SEA. Our view is that these general norms are not enough, and this assumption is supported by the sheer presence of EU EIA- and SEA-regulation.

[3] Glasson, J., Therivel, T. Chadwick, A. (1995:300): *Introduction to Enivironmental Impact Assessment*. London: UCL Press

There is no SEA requirement for National policy provisions pursuant to PBA, but The Administrative Order and The Public Administration Act applies.

To conclude: with the odd exception of an SEA- requirement for certain forms of nature- conservation (specified in the EIA/SEA-regulations), there are no SEA-requirement for central government policies, plans and programmes (PPP).

SEA-guidelines have been issued for the Administrative Order in 2000. There are no guidelines for The Public Administration Act.

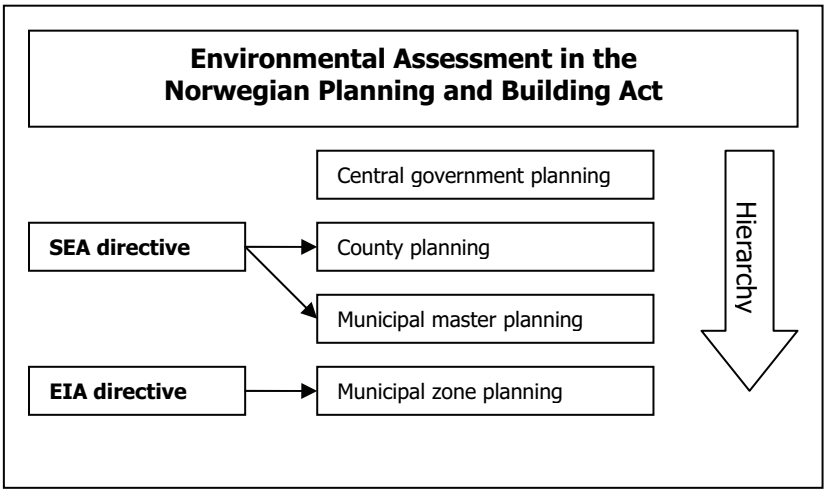
Regional and local authorities

The PBA has a SEA-requirement for all land use in county and municipality plans (and parts of these). Requirements for the process and the documents are laid out in detail, in accordance with the EU SEA-directive. But the standards are raised, in the sense that a planning programme organises the scoping phase and make it more inclusive than required by the Directive.

The SEA-Directive only applies to these plans. It is the understanding of the Ministry of the Environment that no other plans or programmes in Norway are covered by it.

For all municipal and regional decision-making, The Public Administration Act, and its general norm that any proposal shall be as informed as possible, applies. SEA-guidelines for the PBA have been issued. They focus solely on the understanding of the regulations, not on their enactment.

Figure 1.1 *Environmental Assessment in the Norwegian Planning and Building Act*



Process and documents for SEA

Requirements for the process and the documents (such as the SEA report) are laid out in detail in the Norwegian regulations (Regulations on Environmental Impact Assessment of 1 April 2005), in accordance with the EU SEA-directive for all significant parts. But the standards are raised with respect to one important impact assessment aspect. A planning programme to organise the scoping phase is required to be prepared and sent for public consultation. The Directive only requires that the competent authority consults public bodies.

The content of the SEA-report is specified in the regulations as well as in the Directive. Both have a listing of what the SEA-report should contain, and in both cases a certain level of flexibility is allowed in the application of this list.

Public consultation of the report is required in the Norwegian system, and public and non-public organisations are to be identified as relevant submitters of inputs. In Norway the obligation to identify such submitters is limited to organisations, a limitation not found in the EU directive.

The grounds for dismissing inputs have to be stated explicitly. The SEA-report has to be taken into consideration while making the land-use decision, and the planning authority has to report on how this is done. There is an obligation, with the SEA-report, to propose a programme for monitoring the environmental effects of the plan, so that the competent authority may adopt such a programme. With all these points the Norwegian regulations are in strict compliance with the Directive.

The SEA legal structure as it comes across both in the Norwegian regulations and in the EU-Directive has a strict approach to the organization of the process and a more discreet one to the substantial content of the SEA-report. In this sense there is a firm hierarchical approach with the first aspect of SEA, but more openings for arguing and bargaining with the latter part. With respect to the content of the SEA-report, the hierarchical structure is then again strengthened with the role of the competent authority, which has a final say in what the content will be.

1.2 Emission trading

The Norwegian emission trading system was established pursuant to the Quota act of 17/12 2004[4] which was in force in the period 2005-2007. It has covered 51 enterprises in all, in 10 branches of industry. The scope of the quota system is presented in Table 1.1.

[4] Lov av 17. desember 2004 nr. 99 om kvoteplikt og handel med kvoter for utslipp av klimagasser

Table 1.1 *The Norwegian emissions trading scheme (2005-2007). Numbers of enterprises receiving quotas issued in different branches of industry*

Branch of industry	*Number of enterprises receiving quotas*
Fishmeal and fish oil	7
Remote heating plants	8
Gas power plants	2
Gas processing and -terminals	4
Other enterprises with power plants	5
Mineral production	12
Petrochemical industry	4
Refineries	2
Steel production	2
Wood processing	6

The total number of emission quotas were set to 20,5 million, corresponding to 95% of average emissions for these 51 enterprises. Although originally intended to cover a much greater share of emissions from Norwegian industry, the system eventually turned out to have a quite limited scope: Only about 11% of emissions were actually covered. [5] This had partially to do with the fact that the EU system turned out to be more limited than expected. Norwegian authorities did not want to expose Norwegian industries to a policy measure which would render them uncompetitive. Furthermore, it was decided that the existing carbon tax should be retained, because it was expected that this tax would remain a more effective measure than the quota system. Accordingly, emissions covered by the carbon tax were not transferred to the quota system.

[5] Ot.prop. nr. 66 (2006-2007)

The system is managed by the Norwegian Pollution Control Authority (SFT). Emissions permits (quotas) are issued annually by this agency, based on applications from enterprises that are made subjects to the arrangement. Applications are granted based on criteria laid down in the quota act. Permits for each individual enterprise are calculated on the basis of average emissions in the period 1998-2001 (the *baseline period*). There is however an important exemption to this provision. Applications from enterprises established later than January 2001 are treated based on estimated emissions. Furthermore, estimated emissions were used to allocate quotas in cases where production in the reference period was substantially atypical, and in cases where the enterprise had implemented substantial changes in production technology in the years after the reference period. These exemptions turned out to be more widely applicable than expected, and the bulk of enterprises were eventually allocated quotas based on estimated emissions.

This emission trading scheme was established unilaterally by the Norwegian government, and is not directly linked to the EU trading scheme. Quotas issued by the EU scheme are not valid in Norway, but Norwegian enterprises may purchase quotas and cancel quotas in the EU and submit the receipt to the Norwegian Pollution Control Authority for use alongside their Norwegian quotas. Norwegian enterprises may not sell their quotas to European enterprises. The "project-based" mechanisms of the Kyoto protocol (Joint Implementation and the Clean Development Mechanism) are compatible with the Norwegian scheme. As a consequence, Norwegian enterprises may obtain quotas by making investments in emissions reducing projects in other countries.

In 2005 the enterprises were granted annual emissions permits for the period from 2005-2007. However, SFT was authorised to alter the original decision every year, and so the enterprises could not know for sure what volume of quotas they would receive the following year. Quotas were issued and cancelled annually, following this timetable:

- January: The enterprises submit reports on previous year's emissions to SFT, in accordance with the set measuring methodology.

- March: Quotas for the current year are issued by SFT.
- May: A volume of quotas equal to *previous* year's emissions are cancelled by the enterprises.

All enterprises subsumed by the quota system have been set up with an account in the National quota registry, a "bank" for quota trading managed by SFT. Quotas allocated by SFT are deposited on the accounts of each individual enterprise. The enterprises cancel these quotas by asking SFT to transfer a specific amount of quotas to a separate cancellation account. Because quotas for the current year are issued prior to the deadline for cancellation of quotas for the previous year, enterprises may use the current year's quotas for covering previous year's emissions – thereby postponing emissions abatement or quota purchases.

2 Case study on SEA

2.1 Context and Conditions

In 2004 the Regional Health Authority for Central Norway decided that the buildings of Molde hospital were not up to standards, and that new ones should be put up. No decisions were made concerning funding, however.

The next significant step taken by the Authority was to ask the municipality of Molde to start planning for a possible location. The municipality agreed to do so, and it also decided that an SEA should be prepared at this stage.

An SEA process was started with a notification in late 2004. The major aim of the notification was to produce a scoping result concerning the content of the SEA. The municipality was the competent authority according to the SEA-regulations, and it decided that four locations should be assessed. To ensure the quality of the SEA, seemingly unlikely alternatives were included.

The SEA report was circulated to authorities and special interest organisations concerned for comments, and made available for public inspection in September 2005. The conclusion of the SEA was that the hospital should be located in a place called *Hjelset.*

Early in 2006 the mayors of Molde and neighbouring Kristiansund agreed that the new hospital should be located close to the city centre of Molde.

The SEA was approved in early 2006. The municipal council concurrently decided to take a vote on the location of the hospital, although this decision can be said to have been premature as a proper planning procedure for Hjelset had not taken place. Hjelset

won the vote with 27 against 20, although this was the only alternative that was not close to the city centre of Molde. This decision was not in line with the advise of the chief officer of the municipality and the body of aldermen, but it followed the recommendation of the SEA and the position of the Regional health authority (the developer), at the time.

In mid 2006 the board of the Regional health authority, following a similar decision by its local Health trust, decided that they wanted one of the locations close to the city centre of Molde, specifically *Øvre Eikrem*.

In late 2006 a planning programme was initiated for a part of the municipal master plan, covering the location that the Regional health authority had opted for. At this stage the process was moving into formal land use planning, and a second SEA was required. With respect to SEA we now see a version of it which is an integrated tool with this planning process, and which only sets out to address issues which that are new as a result of a closer inspection of the site, or that were considered not to be handled well enough in the first SEA.

The planning proposal with the SEA report was circulated to authorities and special interest organisations concerned for comments and made available for public inspection in early 2007, and adopted by the municipal council two months later.

A process has started to adopt a zoning plan for the site of Øvre Eikrem. This is subject to an Environmental Impact Assessment (EIA). This process is not a subject for our study, but we still take the liberty to note that Molde new hospital has now been made subject to *three* Environmental Assessments, all of which have comply with the legal requirements for that.

2.1.1 The role of the media

The magnitude of this plan for the local community would imply that the local media would get involved. Media coverage reaches back at least to 2002. The location issue is only one of the angles that have been put on the case over these years.

First of all, the need for a new hospital, related to the condition of its buildings got the attention. But also the potential distribution of

hospital functions between Molde and Kristiansund hospitals was an issue this early on.

Media coverage of the case has taken on many angles and many turns. Numerous articles and reader responses have been published. The biggest local paper, *Møre og Romsdal Budstikke*, chose to support the Hjelset location after the adoption of that location by the council.

With the exemption of this support for the Hjelset location at one point, it seems to us that the media first and foremost have been reporting on many of the aspects and twists and turns of the case. It has also been taking in responses form various actors. Thus, the role has been the one of channelling and reporting on what the actors have been up to, more that anything else.

2.2 The Action Arenas

The following action arenas are identified:

1. The first SEA process
2. The approval of the SEA by the municipal council with the decision to go for the only location *not* close to the city centre (Hjelset)
3. The decision by the Regional health authority for another location, close to city centre (Øvre Eikrem)
4. The planning process with SEA for Øvre Eikrem

2.2.1 The first SEA process

What is decided on this arena is the content of the first SEA when this is submitted by the developer to the municipality.

In Norway, the formal starting point for SEA is that land use planning (on all levels, and including subsequent development consents) is decided by the municipalities. This land use planning role of the municipality has been decisive in giving them the role as competent authority for SEA. In doing this, regulators are hoping for a well coordinated execution of the two. Thus, Molde municipality formally decides on the location for a new hospital

for Molde, and formally controls the content of and approval of the SEA.

The Regional health authority, with its building unit, is the developer. This means that they have the overall responsibility for the desirability and feasibility of the whole project, and have to follow the directions of the municipality for the content of the SEA and anything the municipality requests in order to be able to formulate the desired planning proposal. They have, formally, no say on the issue of location of the hospital, but are required to make a recommendation in the SEA-report.

A number of public bodies were involved in this process. Their role is to suggest what the SEA-report should contain. These authorities are, firstly, the county, which manage a number of concerns including cultural heritage, nature protection, noise, farming, children and youth, universal design, disabling physical structures, general safety concerns, roads, and land use planning in general; secondly, the road authority and thirdly neighbouring municipalities.

Land owners are obviously affected by possible developments on their land. Their rights include being compensated for the loss of the land and being enabled to express their concerns in the planning process. However, since there were four alternative locations, and none of the privately owned locations were considered among the front runners, no land owners got involved in this process.

NGOs are common participants in Norwegian SEAs. They have the right to express their concerns on the issues. In this case, however, NGO participation was very sparse.

2.2.2 The approval of the SEA by the municipal council with the decision to go for the only location *not* close to the city centre (Hjelset)

We have grouped together two decisions to approve of the SEA and to adopt a location not close to the city centre of Molde in this action arena. We are doing this mostly because they take place at the same time by the municipal council.

The decision to approve the SEA is a task that comes with the role as competent authority for SEA, and is regulated by the SEA-regulations. According to the SEA-regulations, the approval of the SEA does not have to be taken to the municipal council, but can be decided by the administration. However, it follows from the superior position of the council that it can acquire this task.

According to the Planning and Building Act the municipal council decides on land use issues, and a planning procedure have to be followed to do this. The decision to select Hjelset did not follow any such procedure, and therefore still require the next step of formal planning in order to produce legal development consent at the end. In this sense, it is right to call this decision an *informal* one, even if it is made by an authority that has the right to make it.

At this point in time, the council is relating to the recommendations of the SEA-report (from the Regional health authority) and the advice of the chief officer of the municipal administration and the body of aldermen. These are contradictory. The deal between the two mayors had an impact on the recommendations of the municipal units, but not yet on the regional health authority. The council opted for the recommendation in the SEA-report.

The municipal council is the strongest actor on this arena, and strong enough to go against the chief officer of the municipal administration and the body of aldermen. These are involved in the preparation of the decision, but are still not able to swing the balance. Behind them stands the mayor, who we do not identify as an actor on this arena.

The *knowledge* that is perceived as important by the council is the information on impacts shown in the SEA for the various locations.

Besides these, no actors were involved.

2.2.3 The decision by the Regional health authority for a close to Molde city centre location (Øvre Eikrem)

In Norway, all public hospitals are owned by one of four *Regional health authorities* and run by *Health trusts* responsible for one or

several hospital within the region. The Ministry of Health and Care Services appoints the members of their boards of both these institutions, and is also the sole financier of them and thereby all these hospitals.

The basic idea behind organising the specialist somatic health care system as a system of regional health authorities is to provide room for discretion in decisions pertaining to day-to-day operations as well as in setting regional and local priorities. Following a decision by the present government, a majority of the board members are appointed among elected representatives in local and regional councils. As a consequence, the priorities made by the Regional health trusts have become a subject of regional politics, because deals struck between peers outside the board of these representatives will amount to pressure on them. We think it is right to call this an *informal* sub-arena.

Although the structure of the health care system in principle gives the Regional health authorities considerable leverage in terms of making investment decisions, the strained financial situation of many authorities has in several cases induced the ministry to make use of rather direct modes of steering. As an example, the ministry has decided that loans to the Central Norway Regional health authority, which is responsible for Molde hospital, from 2007 and on will only be granted based on applications to the ministry concerning specific projects. In this situation, the investment decision for a new hospital in Molde is in the hands of the ministry, or in real terms, Parliament.

This leaves the Central Norway Regional health authority in a very week position. It cannot make funding decisions; also it cannot make decisions on the location of a new hospital, according to The Planning and building Act. However, this does not stop it from having influence on both these decisions. Funding for a new hospital is clearly not an option if it should be against it, and our case shows that the city council have adopted what the Regional health authority has recommended, even when that means changing their minds as the health authority changes its. Thus, the Regional health authority and the local health trust have a considerable leverage, probably because of its special knowledge holder position on hospital matters, and its coordinating role, e.g. in the SEA work. Their primary motive is probably to get erected a

new and better hospital and to achieve this they are willing to change position on the second issue that would matter to them, the location of the hospital.

As Parliament becomes the most important actor in the future decision on a new hospital in Molde, our study does not extend to include it in other capacities then a reference point for the other actors[6]. They see Parliament as open to pressure from a unified region. This creates a motive for regional unification on the issue, which again becomes a driving force for striking deals to achieve this. By this, the informal sub-arena, mentioned above, gains significance, and actors that are successful here, gets hegemony.

According to several of our respondents, the two mayors of Molde and Kristiansund picked this up and struck a deal that would show to be really influential. The mayors agreed on a location of the hospital which was close to the city centre of Molde. No formal regulations assign them to making such deals, but it is made possible because of their formal positions as mayors, and because of the circumstances described above. For this position to be interesting to use, requires a motive. In this case it is the benefit of the mayor of Kristiansund not to undermine the long term continuation of the hospital in his city, and for the mayor of Molde it is to collect regional support, or at least avoid resistance, in the effort of getting Parliamentary funding for a new hospital in Molde. Because the two cities are less than one hour's drive apart, both mayors feared that future developments could render one of the hospitals redundant. A close-down of one of the hospitals would amount to a quite massive loss of jobs for the city involved, and a perceived loss of attractiveness. This created a powerful motive for both mayors to take concerted action in a way that would minimize the danger of such structural consolidation.

Over some time they were able to create hegemony over the decision for a location. After having lost the vote in Molde city council the first time around (second action arena), both the council and the Regional health authority changed their original positions to suite that of the mayors.

[6] Our study is limited to SEA and planning for a location for a new hospital in Molde, and explaining the behaviours that try to influence that. In this, Parliament does not play any role.

The elected representatives for public office who are also board members of the Regional health authority and its Health trust in question (Helse Nordmøre og Romsdal) are also actors in this. Their position bound for a strong influence in that they have the majority of both boards. This is not to imply that they are unified to start with, but because of their background, it is reasonable to think that they will be under influence to back what will be considered a strategy for funding. Not backing the strategy could be seen, in the next election, as weakening the funding effort, by supporting a location that would meet resistance from an important allied – the city of Kristiansund.

However, we have no empirical support that any of them put emphasis on this. Those that we have listened to or spoken to, either says that they were influenced by the SEA-report (although contradictory to its summed up conclusions), or they are not backing their vote in any way, even when asked to (by the city council).

The *knowledge that dominates* this action arena, and which comes out of the sub-arena we have identified, is how to get Parliamentary funding for the project. The *discourse* becomes that this is the main priority, and that selecting the best location is not. Even so, actors tend to refer to the SEA if this supports their position.

In this, all other actors are left out. There is not room for public consultation, and the decision making process does not follow any regulations.

2.2.4 The planning process with SEA for Øvre Eikrem

On this arena the formal planning process is carried out and the only alternative is adopted. There is a formal SEA, coordinated with this planning process. The SEA is a lot thinner because the municipality decides not to repeat the assessments from the first round.

In Norway, the formal starting point is that land use planning (on all levels, and including subsequent development consents) is decided by the municipalities. However, certain public bodies have the right to submit formal 'objections' to planning proposals, including on the basis of certain aspects of the SEA. If a

negotiated settlement is not made, a decision is taken on the matter by The Ministry of the Environment. It is also possible for the ministry to take over planning tasks and to make changes to municipal planning proposals before adoption. This does not happen often, maybe a few times every year.

A number of public bodies were involved in this process. They all have the right to 'object' to the planning proposal. The most important implication of this is that the municipality will take them seriously, in order to avoid trouble at a later stage. These authorities are the county authority, the road authority and neighbouring municipalities.

From the point were the Regional health authority has decided to go along with the settlement, the mode of interaction is marked by the fact that there is a coalition of actors sufficiently strong to sway the city council, which was divided in the first place. A planning process for Øvre Eikrem is set in motion, and the council members express discouragement in the possibility of going against the proposal when presented to them.

However, what we see at this stage is that not only land owners (and their lawyers) get involved, but also local NGOs to a larger extent.

2.2.5 Discourses

We have identified three discourses that all play a major part in our analysis. They cut across the various action arenas, and are to different degrees represented in them.

Firstly, there is the medical management discourse on what is the best hospital structure for the region. This issue was settled by the Regional health authority before the first SEA, but reoccurred several times during the process that followed. It did not however get very much attention, although the arguments made for one common hospital for the two cities (at Hjelset) are indisputably strong. The strength of the argument probably explain why it has never been silenced completely.

Secondly, we have identified the discourse over alternative locations for the new hospital, and the consequences for society and environment related to these locations. This issue is in the

forefront in the SEA, and receives a lot of attention. The reason for this is at least the SEA-process itself, which has this as its only outspoken purpose. In other words, this is something you have to talk a lot about, regardless of its real significance.

Thirdly, we have identified a discourse on how the various location options would affect the feasibility of obtaining funding from central government for the new hospital. A key premise of this discourse was a common understanding of the importance of reaching regional unification. It seemed unlikely that central government would fund a new hospital in the face of local disagreement. In order to achieve regional consensus, a location that would serve the interests of both cities was selected.

2.3 Identifying case specific governance arrangements

2.3.1 Governance modes/ Governance arrangements

(Action arena 1 and 2) Planning and SEA in general and the approval of SEA-report and adoption of Hjelset

The planning and SEA arenas are *hierarchical* in the sense that the municipality formally is in charge. The hierarchical authority of the council is delimited to some extent by the "objection" institution, which is formally granted to certain bodies. Submitting such objections take the parties in to an *arguing* situation in the sense that they are trying to convince each other. However, the structure of the objection institute is such that it also introduces a clear element of *bargaining*. Failure to reach agreement means that the issue is decided by the Ministry of Environment. Both parties would potentially try to avoid this outcome, because of the risk that the decision in the ministry would go against their own interests.

All other parties are left to be hopeful that their case will be considered, although the option for legal support seems to be open for land owners. However, the formal framework clearly states that the inputs submitted by all interested parties are to be given serious consideration. With SEA, this has to be accounted for. This weakens the hierarchy and introduces an element of

arguing. The municipal council is happy in its position at the top of this hierarchy, when it approves the SEA and adopts the Hjelset location in the same meeting, asserting their *hierarchical* position by going against the advice of the mayor, the chief officer of the municipal administration, his planning staff, and the body of aldermen, which opted for Øvre Eikrem.

(Action arena 3) Decision-making by the two mayors and the Regional health authority

The deal struck between Molde and Kristiansund represents a *bargained* settlement between to equal parties. Kristiansund, perceiving that they may loose their hospital, is quite committed to the content of the settlement, we may speculate, while Molde is more indifferent to the content (the new location is in Molde anyway), but wants the settlement to get Kristiansund's support for the funding effort. The Regional health authority and the Local health trust were probably somewhat indifferent between the two remaining options for location, because none of them are clearly better than the other. This explains why they change their opinion from the one expressed in the SEA-report to follow the settlement between the two mayors. They also want unified regional support for the funding effort, and getting that wins over priorities for location that they are not committed to. So, in this sense, they are convinced by this *argument*[7].

(Action arena 4) The adoption of the planning proposal for Øvre Eikrem by the municipal council

From the point of view of the municipal council, the planning proposal for Øvre Eikrem can be seen as a move to overpower the formal planning process that followed after the council's adoption of the Hjelset alternative. This is expressed clearly by many members in the debate over the adoption of Øvre Eikrem. A divided municipal council feel that they have no other option than to adopt the location that they have been lead to, despite their original wish that they expressed (with a small majority) when approving the (first) SEA. In this sense we are looking at a *hierarchy*

[7] How strong is this argument really? One of our respondents, an expert in the functions of hospitals, point out that even if the new hospital in Molde is located in the centre of the city an not outside, closer to Kristiansund, this does not hinder the transference of functions from Kristiansund to Molde, from his expert point of view.

of an informal character, because those who are placed in roles that are serving the council - the mayor, chief officer of the municipal administration, his planning staff, the body of aldermen - unifies against a divided council and gives it no other option than to adopt what they want or to contribute to a failed process in that no other option was on the table.

2.3.2 Rules in use and institutional context

(Action arena 1) The first SEA process

In its role as competent authority for the SEA *Molde municipality* manages the whole process in accordance with the SEA-regulations. The SEA forms a process with the aim of producing a decision by the municipal council on the approval of the SEA-report, and the location of the hospital. The process is lead by the planning officers of the municipality, according to signals from the council or other influential (municipal) actors.

They invite all interested actors to express their opinion in two stages of the process. This is first the scoping stage, where the content of the SEA is decided. Second, it is the SEA review stage, where the quality of the SEA can be commented on. And thirdly, a statement about the qualities of the SEA and what has been left out is produced.

They are the central managers of information, and give this out in accordance with rules for what they have to and want to give. They can acquire any information they se relevant. The payoff of the municipality as competent authority for SEA is to produce good planning decisions, and thereby contribute towards a good development of their built environment.

The formal role of the *Regional health authority* is the one of the 'proposer' in the SEA-regulations. This means that it prepares the SEA-report according to the directions of the municipality. They themselves manage much of the information needed along with the municipality. It is not likely that they will face information restrictions with the municipality. To keep information from the public may in some cases make sense, but we have no indication that this has taken place here. For them the payoff of the process is to get consent to build a better hospital.

Public bodies are required to participate, and to fulfil the formal obligations in terms of securing that their particular concerns are taken into account in the planning process. The SEA-regulations give them a right to participate in the public inspection in the scoping phase and in the SEA-review phase. The scope for this is that impacts should be well assessed, and as a result managed well. This can also be taken as their payoff. Limitations of existing information are not particularly likely, and no one has complained about that.

NGOs also have a right to participate, and is doing so out of concern for their particular interests in the public inspection phase. The scope rule for this participation is that impacts should be well assessed, and as a result managed well. Limitations of existing information are not particularly likely, but more so than with public bodies because of their stronger position in planning – they have the right to submit 'objections'. No one has complained about limited access to information.

NGOs and public bodies participate on this arena with the use of arguments. This is also the case for the Regional health authority. The municipality has a steering role within the hierarchical structure and has to relate to arguments that are presented.

(Action arena 2) The approval of the SEA by the municipal council with the decision to go for the only location *not* close to the city centre (Hjelset)

In this arena, the focus is on the municipal actors. On other arenas we have seen the municipality as one consolidated actor, but in this arena it is fruitful to look at the diversity within the municipal structure.

In almost any instance of municipal council decision-making, the chief officer of the municipal administration and the body of aldermen will be involved in preparing the decision. Still, formally speaking, these two bodies have no other role than what the council decides (within the boundaries of the law). Their informal role however can easily be one of taking steps to influence the decision-making of the council, beyond providing a recommendation in the written proposal. In this case, such influence has been exerted in an effort to promote the Øvre

Eikrem location. The pay-off rule is to secure funding for the new hospital.

The Regional health authority has no formal role in this action arena, besides producing the SEA-report. However, this report contains advice which is given more weight by the council than is the advice of the chief officer of the municipal administration and the body of aldermen. The scope rule of the Regional health authority is to obtain a council decision in accordance with its own recommendation, and their payoff would be to be able to proceed with planning for this particular location.

The council is formally on top of a hierarchical structure, and is able to ignore or listen to different arguments from the other actors. Based on this, they made their decision.

(Action arena 3) The decision by the Regional health authority for a close to city centre location (Øvre Eikrem)

The Regional health authority is a formally independent body entitled to make the location decision. But they do not decide formally on where a new hospital will be build. Thus, their decision, and their informal role in the process, will have the scope of influencing the later decision by the municipal council on a location. Their payoff is to be able to proceed with this, and there are no limitations to the information they are able to access.

We would argue that the decision by the two mayors, and the logic behind it, was influential in changing the position of the Regional health authority, and that this forms a sub-arena. Formally, the two mayors are in no *position* to decide on a location, and by that token there are no *boundaries* for what they can decide amongst them selves. By the case history, we see that they are not all that influential to start with. The municipal council at first went against the proposal backed by the chief officer of the municipal administration and by the body of aldermen, and approved the conclusions of the SEA-report. The scope rule for the body of aldermen and the chief officer of the municipal administration was to influence the location decision in the board of the Regional health authority, and later in the municipal council. The payoff rule for the mayor of Molde was to improve the chances of getting funding from Parliament. For the mayor of Kristiansund, the

payoff rule was to improve the city's chances for retaining hospital functions.

On this action arena, all other actors are bypassed – at least in the sense that there was no observable broader participation. The decision-making by the Regional health authority is a closed-off process for those outside its organisation. On the inside, we would describe it as a bargaining network, in which the board reaches its decision. The same is the case for the decision-making between the two majors.

(Action arena 4) The planning process with SEA for Øvre Eikrem

In planning terminology, a process like this starts with the "scoping" stage, where the content of the SEA is decided and premises for planning can be expressed. The next stage is the SEA and planning review stage, in which the quality of the SEA can be commented on and planning concerns can be addressed. Parties granted the formal right to 'object' enjoy easier access and a higher degree of responsiveness from the municipality planners as a direct result of this. They are the central managers of information, and they can acquire any information they see as relevant. The payoff rule of the municipality as competent authority for SEA is to produce good planning decisions, and thereby contribute towards a good development of their built environment.

The municipality may be seen as a set of sub-actors, and these may occupy different roles. This is particularly relevant to this action arena. With regard to planning and SEA the most interesting division is between the management and council. These clearly occupy quite different roles. The administration acts in their planning capacity. Formally speaking, they work in accordance with the wishes of the council, but informally they are able to influence it by dominating the planning stage by the power of their superior knowledge. In this case, the administration decided to commence planning for a location not preferred by the council. They also managed to get a majority decision for this location in the council, much to some councillors' frustration. Accordingly, the scope rule for the administration is to get the plan for Øvre Eikrem adopted. The scope rule for the council is to adopt or reject the planning proposal, and formally they are in the position to do both. Informally, many of the representatives contended that

it would not have made any sense at this stage to vote against the proposal anyway.

While land owners and local interest groups (NGOs) did not get involved in the first SEA, they were present on this last action arena. The reason is the greater realism in planning at this stage, compared to the situation in first action arena, where four optional locations were considered. While Øvre Eikrem was not amongst the frontrunners in the first SEA, it is now the only alternative in the race. The authority rule of the owners is to express their concerns in order to improve conditions (scope rule). They do this trough the formal hearing of the planning programme and planning proposal. According to the SEA regulations the competent authority shall produce an evaluation of all the concerns submitted, and this evaluation shall be made public. The information they get, is what is made public by the municipality. The primary motivation for the land owners is to get a good compensation for the land.

2.3.3 Changes

The most noticeable change throughout the whole case-process is the extent to which local actors are involved in the two SEAs. Involvement of local actors in the first (and most strategic) SEA was low. Local actors in the Øvre Eikrem area may not have felt that this location was very likely to be the outcome, and this may to some extent explain their absence in the first SEA. In the planning process for Øvre Eikrem and the production of the second SEA, however, a much wider range of local actors were involved.

2.4 Identifying case specific KnowledgeScapes

2.4.1 Dominant knowledge forms: content/claims of knowledge forms

(Action arena 1) The first SEA process

Although the SEA process represents a critical investigation of knowledge and a filtering in the sense that only some of it is

allowed to be represented in the SEA-documents, this arena still opens up to everyone to put what they want into the process through the circulation. These contributions are a part of the KnowledgeScape on this arena.

According to SEA-regulations, an SEA should cover both environmental and social impacts. As a result we find a variety of issues and knowledge forms.

There are two major issues in focus on the first action arena. Firstly there is the question about the regional hospital structure – whether or not there should be one hospital in each city. Secondly, there is the question about the location of Molde new hospital. Regarding the first issue, knowledge about hospital policy and hospital management is crucial. The question is one of identifying the mot cost-efficient structure. As for the second issue, on location, knowledge about social and environmental impacts of alternative locations is particularly important. Information on hospital management can be characterized as expert knowledge, but the information on impacts can take on many forms.

The assessment of social and environmental impacts in SEA involves the knowledge of what happens on the various locations in the possible case of development. This local knowledge takes many forms. Sometimes information will come in the form of expert information, and sometimes in the form of first hand experience based on a strong affiliation to the locality. This is in particular the case concerning local environment issues in the broad sense, including transportation, safety, and noise, and with regard to cultural heritage issues.

SEA is a formal process, and those who understand it are able to use this understanding. In this sense institutional and steering knowledge is represented.

(Action arena 2) The approval of the SEA report by the municipal council with the decision to go for the only location not close to the city centre (Hjelset)

At the end of the SEA process follows the approval by it by the municipal council. The council may draw on all available knowledge to inform its decision, including knowledge from the SEA, health management knowledge and local knowledge.

However, to allow the planning process to proceed, the SEA report has to be approved. One respondent contends that hardly anyone has red it. If this is the case, it seems as if the actual qualities of the report may have had little to do with its approval. Accordingly, steering knowledge has played a decisive role in the decision.

Furthermore, the decision for Hjelset was made following the recommendations from the SEA, put forward by the Regional heath authority. It follows that the knowledge about what would be the most desirable option from the developer was accepted. This has a steering knowledge aspect to it, the way we see it.

(Action arena 3) The decision by the Regional health authority for a close to Molde city centre location (Øvre Eikrem)

In this action arena we see a strong element of steering knowledge, and little else. The mayors of Molde and Kristiansund agreed that only a location close to Molde city centre could receive the amount of regional support necessary to convince parliament to fund it. This argument convinced the board of the Regional health authority, and thereby steering knowledge was represented in this arena.

Some actors contended that their preference for the Øvre Eikrem location was based on the consequences assessed in the SEA-report, although this report recommended Hjelset. In other words, they came to different conclusions based on the same information. This argument indicates that expert local knowledge was present. But it can be argued that this was really using the expert knowledge to provide legitimacy for the decision. If so, the actual impact of expert knowledge on this arena becomes more ambiguous.

(Action arena 4) The planning process with SEA for Øvre Eikrem

In this process there is only one location left, and this allows for a thorough local focus. Accordingly, milieu and everyday knowledge is observed. Local stakeholders introduce local knowledge, for the first time in the process. Additionally, the knowledge provided by the first SEA is still present. As a result, all major knowledge forms (bundles) are represented on this arena.

Knowledge forms within discourses

With the discourses we identified in 2.2.5 comes also knowledge forms, and they cut across what is represented in the action arenas. They also "bundle up" in the sense that there is a combination of knowledge forms resented within each discourse. These bundles are not formed along what are similarities between knowledge forms. For example the SEA linked discourse about location has a complex "bundle" of knowledge linked to it.

I our case, we find it more fruitful to explicate the representation of knowledge forms as being generated by discourses within governance modes, than by the representation of governance modes within action arenas (see 2.6.3).

2.4.2 Knowledge holders

(Action arena 1) The first SEA process

Our main observation on the relationship between knowledge holders and what knowledge forms they hold is that they are on quite equal terms. We find that many actors are quite capable in terms of steering and institutional knowledge. NGOs employ competent people, and thereby they enable themselves to speak the expert language. The municipality, the developer and public bodies have this knowledge to start with.

Fringe individuals and citizens' initiatives such as the "One hospital" group express knowledge of hospital policy and management, with the purpose of ensuring that these considerations are taken into account in the process.

(Action arena 2) The approval of the SEA report by the municipal council with the decision to go for the only location not close to the city centre (Hjelset)

The chief officer of the municipal administration and the body of aldermen represents the funding related steering knowledge. The city council members that constitute the majority in the vote represent the local and expert knowledge of SEA report.

The Regional health authority at this point represented a contradictory combination of the local and expert knowledge of the SEA report. They also possessed steering knowledge to the

effect that the Hjelset location would be the one most probable top gain support from regional stakeholders and from Parliament.

(Action arena 3) The decision by the Regional health authority for a close to Molde city centre location (Øvre Eikrem)

The members of the board of the Regional health authority make their decision based on steering knowledge; in particular concerning the chances of providing regional unity and increasing the chances for funding. However, local knowledge may also have had an impact on the board's decision.

(Action arena 4) The planning process with SEA for Øvre Eikrem

In the analysis of the first SEA process, it was observed that most actors hold institutional knowledge. This observation is strengthened in the last action arena due to the fact that the land owners (who have now entered the process) use lawyers. Other local stakeholders, however, like local residents that will be affected by traffic and the golf club have not done this, and do not hold institutional knowledge by other means either.

Local knowledge is strengthened by the involvement of local stakeholders. Such actors were not present in the context of the first SEA. They supplement local knowledge held by NGOs and experts. They also bring institutional knowledge, since they are represented by lawyers.

2.4.3 Excluded/Silent knowledge forms

(Action arena 1) The first SEA process

Local stakeholders were not involved in the first SEA. This leaves out knowledge of everyday life and the milieu aspects of local knowledge that they represent.

The expert knowledge of hospital policy and management is being kept in the background, and is not mentioned at all in the SEA-report. In other words, the consequences of the location decision on effective hospital management are not seen as relevant in the SEA.

(Action arena 2) The approval of the SEA report by the municipal council with the decision to go for the only location not close to the city centre (Hjelset)

The steering knowledge of the funding effort is represented, but is not decisive. The expert knowledge of hospital policy and management is being kept in the background, and is no premise for the decision.

(Action arena 3) The decision by the Regional health authority for a close to Molde city centre location (Øvre Eikrem)

On this action arena, all other knowledge than the steering aspects of the funding effort is being kept out.

(Action arena 4) The planning process with SEA for Øvre Eikrem

Here, we are back to the organized approach of official planning and SEA, which makes it more difficult to exclude knowledge. Expert knowledge on health management is still missing.

2.4.4 Relevance of reflective knowledge

SEA represents a system structured for reflection. Based on many contributions, certain forms of knowledge are filtered out, for explicit reasons. We have observed in this case that this has led to reflective knowledge in the sense that changes has been made to certain existing assumptions of impacts.

There was initially ample space for reflection in the process. Four possible locations were chosen for the first SEA, and there were no real frontrunners. So, there was great opportunity to compare and make a selection based on an ideal of real arguments for and against each of them.

The whole process is marked by actors changing their minds, or arriving at their positions late in the process. The most prominent examples are the Regional health authority and the municipal council changing their position on location after the approval of the SEA report, and thereby devaluating the findings in the SEA-report. Whether this is a result of reflection based on SEA/ planning or based on the steering knowledge concerning funding is

a tricky but central aspect to our analysis. Contentions to the effect that support for the Øvre Eikrem location was based on the consequences assessed in the SEA report are unconvincing. It seems more appropriate to regard this as a way of legitimising the position.

On the other hand, it is not really illegitimate to emphasise other consequences than those in the SEA report. SEA should not be seen as a case of technocracy setting politics aside. The SEA is set up to identify the best location based on social and environmental impacts. Issues pertaining to funding or efficient health management are not a part of the SEA-process.

When there is competition between different knowledge forms on different action arenas, actors will have to reflect on the relative emphasis that they should put on these knowledge forms. So, even if we have not been able to observe this with our respondents, it should be possible to conclude that reflection is central.

It is standard reflection in SEA/strategic planning that local concerns are pushed to the lower level(s) of decision making. This is also the case here. So, there is reflection related to this kind of steering knowledge.

What we have addressed here is processes of reflection within an environment of competition for relevance between knowledge forms. This falls within the concept of strong reflexive knowledge, which is then highly relevant for this case.

2.4.5 Synergies/contradictions between knowledge forms

As we have shown, there is a contradiction between knowledge from the SEA and steering knowledge concerning funding. The concluding recommendation in the SEA was not seen as the one most likely to obtain funding from Parliament.

Otherwise, the knowledge on the arena does not seem to be contradictory. There are however instances of synergy between knowledge forms. The golf club's use of the golf course and knowledge of the game has been able to correct understandings used in planning work that were not adequate. We have seen that local residents express concerns over the traffic situation. Much of

the same is expressed in far more expert like terms in the traffic analysis from the consultancy used by the municipality and the Regional health authority.

2.4.6 Silent knowledge/knowledge deficits

The knowledge that should have been represented on an action arena (or a discourse) but is not can be considered silent of deficit. I our case the lack of local actors and local knowledge by locals may be considered problematic. However, we find that the arguments made that the strategic level of impact assessment (SEA) caters for a lot less of that than project level impact assessment (EIA) is a fair judgement. In that sense it is not so valid to claim knowledge deficits in this instance.

2.5 Identification of interfaces/interaction between knowledge and governance arrangements

2.5.1 Synergies and contradictions between Governance Arrangements and Knowledge Forms

Governance orders

What are the flows of knowledge between the first governance order and the two other?

We have asked all our respondents how they regard the SEA- and planning systems in terms of how well they work to organize the decision making process and resolve conflict. There is a unanimous response that these systems are working well, and to the extent that they are displeased with the process it is due to how the municipality (competent authority) is performing under the systems.

Not only the regulations themselves, but also the discourse and fundamental ideas behind, seem to enjoy an almost complete approval. But this is only as far as the most directly involved actors are concerned. The representatives of the municipal council make

no reference to the knowledge base of the planning proposal and the SEA under the debate prior to the adoption of the plan for Øvre Eikrem. Still, references are made to what they decided for location when the (first) SEA was approved, which did take the SEA as a starting point.

Although the Ministry of the Environments is not disinterested in this case, it is not possible to observe an impact from the Molde process on the regulations. Regulations are of course being revised, and practical experiences are always relevant in such work. However, we have no indication of an influence from first to second order governance in this case.

To what extent is there an influence from the governance arrangements and modes we have identified and on to the knowledge forms that we also have found in the case?

(Action arena 1 and 2) Planning and SEA in general and the approval of SEA-report and adoption of Hjelset

The hierarchical structure implies first of all a position for the planning authority and the competent authority for the SEA as the one that controls the use of knowledge that goes in to the formal documents that are being produced. The planning proposal and the SEA-report are the end products of this.

But even if hierarchy is the structure, there are other more or less formalised norms about the use of knowledge in a setting like this. These norms are perhaps as interesting as the governance arrangement. The gist of these norms is that all inputs have to be taken into account, and have to be represented somehow in these documents. In this perspective, the planning authority/competent authority becomes something of a coordinator for inputs. One could say that the hierarchical authority of the competent planning authority is somewhat diminished by these norms, since they allocate rights to other actors.

Still, this position of the city management has been used to assert some control over the representation of knowledge on the planning and SEA arenas, at least with what goes in to the documents they issue them selves. We can at least find two interesting examples of this in the case: Firstly, consultants have been hired to write the SEA-report. They have structured the material in accordance with their expert knowledge. This is

because the city and the developer have wanted it that way. So, the SEA-report is not a collection of edited statements from the actors, but has been worked on according to expert norms, as a result of hierarchical control.

Secondly, the city management may feel that the local actors do not understand the strategic character of the process in hand, and that they are concerned with issues that are too detailed at this level. The golf club complains about this, and says that not before after the adoption of the planning proposal in our case, they have been able to enter into a communication with the city management, in which their local, milieu, every day knowledge is seen as relevant. In this situation, a "traditional" concept of hierarchy is dominant.

This is also an example that an attempt to argue about the inclusion of knowledge is quite easily disregarded if the arguments are not strong enough. This seems inevitable given the hierarchical structure in combination with the non-restrictive access to the process.

It seems quite obvious that the governance arrangement has disfavoured the inclusion of local, milieu and everyday knowledge. This has a lot to do with the "strategic" nature of SEA and its planning equivalents. Those who represent these kinds of knowledge will also be those who are the most unsure of its application on this level, because that have the least system knowledge. This manifests it self in at least two ways. Firstly, as we have pointed out, what they bring forward will not bee seen as relevant (at this point). And, secondly, also because of the strategic nature of having four locations represented, locals affected by the least realistic options did not see the need to get involved, and did not do so. This was particularly the case with the option that was finally chosen.

(Action arena 3) The bargain between the two mayors and the decision by the Regional health authority for a close to Molde city centre location (Øvre Eikrem)

With the settlement between the two majors the governance mode is clearly bargaining, and the dominating knowledge form is steering knowledge. However, we see no obvious cause and effect link between governance mode and knowledge form here. To us it

is quite clear that the matter in hand is decisive for what type of knowledge is used, and that governance arrangement has little to do with this.

Since this decision making is not regulated formally, the participants are free to choose what kind of knowledge they want to use. It is also fair to view this as a symmetrical relationship, although Kristiansund is maybe the stronger party since it is "all or nothing" for them, while Molde is just choosing between two locations. Bargaining power seems to be an important part of why steering knowledge enters and dominates this arena.

The mode of interaction in the board of the Regional health authority is arguing. The proponents of Øvre Eikrem have used arguing to convince the majority to go against their initial decision for Hjelset. Their main argument has been about funding for the new hospital. These actors are on equal footing as board members, so arguing seems to be the only mode of interaction available.

The use of steering knowledge in this case, is decided by the matter in hand and not by the governance arrangement or mode, as far as we are able to detect.

(Action arena 4) The planning process with SEA for Øvre Eikrem

Even with an up to standards planning process as a background for the adoption, the council is not able to focus on the quality of the planning/SEA. In stead, they focus solely on the circumstances leading up to the initiation and carrying out of this planning process.

By approving the first SEA and taking a vote for the Hjelset location on the first action arena, the municipal council had so far acted out its hierarchical authority in a way that would seem to favour the predominantly expert-based knowledge about impacts in the SEA-report. Yet following the informal agreement in the second action arena between the two mayors, and the subsequent decision in the Regional Health Authority (third action arena) to go for the Øvre Eikrem location, the council in this fourth and final action arena voted against its own decision and adopted the Øvre Eikrem plan. It can be argued that the municipal council thereby failed to maintain the hierarchical mode of governance structuring the decision-making process, thereby weakening the

impact of the SEA-report knowledge in favour of other forms of knowledge – notably, steering knowledge represented by the "strategic" aspects to the informal agreement between the mayors.

The hierarchical structure of the process was confounded in several ways, and with severe implications for knowledge use. Firstly, the initial vote (in the first action arena) for the Hjelset location can be taken as a kind of instruction to the administration to commence planning for Hjelset, pending a decisive vote in the council at a later stage. This weakened the status of the decision, jeopardizing the logical chain between the expert knowledge provided in the first SEA and the outcome of the process. The slim majority for Hjelset further served to undermine the impact of the decision.

Secondly, the administration failed to observe the hierarchical structure of the system of governance by commencing planning for the Øvre Eikrem location in spite of the Hjelset "instruction". As a consequence, the council was presented with a *fait accomplis* when it was asked to adopt a plan it had not requested, for a location it had previously rejected. In the fourth action arena, the majority of the council bowed to the combined pressure of the municipal management and the Regional Health Authority – probably in part because it seemed drastic to scrap the effort put down in producing the plan for Øvre Eikrem. The fact that the original "instruction" only achieved a 27 against 20 vote did not discourage this turnaround either.

In this sense, it seems correct to say that the knowledge use in the last action arena was a result of a breakdown of the hierarchical governance mode rather than the effect of another mode. The two irregularities identified above effectively undermined the hierarchical procedure which was meant to structure and filter the flow of knowledge forms into the decision. As a result, one can argue that the "steering knowledge" represented by the strategic agreement between the two mayors became hegemonic.

As for local knowledge, this form was weakly represented in the first SEA. The absence of a proper planning procedure for the Hjelset decision further exacerbated this deficiency, because such a process would have ensured at least some level of community involvement. The knowledge content of the mayor agreement was not "local", in the sense that it consisted primarily of strategic

elements pertaining to the continued operation of one hospital in each city. Following this argument, we would contend that the *actual* governance mode rendered local knowledge irrelevant in the location decision, but not to the extent that it is contradicted by the decision. Local knowledge was however represented in the second SEA supporting the planning process for Øvre Eikrem.

2.5.2 Relationship between modes of interaction and knowledge forms

(Action arena 1) The first SEA process

In SEA and planning, the municipality is the leading authority. The SEA is open to various inputs, and the municipality controls the fate of these.

Many public bodies have the right to submit formal "objections" if their input is not well enough considered. This gives their expert knowledge a firm representation in the process.

The NGOs do not have a right to "object". As we have pointed out, they also represent expert knowledge, but their weaker position means that they have more of a arguing challenge in order to be represented. Accordingly, their knowledge has a weaker representation than that of public bodies. This difference has to do with different authority rules of these positions.

(Action arena 2) The approval of the SEA report by the municipal council with the decision to go for the only location not close to the city centre (Hjelset)

Here, the focus is on the relationship between various municipal actors. The council has the right to approve of the SEA and give directions for further planning. All others have advisory roles to this.

The council chooses to go with the recommendation in the SEA-report, and thereby emphasises the combination of knowledge about environmental and social impacts of the locations.

The way we see it, there is nothing in the modes of interaction that encourages this. They could as well have chosen to go with the recommendations of the chief officer of the municipal administration and the body of aldermen and thereby chosen a

steering knowledge focus. In fact, this is by far the most common way for Norwegian municipal councils to go about their business.

(Action arena 3) The decision by the Regional health authority for a close to Molde city centre location (Øvre Eikrem)

The fact that the Regional health authority is dependent on extraordinary funding from Parliament to build the new hospital creates a focus on ways to achieve this. In this case it is clear that this leads to an element of steering knowledge in that the board of the Regional health authority is convinced that this option will create regional support for the funding effort.

The Regional health authority does not have the mandate to make the final decision concerning the location of the hospital. This right rests with the municipal council, in its capacity as role as planning authority. Furthermore, they do not legitimise their decision by reference to the concerns identified in the SEA. The decision therefore can be said to reduce the role of the SEA in the process.

However, as an informal norm, there is the need not to overlook social and environmental impacts of land use for anyone having a say in these matters, which is also expressed by our respondents.

(Action arena 4) The planning process with SEA for Øvre Eikrem

As noted, the planning process is decoupled from the adoption of the planning proposal. This is apparent due to the fact that none of the representatives of the council mentions any substance from planning or SEA documents in the council debate.

The fact that the council opted for a decision in line with the preferences of the other actors on the arena suggests that steering knowledge dominated the arena. This steering knowledge indicated that regional unity was required in order to secure funding from parliament. Also, if the plan was rejected the entire process would suffer a setback which could put the new hospital in jeopardy.

The process of preparing the plan and the SEA has been inclusive, allowing room for local, milieu and everyday knowledge. The scope is more detailed than with the first SEA, and there is only

one alternative, leaving less doubt about who will be affected by the new hospital.

2.5.3 Relationship between governance arrangements, knowledge forms and learning processes

As has been noted in the previous sections, the hierarchical mode of governance of the SEA and planning system is a formalised system of knowledge filtering. Generally speaking, it is set up to ensure that relevant forms of expert knowledge are used for the assessment of impacts, as well as to obtain local knowledge by use of public inspections and other mechanisms. This setup has several consequences for learning.

Firstly, it should be noted that the municipality is obliged to provide responses to all statements submitted by interested parties. This provision would seem to favour learning, because it requires the municipality to look into the contents of the statements (the *arguments*) and see how they relate to the issue in question. In the council documents there are a number of considerations made by the management on what they have learnt and what they have done or will do about it. To what extent this learning is "sufficient" by this or that standard becomes another question.

Secondly, it seems probable that the gathering and processing of a broad range of expert knowledge forms is in itself inductive to learning. Officers in the municipal administration will over the years accumulate a considerable body of knowledge through being involved in the broad range of planning issues managed by the municipality. One could argue that such learning effects to some extent are individual and not collective, but provided the rate of turnover is modest this should not in itself be a problem. Although representative bodies have a higher turnover than that of the administration, such learning effects should to be relevant for elected representatives too.

Thirdly, one would expect that the municipal organisation and the local setup of the SEA and planning procedure over time are affected by the steady flow of new plans and SEAs handled by the municipality. Such effects would represent cases of *institutional* learning, potentially increasing effectiveness and inclusiveness of issues in emerging cases.

In the hospital case there is a planning and SEA round following the first SEA. In this round, references are made back to the previous process. It is noted that some issues are sufficiently treated in the first SEA, making further assessments redundant. Other issues require further assessment, partly due to improved knowledge concerning the requirements of a proper SEA.

In the hierarchy of the municipal representative system final decisions are to be made in elected bodies. Expert and local knowledge feeds into the municipal council through the written case documents as well as through direct communication to the councillors. This contextual change gives rise to knowledge transformation: The knowledge is "politicised" in the sense that it is understood and used in a political context, for political purposes.

This transformation process has many consequences. Items of knowledge are selected or discarded based on their usefulness for supporting specific positions, which is a deviation from the SEA norm of extensive inclusion of knowledge and subject-focused non-political agenda. Such processes have been observed several times. Firstly, it has been contended that the recommendation in the first SEA was not in line with the consequences assessed in that report, but on political considerations. The SEA report states clearly that the recommended option is not optimal considering the SEA, but is chosen for other reasons. Basically, this renders the SEA irrelevant.

The other example of "politication" in this case is the effect of the deal struck between the mayors. Seemingly, this also renders the SEA irrelevant, because strong reasons not relevant to the SEA decide the matter through the process we have described. However, in this case it is possible to argue that the SEA supports this location and therefore have not sidelined it.

"Poltication" also have the consequences that uncertainties are commonly exaggerated or made to seem insignificant, again according to political needs. Ideological inclinations affect the perception of the knowledge inputs, giving rise to different understandings from the actor who submitted the statement.

2.5.4 Changes

In the start of the process, interests had not been settled. There is a broad willingness across among the actors (except from the Regional health authority) to look at as many as four options. Along with the formal SEA-requirements this encourages an inclusive, arguing, approach within the hierarchical governance structure. This changes as key actors (the mayors) decide what it is that they want, and use a mode of interaction appropriate to further this end (bargaining). When they are down to one alternative, it is possible to change back into a more ideal planning/SEA approach in order to solve issues within that one area.

More local actors are getting involved as planning is getting more detailed, so there is a change in knowledge forms as more local, every day and milieu knowledge are being taken up. There is in other ways a change in knowledge use due to the increasing level of detail in the planning process.

In terms of dominant knowledge forms we have seen changes from expert knowledge being strongly represented in the first SEA, to steering knowledge taking the scene with the deal between the mayors, and finally to local knowledge, both in the expert form of and the milieu and every day form becoming dominant with planning for only one location.

2.6 Identifying 'Governance For Sustainability'

2.6.1 Assessing Sustainable Development in the Selected Case

In accordance with the conceptual framework of G-FORS, the case on Molde new hospital has been assessed in terms of the three-dimensional conception of sustainable policy developed by William Lafferty. These three dimensions are *comprehensiveness*, *aggregation* and *consistency*. "Comprehensiveness" denotes the extent to which environmental aims are taken into account in policymaking, over a broad spectrum of actors, time and issues. The broadness and complexity of the knowledge base are also

relevant criteria in this dimension. "Aggregation" has to do with the degree to which these concerns have actually been integrated into policy. The assessment of "consistency" identifies elements of policy which seem to be contradictory, and discusses possible points of divergence in the knowledge base.

The analysis has taken departure in the definition of sustainability laid out in the conceptual framework. In this understanding, sustainability has economic, environmental and social dimensions.

The analysis will be presented in full text in the final version of the report. What follows are key observations.

Comprehensiveness

- The SEA procedure has secured that a broad array of knowledge forms has been obtained and processed. In addition to the concerns assessed in the SEA, the knowledge base also includes concerns about effective health administration, more specifically about the effectiveness of establishing two hospitals in the neighbouring towns of Molde and Kristiansund. Lastly, what we have termed "strategic" concerns have been introduced into the knowledge base. This knowledge has to do with local stakeholders' attempts at maximising state funding and job creation in the region. All in all, these are indications of high comprehensiveness.

- The SEA procedure is set up to favour broad participation of local stakeholders. However these opportunities have only to a very limited extent been used, especially in the first SEA. This indicates a deficiency of comprehensiveness.

- The use of SEA may actually be detrimental to local stakeholder participation and inclusion of local knowledge. This observation has to do with the rather problematic division of labour between strategic planning issues and zone planning issues. SEA is supposed to focus on the strategic issues, and as a consequence many issues are rejected because they are seen as too particular or detailed. However many local stakeholders find it difficult to relate to such issues on a strategic levels, and their concerns will frequently bee of a rather place-specific and spatially limited scope. This may explain why few have become involved in the SEA. Paradoxically, it can be contended that

SEA may be detrimental to local knowledge, and thereby comprehensiveness.

- We have observed a few complaints over consequences that are not addressed in the SEA. However some of these were dealt with, including notably by commissioning a report on consequences for transportation. All in all, these observations indicate good comprehensiveness.

Aggregation

- A key observation in the case study is that the SEA did not actually impact on the location decision. Following the local council's adoption of the SEA and their subsequent vote in favour of the location recommended in the SEA, the matter was turned on its head because of the informal agreement between the mayors of Molde and neighbouring Kristiansund based on strategic knowledge (how to secure state funding for one hospital in each city). As a consequence, aggregation is very low.

- Concerns about the consequences for effective health administration were totally disregarded in the decision-making process. These concerns are however quite important to the economic sustainability of the system for health service provision. Because resources in this sector are chronically strained, the failure to organise the structure of the system effectively may jeopardize the sustainability of the system. This indicates a low degree of aggregation.

Consistency

- Although it has been noted that the strategic knowledge in the agreement between the two mayors effectively supplanted the SEA as a basic premise for the location decision, it should be noted that the location promoted by the mayors (and subsequently by the board of the Regional Health Authority) is seen as quite acceptable in the SEA. Although the SEA recommends the Hjelset location, Øvre Eikrem is also seen as admissible in light of the consequences identified in the SEA. As such, consistency seems to be satisfactory.

- As noted, it has been contended that the concern for effective health administration speaks in favour of just one hospital in the area, and the decision for two hospitals can be seen as detrimental to economic sustainability. This indicates a low level of consistency.

- Doubts have been raised concerning the consistency between the assessment of consequences and the concluding recommendations in the SEA. This indicates a moderately low level of consistency.

2.6.2 Assessing the Legitimacy of Policy-Making in the Selected Case (SEA)

The analysis in this section has taken departure in the three-dimensional understanding of legitimation provided in the Conceptual framework. *Input* legitimation denotes the richness of interest representation in policy-making. *Throughput* legitimation has to do with transparency and accountability. *Output* legitimation refers to the legitimising effects of (perceived) problem-solving abilities.

Input legitimation

- Involvement in the first SEA was very sparse, especially from local actors. This clearly undermines its input legitimacy. It should be noted that the scarcity of involvement probably is caused by particularities pertaining to the SEA procerdure. Firstly, the *Øvre Eikrem* location seemed improbable, and it was just one out of four options – in accordance with good SEA practice, several options were assessed. This probably hampered mobilization among local actors. Furthermore, the SEA is seen as a *strategic* document, and detailed inputs are not sought for. Local stakeholders may feel that this makes the SEA difficult to relate to, and some of their inputs often will be regarded as of too limited scope.

- Even so, few complaints were filed, probably because the second SEA and the planning process for the municipal plan for Øvre Eikrem was much more inclusive. This indicates a high level of input legitimation in the last action arena.

- We have argued to the effect that the municipal council bowed to the pressure from the informal mayor agreement and the decision in the board of the Regional Health Trust. By setting aside their own decision for the Hjelset location, and allowing the administration to produce and submit a plan it had not requested (før Øvre Eikrem), the council allowed the representative chain of authority to break down. It can be argued that this endangered input legitimation because the authority of the elected, representative body was set aside.

Throughput legitimation

- Throughput legitimation was high during the production of the two SEAs, and in the council's decision-making processes. These processes took place in accordance with legislation containing provisions for transparency, including the Planning- and building act, the publicity act and the municipality act.

- The agreement between the two mayors was never disclosed to the public, under conditions of zero transparency. Throughput legitimation in this phase therefore is nil.

- The decision in the board of the Regional Health Authority was intransparent in the sense that it came as a surprise to everyone except some of its members. Although the decision was made public post hoc, there exists no written minutes explicating the arguments for choosing the Øvre Eikrem location. Throughput legitimation in this phase is therefore very low.

- Inputs to the SEAs received very adequate responses, explicitly stating the municipality's assessment of the input and whether or not (and why) it would be used in the process further on. This indicates high throughput legitimation.

- However the first SEA is not very explicit in terms of the relationship between the consequences identified in the SEA and the conclusion which was taken in terms of recommending Hjelset. This indicates moderately low throughput legitimation.

Output legitimation

- The output of the process so far is the provision of the necessary basis for moving on with the detailed planning and eventual construction of the hospital. This indicates high output legitimation.

- Proponents of the "One hospital" cause were not satisfied with the outcome of the process, and continue their efforts to stop the plans for building a new hospital. Yet they have no special complaints about the choice of *location* as such – if the hospital is to be built, they have no argument against building it at Øvre Eikrem. Furthermore, although the choice of location is not that recommended in the SEA, the consequences of this option is still seen as satisfactory. This indicates adequate output legitimation.

2.6.3 Synergies/Contradictions between Governance Arrangements and Knowledge Forms on the one side and Sustainability and Legitimate Policy-Making on the other

Sustainability and governance mode

Hierarchy promotes comprehensiveness in the sense that SEA regulations as well as planning related norms specify the kinds of knowledge and premises to be included in the impact assessment. These specifications can also be constrictive however, as they may exclude knowledge relevant for comprehensiveness. Firstly, the SEA norms and regulations leave no room for particularistic knowledge, as the SEA is supposed to focus on consequences relevant for society in the wider sense. Secondly, expressions of interest by any particular actor will also normally be excluded.

Hierarchy does provide some degree of aggregation as the municipality is obliged by SEA regulations to provide responses to all inputs given to the SEA. This ensures that arguments and inputs are at least considered – but there is of course no guarantee that they will be implemented.

Hierarchy does not seem to have ensured consistency in this case, however. The process as a whole is marked by the intervention of

the two mayors' agreement, which arguably supplanted all other considerations. No matter what were the consequences identified by the SEA, the decisive factor was the agreement.

The relative degree of consistency in the final decision was, following this, not caused by hierarchy but by arguing and bargaining in a network. The network mode of governance has not provided comprehensiveness or aggregation, because the two mayors' agreement focused solely on one aspect. But the final decision on location was quite acceptable (albeit not optimal) according to the SEA, and so consistency can also be seen as acceptable.

Interaction between governance mode and knowledge

The Molde new hospital case contains three main knowledge themes; medical-administrative knowledge (effects on the efficiency of the hospital structure from the location and number of hospitals), SEA knowledge (consequences for environment and society related to the individual location options) and strategic knowledge (direct and indirect benefits for the area in which a hospital is located). The hierarchical structure of the SEA promoted SEA knowledge, but barred the two other themes. Strategic knowledge was introduced into the decision by means of a network mode of governance. Medical-administrative knowledge was promoted by means of arguing partially regulated by hierarchy, in the sense that the health trust was allowed to give inputs to the planning procedure.

As argued, these forms of interaction between governance mode and knowledge did provide a good degree of comprehensiveness, due to the fact that all themes were put on the table in the process. We would argue that aggregation was low, because in the end strategic knowledge became hegemonic. Consistency was however reasonable, because the location decision effectively decided in accordance with strategic knowledge was acceptable from the SEA point of view.

Learning

The SEA and planning procedure has involved a lot of knowledge production and management in the municipality, and it is likely that this has in itself been inductive to learning. Planners and

managers accumulate wide-ranging bodies of knowledge by participating in such processes.

Knowledge forms and sustainable development

We would argue that the three knowledge themes identified above promote different aspects of sustainable development in the wider sense. The medical-administrative knowledge would ideally promote the sustainability of the health care system, because this system (notably universal health care rights) can only be retained if costs are kept under control. This effect would go under the headings of economic and social sustainability. The decisions made in this case have not however made any such contribution, as the probable outcome (one hospital in each city, less than one hour apart).

SEA knowledge served to promote sustainability in the environmental sense, as it identified potential issues relating to the natural environment for each optional location (first SEA) and allowed adaptation to such issues for the location eventually chosen (second SEA). It also identified issues relevant for social sustainability, to do with transportation amongst other issues.

As for strategic knowledge, it could be contended that this knowledge form promoted social sustainability by securing employment and revenues for the city of Molde. This effect is substantial, as the hospital provides about 2000 jobs in a city of about 30 000 inhabitants. Because this knowledge form turned out to be hegemonic, strategic knowledge had the greatest impact on sustainability in this case.

Reflexive knowledge, effective and legitimate policy-making and sustainable development

In the Molde new hospital case, reflexive knowledge is represented partially by the juxtaposition of various knowledge forms taking place through the duration of the two SEAs, partially through the fact that the three key knowledge themes confronted each other through the process as a whole. This reflection can be said to have been effective in the sense that stalemate was avoided – a decision was actually made – and the process provided a municipal plan for the selected location. One could argue that SEA does not promote effectiveness due to its time-consuming character; however sustainability does require taking a number of issues into consideration.

3 Case study on emission trading

3.1 Context and Conditions

3.1.1 Case History, Projects, Available Rules, Themes, Problems and Spatial Peculiarities

The case studies on emissions trading examine three enterprises subsumed under the Norwegian quota system. Following the coming into force of the Quota Act and the implementation of the quota system in 2005, these enterprises were among the 51 in all that became obliged to obtain and cancel quotas corresponding to their CO2 emissions. The empirical study was conducted in 2007, but the analysis follows the three enterprises through the three year-period in which the first quota system was in force.

The quota system is to a large extent enacted in a bilateral relationship between the Norwegian Pollution Control Authority (SFT) and the individual enterprises. Key issues are the enterprises' reports on previous year's emissions, the decisions on quota allocation, the subsequent cancellation of the appropriate volume of quotas and the strategic responses chosen by the enterprises to adapt to the change in business conditions imposed by the new system. These issues involve the execution of hierarchical authority, co-ordination in markets and elements of arguing between the enterprises and the authorities. Knowledge flows include a variety of expert knowledge used for reporting emissions and implementing technological change, but market knowledge and steering knowledge are also highly relevant.

Whereas some enterprises for a variety of reasons accumulate a surplus of quotas, others are faced with a shortfall. For the latter group of enterprises, available options in the short run are mainly to buy quotas or to reduce or terminate production. In the longer run the enterprises may consider implementing changes in their production technology, including the use of quota exempt fuels. But such options depend on technological particularities, and are not equally available to all branches of industry.

The three enterprises chosen for the study are quite different in terms of these conditions. *Trondheim Energy Remote Heating Company (TEV)* has accumulated a surplus of quotas due to a shift in energy carrier made possible by the inherent flexibility of the remote heating system. The cement producer *Norcem* has developed new technologies enabling the use of special waste in their ovens, thereby accumulating a surplus. This option is not available to the third enterprise, chalk producer *Verdalskalk*, and this enterprise has experienced a shortfall in quotas. The three enterprises and their case histories are presented in some detail in the following sections.

Verdalskalk

Verdalskalk is a producer of chalk located in the small town of Verdal (13 962 inh.), in Nord-Trøndelag county in central Norway. The enterprise is a subsidiary of the corporation Franzefoss Minerals AS, which was established in 1919 and has its head offices in Bærum, in the vincinity of Oslo. Verdalskalk has 45 employees.

Verdalskalk is the number 12 largest CO2 emitter of the 37 enterprises that received quotas in 2005-2007. However, the 146,763 quotas allocated to Verdalskalk in the period comprised only 0,76% of the total volume of quotas in the system.

Verdalskalk produces chalk from minerals (Limestone) extracted in the mines in nearby Tromsdalen, the largest and purest source of Limestone in northern Europe. The chalk produced by Verdalskalk has a very high level of purity, and is used by the food industry among others.

Chalk is produced in a fairly straight-forward process, which is however highly energy-intensive. The mineral, limestone, mainly contains Calcium Carbonate (CaCo3). In a process called

Calcination, the mineral is heated to a very high temperature (about 1000° C) causing Carbon Dioxide (CO2) to be released, transforming the Calcium Carbonate to Calcium Oxide (CaO) or burnt chalk which can be transformed further by adding water. Chalk is used for a wide variety of purposes, including fertilizing, food production, paper production, construction and cleansing.

Because the purpose of the production process is to release the CO2 from the Calcium Carbonate, CO2 is an unavoidable by-product. These emissions however only account for about 28% of the climate gas emissions – 72% is caused by the ovens, because large amounts of fuel are required to reach the necessary temperatures.

Verdalskalk's dilemma is that it's quite difficult to reduce both forms of emissions.

- Because the technology for CO2 harvest is still in its infancy, the 28% released through the production process cannot be contained by currently available procedures. In paper production, however, the burnt chalk is recarbonated in order to produce precipitated calcium carbonate (PCC). In this process the Calcium Carbonate absorbs CO2 from the air, effectively neutralising the climate gas emissions. There is no paper factory in Verdal, but the bulk of Verdalskalk's exports of chalk is shipped to Finland for PCC production.
- As for the fuel used by the ovens, Verdalskalk currently uses waste oil, which is subsumed under the quota system. Available forms of biofuel or other quota excempt fuels are not viable options, due to the purity requirements of Verdalskalk's high-grade product. The oven constructed in 1995 may be converted to burn natural gas in stead of waste oil, but there are currently no pipelines for gas distribution to domestic consumers in Norway.

For Verdalskalk, the decision to use 1998-2001 as reference period for determining production volume and quota allocation was rather unfortunate. In 1998, Verdalskalk's mother corporation commenced production in a newly built oven in Finland, causing a temporary reduction of production in Verdal. Because of this, Verdalskalk felt it would be inappropriate to use historical

production figures as a basis for determining quota allocation. Accordingly, Verdalskalk applied for a volume of quotas based on estimated production in 2005-07.

This optional procedure is pursuant to the stipulations in §8 of the quota act. These stipulations allows for the use of estimated production volume for determining quota allocation in stead of historical data, provided that production volume in the reference period is *substantially* atypical. The difference between typical and actual production in the reference years needs to be at least 25%. Verdalskalk's slump in production however only comprised 24,5%, and the Pollution Control Authority refused to apply the figures for estimated production volume. As a result, Verdalskalk ran short of quotas. It was allocated 48 921 quotas for 2006, whereas actual emissions in the same year was 59 760 tonnes.

Verdalskalk chose to purchase quotas to cover the difference. They purchased quotas from SMA Magnesium for €9 pr. quota. This enterprise had a surplus of about 16 000 quotas in 2006. Furthermore, Verdalskalk reportedly raised prices slightly to cover some of the costs. Information on these dispositions is however vague, as the enterprise is reluctant to disclose what is sees as business sensitive internal information.

Trondheim Energy Remote Heating Company AS (TEV)

TEV is a fully-owned subsidiary of Trondheim Energi AS, a power company in Trondheim, Norway's third largest city (161 730 inh.). Trondheim Energi AS is fully owned by Statkraft, a state-owned power company which is Europe's second largest producer of renewable energy. TEV has 70 employees.

Trondheim Energi AS is a major electricity producer, but since this current comes in the form of hydroelectricity it has no relevance to the quota system. Trondheim Energi is however also a producer of remote heating through its through its subsidiary TEV. This company supplies heating through a 150 km network of pipes in the Trondheim area, covering about 30% of the city's heating needs. About 5000 private dwellings and 500 enterprises and public offices are heated.

TEV is the 13th largest emitter of the 37 enterprises that received quotas in 2005-2007. However, the 132,082 quotas allocated to TEV in the period comprised only 0,68% of the total volume of

quotas in the system. The emissions originate from the production of heat, which takes place in 10 plants or "heat centrals" in the area. These centrals use a variety of fuels. The largest central uses waste, which is sorted for recyclable materials. 60% of the waste comes from private households, the rest from industry. The other fuels used are methane gas (from a landfill), biofuel, liquid natural gas (LNG), buthane/propane (LPG), heat pumps, electricity and light oil.

LNG and LNP are subsumed by the quota system. TEV was granted quotas intended to cover 95% of the enterprise's CO2 emissions from LNG and LPG, in accordance with the system. Even so, the company has accumulated a substantial surplus of quotas. In 2006, the company only had to cancel about half of its quotas – 44 027 quotas were granted, but as few as 22 772 were cancelled.

The reason why this situation has occurred is that TEV decided to install two new biogas ovens at a very favourable point in time, and then a few years after this managed to increase their use of biogas. TEV's application for quotas was based on expected use of LPG and LNG in the period 2005-2007, not historical emissions in the reference period. The Pollution Control Authority accepted this, because two ovens for burning LPG and LNG had been constructed and put to use in 2000 and 2003, constituting a "substantial" change in production technology. In 2007, however, TEV started burning biogas from a landfill producing as much as 150 GWh and substituting all their use of oil and some of the use of LNG and LPG. Because biogas is seen as carbon neutral, this shift in technology constituted a dramatic reduction of eligible CO2 emissions, which in reality reduced TEV's need for quotas. The Pollution Control Authority however decided to disregard this fact and allow TEV to retain their quotas, even though this created a large surplus for the enterprise. The Authority felt that reducing the volume of quotas would be to punish the enterprise for implementing a transformation which is highly favourable from an environmental point of view.

Norcem A.S Brevik (Norcem)

Norcem is Norway's only cement producer. The company has about 500 employees, and is located in the small town of Brevik in

the eastern part of the country.[8] Norcem is a part of the major German cement- and construction corporation HeidelbergCement, which employs about 70 000 people in 50 countries.

Norcem is the third largest emitter of CO2 subsumed under the quota system. In the period 2005-2007 the enterprise was allocated a total of 2,712,399 quotas, equivalent to 14,1% of the total volume of quotas in the system.

The source of these emissions is the cement oven, partially due to heat production, partially as a consequence of the production method. Cement is produced by calcination of Limestone, similar to chalk production (see above, on Verdalskalk). Because the purpose of calcination is to release CO2 from the Calcium Carbonate, emissions are unavoidable in the absence of effective technologies for CO2 harvest. As for energy use, however, Cement production is much more flexible than chalk production. Contrary to high-grade chalk, cement is described as a "dirty" product. As long as the temperature needed for calcination is reached, the choice of energy carrier can be made without regard for potential pollution of the product, such as soot.

Norcem benefited from this fact because it has been able to gradually shift energy carrier from coal to waste. Cement ovens are highly suitable for burning special waste, and the national refuse disposal plant is located on Norcem's grounds. In Norcem Brevik's application, historical figures for emissions on the reference period were supplemented with estimated emissions in 2005-2007. Whereas production volume was expected to increase, emissions were expected to decrease due to increasing use of biogas, and so Norcem applied for a slightly lower volume of quotas than would follow from actual emissions in the reference period. Even so, the Pollution Control Authority chose to allocate quotas based on historical emissions in the reference period. The reason was that doing otherwise would be the same as punishing the enterprise for implementing a highly environmentally favourable shift in technology.

> På bakgrunn av en helhetsvurdering finner SFT å tildele virksomheten kvoter på bakgrunn av historiske

[8] Brevik is part of a small region containing 85 405 inhabitants in six municipalities. The area has a high density of heavy industries.

> utslipp etter klimakvoteloven § 8 andre ledd bokstav a). SFT har da særlig lagt vekt på at overgangen fra kull til bioenergi er et positivt utslippsreduserende tiltak som i betydelig grad er motivert ut ifra innføringen av kvotesystemet. SFT finner derfor ikke å kunne tillegge utslippsreduksjonen avgjørende betydning ved kvotetildelingen.

Because the Pollution Control Authority found that the shift from coal to biogas constituted a "substantial" shift in technology, the Authority could have chosen to allocate quotas based on estimated emissions. This would effectively have meant a reduction in quota allocation, because estimated emissions were lower than historical emissions in the reference period. SFT however still chose not to take estimated emissions into account, because they felt this would be seen as unreasonable and unfair. They stated explicitly that the transition from coal to biofuel is desirable in terms of emissions reductions, and that this was motivated by the introduction of the quota system.

As a consequence, Norcem has accumulated a considerable surplus of quotas. The enterprise has refused to disclose their decisions pertaining to these quotas.

3.1.2 The role of the media

The local press has shown little interest in the carbon emission quotas their local industry has had to face. Carbon emissions are not perceived as a local problem. However, if the carbon quotas cause higher expenses and lower profit, even perhaps endanger the employment in the local community, the local press covers it. The local press' coverage of these three enterprises seemed to protect the local companies and favour local jobs at the expense of the environment.

The industrial area of Grenland, where *Norcem Brevik* is situated, is the area in Norway with the highest level of CO2 emissions. The local press is highly conscious of this fact, and the level of emissions is therefore an issue frequently discussed in the two local newspapers *Varden* and *Telemarksavisa*. The press' attitude towards the climate quota act seems to be ambiguous: On the one hand, the papers are bragging about how the Norcem Brevik has

changed from fossil to bio fuel and thereby are reducing the emissions, contributing to the slow-down of global warming. On the other hand, the focus is on jobs that might get lost if the quota restrictions are too severe.

In the local newspapers covering the municipalities in which Trondheim Energi Fjernvarme, *Adresseavisa,* and Verdalskalk are situated, no articles were written about the issue during the period of developing the system and implementing it (2000-2007). In the municipality of Verdalskalk, Verdal, a number of articles were published on other forms of pollution from the chalk factory, such as the environmental pollutant PCB, resulting from the using waste oil as fuel.

Regarding the implementation of an emission quota system, the local press has scarcely been aware. This is probably an issue more extensively covered in national media. The local press is inherently patriotic.

3.2 The action arenas

3.2.1 Holders – their Resources and Roles

The three case studies analyse key events related to reporting of emissions, allocation of emission quotas and submission of quotas for cancellation to the quota registry. These events occur annually in accordance with a set schedule,[9] which can schematically be represented as in Table 3.1.

[9] Forskrift om kvoteplikt og handel med kvoter for utslipp av klimagasser av 23.12.06 (klimakvoteforskriften) §2-1 og særskilt tillatelse til kvotepliktige utslipp.

Table 3.1 *Implementation of the Quota system: Annual events*

Event	Enterprises submit reports on previous year's emissions	Acceptance of report or request for supplementary information by the Pollution Control Authority	Quotas for current year are allocated by the Pollution Control Authority	Quotas covering previous year's emissions are submitted for cancellation by the enterprises
Date	January	March	March	May
Action Arena 1				
Action Arena 2				

Two Action arenas have been defined for each of the three case study enterprises. These can be summarised as follows.

- The first action arena contains three events. Firstly, each enterprise submits a report on previous year's emissions. These reports are prepared in accordance with quite rigorous and specific guidelines set down in the regulations, including specifications of the methodology for measuring emissions for each branch of industry subsumed by the quota system. Secondly, these reports are treated by the Pollution Control Authority. This agency may request additional information before the report is formally accepted. Each enterprise is notified of the decision in a letter, which also summarize the main items of the report. Thirdly, the Pollution Control Authority issues quotas for *current* year emissions, based on the report on previous year's emissions.
- The second Action arena focuses on the fourth event in the annual schedule, namely the settlement for previous year's emissions. By May 1. each enterprise is required to submit a number of quotas covering previous year's emissions. The number of quotas is specified in the letter containing the acceptance of the report on previous year's emissions.

Interaction between the subjects and the enactor of the quota system (the enterprises and the Pollution Control Authority) takes place on a bilateral basis, and so the action arena must be defined for each of the three case study enterprises. Furthermore, the quota system studied in G-FORS was a preliminary system for the years 2005-2007. Accordingly, the two action arenas are repeated for each enterprise three times.

Holder concept

Holders fall into two broad categories: Those in the enterprises and those in the Pollution Control Authority. Within the enterprises there are basically three categories of holders.

- *Share holders* are literally the owners of the three companies. Verdalskalk's majority owner (55%) is the corporation Franzefoss Minerals AS. Norcem Brevik is owned by the German corporation HeidelbergCement. TEV is fully owned by Trondheim Energi.
- *Knowledge holders*: The case studies on emission trading involve knowledge about production technology and energy use, about market relations and production economy, and about the quota system on the national and international level. In the three enterprises studied, there are only limited distinctions between the holders of these knowledge forms. Key persons in the enterprises seem to be quite well-versed in all three branches of knowledge. Even so, the fact that TEV has employed a full-time person in charge of the external environment indicates attempts at increasing knowledge specialisation. But because this person was employed recently, her knowledge was still clearly inferior to that of another person who was interviewed, the person in charge of planning and development.
- *Stake holders* would include all employees in the three enterprises and members of their households, members of the communities in which the enterprises are localised and suppliers of raw materials and intermediate goods.

In the Pollution Control Authority, SFT, holders include the following:

- *Knowledge holders* are firstly the officers put in charge of supervising and guiding the three enterprises, secondly the chief officer of the Climate Section.
- *Right holders* are identical with the Knowledge holders, as they have the right to enforce the provisions in the Quota Act and in its regulations.

Status of actors

The enterprises as well as the Pollution Control Authority can be seen primarily as collective actors. Although within the enterprises there are individuals who act relatively independently based on formal position and/or superior knowledge, they primarily act collectively.

Sectoral affilliation

The Pollution Control Authority and the three enterprises are the only actors in the action arenas. Whereas the Pollution Control authority is a branch of the national environmental administration, the three enterprises are private companies.

Attributes of actors

As for the preferences of the actors, the Pollution Control Authority is given the mandate to implement and to enforce the quota system. As such, the preference structure seems unambiguous. However, as many respondents have pointed out, the operation of the system leaves considerable latitude for the use of discretion by officers in this agency. This has above all been the case regarding enterprises established after 2001. These enterprises were allocated quotas for 2005-7 based on estimated emissions, and these estimates were in some cases based on expected increases in activity during the three-year period of the quota system. The SFT has responded to delays in such increases of activity by choosing to cut back on the number of quotas allocated to the enterprise in question. In case the intended increase in activity occurred the following year, the enterprise would be short of the necessary quotas. In other cases, SFT has chosen to let enterprises keep their allowances of quotas based on estimated activity, even though actual eligible emissions have decreased due to for instance shift of energy carrier (substituting oil for gas of biofuel). This indicates that the preference of the SFT is to operate

the system so as to minimize climate gas emissions – not just to implement the system according to set regulations.

As for the enterprises, the overarching preference is to maximise profits, or in other words, to minimize the negative impacts of the quota system on their earnings. In general terms, a limited number of responses are available to this end:

1. Implementation of new technologies
2. Substitution of energy carrier
3. Minimize losses in earnings from buying quotas by increasing prices or reducing/terminating production

As shown in section 2.1 to this chapter, these responses are only to a varying degree available for the case enterprises, due to technological limitations or market conditions. In any case, we would assume that the enterprises would prefer the response that reduces earnings less than all other available responses.

The Pollution control authority operates within a knowledge framework which is quite succinctly defined in the regulations. The verification of emissions reports from the enterprises requires substantial technical knowledge. Because the quota system subsumes enterprises from different branches of industry, each with their own particular production technology, the educational background of employees in the Pollution Control Authority has to be supplemented through accumulation of in-field knowledge with the individual officers. Each enterprise has a designated officer, and each officer is responsible for four to six enterprises.

As for the enterprises, managing the quota system requires a composite of technical, strategic and market-based knowledge. Measuring and reporting emissions in accordance with the set procedure requires considerable technical knowledge, as does the assessment of available responses to the challenges posed by the quota system (implementation of new technologies and/or substitution of energy carrier). Assessment of market-based responses (increasing prices or reducing/terminating production) requires intimate knowledge of the market in which the enterprises operate; in particular, knowledge about price sensitivities and level of competition. These forms of knowledge need to be coordinated, in order to assess the relevant actions.

The enterprises above all select course of action based on an assessment of the relative costs of the responses available. These assessments of course vary according to the time scale in question. In TEV, respondents underscore the flexibility inherent in the remote heating system. Centralised production of heat allows for considerable flexibility in terms of choosing energy carrier. For instance, a relative increase in the price of electricity would imply a shift from electricity to other energy carriers. The quota cost is simply implemented into these calculations the same way as with other costs, making LNGs less attractive. In the short run this kind of flexibility is limited by the capacity of the different ovens. In the long run, the flexibility is greater because of investment options.

The SFT primarily select course of action based on their formal role in the quota system. A distinction may be made between the bureaucratic implementation of set regulations and actions selected for the benefit of the environment. Although these will generally speaking coincide, the SFT has some room for discretion and has been observed to choose action with explicit reference to environmental effects. As noted, SFT chose to allocate quotas to Norcem based on historical data rather than estimated emissions, not because the regulations obliged them to do so but because the transition from coal to biofuel was seen as desirable from an environmental perspective.

As for the Pollution Control Authority, the case studies indicate that they act upon a quite rigorous interpretation of the rules. One of the case study enterprises, Verdalskalk, applied for quotas based on estimated emissions, because the reference years were atypical. However because actual production was only 24,5% lower than typical in the reference years, the application was denied – SFT used 25% deviation as a limit for accepting the use of estimated production.

The three enterprises are quite different in terms of resources; however each can draw on resources from their mother companies. Norcem AS is part of the Heidelberg Cement AG, a big corporation which operates its own research facilities. Verdalskalk is owned by Franzefoss Minerals AS which is a corporation of substantial size in Norwegian scale. TEV is fully owned by one of Norway's biggest energy providers on the private market.

Hegemonic actors

The quota system is enacted pursuant to the provisions of applicable legislation and regulations. The Pollution Control Authority has the authority to issue fines to all enterprises that do not submit reports on previous year's emissions or fail to settle their quota accounts. Accordingly, the Pollution Control Authority is a hegemonic actor.

3.2.2 Absent actors

In the Emissions trading case studies, the actors operate in a highly regulated environment. The allocation and subsequent cancellation of quotas is a bilateral matter involving no actors but the individual enterprises and the Pollution Control Authority. As such, there are no absent actors in the strict sense, at least in terms of first order governing.

3.2.3 Observed modes of interaction

The predominant mode of interaction observed is that of command and control. The Pollution Control Authority acts on its regulatory powers, approving or rejecting emissions reports, allocating quotas and supervising the quota registry. The enterprises prepare emissions reports in accordance with the set procedures, and ensure the annual cancellation of the appropriate volume of quotas.

Because the enterprises are organised as hierarchies, decision-making procedures within the firms are also hierarchical in nature. Decisions are made on lower levels subject to the approval from higher levels in the organisation. For instance, Norcem is not allowed to buy or sell quotas in the absence of approval from the London office of Heidelberg Cement.

There are however indications of other modes of interaction as well. Firstly, there are strains of *arguing* and possibly *bargaining* between the Pollution Control Authority and the individual enterprises. This interaction takes place because the enterprises may communicate directly with their supervising officer in the Authority. In cases of disagreement, notably concerning measurement methodology, the Authority is receptive to

arguments and may in some cases accept compromises. Arguments were also exchanged pertaining to the first year's allocation of quotas, notably concerning the use of historical emission data in the reference period vs. the use of estimated emissions.

Secondly, the relationship between the enterprises subsumed under the quota system has elements of the *market-based* mode of interaction. Quotas are bought and sold similarly to other commodities, although the number of actual transactions carried out in the three years seems to have been rather low. Furthermore, because all decisions made by the enterprises are geared towards maximising profits, adjustment to signals from their respective markets can also be seen as instances of a market-based mode of interaction.

3.2.4 Discourses

The discourses observed in the case studies on the 2005-2007 system alternates between the governing orders. The fact that the system is not established once and for all but will be revised early on in the Kyoto commitment period has probably kept the discussion on second order governing warm. Key questions include the fairness of the system in general and pertaining to the individual enterprise in particular; the ideological and theoretical basis of the system; whether or not it will contribute to emissions abatement; how it will affect each individual enterprise and available strategies for minimising adversarial effects (costs) of the system.

It was clearly the intention of the quota act that enterprises should be allocated quotas based on historical emissions in the reference period (1998-2001). The stipulations allowing the use of estimated emissions as a basis for this decision were meant to be used in special cases, and it came as a surprise the Pollution Control Authority that as many as 46 out of 51 enterprises eventually came to use estimated emissions. Estimated emissions may only be used in cases of "substantial" changes in production methodology, or in cases where production in the reference period deviated "substantially" from typical levels of production. The somewhat ambiguous nature of these stipulations provided fuel for argument

concerning the use of estimated emissions vs. the use of historical data.

These arguments run in several directions. Some actors question the *effectiveness* of the system. Since a number of enterprises have accumulated a surplus of quotas, some contend that the market for quotas has become insufficiently "tight" to provide much incentive for emission cutbacks. Others question the *fairness* of the arrangement. Some feel that the decisions in the Pollution Control Authority concerning the use of historical data vs. estimated emissions seem arbitrary.

Furthermore, there is a discourse intertwined with these issues concerning the ideological basis of the system, and the applicability of such an incentive-based system. It has been contended that the system is an economists' pipe dream, based on theory and not effective in real-life conditions. Firstly, some contend that substantial cutbacks require development of new technologies, and that the quota system does not encourage this. S&T development is costly, but the quota system does nothing to provide the capital for such research; on the contrary, it draws resources from the enterprises. Secondly, it has been noted that incentive-based systems only work if there are optional technologies available. This argument is particularly relevant for Verdalskalk. The enterprise has already implemented "best available technology" and has few options available to cut back on emissions. Yet society needs chalk, including for environmental purposes. If the (future) quota system removes profitability and causes the plant to shut down, chalk will have to be imported from somewhere else, senselessly moving the emission source around the globe without contributing towards actual abatement.

Emissions measurement methodology is certainly a relevant issue, for some of the participants more than others, but this is primarily a technical matter and not subject to "discourse" as such.

3.3 Identifying case specific governance arrangements

3.3.1 Governance Modes/Governance Arrangements

A peculiarity to the quota system is that the actor's conceptions of the governance arrangement tend to vary systematically according to professional background and formal position. Economists, especially in the Ministry of Finance and in Statistics Norway, tend to see the system as primarily a *market-based* mode of governance, emphasising the fact that enterprises are allowed to trade quotas thereby minimising the costs of emission cuts by making sure that these are made in the least costly location. Representatives of the environmental administration, on the other hand (notably the Ministry of the Environment and the National Pollution Control Authority) regard the system primarily as a regulatory device, allowing them to control individual enterprises by use of *hierarchical* authority. But there are also observable manifestations of arguing and bargaining, which suggest that there are elements of *network-based* governance.

Accordingly, the case specific governance arrangements are ambiguous, and need to be seen as composites of elements from all governance modes. The following observations highlight key elements to this assessment.

1. The emissions trading system is an *incentive-based* steering measure, in the sense that enterprises are free to choose their response to the change in business conditions imposed by the system. They are not required to implement specific technologies or indeed to cut back emissions at all, as they are free to purchase quotas in stead.
2. The fact that quotas are tradable is in itself an indication of the appropriateness of regarding the system as a market, although empirical observations suggest that the actual functioning of the system falls rather short of the formal requirements of a self-regulating market.[10]

[10] Notably, there is no independent price formation mechanism. Enterprises use prices on the EU market in stead, and so prices do not reflect the balance between supply and demand on the Norwegian market. The Norwegian market

3. The system includes a plethora of regulatory devices, including notably the procedures for emissions measurement, the mandatory application for quotas, the Pollution Control's authority to approve the emissions reports and their right to make annual quota allocation decisions.
4. Instances of arguing and bargaining have been observed. Due to the limited number of enterprises subsumed under the system, enterprises are allowed to be in direct contact with their designated officer in the Pollution Control Authority, exchanging views on measurement methodology and quota allocation. Some respondents describe the outcome of such exchanges as compromises between opposing views, others highlight the knowledge gap in terms of production technology between the enterprises and the Pollution Control Authority. Furthermore, enterprises (often represented by their trade associations) have entered into discussions and negotiations with the Ministry of the Environment concerning the set-up of the system and the initial allocation of quotas.

The assessment is slightly confounded by the fact that the governance systems of the enterprises differ from that of the quota system. Enterprises can in general be seen as internal hierarchies or networks operating in markets. Quota transactions and other measures implemented to deal with the requirements of the system and minimise the losses incurred by it (including increasing product prices and technological changes) certainly takes place in the context of markets, including the quota market and the market in which the enterprise operates. Even so, the decision-making processes in the firms take place in internal hierarchies, not using a market-based form of governance.

These observations will be elaborated upon below. Items one and two suggest that the appropriate mode of governance is the market. Observations cited under the third item suggest that this market is not just strictly regulated, but to some extent replaced by

is however not a part of the EU market, because quotas from the Norwegian system are inadmissible in the EU. Norwegian enterprises may however purchase and cancel quotas in the EU, and submit the receipt for cancellation in Norway.

hierarchical regulatory mechanisms. The fourth item indicate elements of network governance.

Because these differing aspects to the governance system have quite diverging effects on knowledge filtering, no attempts have been made to reconcile them or to aggregate them into one coherent "mode". In stead, the analysis will refer explicitly to the different aspects.

3.3.2 Rules in use/Institutional Context

First action arena

In the first action arena, position rules in the Pollution Control Authority (SFT) include the individual officers put in charge of the three case enterprises, and the chief officer in charge of the Climate Section. Positions in the three enterprises include the CEO and the chairmen of the boards. In Verdalskalk there is the Plant Manager of the chalk production facility. In TEV positions below the CEO include the person in charge of the external environment and the person in charge of planning and development. In Norcem there is the person in charge of climate and alternative fules in Norway, Sweden and the Baltics in the Heidelberg group. There are also positions in the Heidelberg group outside Norway. In the action arena these include members of the Expert Group on greenhouse gas trading and the London Office, which deals with quota transactions. Boundary rules in SFT and in the enterprises are determined by employment and formal position.

The scope rule in the first action arena is the allocation of quotas for the current year based on reports on previous year's emissions. In order to accomplish this, the enterprises prepare and submit reports on previous year's emissions. The CEO of each enterprise is authorised to do this. In SFT, the Chief Officer's authority to make allocation decisions is exercised following bilateral consultations with each officer, as well as meetings for the entire unit. The aggregation of emission reports into quota allocation decisions is made based on procedures pursuant to the Quota act, which leaves a certain room for discretion in the hands of the SFT.

As for information, all correspondence between the enterprises and SFT is made public on the SFT website. This is not the case regarding information exchanged informally between the parties, but we have not observed formal rules or procedures for restricting access to such information.

The second action arena

In the second action arena, the enterprises cancel a number of quotas equal to the volume of CO2 emissions in the previous year. As such, the scope rule could be defined formally as the execution of this obligation. We have however chosen to define the scope rule in a broader way. The intention of the quota system is to encourage the enterprises to find ways of reducing emissions. Because the action arena takes place repeatedly, the enterprises may choose among a number of optional strategies for adapting to this requirement over time, notably substitution of energy carrier, changes in the production process, or market-related measures including changes in production volume or in product prices. In order to encompass this broader range of options, the scope rule for the second arena has been defined as *satisfying the requirements of the quota system while minimizing its harmful economic impacts.*

While position and boundary rules remain unchanged from the first action arena, the authority rules change. The authority rule for SFT is to monitor quota transactions, to ensure that all enterprises subsumed under the system actually cancel the appropriate volume of quotas. For the enterprises, the authority rule of the actors involved is to maximise profits in the long run. This rule applies in different ways to different positions, because knowledge of the markets and of the production process is situated in (to some extent) different positions.

As for aggregation rules, the enterprises portray this as a simple production function in the short run. TEV will at all times use the energy carrier which is most profitable, and the value of quotas is fed into this function the same way as with all other costs. Verdalskalk has in the short run chosen to buy quotas in order to cover its shortfall, because the marginal return from production exceeding the volume of free quotas was greater than the price of quotas. Norcem has accumulated a surplus of quotas, and has contemplated selling these. In the longer run, Verdalskalk fears that free allocation of quotas will desist. The enterprise fears that

this will make production unprofitable, which will result in termination of production. TEV pictures a continued emphasis on renewable energy, and wants to decrease the use of fossile fulels even further. Norcem has experimenting with alternative fules. As a consequence, aggregation rules remain basically the same in the long run as in the short run, although the number of optional strategies increase.

Information rules change dramatically from the first to the second arena. Whereas all relevant information is made public in the first arena (due to legislation), in the second arena a lot of information on transactions and market adjustments are kept internal to the enterprises. This is regarded as sensitive business information, and has only partially been revealed to the researchers.

Table 3.2 *Summary of the institutional analysis of the emission trading case studies. Scale: 0-4 (4 is the predominant form).*

	Mode of Governance			
Types of rules	Hierarchy	Network – bargaining	Network – arguing	Market
Position	4	0	0	1
Boundary	4	0	0	1
Authority	4	0	0	0
Aggregation	3	0	1	2
Scope	3	0	2	2
Information	4	0	0	1
Payoff	4	0	0	0
Mode of interaction	4	4	1	1

3.3.3 Changes

The case studies cover a three-year period. The two action arenas have occurred annually, creating something of a repeated game-situation. Although the system has remained largely unchanged through this period, some changes are observable in the action arenas from year to year.

Firstly, instances of arguing seem to have been most prominent in the first half of the period. Following the first emission reports, which were submitted in March 2006, most of the controversies concerning the measurement methodology seem to have been resolved, giving fewer occasions for arguments between the enterprises and the SFT. Furthermore, arguments concerning the initial allocation of quotas focused on the original application from the enterprises. As noted, this argument was not least about the use of historical data vs. estimated emissions. As the applications and complaints to these were resolved, there was less to argue about.

Secondly, market transactions were absent in the first two years, and started to occur in the last year. Because quotas for the *current* year were issued two months prior to the deadline for cancellation of quotas for the *previous* year, enterprises were able to "borrow" quotas from themselves, thereby postponing purchases from the market.

3.4 Identifying the case specific KnowledgeScapes

3.4.1 Dominant Knowledge Forms: Content/Claims of Knowledge Forms

Forms of knowledge

Several *forms of knowledge* are represented in this study. They are identified mainly through statements made by the actors, and as knowledge used to validate arguments and claims.

First of all, *institutional knowledge* plays a central part on both action arenas. The term refers to knowledge of the logic and rules of the institutional arrangements. (CF 2006: 44) In our case, this means an understanding of the quota system in general, and the mechanisms of the system in particular. A holder of institutional knowledge refers to the specifics of the system, such as paragraphs and procedures of the quota system. In other words, paragraphs are used as arguments. We identify institutional knowledge

through statements such as "The decision was based on the 25 % rule."

Secondly, we have located *economic (market) knowledge* as an important form of knowledge, particularly in the second action arena. Economic knowledge refers to knowledge of efficiency of markets, calculations of costs and profit, and strategies to maximize rates of return. For instance, when actors say they are loosing in competition with European companies, this is a statement based on economic knowledge.

General knowledge of technology is captured by the term *expert (scientific) knowledge*. The term "expert" might cause confusion. Many actors are experts in one knowledge form. A company is the expert on local knowledge and product knowledge. The Pollution Control Authority is the institutional knowledge expert. In this study, we limit the definition of an expert, to expertise in science and technology. A holder of expert knowledge has an in-depth understanding of available technology and energy solutions. This knowledge form is mainly present in action arena 2, and is important when companies discuss their options to change technology in order to reduce emissions. We understand environmental knowledge as a sub-category of this form.

A combination of economic knowledge and technical knowledge, *product knowledge* "contains technological knowledge in a more narrow sense". (CF 2006: 43) It is knowledge of technology at a less general and more specific level. In other words, it is *applied* expert knowledge. Knowledge on the best available technology or knowledge of possible energy solutions *to go with* a certain product is considered product knowledge. This knowledge form is used mainly by the companies in both action arenas, and is their most important form of technological knowledge.

Milieu knowledge is generated by practical experience, and captures statements such as "this is the way it's always been done." In our case, traditional ways of measuring emissions, and traditional ways of implementing systems could be considered milieu knowledge.

Local knowledge addresses and integrates fragments of knowledge found at local level, especially with regards to knowledge deriving from everyday practical experience from local production. Integrative by definition, we understand local knowledge as a

context-specific, reflective form of knowledge. For instance, a sense of responsibility towards the local community, regarding local employment and local contributions to climate change are local concerns.

Sector and constitutional differences in knowledge content

The knowledge forms discussed in the previous sections are constructed analytical tools. Variation in content exists within all the various forms of knowledge. In the following, we first discuss how sectors influence knowledge content. We then turn to the constitutional differences in knowledge, and how knowledge forms can be general and specific in content.

The three companies in this study operate in different sectors of the economy, and clearly, the content of the knowledge forms they bring into the action arenas differ because of this.

Most importantly, this applies to their *product and market knowledge*. While they all share a common focus on energy supply, the three companies have product and market knowledge specific to their product and the sector they operate within.

In addition to variation in knowledge following sector differences, knowledge also varies in degrees of *generality*.

Second order actors such as Statistics Norway, the Ministry of Finance, and the Ministry of Environment have theory-based and general *institutional knowledge*. For instance, the institutional knowledge of Statistics Norway is based on models used in economic theory. The Ministry of the Environment has a broad and general focus, and the knowledge is oriented towards international and European developments, and national political goals. Being both a first and second order actor, the Pollution Control Authority has both general and specific institutional knowledge: procedural, detail-oriented and technical. This is an implication of the role the Pollution Control Authority has in the system: to make the guidelines from the Ministry operational, the actual implementation of the quota system.

First order actors, the companies, have a more specific, but narrow institutional knowledge. They have very specific and detailed knowledge regarding the details of the system that applies to their

company in particular. At the same time, they express clear knowledge deficits regarding the "big picture".

To sum up, Statistics Norway and the Ministry have an in-depth understanding of the theoretical basis of the system; the Pollution Control Authority has practical, specific knowledge deriving from their role in the implementation of the system, while the companies have institutional knowledge highly specific to their own operations.

There is also a difference in *technical knowledge*, concerning the level of generality. However, this is already integrated in the conceptual framework, where product knowledge and expert knowledge exists as separate terms covering technical knowledge. For instance, the Ministry of the Environment and the environmental NGOs have *expert knowledge* on energy sources and CO2 emissions. This knowledge is general and exists at a theoretical level. On the other hand, the companies have specific *product knowledge* on the possible use of various energy sources in their production process.

A more precise terminology of *economic knowledge* would include micro-level economic knowledge, and macro-level economic knowledge.

Macroeconomic knowledge is held by many actors. For instance, all actors share a general understanding of the logic of international competition and norms of fairness in the market. All actors are aware of the general threat of outsourcing or competition from low-cost producers. The Ministry of Finance has in-depth, specific knowledge on macroeconomic issues. However, microeconomic knowledge, knowledge of particular effect of macroeconomic issues, is found mainly in the companies. To some degree, also politicians with a geographical connection to the local community have this knowledge. For instance, the Verdalskalk case was discussed by the Norwegian Parliament.

We have pointed out how the content of knowledge forms is connected to sectors and to specific actors. However, knowledge is also highly personalized, both first and second order. The personalization of knowledge has implication as to how we understand knowledge transmission. There is not necessarily a correlation between the knowledge found in a company, and the knowledge held by the individual representing the company.

To some degree, there is a polarization of knowledge forms based on constitutional differences. The Pollution Control Authority and the individual companies have long histories of bilateral communication and dialogue. As a result, they share an established culture of flexibility based on a mix of practical and institutional concerns. Among the actors in this study, the companies of course have the highest degree of contingent knowledge on their own situation. The Pollution Control Authority normally chooses an open and deliberate approach in cases when they feel that they lack such knowledge. This culture ensures a reflective decision making processes, providing legitimation for decisions concerning the individual enterprises.

Contrary to this, the knowledge held by Statistics Norway and the Ministry of Finance is based on theoretical insight rather than practical concerns. These actors do not only lack the contingent knowledge of the companies, they also lack the openness of the Pollution Control Authority. Following this, they are seldom exposed to e.g. local knowledge.

This polarization between two "camps" – the Pollution Control Authorities and the enterprises in one camp, and Statistics Norway and the Ministry of Finance in the other – has impacted severely on the legitimacy of the quota system. The theoretical basis of the system makes it less legitimate to the more praxis-oriented actors. At the same time, the modified and practical application of the system has reduced the legitimacy of the system to the theory-oriented actors.

There have been low levels of reflectivity between these two "camps". Used to dealing with both systems at a theoretical basis, and systems in praxis, the Pollution Control Authority should be expected to have an intermediate position. However, in this case, the operational system is based on practical, rather than theoretical concerns, as we see from the many "special applications".

Knowledge bundles, knowledge transmission and border crossing practices

In order to understand the introduction and use of knowledge in the two action arenas, a fruitful analytical approach is to analyze knowledge forms as part of specific *knowledge bundles*. A knowledge bundle is a composition of different knowledge forms. Three

knowledge bundles are proposed by the Conceptual Framework. *Bundle 1* encompasses scientific, expert and professional knowledge. *Bundle 2* includes steering knowledge, institutional knowledge, and economic knowledge. *Bundle 3* includes everyday, local and milieu knowledge.

For each action arena, we have identified the knowledge bundles represented. A main conclusion is the dominance of bundle 2 in both action arenas. Furthermore, we have identified various formal and informal mechanisms that explain how knowledge forms and knowledge bundles enter an action arena. We see a systematic, actor-related pattern of knowledge transmission. Also, it should be noted that knowledge is *personal* to a certain degree, and for the same reason, knowledge transmission is personal. As certain individuals have played central roles in the process, there are examples of companies where knowledge of the system disappears when central actors quit or change role in the company.

Action arena 1: The Pollution Control Authority - companies

In *action arena 1*, institutional knowledge and technical knowledge are most visible.

Economic/market knowledge and local knowledge are also represented. As such, bundle 2 clearly dominates, while bundle 3 is present. One could discuss if the technical knowledge in this arena is an example of expert knowledge or an example of product knowledge. These knowledge forms belong to different knowledge bundles. The technical knowledge is a product of system requirements, and can not be understood in a sufficient way using any of the two terms. Rather, it is particular form of "system-activated" technical knowledge.

While the three companies as well as the Pollution Control Authority have institutional knowledge connected to *bundle 2,* the latter clearly has a higher level of it. For instance, the Pollution Control Authority arranged information meetings on the emission trade system to educate companies. However, we should expect a learning process within the companies over the three-year period.

Another transmission mechanism is the highly formalized reporting system. All the companies in the emission trade system reported their methods and emissions to Pollution Control Authority. These annual reports were highly standardized and

institutionalized. In relation to the emission reports, the Pollution Control Authority and the companies communicated informally and ad hoc both by telephone and e-mail. The companies have talked with a consultant with specific knowledge of their company. The contact was informal, but still a result of a formalized process. This happened both while the company worked on the report, and after. Communication in the first case had a strong focus on institutional knowledge: companies in need of information or elaboration from the Pollution Control Authority. Once again, we see a highly actor-specific transmission of knowledge. In the second case, after the completion of the report, the Pollution Control Authority contacted the companies to discuss errors or flaws in the report. Here, bundle 3 - local knowledge - enters the arena through the company representative, who for instance explain how local measuring process are usually (and sufficiently) done. However, the Pollution Control Authority also has local "company"-specific knowledge. They do not only learn about local concerns from the arguments presented by the company representative, they also visit the companies in order to inspect the production process.

As the Pollution Control Authority has detailed information about *all* the companies, it becomes something of a "knowledge hub" in the system. But while the Pollution Control Authority learns and acquires more product knowledge, there is a limit to this process. The product knowledge is produced by the company, and for this reason; the company is the "knowledge owner" with unlimited access to this information. The Pollution Control Authority has limited access, something that implies limits to reflective knowledge.

The formal, internal organization of the team handling the emission reports within the Pollution Control Authority also serves as a mechanism for knowledge transmission between the consultants and their leader. In particular, the content or specifics of institutional knowledge is discussed. This is an example of how knowledge transmission not only applies to different knowledge forms, but also applies to the content of one specific form of knowledge. In addition, local knowledge is shared and discussed. Here, we might assume that the discussion within this group results in a certain standardization, and a mutual understanding on the flexible implementation of the quota rules.

In our example, the team organization ensures that all consultants are informed about the basis of the decisions. The fact that consultants have switched responsibilities within the team is a strong indication of the knowledge transmission. In addition, the formalized documentation process within the Pollution Control Authority makes it easier for transference of "technical", codified knowledge.

Another possible formal mechanism that could increase knowledge transmission is an annual or mid-way evaluation of the system. However, no formal evaluation of the 2005-2007 system has been arranged. To a certain degree, public hearings connected to the new system function as an evaluation of the old system. Yet, the hearings reflect views on the new system, not the old one. With a notably short deadline, there were few responses.

Maybe as a response to this, informal mechanisms of evaluation have been activated. In particular, the national media have to some extent been used for an open public debate to evaluate the system. While second-order/meta-order actors such as Point Carbon (a consultancy for the power, gas and carbon markets) and Statistics Norway have been active participants, the companies have chosen not to contribute in the public debate to the same degree. We have few indications that explain this. Perhaps companies define this as outside their scope, or perhaps they view the mechanism as inefficient. However, with a specific group of actors as the only participants, the discussions have been a mechanism for transmission of general knowledge – in particular economic (market) knowledge and expert (scientific) knowledge. Bundle 3, local knowledge, is clearly tied to first order actors, and has been missing from the public debate – except when jobs are threatened.

Action arena 2: Inside the company

In *action arena 2*, a wider selection of knowledge forms are visible: institutional knowledge, economic knowledge, production knowledge and local/milieu knowledge. Bundles 2 and 3 are clearly more important than bundle 1.

Several examples show a connection between bundle 2 and 3. First, all three companies have processes where local knowledge triggers the use of bundle 2-related knowledge. To improve their local image as an environmental friendly company, TEV uses

product knowledge. For instance, they point to their 'green image' in public brochures and in presentations, and they have published a report on the issue. This decision is founded on local knowledge - here, knowledge of local norms, and considerations of "acceptable practice". It is this local knowledge that triggers the use of product knowledge and knowledge of BAT. A similar pattern is found in Norcem Brevik. This enterprise is highly conscious about the local community's views on their choice of technology. A main reason is local media coverage.

The knowledge bundles are also connected in a more integrated way. In Verdalskalk, one future scenario has been the possibility of down-sizing production and reducing the number of employees. Economic (market) knowledge is the basis of this scenario; however, the company has also considered the implications to the local community.

An important mechanism for knowledge transmission is found in the company structure itself.

Both Verdalskalk and Norcem Brevik are owned by, and thus part of, large multinational companies (MNCs). Many forms of knowledge are embedded in complex company structures, and communication between different "levels" of the MNCs is a mechanism for knowledge transmission. As a member of the Heidelberg group, Norcem Brevik has knowledge from a research department available to use. Also owned by a large MNC, Verdalskalk are considering using the expertise embedded in the larger company structure. Thus, the MNCs have been used for *scientific knowledge* transmission, as well as product knowledge. Also, companies get significant *institutional knowledge* on the developments of the quota system from their 'mother companies'. Rather than establishing contact with scientific environments at research institutions, Norcem Brevik, TEV and Verdalskalk already have access to scientific knowledge.

Reduction of emissions is an explicit political goal not only in Norway, but also internationally. The fact that political actors and the business community share a common goal has also changed the status of the issue from a non-existent topic to a central topic of public discussion. A large number of actors share the goal, possibly resulting in both formal and informal "knowledge spill-over".

However, we have not seen technology "spill-over" to the degree one might expect. Companies have not collaborated in any way to develop new technology, as most product-focused research take place within each company. This can be seen as an impediment to the incentive mechanism of the quota system. New knowledge is not developed as a common good, but rather as a restricted good that stays within the company.

Dominant knowledge forms

In action arena 1 as well as in action arena 2, a variety of knowledge bundles and knowledge forms are represented. However, some knowledge forms are more important than others. Institutional knowledge and economic\market knowledge are the two dominant knowledge forms in the action arenas. All other knowledge forms represented are used with reference to the dominant knowledge form. In the first action arena, implementation of the quota system is the main focus, and for this reason, *institutional knowledge* - system and procedural knowledge - dominates.

In the second action arena, the main goal is to survive as a company. *Economic knowledge* dominates the reasoning at this arena. One would perhaps expect institutional knowledge to dominate, as system knowledge dominated the higher levels in the hierarchy of the quota system. Yet, institutional knowledge about the quota system also plays a central part at action arena 2. Changes in technology came as a result of a combination of market knowledge and institutional knowledge. Thus, institutional knowledge was indeed an incentive for companies to change their behaviour. *Product knowledge* can be understood as secondary to other forms of knowledge, something that implies a hierarchy of knowledge forms.

3.4.2 Knowledge holders

In 4.1., we discussed the dominant knowledge forms in both action arenas. Is there a connection between dominant knowledge, and knowledge holders in the arenas?

Both *traditional professions* and *traditional knowledge roles* are represented in this study.

There have also been *new professional roles* and *new knowledge roles* created by the system. However, the term "new" could be discussed. Some roles are not "new" or invented from scratch as a result of the implementation of this system. They are transferred from similar systems, such as the already functioning market, and applied to the new system with small changes.

At the first arena, where the Pollution Control Authority meets the companies, institutional knowledge and technical \product knowledge dominates. While the leader of the Pollution Control Authority team has institutional knowledge, the consultants in team also have technical knowledge connected to the implementation of the system. The knowledge holders within the Pollution Control Authority are civil servants and engineers, and acts as *traditional professions*. The focus is on technical details in relation to system implementation. Even if the same people might act more innovatively, politically or openly in other second order action arenas, this is not the case here.

Within in the Pollution Control Authority, new *professional roles* tied to institutional knowledge have developed. With new responsibilities, such as keeping track of the quota market transactions, this has been necessary. In addition, and as a result of the mandatory emission reports, a new group of external consultants have developed.

Company decision-makers who act within their own arena – action arena 2 – have traditional *knowledge roles,* and are focused on problem-solving and reflective processes. In addition to a search for new, relevant knowledge, companies carry out practical research themselves through trial\failure and they accumulate knowledge through experience. As a result, we see several forms of knowledge represented: product knowledge, market knowledge, local knowledge and also company-specific institutional knowledge.

We also observe *new knowledge roles* in this arena, mainly focused on product knowledge or technical expert knowledge, for instance the research department in the Heidelberg group. Researchers are now working to develop environment-friendly technology, not only cost efficient technology.

As the most important new actor, Point Carbon has taken a new and central *knowledge role* by providing institutional and market knowledge to all actors in the system. To inform and advise actors in a market is no new role in a market system. Point Carbon has transferred this idea into the newly created quota market.

3.4.3 Social/Spatial Distribution of Knowledge

As noted, the distribution of knowledge on particularities pertaining to the individual enterprises seems to be limited to the Pollution Control Authority and the enterprises themselves, in addition (to some extent) to the Federation of Norwegian Industries. Other actors do not seem to possess such knowledge to any considerable extent. This observation clearly represents a skewness in the distribution of knowledge, but social and spatial aspects have little to do with this.

3.4.4 Excluded/Silent Knowledge Forms

The discussion on excluded knowledge forms is structured around formal and informal rules and arrangements. In addition to this structural analytical focus, it must be noted that we also see strategic behaviour and rhetoric. Knowledge forms can be left out of an action arena as part of deliberate choice made by the actor, for instance if the knowledge contradicts the favoured conclusion.

Action Arena 1

Institutional knowledge and market knowledge are the main forms of knowledge represented in this arena. However, some knowledge forms are *excluded* from the arena by formal or informal rules. Silent knowledge forms resulting from knowledge deficits are discussed in 4.7.

By formal rules\arrangements

In action arena 1, there has been no discussion on the efficiency of the quota system. As such, it might seem as if companies relate to the system without reflecting upon its purpose or on other alternative regulations. However, even if this "knowledge" or discourse is lacking in the action arena, an actor such as Verdalskalk has expressed doubts on the issue. This might imply

that the action arena, which is highly formalized and procedural, has excluded normative, evaluative views in the system.

In addition, the political/institutional knowledge held by individuals within the Pollution Control Authority is excluded. As the Pollution Control Authority has a clearly defined role in this action arena, as the executor of a system, leaders and consultants follow their neutral, bureaucratic roles and leave any normative opinion on the quota system out of the action arena.

Informal rules\arrangements

The alternative of closing down production in factories where possible emission reductions are limited, is a scenario built on a combination of market knowledge, product knowledge and political knowledge. Do we need products that are produced with high levels of CO2 emissions? Are there other options or substitutes? These questions are not excluded, but the actual alternative is. Companies use the argument of closing down as a threat, because they are aware of the political "taboo" connected to it. The topic of closing down factories is highly controversial.

Climate change as a global problem does not have focus at all. In a way, the quota system reduces the link between companies and climate change. Companies relate to the system, as one of many regulatory measures, not to the problem of climate change.

Action Arena 2

Economic\market knowledge dominates this arena. However, institutional knowledge and product knowledge are closely tied to market knowledge. Institutional knowledge defines external conditions of the company. Product knowledge is important, when the company responds to the quota system. In addition, local knowledge matters, in particular local norms: what are acceptable actions within this local community? This relates to down-sizing issues, outsourcing, and also bad publicity in the local media.

In action arena 2, no formal rules or arrangements exclude knowledge. However, informal rules seem to exclude the discourse on *responsibility*. A form of knowledge notably absent among companies is *political knowledge* – knowledge of how one may influence the political process. Companies rely on the Federation

of Norwegian Industries[11] for political knowledge. Still, many place responsibility with politicians, in particular when it comes to development of technology. Evidently, there is a paradox in how companies blame the political actors, and thus escapes individual responsibility, but without any incentive to develop political knowledge to increase own ability to contribute in the political process. One exception is Verdalskalk. Here, we find views on the political process connected to the Mecado case, a competitor. Still, Verdalskalk did nothing to influence the political system. It is also a paradox that a "moral discourse", where companies reflect on how their history of CO2 "polluters", lacks completely.

3.4.5 Relevance of Reflective Knowledge

We have seen several examples of mechanisms and arenas where different knowledge forms meet. However, this alone does not necessarily imply *learning* or the occurrence of reflective knowledge. *Reflective knowledge* refers to the ability to learn and change behaviour given new knowledge. Reflective knowledge should be understood both in a weak and a strong sense. That different knowledge forms meet, is an indication of weak reflective knowledge. In the following, we focus on *strong* reflective knowledge based on seven different indicators.

It is important to note that the 2005 – 2007 system was at least partly a trial system, where reflective knowledge was *meant* to occur. Emission reduction was not the sole goal of the process. In addition, the system should be tested and improved. Thus, reflective knowledge should occur among both first and second order actors. The system was meant make companies reflect and reconsider their modes of production. Reflection follows the market logic at the core of the quota system. Companies are forced to respond to the quota market and discuss necessary changes. In the second order, the *implementation* of the trial system should encourage reflective processes.

Identification of *actors with an ability to hesitate over routine courses of action* indicates strong reflective knowledge. For instance, all the

[11] The Federation of Norwegian Industries is the largest sectoral federation within the Confederation of Norwegian Enterprise (NHO), Norway's largest employer's organisation.

three companies have discussed their "usual way of doing things", in particular production technology. This might as well be a result of other processes, and not the quota market alone. With a low quota price, there has not been a prospect of immediate economic gains following a change in production technology. However, expectations of a future system with higher quota prices might be a better explanation for the observed reflectivity.

Not only companies have questioned their routines. The Pollution Control Authority has implemented structures of a market-based system, which are different from structures of traditional regulation. With this new structure, the Pollution Control Authority has been forced to rethink routines used in traditional regulation.

The relationship between the Pollution Control Authority and the companies is characterized by mutual trust. This might be explained by the high degrees of trust, and a corporative tradition between private and public sectors in Norway. For instance, the Pollution Control Authority has established a norm of flexibility regarding CO2 emission measures. Flexibility might not be a new feature in the relationship between the Pollution Control Authority and companies. However, the application of this flexibility to this specific case must have been considered.

While the Pollution Control Authority acts as an open, deliberate and flexible organization, it still has a strong focus on regulation. This priority has not changed significantly, and the formal routines are still heavily influenced by a traditional regulatory mindset. Emissions controls and other controls are conducted by the same person in the respective companies.

Whether *actors deliberate on various courses of actions, or question accepted structures or knowledge* is a second indication of strong reflective knowledge. As a response to the new quota system, alternative energy options have been considered in all the companies. In this process, the companies have searched for new knowledge and new alternatives to get a full view of possible courses of action. There might be environmental, institutional *and* economic benefits deriving from a change to a more cost-efficient energy source.

To develop a functioning emission report system has been a priority within the Pollution Control Authority. As a part of this

new system, companies experience pressure to report emissions with new and lower levels of uncertainty. A possible effect of this is a heightened consciousness in the companies on the less environmental-friendly parts of production.

Reflection can also be traced by locating a *stronger or weaker understanding of certain knowledge forms*. As participants or enforcers of the emission quota system, all actors have been introduced to the system, and have seen the necessity of increasing their institutional knowledge. Point Carbon has been a central source of information in the strengthening of institutional knowledge. However, in a self-assessment of their own institutional knowledge, the companies are conscious of certain knowledge deficits.

An actor that expresses a *need for new alternatives and new knowledge* is a forth indicator of reflective knowledge. Our case includes only a limited number of reflective actions of this kind. While some changes have been made, much is still "business as usual", following general routines. When actors describe how they have changed behaviour or became more reflective as a result of the new system, this has often happened in *certain* areas, most commonly the company "adds" more knowledge to an already important or dominant knowledge form. In particular, the companies have focused on product and market knowledge. Companies seeking new technology are examples of non-procedural reflective processes. This search now includes environmental priorities, in addition to the traditional economic concerns, and is connected to certain persons and positions within companies.

However, Norcem Brevik has included scientific knowledge in their search, which is available through the research department of the Heidelberg group. Verdalskalk has expressed a need to do the same, and has also conducted small-scale research at their own laboratories. Verdalskalk has also made attempts use gas as energy source, but without success. Verdalskalk has the best available technology in the market at this point, and has a strong overview of the existing alternatives regarding energy supply in their production. Our last company, TEV, has also searched for new alternatives, a search that has resulted in a change in energy supply - burning garbage. However, this alternative was chosen for economic, not environmental reasons.

Reflectivity is secured by formal procedures, and thus, institutionalized, but it also happens "by chance". For instance, environmental NGOs have been invited for discussions.

Contact between NGOs, companies and the Pollution Control Authority follows a regular pattern. However, communication mainly follows work with the annual report. No other formal "meeting places" have been created.

In our case, all actors question the knowledge of the others; however, none question their own. As the most reflective actor on the point, SSB had noted communication problems in their relationship with the Ministry of the Environment, as they did not share the same "language".

The last indication of reflective knowledge is how actors *generalize their arguments*, and how they understand their argument as valid for one or more cases. Generalizations are commonly used by the companies. This might be an indication of a reflective process. However, to make a claim general and valid for a larger population of actors, is an argumentative norm that adds addition strength to an argument. In our case, companies generalize and cover all companies in the same situation. For instance, Norcem Brevik claims that The Pollution Control Authority works in favour of large companies, rather than smaller companies. The Pollution Control Authority, on the other hand, show signs of being critical of generalizations in the system. Special considerations are made in most cases, implying that the Pollution Control Authority find it difficult to operate a new and complex system from a general perspective.

In sum, we find that degree of reflexivity to be medium. While all actors consider new information, none have actually changed their priorities. While some actors respond to the change by considering existing options and alternatives, others actively seek new knowledge and expand their alternatives.

Actor priorities and knowledge forms

One of the most important filtering mechanisms for encouraging or hindering reflectivity is actor-specific goals. Different sets of goals define different knowledge priorities, and what is considered the best solutions. Even if the goals are the same – to reduce CO2 emissions – there are many views as to how this should be done:

through a stricter system, a higher degree of regulation, or a stronger focus on research on new technologies. The many views derive in part from different dominant knowledge forms: market knowledge, institutional knowledge, technical knowledge. Different professions or roles, and different organization mindsets\cultures might explain this.

Yet, most actors have a wide range of knowledge forms. What knowledge they bring into the action arenas and activate, depend to some extend on their strategic goals. Knowledge activated in the action arenas is used pragmatically – as a part of a larger strategy. Thus, we see a use of knowledge forms that not necessarily is defined by specific rules or systems.

Even if behaviour has changed in the companies, e.g. by reflective behaviour concerning energy sources, the primary goals of the companies has not changed. Still, the main focus is economic profit, and companies search for, and activate, knowledge that improves the chance to increase this profit. The quota system changes market behaviour in a more environmental friendly direction, however, it does not necessarily lead to a change in the goals. The companies change behaviour only as a response to new external conditions, in this case the quota system. We have not seen company goals change over the 2005 – 2007 period. This is an indicator of moderate reflectivity.

3.4.6 Synergies/Contradictions between Knowledge Forms

Action arena 1

In action arena 1, knowledge forms are mainly *contradictory*. For instance, system knowledge and market knowledge contradict each other to some extent. In particular, companies complain over the "unfairness" of the system – others getting better conditions than they do. System knowledge also conflict with local knowledge, which the Pollution Control Authority does not possess. The Authority implements the system without the inclusion of local considerations. How the Pollution Control Authority handles these concerns, that conflict with the system, is an issue of how sustainable and legitimate the system is.

The contradiction discussed above is clearly connected to the general knowledge contradiction at the second order. Here, "regulation focus" represented by the institutional knowledge of the Pollution Control Authority and Ministry of Environment, and "economic theory" found in Statistics Norway and Ministry of Finance is in conflict. Rather than a conflict between different knowledge forms, it is rather a conflict over content *within* a knowledge form. Companies, represented by the Federation of Norwegian Industries, have expressed doubts about the "economic theory" dogma, leaving a theoretically based system with no legitimacy. The Pollution Control Authority supports this view to some extent, claiming that the system should be operated with more flexibility. By saying the system is destroyed by practical concern and regulation focus, and favouring a stricter system, Statistics Norway argues the exact opposite. In sum, there are contradictions within the first action arena that weakens the legitimacy of the system – to all actors.

Action arena 2 - companies

In action arena 2, the relationship between knowledge forms is less definite. Here, both contradiction and synergy exists between knowledge forms. In Norcem Brevik and TEV, product knowledge, environmental knowledge and market knowledge work in synergy when it comes to choice of energy source. There is also synergy between local, image-related knowledge and environmental concerns. The social responsibility connected to climate change is clearly a new concern to the companies. On the other hand there is a contraction between local knowledge on local employment and environmental concerns.

Companies use environmental knowledge, and environmental arguments, in the economic discourse. Interestingly enough, this mainly occurs when the environmental knowledge works in synergy with economic knowledge, particularly in the debate over closing down production. If production is moved from Norway to another country with fewer environmental standards, this would harm the environment even more. Another example is how Verdalskalk, a producer of a product used for environmental purposes, is given a heavy quota 'burden'.

3.4.7 Silent knowledge/knowledge deficits

There is a clear deficit of quota market knowledge in Verdalskalk, TEV and Norcem Brevik. The fact that companies do little to sell excess quotas, their own statements, and the Pollution Control Authority work to increase system knowledge are indications of this.

Where all actors make comments and complain concerning the knowledge base of other actors, few reflect openly on their own. The Federation of Norwegian Industries had critical views of they understood as a hegemony of economic theory. SSB, on the other hand, saw weakness in the knowledge in the other actors, especially when it came to market mechanisms and market theory. This had in their view led to a quasi-market in the implementation phase with the integration of typical regulation measures. The lack of practical marked and product knowledge among second order actors have been a central issue raised by the companies. The environmental NGO in this study has been the only actor pointing out deficit in own knowledge, and then particularly system and market knowledge.

3.4.8 Changes in Knowledge Formations

There are two ways to understand the concept "knowledge formation". First, the term may refer to the creation or formation of knowledge. Second, it might also be understood as the relative positioning of knowledge forms in relation to each other. Here, we focus on the latter.

Companies now have a stronger focus on new, environmental-friendly technology rather than previously. While economic profit still is the main rationale of the companies, environmental concerns seem to be a more important sub-goal that previous. This change has led companies to be more active in their search for new knowledge, and companies have clear reflective knowledge basis that guides decisions in action arena 1.

In the Pollution Control Authority, the changes in knowledge formation have been less visible. While economic knowledge, product knowledge and local knowledge all are part of action arena

1, the Pollution Control Authority is still highly institutional in its focus.

In conclusion, all actors have expanded their knowledge, and that there have been changes in knowledge formations – with the exception of the dominant knowledge forms, which are the same. Without any changes in goals, this is perhaps not surprising.

3.5 Identification of Interfaces/Interaction between Knowledge and Governance Arrangements

3.5.1 Synergies/Contradictions between Governance Arrangements and Knowledge Forms

Each action arena has its own combination of knowledge forms. How do we explain these results? The institutional arrangement itself, or certain elements within the arrangements, are two possible explanations. Here, we assess the connection between governance modes and knowledge forms. Is there, for instance, a systematic connection between hierarchy and knowledge? Are governance modes encouraging or hindering the application of certain forms of knowledge?

We argue that there is a no systematic relationship between knowledge form and governance mode. Hierarchy, the governance mode best represented in this study, can encourage *different* knowledge forms. We argue that *motivation*, rather than mode, explains of this variation.

Action arena 1 – The Pollution Control Authority – companies

In Action Arena 1, *hierarchy* is the most important governance mode. The Pollution Control Authority and the companies are in an asymmetrical relationship, where the Authority has the rights to distribute quotas, make decisions on valid measurement methods, and control the emissions of the companies. The *node* - the 'connection point' of knowledge - is found on top of the hierarchy; in the internal team in the Pollution Control Authority, where

certain forms of knowledge are defined as relevant, and given weight in the decisions-making process.

As we concluded in chapter 4, the knowledge forms given special priority in this team are *institutional knowledge* and *technical knowledge*. Here, a hierarchical governance mode seems to favour knowledge bundle 2 and knowledge bundle 3, but pay less attention to bundle 1.

This fact - the presence of certain knowledge forms - can be explained by the *position* of the Pollution Control Authority in the hierarchy. As a function of its position, the Pollution Control Authority has the authority to operate and control the quota system. Institutional knowledge and technical knowledge is absolutely necessary to fulfil these position-defined obligations, so that the system can be applied on equal basis and in an efficient way. The institutional knowledge at the top of the hierarchy is *broad* and comprehensive, and also includes knowledge of the *particularities* of the system. There is no clear distinction between the particular knowledge of the system and the technical knowledge of the consultants. Institutional knowledge defines certain forms of technical knowledge as valid. Only correctly measured and codified emission reports are considered valid knowledge. Only codified knowledge can be compared, which is necessary into make the process fair and equal after bureaucratic standards.

The hierarchy also serves as a filtering mechanism. Knowledge *not* needed to fulfil obligations in the system, such as local knowledge, is left out in the *formal* hierarchical process. Knowledge that contradicts system knowledge is also given less relevance. For instance, institutional knowledge on procedures, and the the 25 % rule, had a higher priority than local knowledge on local jobs. Here, local knowledge is not filtered out of the arena, it is filtered out as less relevant in the decision-making. We expect these filtering mechanisms to increase in strength. The Pollution Control Authority anticipates that the 2008 emission trade system will be more hierarchical, with less weight given to the specific concerns of the companies. Thus, local knowledge will be filtered out to a larger degree. To some extent, this process has already started.

However, local concerns are still visible in the arena. Even if local knowledge is filtered out by the formal hierarchical process, the action arena also has elements of informal network arrangements based on *bargaining* and *arguing*. Companies perceive *parts of* the action arena to be open for arguing and\or bargaining. These are the more informal parts of the arena, such as telephone/e-mail communication between the consultants in the Pollution Control Authority and the company representative. Further, companies share the perception that a good argument count in the final decision-making process, where quotas are allocated. Based on this assumption, they include other forms of knowledge in their communication with the Authority. This is strategically selected knowledge that may improve their argumentation. Because cases vary from company to company, we see all three knowledge bundles represented in this arguing/bargaining process. Local and milieu knowledge is used to describe 'how things are done', market knowledge is used to describe economic consequences of specific decisions, and scientific knowledge is for instance used to describe possible and impossible technological changes.

We see elements of network arguing when the Pollution Control Authority and the companies argue over measurement methods, and when companies are allowed to continue a practice they argue is "good enough", "has always been used", or"is cost-effiecent". In some cases, the Pollution Control Authority unilaterally changes opinion on behalf of the companies – and the better argument.

In contrast to the formal hierarchy, the non-hierarchical, network-based mode encourages several forms of knowledge. Where we see elements of *arguing*, all knowledge forms are accepted. There is no systematic connection between one knowledge form and arguing, all knowledge forms are used. In addition to local knowledge, *market knowledge* is used to convince decision-makers of "bad years", a negative market, market history, and the financial impacts of the quota system. *Product knowledge* is used when companies describe technical limits, or how their product is of high societal or environmental importance. In general, "company knowledge", a combination of product knowledge and local knowledge, is used to validate claims: for instance, historical knowledge of production, expansion and reduction, and relevant technological alternatives.

We argue that this inclusiveness is a result of the structure of the arrangement - an arguing-based governance mode. As decisions in this mode are based on *good reasons*, all knowledge relevant to support a "good reason" is accepted as valid. However, the fact that no knowledge form is excluded does not mean the knowledge form is accepted or given weight by the Pollution Control Authority. Also, companies define relevant and irrelevant knowledge in this process themselves. 'Irrelevant' arguments, in their own view, are excluded from the arena.

Elements of a *bargaining* network mode are less complex, and often connected to product knowledge and system-specific technical knowledge– in short; technical, practical matters. We see bargaining when the Pollution Control Authority and a company disagree on valid report values, and then compromise by choosing a middle position. Compared to the *arguing mode*, this encourage a more limited set of knowledge forms. Certain topics are easier to bargain over than others. It is easier to bargain over factors that can be measured, counted and codified.

Action arena 2 – companies

To achieve a better understanding of knowledge forms in the three companies Verdalskalk, TEV, and Norcem Brevik, we focus on the influence of *internal* and *external* governance modes. Internally, the companies are organized as hierarchies. Externally, companies operate a *quota market* and a *product market*. To understand the set of knowledge forms that guides decisions in the quota system, it is essential to study both modes.

The local company managers function as knowledge *nodes* in this arena. Managers in the three companies make decisions regarding emission quotas and emission levels. It is a central part of their position to acquire the knowledge they perceive as necessary in order to reach a well-informed decision. In fact, all the three companies *are* well-informed. All three knowledge bundles are represented. The managers accumulate bundle 1 knowledge from their owners, and partly from the Pollution Control Authority. External actors, such as Point Carbon, and the Pollution Control Authority transmit bundle 2 knowledge, while bundle 3 knowledge reach the decision-makers through local employees and local media. In the following discussion, we focus on *why* this knowledge is represented.

As a governance mode, the *market* encourages all forms of knowledge – for instance, market knowledge, product knowledge, and scientific knowledge; in short, knowledge that improve the market situation of the companies. In addition, the (regulated) market also encourages political knowledge, as regulation is based on political decisions, which makes it necessary for companies to follow political changes. Thus, in its ideal form, the market as a mode of governance encourages *reflective knowledge*. The changes in supply, demand, and price have determines the future strategies of companies to a large degree.

The *quota market*, however, has not encouraged reflective knowledge. The market as a governance mode has not worked properly given the low market price of quotas. The low price is explained by too generous quota distribution. It is also a result of the small size of the market; a market limited to the Norwegian companies. Given these defects in the quota market, the companies have not had the chance to learn and gain trading experience on emission quotas. Also, as long as the companies have kept an eye on the price level, and as long as the price has remained low, there has not been any reason to learn how the quota market actually works. As transactions in the quota market have been few, no specific "quota market" knowledge has developed in the companies. In addition, we see few incentives produce *new* technology. We see fragmented, small-scale innovation, for instance in Verdalskalk; but more often, companies use existing knowledge or knowledge forms in combination. One example is how Norcem Brevik used their (local) knowledge of a nearby garbage disposal to develop energy used in their production. While political will and investments in R&D might be the only solution, as some actors have argued, it is also possible that a higher quota price will encourage invention to a larger degree than what we have seen so far.

As the quota market has had a limited importance as a governing mode, the hierarchical organization of the companies has proven central. The knowledge encouraged by hierarchy in this case, is different from what we found in action arena 1. Knowledge must be seen in relation to the market, as it is contextual *economic knowledge* that dominates internal decision making. As the main goal of the company is to maximize profit, this coordinates the inclusion and exclusion of knowledge forms. As an example of the

latter, knowledge *not* relevant to this goal, for instance knowledge of moral and historical responsibility is filtered out. These processes possibly are explained by the ownership hierarchies Verdalskalk, TEV and Norcem Brevik are parts of, where owners have increased returns as the dominant goal.

While it is true that knowledge is accumulated because of market concerns, these decisions are based on vague signals and uncertainty. The emission quotas function can affect the price of a product, for instance if a company would have to buy quotas. To avoid financial trouble, an emission-effective production process has been a focus of the companies. Two of the companies have changed their energy supply, partly because of emissions, but also out of general economic reasoning. These internal decisions are based on *expectations* of a stricter market in the future. Both Norcem Brevik and the other companies follow policy developments closely. For instance, Norcem Brevik has had an eye on climate policy all since the Rio conference in 1992. The fact that the issue is highly political, raise the level of uncertainty connected to it. Who will have political power in Norway and in Europe? There is also uncertainty at a different level, connected to the effects of climate change. How fast do we see the climate changing? How certain are we about the consequences?

Even if we find few explicit traces of *local knowledge*, we assume that this knowledge form is included in the decision-making processes. However, it is not necessarily the hierarchical mode that encourages the transmission of local knowledge. Rather, it appears to be a culture of trust in the companies, which encourage the transmission of local knowledge. There are also formal and informal mechanisms through which management and workers communicate.

3.5.2 Relationship between Modes of Interaction and Knowledge Forms

Each governance mode has a specific *mode of interaction*. In order to understand how a governance mode encourage or discourage certain knowledge forms, we need to study this interaction in greater depth. However, we also need to study the *rules* of each governance mode. In this way, we can identify crucial parts of the structure that influence the knowledge input in an arena. In

addition, the modes of interaction are seldom seen in 'pure' form in the case studies. To clarify *where* the interaction mode departs from the 'ideal', we need to study the rules of each governance mode.

Action arena 1

As pointed out in 5.1., the *hierarchy* is the dominant governance mode in action arena 1. In hierarchy, the expected mode of interaction is command, control and unilateral adjustment. (CF 2006: 32) Those with authority have the power to include and exclude knowledge forms.

However, also elements of *non-hierarchical networks* are represented. In a bargaining network, the typical mode of interaction is "negotiated agreements based on individual satisfaction". In an arguing network, the mode of interaction is negotiated agreements based on mutual and unilateral adjustment, and trust and consent.

There is, for this reason, no "pure" mode of interaction in action arena 1. Rather, we see a mix of three different modes of interaction, where hierarchical interaction forms are found in combination with modes associated with bargaining and arguing. However, as we see when we discuss the rules, the hierarchical mode of interaction is the most important structure. It *allows* for network interaction. The 'authority' within the hierarchy, could in theory decide to minimize network activity.

Position rules are rules that "establish positions, assign participants to positions, and define who has control over tenure in a position". (CF 2006: 28) The Pollution Control Authority is organized as a formal hierarchy. The team leader has the authority to establish positions, and assign positions to participants. In our example, the team leader has the authority to assign and distribute quota system companies among the consultants. He also defines the content of the position. Also, the leader delegates responsibility to consultants.

However, we assume that the mode of interaction has elements of negotiation, not only "control and command. Consultants and the team leader work closely together, and reach decisions as a team. There are reasons to expect informal negotiations inside the Pollution Control Authority. Yet, this interaction exists based on *approval* from the leader, and can be removed. The informal,

everyday mode of interaction is subordinated the formal, codified hierarchy.

Position rules can also be understood in a more general way. If we discuss the system in total, neither the Pollution Control Authority nor the companies have the power to establish and assign positions. The positions are created by the authority of the second order actors who designed the quota system. Neither the Pollution Control Authority nor the companies entered the system voluntarily.

Boundary rules are rules that set "the entry, exit, and domain conditions for individual participants". (CF 2006: 28) The rules we identify are highly formal and tied to the hierarchical mode. To act as a Pollution Control Authority representative or company representative in action arena 1, employment is the dominant rule of entry. The participants are allowed to enter the arena because of their employment status. As a result, the formal and informal employment procedures might have importance. For instance, most consultants have technical education, rather than say, a background as economists. They are used to handling and give priority to technical and not economical issues.

In the communication between the Pollution Control Authority and the companies, boundary rules are fairly non-restrictive and have clear network mode features. Companies are welcome to contact the company. The contact is not limited to formal invitations from the Authority. However, the companies have no formal ways to *limit* entry. If the Authority requests a formal inspection, the company has no right to oppose this. Moreover, it is also limited in the sense that only those subsumed under the system can enter – not other actors.

Institutional/technical knowledge actually serves as an informal boundary rule in this study. Because the Pollution Control Authority and the companies mainly discuss formal procedures connected to the annual emission reports, it is a precondition for a representative to enter the arena to have a minimum of this knowledge. The consultant and the company representative must "speak the same language". This language, and the knowledge needed to speak it, is defined by the system and perhaps by the prevailing knowledge culture in the Pollution Control Authority.

This is something the company must consider when they pick their representative.

Authority rules are rules that "specify which set of action is assigned to which position at each node of a decision tree". (CF 2006: 31) In action arena 1, we mainly see hierarchical authority rules. Consultants, who have the basic contact with the companies, are given a rather high level of authority. Because they are allowed to use some flexibility in the implementation of the system, local knowledge and product knowledge is allowed to enter the action arena.

Aggregation rules prescribe "how decisions and other outcomes in an arena are being made or reached". (CF 2006: 31) We find elements of both hierarchically based aggregation rules, but also network based aggregation rules. Aggregation of knowledge and decision-making happens at two levels in this arena: informally, in the communication between the consultant and the company, and formally, in the Pollution Control Authority team. As decisions are reached on basis of the legal framework, institutional knowledge is a dominant form of knowledge. Still, other forms of knowledge are considered: such as local knowledge, market knowledge and product knowledge. Our knowledge of the actual aggregation process is weak, as we did not have access to meetings inside the Pollution Control Authority. However, we know from interviews with both companies and the Pollution Control Authority that considerations raised by the company were given weight in the decision-making.

Scope rules are rules that "prescribe the possible outcomes of interaction in a certain arena". (CF 2006: 31) The scope rules in this action arena are purely hierarchical based. The Pollution Control Authority allocates quotas, and evaluates and sanction emission reports. Companies report what is requested from the Authority, and apply for quotas. To the companies, possible "outcomes" or actions are defined by the system. As a result, we do not see companies actively searching for knowledge in this arena. The scenarios are already 'defined', and can not be changed. Companies are mainly interested in improving their institutional knowledge; for instance, learn how to complete the annual emission report in a satisfactory manner.

Information rules are rules that "specify the information available to each position at a decision node". (CF 2006: 32) Here, information is asymmetrical. While the Pollution Control Authority has information on all the companies in the system, this is classified information, and not available to the other companies. In addition, the companies do not know what is going on in the team meetings, or how the system is implemented in the various cases. However, for most parts, the processes are public and well-documented. Information rules also apply to company-specific information. While the company has detailed information on internal processes, the Pollution Control Authority has to trust the information acquired through the company reports and visits.

These asymmetrical relationships make procedures important. Communication and information flows are secured by formal, institutional procedures. If information was more symmetrical, the procedures would be been less relevant. As such, the system of annual reports is a mechanism to transmit knowledge; a system to secure information flows.

The information flow is particularly important from companies to the Pollution Control Authority. While more informal, it is also present the other way around: companies contact the Authority to learn more about procedures and the specifics of the system.

In sum, action arena 1 is formally organized as a hierarchical system of command and control. However, the "controller" has allowed for the creation of an informal network structure with negotiation and open communication. As a consequence, the formal, hierarchical mode is modified, and a less "defined" set of knowledge forms are allowed to enter the action arena.

Action arena 2

As discussed in 5.1., companies make decisions based on two sets of structures: the external market, and the internal hierarchy. We have already pointed out the essence of interaction in a hierarchy: control and command. In a market, this is different: the mode of interaction is characterized by the "hidden hand", prices and mutual adjustment.

There are certain rules connected to a hierarchy, which also applies to the companies. Positions within the company are established by people with 'employment' authority. The *position rules* are as such

based on authority, as one would expect from the hierarchical mode. The same is true when it comes to the *boundary rules*, which define entry and exit conditions for participant. This is, as we also found in action arena 1, strictly based on an employment relationship. The decisions on quota-related issues are made by employees in certain positions. Possible external "stakeholders", such as local politicians or environmental activists, are not invited in.

When it comes to *authority rules*, actions are assigned to certain positions by leaders in the company. An interesting point is how the local hierarchy relates to the larger hierarchy of their owners. This 'larger' system has assigned certain "set of actions" to the local leaders – but not all. For instance, the owners of TEV and Norcem Brevik have to approve certain new changes, such as major investments in new technology.

How are decisions made within the company? In fact, *aggregation rules* depart from the expectation of hierarchical decision-making. In an ideal hierarchy, authorities make decisions on the basis of legal frameworks. However, we see more consultation and discourse, than we see application of a certain framework. These are elements of non-hierarchical network modes and arguing. Seemingly, reflective knowledge is found at the highest level of the company hierarchy – with the company managers. As a function of their authority, they have the power to request (command) knowledge from various sources within and outside the company.

The goal to maximize profit defines "alternative" actions and desired outcomes, and is thus the dominant scope rule. As such, the scope rule defines a wide range of knowledge forms as relevant. In the companies, the scope rule can be said to facilitate reflective knowledge processes. However, knowledge and outcomes that contradicts the central goal are excluded. For this reason, knowledge has a clear target and is supposed to be useful to decisions-markers. Outcomes that might serve a different goal, for instance outcomes that give priority to environmental issues, are excluded per se. Other priorities are only included if they function in synergy with the fundamental goal of the corporation.

As we discussed in the previous section of chapter 5, the *market* as a governance mode has not worked properly given the low market price of quotas. The quota market, for this reason, has not

encouraged significant learning or knowledge transmission. In the market, the boundary rules are based on voluntary interaction: actors with anything to buy or sell. Also, information rules are symmetrical, with a price focus. These mechanisms, namely the interaction of supply and demand, have been the basis of the (quota) market knowledge in the companies. Companies have used their access to price information at a frequent basis, and as the price has been low, responsive market activity have been discouraged.

3.5.3 Relationship between Governance Arrangements, Knowledge Forms and Learning Processes

As already discussed, modified versions of hierarchy are the dominant governance arrangements in action arena 1 and action arena 2. Action arena 1 is formally organized as a hierarchical system of command and control, but we have also identified an informal network structure with negotiation and open communication. As a consequence of this, institutional knowledge has been supplemented by a wider set of knowledge forms. In action arena 2, we have seen a combination of market and hierarchy in the governance arrangement. Here, company managers have been free to use all knowledge that might improve their long-term economic strategy. *Reflective knowledge*, deriving from a consideration of market knowledge, product knowledge, local knowledge, scientific knowledge and institutional knowledge seems to be dominant.

The observation of several different forms of knowledge in both action arenas might imply a connection between hierarchy, knowledge and learning. Hierarchy is the only mode of governance that is present in both arenas. The dominant mode of interaction in hierarchical settings is one of *control and command*, where the actors with authority can control formal knowledge transmission. For instance, they might expect certain knowledge from other actors at lower levels in the hierarchy. They might also use their authority to get hold of knowledge themselves.

However, hierarchies do not by necessity support learning. We see a clear difference in how the hierarchy as a governance mode

works in action arena 1, and how it works inside the three companies. Hierarchy as a governance mode might encourage learning, but not as a rule.

In our two action arenas, learning and governance modes must be understood in their specific context. In particular, we see two important contextual features. First, it is relevant to see whether the hierarchy is modified by and interacts with another governance mode. In action arena 1, we see two functioning governance modes, while hierarchy is practically the only active governance mode in action arena 2. Second, the interaction mode in hierarchies – control and command – can be used actively or passively, to various degrees. This depends upon the strategic goals held by people of authority. If a preferred outcome depends of knowledge accumulation, it is expected that a (rational) actor would accumulate knowledge. On the other hand, if broad knowledge is not necessary, we do not have the same expectations.

Inside the Pollution Control Authority, part of the learning is *reactive*, and comes as a result of *demands*. With a mandate limited to the execution and implementation of the quota system, the Pollution Control Authority has no 'interest' in gathering substantive knowledge. Complete knowledge is not a goal, as the premises of action are pre-defined. The Pollution Control Authority is obliged to make correct and fair decisions in their implementation of the quota system. To do this in a proper way, they limit their formal search for knowledge to the mandatory knowledge in reports from companies.

In addition, the Pollution Control Authority becomes a *passive* receiver of knowledge when companies describe their situations. As previously discussed in chapter 5, we see elements of *network* governance. In these cases, knowledge transmission becomes less authority-controlled. Consultants acquire knowledge they not necessarily are asked to collect from the companies. Knowledge forms that are not formally invited to the arena are still allowed to enter. In these cases, consultants in the Pollution Control Authority learn, but the learning lacks direction. It is not formally asked for in the decision-making processes, and has no clear purpose.

As with the Pollution Control Authority, institutional demands placed upon companies force them to learn. The Pollution Control

Authority educates companies in institutional knowledge. They *expect* companies to learn how to function well within the system, and to acquire the necessary knowledge if they do not already have it.

However, most of the learning occurs when companies work *actively* to achieve their goals. In the companies, decision-makers have a stronger incentive to collect new knowledge, as they have a wider set of valid options to choose from. Knowledge is aggregated at the top level with the local management. This is where strategic decisions are made, something that often requires knowledge transmission. In the strategy process, decision-makers also become aware of problematic knowledge deficits. In all three companies, companies expressed a need for more product/scientific knowledge. To prepare for a complaint case against a Pollution Control Authority decision, Verdalskalk actively accumulated institutional knowledge from previous complains. Learning processes are also observed when companies make attempts to minimize uncertainty. What are the implications of a quota system? What is happening in the rest of Europe? In what direction are national political developments moving the next 10-20 years? What technology might be available in to use the next 5 years? To make more complete economic prognosis and strategies, they actively and systematically follow institutional and quota market developments in Europe and in Norway.

In conclusion, hierarchy has been the most important feature to improve the wide spectre of knowledge inside companies. The quota market as a coordination mechanism between companies has not worked after the original intensions, and has not encouraged significant knowledge transmission. For this reason, a hierarchical form of interaction, control and command, has dominated knowledge processes. These forms of interaction have been activated by decision-makers who have seen learning as essential to make informed decisions.

Inside the Pollution Control Authority, the control and command interaction has not been activated to the same extent. The 'command' function has only been used to accumulate knowledge that serves a narrow institutional purpose. A 'good' decision is pre-defined as a decision that follows the rules. That we see a variety of knowledge forms in action arena 1, and inside the Pollution

Control Authority, is a result of negotiation and the creation of informal networks.

3.5.4 Changes

Learning is not necessarily followed by actual or *observable* changes. Some changes are only observable in a longer time perspective, and may be hard to identify this early on. For instance, institutional processes are in general slow, such as changing the actual rules of the quota system.

Actors might also lack the *freedom* to make large-scale, formal changes. This certainly applies to the Pollution Control Authority, but also many companies have limited freedom. The Pollution Control Authority is given a formally defined mandate, but lack the power to redefine the mandate and the procedures that guide its own behaviour. Thus, only *informal* changes have been observed within the Pollution Control Authority. Over the three-year time span, individual actors have had frequent contact: consultants and leaders, and consultants and company representatives. In result, network modes have developed, modifying the hierarchical structure. This change has led to the introduction of negotiation as a new mode of interaction. Yet, the presence of learning and informal negotiations has not led to formal changes in the governance arrangement in action arena 1.

The opportunities for change are also limited inside the companies. Owned by larger corporations, companies are parts of hierarchies where important changes must be approved at a higher level of authority. Yet, this process is not as slow as in bureaucracies, and there are no signs that this has been a limitation in any of the three companies.

If new insights are perceived as less important than existing knowledge, learning is less likely to be followed by large-scale changes. *During* the 2005 – 2007 system, knowledge formations have changed. The dominant knowledge forms in both action arenas did not. At the start of the system in 2005, institutional knowledge was introduced in action arena 1 and 2.

At this point, knowledge on the quota system, the regulations and procedures – institutional knowledge – was a new knowledge form

at both arenas. From the start, institutional concerns came to dominate action arena 1. This has led to a number of observable changes. To fulfil their obligations in the system, institutional knowledge has become a necessity to the companies. New actors – external consultants – have been introduced to secure and standardize the measuring of CO2 emission. On their side, the Pollution Control Authority has obligations as the 'operator' of the system. To fulfil their role, the team has established a report and control-based system. As such, hierarchy is the most important feature in the relationship between the Pollution Control Authority and the companies, and by defining certain responsibilities and certain positions, hierarchy as a mode of governance has evoked important changes.

In action arena 2, where companies discuss how to include quota system issues in their strategies, market concerns still guides decisions. The market motivates and encourages reflective knowledge, as company managers accumulate all forms of knowledge relevant from a market perspective. We also see the introduction of institutional knowledge in the companies. Clearly, this institutional knowledge has entered the reflective process. While it is not the dominant form of knowledge, it has certainly provoked very important changes. CO2 emissions now come at a price, and companies have included this in their economic strategies.

To reach informed decisions, the management of the companies has been in contact with new actors – typical *knowledge roles* – actors with BAT-knowledge and with institutional knowledge, such as Point Carbon.

Neither the Pollution Control Authority nor the companies have the freedom to define their own goals. For this reason, dominant knowledge and priorities have not changed. They are already set by others – either the Ministry of Environment, or a larger national or foreign corporation. These hierarchical structures define action arenas to a certain degree, and create expectations of certain behaviour. As long as hierarchy is the dominant form of governance, we do not expect any dramatic changes in either the Pollution Control Authority or in the companies. The authority to changes the fundamental 'institutional design' or rationale is not held by any actor in neither action arenas.

This point has also other consequences in the discussion on changes. Prior to this first application of a quota system in Norway, no empirical data existed, and the system could only be designed based on theoretical assumptions. Within action arena 1 and 2, a new, contextualized dimension of institutional knowledge now exists. As such, a change has occurred. This knowledge could be used to improve or modify future versions of the quota system. However, if this new experienced-based dimension of institutional knowledge will lead to observable changes, is uncertain. The 'new' empirical material from the application of the system still lacks formal, codified and institutional representations. As we have seen, this knowledge has developed through informal mechanisms of knowledge transmission. For this reason, the contextualized knowledge is 'personal' – and rests with consultants and company managers. We have seen rather unrestrictive knowledge flows between companies and consultants. For the experience-based knowledge to have any formal impact and lead to changes, a start would be to secure knowledge flows between consultants and the quota system designers.

In sum, we have observed changes. First, there *have* been changes in governance modes. This is in particular evident in action arena 1, where we see the development of an informal network mode that has modified hierarchy. In action arena 2, we have discussed a governance arrangement consisting of hierarchical and market elements. The major change in this arena has been the introduction of a new market – the quota market. However, this market has been less functional than expected. As a consequence, hierarchical interaction has become more important than it usually is in relation to other markets. Decision-makers have had more freedom to act than usual, as quota price considerations have been largely irrelevant. They have rather acted on basis of their perceptions of a future market. As such, this is a change from previous arrangements, where market price is dominant and structures all decisions. In other words, market information (price) has been less important, and the definition of relevant knowledge has rather been defined inside the hierarchy. Maybe as a result of this, companies have accumulated a high level of contextual, reflective knowledge. With the quota price at a low level, decision-makers have had time to consider their long-term strategies, and have gathered knowledge from various actors to improve their

knowledge. As the Pollution Control Authority have a more formal and predefined role than companies, they have an obligation to give priority to institutional knowledge. Still, as discussed above, a broad 'knowledge pool' as developed within the Pollution Control Authority, as a result of the frequent formal and informal interaction with companies.

3.6 Identifying 'Governance For Sustainability'

3.6.1 Assessing Sustainable Development in the Selected Case

In accordance with the conceptual framework of G-FORS, the case on emissions trading has been assessed in terms of the three-dimensional conception of sustainable policy developed by William Lafferty. These three dimensions are *comprehensiveness*, *aggregation* and *consistency*. "Comprehensiveness" denotes the extent to which environmental aims are taken into account in policymaking, over a broad spectrum of actors, time and issues. The broadness and complexity of the knowledge base are also relevant criteria in this dimension. "Aggregation" has to do with the degree to which these concerns have actually been integrated into policy. The assessment of "consistency" identifies elements of policy which seem to be contradictory, and discusses possible points of divergence in the knowledge base.

The analysis has taken departure in the definition of sustainability laid out in the conceptual framework. In this understanding, sustainability has economic, environmental and social dimensions.

Comprehensiveness

- The implementation of the system has introduced the concern for CO2 emissions to activities previously not made subject to carbon abatement measures. Notably, the Carbon tax did not apply to the emissions now covered by the quota system. This indicates a high level of comprehensiveness.

- The knowledge base of the quota system does not take local knowledge into account. Concerns for the sustainability of the local communities involved, including employment

opportunities, are absent. This indicates a low level of comprehensiveness.

- The system deals with CO2 emissions exclusively, in spite of the fact that global warming is caused by emissions of several different gases. This indicates a low level of comprehensiveness.

- It may be contended that the quota system is detrimental to carbon abatement, because enterprises are not encouraged to take on a genuine individual responsibility for emissions abatement. The system sends a signal to the effect that as long as they comply with the requirements of the system, they need not worry about taking further steps. Also, in conjunction with this, the "polluter pays" principle is abandoned due to the free allocation of quotas. Finally, two of the three case study enterprises have been allocated a volume of quotas exceeding actual emissions, further weakening the incentive to cut emissions. This indicates a low level of comprehensiveness.

Aggregation

- Among the three case study enterprises, only one (Verdalskalk) has accumulated a shortfall of quotas. In this sense, aggregation has only taken place for this one enterprise. But it should be noted that concerns for the new system following the 2005-07 period has affected the dispositions of the other companies. This indicates a medium level of aggregation.

- The price of quotas has been integrated into the cost functions of the enterprises. This indicates a high level of aggregation.

- Decisions in the Pollution Control Authority (mainly concerning quota allocation) do not take into account local knowledge, specifically concerns over local economic and social sustainability. All in all, the system encourages a rather narrow-minded focus on rigid application of rules and adaptation to market conditions in SFTs decisions. This indicates a low level of aggregation.

- The enterprises seem to be highly knowledgeable about a broad range of issues, and display a rather reflexive and well-

considered mode of decision-making. This indicates a high level of aggregation.

- As noted, two of the case study enterprises were allocated a substantial surplus of quotas, although the intention of the quota act was that enterprises should be allocated quotas corresponding to 95% of emissions. SFT felt obliged to do so, because emissions became lower than projected due to environmentally favourable transitions in energy use (the switch to biofuels). Even so, the system seems unsustainable if SFT feels obliged to allocate quotas allowing increasing emissions free of charge. This indicates a low level of aggregation.

- The system is made increasingly sustainable over time because of learning effects. For instance, measurement methodology is gradually improved, and acceptable compromises fall into place. The system thereby has the capability of sustaining and elaborating on its own legitimacy, improving aggregation.

Consistency

- It has been observed that the impacts of the quota system on the chalk industry are radically different from those on the cement industry. This has to do with the broader range of abatement measures available to the cement industry: Due to the cleanness requirements of high grade chalk, biofuels are less of an option than it is in cement production. It seems inconsistent to use an incentive-based system in the absence of effective abatement measures, and there is an element of unfairness in the fact that two industries with quite similar production processes should fare so differently. This indicates a low level of consistency.

- This inconsistency is aggravated by the fact that chalk is an essential product, and will be imported if production in Norway is terminated due to quota costs. Furthermore, chalk is among other things used for environmentally favourable processes including cleansing. This indicates a low level of consistency.

- Chalk production involves the burning of waste oil, and although this is what causes CO2 emissions society would have

to dispose of that waste oil even in the absence of chalk ovens. It has been contended that chalk ovens is the least unfavourable way of doing this, because of the technology of these particular ovens. This indicates a low level of consistency.

- As noted, emissions from chalk production are to a considerable extent carbon neutral, because the bulk of exports is used for PCC production. This process involves recarbonisation, which means that an amount of CO2 corresponding to the original emissions is actually absorbed from the air. Because this process takes place in Finland, however, this effect is not taken into account by SFT. This indicates a low level of consistency.

- The burning of special waste by Norcem is favourable in a carbon abatement perspective, but the neighbours of the plant complaint about the smell. There is also the concerns over local pollution on Verdal and Trondheim. CO2 abatement measures are not always consistent with other environmental measures.

- The deliberate allocation of a surplus of quotas to TEV and Norcem came as a "reward" for environmentally favourable transitions implemented prior to the coming into force of the quota system. TEV was actually granted a volume of quotas double that of its actual emissions, although SFT knew that they had no use for this surplus. TEV switched from LNGs to biofuels before the coming into force of the quota system. SFT would not punish them for making this environmentally favourable transition, and granted quotas to cover the emissions that would have occurred had this transition not taken place. It can be contended that this policy is inconsistent, firstly because it does not provide an incentive for further abatement, secondly because the emission-reducing effects of the transition to biofuel would have been nullified had TEV chosen to sell the quotas to other enterprises. This indicates a low level of consistency.

3.6.2 Assessing the Legitimacy of Policy-Making in the Selected Case

The analysis in this section has taken departure in the three-dimensional understanding of legitimation provided in the Conceptual framework. *Input* legitimation denotes the richness of interest representation in policy-making. *Throughput* legitimation has to do with transparency and accountability. *Output* legitimation refers to the legitimising effects of (perceived) problem-solving abilities.

In the emissions trading cases, first order governance does not really have to do with public policy-making. Political actors are absent from the case studies, as the studies mainly revolve around the bilateral relationship between the Pollution Control Authority and the individual enterprises, and between the enterprises and their markets. In this respect, the assessment of legitimation is not straight-forward. Enterprises are not democracies, and do not need to be legitimated in quite the same sense as do representative bodies. Beyond the information requirements laid down in the quota system and other regulations, they are not under any democratic obligation to receive specific "inputs" or to organise participatory processes in order to obtain such. Furthermore, in a business environment it is commonly recognised that information on business strategy is business sensitive and so should not be disclosed. Following this, full transparency and throughput legitimation is not an ideal, rather the contrary. Finally, companies survive or desist depending on their ability to create profits, and legitimation is not the key issue in this respect – although we will argue that image-building and good relations with their local communities can be important for continued profitability.

As for the Pollution Control Authority, SFT, this is a bureaucratic organisation not a representative body, and its decisions are not legitimised in quite the same way as political decisions are.

Input legitimation

- The companies have been able to submit inputs to SFT. One could argue that this has served to legitimise the decisions made in the SFT concerning quota allocation.

- In their original applications for quotas, the enterprises could report on historical emissions in the reference period 1998-2001. They could alternatively submit estimated emissions in 2005-2007, provided there were grounds to contend that production in the reference period was atypical, or that there had been a substantial shift in technology since then. The ability to submit such inputs could be seen as favourable to input legitimation.

Throughput legitimation

- Transparency has been excellent regarding the processing of applications and emission measurements in the SFT. In accordance with relevant legislation, key documents have been made available on the SFT website. *This indicates a high level of throughput legitimacy*.
- Internal dispositions in the enterprises are not in the public domain, but this is hardly a relevant issue in terms of legitimation. This opaqueness includes knowledge on sales and purchases of quotas. This is probably irrelevant for legitimation.
- The enterprises state that they feel a need to be accountable to their local communities. This indicates a certain level of throughput legitimacy.

Output legitimation

- Emissions from the case enterprises (indeed from Norwegian sources overall) have not decreased during the three years. This indicates a low level of output-legitimation.
- The quota market has probably not been sufficiently tight to induce to actual cutbacks. Furthermore, the number of actors has not been sufficient to allow market-specific price-formation. The lacking connection to the European market has meant that surpluses of quotas have been unsellable. These factors imply a low level of output legitimation.
- Even so, the enterprises contend that the system has made them more conscious about carbon emissions. Increasing regard for local opinion as well as the anticipation of less

lenient systems in years to come has added to this effect. This indicates a certain level of output legitimation.

3.6.3 Synergies/Contradictions between Governance Arrangements and Knowledge Forms on the one side and Sustainability and Legitimate Policy-Making on the other

Sustainability and governance mode

- The hierarchically implemented allowance trading system has introduced concerns for CO2 emissions into activities previously not subjected to policy measures. This indicates a high level of comprehensiveness due to hierarchical mode of governance.
- In a hierarchy, one may decide formally what kind of knowledge is relevant for decision-making. In the market, on the contrary, the relevance of knowledge forms is determined by the enterprises' business environment. Accordingly, hierarchies may provide a lower degree of comprehensiveness than markets.
- As for aggregation, a similar argument can be made. There is a profound difference between aggregation in bureaucracies and in markets. Bureaucratic aggregation is structured by formal regulations whereas enterprises need to interpret signals from their surroundings in order to decide what emphasis to put on specific concerns, to ensure survival and continued profitability. The resulting degree of aggregation is however uncertain. For instance, TEV has emphasised the importance of maintaining a public image as environmentally friendly, but it is hard to assess the extent to which this has affected actual decisions.
- The elements of the "network" mode of governance observed in the case studies seems to indicate that arguing may enhance comprehensiveness to a certain extent. SFT may have benefited to some extent from the dialogue with the enterprises concerning measurement methodology, possibly providing more in-detail knowledge concerning issues pertaining to emissions measurement.

- The "market" mode of governance seems to have impacted on sustainability on all three counts. Comprehensiveness may have been enhanced in the sense that the enterprises have incorporated the costs of emissions into their production functions. Aggregation is provided by the fact that they have been forced to do so by the market forces. Finally, it is interesting to note that the market situation forces the enterprises to weigh a range of different and to some extent conflicting issues against each other, such as increasing production and sales, price elasticity, local image-building, the feasibility of new technologies, future climate policy measures and so forth. This process of aggregating issues may represent a form of reflective knowledge unknown to the SFT, which operates based on a fairly one-dimensional goal structure defined in a hierarchical environment. SFT may concern themselves with these rather narrow aims without taking other concerns into account, whereas the enterprises are forced to take a range of issues into account in order to ensure continued survival and profitability. In this sense, markets may provide a greater degree of consistency than hierarchies.

Interaction between governance mode and knowledge

- Picking up the argument from the previous section, we would contend that knowledge use in hierarchies tend to be narrow and one-dimensional due to the specialised structure of public management. There is to some extent a tendency to split the responsibility for managing public policies between a number of rather specialised agencies, or units within such agencies. Knowledge use in these units is often structured by formal procedures and professional backgrounds, resulting in rather clear definitions of relevant and admissible knowledge.
- In enterprises, on the other hand, knowledge use seems to be much broader and better co-ordinated. Contrary to the SFT, enterprises may not think solely about the price of allowances, they must also concern themselves with public image, competition, optional technologies and so forth.

- The emission trading system (a hierarchical mode of governance) includes highly specific provisions on the use of expert knowledge, especially concerning measurement technology. Hierarchy does not however give rise to any concern for local knowledge whatsoever, although the system may have severe impacts on local communities – for instance following closures. Local knowledge is incorporated only to the extent that the market forces the enterprises to take this into account.
- In a sense, the emission trading system was set up to correct market failure – the failure to include the costs of pollution into the production function. Although characterised by extensive hierarchical regulation, the market-based mode of governance is to some extent retained – enterprises are faced with altered business conditions, and are expected to find the best strategy to adapt to this. This is of course the reason why the system in itself does not take local knowledge into account; the enterprises are expected to do this. However one may argue that the system's rather one-dimensional focus on one single policy goal is not in line with a broader conception of sustainability, taking into account not just the natural environment but economic and social concerns as well.

Learning

- We have observed few if any instances of second order governing being influenced by first order governing. To put this differently, SFT has not had the opportunity to change the rather rigid system in light of practical experience. In this sense, one may argue that the rigidity of hierarchy may be detrimental to learning.
- On the other hand, the SFT as well as the enterprises have accumulated a substantial volume of knowledge related to emissions during the three years that the system has been operational. This way one may certainly contend that hierarchy has enhanced learning.
- Operating the system has also involved substantial learning in the enterprises concerning climate policy and regulatory measures.

- Technological change constitutes a form of learning. For instance, Norcem started producing cement by burning special waste, a process seen as unfeasible by other producers.
- Because the volume of transactions has been low, there has been very limited learning on quota trading.

Knowledge forms and sustainable development

- If sustainability is seen as a composite of ecological, social and economical concerns, it can be contended that all knowledge forms are essential. Following the argument made above, we would contend that the one-dimensional knowledge use in the quota system can potentially be detrimental to sustainability in the broader sense. In particular, local communities may be hit hard if a cornerstone enterprise closes down due to increasing quota costs. Furthermore, the study has demonstrated that the very narrow focus on CO2 emissions in this system in some cases has led to inconsistencies that may potentially have non-sustainable outcomes. Chalk production may be rendered unprofitable due to quota costs, because unlike in cement production there are few optional technologies that may curb emissions. This could potentially lead to the closure of Verdalskalk and harmful impacts on local sustainability although without discernable effects on global warming, because chalk is an essential product that would have to be imported from elsewhere.

Reflexive knowledge and sustainable development

- Meta governance and second order governance was marked by the quite profound difference in outlook between the environmental administration and the economists in the Ministry of finance and in Statistics Norway. Whereas the environmental administration tends to adopt a regulatory outlook, the economists tend to prefer incentive-based measures. Add to this the political considerations that seem to be largely responsible for the small number of enterprises that eventually were subsumed under the system. Such clashes between outlooks may often provide a certain amount of reflexivity, although this seems to have been

limited in this case: Most actors seem to have retained their original outlook, which seems to a large extent to be based on position and professional background. We have however noted that the system resulting from this reflexive process is less than clear-cut in terms of governance mode. The very limited number of enterprises subsumed under the system as well as the lack of direct coupling to the EU system and the excessive allocation of free quotas has hampered independent price formation and resulted in few actual transactions. It can be argued that a smaller amount of reflexivity in the design phase would have enhanced the effectiveness of the system by making it a closer approximation to a functional market.

Effective and legitimate policy-making

- The system has been rather *ineffective* in the sense that it has not resulted in substantial emissions reductions. Because rather substantial efforts have been devoted to the design and operation of the system, *efficiency* has also been low.
- The limited effectiveness and efficiency of the system has probably mainly had to do with its very limited scope and the problems related to allocation of quotas. From an economist's point of view effectiveness would probably been higher if most or all emitters were included in the system, and if free allocation of quotas was avoided. As it stands, it is hard to see that the system has distributed emission cuts so as to minimize the costs associated with this. This deficiency has arguably had consequences for the legitimacy of the system. Some enterprises, noting these problems, have expressed dissatisfaction and doubted the legitimacy of the system. However, the limited scope and the fact that few enterprises have been severely affected has probably contributed to rather low public awareness of the system, decreasing the gravity of the legitimation problems.
- Finally, many actors clearly see the 2005-2007 system as a trial, a first step in the development of an improved and wide-ranging system to come. As most or all respondents recognise the need for effective measures to combat global warming, this development is generally regarded as legitimate.